Draft Determination Representation

Expenditure allowance

Part 2: Clean water enhancement costs

YKY-PR24-DDR-03-Cost-efficiency-Part-2-enhancement-costs-water

YorkshireWater

Contents

1. Overview

1.1 Overview of our draft determination representation on expenditure allowances

This document sets out our points of representation to the draft determination in relation to enhancement allowances for the clean water and overarching programmes.

We have reviewed all Ofwat's challenges against our enhancement allowances and set out our response below. We respond to challenges made for each enhancement case. We also propose some changes to existing enhancement cases, driven either by regulatory alignment between the DWI and EA (WRMP) or by realigning the programme to expected PCL outcomes and stakeholder expectations. We also retain the New WTW (Bradford) as being procured though DPC, which is highlighted through the difference in resilience expenditure, but also includes expenditure investment in justification of the Ofwat modelled allowance. The net zero expenditure requirement has also been removed from our programme.

The table below summarises changes to the enhancement programme (pre frontier shift and RPE), from the Ofwat January position and keeping the same Ofwat format for consistency.

Table 1-1: Summary of changes for clean water enhancement expenditure

	YW January submission (£m)	Ofwat draft determination (£m)	YW DDR (£m)
WINEP / NEP			
Biodiversity and conservation	20.43	12.26	20.86
Eels / fish screens	5.96	5.66	6.26
Eels / fish passes	7.70	7.31	8.09
Invasive non-native species	3.90	3.70	3.90
Drinking water protected areas	18.53	17.60	18.53
Water Framework Directive	8.63	8.20	8.56
Discharge monitoring	0.24	0.23	0.00
25-year environment plan	0.00	0.00	0.00
Investigations	9.59	9.08	9.29
Wetland creation	0.00	0.00	0.00
Supply-demand balance and metering			
Supply	30.70	29.03	56.08
Supply interconnectors	0.00	0.00	0.00
Leakage	15.17	15.82	15.67
Demand	32.44	6.95	32.44
Strategic resource options	20.21	19.59	35.43
Metering	141.07	153.28	142.63
Water quality improvements			
Taste, odour and colour	33.15	13.26	32.47
Raw water deterioration	42.21	30.64	42.18
Lead	21.81	33.28	21.42
Resilience and security			

Resilience Interconnectors	0.00	0.00	0.00
Resilience	133.50	52.95	36.07
SEMD	24.97	19.98	24.97
Cyber	34.51	24.16	34.51
Reservoir safety	0.00	0.00	0.00
Other enhancement areas			
Net zero	10.80	0.00	0.00
Freeform	0.00	0.00	0.00
PR19 WINEP carryover	0.00	0.00	0.00
Total water enhancement allowance			
Total enhancement expenditure	615.52	462.99	549.34

The equivalent total enhancement expenditure included in the 'Changes to our plan' section is shown below. This is the submitted value of our January submission, prior to adjustments made by Ofwat for the purposes of the draft determination (for example inclusion of DPC costs within Totex).

	YW January submission (£m)	Ofwat draft determination (£m)	YW DDR (£m)
Total enhancement expenditure (Changes to Our Plan)	472.18	462.99	549.34

1.2 Overview of enhancement representation

Table 1-2: Summarises the rationale for representation for the water enhancement cases.

Enhancement case	Driver (where applicable)	Rationale for representation
Water quality improvements (DWI)	Addressing raw water quality deterioration	Response to Ofwat's deep dive to outline why the chosen solutions are the best options for customers, the costs are efficient, and the investments do not overlap with base expenditure. Evidence for why 100% of requested cost is required to deliver the water quality improvement schemes.
	Improvements to taste, odour and colour	
	Lead Programme	Justification for requirement of transitional early start funding for identification, investigation and stakeholder engagement for the Lead Programme.
Supply-demand	Supply side improvements	Evidence for why 100% of requested cost is required to deliver the supply side improvement schemes. Increased scope required on three schemes and inclusion of two new investigation schemes.
	Demand side improvements	**PCC and business demand**

		Representing on cost efficiency for interventions addressing PCC and business demand. Challenge that cost incremental increases when reducing PCC (in other words, the lower the PCC the higher the cost reduction per l/h/d). **Leakage** Updated AMP7 outturn performance and justification of full requested enhancement costs. Represented on Ofwat's modelling approach to determine future leakage reduction. Highlighted key dependency between infrastructure cost adjustment claim and our submitted leakage plan.
	Strategic resource options	New SRO schemes as agreed in the RAPID process. Alteration of cost profile of Kielder to spread costs over AMP9.
Metering	Metering	Request a change to the PCD to align cost and strategy for deployment of meters. Update of estimated unit costs and representation on Ofwat's cost modelling methodology impacting both base and enhancement.
Security	Security - SEMD	Additional evidence on why the chosen solutions are the best option for customers and why our risk assessment methodology assures value for money, the process is supported by thorough external assurance.
	Security - Cyber	
	Security - ECAF	
Water resilience – New WTW (Bradford)	Resilience	Representation on Ofwat's deep dive challenges outlining the need for enhancement investment, the best option for customers with the DPC mechanism and evidence of cost efficiency and benchmarking.
Water resilience case	Resilience	New proposed investment to improve resilience in a discrete area of Yorkshire that was seen as the highest risk as a result of the drought in 2022, as well as schemes to improve our resilience to power outages.
PFAS investigations case	Addressing raw water quality deterioration	New enhancement case for PFAS investigations to meet the guidelines and outcomes set out by the DWI.
Clean water WINEP - biodiversity	Biodiversity and conservation	Challenging the applied cost reduction and providing evidence to deep dive points on cost efficiency, benchmarking and working with stakeholders.

1.3 Overview of approach to 'Six Capitals' and carbon

'Six Capitals' and carbon

This section will outline our 'Six Capitals' approach and how we have considered the carbon within our optioneering and technical design to help address the comments from Ofwat in deep dives across our clean water enhancement cases (DWI, Supply-side improvements, Resilience and WINEP)

Carbon is reviewed throughout the DMF (decision management framework) process when a scheme is at its infancy of being developed, and then at key stages throughout the capital gated process. When moving through the investigation phase, scope development and optioneering, carbon costs associated with a proposed solution are linked to the 'Six Capitals' and considered alongside service impacts when carrying out the economic value assessment. Therefore, the most carbon-beneficial option is one of the key decision criteria for when we are considering and selecting the best option for our customers.

Our service measure and valuation framework aides us in identifying the reasons we need to invest and the value of doing so. It enables us to link expenditure to service and understand the benefits of our programme at a much more detailed level. We have mapped each service measure against the 'Six Capitals' framework - natural, social, human, financial, intellectual and manufactured. These benefits are measured and valued according to the different service impacts.

Once we have understood our risks to service, identified our potential interventions and estimated efficient costs, we assess whether the solutions are viable using cost-benefit analysis.

This assessment of potential investment options considers the overall value added rather than simply selecting the lowest absolute cost.

We use best-practice industry standard for the economic value assessment:

- financial, social and environmental Impacts (via the 'Six Capitals');
- net present value (NPV);
- value of costs and benefits over several years;
- capex is annuitised to reflect smoothed repayment profile rather than lumpy spend profile; and
- all costs and benefits are discounted to reflect a present value.

By understanding the costs and monetised benefits, we can calculate the net benefit of a given scheme. As part of our investment planning process, we assess the embodied and operational carbon impact of each scheme to provide a granular view of the impact of all our investments, examples of this are provided in the relevant sections below.

2. Water quality improvements (DWI) – addressing raw water quality and deterioration

2.1 Overview

Our enhancement case for East Ness water treatment works (WTW) and Doncaster boreholes, which we submitted for water quality improvements (addressing raw water quality and deterioration)[1] are supported by the DWI but have been subjected to significant financial reductions. While Ofwat has agreed to part of the funding, the reductions, which have been applied to East Ness and Doncaster boreholes, result in insufficient funding to remove the risk to water quality at these sites. Therefore, we are resubmitting this to request further funding by providing additional supporting information and evidence.

In addition, we can confirm that the YKS-2024-00003 Loxley Colour, THMs and DBPs (YKS4) enhancement case was not fully supported by the DWI, as a result we have not included expenditure to address raw water quality and deterioration at Loxley WTW (as discussed in the Yorkshire Water inbound query (OFW-IBQ-YKY-14).

2.2 Key messages – East Ness, Doncaster boreholes and Loxley

- The funding allocated at the draft determination will not be sufficient to remove the risk to drinking water – and therefore to our customers.
- There is clear evidence that the raw water is deteriorating at East Ness and Doncaster boreholes, and we are asking for the full requested funding.
- We have sufficient and additional evidence to support our case for why the preferred solutions are the best value options for customers.
- The preferred solutions provide protection for the drinking water at these sites for current and future generations.
- We can confirm that the Loxley WTW scheme will not be going ahead in AMP8.

For both Doncaster boreholes and East Ness WTW, we request Ofwat reconsiders our case, considering the additional supporting evidence.

1. The Doncaster boreholes scheme has been subject to a 40% reduction in proposed expenditure. We are grateful that Ofwat has acknowledged the need for enhancement, that it has been deemed a pass, and is supported. The reductions are based upon demonstration of:
   - the best options for customers; and
   - cost efficiencies.

This representation will provide further evidence to support our optioneering and expenditure requirements.

2. East Ness has been subject to a 50% reduction in cost allowance in the DD, although it is fully supported by the DWI. Since our submission we have undertaken an early start investigation, which has provided us with further evidence to support the identified scope.

We require this case to be reconsidered, and provide additional information supporting:
- the need for investment;
- best options for customers; and
- cost efficiency.

[1] yky29_water-quality-improvements-enhancement-case.pdf (yorkshirewater.com)

Table 2-1 Summary of changes to the water quality improvements (DWI) enhancement allowances - addressing raw water quality and deterioration

	Allowance (£m)
October 2023 business plan submission	40.81*
January 2024 business plan resubmission	40.81*
Ofwat's draft determination	30.64
YKY draft determination representation	42.18**

* Note: this value is Yorkshire Water's submission; the Ofwat value has a double count of transitional expenditure.
** Note: this value is greater than previous submissions as it includes the new enhancement case for PFAS, see section 10. PFAS Investigations for further detail.

This section will initially address the concerns for Doncaster boreholes and then follow up with East Ness WTW.

2.3 Doncaster boreholes

2.3.1 Yorkshire Water's response to Ofwat

We will address the following points made in PR24-DD-W-Raw-water-quality-deterioration tab – YKY (Doncaster BHS), specifically around best option for customers and cost efficiency where 20% adjustments have been made for each criteria.

The Doncaster boreholes scheme (YKY29 Water Quality Improvements Enhancement Case - Annex B2) we have proposed has been subject to review by Ofwat and partly met the criteria for enhancement expenditure. However, there has been a 40% adjustment from £22.9m (please note this includes a double count of transitional expenditure) to £13.7m (confirmed in OFW-IBQ-YKY-018). The points below address the challenges raised in the review by Ofwat. We are requesting the full investment to be able to deliver improvements and outcomes required to protect water quality and public health.

Below is a summary of the comments and concerns raised by Ofwat and where and how we have addressed them.

Table 2-2 Evidence to support the rationale for the Doncaster boreholes representation

Ofwat concerns	Representation rationale and supporting evidence
Optioneering approach 1. **Best value:** *We have some concerns whether the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.* 2. **Six Capitals and carbon:** *The company has not presented evidence from their DMF to demonstrate the preferred schemes are best value. There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is*	**Best Value**: Yorkshire Water undertook a detailed optioneering study that assessed the root cause, identified an exhaustive list of options, compared them based on cost, carbon, CBA, and if they are feasible for resolving the risk. This thorough assessment of the solution using several variables has ensured that the preferred option chosen is the best value option for our customers. **Six Capitals and carbon**: Each option has undergone a robust economic value assessment based on the 'Six Capitals' approach in addition to the considering the impact of carbon at both

there any evidence to show that carbon has been considered.	the optioneering and technical design stage. As mentioned above, carbon was one of the factors that fed into our optioneering approach. Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon
Cost efficiency 1. **Cost-efficient:** *We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed investigation is efficient.* 2. **Benchmarking and third-party assurance:** *The company describes in general terms use of their unit cost database to produce cost models, their use of optimisation to produce an optimal programme, and that the enhancement table, CW3 has been assured externally. The company does not provide any evidence that costs have been benchmarked. While the company states enhancement table, CW3 is assured by a third-party, the company does not provide evidence of the specific findings of that assurance for this scheme.*	**Cost Efficient:** Our optioneering approach concluded that the preferred option is the cost-efficient solution because its lower overall from a totex perspective, demonstrates a high net present value (NPV), and is the only option that resolves the multiple water and network issues. If we proceed with any of the alternative options we run the risk of additional work, which would not be a cost-efficient approach. **Benchmarking:** The costs have been benchmarked by using our internal benchmarking tool titled 'Unit Cost Database'. The costs within this database are reviewed annually and represent the latest best cost estimates for the materials.

In summary, we understand that, for the Doncaster boreholes scheme, Ofwat is looking for further evidence:

- that the investment is cost beneficial and best value for customers
- of the 'Six Capitals'
- of consideration of carbon
- that the investigation is efficient
- that costs have been benchmarked, and
- of specific findings of third-party assurance

2.3.2 Evidence the investment is best value for customers (optioneering approach)

Ofwat's draft determination assessment:

- **Best value:** *We have some concerns whether the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.*

- **Six Capitals and carbon:** *The company has not presented evidence from their DMF to demonstrate the preferred schemes are best value. There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*

Best value, 'Six Capitals' and carbon:

The issue at Doncaster boreholes is an increase in coliform detections and nitrate levels (see our original water quality improvements enhancement case (YKY29_Water Quality

Improvements Enhancement Case - Annex B2). We selected Highfield/Austerfield Lane BHS - Disinfection Scheme and Littleworth BHS Rehab to overcome this risk.

We are pleased to see that the need for enhancement for this DWI-supported scheme has passed.

Identifying the root cause:

There have been thorough investigations due to the water quality issues which are increasing at the Doncaster boreholes. The boreholes have previously been classified as pristine but, after the coliform detections, we now need to consider additional protection for our customers. These investigations have been completed utilising our internal expertise – hydrogeologists, water quality scientists, asset management teams, as well as area operational teams – to fully understand the issues. They identified a need for a treatment solution.

Alongside the scheme at Doncaster boreholes, the catchment management scheme (aim: to reduce levels of nitrates in the raw water) delivered within in the WINEP programme, currently running (started in AMP7 and continuing into AMP8), will deliver in the medium to long term. For example, we are beginning to see agricultural changes within catchments by adding instrumentation to document and track improvements. This twin track approach (treatment and catchment management) will continue in the future and reduce levels of nitrate at the source, however additional levels of protection are required at certain water sources now, as is the case at the Doncaster boreholes.

Optioneering:

Once the root cause was established, we conducted the next level of investigations and solution development with our Yorkshire Water teams again but including the Engineering Design team, Programme Delivery team and our strategic planning partner, Stantec. This included reviewing water quality data, information from the hydrogeologists on ground water and borehole condition, understanding the links with distribution assets, site visits and desktop studies, to fully assess the issues and potential solutions.

During the optioneering process we identified a total of eleven options as part of our longlist as shown in table 2-3 below. Our process and decision-making framework resulted in:

- Four solutions being discounted early in the process based upon not assuring removal of the water quality risk to customers.
- A further three solutions being deemed partially successful through rationalising boreholes, UV treatment at boreholes and a nitrate removal plant at Littleworth. Therefore, they were removed from the selection process. These were discounted due to not fully addressing the water quality risk, a lack of feasibility and high totex cost associated with energy and new power supplies in a rural area, when compared to the other options.
- This resulted in a shortlist of just four solutions which would remove the coliform and nitrate risk to customers in the Doncaster area, including the chosen solution (SE-01b in the table below). At this stage in the optioneering process the three options which were not selected all involved a significant transfer of raw water sources from boreholes to Nutwell WTW via over 30km of new raw water trunk main, an upsizing and upgrade to the existing 60 MLD WTW and the associated treated water trunk mains to transmit the water back to customers. These solutions are significantly higher in totex and carbon than the remaining chosen solution, therefore do not demonstrate best value for customers or alignment with our ‘Six Capitals’.

Table 2-3: High-level option review for Doncaster boreholes

Options Identified for:		South Eastern Grid (Doncaster)			
Ref	WSSZ	Solution Options	Linked to WRMP	Solution Option Status	Does it remove the Coliform and Nitrate risk to customers?
SE-01a	South Eastern Grid (Doncaster)	SE-01a: New combined treatment system rationalising 2 sources (Austerfield and Highfield Lane) at Highfield Lane	No	Potential alternative to DWI WQ scheme (SE-01b) Cost estimate >£15m	Partially
SE-01b	South Eastern Grid (Doncaster)	SE-01b: New combined treatment system rationalising 3 sources (Austerfield, Highfield Lane and Littleworth) at Highfield Lane	No	Option is viable, preferred option and initial cost estimate >£20m	Yes
SE-01c	South Eastern Grid (Doncaster)	UV at Highfield and Austerfield	No	Not being progressed / technically or operationally infeasible or undesirable Cost in excess of >£15m	Partially
SE-01d	South Eastern Grid (Doncaster)	Nitrate Removal at Littleworth	No	Not being progressed / technically or operationally infeasible or undesirable Cost in excess of >£15m	Partially
SE-02a	South Eastern Grid (Doncaster)	SE-02a: New treated water reservoir into supply at Highfield Lane	No	Not being progressed / technically or operationally infeasible or undesirable	No
SE-02b	South Eastern Grid (Doncaster)	SE-02b: Surge protection and new treated water reservoir at Highfield Lane	No	Not being progressed / technically or operationally infeasible or undesirable	No
SE-02c	South Eastern Grid (Doncaster)	SE-02c: Enhanced surge protection	No	Not being progressed / technically or operationally infeasible or undesirable	No
SE-03:	South Eastern Grid (Doncaster)	SE-03: Increase Nutwell storage in system - new clean water storage tank with minimum capacity 30Ml	No	Being scoped / costed by Stantec engineering team - base funded scheme	No
SE-05a	South Eastern Grid (Doncaster)	SE-05a: Maximise Nutwell WTW to treat onsite raw water to 60 Mld design capacity (how much available water is there from additional boreholes? What is the surplus?)	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£40m	Yes
SE-05b	South Eastern Grid (Doncaster)	SE-05b: Upsize Nutwell WTW to treat additional onsite raw water and Littleworth to 65 Mld design capacity	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£50m	Yes
SE-05c	South Eastern Grid (Doncaster)	SE-05c: Upsize Nutwell WTW to treat additional onsite raw water and Littleworth, and Hatfield or Selby raw water to 70 Mld design capacity	No	Not being progressed / technically or operationally infeasible or undesirable Not cost beneficial initial > £70m	Yes

Following the optioneering process the best value solutions was down to one, with slight variances in approach. Following review, it was concluded that the most cost-efficient solution includes the installation of a contact tank, to allow both blending and disinfection, along with rationalisation for treatment of all sources at a single site. The preferred solution also includes supplies from Littleworth borehole as this provides the greatest water quality improvements, nitrate blending options, provides wider resilience by maximising the available abstraction, and assurance of water quality compliance over the long-term.

Table 2-3 Cost benefit assessment and carbon summary for the two possible solutions at Doncaster boreholes

Doncaster BHS: Options considered	Capital Costs (£m)	Selected Option	Cost Benefit Ratio	Lifecycle Embodied Carbon (tCO2e)	Lifecycle Operational Carbon (tCO2e)
New combined treatment system rationalising 3 sources (Austerfield, Highfield Lane, and Littleworth) at Highfield Lane	£ 22.58	Yes	2.05	3246	43412
New combined treatment system rationalising 2 sources (Austerfield, Highfield Lane) at Highfield Lane	£ 16.37	No	2.29	2439	39255

The Table 2-4 summarises the new and enhanced assets required at each borehole site to address the risk.

Table 2-4 New and enhanced assets required by boreholes

	DWI
Highfield Lane	• 36.5 Ml/d chlorine contact tank • Nitrate blending mixer • MSP & ammonium sulphate dosing • Replace borehole pumps 4no • Headworks raising 3no • Treated booster pumps 2 sets • Site boundary extension • Increased power supply
Austerfield	• Replace borehole pumps 3no • Headworks raising 3no • Raw & treated water pipelines to Highfield Lane 450mm dia.
Littleworth	• Borehole rehabilitation inc. pumps • Settlement tanks • Raw water booster pumps • Access junction improvements • Raw & treated water pipelines to Austerfield 250 mm dia • Tower demolition

The notional solutions were tested and measured within our DMF on cost (totex), efficiency and carbon. The ease of installation was tested with capital partners, understanding of construction duration from previous schemes, and being able to achieve against the compliance date to ensure our customers get the benefit when they expect it to be delivered.

As our preferred solution is introducing an additional (previously decommissioned for WQ risk) 5MLD source into the Doncaster boreholes supply system, the cost benefit analysis is slightly lower than that of the option to not reintroduce Littleworth BHS. However, the additional resilience provided by this source plus the new combined nitrate blending and contact tank at Highfield Lane BHS provides a permanent future proofed solution to the quality and quantity of water needed by our customers in this area.

To summarise, our overall optioneering process is robust, engaging with multiple stakeholders both internal and external to ideate a plethora of options. Additionally, we contracted third-party assurance by Stantec to review our options, technical design and costs. Stantec has provided further robustness to our optioneering process and agrees that the proposed option is the most suitable to address the challenges at hand. Therefore, we can conclude that this is the only suitable solution to resolve the risk for our customers to ensure protection for water quality and supply for the future.

2.3.3 Evidence the investment is cost-beneficial (cost efficiency)

Ofwat's draft determination assessment:

- **Cost-efficient:** *We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed investigation is efficient.*

- **Benchmarking and third-party assurance:** *The company describes in general terms use of their unit cost database to produce cost models, their use of optimisation to produce an optimal programme, and that the enhancement table, CW3 has been assured externally. The company does not provide any evidence that costs have been benchmarked. While the company states enhancement table, CW3 is assured by a third-party, the company does not provide evidence of the specific findings of that assurance for this scheme.*

Cost efficiency:

The challenge from Ofwat regarding cost efficiency is fair, that our evidence around the costing of our solutions lacked detail, we welcome the opportunity to address this with further evidence to support the submission.

Our Unit Cost Database (UCD) has been developed using actual outturn costs from projects delivered over the last 20 years (indexed to the appropriate base year). The database includes granular data for over 800 asset types, allowing us to generate accurate costs against defined scope of activity and asset type. These models have been used to establish accurate costs for Doncaster boreholes, and you can see examples of scope definition in the SIC (Solution Information for Costing) sheet, which are included in clean water EC cost evidence asset breakdown (YKY-PR24-DDR-57). We have not provided all SIC sheets in this enhancement case, but can and will, should Ofwat require it to assess further bottom-up cost builds.

Given that the models are based on the cost outputs from commercially tendered capital delivery frameworks we consider that the basic building blocks of our models already have efficiency built into them. The models output the contract delivered cost to Yorkshire Water.

The rigorous process through which we derive our scheme costs, should give Ofwat confidence that they are robust and efficient.

The preferred option for Doncaster boreholes is the “Highfield/Austerfield Lane BHS - Disinfection Scheme + Littleworth Rehab”.

Option selected: Highfield/Austerfield Lane BHS - Disinfection Scheme + Littleworth Rehab

Our optioneering approach, as outlined in the section above, confirmed that our preferred option is the most efficient way to address the problems. For example, our optioneering approach and shortlisting of the preferred option was reviewed and assured by our strategic planning partner Stantec. Stantec confirmed that the preferred solution was the installation of a contact tank along with rationalisation for treatment of all sources at a single site.

This solution is the best solution from a totex perspective. The other options were all between 100% and 250% more expensive than the preferred option. Therefore, the preferred option demonstrates good value for money for customers.

The preferred solution includes supplies from Littleworth borehole as this maximises nitrate blending, provides wider resilience, and assurance of water quality compliance. Preventing the need for additional off-site treatment and blending at a greater capital and carbon expense.

Lastly, the solution was selected because it was the only viable option that was able to resolve the multiple water quality and network risks. It avoids distribution pressure surging and risks to the network through having a variable speed distribution pumping arrangement, and also reduces the stop-start nature of existing borehole pumps. This allows better options for nitrate blending across the three sites.

The proposed investment is the most efficient method of mitigating the risk to customers as it not only addresses the issues, but does so in a cost-efficient, beneficial and carbon-friendly manner.

Benchmarking and third-party assurance:

Our team has undertaken thorough benchmarking by using our internal benchmarking tool. The tool is titled ‘Unit Cost Database’ and provides estimated cost for the notional solutions. Our UCDs are made using specific asset types and categories of work (in other words, rapid gravity filter refurbishment or rapid gravity filter re-build). The costs were in financial year 2022-23 and updated with information fed back from capital schemes which are delivered by Yorkshire Water’s capital partners to ensure that they are as accurate as possible. They are subject to a rigorous review and annual indexation process so that each datapoint is relevant to the year in which it is created. An example of how costs are built up for a particular scheme is shown in the Clean water enhancement cost evidence appendix (YKY-PR24-DDR-26).

As part of the capital project lifecycle review, a detailed project design and notional solution review is carried out to ensure the cost, ‘Six Capitals’ benefit and carbon attributes are of best value to the scheme.

In addition to using accurate and relevant benchmarked costs, we have also commissioned third-party assurance. Our cost models and asset modelling outputs have gone through rigorous technical assurance to ensure they are fit for purpose and provide the right degree of accuracy and granularity with regards to the data processing, input data quality, modelling methodology and outputs review. Atkins (our assurer) fed back that our cost modelling suites and asset modelling suite demonstrate a good level of understanding of the core principles and ensure it follows best practice investment planning and asset management in line with ISO55001. This ISO accreditation is industry best practice and provides further evidence that our cost modelling is robust.

Please see the appendix our original enhancement case YKY29 Water Quality Improvements Enhancement Case - Annex B2 for further information on the DWI business case.

2.4 East Ness borehole

2.4.1 Yorkshire Water's response to Ofwat

In this section we will address the points made in the tab YKY (East Ness WTW), specifically around need for enhancement investment, best option for customers and cost efficiency.

The East Ness boreholes scheme (PR24-DD-W-Raw-water-quality-deterioration tab – YKY (East Ness WTW)) we have proposed has been subject to review by Ofwat and partly met the criteria for enhancement expenditure. There has been a 50% adjustment from £9.9m to £4.95m. We believe the points below address the challenges raised in the review by Ofwat. We are requesting the full £9.9m investment to be able to deliver the improvements in water quality to out customers.

Below is a summary of the comments and concerns raised by Ofwat and where and how we have addressed them.

Table 2-5 Evidence to support the rationale for the East Ness borehole representation

Ofwat concerns	Representation rationale and supporting evidence
Need for investment 1. **Overlap with base:** *The company does not provide sufficient and convincing evidence to show that they have considered overlap with base allowance.* 2. **Outside of management control:** *Yorkshire Water provide evidence of an increase in the number of coliform detections. The company does not provide sufficient and convincing evidence that the required investment is outside of management control, that need for investment could have been mitigated through base maintenance in the case of the damage to the borehole casing, or why the short casings on the boreholes have not been addressed prior to now.*	**Overlap with Base**: section 2.7.2 provides further information with regards to overlap with base, including what has already been funded this AMP to mitigate the water quality risks at East Ness WTW. **Outside of Management Control:** section 2.7.2 provides information on why we cannot complete the replacement of the boreholes while the site is in operation. As it would cause a significant risk to water quality which is in direct supply to our customers.
Optioneering approach 3. **Best value:** *We have some concerns that the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.*	**Best Value:** Yorkshire Water undertook a detailed optioneering study that assessed the root cause, identified an exhaustive list of options, compared them based on cost, carbon, CBA, and if they are able to address the problems at hand. Further information is provided in section 2.7.3. This thorough assessment of the solution using several variables has ensured that the

4. **Six Capitals and carbon:** *The company sets out within their submission their decision-making framework (DMF), and how it informs cost benefit analysis and best value. The company presents three schemes for East Ness and have costed and quantified benefits for unplanned outage and CRI. The company has not presented evidence from their DMF to demonstrate the schemes are best value. There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*	preferred option chosen is the best value option for our customers. **'Six Capitals' and carbon:** Each option has undergone a robust economic value assessment based on the 'Six Capitals' approach in addition to considering the impact of carbon at both the optioneering and technical design stage. As mentioned above, carbon was one of the factors that fed into our optioneering approach. See section 2.7.3 for further information on optioneering. Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon
Cost Efficiency 5. **Cost-efficient:** *We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient.*	**Cost Efficiency:** Our optioneering approach concluded that the preferred option is the cost-efficient solution because it's lower overall from a totex perspective, demonstrates a high net present value (NPV) and is the only option that resolves the multiple water and network issues. If we proceed with any of the alternative options we run the risk of additional work, which would not be a cost-efficient approach.

We understand that, for the East Ness borehole scheme, Ofwat is looking for further evidence:

- that we have considered overlap with base allowance
- that the required investment is outside of management control
- that the need for investment could have been mitigated through base maintenance in the case of the damage to the borehole casing
- that explains why the short casings on the boreholes have not been addressed prior to now
- that demonstrates the scheme is cost-beneficial or best value for customers
- from the DMF to demonstrate the schemes are best value
- of the 'Six Capitals' presented as part of our DMF
- that shows that carbon has been considered

2.4.2 Need for investment

- Overlap with base: *The company does not provide sufficient and convincing evidence to show that the that they have considered overlap with base allowance.*

- Outside of management control: *Yorkshire Water provide evidence of an increase in the number of coliform detections. The company does not provide sufficient and convincing evidence that the required investment is outside of management control, that need for investment could have been mitigated through base maintenance in the case of the damage to the borehole casing, or why the short casings on the boreholes have not been addressed prior to now.*

Overlap with base:

Various options were explored to address the problem during AMP7, within our base funding, including installation of a temporary filtration rig at a cost of £1.7m in attempt to mitigate the risk. However, this filtration unit does not remove the root cause of the bacterial issue. We also looked at alternative solutions within base as part of the optioneering process, such as considering whether we could refurbish the borehole. Investigations showed that this option was

not feasible while the site was in operation due to the risk that would arise to water quality and network restrictions.

The best solution for this scheme is to install a new borehole arrangement, including two new boreholes, casing, pumps, new MCC and controls. The existing boreholes have legacy issues with the casings not being long enough (8m and 10m with a borehole depth of 100m and pumping water level of 22 m below datum), and due to their age, and now condition they are compromising water quality.

We cannot address the short casing or the casing lengths as the boreholes are directly next to one another and therefore cannot be taken out independently. The risk of cross contamination, disturbing the aquifer while the other one is in service and directly feeding to customers is not acceptable as it would cause a water quality failure. This presents a clear need for investment via enhancement funding.

See further information in our optioneering section for base maintenance consideration.

Outside of management control:

As with all assets there is an expectation of deterioration over time, as has been identified at East Ness. However, the interconnected nature of the two existing boreholes on site necessitates full site removal in order to carry out even minor remedial activity on pumps or borehole casing and lining. Therefore, carrying out significant upgrades to the boreholes is not possible within the current legacy site design and is therefore outside of management control. Although we have attempted to provide additional protection above ground. A significantly enhanced arrangement is required to sustainably deliver the water quality improvements for customers.

The raw water deterioration seen at these boreholes, and the risk it poses to customers, is down to exogenous environmental factors within the aquifer and legacy borehole arrangements. This requires Yorkshire Water to enhance and adapt its asset base to protect customers from coliforms which present themselves within the water abstracted through the boreholes.

In addition, there are no alternative supplies into this area, which means that we cannot supply the system from other water supply systems. This is where there are links to the WRMP supply-side scheme, which will allow much needed resilience to the network for water distribution in the Howardian Hills area.

We need to install two new boreholes in new locations to allow for maintenance, asset rotation and inspections during normal operation. We will also enhance the existing borehole casing in one borehole and decommission the highest risk borehole to allow us to assure our customers of resilience and reliability as well as water quality enhancement.

2.4.3 Optioneering approach

- *Best Value: We have some concerns that the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.*

- *Six Capitals & Carbon: The company sets out within their submission their decision-making framework (DMF), and how it informs cost benefit analysis and best value. The company presents three schemes for East Ness and have costed and quantified benefits for unplanned outage and CRI. The company has not presented evidence from their DMF to demonstrate the schemes are best value. There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*

Best value, 'Six Capitals' and carbon:

The issue at East Ness WTW is an increase in *E. coli* and coliform bacteria detections (see our original enhancement case YKY29 Water Quality Improvements Enhancement Case - Annex B2). We selected *East Ness WTW - new BH arrangement* to overcome this risk.

Identifying the root cause:

Our team has conducted a thorough approach to gather the necessary information in order to develop the best value solution. We initially looked at understanding the root cause of the problem, which then allowed us to test options based on a number of factors. This is set out in more detail below.

There have been thorough investigations into the increasing water quality issues in the boreholes at East Ness WTW. Due to the bacterial failures, we need to consider additional protection for our customers. These investigations have been completed utilising our internal expertise – hydrogeologists, water quality scientists, asset management teams and area operational teams – to fully understand the issues.

Optioneering:

Once the root cause was established (the casing, depth and condition of the boreholes), we conducted the next level of investigations and solution development within Yorkshire Water, but also including our Engineering Design team, Programme Delivery team and our strategic planning partner, Stantec.

The notional solutions suggested were tested and measured on cost (totex), efficiency, ease of installation, carbon and ability to achieve against the deadlines to ensure our customers get the benefit when they expect it to be delivered.

During the optioneering process we identified a total of eight options as part of our longlist as shown in table 2-7 below. Our process and decision making framework resulted in:

- Three solutions being discounted early in the process based upon not assuring removal of the water quality risk to customers.
- A further two solutions being deemed partially successful through some replacement or refurbishment of existing boreholes. These were discounted due to not fully addressing the water quality risk, and in some cases the potential to cause future water quality failures.
- One option to supply the area from Elvington was discounted as it was not cost beneficial, or operationally feasible, would add further demand onto Elvington WTW which feeds into the grid network, and is an area of near-term supply-demand challenges which we are addressing through the WRMP.
- One option to install enhanced disinfection with super and de-chlorination would only treat the problem, not resolve the root cause of water quality for customers and we would still have a residual risk with the condition of the boreholes which cannot be resolved while the site is operational.

This resulted in the selected preferred solution being the best value for customers, cost and carbon efficient, and providing confidence in removal of the water quality risk at the source. The process satisfied the success criteria that the risk would be removed and provide a sustainable solution for the future resilience of the Howardian Hills supply system and its customers.

Table 2-6 High-level option review for East Ness boreholes

Options Identified for:		Howardian Hills (East Ness)			
Ref	**WSSZ**	**Solution Options**	**Linked to WRMP**	**Solution Option Status**	**Does it remove the E-coli and Coliform risk to customers?**
EN-01	**Howardian Hills (East Ness)**	Supply Huby fed zones from new Acomb II WTW with additional treated water storage	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost benficial initialy estimate >£25m	No
EN-02	**Howardian Hills (East Ness)**	East Ness WTW - New BH Arrangement (2no)	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£5m	Partially
EN-03	**Howardian Hills (East Ness)**	East Ness WTW - New BH Arrangement (1no)	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£3m	Partially
EN-04	**Howardian Hills (East Ness)**	East Ness WTW - New BH Arrangement (3no)	No	Option is viable, preferred option and initial cost estimate <£10m	Yes
EN-05	**Howardian Hills (East Ness)**	East Ness WTW - Abandonment and Supply from Elvington WTW	Yes- possible conflict with WRMP AMP8	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£25m	Yes
EN-06	**Howardian Hills (East Ness)**	Enhance Huby WTW and Moor Monkton No1. Additional DAF at Huby; De-silting of Moormonkton; Second Lagoon and upstream WQ monitoring on R Ouse	Yes- possible conflict with WRMP AMP8	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£25m	No
EN-07	**Howardian Hills (East Ness)**	HH-09: Network changes to enable Huby and Keld Head to support Nawton and Terrington area in East Ness outage	No	Not being progressed / technically or operationally infeasible or undesirable Network flexibility - not new treatment capacity. Initial estimate >£1m	No
EN-08	**Howardian Hills (East Ness)**	Enhanced disinfection with super- and de-chlorination	No	Not being progressed / technically or operationally infeasible or undesirable Not Cost beneficial initial estimate >£2m	Partially

Option selected: *East Ness WTW - new BH arrangement (3no.)*

Cost-beneficial: Yes

The preferred option is the new borehole arrangement, option EN-04 in the table above.

Scope: The preferred solution to address the bacterial WQ risk at source is to install an engineering best practise and quality compliant borehole arrangement. This will have a casing that extends the residence time that the water is in the ground/aquifer before being able to be abstracted by the pumps, thus allowing the bacteria to die off. This will remove the current water quality risks.

Elements to be included within this arrangement will be;
- Drill two new boreholes (located off site, land purchase necessary)
- Connections to WTW - Pipework
- Reline BH1 with longer casing.
- Install 3x new borehole pumps, 1 per borehole well.

Option EN-04, is the only option that addresses the issues with the short casings of the existing boreholes (by re-lining BH1 and abandoning BH1A). It also includes the drilling of new boreholes at offsite locations to allow site throughput to be increased to the 17 MLD in our abstraction licence and required to supply customers. Therefore, this solution is best value for the customer as it improves water quality, resilience, and site throughput, something that the other options cannot all accomplish.

The preferred solution is the most cost beneficial as can be seen in the appraisal table below. Table 2-7.

Table 2-7 Cost benefit assessment summary of the three possible solutions for East Ness

East Ness WTW: Options considered	Capital Costs (£m)	Selected Option	Cost Benefit Ratio	Lifecycle Embodied Carbon (tCO2e)	Lifecycle Operational Carbon (tCO2e)
East Ness WTW - New BH Arrangement (3no)	£ 11.22	Yes	1.88	1664	5039
East Ness WTW - Enhanced Disinfection with super and de-chlorination	£ 10.15	No	0.68	1595	874
East Ness WTW - Abandonment and Supply from Elvington WTW	£ 23.63	No	0.85	6499	3973

Please see section 2.3.2 for an overview of our approach to 'Six Capitals' and carbon.

The operational carbon for the selected solution is higher due to the addition of a new borehole pump, however this is still the preferred option as it provides better protection to customers, both from a water quality, and resilience for supply into the longer-term future. Maximising the available abstraction on site and allowing maintenance of the boreholes for the future, further enhancing the water supply for customers.

Please see our original enhancement case YKY29 Water Quality Improvements Enhancement Case - Annex B3 for further information on the East Ness WTW DWI business case.

2.4.4 Cost efficiency

- *Cost Efficient: We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient.*

Cost efficiency:

The challenge from Ofwat regarding cost efficiency is fair, that our evidence around the costing of our solutions lacked detail, we welcome the opportunity to address this with further evidence to support this.

Our Unit Cost Database (UCD) has been developed using actual outturn costs from projects delivered over the last 20 years (indexed to the appropriate base year). The database includes granular data for over 800 asset types, allowing us to generate accurate costs against defined scope of activity and asset type. These models have been used to establish accurate costs for East Ness boreholes, and you can see examples of scope definition in the SIC (Solution Information for Costing) sheet, which are included in clean water cost evidence asset breakdown appendix (YKY-PR24-DDR-57). We have not provided all SIC sheets in this enhancement case, but can and will, should Ofwat require it to assess further bottom-up cost builds.

Given that the models are based on the cost outputs from commercially tendered capital delivery frameworks we consider that the basic building blocks of our models already have efficiency built into them. The models output the contract delivered cost to Yorkshire Water.

The rigorous process through which we derive our scheme costs, should give Ofwat confidence that they are robust and efficient.

The preferred option for East Ness

Option selected: *East Ness WTW - new BH arrangement (3no)*

Our optioneering approach, as outlined in the section above, confirmed that our preferred option is the most efficient way to address the problems. For example, our optioneering approach and

shortlisting of the preferred option was reviewed and assured by our strategic planning partner Stantec. Stantec confirmed that the preferred solution was the installation of a new borehole arrangement to fully mitigate the water quality risk which is posed from the condition of the existing boreholes, this removes the risk at the source rather than a treatment option, providing a confident and resilient option.

This solution is the best solution from a totex perspective. The other option which would remove the risk is 150% more expensive than the preferred option. Therefore, the preferred option demonstrates bast value for money for customers.

The preferred solution includes new boreholes, which provides wider resilience of meeting demand, and assurance of water quality compliance. Preventing the need for additional treatment, which is better from a totex and carbon expense perspective.

As mentioned above in the best value section, the proposed costs are efficient as this is the only option that addresses all the issues and delivers on the outcomes.

The preferred solution:

- resolves water quality risk;
- allows utilisation of the full capacity within the abstraction licence;
- incurs a lower opex cost from not installing treatment options, and removing the risk at the source.

The solution is also seen as cost-effective by DWI , which fully supports the scheme, and has been thoroughly investigated by our internal teams, such as Asset Management, Engineering Design, Programme Delivery and Stantec. Stantec reviewed the scope and programme by applying lessons learned from other schemes and can confirm that this solution is the most cost-efficient investment in order to address the problems (as shown in table 2-8).

Furthermore, based on our cost assurance, in which we assured the option by commissioning Stantec to undertake a technical assessment, we have established a high level of confidence in our cost estimates for the scheme. Therefore, we are certain that we cannot deliver the scheme with a 50% reduction in funding. The reduction in funding will significantly undermine the scheme's ability to deliver the intended benefits to our customers. For example, the reduced funding will undermine the scheme as it is not possible to only build half the scheme and receive the benefits required to resolve the issues identified.

It is therefore imperative that Ofwat reassesses the percentage reduction provided to this scheme, after the provision of further evidence and rationale, to not undermine the outcomes of this scheme for our customers.

2.5 Customer protection

Predicated upon the reinstatement of the investment proposed by Yorkshire Water in our PR24 submission (required to achieve the solutions set out in this enhancement case), we don't propose specific amendments to the PCD proposed by Ofwat at draft determination with the exception of all the generic points in our PCD draft determination response (YKY-PR24-DDR-07). The PCD is an appropriate protection to ensure we deliver on our milestones and outputs

2.5.1 Customer support

We conducted a large-scale valuing water study (where we spoke to 1,499 customers) to investigate the relative importance of service-related priorities for customers. Here we found that 'providing continuous supply of water that is safe to drink' was the number one priority to emerge, being selected by 75% of customers. In addition to this, we conducted another quantitative research study (speaking to a group of 391 customers on our 'Your Water' community), which also found that 'Providing a continuous supply of water that is safe to drink' was a priority for customers, with 83% selecting this as their top priority.

A recent extensive piece of research was conducted into gauging customer support for and perceived value of each of our priority Enhancement Cases. This was a large-scale study involving 1,967 household, non-household and future customers quantitatively, and a further 154 engaged qualitatively. The findings show that we have very high levels of customer support for our drinking water quality enhancement case at 87% for our household customers, rising to 91%

for non-households and 95% for future customers. The majority of customers also agree with this case, which involves investigations and improvements into water quality, to be good value for money – with 59% of both current and future household customers agreeing, rising to 73% of non-households. The vast majority of customers also agree that this enhancement case is important (89% of current and future household customers and 97% of non-households). Those in support of this enhancement case understand a proactive approach is needed. Some vulnerable customers with health issues indicate that safe drinking water is very important to them, so they are willing to pay extra to ensure this.

When testing support for the elements of our long-term delivery strategy (LTDS), we spoke to 1,167 customers via an online survey. The study found that drinking water quality has the highest level of customer support out of all other aspects of the plan, with the vast majority (97%) supporting Yorkshire Water focussing on this element. Following this, 'clean water security' also received a high level of customer support, with 94% in favour. In the same LTDS research, 82% of customers supported the alternative 'lead-free pathway', citing health-related concerns due to the presence of lead in drinking water pipes.

In addition to undertaking an affordability and acceptability testing study following Ofwat guidelines, we undertook our own independent study with 1,471 customers. The results showed high levels of support for our 'secure, clean water supplies' outcome, with 86% of household and non-household customers respectively supportive of the performance commitment target, and 73% of future bill payers.

In addition, in the Ofwat-prescribed affordability and acceptability testing of our plan, we consulted a total of 1,682 customers. In this research, customers were asked of the water-related performance commitments shown, which were most important to them. The 'taste, smell and appearance of tap water' was ranked second (after reducing leaks) with over a third choosing this as their top priority.

2.6 Concluding points

Both East Ness WTW and Doncaster boreholes schemes have been supported by the DWI. These schemes are a continuation of the good work we have been doing throughout AMP7 to address rising threats to water quality.

We believe we have, in the representation above, supplied satisfactory evidence to demonstrate:

- there is no overlap with base maintenance
- these two schemes are the best option and value for customers
- these schemes are cost-efficient, and
- the level of investment we requested in our original PR24 submission and re-submit as part of this representation is required to remove the risks to customer and public health

It is important to us to be able to continue to protect customers against deteriorating raw water, to ensure we can deliver the excellent quality water our customers require and that we know they expect. We need the support of Ofwat to allow us to make this investment at our sites and network. This helps us to achieve the required resilience for drinking water quality and resources, now and into the future.

3. Water quality improvements (DWI) – improvements to taste, odour and colour, and lead

3.1 Overview

The following section will provide further evidence for the water quality improvement cases: Ingbirchworth WTW, trunk main conditioning and lead programmes.

The outcomes which we are aiming to achieve through the taste, odour and colour enhancement case will be severely restricted by Ofwat's decision to reduce our enhancement allowance by 60% for Ingbirchworth WTW and Trunk Main conditioning.

- Regarding Ingbirchworth WTW, the reduction of 60% will significantly reduce our options for what we can achieve if we are to mitigate against these taste and odour issues, which are now occurring yearly (seasonally) more often in the raw water supplying the works. This is directly impacting our customers and needs the appropriate level of funding.

- Reducing our allowance for the trunk main conditioning schemes will significantly impact the proposed interventions, which will lead to an increase in the number of times our customers will contact us about discoloured water. This is associated with costs and, unless we treat the source, this problem will only grow in the next AMP.

Ofwat's decision to not fully support our cases for taste and odour schemes at Ingbirchworth WTW[2], and our trunk main conditioning programme, is unsubstantiated and not in line with DWI's support of the schemes.

In addition, we can confirm that the YKS-2024-00004 regional taste and odour investigation (YKS8) enhancement case was not fully supported by the DWI and is therefore not included in our enhancement case for expenditure and improvements to taste, odour and colour (as discussed in OFW-IBQ-YKY-14).

We represent on the need for transitional expenditure for Ingbirchworth WTW and Lead replacement schemes to ensure we can achieve the compliance date and delivery profiles proposed in the PCDs.

The following sections will provide further evidence in response to Ofwat's deep dives and focus on:

1. best options for customers;
2. cost efficiencies; and
3. need for investment.

3.2 Key messages

3.2.1 Ingbirchworth WTW

- This scheme has been supported by the DWI, who have notified us that the investment is the most appropriate steps to address water quality risks within AMP8. The reductions proposed will result in us not being able to achieve what has been set out in the DWI and PR24 plan to address taste and odour risks which we and customers are realising.

- In addition, we request Ofwat recognise the need for transitional expenditure to be reinstated to ensure Yorkshire Water can complete the thorough investigations required to achieve compliance date and delivery profile in the proposed PCD.

[2] yky29_water-quality-improvements-enhancement-case.pdf (yorkshirewater.com)

3.2.2 Trunk main conditioning

This scheme has been supported by the DWI, who have notified us that the investment is the most appropriate steps to address water quality risks within AMP8. The programme of work, based upon evidence provided in AMP7, will reduce the risk of discolouration to customers when there is an unintended flow increase in the trunk mains that we are intending to condition.

- As this is a pipe-related solution, there are limited alternative options. Only a programme of mains renewal or relining would provide a similar benefit, but at a significantly increased cost. We believe the solutions we have presented provide significant benefit to the customers within the areas that we are planning to do the work, at a low cost, especially when compared to alternative solutions. Research carried out by Sheffield University also confirms this type of work is more cost-beneficial than alternative solutions.

- Without reinstating the 60% adjustment from the overall cost, we will not be able to provide appropriate investment in the trunk mains we have identified as high-risk to carry out the complex conditioning work that is required. This includes installing chambers, loggers, meters, valves and PRVs that are required for this specific piece of work.

3.2.3 Lead programme

Ofwat provided support and sufficient allowance for our lead programme in AMP8. However, no transitional early start expenditure was allowed; we believe Ofwat should allow the funding. This will allow us to complete the required investigation and identification of lead pipes to allow replacement from the start of Year 1 of AMP8, to provide the maximum benefit to our customers and achieve the outputs and outcomes of associated PCD.

3.3 Change requested – Ingbirchworth and trunk main conditioning

There are no changes to the original PR24 submission for scope or cost, but a resubmission of the original case with further evidence to support.

The allowances in the table below are for both schemes.

Table 3-1 Summary of changes to the water quality improvements (DWI) enhancement allowances - Ingbirchworth and trunk mains

	Allowance (£m)
October 2023 business plan submission	32.44
January 2024 business plan resubmission	32.44*
Ofwat's draft determination	13.26
YKY draft determination representation	32.47

* This value is Yorkshire Water's submission; the Ofwat value has a double count of transitional expenditure.

Table 3-2 Summary of changes to the water quality improvements (DWI) enhancement allowances – trunk mains only

	Allowance (£m)
October 2023 business plan submission	9.37
January 2024 business plan resubmission	9.37

Ofwat's draft determination	3.74
YKY draft determination representation	9.37

Table 3-3 Summary of changes to the water quality improvements (DWI) enhancement allowances – Ingbirchworth WTW only

	Allowance (£m)
October 2023 business plan submission	23.1
January 2024 business plan resubmission	23.74*
Ofwat's draft determination	9.51
YKY draft determination representation	23.1

* Note: this includes a double count of transitional expenditure.

The first section of our representation will provide further information on Ingbirchworth. This will be followed by additional information on trunk main conditioning.

3.4 Ingbirchworth WTW

This section addresses the following points made in PR24-DD-W-Improvements to taste-odour-and-colour tab – YKY (Ingbirchworth), specifically around need for enhancement investment, best option for customers, cost efficiency and customer protection.

The Ingbirchworth WTW scheme (yky29_water-quality-improvements-enhancement-case - Section 3) we have proposed has been subject to a deep dive and partly met the criteria for enhancement expenditure. However, there has been a 60% adjustment from £23.78m to £9.51m (please note the £23.78m included a double count of transitional expenditure). The points below address the challenges raised in the deep dive by Ofwat. We are requesting the full investment to be able to deliver improvements to taste and odour at Ingbirchworth WTW.

Additionally, we are requesting that the transitional funding requirement be recognised to ensure delivery of the compliance date and PCD delivery profile milestones. We have held planning workshops and, in our assessment, the programme will achieve the date required for the DWI if transition funding is in place. At this stage it is essential that this planning and investigation work does not have to pause and jeopardise the outcomes completion date.

Table 3-4 Evidence to support the rationale for the Ingbirchworth WTW improvements representation

Ofwat concerns	Representation rationale and supporting evidence
Need for enhancement investment (partial pass)	
1. **Overlap with base allowance:** *The company does not provide sufficient and convincing evidence to show that the that they have considered overlap with base allowance.*	**Overlap with Base**: section 3.4.1 provides further information with regards to overlap with base, including what has already been funded this AMP to mitigate the water quality risks at Ingbirchworth WTW.

1. **Increasing risks:** *The company also provides no evidence of increasing risks, including an increase in the concentration of manganese, algae and chlorophyll concentrations.*	**Increasing Risks:** section 3.4.1 provides information on the increasing raw water quality risks, and the impact on customers.
1. **Management control:** *The company does not provide sufficient and convincing evidence that the required investment is wholly outside of management control. Two water quality events have been recorded between 2020 and 2023, of which one was related to operational error. The proposed change to treatment overlaps with current treatment maintenance. Our base expenditure is for companies to deliver resilient services on a day-to-day basis. This includes maintenance. The company does not provide evidence of how any overlap between this enhancement and activities funded by the base allowance has been accounted for.*	**Outside of Management Control:** section 3.4.1 provides information and additional evidence from our incident logs provided to show that the root cause of the water quality risk at Ingbirchworth is outside management control.
Best option for customers (some concerns)	
1) **Limited evidence schemes are best value:** *The company sets out within their submission their decision-making framework (DMF), and how it informs cost benefit analysis and best value. The company presents three schemes for Ingbirchworth and have costed and quantified benefits for outage and Compliance Risk Index. The company has not presented evidence from their DMF to demonstrate the schemes are best value.*	**Best Value:** Section 3.4.2 Provides evidence that the preferred option is the most suitable to address both the raw water deterioration of the reservoir and provide an appropriate treatment solution to mitigate the taste, colour and odour risk.
2) **Six Capitals and carbon:** *There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*	**'Six Capitals' and carbon:** Further evidence of our 'Six Capitals' approach has been provided, and consideration of carbon during the option design and optioneering stage see section 3.4.2. Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon.

Please see YKY29 Water Quality Improvements Enhancement Case - Annex B5 for further information on the Ingbirchworth WTW DWI business case.

3.4.1 Need for enhancement investment

The company's proposed investment relates to addressing, with a high degree of confidence, multiple water quality risks. This is supported by the Drinking Water Inspectorate, it has served a notice on the company under regulation 28(4) of the Water Supply (Water Quality) Regulations 2016 (as amended) reference YKS-2023-00007 (Ingbirchworth) that the our proposed investment is the most appropriate step to address water quality risks within the 2025-2030 period.

Ofwat's response:

- **Overlap with base allowance:** *The company does not provide sufficient and convincing evidence to show that the that they have considered overlap with base allowance.*

- **Increasing risks:** *The company also provides no evidence of increasing risks including an increase in the concentration of manganese, algae and chlorophyll concentrations.*

- **Management control:** *The company does not provide sufficient and convincing evidence that the required investment is wholly outside of management control. Two water quality events have been recorded between 2020 and 2023, of which one was related to operational error. The proposed change to treatment overlaps with current treatment maintenance. Our base expenditure is for companies to deliver resilient services on a day-to-day basis. This includes maintenance. The company does not provide evidence of how any overlap between this enhancement and activities funded by the base allowance has been accounted for.*

Overlap with base allowance:

There is no overlap with base allowance as the required investments and solutions in this scheme are enhancement to existing raw water sources and water treatment processes. This has been considered at all stages in development of the solution and has been assessed during the technical challenge process working with our teams: Asset Management, Programme Delivery, Engineering Design and Stantec, our strategic planning partner. The output of that work is illustrated in the diagram below and shows the separation of base and quality works.

Figure 3-1 Options to be investigated for water quality improvements

Options to be investigated

Items in red included in Business Plan solution

Solution Category		Quality				Base Maintenance			
		Solution	Capex	Opex	Certainty	Solution	Capex	Opex	Certainty
	Eliminate Remove the root cause	Catchment management to reduce nutrient load to reservoirs	-	L	L	Repair bywash channels to Royd Moor reservoir	L	L	M
		Improve mixing/aeration to Ingbirchworth reservoir	L	M	M				
		Source monitoring and selection	L	L	L				
	Operate Operational and maintenance solution	Optimise PAC dosing and control from real-time reservoir data	L	L	M	Increased sampling to inform source selection	-	L	L
		Raw water manganese/ammonia monitors to inform source selection	L	L	M	Network operation to allow seasonal WTW shutdown	L	M	L
						Dredge sediments from reservoir	-	M	L
	Invigorate Leverage asset capabilities or unused headroom	Booster PS to improve availability of Royd Moor source	H	L	H	Access improvements and refurbishments to Thurlstone Moor intakes to maximise yield	L	L	L
		Add higher-level intakes to Ingbirchworth reservoir	M	L	L				
		Targetted improvements to PAC system	M	L	M	Construct facility to turn out Annat Royd pond	L	L	L
		Modifications to existing filters to improve T&O removal	M	L	L				
	Fabricate Construction of new assets	Pipeline from Broadstones reservoir to WTW bypassing Ingbirchworth reservoir	H	L	M				
		GAC, interstage pumping and washwater treatment	H	H	M				
		Advanced oxidation process	M	H	M				
		Ozone, GAC, interstage pumping and washwater treatment	H	H	H				

The elements of scope (in the 'quality' column of the table above) are 'enhancement' as they go beyond what is currently in place to treat the T&O compounds and manganese levels that are present in the raw water.

The deteriorating raw water quality, and the existing treatment works inability to treat the raw water it is receiving, requires solutions outside of its design envelope. Items which should fall under base allocation are shown separately in the 'base maintenance' column of the table above will be funded from our base allocation and are not included in this enhancement expenditure submission.

To summarise, the base elements of the scheme include the:

- work to be completed on the Royd Moor IRE by wash channel;
- access to the Thurlstone Moor IRE intakes; and
- facility to turn out Anat Royd IRE.

This shows that, contrary to Ofwat's observation, we have carefully considered overlap with base allowance, which does account for some of the work, but the additional work for which we are seeking funding is clearly enhancement.

Increasing risks - Please see YKY29_Water Quality Improvements Enhancement Case - Annex B5 for the evidence we presented to the DWI when building the Ingbirchworth WTW case for support. The charts below show that incidents affecting the raw water treatability are increasing in frequency.

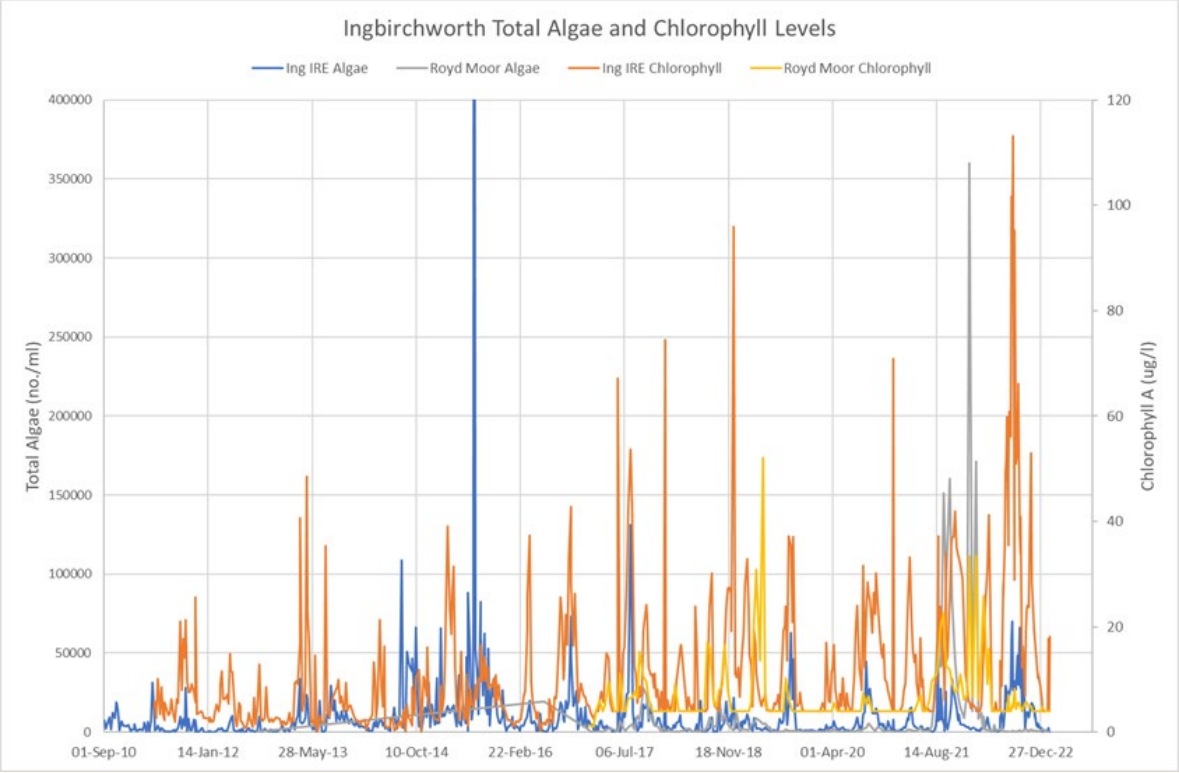


Figure 3-1: Ingbirchworth total algae and chlorophyll levels

This graph shows that the algae and chlorophyll levels are increasing, both in duration and peaks, which has already affected the taste and odour for customers. The expectation is that the trend of increasing peaks in manganese, algae and chlorophyll are likely to continue. Enhancement to the existing processes at Ingbirchworth WTW is required to mitigate further deterioration in raw water colour.

Investment outside of management control:

The deep dive states that we have not provided sufficient and convincing evidence that the required investment is wholly outside of management control.

There have been two water quality events recorded between 2020 and 2023. One of these events was related to unprecedently sustained excessive levels of soluble manganese in raw water which was beyond the treatment capacity of the existing site processes. The second event was related to partial failure of an existing Powdered Activated Carbon (PAC) treatment process.

The nature of the PAC dosing process is that it is a reactive preventative measure to T&O in water based on manual site observations and submitted laboratory samples. Although, theoretically, PAC dosing systems can meet raw water challenged, in reality a lag between detection of risk and uprated PAC dosing is unavoidable. Customers will remain at risk while the PAC dosing remains in place.

We are proposing to replace the current PAC dosing system with a more robust Granulated Activated Carbon (GAC) filtration stage. Rather than rely on a carbon dosed into treatment stream, GAC filtration ensures all water supply to customers is always filtered through an extremely a high effective carbon dose removing the need for reactive alteration to dose. This

arrangement provides significant enhancement to the protection for customers, as part of this business case.

3.4.2 Best option for customers

Ofwat's response:

- **Some concerns:** *We have some concerns that the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.*

- **Limited evidence schemes are best value:** *The company sets out within their submission their decision-making framework (DMF), and how it informs cost benefit analysis and best value. The company presents three schemes for Ingbirchworth and have costed and quantified benefits for outage and Compliance Risk Index. The company has not presented evidence from their DMF to demonstrate the schemes are best value.*

- **Six Capitals and carbon:** *There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*

Customer support

A recent extensive piece of research was conducted into gauging customer support for and perceived value of each of our priority enhancement cases. This was a large-scale study involving 1,967 household, non-household and future customers quantitatively, and a further 154 engaged qualitatively. The findings show that we have very high levels of customer support for our drinking water quality enhancement case at 87% for our household customers, rising to 91% for non-households and 95% for future customers. The majority of customers also agree that this case, which involves investigations into and improvements to water quality, is good value for money, with 59% of both current and future household customers agreeing, rising to 73% of non-households. The vast majority of customers also agree that this enhancement case is important (89% of current and future household customer and 97% of non-households). Those in support of this enhancement case understand a proactive approach is needed.

Limited evidence schemes are best value:

Preferred option: Ingbirchworth WTW - reservoir changes and process improvements

Cost-beneficial: Yes

The preferred solution is the treatment option of process improvements, including the installation of ozone and GAC filtration. This will be supplemented by raw water supply solutions as informed by our ongoing investigation. This is the only solution at the present time that gives sufficient confidence in delivering the required outcomes.

This solution combines two parts:

1. Raw water source selection enhancement. This allows us to blend the raw water quality, protecting the treatment process at Ingbirchworth. For example, when algae blooms occur, we could blend raw water with other available sources.

2. A treatment solution for water entering Ingbirchworth, allowing us to fully guarantee a water supply to customers that meets their quality expectations – and those of the DWI.

The cost-benefit analysis (see table 3-6) shows that the solution is the most cost-beneficial, and our analysis has proved this is the best option because the proposed solution of raw water management, catchment management and process improvement (GAC and ozone) will fully resolve the risk of T&O for our customers.

Our costs are established using our Unit Cost Database (UCD). This database has been developed using actual outturn costs from projects delivered over the last 20 years (indexed to the appropriate base year). The database includes granular data for over 800 asset types, allowing us to generate accurate costs against defined scope of activity and asset type. These models have been used to establish accurate costs for Ingbirchworth WTW, and the scope definition in the SIC (Solution Information for Costing) sheet, is included in Clean water cost evidence asset breakdown appendix (YKY-PR24-DDR-57).

Given that the models are based on the cost outputs from commercially tendered capital delivery frameworks we consider that the basic building blocks of our models already have efficiency built into them. The models output the contract delivered cost to Yorkshire Water.

The rigorous process through which we derive our scheme costs, should give Ofwat confidence that they are robust and efficient.

'Six Capitals' and carbon:

Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon

Table 3-5 Cost benefit assessment summary of the three possible solutions for Ingbirchworth WTW

Options considered	Capital Costs (£m)	Selected Option	Cost Benefit Ratio	Lifecycle Embodied Carbon (tCO2e)	Lifecycle Operational Carbon (tCO2e)	Does it mitigate risk?
Ingbirchworth WTW – Reservoir Changes & Process Improvements	£ 22.43	Yes	0.56	3940	7464	Yes
Ingbirchworth WTW – Process Improvements only	£ 18.21	No	0.30	3335	6647	Yes
Ingbirchworth WTW – Reservoir Changes only	£ 4.22	No	0.30	803	1831	No

The selected option as indicated in table 3-6 above is the preferred option, as it is the only solution that fully mitigates the risk. Process improvements alone does not help to address the root cause, treating poor quality water rather than improving future resilience for water quality issues. Only completing changes in the catchment and reservoir source selection does not remove the risk and would be a reactive response, continuing to expose customers to T&O issues.
Using a combined solution provides resilience to water quality compliance and allows us to use alternative raw water supplies should a water quality risk arise with one of the raw water sources. This is the only option to fully remove the risk to customers.

3.4.3 Concluding points

In order to deliver the best option for our customers, Yorkshire Water requires funding outside of the base allowance. The additional evidence supplied above for Ingbirchworth provides proof on the areas of challenge, and we look forward to meeting the needs of our customers within AMP8.

3.5 Trunk mains

The points below address the challenges raised in the deep dive by Ofwat; we are requesting the full £9.37m investment. This is required to deliver improvements to discolouration in the highest-risk areas in Yorkshire, with the most cost-efficient solution in the industry.

This enhancement case specifically covers the following water quality area: improvements to water taste/colour/odour.

A summary of our evidence is provided in the table below.

Table 3-6 Evidence to support the rationale for the trunk main improvements representation

Ofwat concerns	Representation rationale and supporting evidence
Need for enhancement investment (partial pass)	
1) Overlap of base allowance: *The company does not provide sufficient and convincing evidence that the proposed activity is an enhancement activity rather than base. The work proposed is a maintenance of an existing asset and therefore we consider there to be significant overlap with base.*	1) There is no overlap with base allowances. This work is taking place in named locations where enhancement of the network is required in order for the trunk main conditioning to take place. A breakdown is provided splitting out the base allowance and enhancement.
Best option for customers (some concerns)	
6) **Optioneering:** *The company sets out within their submission their DMF, and how it informs cost benefit analysis and best value. The company provides evidence to demonstrate they are targeting District Metered Areas (DMAs) and have considered overlap with mains renewal. The company state the main alternative option is to renew the mains which they discount due to prohibitive costs. Other than the discounted main alternative of mains renewal, the company does not list other alternatives to demonstrate it has considered alternative appropriately.*	1) There are only a limited number of alternative options, given the nature and extent of the problem. This is further supported by university-led studies. We provide further evidence of this below.
7) **Best value:** *The company does not provide evidence from their DMF to demonstrate the selected schemes are best value.*	2) Further evidence is provided, showing that our approach presents the best value from an option perspective, and that the alternative options would not deliver the required outcomes. Also, studies show there are limited options and ours is the preferred approach for the problems at hand.
8) **Six Capitals and carbon:** *There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*	3) Information on how carbon is a fundamental consideration within our option design and optioneering process. 4) Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon
Cost efficiency (Some Concerns)	
9) **Benchmarking of costs:** *The company does not provide any evidence that costs have been benchmarked. The company does not present any evidence of*	5) The benchmarking of costs has had to be carried out internally as we believe we are the only company within the industry that has carried out trunk main conditioning in AMP7.

benchmarking scheme costs. Assurance of cost tables has been carried out by a third-party assurer. However, the company does not provide evidence of the specific findings of that assurance for this scheme.	Further details are shown in the cost efficiency section.

3.5.1 Need for enhancement investment

Ofwat's response:

Partial pass: *The investment partly meets the criteria for enhancement investment and additional customer funding.*

The company's proposed investment relates to addressing water quality risks and is supported by the Drinking Water Inspectorate (DWI). The DWI served a notice on the company under regulation 28(4) of the Water Supply (Water Quality) Regulations 2016 (as amended) reference YKS-2023-00008 (multiple zones), stating that the investment is the most appropriate approach to addressing water quality risks within the 2025-2030 period.

- **Overlap with base allowance:** *The company provides evidence of customer contacts for water discolouration which demonstrates reductions from 2015 contact rates as it has undertaken action to improve its service. In recent years, numbers are observed to have plateaued resulting in the need for new activity, mains flushing. The company does not provide sufficient and convincing evidence that the proposed activity is an enhancement activity rather than base. The work proposed is a maintenance of an existing asset and therefore we consider there to be significant overlap with base.*

Overlap with base allowance:

Base Activities: The proposed enhancement expenditure is not part of our ongoing maintenance activity. We have carried out similar work within AMP7 under an agreed programme of work with the DWI in 16 water supply zones (WSZ). This was a novel approach, and the first time this type of activity had taken place in the UK. This conditioning activity evidenced the need for new assets to be installed, to allow for trunk main conditioning. These assets were required to improve the water quality contacts within the specified area, and included meter chamber installation (to allow a greater understanding of flows), bypass arrangements (to allow the servicing of meters), installation of washouts (allows the main to be drained, cleaned and flushed), turbidity loggers (to measure the level of discolouration) and PRVs (to manage pressure). This is further evidenced in the table provided below. The table below shows the programme of work which is taking place currently in South Yorkshire and the type of activity required in order to deliver this work.

Table 3-7 An example of current work being undertaken to improve water quality

WSZ	Engineers	Meter Chamber Installation with 2" tapping (*to allow turbidity logger to be fitted along with strap on meter*)	Standard Meter set up on Bypass	WO installation on the main to allow turbisty logger to be fitted (*possibly where there is a flow meter, but no fittings along the main*)	Sluice Valve Installation	PRV Installation	Meter Installation	Additonal Sites Now Required	Total	No of Enabling Works Pack/Slide completed	Outstanding Work Pack/Slides (LEAVE - auto calculates)	Comments for addi
Aughton 2019	M. Aykroyd / P. Dean	2	0	3	1	1	0	0	7	8	-1	No additonal sites id
Manor 2019	L. Platts / R. Leckey	5	0	0	0	1	1	0	7	7	0	No additonal sites re
Moonshine 2019	M. Hancox / J. Gilpin	3	0	7	0	0	0	2	12	1	11	
Norton Sheffield 2019	L. Platts / R. Leckey	2	0	0	0	0	0	0	2	2	0	No additonal sites re
Rotherham Tinsley 2019	M. Aykroyd / P. Dean	5	0	8	4	0	0	0	17	17	0	No additonal sites id
Sheffield Grenoside	M. Hancox / J. Gilpin	3	0	1	0	0	0	0	4	4	0	
	TOTAL	20	0	19	5	2	1	2	47	39	8	

Enhancement Activities: Within the named WSZs that make up the agreed AMP8 schemes, the target overall is a 20% improvement over and above the regional average. Specifically, within the agreed WSZs:

- a mean contact rate of < 0.5 / 1,000 population in each tranche of WSZs in the assessment year; and
- no water quality events in each tranche of WSZs within the reporting year.

The trunk mains conditioning required (with the installations described above) helps distinguish the base maintenance improvement across the region, in comparison to two specific targets (described above) that are over and above the general improvement in the water quality contact rate region-wide. Without enhancing our network through these installations, we will not be able to achieve the agreed targets as we will not have the capability to carry out the appropriate level of trunk main conditioning that is required to the deliver the level of performance proposed for these water supply zones.

In conclusion, we are confident that this is enhancement expenditure with no base overlap as it is a first-time activity to address the risks, with ongoing maintenance post-AMP8 in these specific areas to then be delivered through base totex.

3.5.2 Best option for customers

Ofwat's response:

Some concerns: *We have some concerns that the investment is the best option for customers. The company has considered a range of options but does not provide sufficient evidence to demonstrate the scheme is cost beneficial or best value.*

- **Optioneering:** *The company sets out within their submission their DMF, and how it informs cost-benefit analysis and best value. The company provides evidence to demonstrate they are targeting District Metered Areas (DMAs) and have considered overlap with mains renewal. The company states the main alternative option is to renew the mains, which they discount due to prohibitive costs. Other than the discounted main alternative of mains renewal, the company does not list other alternatives to demonstrate it has considered alternatives appropriately.*

- **Best value:** *The company does not provide evidence from their DMF to demonstrate the selected schemes are best value.*

- **Six Capitals and carbon:** *There is no evidence presented for the 'Six Capitals' they present as part of their DMF nor is there any evidence to show that carbon has been considered.*

Optioneering:

The intervention required (due to it being a pipework-related solution) limits the number of technically feasible alternative options. Mains renewal or relining are generally the only alternative solutions, at a significantly increased cost in comparison to trunk main conditioning. Our experience of delivering this solution across other high-risk areas in Yorkshire gives us confidence that this is not only the best solution to the technical problem, but also the most beneficial and lowest cost option for customers. This is further evidenced by our comparison of this option against the alternatives. The best value for customers is explored in detail in the section below.

Best value:

The table below shows the revised length of trunk main within the AMP8 WSZ schemes we have selected. A GIS desktop exercise to change how the WSZs are represented across the region has taken place in the last 12 months, the updated 33 WSZs are reflective of what the 32 WSZs that were included in our original business plan submission.

Table 3-8 Revised length of trunk main within the AMP8 WSZ schemes selected

Measures	Original 33 WSZ	Revised 32 WSZ	Difference
Population	1,307,244	1,591,746	284,502
Total contact (2020 - 23)	3,221	4,334	1,113
Trunk Mains Length (km)	765.64	1,261.66	496.02
CCR mean average	0.592	0.714	0.12

The funding proposed by Ofwat in its draft determination also falls well below the amount required to undertake the only feasible alternative option of mains renewal to achieve water quality improvements. The table below shows the different scenarios of renewal and the assumed cost. For the cost of the trunk main conditioning scheme we are proposing, the alternative option would only allow 1% of the trunk main length to be renewed, which would not give the performance benefit we are aiming to achieve. There is a separate maintenance cost (base) in future AMPs to go alongside the proposed £10m of trunk main conditioning, but we feel this clearly demonstrates it is the best value for customers and is efficient when compared to alternative solutions. As the solution is pipework-related, there is very little scope to look at anything else; all our WTWs are now optimised to ensure manganese output (a historic source of discolouration) is at a minimum.

Table 3-9 Trunk main costs

Scenario	Length (m)	Cost (£) (assumed £800 / m of trunk main)	PR24 proposed cost (£)
Total length of AMP8 scheme (m)	1,261,660	1,009,328,000	
Assumed 50% renewal	630,830	504,664,000	
Assumed 25% renewal	315,415	252,332,000	
Assumed 20% renewal	252,332	201,865,600	
Assumed 10% renewal	126,166	100,932,800	
Assumed 1 % renewal	12,616	10,093,280	
Trunk main conditioning	1,261,660		9,370,000

Furthermore, the quote below, taken from a Sheffield University paper on appropriate ways to manage discolouration also compares trunk main conditioning to renewal, with no other alternatives listed. This provides further evidence that there are limited alternative options to address the issues at hand, and that the preferred option is the most efficient expenditure for customers when compared to the other solutions.

The resource and financial implications of managing ageing water infrastructure are concerning. AWWA (2012) stated that about $1 trillion in funding would be required over the coming 25 years to effectively manage and deliver clean water considering both aged asset rehabilitation and meeting the demand of growing populations. Such estimates are usually dominated by pipeline asset renewal or replacement costs. This study shows that flow conditioning is a viable long-term maintenance strategy, using only controlled changes in hydraulics, to manage discolouration risk. No specialist tools or rezoning are required for operation and it can potentially be implemented across most networks and pipes conditions. It should be noted that this is only for discolouration resilience, when there are structural issues compromising the continuity of supply and/or water loss, replacement, structural lining etc. will still be required.[3]

To provide best value for customers, our approach to addressing discolouration risk in our large-diameter mains will be to carry out trunk main conditioning and, where possible, to automate the conditioning process. Some capital investment for the conditioning to be implemented is

[3] https://www.sciencedirect.com/science/article/pii/S0043135423007376#fig0007

required, as often small-scale capital works are needed for this type of activity to take place or investment related to telemetry may be required as part of the automated solution.

Customer Support

In addition to the technical evidence provided above, we have also assessed the support of our customers for our 'drinking water quality' enhancement case. The engagement showed high levels of support across households, future bill payers and non-households (see table below). The case is also deemed to be good value for money by the majority of customers and particularly non-households. Some vulnerable customers (base size of 14) with health issues indicate that good quality drinking water is very important for them, so they are willing to pay extra to ensure this. Vulnerable customers agree that the impact on bills is minimal, making it good value for money.

Table 3-10 Drinking water quality EC/CAC customer testing

Audience type	Support	Good value for money
Household	87%	59%
Future bill payers	95%	59%
Non-household	91%	73%

Base sizes = HH respondents (406) FBP respondents (37) NHH respondents (57)

When testing support for the elements of our core pathway of the long-term delivery strategy (LTDS), 'drinking water quality' has the highest level of customer support out of all other aspects of the plan, with the vast majority supporting Yorkshire Water focussing on this element at 97% (base size of 1,167).

'Six Capitals' and carbon:

Please see section 1.3 for an overview of our approach to 'Six Capitals' and carbon.

As discussed in previous sections, the alternatives to trunk main conditioning are far more carbon intensive. Even the most carbon-beneficial mains renewal solution, for example sliplining or mains relining, will have a bigger carbon impact than trunk main conditioning. The benefit of trunk main conditioning is around maximising the use of the existing main by installing technology on it, which can very carefully increase flows to allow layers of sediment to be removed from the main in a controlled way. This is seen as a far more carbon-beneficial solution than renewal of a main.

3.5.3 Cost efficiency

Ofwat's response:

- **Some concerns:** *We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient.*
- *The company describe in general terms use of their unit cost database to produce cost models and their use of optimisation to produce an optimal programme.*
- **Benchmarking of costs:** *The company does not provide any evidence that costs have been benchmarked. The company does not present any evidence of benchmarking*

scheme costs. Assurance of cost tables has been carried out by a third-party assurer. However, the company does not provide evidence of the specific findings of that assurance for this scheme.

Benchmarking of costs

The costings for the AMP8 investment have been carried out using our AMP7 outturn costs. Benchmarking against external costs has not been possible as we believe we are the only company that carries out trunk main conditioning to this degree but we are confident that our internal cost information is robust and challenging. A breakdown of the AMP7 costs can be seen below and these prices have then been uplifted to the relevant price base.

This table shows the capital partner costs to deliver the meter chamber installations, bypass arrangements, installation of washouts, turbidity loggers and PRVs in six of the WSZs in AMP7. This works out at 0.43m per WSZ. In addition, trunk main engineers, specialist discolouration engineers and field resources are required to perform the flushing. Based on our AMP7 experience, this works out at £59k per WSZ. Also, DMA-enabling work within the WSZ (via a full zonal conditioning of the DMA, and 50% of the DMA requiring this twice) costs an estimated £63k per WSZ. Overall, the costing was estimated to be £0.552m per WSZ, with 16 WSZs requiring this work. As described further above, when compared to alternative solutions, these are more efficient costs to deliver the benefits. The costs have then been uplifted to the relevant price base.

Table 3-11 Capital partner costs

Cost Description		Total (£)
Investigation Forecast Outturn		£0.00
Contract Partner Delivery Quote		£1,922,000.00
YW Salaries		£124,050.00
Other YW Costs		£41,600.00
Consultant Costs		£10,000.00
Project Risk		£236,000.00
Overheads	Enterprise Overhead (0.55%)	£13,068.44
	Indirect Assurance Partner Recharge (1.68%)	£39,672.05
	YW Management & Support Overhead (175%)	£217,087.50
Total Project Cost		**£2,603,477.99**

3.5.4 Concluding points

In order to deliver the best value and most cost-efficient option, Yorkshire Water requires funding outside of base allowance. Our trunk mains conditioning enhancement scheme, as supported by the DWI and currently being the most optimal of the few feasible options available, should be reviewed and reconsidered by Ofwat, taking into account the additional evidence supplied above which provides proof on the areas of challenge we face and the need for investment. We look forward to meeting the needs of our customers within AMP8.

3.6 Lead programme

Ofwat provided support and sufficient allowance for our lead programme in AMP8. However, in the 'Expenditure Allowance' document, Ofwat disallowed transitional funding for the lead enhancement schemes due to lack of justification. We believe Ofwat should allow the funding and have outlined our justification in the following section.

The table below summarises the transitional expenditure required for the lead programme. We have requested £500k of early start investment in financial year 2024-25 to allow investigation, identification and stakeholder engagement for delivery of the lead programme. We have allocated £350k for identifying lead pipes in ‘DMA hotspot’ schemes and £150k for identifying and agreeing with school stakeholders in the Yorkshire region. Investigation and stakeholder

engagement as part of the transitional expenditure will then allow construction to take place in Year 1 of AMP8, therefore maximising the benefit to our customers.

Table 3-12 Summary of changes to the water quality improvements (DWI) enhancement allowances – transitional expenditure – lead programme

	Allowance (£m)
October 2023 business plan submission	0
January 2024 business plan resubmission	0.50
Ofwat's draft determination	0
YKY draft determination representation	0.50

Our investment case for lead pipe replacement, as agreed with the DWI, focuses on delivering the maximum benefit to as many customers as possible. The early start programme will allow us to deliver that benefit to customers from Year 1 rather than later in the AMP. If the transitional expenditure is not supported, the delivery profile of the number of lead pipes per year will be adjusted.

4. Supply-side improvements

4.1 Overview

We are challenging three areas of Ofwat's supply-side enhancement decision:

- **Supply scheme complexity**: We are pleased to see that Ofwat supports our supply schemes. However, we believe that the complexity of three of our supply schemes (YKY_R3_Increased River Ouse pumping capacity, YKY_R13_East Yorkshire Groundwater Option 2 and YKY_R91_East Ness Full Site Throughput and Feed to Huby), which have all been classed as 'low', is not fully understood. We believe the three schemes should be classed as 'medium' complexity and therefore should attract a higher unit rate. Our representation supports the case by clarifying the scope and therefore complexity, how the decisions have been made to confirm which solution has been selected and why it is the most cost-effective solution, right for our customers and right for the environment. Our representation also describes the increased scope of these schemes, highlighted through early start investigations, which provides further evidence that the draft determination complexity categorisation is not appropriate.

- **Ouse water quality investigation**: The disallowance of £1.049m against the 'New north to south internal transfer connection' and 'New WTW (York) supplied by the River Ouse' (DV8 lines in Table CW8) for the River Ouse water quality investigation. Further evidence is provided to demonstrate the eligibility for enhancement expenditure beyond that provided in OFW-OBQ-YKY-135 (response to Q2).

- **River Aire and Calder WRMP adaptive pathway investigation**: We have retained the allowance of £0.787m for the investigation into the rivers Aire and Calder source as part of the WRMP adaptive pathway planning. Ofwat has determined that the proposal does not meet the criteria for enhancement investment and additional customer funding for adaptive pathways. This investigation has now been included within the new South Yorkshire Sources Strategic Resource Option (SRO) proposed in section 6 and should this new SRO be funded then the supply enhancement allowance considered here would not be required. We have, however, provided further evidence that the investigation meets the adaptive pathway criteria in this section.

Ofwat's determination for each supply scheme is provided in the PR24-DD-W-Supply Cost Assessment Model (Scheme allowance tab, Non-enhancement tab and Adaptive planning tab); and PR24 draft determinations: expenditure allowances report.

Our original supply-demand enhancement case can be found here.

4.2 Key messages

4.2.1 Supply scheme complexity

- The three supply-side WRMP schemes have been deemed as 'low' complexity, however, we are confident they are at least of 'medium' complexity.

- We need 100% of the funding requested and have provided further evidence on the scope to support this. Without this enhancement investment we will miss key opportunities to increase WAFU as well as detrimentally impact on the security of supply risk.

- We have completed further investigations utilising the transitional funding and can further assure that the correct scope has been selected.

4.2.2 Ouse water quality investigation

- We have provided further evidence that the Ouse water quality investigation qualifies for enhancement funding. Additionally, we are requesting that the transitional funding element be brought back into the business case, to allow us to meet the WRMP24 decision date required for the River Ouse new York WTW treated water transfer scheme (DV8). Please refer to our New SRO Enhancement case appendix (YKY-PR24-DDR-41) for the wider water resource context.

- We have increased the allowance for the investigation from £1.049m to £2.049m based on further assessment since the January 2024 resubmission and through consultation with the Environment Agency. This investigation goes beyond the scope of the existing AMP7 WINEP investigation agreed with the Environment Agency (section 4.5).

- This investigation is part of our Ofwat core pathway and, in anticipation of the loss of the Severn Trent import in 2035, critical to delivering our WRMP24 best value plan.

4.2.3 River Aire and Calder WRMP adaptive pathway investigation

- We have included the Aire and Calder sources investigation under our new South Yorkshire Sources SRO enhancement case which is described in section 6. We would not challenge the disallowance of £0.787m for the Aire and Calder investigation under the scheme "YKY_R37b (ii)_River Aire abstraction option 4" in AMP8 on the assumption that the new SRO is accepted and funded as requested.

4.3 Change requested

The table below summarises the Ofwat concerns (where applicable) raised in its draft determination and our representation rationale. Further details of Ofwat's concerns and our representation rationale and supporting evidence are provided in sections 4.4 to 4.6.

Table 4-1 Evidence to support the rationale for the supply-side improvements representation

Ofwat concerns	Representation rationale and supporting evidence
1. **Supply scheme complexity:** No concerns raised by Ofwat.	We are challenging the scheme complexity category that Ofwat has assigned to three of our supply schemes. We provide further evidence, including a revised scheme scope and cost breakdown, to justify the schemes should be classified as 'medium' rather than 'low' complexity.
2. **Ouse water quality investigation:** *Base overlap concerns. The company request does not meet the requirements for enhancement investment. The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances.*	We provide further evidence of the need for enhancement investment. We describe why the need for investment is required as part of WRMP24 to confirm the sustainability of the existing River Ouse Acomb Landing abstraction licence (an enabler of the New York WTW (DV8 lines) supply option to replace the loss of the Severn Trent Water import in 2035.
3. **River Aire and Calder WRMP adaptive pathway investigation - adaptive planning:** *The investment does not meet the criteria for enhancement investment and additional customer funding for adaptive pathways.*	We are proposing to undertake an investigation of the Aire and Calder sources under the new South Yorkshire Sources (SYS) SRO proposed in section 6. We have retained the funding allowance of £0.787m in table CW8 until the new SYS SRO is accepted and funded as requested.

	We provide further evidence in section 4.6 below to say why it meets the adaptive pathway funding criteria.

We note that the January 2024 business plan resubmission reflects the investment set out in the revised draft WRMP submitted on 31 October 2023. We propose the following changes as part of this representation, the evidence for which is set out in sections 4.4 to 4.6.

4.3.1 Supply scheme complexity

We are challenging Ofwat's scheme complexity categorisation of 'low' for the following three supply schemes:

- YKY_R3_Increased River Ouse pumping capacity;
- YKY_R13_East Yorkshire Groundwater Option 2; and
- YKY_R91_East Ness Full Site Throughput and Feed to Huby.

Through early start investigations on these schemes, we have identified changes to the scope developed during WRMP24 option development which has increased totex by £13.1m compared to our January 2024 business plan resubmission. Our draft determination representation business plan table CW8 has been updated with these additional costs.

The October 2023 business plan submission was based on a working version of our revised draft Water Resource Management Plan and includes only one of the three schemes discussed under this representation and therefore is not comparable.

Table 4-2 Summary of changes to the three supply schemes enhancement

	Allowance (£m)
October 2023 business plan submission	---[1]
January 2024 business plan resubmission	23.34
Ofwat's draft determination [2]	14.92
YKY draft determination representation	36.46

Note 1: The October 2023 business plan submission was based on a working version of the revised draft Water Resource Management Plan and includes only one of the three schemes discussed under this representation and therefore is not comparable.
Note 2: Values taken from the PR24-DD-W-Supply cost assessment model (Scheme allowance tab)

4.3.2 Ouse water quality investigation

We are challenging Ofwat's determination that this investigation does not meet the criteria for enhancement funding. We are also requesting additional funds for this investigation from £1.049m submitted in the January 2024 business plan resubmission by £1.00m to £2.049m in this representation. The revised costs are included against WRMP schemes DV8(iv)A(i) and DV8(v)A in table CW8 in our draft determination representation. We provide the evidence for this in section 4.5 below.

Table 4-3 Summary of changes to the Ouse water quality investigation enhancement allowance

	Allowance (£m)
October 2023 business plan submission	0.00
January 2024 business plan resubmission	1.049
Ofwat's draft determination[1]	0.00
YKY draft determination representation	2.049

Note 1: Values taken from the PR24-DD-W-Supply cost assessment model (Scheme allowance tab)

4.3.3 River Aire and Calder WRMP adaptive pathway investigation

We are proposing to undertake an investigation of the Aire and Calder sources under the new South Yorkshire Sources (SYS) SRO proposed in section 6. We would not challenge the disallowance of £0.787m for the Aire and Calder investigation under the scheme "YKY_R37b (ii)_River Aire abstraction option 4" in AMP8 provided that the new SRO is accepted and funded as requested. However, the investigation allowance is currently retained within our draft determination representation (table CW8) until this is confirmed.

Section 6 and the new SRO enhancement case appendix (YKY-PR24-DDR-41) provide evidence that this investigation meets the adaptive pathway set out in Ofwat's PR24 Final Methodology Appendix 9, pages 112 -113. This evidence is also summarised in section 4.6.

As per our response to OFW-OBQ-YKY-148, we have reassigned the investigation costs in table CW8 from 'R37b(ii) R. Aire abstraction at Bingley' to the 'R86 Aire and Calder WTW'. This corrects the misalignment with WRMP.

Table 4-4 Summary of changes to the river Aire and Calder WRMP adaptive pathway investigation enhancement allowance

	Allowance (£m)
October 2023 business plan submission	0.000
January 2024 business plan resubmission	0.787
Ofwat's draft determination[1]	0.000
YKY draft determination representation[2]	0.787

Note 1: Values taken from the PR24-DD-W-Supply cost assessment model (Scheme allowance tab)
Note 2: The proposed allowance of £0.787m is retained in table CW8 of our draft determination representation but would be removed following acceptance of the new South Yorkshire Sources SRO.

4.4 Supply scheme complexity

4.4.1 Yorkshire Water's response to Ofwat

Ofwat's allowance for each supply scheme is provided in the PR24-DD-W-Supply Cost Assessment Model (Scheme allowance tab), and the approach to supply scheme unit cost benchmarking is explained in section 3.5.1 of Ofwat's PR24 draft determinations: expenditure allowances report. Ofwat's unit cost benchmarking (cost efficiency) approach considers *... the cost associated with increasing infrastructure complexity and new asset intensity of different supply scheme interventions' and they have split the supply schemes into five complexity / asset intensity categories based on engineering rationale of scheme types and scope (Table 21 from the Ofwat report is reproduced below). For each scheme complexity category, Ofwat 'set the efficient cost based on the median unit cost across both outturn and forecast costs per Ml/d of scheme benefit.*

In their response to OFW-IBQ-YKY-015, Ofwat has further clarified: *We have used the WRMP and business plan submissions to help us categorise the schemes, including scheme name, WRMP categories and scope descriptions where available. We also consider where a scheme is new and standalone, or whether it expands on similar existing infrastructure. Where a scheme has multiple elements, the category represents the predominant type through which the majority of costs or water available for use (WAFU) benefit will be delivered.*

Table 4-5 Ofwat's supply scheme complexity categorisation used for benchmarking

Complexity category	Category description	Examples of scheme types
Very Low	Utilising available water supplies	• Licence trading (little enabling infrastructure needs)
Low	Utilising available water supplies	• Licence trading (some enabling infrastructure needs)
Medium	Small scale new infrastructure options	• Transfers • Groundwater and surface Water abstractions • Network enhancements
High	Large scale new complex infrastructure	• New reservoirs • Water recycling • Desalination
Infrastructure schemes with high level of base activity	Infrastructure options which have significant overlap with base activities and costs.	• Water treatment schemes

Summary details of the schemes where we are challenging the scheme complexity are provided in the table below. Each of the schemes in 6 was assigned a complexity categorisation of 'low' based on the fact that they are utilising existing water supplies and that to do this there are some enabling infrastructure needs. This attracts a unit cost rate of £0.71m per MLD However, we believe the three schemes should be classified as 'medium' complexity as they are either a new groundwater resource scheme or strategic raw or treated water transfers with a high degree of asset intensity. We have provided further evidence including scope summaries in the sections below and scheme cost breakdowns in the clean water enhancement cost evidence (YKY-PR24-DDR-26) and clean water cost evidence asset breakdown (YKY-PR24-DDR-57).

Table 4-6 Summary of totex cost changes for each supply scheme

Scheme name	WRMP scheme reference	BP January 2024 resubmission (£m)	Ofwat's draft determination (£m)	Draft determination representation (£m)	Scheme benefit (WAFU; MLD)
YKY_R3_Increased River Ouse pumping capacity	R3	13.349	7.102	18.128	10.0
YKY_R13_East Yorkshire Groundwater Option 2	R13	5.824	4.261	9.579	6.0
YKY_R91_East Ness Full Site Throughput and Feed to Huby	R91	4.165	3.551	8.749	5.0
Total		23.338	14.915	36.456	

*Note-includes only the three schemes discussed under this representation not the total supply expenditure requested.

4.4.2 Need for enhancement investment

All of the investment requested in our draft determination representation is needed to be able to achieve the water available for use (WAFU) benefit outcome for WRMP24 on these three schemes.

As stated elsewhere in our plan, our cost models have gone through a rigorous process review which includes technical assurance on the methodology and quality of the modelling approach. All of the supply scheme options have gone through our WRMP decision making framework, to ensure they meet our future ambition in terms of supply-side requirement beyond AMP8. Modelling and future uncertainty is accounted for in the model, particularly for longer term options. These are selected as part of the optimisation process to ensure they remain the best options across the 'Six Capitals' and other metrics including carbon and environmental factors.

These schemes are early start investigation schemes for AMP7, with work now in progress, and this is helping us to gain further assurance of the scope, identify further risks, and any unique issues which may arise, this is assisting us with development of the schemes to achieve the WAFU by the first year of benefit specified in the WRMP24.

Each scheme has been subject to an investigation workshop (a design sprint) with a team of experts from Yorkshire Water including asset management, capital programme delivery, engineering design, hydrogeologists, planners, area operational teams as well as Stantec, our strategic planning partner. This has helped us to refine the scope, reducing risk as it moves through our well-established gated capital delivery process.

There are increases to the funding requests for these three schemes, compared to that requested in the January 2024 business plan resubmission, as a result of the early start investigations. This is due to improved scope definition as we progress from WRMP notional solution into scheme development, which has allowed the team to fully understand the extent of work required to achieve the WAFU benefit in WRMP24.

We have provided a summary of each scheme's scope below, including the predominant infrastructure components.

YKY_R3_Increased River Ouse pumping capacity

This scheme would increase the pumping station capacity of a strategic raw water transfer from the River Ouse to Leeds at higher river flows subject to the existing licence constraints (see table below). We have assumed a conservative WAFU benefit of 10 MLD. The enhancement would allow us to abstract up to 150 MLD from the current constraint of 124 MLD, allowing us to preserve reservoir stocks in the Leeds area. At a maximum capacity of 150 MLD, this strategic scheme will transfer around 12% of the region's daily demand.

Table 4-7 Licence and infrastructure constraints on Ouse to Leeds transfer

Flow at Skelton Gauging Station	Current Licence MLD	Ouse to Leeds MLD	Max. additional water available MLD
Greater than 1,000 MLD	300	124	26
650-1,000 MLD	150	124	26
400-650 MLD	72	72	0
Less than 400 MLD	10	10	0

The early start investigation has clarified some of the risks and confirmed we need to include additional scope to ensure we are confident in delivering the WAFU benefit of 10 MLD. The additional scope includes the completion of a hydraulic modelling assessment of the main to confirm additional pinch-points where the existing main needs upgrading. An existing feasibility study by Arup has confirmed a key pinch-point is the existing River Wharfe crossing and this was already identified as a risk that the existing main may need to be duplicated. Following further investigations as part of the early start work, we have confirmed the River Wharfe crossing will be required and therefore we have included the twinning of the main river crossing as part of the scheme. We have also included conditioning of the main to increase capacity of flow within it. Similar to our distribution trunk main conditioning, due to the complexity of this

work, it would require sophisticated enabling work (installation of valves, meters, loggers) to ensure the work is done safely, minimises risk and can be repeated when necessary.

The revised scope of the scheme is as follows and a cost breakdown has been provided in clean water enhancement cost evidence (YKY-PR24-DDR-26) and clean water cost evidence asset breakdown (YKY-PR24-DDR-57):

- hydraulic modelling of the main – 14km of 42-inch diameter main and 14.5km of 1,000mm diameter main;
- additional variable speed drive pump at Moor Monkton to allow new design flows, including associated civils works to house the pump and electrical upgrades;
- high-voltage power upgrade to Moor Monkton site for new pump capacity;
- additional pump at Wetherby booster station to allow new design flows, including associated civils works to house the pump and electrical upgrades;
- high-voltage power upgrade to Wetherby booster station for new pump capacity;
- twinning of the main river crossing across the River Wharfe, including directional drilling; and
- conditioning of the full main length, including enabling work, for new design flows.

Using the scheme complexity definitions in Table 21 of the PR24 draft determinations: expenditure allowances report (Page 92 and Table 4-5 above), and the clarification received from Ofwat (OFW-IBQ-YKY-015), we believe this strategic bulk transfer scheme should be classified as 'medium' complexity. This is because it is a network enhancement and transfer scheme, and the predominant work type includes the installation of a number of new assets, including two new pumps and a new twin main river crossing to allow an increase in flow of up to 26 MLD.

YKY_R13_East Yorkshire Groundwater Option 2

This scheme is for a new groundwater source feeding into Yorkshire Water's grid network and it includes the construction of two new boreholes, two new pumps, disinfection and water treatment infrastructure to provide a WAFU benefit of 6 MLD with a daily maximum abstraction of 9 MLD. It will be connected to the Yorkshire grid network at Brayton SRE.

We currently hold an existing abstraction licence for a borehole in the area. This borehole was used for supply until the source became contaminated with bacteria about ten years ago. An in-depth feasibility investigation was carried out on the abandoned borehole to determine the potential reliability and effectiveness of supply should the borehole be repaired and reinstated. Due to the historic issues with water quality, particularly bacterial contamination, it has been concluded that refurbishing the borehole would not be an economically viable option in the long term.

The new boreholes would be sited in a slightly different location to the disused borehole, on higher ground in an area capped by clay which would reduce the risk of contamination. Originally, we understood that this scheme would mean applying to the Environment Agency for a new abstraction licence, however, recent discussions with the Environment Agency suggest that instead, a licence variation would be required.

There is also added scheme complexity associated with the construction works as the site is surrounded by, and has constrained access through, an ancient woodland. Appropriate construction mitigation measures will need to be implemented to ensure we protect the local environment.

The revised scope of the scheme is as follows and a cost breakdown has been provided in the clean water enhancement cost evidence (YKY-PR24-DDR-26) and clean water cost evidence asset breakdown (YKY-PR24-DDR-57):

- siting, testing and drilling of two new boreholes;
- installation of two new duty/standby boreholes and pumps, including associated ancillary equipment such as kiosks, valves, flowmeters and connecting pipework;
- installation of a UV dosing system for disinfection;
- installation of two sodium hypochlorite storage tanks and dosing system to provide a residual chlorine dose;
- installation of monosodium phosphate (MSP) storage and dosing system to provide lead failure protection;

- a power upgrade to accommodate extra power requirements for UV installation; and
- an upgrade to the existing run to waste system, including the replacement of all existing valves.

As this is a new groundwater source, we have included additional items within the scheme to ensure we provide a resilient and reliable resource. This includes an additional standby borehole with associated pump, hypochlorite storage and dosing, valves, flow meter and connecting pipework, an MSP storage and dosing system to meet lead treatment requirements, a power upgrade to meet additional power requirements and modifications to upgrade an existing run to waste system. The proposed treatment infrastructure ensures we address all the water quality risks associated with the source.

This has resulted in an increase to the total cost of the scheme. It is essential that we deliver a new borehole and treatment facility, with full opex costs for maintenance and management for operation in future years. The totex cost for this scheme has therefore also increased.

Using the scheme complexity definitions in Table 21 of the PR24 draft determinations: expenditure allowances report (Page 92 and Table 4-5), and the clarification received from Ofwat (OFW-IBQ-YKY-015), we believe this new groundwater abstraction scheme should be classified as ‘medium’ complexity as it is a new groundwater source with treatment which goes well beyond ‘enabling infrastructure needs’. The predominant works type involves network enhancement which includes two new boreholes, duty/standby pumps and treatment facilities to achieve an increase in WAFU of 6 MLD.

YKY_R91_East Ness Full Site Throughput and Feed to Huby

This option has been enabled by a DWI water quality scheme (see section 2) to relocate an existing borehole at East Ness in North Yorkshire. The relocation is to resolve water quality issues that have limited utilisation of the source under the existing licence permissions. Once the borehole is relocated, the WRMP scheme proposes to connect the East Ness source to Huby WTW. This will allow Huby WTW to be fed by the borehole supply when the River Ouse is at low flows and the permitted abstraction volume is limited. This would allow a proportion of the River Ouse abstraction to feed other areas of the grid water resource zone. This scheme has a WAFU benefit of 5 MLD. This network enhancement scheme maximises the use of an existing local groundwater source allowing the strategic River Ouse source to be used elsewhere in the Yorkshire grid network.

The water quality improvements (DWI) scheme which this option supports (section 2) does not change the capacity (or abstraction licence) of the East Ness borehole but significantly enhances the reliability and resilience of the works, which creates an opportunity to increase utilisation of the current licence.

The WRMP solution is a network enhancement scheme to install a new 5.75km main from an existing service reservoir to the Huby WTW and connect to the existing network. However, as a result of the early start investigations, the solution has evolved and the 5.75km main is no longer required as an existing main has been modelled and confirmed as bi-directional. However, other network enhancement investment is required to enable the WAFU benefit at Huby WTW. This network enhancement includes new treated water storage at East Ness, a new pumping station at Yearsley and a new 8.4km distribution main.

The revised scope of the scheme is as follows and a cost breakdown has been provided in clean water enhancement cost evidence (YKY-PR24-DDR-26) and clean water cost evidence asset breakdown (YKY-PR24-DDR-57):

- new 3.5 ML capacity service reservoir (SRE) at East Ness on outlet of contact tank (CT) before distribution pumps, capable of providing adequate storage to buffer the limiting sump of the current CT with peak demand including supplying Huby water supply system;
- additional pipework to allow flows to all four pump sets (average peak 320 l/s) between CT and SRE, and SRE and pumping station;
- installation of four variable speed drives (VSDs) and associated controls on the distribution pumps at Terrington and Hildenley to allow an increase in flow as well as greater flow control;
- replacement of both Yearsley pumps with new pumps (with VSDs), including associated civil works such as an extension to the existing building to accommodate the VSDs;

- new 8.4km 250mm diameter distribution main from East Ness WTW to Yearsley SREs – existing main to remain in service; and
- replacement and enhancement of an existing 90mm bypass at Gallows Hill SRE with 160mm bypass – actuated valve, meter and telemetry are needed on this bypass.

There is also added scheme complexity associated with the construction works as the site is within a protection order associated with a Roman villa; this will require careful planning to mitigate any impacts.

Using the scheme complexity definitions in Table 21 of the PR24 draft determinations: expenditure allowances report (Page 92 and Table 4-5), and the clarification received from Ofwat (OFW-IBQ-YKY-015), we believe this scheme should be classified as 'medium' complexity as it is a network enhancement and transfer scheme. The predominant work type includes a new service reservoir, new distribution pumps and network enhancements, and a new distribution main without which the WAFU benefit of 5 MLD is not possible.

4.4.3 Concluding points

- The three supply-side WRMP schemes have been deemed as 'low' complexity; however, we are confident they are at least of 'medium' complexity.
- We need 100% of the value indicated and have provided further evidence on the scope to support this. Without this enhancement investment we will miss key opportunities to increase WAFU as well as detrimentally impact on the security of supply risk.
- We have completed further investigations utilising the transitional funding and can further assure that the correct scope has been selected.

Table 4-8 Summary of supply scheme complexity

Scheme	Ofwat's scheme complexity	Our assessment of scheme complexity	Summary of rationale
YKY_R3_Increased River Ouse pumping capacity	Low	Medium	Network enhancement \ transfer scheme. The predominant work type includes two new pumps and a new twin main river crossing to allow the increase in flow by at least 10 MLD.
YKY_R13_East Yorkshire Groundwater Option 2	Low	Medium	New groundwater abstraction scheme. The predominant work type includes two new boreholes, duty/standby pumps and treatment facilities to achieve an increase in WAFU of 6 MLD and to address all water quality risks.
YKY_R91_East Ness Full Site Throughput and Feed to Huby	Low	Medium	Network enhancement \ transfer scheme. The predominant work type includes a new service reservoir, new distribution pumps and network enhancements, and a new distribution main without which the WAFU benefit of 5 MLD is not possible.

4.5 Ouse water quality investigation

4.5.1 Yorkshire Water's response to Ofwat

This section addresses the following points made in PR24-DD-W-Supply.

Table 4-9 Evidence to support the rationale for the Ouse water quality representation

Ofwat concerns	Representation rationale and supporting evidence
Base overlap concerns	
1. The company request does not meet the requirements for enhancement investment. The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances. *2. Our PR24 Final Methodology (Appendix 9, Section 2) sets out the expectations between base and enhancement expenditure. Our assessment determines whether companies investment aligns with and is justified against the expectations set out for enhancement funding in the methodology, and does not overlap with base allowances for reasons such as maintenance, planning and development activities.* *3. The company has requested £1.049m of enhancement investment in 2025-2030 against New WTW (York) related lines. The company does not provide sufficient and convincing evidence to demonstrate that the investment would be over and above normal option investigation, development, and appraisal activity, which is covered through base expenditure allowances.* *We have not allowed funding against New WTW (York) related lines for Yorkshire Water.*	We provide further evidence of the need for enhancement investment. We describe why the need for investment has only recently been identified and is now required as part of WRMP24 to confirm the sustainability of the existing River Ouse Acomb Landing abstraction licence (an enabler of the New York WTW (DV8 lines) supply option to replace the loss of the Severn Trent Water import in 2035). We confirm it is beyond the scope of the existing AMP7 WFD WINEP investigation, and provide further details of the scope and why the request has increased to £2.049m. We describe how it meets the enhancement funding criteria.

4.5.2 Need for enhancement investment

The need for the investigation was initially raised in the revised draft Water Resources Management Plan 24 (rdWRMP24) issued to Ofwat at the end of October 2023, after the submission of the October 2023 business plan. The funding was included in the January 2024 business plan resubmission and further explanation of the funding request was provided in our response to Question 2 of Ofwat query, OFW-OBQ-YKY-135. The investigation is due to be undertaken as part of transitional expenditure in 2024-25 and in Year 1 and 2 of AMP8. It is part of a critical programme of water resources investigations including the Derwent WINEP, the new Nottinghamshire mine water and South Yorkshire Sources SROs that will inform decision points for WRMP24 adaptive pathways and WRMP29 plan development at end of 2026 and start of spring 2027 (refer Section 6 and the New SRO enhancement case appendix (YKY-PR24-DDR-41).

A key source of supply for our rdWRMP24 preferred plan is the Acomb Landing/York abstraction licence which has a surplus under existing licence conditions as infrastructure limitations mean we cannot utilise the full licence. The rdWRMP24 DV8 scheme for a new York water treatment works and a treated water dual main to South Yorkshire provides the infrastructure to utilise the spare licence capacity. This scheme is required to meet the loss of the Upper Derwent Valley import in 2035, a bulk supply agreement which Severn Trent Water intends to terminate to meet its own long-term water resource needs. Further details of the wider strategic water resource

requirements are provided in section 6 and the New SRO enhancement case appendix (YKY-PR24-DDR-41).

In our rdWRMP we noted that our AMP7 WFD No Deterioration WINEP investigation into using the full licence at Acomb/York was ongoing and was due to conclude soon. Initial conclusions indicated that increased abstraction in itself was unlikely to lead to any adverse environmental impacts. However, there remained uncertainty around the environmental impact of increased abstraction in combination with episodes of poor quality linked to combined storm overflows following heavy rainfall (section 10.2.1 of the previously issued revised draft WRMP24 Technical Document).

This enhancement is a new item since the October 2023 business plan submission, following on from the AMP7 WINEP scheme. As a result of the AMP7 investigation data collection it was found that there were sags (reductions) in river dissolved oxygen levels, which were potentially related to CSO spills at times of low flow in the lower River Ouse. There is a risk that the dissolved oxygen sags may be exacerbated by reducing the available dilution of the CSO spills, as a result of reducing flows by increasing the water abstraction in the lower River Ouse. Further investigation is now required to assess whether river water quality is more greatly affected by discharges from our assets when increased abstraction takes place. This study will inform whether the increased abstraction has the potential to cause detriment under WFD regulations and, if so, inform any additional improvements that need to be made to our wastewater network to ensure no deterioration of related waterbodies. This is beyond the scope of the existing AMP7 WFD WINEP scheme, which was agreed with the Environment Agency at the start of the investigation[4].

It is proposed that this study is akin to the WFD (Urban Pollution Management) investigations in the wastewater elements of WINEP and therefore would be considered as enhancement expenditure.

The nature of the WFD (Urban Pollution Management) investigation resulting from the above is significant in size. It covers the area from the proposed Acomb Landing abstraction to Naburn Lock. This section of watercourse and relevant tributaries covers 67 individual storm overflow discharges and is a sizeable and complex undertaking.

The cost for undertaking the study is £2.049m. This incorporates sewer network modelling, associated asset and flow surveys, water quality monitoring and modelling, incorporating river flow and quality calibration and optioneering. The cost for this is based on our specialist modelling framework rates. We believe them to be highly competitive given that they were negotiated in May 2021, prior to inflationary impacts from the economy and the boom in the market for modelling work, resultant from the advent of the Environment Act.

Although the initial £1.049m was included in the January 2024 business plan resubmission, further work and consultation with the Environment Agency has confirmed that a WFD (Urban Pollution Management) investigation is required, and this funding request has increased to reflect the complexity and scale of the investigation. The final scope of this investigation is to be agreed with the Environment Agency.

We have set out how the investigation meets the enhancement criteria in Table 4-10 below.

4.5.3 Best option for customers

The investigation forms part of our WRMP24 preferred best value plan. Our WRMP24 follows the Water Resource Planning Guidelines[5] in which we have undertaken a process of option identification and development to identify feasible options to help meet the supply-demand deficit in future years. The best value plan has been selected using a decision-making framework that considers metrics representing important societal and environmental factors, including carbon. This ensures our WRMP is a best value plan which is right for our customers and right for the environment. This process and the output is described in sections 9 and 10 of our WRMP24 Technical Document.

[4] Yorkshire Water AMP7 River Ouse WINEP Scheme: Environmental Scoping Review, 1 March 2021
[5] Environment Agency and Natural Resources Wales (2021). Water Resource Planning Guidelines.

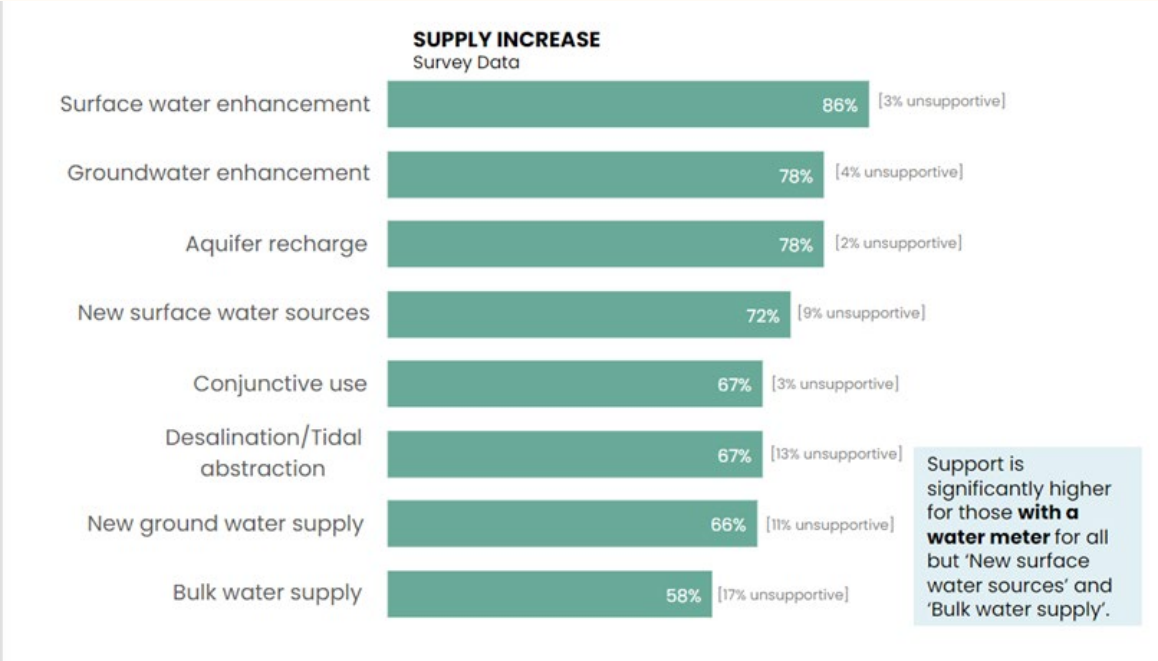
Customer research

In preparation for PR24, we have conducted a huge volume of research. Our studies consistently reference resilience as an important factor in the consideration of water provider service. In Ofwat's own preferences research, resilience was a mid-tier priority, however, this sat behind top-tier priorities such as water quality and interruptions which function well because of resilience in the round.

In addition, our wider research programme tells us that customers support activity which increases the resilience of their network. Customer support for Yorkshire Water's Water Resource Management Plan (WRMP) is very high and is evidenced by extensive customer research where we have engaged with over 2,000 customers on this area of our plan in both our enhancement case and cost adjustment claim research and our independent affordability and acceptability testing. The overall WRMP is supported by 86% of our household customers, rising to 89% of non-households and 96% of future bill payers. The majority of customers also believe it represents good value for money with agreement ranging from 54% up to 76% for non-households.

Specific research we conducted on our draft WRMP in 2023 (speaking to 236 customers) has shown that the majority of customers are supportive of all our supply increase proposals, particularly surface and ground water enhancement, aquifer recharge and new water sources. As the chart below shows, very few customers are unsupportive of investments in this area:

Figure 4-1 Customer research findings



We have also conducted additional recent research (August 2024) on our rdWRMP which continues to demonstrate strong support for our overall plan, as well as the individual aims and initiatives within it. In this research we engaged with 626 household customers.

After having read the WRMP plan in detail, the vast majority of customers are supportive of the **plan overall** (89%).

The vast majority, at 93%, are also supportive of the **plan's key aims** (pictured below for reference):

In terms of our **demand and supply** plans specifically, these were also very well supported, 91% were supportive of our plans to reduce demand and 87% supportive of our plans to increase supply. 87% are also supportive of the balance between the contribution of supply and demand measures proposed. 89% are also supportive of the general direction and timeline of the plan to address the deficit up to 2073.

Table 4-10 How we meet criteria for enhancement funding of Ouse water quality investigation

Ofwat enhancement criteria	How we meet the enhancement criteria
Need for investment	
1.	The investment is identified in the rdWRMP24 (section 10.2.1) and is required to provide confidence in the sustainability of the Ouse Acomb Landing abstraction licence. This licence is in turn required to achieve the deployable output benefits of the new York WTW and treated pipeline scheme to 'backfill' the loss of the Severn Trent import in 2035. This investigation is therefore critical to delivering our WRMP24 best value plan and is part of our Ofwat core pathway.
2.	The investigation is due to be undertaken as part of transitional expenditure in 2024-25 and in Years 1 and 2 of AMP8. It is part of a critical programme of water resources investigations, including the Derwent WINEP, the new Nottinghamshire mine water and South Yorkshire sources SROs that will inform decision points for WRMP24 adaptive pathways and WRMP29 plan development at the end of 2026 and the start of spring 2027 (refer to section 6 and the New SRO enhancement case appendix (YKY-PR24-DDR-41).
3.	The outline scope of the investigation does not overlap with base activities undertaken for WRMP24 planning and is beyond the level of investigation undertaken as part of the WRMP option development process. The scope is akin to the WFD (Urban Pollution Management) investigations undertaken under wastewater WINEP.
Best option for customers	
3.	The investigation forms part of our WRMP24 preferred, best value plan. Our WRMP24 follows the Water Resource Planning Guidelines[6] in which we have undertaken a process of option identification and development to identify feasible options to help meet the supply-demand deficit in future years. The best value plan has been selected using a decision-making framework that considers metrics representing important societal and environmental factors, including carbon. This ensures our WRMP is a best value plan which is right for our customers and right for the environment. This process and the output are described in sections 9 and 10 of our WRMP24 Technical Document.

[6] Environment Agency and Natural Resources Wales (2021). Water Resource Planning Guidelines.

4.	As described above, customer views have been sought on the draft and revised draft WRMP and confirm that the majority are supportive.

4.5.4 Concluding points

- We have provided further evidence that the Ouse water quality investigation clearly meets the criteria for enhancement funding, presenting a clear need for investment and the best value for customers.
- We have increased the allowance for the investigation from £1.049m to £2.049m based on further assessments and through consultation with the Environment Agency. This investigation goes beyond the scope of the existing AMP7 WINEP investigation agreed with the Environment Agency.
- This investigation is part of our Ofwat core pathway and, in anticipation of the loss of the Severn Trent import in 2035, critical to delivering our WRMP24 best value plan.

4.6 River Aire and Calder WRMP adaptive pathway investigation

4.6.1 Yorkshire Water's response to Ofwat

This section addresses the following points made in PR24-DD-W-Supply.

Table 4-11 Evidence to support the rationale for the River Aire and Calder WRMP adaptive pathway representation

Ofwat concerns	Representation rationale and supporting evidence
Adaptive planning	
The investment does not meet the criteria for enhancement investment and additional customer funding for adaptive pathways. The company has not provided sufficient and convincing evidence to demonstrate that the preparatory investment, specifically option planning and development, would be over and above that covered through base expenditure activities and has also not justified its need in the context of development lead-in time. This does not meet the expectations set out in the PR24 Final Methodology (Appendix 9, pg. 112-113) for adaptive pathway funding and is therefore disallowed. *The company has requested £0.785m of enhancement investment in 2025-2030 against the River Aire abstraction option 4 adaptive pathway option. The company has not set out that funding is to deliver activities that are akin to those listed under gate three activities for strategic schemes (with earlier activities covered by base allowances), and states the option is needed in 2039, and has a 10-year lead in time meaning work does not need to start until 2029.*	We are proposing to undertake an investigation of the Aire and Calder sources under the new South Yorkshire Sources (SYS) SRO proposed in section 6. We have retained the funding allowance of £0.787m in table CW8 until the new SYS SRO is accepted and funded as requested. We have reassigned the funding from R37b(ii) River Aire at Bingley to R86 Aire and Calder WTW in table CW8 to correct the misalignment with WRMP. We provide further evidence in the section below to say why it meets the adaptive pathway funding criteria. This is summarised from section 6 and the New SRO enhancement case appendix (YKY-PR24-DDR-41).

4.6.2 Need for enhancement investment

Table 4-12 How we meet criteria for enhancement funding of R86 Aire and Calder WTW adaptive pathway investigation

Criteria from PR24 Final Methodology (Appendix 9, pg. 112-113) for adaptive pathway funding	How we meet the criteria for River Aire and Calder WRMP adaptive pathway investigation (R86)
The scheme should be connected to an alternative adaptive pathway set out in a company long-term delivery strategy to meet a defined externally driven uncertainty	Under both adaptive pathway 2 (high environmental destination) and adaptive pathway 5 (underachieving demand reduction) in our revised draft WRMP, the 'Aire and Calder WTW' (R86) scheme would be required by 2039. The decision point for both pathways is in 2030, which would allow time to design and construct a scheme to achieve the desired benefit in 2039. However, given the increased uncertainty in River Ouse licence availability for the new York WTW to South Yorkshire scheme (DV8), these sources are now considered as potential alternatives earlier in the planning period to offset the loss of the Severn Trent (Upper Derwent Valley) import by 2035 (see sections 4.5 and 6).
The scheme requires a material enhancement allowance and has a long lead-in time to develop and deliver which covers more than one price control period	Development of the 'Aire and Calder WTW' (R86) scheme requires two new river intakes, raw and treated water infrastructure and a new water treatment works. Further investigations are required to inform the feasibility of the scheme including surveys, environmental monitoring and assessment, hydraulic assessment and pre-application consultation. We anticipate a scheme of this type would take approximately ten years to deliver and would span more than one price control period. This requires a material enhancement allowance. If it is developed as a potential alternative to the new York WTW to South Yorkshire scheme (DV8) as part of the new SYS SRO the scheme would need to be in place by 2035 and therefore investigations would need to begin in 2025. A summary of the new SYS SRO timeline and how it aligns with the RAPID gated process can be found in the New SRO enhancement case appendix (YKY-PR24-DDR-41).
The preparatory investment in the scheme in this price control period is better value for money than delaying the investment until there is certainty of need in a subsequent price control period	As indicated in our response above, the preparatory investment would need to begin in 2025 if the scheme is to be developed as a potential alternative to the new York WTW to South Yorkshire scheme (DV8) given the 10-year lead in time and the loss of the Severn Trent (Upper Derwent Valley) import by 2035. Given the context, the timeline for the new SYS SRO and its alignment with the RAPID gated process should deliver better value for money.
The scheme is the best option to meet the need and the proposed funding allowance is efficient and appropriate for the preparatory work	The new York WTW to South Yorkshire scheme (DV8) is selected in our WRMP24 Best Value Plan. We consider that the potential alternatives, including the Aire and Calder sources, proposed in the new SYS SRO, may have equal or greater environmental, water resources and resilience credentials and should be considered if they can be accelerated for delivery by 2035 and given the uncertainty in the River Ouse licence. We know that the 'Aire and Calder WTW' (R86) scheme has been selected under adaptive pathways 2 and 5 as part of the WRMP24 decision making framework and represents the best option under those alternative WRMP pathways. Inclusion within the SYS SRO as a potential alternative to new York WTW to South Yorkshire scheme (DV8) accelerates this option (along with others in the SRO) such that they can be delivered by 2035. This ensures we consider we have the right solution for customers and environment.

	The proposed funding allowance, which includes the Aire and Calder sources, for the SYS SRO is presented in section 6.
There is appropriate customer protection in place to ensure that the preparatory work is progressed	The risk of uncertainty of the solution is reduced through the inclusion of the R86 Aire and Calder option as a potential alternative within the SYS SRO as well as it being part of the portfolio approach across the SROs (section 6 and New SRO enhancement case appendix (YKY-PR24-DDR-41). The RAPID SRO Gates incentivise companies to deliver key submissions to RAPID on time and to high quality. Solutions discontinued or reallocated can result in some customer funding being returned. The key outputs from investigations are timed to allow the best value option which is feasible whether that is the current option in the WRMP best value plan or a substituted option selected and progressed.

4.6.3 Concluding points

- We have included the Aire and Calder sources investigation under our new South Yorkshire Sources SRO enhancement case which is described in section 6. While we disagree with the basis on which Ofwat has disallowed £0.787m for the Aire and Calder investigation under the scheme "YKY_R37b (ii)_River Aire abstraction option 4" in AMP8, we would not challenge the disallowance provided that the new SRO is accepted and funded as requested.

5. Demand-side improvements

5.1 Overview

Yorkshire Water has ambitions to reduce PCC and NHH business demand in line with long-term targets as laid out in WRMP24. The Ofwat draft determination has resulted in the reduction of the investment requested by Yorkshire Water by 79%, totaling £6.9 million against a request of £32.44m. This funding reduction is far too severe, preventing us from effectively delivering demand reductions or meeting the stringent targets set by Ofwat.

Against this background, we have concerns with Ofwat's approach to demand side improvements in its draft determination:

- We challenge the funding granted by Ofwat and propose the separation of the efficiency assessment of PCC and business demand, considering the different approaches and solutions proposed to address these different outcomes, customer cohorts and investment needs.
- We challenge that the approach to deriving an efficient cost for per capita consumption is not an appropriate methodology given the diminishing returns of water efficiency activity as PCC is reduced towards the 2050 110 l/h/d target.
- We reference an update to CW8 tables on demand reduction, which will impact the total MLD of activity we are requesting funding for during AMP8.

This enhancement funding representation should be considered in conjunction with the outcomes representation we are making to the targets proposed by Ofwat at draft determination, which have to be achieved within the financial constraints of the enhancement funding.

5.2 Key messages

1. Yorkshire Water believes that the interventions and strategies adopted to reduce demand are different between per capita consumption and business demand. As such, Ofwat should not assess cost efficiency on a single demand reduction measure. Ofwat should analyse cost efficiency separately for PCC, which has more historical information and basis across AMPs for costs of reduction than business demand, which is a new performance commitment and as such will have less evidence as to the deliverability and cost efficiency of the solutions available.
2. PCC across the industry has a wide range of performance, from 156.3 to 126.9 l/h/d using the latest 2023-24 industry performance information. The cost of the glidepath to the target of 110 l/h/d is not linear and produces a cost curve, as costs per litre incrementally increase as PCC is reduced to the 2050 target. As such, Ofwat's application of a single unit rate independent of PCC performance is inappropriate.

5.3 Change requested

Ofwat should assess the demand reduction submissions for PCC and business demand separately. We have included in the table below the notional split of cost and benefit, omitting benefits associated with smart metering initiatives.

Ofwat should amend the PCC median based efficient rate methodology to consider the diminishing returns on investment for companies at the frontier of PCC. The ability to target and influence already largely efficient customers to reduce demand further requires more bespoke targeting of intervention compared to customer bases using 25% more water on a daily basis.

An option may be to consider cohorting companies into performance bands and apply a cost model based on current performance given the fundamentally different challenge between companies with high PCC and those with already frontier levels.

Table 5-1 Summary of changes to the demand-side improvement enhancement allowance

	Allowance (£m)	MLD Benefit
October 2023 business plan submission	32.44	6*
January 2024 business plan resubmission	32.44	6*
Ofwat's draft determination	6.95	6*
YKY draft determination representation	32.44	9.12
YKY draft determination representation PCC only	10.22	6.30
YKY draft determination representation business demand only	22.22	2.82

* *We identified an error in the flow regulator benefit in CW8 prior to submission but have rectified in our response. The CW8 benefit line for flow regulators was 0.347 MLD and is now 3.47 MLD which is the accurate benefit over AMP8. This was a known error at time of submission, but the data table assurance did not allow for editing tables later in the process.*

5.4 Yorkshire Water's response to Ofwat

Table 5-2 Evidence to support the rationale for the demand-side improvements representation

Yorkshire Water representations	Representation rationale and supporting evidence
1. Separating PCC and business demand costs	The intervention types and approach to customer communication and collaboration are discrete. As such, they should not be considered together and comparable when assessing cost efficiency for the two performance commitment areas.
2. Appropriate Ofwat efficiency modelling using an industry median rate	When analysing the CW8 table, it is apparent there is a cost curve, with higher costs for further PCC reductions, where companies are industry leading. Ofwat should consider the diminishing returns and customer-specific approaches required by companies at the frontier of PCC performance which attract an increased cost per ML of PCC reduction.

5.4.1 Separating PCC and business demand cost efficiency modelling

We have developed a bottom-up plan for PCC reduction from the AMP7 exit point, utilising a number of interventions targeting a range of customer types. The same activity has occurred for NHH business demand. The interventions within these plans differ, with schemes like large scale rainwater harvesting subsidies and complex private network water efficiency audits producing higher per-intervention benefits, but also attracting a higher cost to implement.

The complexity of having to work alongside retailers, having to collaborate across several accountable individuals to influence water efficiency and the added complexity of differing technical needs for water consumption in industry results in NHH demand being a more complex performance commitment to deliver, with an associated higher cost per MLD.

The differing intervention sets and increased complexity in the delivery of interventions to realise a persistent improvement in demand are fundamental reasons why we believe PCC and business demand should be assessed separately when determining the efficiency rate per MLD of demand reduction.

5.4.2 Ofwat modelling of PCC efficient cost using a median approach

Yorkshire Water has achieved its frontier position on PCC without previously claiming any enhancement funding. We have only been provided with £400k in base funding for PCC. While Ofwat cites “significant underspending of PR19 2020-23 enhancement allowances for some companies”, that does not apply to Yorkshire Water as we did not receive any PCC enhancement funding.

As customers’ water usage reduces, achieving further incremental reductions in PCC can require significantly more time, money and resource (as has been recognised by Ofwat both in PR19 and PR24 in relation to other PCs).

A PCC of 110 l/h/d is an aspirational target and should be achievable as modelled and supported with WRMP24. For metered customers, we demonstrated in APR 2023-24 that our metered customers on average use 105.4 l/h/d. This average level of PCC shows a generally engaged customer base, which we can target at the extreme end of the distribution curve; however, the number of outliers is limited.

Given this level of engagement in water efficiency for environmental reasons and financial vulnerability, our metered customer base presents a limited opportunity to progress water efficiency communications and implementation of devices. Efforts within this element of the customer base are far more limited and as such will incur a higher cost per MLD of reduction, compared to companies who have significantly higher levels of metered PCC. For example, implementing a flow regulator at a 105 l/h/d home who has an average shower length of 5-minutes, will save marginally less water than a 120 l/h/d home who has a 10-minute shower. The cost per MLD for implementing flow regulators therefore is higher.

The secondary option for Yorkshire Water is to target water efficiency schemes at unmetered properties. The challenge here is that we have no empirical data to direct the interventions at the correct customers, unlike with metered customers where bill cost and measured volumes can be paired with analytics to deliver a cost-effective targeted demand reduction plan.

Unmetered customers tend to be self-selecting, with a predominant proportion choosing not to be metered given elements of their water use would cause an increase in bills by moving from ratable value to a metered billed volume, such as avid gardeners. The combination of being unable to effectively target interventions, quantify the benefit or link the change in behaviour to a financial benefit, also causes those companies at the frontier of PCC to incur a greater cost per MLD of PCC reduction.

5.4.3 Data supporting a cost curve for PCC

There is strong evidence in the data on how relative costs of PCC reduction differ depending on a company’s average household PCC starting point. This can be seen from Figure 5-1 below, which shows water companies’ PCC performance plotted against the average cost per MLD of their AMP8 programme, populated from data in CW8. The figure shows that companies at the forefront or upper quartile of the industry tend towards having more costs associated with better performance in relation to PCC. This data also shows how staggered cost efficiency assessments for cohorts of water companies based on their PCC performance would be more appropriate for assessing PCC reduction unit rate costs, producing a fairer cost curve across the industry.

Figure 5-1 categorises company interventions into those which we assume to be PCC-centric as opposed to delivering business demand reduction. The trend within the table shows a significant skew that companies with a high PCC are requesting a very low £/MLD, with companies below ~135 l/h/d having a significantly different request £/MLD PCC reduction.

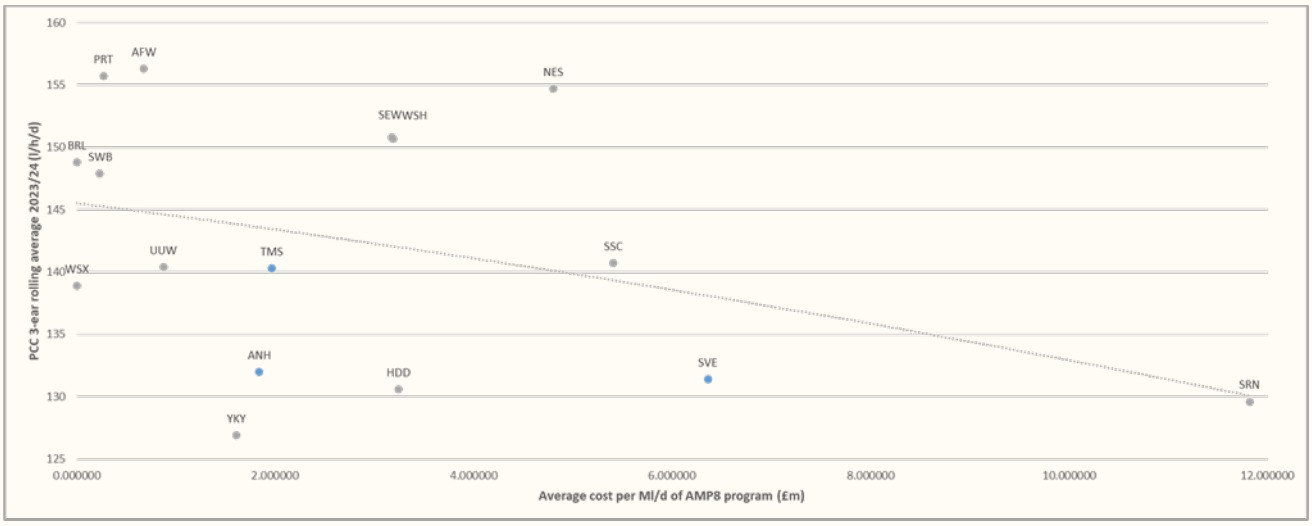
We believe a cohort methodology could be used whereby 10 l/h/d bandings are used to cluster companies into a cohort being >145 l/h/d, <145>135 l/h/d and <135 l/h/d with an efficient cost

per cohort applied. This cost curve would provide funding to accommodate the different challenge for engaging with largely water-efficient customers as opposed to working with customers who are significantly behind the frontier companies.

Please note that companies in blue have mature smart metering programmes, with >100k of smart meters installed. Other companies will not get the maturity in analytics and penetration until part way through AMP8. This is a further reason that a median cost is problematic; where companies have high smart meter penetration already, the ability to effectively target interventions is greatly enhanced. For companies who are starting on this journey, that level of maturity will only be achieved much later into AMP8, hampering the ability to target interventions as efficiently at the front half of the AMP.

Furthermore, please note the our cost per MLD is plotted using an update to CW8, increasing the volume of PCC reduction from flow regulators, due to an error in our previous submission (referenced in PCC outcomes representation).

Figure 5-1 Industry comparison of 3-year PCC performance against the cost per MLD of their AMP8 program CW8 data. Those companies with mature smart metering programmes are highlighted in blue.



We consider that the use of a median unit cost average is not appropriate for assessing our costs (or indeed other companies' costs). Lower quartile companies with higher average PCC, and lower cost options still available to them to achieve reductions in PCC, significantly reduce the median unit cost to the detriment of Yorkshire Water (which, as explained above, needs to spend more to achieve further, or the same, percentage reductions).

Ofwat has calculated a very wide range for unit costs per company of £0.34 million to £8.32 million per MLD, producing a median value of £1.16 million per MLD. This is not a sufficiently robust way of assessing unit costs. Ofwat has neither considered the estimated range of costs for Yorkshire Water's activities, nor has it considered the factors specific to companies in a frontier position which directly affect unit costs.

5.4.4 NHH business demand

We have developed the demand reduction suite of interventions in line with costs from market engagement and trial benefits. We are therefore representing that the costs submitted at PR24 submission are an accurate portrayal of the estimated costs to deliver the required outcome, with minor amendments to benefit ratios given additional insight and evidence being accrued since PR24 submission.

5.4.5 The need for investment

5.4.5.1 PCC

We plan to reduce per capita consumption by 6.3 MLD through specific interventions with customers; this is in addition to the PCC benefits from smart metering which is not included in

the 6.3 MLD mentioned. To support this reduction, we have built a programme to; install flow regulators, undertake water efficiency home visits, support customers with water saving devices, undertake targeting water efficiency campaigns and educate children in schools. These activities will underpin the delivery of the PCC demand reduction in AMP8, which Yorkshire Water is requesting enhancement funding to achieve.

The specific cost and benefit of each intervention is detailed in CW8 and is supported by the optimisation within our WRMP24 submission.

5.4.5.2 NHH business demand reduction

Our plans to reduce business demand by 2.82 MLD through specific interventions with NHH customers. In addition, we will use smart metering data to reduce NHH demand by a further 4.04 MLD in AMP8. The enhancement funding will deliver five intervention types through AMP8, including: business water efficiency audits for large water users, targeted media campaigns, water retailer incentives to collaborate with retailers, subsidise the installation of large rainwater harvesting for water reuse and small business water efficiency visits.

This new performance commitment has never previously been funded for targeted intervention. We have created a blended plan of the most deliverable options, from which benefits will be tracked and the programme further optimised once cost-benefit certainty increases.

The specific cost and benefit of each intervention type are included in CW8 and are supported by the optimisation within our WRMP24 submission.

5.4.6 Best option for customers

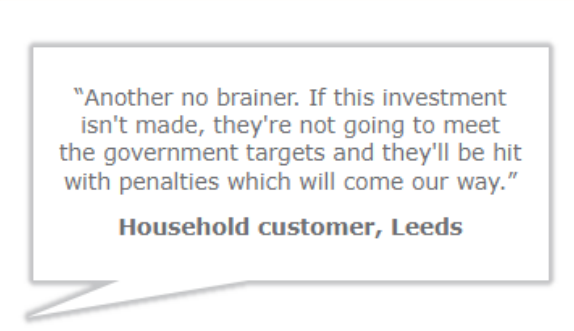
5.4.6.1 PCC

The WRMP24 supports the blend of demand reduction and supply-side options put forward by Yorkshire Water for PR24. The demand reduction activities total 16.49 MLD from PCC activities, of which 6.3 MLD is funded through this enhancement case.

We've conducted a wide range of research on managing our water resources with customers, including research on our WRMP and enhancement spend specifically in relation to the WRMP. This included information on PCC, and what this reduction activity will cost.

Our customers tell us that, overall, reducing demand is preferred to increasing supply-side options due to the positive impact on the environment, reduction in carbon emissions and requirements for chemicals to treat water.

In addition, 86% of household customers supported the WRMP enhancement spend, including this specific spend on PCC, even when they were presented with the cost of the options up to 2050; this is even higher for non-household customers at 88% and future bill payers even more so at 96%.

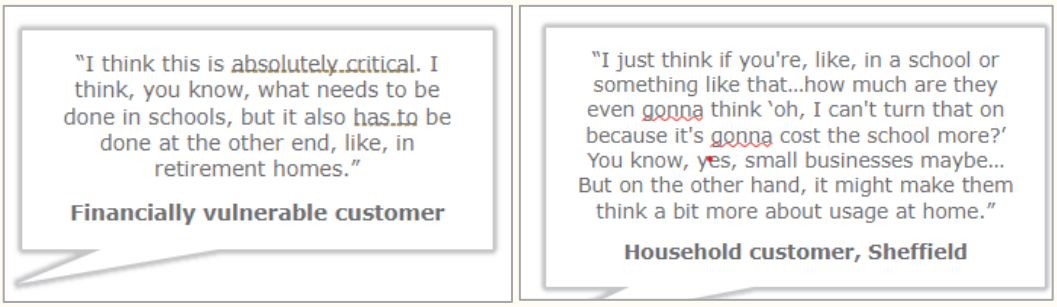


5.4.6.2 NHH business demand

The WRMP24 supports the blend of demand reduction and supply-side options put forward by Yorkshire Water for PR24. The demand reduction activities total 6.86 MLD from NHH activities, of which 2.82 MLD is funded through this enhancement case.

Reducing demand is supported by customers as opposed to increasing supply-side options due to the positive impact on the environment, reduction in carbon emissions and requirements for chemicals to treat water. We tested the proposed ambition and investment to reduce NHH demand with HH, future and NHH customers via our study which aimed to understand support for some of our priority enhancement cases and cost adjustment claims.

WRMP was one of these enhancement cases and it covered PCC, NHH demand, leakage and enhancing supplies (to cover the loss of our transfer from the Derwent Valley). Overall, there were high levels of support for the enhancement case, with 86% support from HH customers, 88% support from NHH customers and 96% for future customers.
While some customers had concerns if businesses would really pay attention to campaigns, it also revealed that customers would benefit from target NHH campaigns and overall usage would come down.



5.4.7 Cost efficiency

We are concerned that the econometric modelling approach incorporates several non-comparable schemes to estimate an efficient unit rate. Companies have very different make-ups of businesses and the opportunity for further demand reduction is likely to vary significantly based on the types of users and the existing level of water efficiency. A simple model assessing a £/MLD reduction will not account for the relative opportunity to reduce demand going forward. We set out below how we have ensured that the interventions proposed are efficient and the correct solutions to reduce NHH demand in Yorkshire.

5.4.7.1 NHH business demand

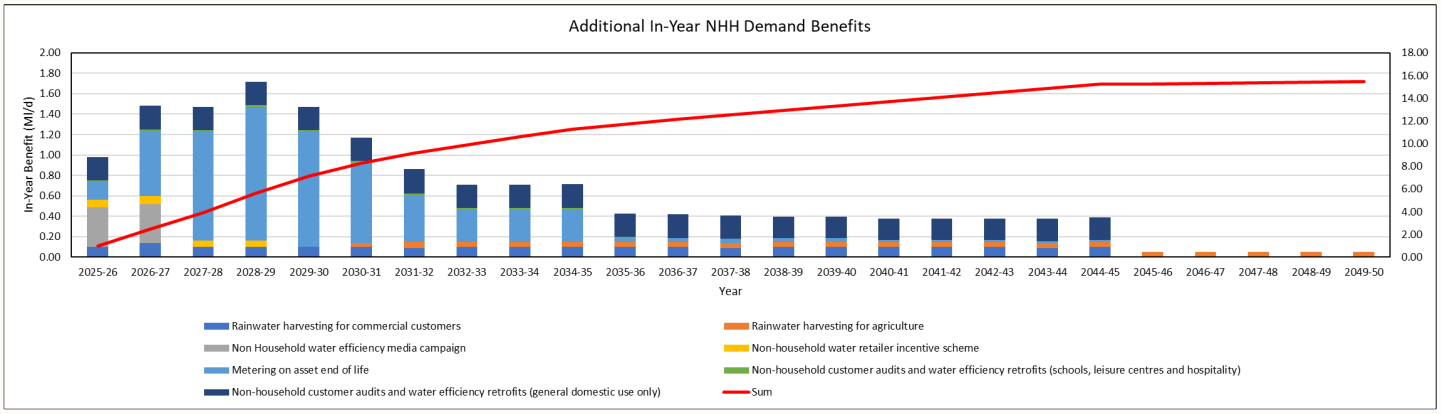
Within our WRMP24 submission we progressed our demand optimisation process significantly through the use of multiple options, with individual costs and benefits to allow for an optimum glidepath across the planning period. The process is iterative and starts with unconstrained options as described to allow the model to select from a wide range of demand options.

We engaged RPS to conduct a thorough review of all available NHH options which could be applied between 2025-2050 to help close the long-term supply-demand deficit, provide a resilient supply of water for customers today and in the future, and move us closer to our long-term targets.

RPS reviewed the NHH demand reduction initiative benefits utilising industry-wide knowledge and data. This was then used in conjunction with our consumption data to produce cost-benefit profiles for all NHH initiatives as specified by Yorkshire Water. RPS ensured that where values from research were used, they were both referenced and appropriate for application within Yorkshire Water. RPS used its industry expertise to review all assumptions, savings and costs to ensure they were realistic and achievable.

Once the options were shortlisted, they were reviewed to assess their deliverability and provide a varied programme of initiatives, as this performance commitment commences in AMP8 and knowledge of actual cost and benefits is less certain. The graph below represents the in-year reduction benefits modelled to 2050 for the NHH demand initiatives selected in the optimisation selection process.

Figure 5-2 Additional in year NHH demand benefits



Business demand is a new performance commitment for AMP8, so we are reliant on the benefits from the initiatives included in our AMP8 plan, plus industry-wide innovation in this sector overtime to enable us to achieve our interim and long-term reduction targets.

5.4.7.2 PCC

As explained above, we disagree with Ofwat's PCC median based efficient rate methodology and propose that it be amended to consider the diminishing returns on investment for companies at the frontier of PCC.

5.4.8 Customer protection

The outcome of this investment is demand reduction, for which there are already PCLs and ODIs in place.

PCC has a measure of l/h/d. Our representation case for PCC outcomes has committed 5.9 l/h/d reduction in in-year terms by the end of AMP8, with an underperformance fine of £1,028k per l/h/d. This performance regime strongly incentivises Yorkshire Water to deliver against the PCL, alongside progressing to the 2050 110 l/h/d target.

NHH business demand is measured per MLD with an ODI of £254k per MLD of under attainment.

We have committed 6.86 MLD of reductions across the AMP, incentivising us to deliver the improvements within the ODI and against the national 15% glidepath in a timely manner, with the interim of 9% reduction by 2038.

5.5 Concluding points

We are representing on the different nature of the two performance commitments which have been combined by Ofwat for assessment under the title 'demand reduction'. We believe each performance commitment and intervention set are unique and should be assessed separately to ensure appropriate funding occurs across the sector.

We are representing that the median approach put forward by Ofwat is not appropriate given the frontier levels of water efficiency displayed by a large proportion of the Yorkshire Water customer base, whereby there is little cost-efficient opportunity to further reduce demand. Ofwat should consider the cost curve associated with reducing PCC at frontier levels and the most suitable econometric approach to ensuring efficiency at frontier performance levels.

Finally, we are representing that the investment plans put forward at PR24 submission have been market tested and the benefits trialled. The costs and benefits remain an accurate portrayal of the unit costs to deliver demand reduction within the Yorkshire Water customer base.

6. New Strategic Resource Options

6.1 Overview

Our Strategic Resource Options (SRO) programme has evolved significantly since submission of our business plan in October 2023. This is due to developments in the requirement for (and feasibility of) strategic supply-side solutions linked to company and regional water resources planning, informed by ongoing engagement with regulators and other water companies.

Our October 2023 business plan submission did not explicitly include enhancement allowances in the SRO data tables. At this point in time only one major supply-side solution, the new York Water Treatment Works (WTW)[7], was proposed for development in AMP8 exclusively in the SUP12 data tables. The allocation of costs to these tables reflected uncertainty in the delivery model for this 'backfill' solution at the time of submission, which we have sought to clarify here and in the New SRO enhancement case appendix (YKY-PR24-DDR-41).

In the January 2024 business plan resubmission, following engagement with RAPID, we included proposed costs for a new Kielder SRO. Ofwat has also provided its draft determination on the Kielder SRO. Our representation on the Kielder SRO is provided separately in section 7.

Ofwat has provided its draft determination on the York WTW (Backfill SRO) DPC allowance[8]. Following further developments on the UDVRE (Backfill) SRO during AMP7, we have engaged with RAPID on the expansion of this SRO to include alternative options (section 6.4). We have also requested an enhancement allowance (under the supply-side enhancement case) for enabling water quality investigations to support the new York WTW to South Yorkshire solution. This is set out separately in section 4.

Finally, alongside Severn Trent Water, we have engaged with RAPID in relation to a multi-sector mine water treatment solution in Nottinghamshire which, if feasible, could provide a novel, best value solution, contributing to regional water resources resilience. Although not formally included in our business plan at draft determination, Ofwat has signalled its intent to support this project, subject to further information. Our proposal for this new SRO is set out in section 6.5.

Section 6 and section 7 should be read in parallel. The proposed SRO schemes will be brought forward as a portfolio of projects, which encompasses three SRO schemes, namely South Yorkshire Sources, Nottinghamshire Mine Water Treatment, and Kielder Transfer. Two of which are newly proposed schemes (South Yorkshire Sources and Nottinghamshire Mine Water Treatment), and one (Kielder Transfer) is a scheme that has already been included in the January 2024 business plan but a representation will be submitted as part of this submission.

Section 6 will introduce all three schemes as part of the overview, representation rationale, and the required allowance. However, the remaining section 6 will provide background on the two new SRO schemes, while section 7 provides more information on the Kielder Transfer SRO in the form of a response to Ofwat's decision. The table below further demonstrates the split between sections 6 and 7.

Information	South Yorkshire Source and Nottinghamshire Mine Water Treatment	Kielder Transfer
Introduction of portfolio of projects	Section 6	Section 6
Representation rationale	Section 6	Section 6 and Section 7
Portfolio allowance	Section 6	Section 6

[7] York WTW was the solution name stated in the SUP12 data table, but these were effectively proposed costs to develop the 'Backfill' SRO comprising a treated water transfer from York to South Yorkshire.

[8] The representation for the water resilience DPC for Chellow can be found in Section 13 of this document (YKY-PR24-DDR-03).

Kielder Transfer allowance	N/A	Section 7
Detailed description of new SROs	Section 6	N/A

In addition to the two newly proposed SRO schemes in Section 6, the section will also provide a response to Ofwat's PR24 major projects draft determination methodology in terms of the overall revised percentage funding and percentage cost split across gates. This is separate to the three SRO portfolio schemes but relevant for the progression of the projects and thus included within section 6.

6.2 Yorkshire Water's response to Ofwat

This section provides a high-level summary of the changes to our SRO enhancement case. Our representation now includes an SRO portfolio based on three major projects. Each investment is separate in nature and addresses a different need, but overall, the portfolio is required to support the development and delivery of our WRMP through AMP8 and beyond.

The following two SROs are discussed in this section.

1. **South Yorkshire Sources** (*previously referred to as the Backfill SRO/York WTW*): This is discussed in section 6.4.
    a. Need for investment: in-region solution to offset the loss of a bulk supply to Yorkshire in 2035.

2. **Nottinghamshire Mine Water treatment**: this is discussed in section 6.5.
    a. Need for investment: novel, cross-sector solution to treat mine water as an alternative to the South Yorkshire Sources SRO or to meet other WRMP24 needs.

The Kielder Transfer option is part of the SRO portfolio-based approach but will be discussed in section 7, where we challenge Ofwat's draft determination on the existing SRO submitted within the January 2024 business plan.

3. **Kielder Transfer**: Our representation is provided in section 7.
    a. Need for investment: Inter-company transfer (recipient) to offset loss of supply under protected sites drivers by 2040.

An overview of these three solutions, plus the additional four sub-solutions for South Yorkshire Sources- is shown below in Figure 6-1. A corresponding programme for the SRO programme (2024-2040) is shown in Figure 6-2, below. Further explanation of the wider strategic water resource context is provided in the New SRO enhancement case appendix (YKY-PR24-DDR-41).

Figure 6-1 Strategic water resources and investigations overview

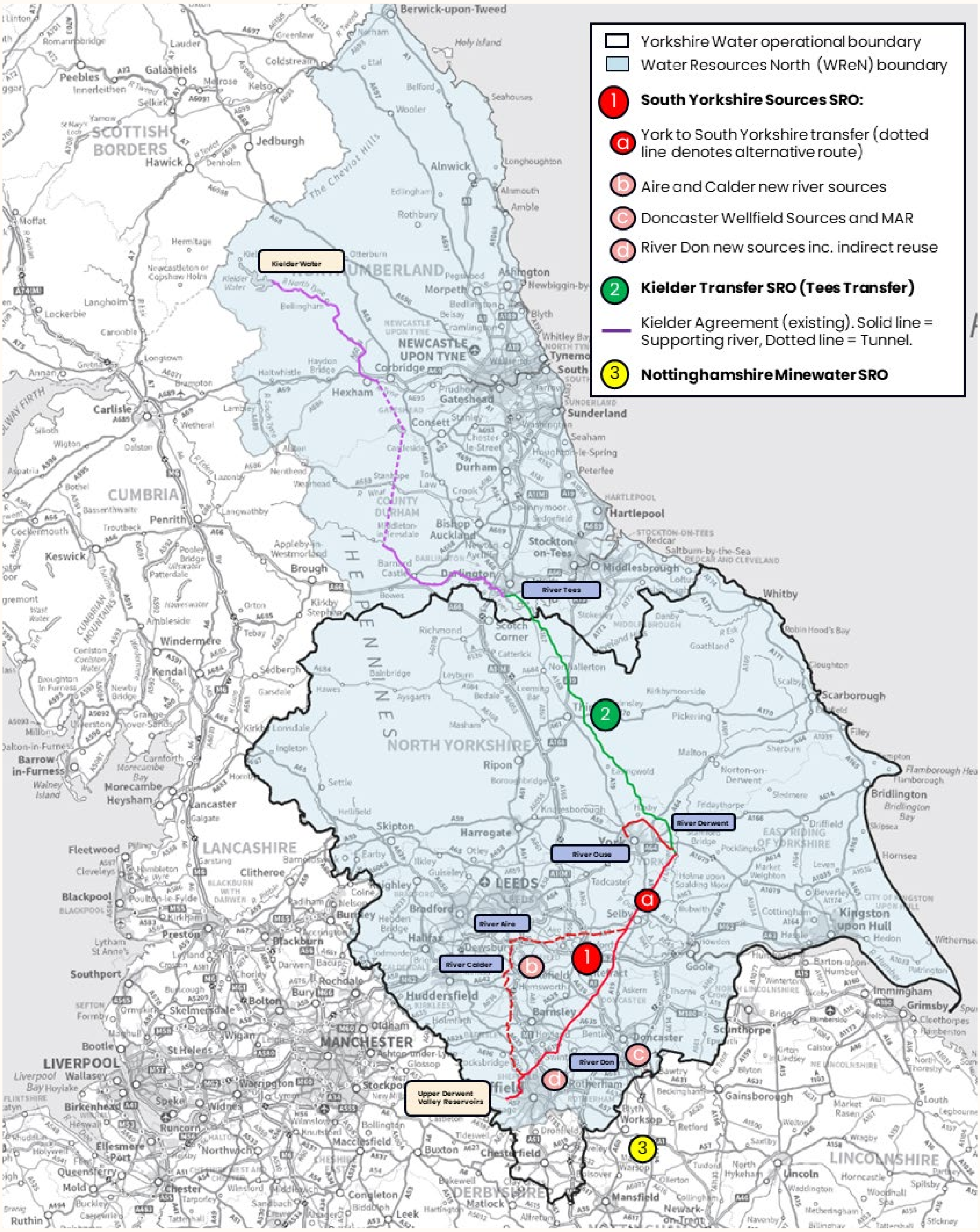
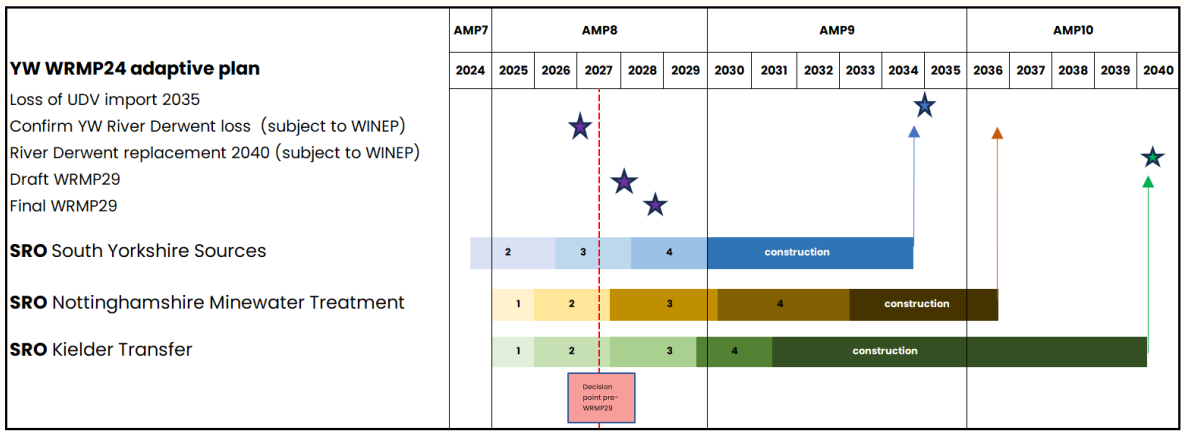


Figure 6-2 Strategic water resources and investigations programme



The overall funding request for the SRO enhancement allowance case is summarised below. This includes all three SROs listed above. The representation rationale and supporting evidence for each SRO are described in section 6.4 (South Yorkshire Sources), section 6.5 (Nottinghamshire Minewater) and section 7.4 (Kielder Transfer), respectively.

Table 6-1 Summary of changes to the SRO enhancement allowance

	Allowance (£m)
October 2023 business plan submission	00.00
January 2024 business plan resubmission	20.21
Ofwat's draft determination	19.59
YKY draft determination representation	35.43

6.3 Key messages

1. New 'South Yorkshire Sources' (SYS) SRO enhancement request for AMP8, based on the continuation of the AMP7 UDVRE SRO (backfill option), to include four additional options (Table 6.2) to address uncertainty associated with the new York WTW treated transfer option (DV8).

2. New innovative joint SRO with STW to explore further option to treat mine water to provide a potential full or partial alternative to the new York WTW treated transfer option (DV8).

3. Acceptance in principle of PR24 methodology in terms of overall revised percentage funding and percentage cost split across gates. However, we challenge the assumption that the early gate investigations are largely funded from base allowances.

The two solutions are discussed in more detail within sections 6.4, 6.5, while the alignment with Ofwat's major projects draft determination principles is discussed in section 6.6.

6.4 South Yorkshire Sources (previously referred to as Backfill SRO/York WTW)

6.4.1 The need for investment

In 2022, we commenced a new SRO with Severn Trent Water to explore the expansion of the UDV reservoirs (UDVRE SRO), which would investigate options to increase storage in the UDV, mutually benefitting both companies by increasing water supply to meet long-term needs. However, due to regulator and stakeholder concerns around the environmental/heritage impacts

associated with UDVRE, in July 2023 RAPID confirmed that it could no longer support the development of UDVRE beyond Gate 2.

Following RAPID's decision not to progress with UDVRE options, we agreed to progress with a 'backfill only' SRO focussing on the new York WTW to South Yorkshire (DV8) identified in our WRMP best value plan/core pathway. The river source utilised for this solution is subject to an ongoing AMP7 WINEP investigation under a Water Framework Directive (WFD) No Deterioration driver, which has identified significant uncertainty in the sustainability of abstraction relating to WFD hydrological regime plus storm overflow reduction plan requirements under the Environment Act.

To ensure certainty in the development and implementation of a feasible 'backfill' solution by 2035, we have proposed to include an additional three supply options for consideration in Gate 2 of the Backfill SRO (to be renamed South Yorkshire Sources 'SYS'). We have engaged directly with RAPID on these proposals and anticipate progression of the rescoped SYS in AMP7 / continued into AMP8.

This SRO will therefore:

- accelerate solution development to ensure a replacement source is implemented no later than 2035;
- consider candidate solutions more local to South Yorkshire with potentially improved environmental, water resources and resilience credentials when compared to the River Ouse new York WTW treated water transfer option; and
- explore a more rounded, holistic approach to offsetting the loss of the UDV import (alongside the Nottinghamshire Minewater SRO), which is in the interests of both customers and the environment.

A summary of the options to be considered in SYS is summarised below in Table 6-1. We consider that all these options meet the suitability criteria for enhancement funding and have provided justification for this in section 6.7 and in the New SRO enhancement case appendix (YKY-PR24-DDR-41).

Table 6-2 South Yorkshire Sources Candidate Solutions

Solution	Description
River Ouse treated water transfer to South Yorkshire	New WTW near York (supported by increased abstraction from River Ouse utilising headroom in an existing abstraction) plus treated water transfer to South Yorkshire. This is the option included in our core WRMP24 plan for 2035.
Aire and Calder new river sources[9]	Two new river abstractions and treatment infrastructure to provide alternative supply to South Yorkshire. This solution is included in our WRMP24 adaptive pathways (enhanced environmental destination and underachieved demand reduction) for implementation in 2039. However, given the increased uncertainty in River Ouse licence availability, these sources are now considered as potential alternatives earlier in the planning period to offset the loss of the UDV import by 2035.
Doncaster Wellfield sources and MAR	Development of under-utilised and/or new groundwater sources in the Doncaster Wellfield, plus potential application of managed aquifer recharge (MAR). These options were initially developed as WRMP24 options but could not be included in WRMP24 due to ongoing AMP7 WINEP investigations. As these investigations are now reaching a conclusion, we consider these as potential alternatives to the River Ouse treated water transfer. They also

[9] In our January 2024 Business Plan resubmission, we included a Supply-Demand Balance enhancement request for the development of a River Aire and Calder solution as part of specific WRMP adaptive pathways. Following engagement with RAPID we propose to include this allowance within SYS SRO and remove it from the supply enhancement data tables. However, our representation still retains the allowance of £0.787m in the supply enhancement case (table CW8 and Section 4) but this would be removed if the SYS SRO funding request is accepted with the Aire and Calder option.

	have potential to deliver significant benefits alongside the Nottinghamshire mine-water SRO solution given the close geographical proximity.
River Don new sources including indirect reuse.	New river abstraction on the River Don, with indirect and direct reuse scenarios for consideration.

We anticipate completion of SYS SRO Gate 2 by June 2026, at which point a candidate solution(s) would be taken forward into Gate 3 in agreement with RAPID. We anticipate completion of Gate 3 by June 2028 to coincide with:

- draft regional and WRMP29 plans submitted with high confidence in deliverability of proposed best value solutions;
- confidence in the sustainability of the River Ouse licences (informed by water quality modelling investigations as set out in section 4; and
- confidence in the magnitude of loss from River Derwent sources under protected sites rivers, which has significant implications for the configuration of our conjunctive-use grid system.

6.4.2 Change requested

Our SYS SRO allowance proposal is based on the continuation of the SRO into AMP8 and the programme outlined in Figure 6-2 above. These key strategic supply-side solutions contribute considerably to regional water resources resilience. Table 6-3 summarises the changes to our plan following Ofwat's draft determination. It explains how we have amended our proposal allowances across three associated cost models (SRO, Supply and DPC). In summary, our proposal is based on:

1. inclusion of SYS in the SRO data tables;
2. removal of the River Aire and Calder solution from the supply data tables for inclusion in SYS[9];
3. inclusion of DPC development costs proposed by Ofwat at draft determination and rephased DPC construction costs based on a programme review.

Table 6-3 Summary of changes to the South Yorkshire Sources SRO enhancement

	SYS SRO costs (£m)	Supply-demand balance (£m)	DPC development (£m)	DPC related (£m)	DPC construction (£m)	Description
October 2023 business plan submission	-	-	25.04	7.0	152.01	No explicit SRO allowance requested. Backfill SRO (York WTW) allowance included in DPC/SUP12 tables
January 2024 business plan resubmission	-	0.79	25.04	7.0	152.01	As per October, but with additional enhancement request to support River Aire supply solution
Ofwat's draft determination	-	-	9.82	10.95	152.01	DPC development and project related costs changed. River Aire enhancement request disallowed due to lack of evidence.

YKY draft determination representation	17.09	0.79	-	10.95	11.03	Total allowance for SYS in SRO (by gate in table below) plus DPC related costs reflect Ofwat draft determination. Aire and Calder included within SYS. DPC construction rephased.

Note 1: The DPC costs in SUP12 were not correctly inflated to the PR24 price base in the October 2023 and January 2024 submissions but were corrected in the April 2024 business plan resubmission not mentioned above.
Note 2: Our representation still retains the allowance of £0.787m in the supply enhancement case (table CW8 and section 4) but this would be removed if the SYS SRO funding request is accepted.

Table 6-4 AMP8 Enhancement Allowance Proposal – South Yorkshire Sources

SRO	Gate 2*	Gate 3	Gate 4	AMP8 Total
SYS	£2.8m	£7.84m	£6.42m	£17.09m

** Gate 2 remaining forecast based on partial progression during AMP7.*

6.5 Nottinghamshire mine-water SRO

6.5.1 The need for investment

Our other SRO proposal is a novel, cross-sector project in collaboration with Severn Trent Water and the Coal Authority. This SRO will explore the potential to treat mine water for the purposes of public water supply while minimising the waste streams associated with the dewatering operations of mine-water treatment schemes. The specific potential benefits to Yorkshire Water of this potential new source of supply are two-fold:

1. a direct supply to our conjunctive-use grid via South Yorkshire, partially replacing the loss of supply from termination of UDV;
2. a direct supply to Severn Trent Water's Nottinghamshire water resource zone (WRZ) and reducing the support required in this zone from UDV via Severn Trent's grid.

We have engaged with RAPID on this proposal and Ofwat's draft determination is as follows:

Some new schemes have been identified at a late stage and require further evidence and information before we can confirm that they would be included within the RAPID programme. In many cases, these projects are innovative and reflect the emerging opportunities of cross sector collaboration, particularly the Nottinghamshire Mine Water treatment project (Severn Trent Water, Yorkshire Water and the Coal Authority) and the Rudyard reservoir augmentation project (Severn Trent and the Canal and Rivers Trust). We continue to engage with companies on these projects and, subject to further information, are minded to accept these as major projects within the RAPID programme[10].

We anticipate completion of Gates 1, 2 and 3 in 2025, 2027 and 2030 respectively. Outputs from Gate 2 would also inform whether there is the potential to incorporate this solution into SYS SRO to enhance regional water resources resilience. On completion of Gate 2, we would review the outputs alongside other ongoing SROs with a view to reallocating SRO programme funding according to need (that is, where new evidence supports acceleration of a specific project(s)).

6.5.2 Change requested

Our Nottinghamshire mine-water allowance proposal is summarised in Table 6-4 below. The enhancement costs for this SRO have been developed jointly with Severn Trent Water (STW) based on the capex required to develop phases 1 and 2 of the project excluding costs associated with the third party (The Coal Authority) spend. The PR24 methodology has been adopted using 5.5% of the total capex for development costs with 10% of the total in Gates 1

[10] https://www.Ofwat.gov.uk/wp-content/uploads/2024/07/PR24-draft-determinations-Major-projects-development-and-delivery-1.pdf

and 2, 55% in Gate 3 and 45% in Gate 4. The share is 50:50 between companies based on assumed benefit.

The proposal costs agreed with STW in Table 6-5 have since been adjusted by STW and the total requested allowance reduced. These financial changes were too late to accommodate in our tables and therefore any adjustments will be made through the Ofwat query process and following further engagement with RAPID on the scope of this SRO. This does not change the split between companies, the assumed benefit of the SRO or the partnership agreement going forward.

Table 6-5 Summary of changes to the Nottinghamshire mine-water SRO enhancement allowances

	Allowance (£m)
October 2023 business plan submission	-
January 2024 business plan resubmission	-
Ofwat's draft determination	-

Table 6-6 AMP8 enhancement allowance proposal – Nottinghamshire mine water

SRO	Gates 1 – 2 (10%)	Gate 3 (55%)	Gate 4* (45%)	AMP8 Total
Nottinghamshire mine water	£2.35m	£3.29M	£0.28m	£5.92m

** Partial progression in AMP8 assumed.*

6.6 Alignment with Ofwat's major projects draft determination

This section provides additional information to support our SRO programme, aligned with the principals of Ofwat's major projects draft determination and associated PR24 methodologies.

6.6.1 Early development allowances and profiling of allowances

- In terms of the PR24 methodology, we consider the movement of the total investigation costs from 6% of total capex to 5.5% to be reasonable.
- We accept the reprofiling of the percentage spend across the gates for AMP8 schemes in PR24 underpinned by evidence presented by RAPID on previous projects. Our AMP8 SROs for Kielder (section 7) and the Nottinghamshire mine water have been calculated using this profile.
- However, we are challenging that early gate investigations (previously Gates 1 and 2) are largely base funding due to the size, complexity and novel/innovative aspects of the projects. We have concerns with disallowance of funding for early gate development for SROs as we believe this acts as a disincentive to explore more novel options and does not reflect the complexity of large multi-party projects.
- We do not agree that the investigation and costs required in the early SRO gates are necessarily equivalent to WRMP options development base costs. They will include costs for engagement with multiple partners and multiple regulatory representatives (including funding National Appraisal Unit activities). They include additional costs for commercial, legal and assurance activities associated with the development of multi-party options and increased governance associated with the gated process.
- As further clarity is awaited from RAPID with respect to the PR24 approach to these early gates, we have assumed a lighter touch Gate 1 process and have requested full enhancement funding for Gates 2, 3 and 4. We would welcome further clarity on changes to the gated process for PR24.

6.6.2 Case for water resources enhancement funding

We support Ofwat's position, as set out in PR24 final guidance[11], that enhancement investment for the development for strategic supply solutions is justified in certain conditions. Table 6-7 summarises how each of our proposed SROs meets these criteria.

Table 6-7 Enhancement Criteria from PR24 methodology

Criteria from PR24 methodology	South Yorkshire sources	Nottinghamshire mine water
The scheme should be connected to an alternative adaptive pathway set out in a company long-term delivery strategy to meet a defined externally driven uncertainty	Yes, the solution is required by 2035 to offset the loss of supply due to UDV termination.	This solution is not currently in the WRMP / adaptive pathway but could provide significant regional benefit if feasible.
The scheme requires a material enhancement allowance and has a long lead-in time to develop and deliver which covers more than one price control period	Yes, development and delivery spans multiple price controls and must be construction-ready in AMP8 / implemented by the end of AMP9.	Yes, the development and delivery of this novel solution is likely to cover multiple price controls (AMP8 and AMP9).
The preparatory investment in the scheme in this price control period is better value for money than delaying the investment until there is certainty of need in a subsequent price control period	Yes, the preparatory investment is critical to ensure timely implementation of a feasible solution by 2035.	Yes, understanding the feasibility of this solution through investigations early in AMP8 is central to understanding its potential benefit regionally alongside other needs and solutions. Also ensures early benefit to Coal Authority in terms of dewatering need.
The scheme is the best option to meet the need and the proposed funding allowance is efficient and appropriate for the preparatory work	Yes, the River Ouse new York WTW treated water transfer (DV8) solution is selected in Yorkshire Water's best value plan WRMP24. We consider that the potential alternatives may have equal or greater environmental, water resources and resilience credentials. Solution development costs are consistent with RAPID methodologies.	Solution development costs are consistent with RAPID methodologies.
There is appropriate customer protection in place to ensure that the preparatory work is progressed	Yes, a solution is required as part of the long-term strategy set out in WRMP24 and in the best value plan. The risk of an uncertain or undeliverable solution is reduced through the inclusion of alternative options and the portfolio approach across the SROs. The RAPID SRO gated process incentivises companies to deliver	Yes, the RAPID SRO gated process incentivises companies to deliver key submissions to RAPID on time and to high quality. Solutions are discontinued as soon as they are identified as no longer being feasible. Discontinued or reallocated funding can result in some customer funding being returned.

[11] Section 3.4.5 in https://www.Ofwat.gov.uk/wp-content/uploads/2022/04/PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies_Pr24.pdf

	key submissions to RAPID on time and to high quality. Solutions are discontinued as soon as they are identified as no longer being feasible. Discontinued or reallocated funding can result in some customer funding being returned. The funding reconciliation process also means that unspent funds are returned to customers. The key outputs from ongoing investigations are programmed to allow the best value option which is feasible to be taken forward, whether that is the current option in the WRMP24 best value plan or one of the alternative options. Concurrent investigation reduces programme risk and the risk of abortive work.	The funding reconciliation process also means that unspent funds are returned to customers.

6.6.3 Portfolio approach

We support Ofwat's proposal to allow companies to take a portfolio approach to their major projects, allowing flexibility to reallocate funding according to need, as well as allowing solutions to be substituted. We would welcome further engagement from RAPID/Ofwat around the practicalities of this ahead of final determination.

6.7 Best option for customers

6.7.1 WRMP24 best value plan

Our WRMP24 preferred, best value plan has been developed in accordance with the Environment Agency's Water Resource Planning Guidelines[12]. In developing our WRMP we have undertaken a process of supply and demand option identification and development to identify all feasible options that could meet the supply-demand deficit in future years. The best value plan has been selected using a decision-making framework that considers metrics representing totex as well as important societal and environmental factors, including carbon. This ensures our WRMP is a best value plan which is right for our customers and right for the environment. This process and the output is described in sections 9 and 10 of our WRMP24 Technical Document.

The SRO portfolio is linked to the need to provide two large water infrastructure solutions to the address the supply-demand deficit resulting from the loss of the Upper Derwent Valley import to South Yorkshire in 2035 and the reduction in the River Derwent abstraction in 2040. Further details are provided in the New SRO enhancement case appendix (YKY-PR24-DDR-41).

The SRO portfolio allows us to accelerate solution development to meet the deficit in 2035 but also consider candidate solutions more local to South Yorkshire with potentially improved environmental, water resources and resilience credentials when compared to the River Ouse new York WTW treated water transfer option (DV8). The portfolio approach allows us to substitute alternative solution(s) if they are found to improve on the existing solution ensuring we have the right solution for customers and the environment.

6.7.2 Portfolio approach

As mentioned above, Ofwat's proposal allows companies to take a portfolio approach to their major projects, allowing flexibility to reallocate funding according to need. Investigating a

[12] Environment Agency and Natural Resources Wales (2021). Water Resource Planning Guidelines.

number of options as part of this portfolio allows efficient use of funds while allowing us to meet the supply-demand deficit set out in the WRMP24. For example, by progressing the alternative options as part of the SYS SRO, and with prompt elimination of non-feasible options, we can ensure we have certainty in delivering a solution that will offset the deficit identified in WRMP24, while ensuring efficient use of customers' money. Customer protection in relation to SRO and DPC is discussed in section 6.8 below.

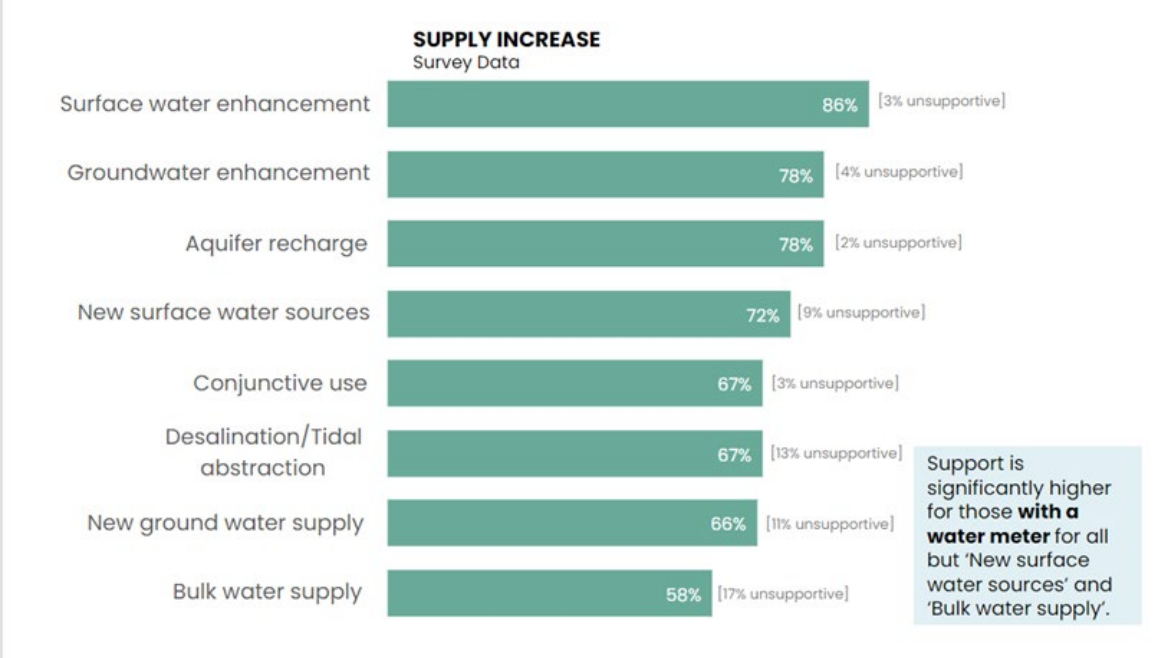
6.7.3 Customer support

In preparation for PR24 we have conducted a huge volume of research. Our studies consistently reference resilience as an important factor in the consideration of water provider service. In Ofwat's own preferences research, resilience was a mid-tier priority however, this sat behind top-tier priorities such as water quality and interruptions, which function well because of resilience in the round.

In addition, our wider research programme tells us that customers support activity which increases the resilience of their network. Customer support for our Water Resource Management Plan (WRMP) is very high and is evidenced by extensive customer research where we have engaged with over 2,000 customers on this area of our plan in both our enhancement case and cost adjustment claim research and our independent affordability and acceptability testing. The overall WRMP is supported by 86% of our household customers, rising to 89% of non-households and 96% of future bill payers. The majority of customers also believe it represents good value for money with agreement ranging from 54% up to 76% for non-households.

Specific research we have conducted on our draft WRMP in 2023 (speaking to 236 customers) has shown that the majority of customers are supportive of all of our supply increase proposals, particularly surface and ground water enhancement, aquifer recharge and new water sources. As Figure 6-3 below shows, very few customers are unsupportive of investments in this area.

Figure 6-3 Customer research findings



We have also conducted additional recent research (August 2024) on our rdWRMP which continues to demonstrate strong support for our overall plan, as well as the individual aims and initiatives within it. In this research we engaged with 626 household customers.

After having read the WRMP plan in detail, the vast majority of customers are supportive of the **plan overall** (89%).

The vast majority, at 93%, are also supportive of the **plan's key aims** (pictured below for reference):

In terms of our **demand and supply** plans specifically, these were also very well supported, 91% were supportive of our plans to reduce demand and 87% supportive of our plans to increase supply. 87% are also supportive of the balance between the contribution of supply and demand measures proposed. 89% are also supportive of the general direction and timeline of the plan to address the deficit up to 2073.

6.8 Approach to optimism bias

Our approach to applying optimism bias (OB) to the costs for the SROs is based on HM Treasury Green Book guidance, including the Supplementary Guidance on Optimism Bias, as well as the All Company Working Group (ACWG) guidance produced by Mott MacDonald.

The key reference documents used for this approach are:

- HM Treasury Green Book, Supplementary Green Book Guidance, April 2013; and
- Cost Consistency Methodology, Technical Note and Methodology. Mott MacDonald, February 2022.

Project type: The relevant project type for our projects is 'standard civil engineering projects', which we consider to be the appropriate type for the scope of the proposed SRO schemes. As described in the guidance, standard civil engineering projects involve the construction of infrastructure facilities, in addition to buildings, that do not require special design considerations. We interpret this as meaning design considerations beyond what Yorkshire Water as a utilities sector provider commonly delivers. Based on the current stage the projects are at, we do not envisage that there are special design considerations, whether related to constraints such as space, or unusual output specifications or innovations, as would be the case with non-standard civil engineering projects as noted in the guidance. Any software or equipment installations associated with the SRO projects form a smaller proportion of the project costs, and equally are considered well-established in terms of needs, specifications, procurement and suppliers.

Key contributory factors: We have assessed the following as the key contributory factors to uncertainty, and therefore to the selection of the level of OB. The factors are taken from Supplementary Green Book guidance and are assessed based on current understanding of the project proposals and future uncertainties.

Procurement factors: These relate primarily to the potential complexity of the contract structure, especially where direct procurement for customers (DPC) delivery is concerned. This is a new delivery mechanism for the water sector and may present a material level of risk due to this being a new, innovative approach to funding large water infrastructure assets. The Ofwat stages and DPC procurement process provide a suitable mitigation approach; however, the details of risk transfer are yet to be worked out and clarified. In addition, payment mechanisms are to be defined as part of the contract set-up, and there is an unknown (but likely significant) amount of contract negotiation required on terms of the contract.

Client-specific factors: These relate to the range of stakeholders likely to be involved, given the regional nature of the SRO projects, as well as potential for different public -sector parties to have differing interests in some of the projects (such as water for energy and industry, and mine -water disposal). Further considerations include approval processes taking longer due to the number of parties involved, funding availability (Yorkshire Water versus DPC investors, or DPC investor market interest) and complexities that are likely to be associated with confirming availability of finances for the projects in a timely manner.

Environmental factors: Environmental factors pose the greatest uncertainty to civil engineering projects; findings by Mott MacDonald in its cost consistency report indicate that for standard civil

engineering projects, environmental impacts led to the greatest proportion of recorded optimism bias (circa 22%). For the SRO projects, we have identified that environmental permits, consents and approvals are likely to lead to significant programme and scheme design uncertainty. This includes abstraction and discharge permits, on which viability of all the SRO schemes is reliant. Obtaining planning permission is also expected to be onerous, regardless of whether DCO or TCPA approaches are used. The projects will also be influenced by the findings of environmental investigations, particularly under the WINEP programme, and therefore there is some risk associated with environmental impacts, as well as stakeholder opposition in regard to the project construction phase (for example traffic and construction noise).

External influences: Key external influences leading to uncertainty include the broad economic context, along with ongoing price inflation, which has been a significant feature of AMP7. The economic context could influence changes in market demand resulting in changes in funding priorities and affecting appetite for DPC, or at the very least, timeliness of funding. There is also some uncertainty associated with ongoing legislation and regulation of the environment and water sectors which could contribute to uncertainty, albeit to a lesser extent.

Selected optimism bias bound: We have based the selected OB level on our assessment of the contributory factors outlined above. We have also carried out an internal review of our internally generated costs versus contractor costs across a range of our infrastructure and non-infrastructure projects. The review showed that for most clean-water projects our generated costs are lower than contractor costs. We have therefore taken this into account in setting an appropriate OB level.

We have concluded that the appropriate capex OB level for all our SRO projects is 40%. This is based on or assessment above and is comparable to the upper bound of 44% for standard civil engineering costs, as shown in Table 3-1 of the Green Book (see extract below, Table 6-8).

As a further check, we have carried out a high-level review of five ongoing SRO projects, for which the Gate 2 submissions OB ranged from 26% to 51%, with an average of 38.2%

We conclude, therefore, that we have set an appropriate and reasonable OB based on the key contributory factors we have assessed as most likely to affect cost uncertainty.

Table 6-8 Extract from Table 3-1 of the Green Book

Table 3-1: Green Book – Upper and Lower Bound of Optimism Bias (%)

Project Type	Optimism Bias (%)			
	Works Duration		Capital Expenditure	
	Upper	Lower	Upper	Lower
Standard buildings	4	1	24	2
Non-standard buildings	39	2	51	4
Standard civil engineering	20	1	44	3
Non-standard civil engineering	25	3	66	6
Equipment / development	54	10	200	10
Outsourcing	n/a	n/a	41*	0*

Source: HM Treasury (2018), Green Book Guidance[11]

6.9 Customer protection

Our customers will benefit from protections against late delivery and poor-quality submissions to RAPID for our SRO schemes. These protections take the form of incentives placed upon Yorkshire Water to invest efficient allowances effectively in accordance with the framework of SRO delivery penalties under the gated process.

For any solutions discontinued, unspent funding will be returned to customers where the solution is stopped at an in-period gate, and the funds are not reallocated to a substitute solution.

For solutions that do progress, companies can face penalties of up to 30% of a company's efficient gate funding for late and poor-quality submissions to RAPID. We understand this excludes where expenditures are from the company AMP8 base allowances (that is, necessary early development costs required for Gate 1 and/or Gate 2 where Ofwat disallows this funding as within its PR24 final determination).

To help protect customers from the uncertainty in developing major projects, any project over and underspends will be addressed with specific cost-sharing arrangements.

Any funding contingent on the granting of consents or permissions will not be added to customers' bills in 2025-30. Yorkshire Water will log up such expenditures and seek an end of period reconciliation to recover these costs from customers' bills in the 2030-35 period (AMP9). We believe this approach to contingent funding proposed by Ofwat strikes a fair balance in addressing uncertainty of project progression and required allowances, as long as the opportunity to secure funding from bills in AMP9 is secure.

Where an SRO scheme proceeds into delivery and this is progressed via the DPC route, a further penalty framework is proposed by Ofwat again on the quality and timeliness of delivery at key stages within the DPC regime.

We note that the DPC incentive mechanism is designed to work to complement the RAPID incentives framework, and we think, as proposed, they do this. For example, the DPC incentives will not apply at DPC Stage 2 where the project is a RAPID project, since the project will face RAPID delivery incentives at Gate 3.

Below, we present the DPC incentives mechanism as proposed by Ofwat at the PR24 draft determination (Table 6-8) and then the Yorkshire Water view of suitable DPC incentives (Table 6-9). We welcome the structure Ofwat sets out but believe the incentive values (penalties and success fee) require reducing under DPC Stages 2-4 and financial closure.

Table 6-9 Ofwat illustration of proposed DPC incentives

Ofwat proposed DPC incentives	Stage 2 (applicable for non-RAPID DPC projects only)	Stage 3	Stage 4	Financial close
Example activities/ deliverables as per DPC guidance	High-level contracting strategy covering payment, termination / exit / asset management, etc.	Detailed payment mechanism, draft CAP agreement	Final version of CAP agreement; programme plan covering the construction period.	Entering into CAP agreement and provision of project handbook within six months of CAP agreement signing.
Quality weighting	60%	50%	40%	Single success fee on entering CAP agreement, calculated as **4%** of the project's whole life totex.
Timeliness weighting	40%	50%	60%	
Penalty (cumulative)	**20%** of Stage 2 DPC related costs funded in PR24	**25%** of Stage 2 + Stage 3 DPC related costs funded in PR24	**40%** of Stage 2 + Stage 3 + Stage 4 DPC related costs funded in PR24	N/a

Table 6-10 Ofwat illustration of proposed DPC incentives

Yorkshire Water proposed DPC incentives	Stage 2 (applicable for non-RAPID DPC	Stage 3	Stage 4	Financial close

	projects only)			
Example activities/ deliverables as per DPC guidance	High-level contracting strategy covering payment, termination / exit / asset management, etc.	Detailed payment mechanism, draft CAP agreement	Final version of CAP agreement; programme plan covering the construction period.	Entering into CAP agreement and provision of project handbook within six months of CAP agreement signing.
YW view - Quality weighting	**70%**	50%	40%	Single success fee on entering CAP agreement, calculated as **3%** of the project's whole life totex.
YW view - Timeliness weighting	**30%**	50%	60%	
YW view - Penalty (cumulative)	**10%** of Stage 2 DPC related costs funded in PR24	**10%** of Stage 2 + Stage 3 DPC related costs funded in PR24	**20%** of Stage 2 + Stage 3 + Stage 4 DPC related costs funded in PR24	N/a

We would be happy to discuss the incentives mechanism with Ofwat, particularly in relation to any of our SRO schemes that progress towards DPC delivery.

6.10 Concluding points

We propose the following key changes as part of our representation for Ofwat's consideration:

- The inclusion of AMP8 costs for a new South Yorkshire Sources (SYS) SRO enhancement request based on the continuation of the AMP7 UDVRE SRO (Backfill option). This includes additional options to address uncertainty associated with the new York WTW treated water transfer option on the River Ouse, and to ensure we have the right solution for customers and the environment which considers all new information that has come to light since submission. The associated programme allowance for this has been revised to reflect the changes (including DPC costs).

- The addition of a new innovative joint SRO with STW, which Ofwat has stated at draft determination it is 'minded to support'. This explores a novel option to treat mine water in Nottinghamshire to provide a potential full or partial alternative to the SYS.

- A statement of our acceptance of the PR24 methodology for major projects (PR24 draft determinations: major projects development and delivery report) in terms of revised total percentage funding and cost split across gates; however, we challenge the principle that the early gate investigations are largely base funding.

- An alternative proposal to the incentive mechanisms for customer protection.

Not only is our proposed enhancement investment in AMP8 justified for the development of these strategic supply solutions, but our SRO portfolio will play a crucial role in supporting the development and delivery of our WRMP through AMP8 and beyond.

7. Kielder Transfer Strategic Resource Option

7.1 Overview

Kielder Transfer Strategic Resource Option (SRO) was proposed in our January 2024 business plan resubmission, in collaboration with Northumbrian Water and United Utilities, following engagement with RAPID. We did not include an original enhancement case in our draft business plan, although a joint Yorkshire Water / Northumbrian Water / United Utilities proposal[13] was issued to RAPID on 12 January 2024 alongside the January 2024 data table updates. Further to clarification queries from post submission, an updated project scope[14] was provided to Ofwat and RAPID on 19 April 2024, although no additional changes were made to data tables.

This section responds to Ofwat's draft determination on the Kielder Transfer SRO. Our response has been developed and is consistent with Northumbrian Water's and United Utilities' representations. The section should be read alongside our supplementary New SRO enhancement case appendix (YKY-PR24-DDR-41), which set out the context to our proposed SRO portfolio.

7.2 Ofwat action reference

Ofwat's draft determination is summarised in *PR24-DD-W-Strategic-resource-options-1* and the associated *Major Projects Development and Delivery* appendix.

We requested £20.21m enhancement totex, with funding contingent on satisfactory progression through the SRO gated process. Ofwat has partially accepted this enhancement request with the following proposed amendments:

1. reduced allowed development cost allowances as a proposition of total solution capex from 6% to 5.5% following cost benchmarking of existing SROs;
2. reprofiled expenditure allowances to reflect that for existing SROs, Ofwat observes that around 90% (rather than 75%) of spend is incurred from the start of the planning process pre-application phase of work (Gates 3-4)
3. is allowed some early development costs in line with the PR24 methodology position that these should be funded from baseline allowances, replacing these costs with a lower, notional development cost.

The above amendments reduce the total development allowance from £20.21m to £19.59m (comprising £18.38m baseline development costs and £1.35m contingent) as set out in the *development costs split tab* in Ofwat's PR24-DD-W-Strategic-resource-options-1 cost model.

It should be noted that beyond the notional £0.24m early development costs, the remainder of the £19.59m enhancement allowance is contingent on completion of Gate 2 activities which Ofwat has disallowed enhancement funding for.

7.3 Yorkshire Water's response to Ofwat

We accept the reduction in the development cost benchmark from 6% to 5.5% and have updated our cost tables accordingly. We have also reprofiled expenditure allowances so that 10% of expenditure is allocated to Gate 2 and 90% of expenditure is allocated to Gates 3 and 4. In addition, we have updated the programme such that Gate 4 would be commenced in AMP8 but completed in AMP9, which reflects a more realistic phasing based on the progression of existing SROs.

[13] Kielder SRO Indicative Project Scope – Draft (January 2024) – A Joint United Utilities, Yorkshire Water and Northumbrian Water proposal to RAPID.

[14] Kielder SRO Indicative Project Scope – Revised Draft (April 2024) – A Joint United Utilities, Yorkshire Water and Northumbrian Water proposal to RAPID.

However, we disagree with Ofwat's decision to disallow some early development costs and its position that these should be funded from baseline allowances based on the following principles:

- The Kielder SRO is a strategic, regionally important study which has scope over and above the WRMP options development process. It will involve multiple partners and engagement with multiple regulatory representatives (including funding National Appraisal Unit activities). Outcomes from the early gates are likely to have significant implications on future water supply (and industrial) strategies and water network configurations nationally.

- We consider that Ofwat's proposed notional allowance of £0.24m per company for Gate 2 is insufficient to fund the range of activities required at Gate 2. An alternative proposal to fund two separate SROs (Kielder-United Utilities and Tees Transfer) would in theory double this allowance, however we see significant benefit and efficiency in retaining the SRO as a single project.

- We acknowledge that RAPID has issued further guidance '*Approach to the RAPID programme and gated process for PR24*' [15] on 22 August 2024 and we note that they '*acknowledge that there is a possibility that base expenditure does not sufficiently encompass all activities required to progress a solution for gate two*'. As this guidance was not available in time to feed into this representation, we have assumed that the existing methodologies apply. We would welcome further engagement on this ahead of final determination. Our analysis suggests that Gate 2 outturn costs for similar tripartite AMP7 SROs is in excess of our Gate 2 request for £5.1m between the three partner companies.

We consider that the early-stage development costs meet the criteria for enhancement funding as set out in PR24 guidance[16], also see section 2 of New SRO enhancement case appendix (YKY-PR24-DDR-41).

7.4 Changes required

Table 7-1 summarises our revised proposed enhancement allowance, based on the following key assumptions:

- development cost allowance reduced to 5.5% of total solution capex;.
- development cost reprofiled at 10% (Gate 2), 55% (Gate 3) and 45% (Gate 4); no enhancement request for Gate 1;
- Gate 2 development allowance based on combined total capex of Tees Transfer and Kielder-UU Transfer solutions (£1.05bn in 2022-23 price base), Gates 3-4 development allowance based on total capex of Tees Transfer only (£0.41bn in 2022-23 price base);
- equal partner funding up to Gate 2; 90:10% split between Yorkshire Water and Northumbrian Water for Gates 3-4 (assumption to be reviewed at Gate 2 submission); and
- Gate 4 activities commenced in AMP8 (Year 5) but the majority of expenditure incurred in AMP9.

Table 7-1 Our proposed Kielder Transfer SRO Allowance

Partner	Gate 2 (10%)	Gate 3 (55%)	Gate 4* (45%)	AMP8 total
Northumbrian Water	£1.70m	£1.12m	£0.08m	£2.90m
Yorkshire Water	**£1.70m**	**£10.08m**	**£0.67m**	**£12.45m**

[15] https://www.ofwat.gov.uk/wp-content/uploads/2024/08/Approach-to-the-RAPID-programme-and-gated-process-for-PR24.pdf

[16] https://www.Ofwat.gov.uk/wp-content/uploads/2022/04/PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies_Pr24.pdf

United Utilities	£1.70m	-	-	£1.70m
Total	*£5.10m*	*£11.20m*	*£0.75m*	*£17.05*

** Total Gate 4 allowance is estimated at £8.95m, consistent with Ofwat's draft determination. However, the total allowance requested for AMP8 only is £0.75m based on reprofiling of most Gate 4 costs into AMP9.*

7.5 Concluding points

We accept the reduction in the development cost benchmark from 6% to 5.5%, and also reprofiled expenditure allowances so that 10% of expenditure is allocated to Gate 2 and 90% of expenditure is allocated to Gates 3 and 4. This is aligned with the principles of Ofwat's major projects draft determination appendix.

We have updated the programme such that Gate 4 would commence in AMP8, but completed in AMP9, which reflects a more realistic phasing based on the progression of existing SROs. The summary of changes is provided in Table 7-2.

We disagree with Ofwat's decision to disallow some early development costs for Gate 2, and provide evidence why it should be considered as enhancement funding.

Table 7-2: Summary of changes to the Kielder Transfer SRO enhancement allowances

	Allowance (£m)
October 2023 business plan submission	0
January 2024 business plan resubmission	£20.21
Ofwat's draft determination	£19.59
YKY draft determination representation	**£12.45***

** Total does not include the DPC allowance of £1.35m which is included in data table CW3.54*

8. Leakage

8.1 Overview

Yorkshire Water accept the mechanism used to derive the funding for Yorkshire Water's PR24 enhancement leakage case but considers it necessary to make a representation on leakage due to the impact of reductions made in Ofwat's draft determination to Yorkshire Water's proposed mains renewal base cost allowances.

This representation is dependent on Ofwat accepting Yorkshire Water's representation on mains renewal. Yorkshire Water considers its mains renewal representation 'not successful' if the proportion of modelled implicit allowance in the final determination is greater than 0.205% and the cost per km of mains renewal is funded below £336k per km. If the mains renewal representation is not successful, making Yorkshire Water unable to deliver the target 1092km of mains renewal due to a higher mains burst rate and the need for additional leakage interventions to offset the reduction in benefit from mains renewal, Yorkshire Water requires this representation to be reviewed.

This representation would reoptimise the leakage investment blend with a decreased mains burst and leakage benefit, while providing additional enhancement funding for solutions to bridge the gap in leakage performance, as a consequence of a reduction in ability to deliver the original mains renewal plan within the leakage glidepath. The total reduction in leakage benefit, from reducing the mains renewal programme by 295km is 2.9Ml/d.

The total enhancement programme under this conditional representation would require £21,396,694 to deliver 17.21 Ml/d of leakage reduction by the end of AMP8.

This representation should be viewed in combination with our leakage outcome representation, whereby Ofwat modelled a Year 5 AMP7 'in-year' outturn, significantly lower (255.1 Ml/d) than required to achieve a 15% leakage reduction. Ofwat is requesting to adjust the glidepath start point in line with the outcome representation and required "in year" performance to achieve 15% leakage reduction, not applying any reductions for under-delivery or an incorrectly modelled end of AMP7 exit point.

8.2 Key messages

1. **The amended leakage enhancement claim is subject to Yorkshire Water's mains renewal representation not being successful. We class the representation as not being successful if the proportion of modelled implicit allowance in the final determination is greater than 0.205%, and the cost per km of mains renewal is funded below £336k per km.**

   Shortfall in leakage related to a reduced mains renewal programme has been determined by UKWIR published papers, and a new optimised leakage plan has been created to bridge the gap in leakage and higher burst rates. To address this shortfall in leakage, the value of the reoptimised enhancement plan is £21.40 million. This is necessary to achieve the required 12.2% leakage reduction in AMP8, totalling 27.2% from baseline.

2. **If the mains renewal representation is not successful, the draft determination position would result in Yorkshire Water delivering 295km less mains renewal. This is the equivalent of 2.9 MLD of leakage and would result in a higher financial cost to find and repair a higher level of mains bursts.**

3. **The £1.287 million removed through the mechanism described in the 'leakage enhancement feeder model' tab 'Additional Enhanced Red and Cap' should be amended to reflect expected full delivery of the 15% leakage reduction in AMP7**, in line with the updated actual performance and Year 5 blind year forecast outturn, which will achieve 15.1% leakage reduction in AMP8. This also means any applied reduction in enhancement funding should be adjusted with no underperformance repayment.

4. **There is a misunderstanding within the Ofwat model.** As a result, the Yorkshire Water plan of investment for leakage enhancement has been built to start from 268.0 MLD in three-year rolling terms, not from the outturn position. This means that, regardless of outturn, we request only the funding required to reduce from 268.0 to the end of AMP8 position of 229.6 MLD. We are therefore not asking for enhancement investment for service levels already funded and the outturn for AMP7 should no be used for any mechanism to reduce investment due to the risk of double funding service improvement.

5. **Ofwat's assessment of APR19 and 21 to determine cost-efficient MLD reduction costs, requires review. This is because Ofwat currently uses historic costs per MLD to determine future costs at frontier levels of leakage and does not consider the cost curve of interventions increases, as the most cost-efficient options have already been delivered.** This cost curve for leakage into the future is the basis of the analysis within the SoLow optimisation model used by Yorkshire Water in WRMP and PR24, selecting the next most efficient solution to drive the lowest cost 25-year delivery plan. Ofwat's £1.11 million per MLD differs from our future cost of leakage reduction being £1.243 million per MLD. Further details are provided in section 8.5.

8.3 Change requested

The table below demonstrates our requests of Ofwat in the event that our mains renewal representation is not successful and the objectives of this representation. Each of the four changes are then explored in more detail in turn in section 8.4.

Table 8-1 Summary of changes

Summary of change	Commentary
Yorkshire Water's request of Ofwat	
1. If the mains renewal representation is not successful, our reoptimised leakage plan will deliver to the same leakage glidepath and outturn of 27.2% leakage reduction in AMP8, but a change in intervention blend and cost from PR24 submission to £21.40m.	We have utilised the SoLow best practice leakage optimisation model, used in the WRMP24 and PR24 submission to consistently optimise this investment required if the mains renewal representation is not successful. The reoptimisation considered the leakage volume and burst rate of being able to deliver **797km** of mains renewal, as opposed the planned **1,092km**, within our WRMP24 and PR24 submission. This reduction in length to 797km is due to deliverability constraints in the draft determination methodology. Please see the mains renewal representation; the focal points of the representation are the implicit mains renewal percentage within base, and the efficient cost per km. The 797km have been determined using actual outturn costs for current Yorkshire Water schemes of ~£390.5 per meter and the total funding provided at draft determination. Together, these constrains result in us only being able to deliver a shorter km of renewal, with the consequential reduction in leakage benefit and a lessened reduction in mains burst rates. The leakage benefit from 797km of mains renewal was calculated within the SoLow optimisation model and is based on the findings of the UKWIR published paper 'The Impact of Burst-Driven Mains Renewals on Network Leakage Performance'
2. Any adjustment to leakage enhancement investment requested is not appropriate as we have planned that any under delivery of the AMP7 target would be funded by us and	We have built a leakage reduction plan, which delivers leakage reduction from the three-year rolling average position of 268.0 MLD. As such, we have not used OUT2 or OUT8 tables to determine our investment need. It is therefore inappropriate for Ofwat to apply any adjustment to our enhancement case based on concerns that we have been funded twice to deliver the same MLD reduction.

not included in the request for enhancement funding.	For clarity, we have built a plan to reduce leakage from **268.0 MLD to 229.6 MLD in 3-year terms**, a reduction of 38.4 MLD of leakage activity. If we do not achieve 268.0 MLD at 2024-25 outturn, we will self-fund the 'catchup' activity, and Ofwat should not remove any enhancement funding from the programme to address the catchup. This modelling is currently undertaken in the 'Post Adj & FS Allowances' tab of the leakage enhancement Ofwat model.
3. Ofwat should reanalyse the OUT 2 performance submission, which results in Yorkshire Water attaining 15% leakage reduction.	This would negate the process to remove funding for AMP8 as all targets would have been achieved. This change should be viewed in combination with point 3 below. If our Year 5 outturn is below 15%, Ofwat should recognise point 3 below that protects customers from paying twice for leakage reduction activity.
4. Ofwat should consider that the leakage management costs increase as the cost to deliver the next MLD requires more expensive solutions.	Using historic costs without an upwards adjustment to determine future costs is flawed, and Ofwat should utilise a different approach to determine future costs, elevating £ per MLD for AMP8 from the draft determination level. Without this adjustment, Ofwat risks underfunding the sector to deliver the WRMP24 outcomes, which in turn may trigger adaptive pathways to sustain supply-demand resilience.

Table 8-2 Summary of changes to the leakage enhancement allowance

	Allowance (£m)
October 2023 business plan submission	23.49
January 2024 business plan resubmission	15.17
Ofwat's draft determination	15.83
YKY draft determination representation	15.67
YKY conditional draft determination representation (mains renewal)	21.38

8.4 Yorkshire Water's response to Ofwat

This section provides further detail on each of the four changes described in the table above. Following this, it demonstrates our consideration of consumers and cost efficiency.

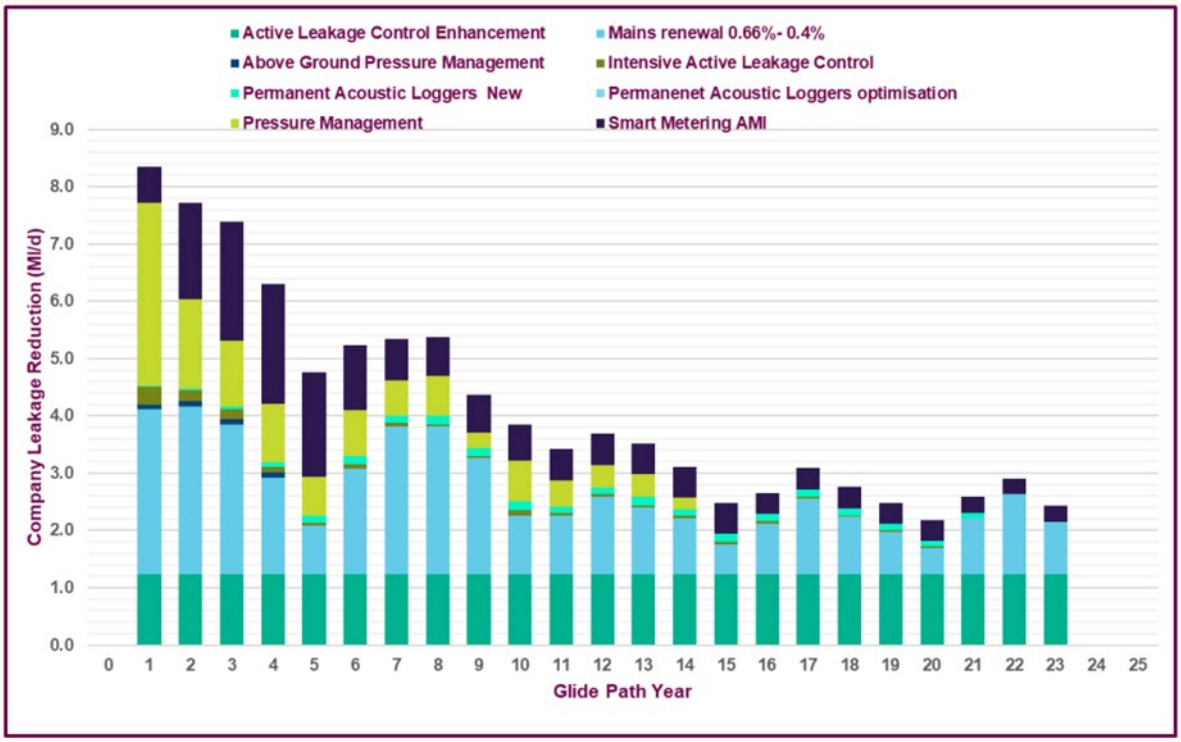
8.4.1 Yorkshire Water's requests of Ofwat

Conditional mains renewal linked representation

As per the supply-demand enhancement case submitted at PR24 submission, Yorkshire Water has created a blended plan to reduce leakage, demonstrated in Table 8-3 and Figure 8-1/8-2. This plan includes pressure management, ALC, smart metering and mains renewal. Within this plan, 10.52 MLD of the leakage reduction plan is delivered through mains renewal, reducing background leakage, burst-related leakage and burst rates.

Yorkshire Water has an ambition to replace 0.66% mains renewal per annum, resulting in 1,092km of mains being renewed. If our representation on mains renewal is not supported, we will be limited to replacing a shorter length of mains and subsequently realise a lower leakage benefit and sustain a higher mains burst rate than planned at PR24 submission.

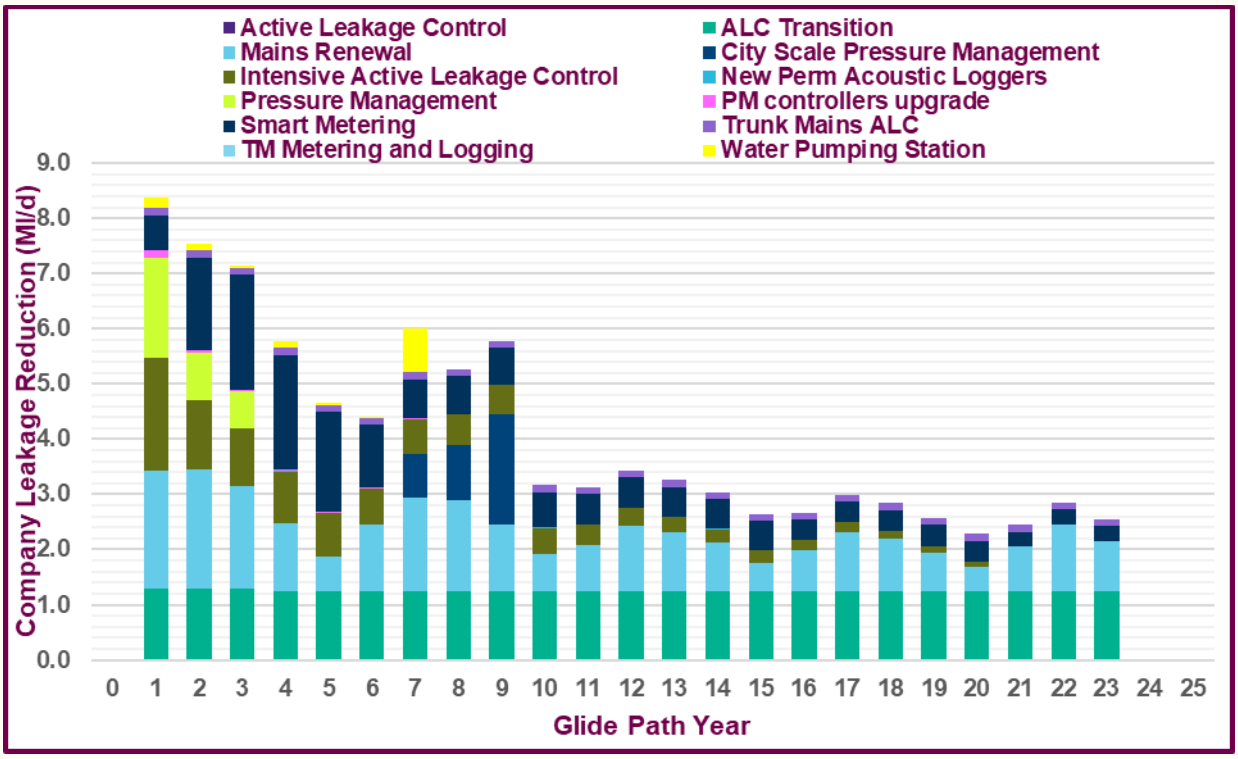
Figure 8-1 Yorkshire Water investment plan, including 1,092km of mains renewal



The draft determination position would result in Yorkshire Water being able to deliver 295km less mains renewal, the equivalent of 2.9 MLD of leakage and a higher financial cost to find and repair a higher level of mains bursts. Utilising a consistent approach to WRMP24 and PR24 submission, we have reoptimised the leakage delivery plan over the following 25 years. We have established a cost-optimal solution with a lower level of mains renewal, in line with the financial constraint; such a plan will deliver only 797km of mains renewal. The blend of solutions has changed to accommodate a higher mains burst rate and the need for additional leakage interventions to offset the reduction in benefit from mains renewal. The optimised plan is shown below.

The enhancement totex plan for intervention and maintenance of the solutions implemented (such as PRVs and advanced controls on water pumping stations) totals £21.397 million.

Figure 8-2 Yorkshire Water investment plan aligned to draft determination mains renewal reduction in benefit



The optimisation process utilised the SoLow industry best practice optimisation tool and a consistent set of intervention types, as outlined in section 1.4.1 of the Supply-Demand Balance enhancement case[17].

The SoLow solution selects the most cost-efficient plan to deliver a 50% leakage reduction by 2050. The table below demonstrates the schemes considered and the level of investment selected over the next five years. The costs include the increasing cost of solutions to reduce the next MLD of leakage and the aggregate of the maintenance costs for solutions implemented, such as maintenance of pressure-reducing valves installed to deliver the leakage reduction.

Table 8-3 Transition Cost (£)

Option	Year 1	Year 2	Year 3	Year 4	Year 5	AMP total
ALC transition	1,480,167	1,510,395	1,530,120	1,513,670	1,559,242	7,593,594
City scale pressure Management	0	0	0	0	0	0
High tech ALC	0	0	0	0	0	0
IALC	671,984	826,281	955,690	1,114,657	1,147,882	4,716,494
PAL new loggers	2,775	10,418	18,991	6,618	26,813	65,615
PM	1,847,423	987,338	890,097	32,760	32,760	3,790,378
PM smart control	15,983	17,654	16,102	17,216	18,330	85,285
Supply pipe repair	0	0	0	0	0	0
TM ALC	312,795	312,795	312,795	312,795	312,795	1,563,975
TM metering and logging	0	0	0	0	0	0
Transients	0	0	0	0	0	0
WPS	531,933	633,965	736,991	839,005	839,460	3,581,354
Total £ investment	**4,863,060**	**4,298,846**	**4,460,786**	**3,836,721**	**3,937,282**	**21,396,696**
Total benefit of schemes	**5.59**	**3.71**	**3.21**	**2.48**	**2.21**	**17.21**
£/MLD	**869,957**	**1,158,719**	**1,389,653**	**1,547,065**	**1,781,576**	**1,243,271**

[17] yky26_supply-demand-balance-enhancement-case_public.pdf (yorkshirewater.com)

Reduction in enhancement allowance due to under performance in AMP7

Yorkshire Water is submitting updated leakage levels in OUT1 using APR 2023-24 leakage attainment and business plan 2024-25, utilising the year-to-date performance as a better informed projection of the Year 5 outturn. The updated OUT1 table will demonstrate Yorkshire Water achieves a 15.1% leakage reduction in AMP7, surpassing the leakage target.

As such, we should not have any reductions in enhancement funding in AMP8 as a result of under delivery of AMP7 outturn. Ofwat should accommodate this change in the table below (from the Ofwat enhancement model tab 'Additional Enhanced Red and CAP') to not reduce enhancement funding. This representation should be viewed in conjunction with representation 3, which provides logic and background to our start point for requesting leakage enhancement expenditure. Furthermore, our plan for AMP8 is built starting from a 268.0 MLD three-year rolling average, the required 15% reduction level. Therefore, the assumption that we are requesting enhancement for service level improvement already funded is not correct.

The quote and table below reference the leakage enhancement financial model spreadsheet and tab titled 'Additional Enhanced Red and CAP', where this reduction in funding is inappropriately applied.

This sheet is used to ensure that all leakage reduction, beyond that set out in the 2019 price review, is funded and to ensure any under-delivery from the 2019 price review is not funded again. Company queries where we requested the company to set out where leakage funding is included so any base funded leakage can be included. The improvement to fund cap is provided by the cost service team and is used as a hard limit on the maximum amount of leakage reduction that can be funded for any company. In the case of Anglian, this removes all funding as they propose only a 0.6 Ml/d reduction over what is proposed and this is funded through CSL reduction within metering.

Table 8-4 Ofwat's draft determination leakage enhancement model

	Volume to fund (Ml/d)	Enhancement Leakage Reduction (Ml/d)	Company leakage reduction in base (Ml/d)	Volume to remove (Ml/d)	Expenditure to remove (£m)
ANH	0.600	10.700	0.000	-10.100	-17.176
WSH	20.900	18.580	0.000	0.000	0.000
HDD	1.400	0.450	0.930	0.000	0.000
NES	12.100	7.170	4.900	0.000	0.000
SVE	56.100	25.400	30.700	0.000	0.000
SWB	14.000	12.920	0.000	0.000	0.000
SRN	10.200	10.200	0.000	0.000	0.000
TMS	96.200	51.770	44.430	0.000	0.000
NWT	50.000	48.220	1.780	0.000	0.000
WSX	3.500	3.500	0.000	0.000	0.000
YKY	31.300	32.460	0.000	-1.160	-1.287
AFW	22.400	5.200	17.200	0.000	0.000
BRL	2.000	1.470	0.000	0.000	0.000
PRT	2.700	0.800	2.950	-1.050	-1.165
SEW	10.500	10.500	0.000	0.000	0.000
SSC	11.400	4.100	7.300	0.000	0.000
SES	3.500	3.000	0.500	0.000	0.000

Ofwat assumptions on MLD start point for enhancement funding

Yorkshire Water's plan for leakage enhancement expenditure for AMP8 starts from a 268.0 MLD three-year rolling average, the required 15% reduction level. Therefore, Ofwat's assumption, (in the leakage enhancement model) that our enhancement request for service level improvement is linked to the end point of AMP7 in OUT tables, is incorrect.

We have not request funding for leakage reduction already funded through AMP7. All interventions in our AMP8 plan are to reduce leakage from 268 MLD, in three-year terms, to the end of AMP position of 229.6 MLD. Therefore, the enhancement expenditure is explicitly to reduce leakage by 38.4 MLD, and in doing so achieve a 27.2% reduction from baseline.

To be clear, any adjustment to leakage enhancement investment requested, which is linked to OUT table inputs, is not appropriate, as we have planned that any under delivery of the AMP7 target would be funded by Yorkshire Water, and not included in the request for enhancement

funding. The enhancement funding is solely to deliver a subsequent 38.4 MLD ~12.1% reduction in AMP8.

Ofwat efficient unit rate £/MLD calculations

Ofwat has used historic leakage reduction cost data from 2019 and 2021 to deduce the median cost per ML of leakage reduction, as detailed in the leakage enhancement feeder models in tab '2019&2021 APR analysis'.

We have concerns regarding the appropriateness of using historic costs of leakage reduction that will only establish the average cost, when sector leakage levels were 15.96% higher than the industry start point of AMP8 and up to 27.2% higher than Yorkshire Water's leakage level at 2030.

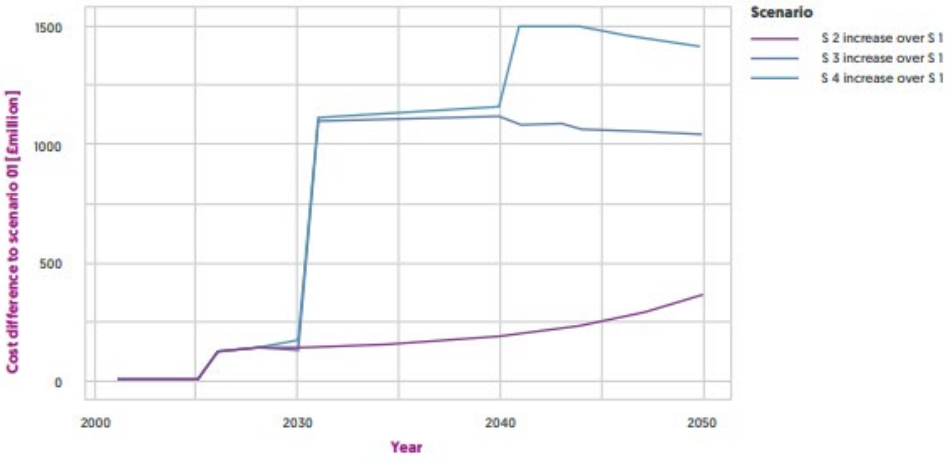
The flaw in this methodology is the assumption that leakage costs are consistent as leakage is reduced. This is not the case; leakage levels reduce the cost of the incremental MLD, as acknowledged in the industry best practice document from Water UK, 'A Leakage Routemap to 2050', published in 2022. Extracts from this are shown below, articulating the need to develop leakage cost curves and optimise leakage intervention plans to deliver an optimal cost curve. This is our approach in using the RPS SoLow leakage optimisation model, but undermined by the Ofwat financial model for leakage, which assumes a historic cost is representative of future costs at a lower level of leakage.

Figure 8-3 Extract from A Leakage Routemap to 2050

4.8 Cost comparison of scenarios

The high-level cost modelling of the different scenarios has provided a national perspective in relation to the increase in costs of scenarios 2, 3 and 4 relative to scenario 1. The range of costs varies considerably, as demonstrated in **Figure 4.9** and **Table 12**.

Figure 4.9 – Cost Comparison of Scenarios



6. Cost curves and modelling

Robust cost and benefit data should be collected with cost curves for different options being developed. These should be used to determine the costs and benefits of the different scenarios. Any offsetting of increases due to upward pressure on leakage such as network growth will need to be offset before utilising any options to reduce leakage via the adaptive pathways.

As leakage levels reduce and the levels of leakage reach historical lows, the certainty around costs will reduce. The industry must develop a method of informing all companies of the potential costs of these reductions, without breaching competition law.

Any model used by Ofwat should consider a coefficient for an increased cost to deliver leakage at lower levels in line with established industry understanding of leakage economics.

We believe the optimisation modelling used is compliant with approaches laid out in 'A Leakage Routemap to 2050, and Ofwat should take a different approach to determine future costs, elevating £ per MLD for AMP8 from the draft determination level. Without this adjustment, Ofwat

risks underfunding the sector to deliver the WRMP24 outcomes, which in turn may trigger adaptive pathways to sustain supply-demand resilience.

The table below is the tab explaining the methodology used by Ofwat to determine the efficient rate of leakage reduction, which we believe is not an appropriate mechanism to determine future leakage reduction costs and should be updated accordingly.

We have two investment scenarios whereby a cost per ML is defined:

1. If the mains renewal representation is successful, then the original PR24 submission is sustained. We would achieve 14.21 MLD of leakage reduction through leakage enhancement initiatives for £15.76 million: a unit cost of £1.11 million per MLD.

2. If our mains renewal representation is not successful, then our reoptimised solution at a higher burst rate, as described in this representation becomes relevant. We would achieve 17.21 MLD of reduction for £21.397 million: a unit cost £1.24 million per MLD.

Table 8-5 Ofwat methodology to determine the efficient rate of leakage reduction

2019&2021 APR analysis

Source	https://ofwat.sharepoint.com/sites/ofw-pr24/Draft determinations/Cost assessment/Enhancement/Water enhancement/Demand/Leakage/[APR data analysis.
Purpose	This is analysis of APR23 data. It uses 2019/20 and 2021/22 data for expenditure for leakage reduction and the reduction in leakage. These years are used due to the weather in these years being less extreme. The used value is in J28 and is calculated as the average of the median values in cells H28 and I28.

			Reduce expenditure		Reduction in leakage		Reduction expenditure / Reduction in leakage			
2019-20	3	Year	3	5	3	5	3	5		
2020-21	4		2019-20	2021-22	2019-20	2021-22	2019-20	2021-22	Average	Weighted average
2021-22	5		£m	£m	Ml/d	Ml/d	£m / Ml/d	£m / Ml/d	£m / Ml/d	
		ANH	9.181	34.629	8.850	8.970	1.037	3.861	2.449	3.263
		HDD	0.000	0.090	2.513	0.784		0.115	0.115	0.115
		NES	0.000	4.815	2.390	16.260		0.296	0.296	0.296
		NWT	25.810	16.157	9.870	10.800	2.615	1.496	2.056	2.208
		SRN	2.750	2.189	7.790	1.602	0.353	1.366	0.860	1.158
		SVE	20.144	4.532	19.832	-29.984	1.016		1.016	1.016
		SWB	4.198	10.203	-2.681	45.430		0.225	0.225	0.225
		TMS	80.047	72.303	95.560	-4.230	0.838		0.838	0.838
		WSH	2.805	3.399	1.590	6.207	1.764	0.548	1.156	1.476
		WSX	14.249	11.681	5.040	1.736	2.827	6.728	4.778	5.574
		YKY	53.984	10.157	19.020	6.720	2.838	1.511	2.175	2.377
		AFW	24.307	34.112	33.955	17.190	0.716	1.984	1.350	1.648
		BRL	1.857	1.940	4.500	-0.120	0.413		0.413	0.413
		PRT	0.913	0.771	4.540	-3.380	0.201		0.201	0.201
		SES	0.000	4.027	0.200	3.870		1.041	1.041	1.041
		SEW	0.626	2.606	0.480	4.021	1.305	0.648	0.977	1.087
		SSC	1.097	3.959	2.050	-1.980	0.535		0.535	0.535
		Average	14.233	12.798	12.676	4.935	1.266	1.652	1.459	1.484
		Median	2.805	4.532	4.540	3.870	1.016	1.203	1.110	1.041
		LQ	0.913	2.606	2.050	-0.120	0.535	0.485	0.510	
		UQ	20.144	11.681	9.870	8.970	1.764	1.630	1.697	
		"Other Leakage" Unit Rate	1.110							

8.4.2 Best option for customers

The options put forward in this conditional representation have been optimised using the SoLow tool to ensure the most cost-efficient plan is delivered over the 25-year planning period.

Our customers support our WRMP leakage trajectory, delivering demand reduction initiatives in preference to additional supply options. This customer support can be found in section 1.3.6 of the supply-demand enhancement case and within the WRMP24.[18]

[18] https://www.yorkshirewater.com/media/tsubsu1f/water-resources-management-plan-final-project-report-pdf.pdf

Yorkshire Water is not proposing a different glidepath to the plan supported by customers in the documents above. The WRMP glidepath has been optimised using the SoLow tool to create the cost-optimal glidepath to achieving 50% leakage reduction by 2050.

8.4.3 Cost efficiency and consumer protection

We challenge the cost efficiency mechanism proposed by Ofwat. Ofwat uses a historic efficient cost mechanism to determine a rate of £1.11m per MLD. As mentioned before, this approach is flawed, due to the assumption that historic leakage reduction costs at significantly higher levels of overall leakage are indicative of future leakage reduction costs when leakage is up to 27.2% lower than the modelled assumption level.

Ofwat needs to consider applying a coefficient to historic costs to uplift leakage reduction costs; this would accommodate the cost curve associated with delivering leakage reduction at levels never previously achieved.

This is in line with industry best practice outlined in 'A Leakage Routemap to 2050', where investment options are prioritised along the cost efficiency curve to ensure the lowest cost options are delivered first.

8.5 Concluding points

As set out in our PR24 Business Plan and in line with the WRMP24, our enhancement request remains centered on delivering a leakage outturn from 268Ml/d in 2025 to 229.6 MLD in 2030, through enhancement interventions only totalling 14.2 MLD of leakage reduction for £15.766 million.

The delivery of the required PCL is at risk due to a discrepancy between the length of mains renewal activity Yorkshire Water wish to undertake, which ***would*** contribute 10.52Ml/d of leakage benefit, and the length of mains renewal Yorkshire Water ***can*** undertake following the financial constraints on deliverability of Ofwat's draft determination. Yorkshire Water has therefore limited the request for enhancement funding to deliver leakage reduction by creating this conditional representation and an optimised leakage delivery plan, including adjusted benefits from base funded mains renewal and smart metering activities.

While Yorkshire Water is only submitting this conditional representation for consideration if our mains renewal representation is not accepted as submitted, this representation would increase the enhancement funding request to £21.397m, to deliver 17.21 MLD of leakage reduction, and reflects the interdependent nature of Yorkshire Water's balanced business plan. The additional funding would be used to address the gap in solutions to deliver the required leakage reduction plan as set out in the PCL profile.

Yorkshire Water asks that Ofwat also factors in our specific concerns regarding modelling:

- Ofwat's historic modelling approach to determine future leakage reduction costs is inappropriate and should be reviewed, with YW's industry best practice approach suggesting a unit rate of £1.24 million being the optimised cost per Ml/d within Yorkshire Water's plan.

- Ofwat should decouple the modelling calculations dependency on OUT table figures from a mechanism to reduce enhancement funding as YW's plan is to start leakage investment from a position of 268.0 MLD in line with the 15% reduction required, with any shortfall in performance being funded by YW, not through the enhancement programme put forward within this plan.

9. Metering

9.1 Overview

We are representing on the approach to funding the metering programme. To avoid duplication, this representation focuses solely on our metering enhancement case but we note that the themes within this representation, such as the suitability of a median based cost model, are equally applicable across base and enhancement cost model assessments.

We have concerns relating to the interplay between the Price Control Deliverable (PCD) and the modelled cost allowance per meter method. The current funding model does not correctly support the delivery of the PCD and will result in significant programme under delivery, fewer demand reduction benefits and an under delivery fine for Yorkshire Water via the PCD. These issues stem from two mechanisms, which we explore further in this chapter:

1. Funding to deliver a PCD which requires every meter to be exchanged and in accordance with a timeliness measure. The representation would require Ofwat to fund meter relocations via installing new boundary boxes, which are not currently correctly considered within the econometric model. We submit a conditional representation in the event that either a timeliness PCD, or the total percentage of meters to which the PCD relates remains above 88% of the total Yorkshire Water programme, is maintained at final determination.

2. Funding to deliver a radio network infrastructure supporting data connectivity, in line with the PCD to classify a meter as 'installed'. This data completeness metric suggested by Ofwat would require a significantly denser radiocommunication network at significantly greater cost than current contracted rates.

We have two further representations on modelling not associated with the PCD:

3. An update to unit costs for delivery of the smart metering, following the award of a framework for the AMP8 scope of work. We will be updating the modelled cost of our AMP8 smart metering programme with actual tendered costs not acquired through competitive tender.

4. We have concerns regarding the costing model used by Ofwat to determine a single efficient rate, regardless of the range of activities being delivered within each water company's bespoke smart metering plan. Furthermore, the use of a modelled approach could underfund companies compared to actual tendered costs. Yorkshire Water's combination of meters and meter location, and blend of inline versus screw-in meters is specific to Yorkshire. Every company will have a different blend of activities which is not considered within a simple unit rate assessment undertaken by Ofwat for draft determination. Furthermore, any model should not undermine tendered actual costs from the market to deliver the requested plans, supported in the WRMP.

1. Meter relocation through installation of new meter and chamber to satisfy 100% delivery of meter installation PCD clause – increase in funding requirement

Given the PCD structure, a differing strategy and costing model is required compared to the approach we used during the PR24 submission. A PCD which includes every meter will require more meters to be relocated than planned at PR24 submission. Yorkshire Water has assessed that it would not be possible to exchange 12% of meters; these would require the installation of a new meter into a new chamber. The requirement for 12% of meters being installed was not included in the PR24 submission, meaning additional costs are needed to achieve a 100% exchange programme and for delivery on time.

Meters which cannot be located, or where companies are unable to undertake a meter exchange, will result in the programme cost being significantly higher than we had previously modelled, before we were aware of the PCD mechanism. For Yorkshire Water, the average cost of a meter and chamber installation, where meter relocations are required, is £603.17,

compared to an average exchange cost of £151.08. We request the additional funding for 12% of meters, where a relocation is expected to be required. We have proposed alternative options and our preferences to managing meter relocation allowances in section 9.3, 'Cost model to deliver programme in line with PCD measures on timeliness and total numbers installed'.

2. PCD on data completeness, to satisfy installed status, increase in funding to improve data connectivity

Ofwat has specified that meters can only be classed as installed if the meter achieves 95% of days having 100% data complete for a one-month period.

Given the data completeness PCD, we would require an additional £14.32 million in funding to achieve the data completeness PCD. This value has been derived by working with our long range wide area network (LoRaWAN) providers, Netmore, to determine how many additional LoRaWAN gateways would be required to achieve a higher data success rate. This cost is then converted into a cost per meter per year, totalling £14.32 million in AMP8. The PCD of 95% packet success rate to deem the meter installed is not appropriate and not cost -efficient for customers. The benefits of PCLs and ODIs are available to companies who supply complete data. As such, if networks underperform, and the benefits from metering are not realised, customers are already protected.

3. Framework tendered costs update - submission costs were modelled, not actual costs

We have now awarded a smart metering framework for supply of meters, install/exchange of meters and provision of a communications network. Through the representation process, we are updating funding requirements, to deliver our smart metering programme costs in line with the tendered unit costs. The costs submitted at PR24 submission were modelled costs, rather than actual costs. Yorkshire Water now has cost certainty for the scope of work within the programme. The completed tender will increase the average cost per meter from £177.34 to £201.71, and we will update our cost tables to reflect these figures during the draft determination representation process. **The costs at submission, which were modelled costs, totalled £246.38 million. The costs submitted at draft determination representation using actual tendered costs have increased to £260.53 million.**

This financial update will include an amendment to the total number of meters to be delivered in the plan, following an in-field and desktop review of meters meeting the criteria, to require exchange in AMP8.

4. The appropriateness of using a generic modelled cost

Yorkshire Water has a smart metering framework in place, which is based on the actual competitively cost -tendered contract, to deliver our smart metering programme. The Ofwat model assumes that all programmes have a similar blend of meter types and activity to deliver the plan. Furthermore, the modelled approach assumes water companies can outperform the tendered programme delivery costs, based on a median unit cost. **If the Ofwat models do not align to real-world delivery costs ascertained through competitive tender processes, water companies will not be able to deliver the smart metering programme's requested and associated benefits.** The costs achieved through the tender process are the most cost-efficient possible, which can be attained by water companies with their specific meter stock and scope of work. They are underpinned by very detailed bottom-up builds of the delivery programme and associated unit costs for delivery.

Point of notice: we have updated data tables CW7, CW3 and CW18 with metering cost and number updates. Due to internal governance and assurance in submitting CW2, this data table does not accurately include the required investment for metering, being £10 million less than required base investment.

9.2 Key messages

- The PCD being released post-submission has caused a misalignment in cost assumptions. The data tables we submitted at draft determination representation are aligned to the costs for adjusting the number of meters, and the tendered delivery costs for an exchange programme.

- Our data is not aligned to the additional costs associated with the PCD conditions, where ~12% of meters will need to be relocated with a new chamber installed, and additional radio infrastructure will be required to meet the data requirements of the new 'install' criteria. The costs for the conditional representation are solely included within this representation case in the table, 'Summary of changes to the metering enhancement allowance' (Table 9-2).

- The PCD mechanism requires a change to strategy for deploying meters to achieve 100% of the programme and meet the timeliness and connectivity requirement of the PCD.
    - Yorkshire Water will require additional funding to deliver to the PCD at draft determination, if we are to meet both the timing and volume requirements of more than 88% of meters installed. The total value for relocating meters into new boundary boxes is £93.43 million.
    - The delta between the additional funding needed, less the value already allowed for within exchanges, then adjusted for the abortive costs of meters we cannot locate or successfully exchange, results in the additional cost to the plan of £67.70 million.
    - The additional cost to satisfy the PCD for connectivity to the meter installed is £14.32 million in AMP8, to densify the radio infrastructure to achieve such a connectivity rate. The cost thereafter would be approximately £4.7 million per annum additional for each year of the asset's life.

  In summary, to deliver 100% of the meters committed within the plan and achieve the data connectivity clause, we would require an additional £82.02 million, made up from £67.70 million for relocating meters, and £14.32 million to ensure 95% connectivity.

- Yorkshire Water is concerned that the current Ofwat cost model utilises a median cost across the sector. This mechanism does not seem appropriate, given factors which drive very large discrepancies in cost are not considered. These include: meter size, internal or external location, screw-in or in-line meter types. These are factors outside of management control and not reasons for being classed as inefficient.

  A final determination which requires all meters delivered to the yearly profile and total number, which is not funded to the appropriate level, threatens the WRMP24 outputs and risks significant under delivery, via the ODI's mechanism. We therefore ask Ofwat to thoroughly consider the funding required to deliver a company-specific meter exchange programme and the resulting outcomes in service for customers.

- We will be updating the 'estimated' unit costs with 'real' tendered costs for our programme, given that we have now awarded our AMP8 framework for the exchange of 1.3 million meters. This programme cost is built up from 141 unit costs which are required, in various combinations, to deliver the full scope of the programme.

9.3 Change requested

The table below summarises the changes Ofwat has requested. These changes are further detailed in this section, and additional information is provided in section 9.4 'representation rationale' to support the points below.

Table 9-1 Summary of change for metering

Summary of change	Context
Changes to Yorkshire Water portfolio and delivery costs	• We will be updating our unit costs in our representation using the awarded framework costs, based on the competitive tender and award of AMP8 framework for programme delivery since the time of submission. • Based on an infield and corporate systems review, we will reduce the total number of meters requiring exchange from **1,389,314 to 1,291,626.** • The consequence of the change in costs (resulting from an awarded contract rate) and the change in meter numbers is a funding requirement alteration, from **£246.38 million to £260.53 million.**
Changes to the cost model to deliver the programme in line with PCD measures on timeliness and total numbers installed	• We are submitting a conditional representation in relation to the PCD associated with smart metering. If a timeliness PCD is maintained at final determination and/or the total percentage of meters within the PCD remains above 88% of the total Yorkshire Water programme (in line with the proportion of meters likely to require relocation), we wish to trigger this representation case. • We urge Ofwat to consider enhancement funding and suggest three potential mechanisms later in this section.
Changes to the costs associated with achieving the PCD connectivity threshold .	• We would require additional funding to achieve the PCD threshold for connectivity if the PCD maintains a connectivity clause which is greater than the current contracted 'Data as a Service' agreement with the Yorkshire Water AMP8 smart metering contract. • The additional infrastructure to achieve the success rates across all meters within the exchange programme and meter optant customer base would require **£14.32 million additional funding in AMP8 and £4.71 million per annum** thereafter, for the duration of the meters' asset life.
Changes to the median based cost efficiency model utilised for draft determination	• The current Ofwat model does not consider differences in metering programmes, such as size, location and customer water sensitivity, which have large impacts on unit cost efficiency and are outside of water company control. • Yorkshire Water urges Ofwat to consider where a competitive tender has taken place, that delivery costs are known, and that water companies are unable to deliver at a 'modelled' rate lower than the tendered cost.

Change to Yorkshire Water portfolio and delivery costs

has submitted a plan to exchange and install 1,389,314 meters at a cost of £246.38 million. Since submission, we have undertaken a competitive tender and awarded our AMP8 framework for the delivery of both our meter programme and our ongoing 'Data as a Service' provision. We will be updating our unit costs in our representation using the awarded framework costs. These costs have been derived from a bottom-up build of 141 unit cost types, required to deliver such a programme including differentials in cost, including but not limited to:

a) meter size;
b) screw-in or inline;
c) internal or external;
d) HH or NHH;
e) water sensitivity of the customer;

f) meter lay length and plumbing changes;
g) council permits, traffic management and lane rental; and
h) ancillaries for meter maintenance.

We have also undertaken an in-field and corporate systems review of the meters requiring exchange in AMP8 due to life expiry. We will also be updating the total number of meters in our representation, which will reduce the total number of meters requiring exchange from 1,389,314 to 1,291,626.

As a result of the change in costs from using an awarded contract rate, and the change in meter numbers, our financial requirement for funding will change from £246.38 million to £260.53 million.

While the median cost proposed by Ofwat is largely in line with Yorkshire Water's funding requirement at submission, the current cost model is not appropriate and could set a precedent for cost modelling in future AMPs which would be flawed and exacerbate funding challenges in the future. Any cost model which Ofwat uses will have different results to a tested, competitive tender process. The median model does not consider differences in metering portfolios such as those listed above, which are explanatory factors outside of general efficiency and largely out of the water companies' control. Using models like the median-based approach could therefore set a dangerous precedent, exacerbating funding challenges in the future. With such a wide range of external factors at play across different regions, Ofwat's models are not an appropriate way to determine an efficient unit cost. A company-specific deep dive would be more appropriate.

Cost model to deliver programme in line with PCD measures on timeliness and total numbers installed

Yorkshire Water is submitting a conditional representation in relation to the PCD associated with smart metering. This representation should be viewed in combination with the PCD representation. The conditions to trigger this representation relate to changes to parameters within the PCD. If a timeliness PCD is maintained at final determination and/or the total percentage of meters within the PCD remains above 88% of the total Yorkshire Water programme, (in line with the proportion of meters likely to require relocation), we wish to trigger this representation case.

Yorkshire Water proposes a mechanism to fund the relocation of meters where exchange is not possible, using a suitable unit cost approach. We propose that the current cost model does not consider that it is not possible for individual water companies' competitively tendered costs for smart metering programmes to be excessively outperformed. As such, funding water companies to a median, or other modelled solutions, is not appropriate, where market efficiency has been tested within the competitive tender process.

Yorkshire Water agrees a PCD is appropriate to protect customers and ensure the metering programme is delivered as proposed. We would, however, urge Ofwat to consider enhancement funding to be aligned to one of the following mechanisms, depending on the interplay with an amended and consistent PCD across the industry.

1. A greater allowance for boundary boxes where meters require relocating, in line with tendered and awarded costs from companies and the blend of metering scenarios experienced within the metering programme. For Yorkshire Water, 12% of meters will require relocation, and as such, a new chamber installing.

2. A mechanism though smart metering programme delivery to evidence the requirement for new boundary boxes, triggering a quick approval from Ofwat for funds to undertake the relevant meter relocations. This would result in an in-year approval of additional funding at an appropriate level to undertake the work, but limit the risk of customers overpaying for a modelled meter relocation proportion of the meter stock.

3. A relaxation of the PCD, where evidenced, in line with real-world challenges. This would allow for a known scope of meter relocations in the AMP9 smart metering scheme. This would impact upon associated benefit ODI and PCLs such as PCC, NHH demand and leakage PCLs, where limited funding from constraints in evidencing meter relocation

requirements would result in delivering a smaller scope and increase the risk of under delivery of the PCLs.

Yorkshire Water's preference would be options 1 or 2, or a blend of both. This would allow for efficiency, as the installation can take place while we are in the region undertaking the rollout programme, avoiding costly revisits. Further, option 3 would regress the service levels that customers experience if their AMR meter is at the end of its life, and no new solution has replaced the asset.

The costs associated with an upfront amendment to the cost model, or estimated for a gated process of approval, are shown in the table below as 'YKY draft determination representation' if the conditional trigger described by Yorkshire Water is met.

Costs associated with achieving PCD connectivity threshold

Yorkshire Water would require additional funding to achieve the PCD threshold for connectivity if the PCD maintains a connectivity clause which is greater than the current contracted 'Data as a Service' agreement with the Yorkshire Water AMP8 smart metering contract.

In order to achieve the desired success rates across all meters within the exchange programme and the meter optant customer base, additional infrastructure is required. This will cost £14.32 million in additional funding through AMP8, and £4.71 million per annum thereafter for the duration of the meters' asset life.

Yorkshire Water recommends the removal of a PCD relating to connectivity and the associated cost. We believe the costs outlined above are not in the interest of customers, as ODIs provide sufficient incentive to water companies to achieve a very high connectivity rate of the meter base.

Please note, in the table below the representation values are based on a lower total number of meter exchanges than PR24 submission. We have updated CW.7 accordingly.

Table 9-2 Summary of changes to the metering allowance

	Summary of changes to totex metering case across base, CAC and enhancement (£M)	Summary of changes to totex metering case for enhancement only (£M)
October 2023 business plan submission	289.982	134.06
January 2024 business plan resubmission	289.982	134.06 *
Ofwat's draft determination	317.03	153.283
YKY draft determination representation	311.431**	142.632
YKY draft determination representation if PCD requires >88% of funded meters to be exchanged	379.131	210.331
YKY draft determination representation if PCD requires >88% funded meters to be exchanged and achieve 95% connectivity clause	393.451	224.651

* Note: this value is Yorkshire Water's submission; the Ofwat value has a double count of transitional expenditure.

** Note: this value includes meter exchange programme, technology systems and radiocommunication infrastructure and meter optant programme (radiocommunication for Yorkshire Water works as 'Data as a Service' (DaaS), £ per meter per year, which includes costs of DaaS for new developments).

9.4 Yorkshire Water's response to Ofwat

Table 9-3 Evidence to support the rationale for the metering representation

Ofwat questions	Representation rationale and supporting evidence
Question 9.1) Do you agree with our approach to assessing new meter installation and meter upgrade costs?	1. Please see our metering representation for both Price Control Deliverable, and enhancement expenditure. We do not agree with the approach for new meter installation or upgrades. This is summarised in the following three points: 1. The three methods and processes to install a meter should be assessed separately from a cost-efficiency perspective, due to the differing levels of customer engagement, customer willingness to support and potential abortive costs, leading up to the decision point where a new installation needs to occur where an exchange cannot occur. The three processes with differing price points are as follows: a) new meter installations, customer optant metering; b) new meter installations, company Selective metering; c) new chamber and meter installations, where an exchange in existing location could not occur; d) in moving from Basic/AMR meters. 2. Ofwat does not consider any differentials in the smart metering programme where a clear explanatory factor exists. The current model only assumes total number of meters, with no secondary factors of price differentiation such as: a) meter size; b) mMeter type, screw-in or in-line; c) water sensitivity of customers; d) internal versus external blend of meters; and e) household versus non-household blend of customers. 3. It is not appropriate for Ofwat to consider cost without having published a final PCD, which can significantly impact the cost of the delivery programme. Ofwat should allow for cost resubmission ahead of final determination after a final PCD mechanism is released. Relating to the installation and upgrade costs: a) requirement to install 100% of the programme; and b) requirement to attain data completeness to categorise as installed.
Question 9.2) Do you agree with our decision to assess smart infrastructure costs within the meter installation and meter upgrades models?	Yorkshire Water believes Ofwat's draft determination model does not allow for a clear comparison of cost efficiency. Further clarity, through guidance on the component costs to be included within data table rows, would help ensure any comparison between companies is being undertaken on a like-for-like basis. Furthermore, the variables driving cost differences which cannot be attributed to general efficiency are not considered within the Ofwat modelling. Yorkshire Water doesn't have a strong opinion on whether to include the infrastructure costs within the installation or upgrade model. However, viewing infrastructure costs only against a single AMP view could hamper appropriate assessment of cost efficiency, as different approaches may incur a different phasing of costs over the 15-year life cycle of the assets. A more general point is that modelling efficient costs may be problematic in general, as any determination which doesn't fund water companies to deliver the metering programme in line with commercially tendered rates will result in under delivery.

This section expands upon the changes noted in the previous section by providing more supporting narrative. Firstly, we demonstrate the criticality of smart metering. Secondly, we outline the issues regarding the econometric model used in calculating the funding for the draft determination, Ofwat's cost model representation and the interplay with the PCD.

9.4.1 The need for investment

Smart metering outcome criticality

Yorkshire Water does not view the delivery of a communicating meter as the key deliverable and outcome for our customers. The outcomes are an improved customer experience, together with environmental sustainability resulting from water demand reduction and operational carbon reduction. Smart metering is therefore a cornerstone of the WRMP24 and crucial to the digital transformation of our service offering. Insufficiently funding this programme will risk the under delivery of the programme, which will severely impact our ability to deliver the outcomes supported by customers within the WRMP24. The support for our metering, leakage, PCC and NHH demand reduction strategies was laid out in our metering enhancement case, supply and demand enhancement case and in the WRMP.[19]

9.4.2 Ofwat cost model representation and interplay with PCD

Ofwat's model calculates the cost of our efficient rate of meter exchange and upgrade, with subsequent infrastructure requirements, at £200.80 for the total allowance, per meter, for AMP8.

Yorkshire Water wishes to represent on four issues regarding the econometric model Ofwat has used in calculating the funding for draft determination. These issues are noted below, and explored individually in this chapter:

1) Neither the median cost model, nor other variants using simple comparisons of cost, consider the explanatory differentials in cost. There are many factors outside of water company control and these should not be considered efficiency-related.

2) Actual tendered costs within contracts will result in companies being unable to deliver smart metering programmes if a simple cost model is used, or indeed if there is a differential between tendered unit costs and Ofwat allowed unit cost. Ofwat should reflect that companies have smart metering contracts in place and the associated unit rates within those contracts are the most efficient the companies have achieved through a competitive tender.

3) The PCD on connectivity to satisfy the status of 'installed', will result in potential retendering of already awarded contracts. This would occur because the scope within awarded contracts will change significantly, opening up the chance of legal challenge from previously unsuccessful suppliers, and/or could result in significant additional cost to achieve the required data success rates. We have modelled the impact with our suppliers at an increased cost of around 3.5 times the existing data as a service cost, to attain a persistent 95% total connectivity rate for all meters. This increased cost would put at risk the business case for demand-side reduction utilising smart metering.

4) The PCD requirement to install all meters within the smart metering programme, and the inclusion of a timeliness fine, will require a different approach to delivery compared to those assumed in PR24 submission. Water companies attempting to achieve a 100% rollout plan and on time, will require the installation of new boundary boxes, where meters cannot be located or accessed in a timely manner. The Ofwat models, and companies' submitted costs, do not currently fully consider the delivery of a smart metering programme within the PCD constraints. An updated cost model should consider the prevalence of the requirement for meter relocations, largely via boundary box installations and the subsequent associated cost.

1. Median cost model and cost explanatory factors.

[19] https://www.yorkshirewater.com/media/tsubsu1f/water-resources-management-plan-final-project-report-pdf.pdf

The Ofwat model is based on a median cost rate. This cost would be reduced further if Ofwat were to apply an upper quartile measure to the final determination.

Yorkshire Water and all other members of the national Smart Metering Advisory Group (SMAG), have significant concerns around the use of a median or upper quartile price model[20]. In its current guise, it is likely to underfund the sector at large, compromising our ability to deliver our smart metering programmes, and setting a precedent for future modelling approaches which will exacerbate underfunding into future AMPs.

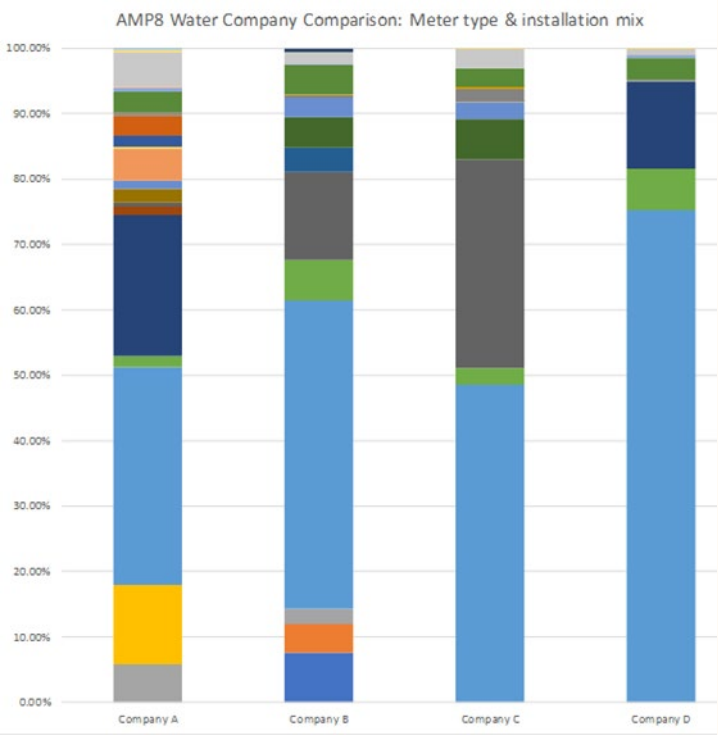
The major concern with the approach of using a median or upper quartile approach is that it does not consider variables in cost that are outside of water companies' control. These factors can cause metering exchange and upgrade costs to range from <£200 per meter for ideal scenario jobs to >£10,000 for large complex exchanges. The blend of these job types should be considered in any model, as they could largely explain cost differentials between companies' metering programmes. The median cost model does not consider the differences between companies' delivery portfolios and associated explanatory differentials, including for hardware, install journey or Tec systems upgrade requirements to leverage the benefits from smart metering.

The Ofwat model should better consider these factors and provide allowances in line with the overall programme explanatory differentials. We provide data in the supporting evidence for metering appendix (YKY-PR24-DDR-28) on our meter portfolio, from which we have undertaken a bottom-up build of costs. Differences in the percentage of each of these installation types, as well as secondary factors such as percentage void, percentage requiring relocation, percentage traffic sensitive and percentage water sensitive, will provide further differentials in smart metering delivery cost, and help to explain prices that water companies have submitted. Knowledge sharing in the SMAG has revealed that the shape of each water company's exchange and installation programmes varies significantly when assessed at more granular levels of analysis.

The table in the supporting appendix (YKY-PR24-DDR-28) shows the complexity within the Yorkshire Water programme, and differences are abundant within water companies' metering programmes. Information shared within the SMAG group shows an anonymised breakdown of four water companies' deployment plans, with meters broken down into relatively high-level groupings of price differential. It is clear to see in Figure 9-1 the makeup of the programmes are vastly different, even without granular detail.

[20] The SMAG held meetings on 17 July, 31 July and 7 August 2024 (including multiple sub-group workshops in between), where consensus was met on the PCD challenge and appropriateness of funding alongside developing common themes for responses.

Figure 9-1 AMP8 Water Company Comparison: Meter type and installation mix



Given the varying delivery programmes, a single median-based financial model is not appropriate to assess cost efficiency across the sector.

A further problem with the median (or other benchmarked cost) approach is demonstrated by the fact that Yorkshire Water has 141 different unit costs to deliver the scope of work above. These unit costs are used to build up the total costs of the smart metering programme. When delivering a single meter exchange, several unit costs will be included in the completion of the job. As such, there are several hundred different blends of unit costs required to deliver our smart metering programme, which, when viewed in their entirety, clearly explain the required cost of the programme. Every water company will have very different blends of these variables, with a small percentage change in certain variables making a large impact on total programme cost. The current Ofwat model distils all the cost variables into an assessment of a limited range of parameters within CW3 and CW7. This fails to account for the reasons behind the funding need for the specific programme, and as such is not a fair cost appraisal of the funding requirements.

We would also advise Ofwat to be more explicit about which unit costs to include when building the metering programme costs, and where to include them within PR24 data tables. This will ensure that any comparative measure is comparing on the same scope of activity. This should consider:

- the costs to install or exchange a meter, inclusive of customer planning scheduling and communication to gain access;
- the costs outside of company control, such as permits and traffic management;
- the cost to support the benefits realisation of the programme, such as IT systems upgrades and ongoing costs of IT systems for such large volumes of data;
- the cost of smart metering infrastructure to provide regular readings; and
- the increased cost of maintenance for the metering asset base to maintain appropriate connectivity levels and the associated benefits.

2. Tendered costs for smart metering programmes

Yorkshire Water and other members of SMAG have undertaken a competitive tender process and have now awarded contracts to achieve the required number of meter exchanges and installations. In doing so, we have enabled the benefits within the WRMP24 submissions, supported by the DEFA Secretary of State.

We considered the metering portfolio above from a hardware and installation perspective and created a very specific request from the supply chain to deliver as efficiently as possible. The

tendering process underwent multiple rounds of financial assessment, culminating in the selection of a single supplier. This process took nine months. We funnelled 51 suppliers into one provider who was competent and cost-efficient at delivering the work, as shown by the timeline and down selection table below.

Process		
Date	**Round**	**No. Suppliers**
Aug 23	Pre-market engagement	-
Oct 23	Contract notice	-
Nov 23	Webinar open to whole market	>100
Nov 23	Expressions of interest	51
Dec 23	Selection stage	21
Mar 24	ITT round 1	5
Apr 24	ITT round 2	4
May 24	Best and final offers	4
May 24	Award	1*

Any model which undermines the costs arrived at through such an exhaustive and thorough tendering process will risk the deliverability of the smart metering programme. This would result in a significant PCD fine, an ODI fine and a failure to realise the objectives of the WRMP demand reduction strategy. The resulting need for an adaptive path may require additional supply-side options, and funding at greater expense than a well-funded metering programme.

3. Costs to achieve PCD requirement of 'install status' being 95% of days at 100% completeness

Yorkshire Water has awarded a smart metering framework for AMP8. We have a known cost per meter to achieve a data regime necessary for the delivery of the demand reduction benefits and customer service improvement.

Through trials, and the delivery of our current operational smart metering asset base, we have created a data requirement regime which provides data at a frequency, granularity and completeness to enable our analytics to drive activity and benefit.
These KPI measures are outlined below:

1. Percentage of meters connected to the network and with stable data received. This ensures the IOT network is in place for nearly all customers, and provides a real-world scenario buffer for meters in environments which may never be connected to the network in a cost-effective manner.
2. Percentage of meters sending one meter index within a 14-day rolling window. This is to ensure customers have accurate billing for a range of tariff options, such as monthly billing. AMR meter reading costs can be largely removed.
3. Percentage of meters providing data for the leakage nightline period, supplied by midday, allowing for in-day water balancing and subsequent planning and scheduling of DMA leakage find activity the next day.
4. Percentage of total possible data successfully received, underpinning continuous flow analysis and customer experience, when influencing water efficiency activities.

We have worked with LoRaWAN radio network providers, Netmore, our incumbent and AMP8 solution provider, to deduce the increased number of LoRaWAN gateways required to achieve the Ofwat PCD installation criteria. The additional gateways are then modelled into the 'Data as a Service' cost model to deduce the new opex cost per meter per year, to fund the LoRaWAN 'Data as a Service' data provision.

We have interpreted the Ofwat PCD to mean that every meter must achieve one month with over 95% of days having 100% data completeness. In essence, this means that one day per month can have less than 100% data availability (100% data availability is defined as all 24-hourly data packets being received.)

The cost consequence of this PCD for Yorkshire Water is around 3.5 times the current cost. This multiplier will differ between companies who have chosen LoRaWAN as their solution, because the result will depend on the density of smart metering programmes, and blend of stock.

We are comfortable that the data regime within our existing framework is sufficient to unlock the benefits of smart metering. However, if Ofwat was to stick with the current PCD definition, Yorkshire Water would require the densification of the LoRaWAN network. The subsequent

whole life cost of meters with an asset life of 15 years would increase by over £45 million. This does not provide value for money for customers, as moving data success rates from the contractually negotiated and evidence-informed levels to the Ofwat definition would have negligible benefits.

4. Delivery of full scope of meter installations, requiring funding for meter relocation

Within a metering programme, there are multiple reasons why a meter exchange cannot be undertaken. These reasons generally fall into two categories:

1. **Built world constraints:** examples include councils tarmacking over meter chambers within footpaths or roads, homeowners building over meter chambers, homeowners enclosing water meters within house fixtures and fittings and chambers which are now located in high-risk H&S environments.
2. **Customer-specific constraints:** examples include void status, customer willingness to grant access, knowledge of meter location within property, customer willingness to alter pipework and fixtures and fittings.

Yorkshire Water has undertaken a desk-based assessment of meters known to be unfindable, and utilised knowledge from multiple meter rollouts across the UK in this model. We found that approximately 12% of meters will require relocation in the form of a new chamber being installed to realise the full benefits from the metering programme and satisfy the Ofwat PCD.

We arrived at the 12% estimation (equivalent to 156,050 meters) via the following logic:

Our field-based studies suggest the number of meters that cannot be located totals 50,000. We have visited a further external 27,000 meters to understand the prevalence of chambers no longer being accessible. This activity allowed us to conclude that 3.6% of meters were no longer accessible, due to road and pavement resurfacing, or customers installing new driveways or building over the existing chambers. When scaled to the total number of external meters in the Yorkshire Water programme, this equates to a further 28,050 meters which would require a new chamber installing.

Finally, working within the SMAG group, we have used data from other companies who have undertaken smart metering programmes to build an average internal meter exchange success rate. The industry mean for internal meters not successfully exchanged was 15%. Reasons for unsuccessful exchanges ranged from customers' kitchens, fixtures and fittings restricting access to internal pipework, customers refusing access, and inability to respond to all forms of communication. 15% of the internal Yorkshire Water programme would total 78,000 meters. Together, these meter volumes provide a likely 156,050 meters, where to achieve a 100% exchange programme, a new external meter and chamber would require installing.

While flawed, the current Ofwat cost model reflects the average cost of a meter exchange for the Yorkshire Water programme relatively well. However, it does not accurately reflect the need for meter relocations and subsequent cost of installing a new meter chamber, or the differences in meter size within the relocation portfolio. This modelling approach will not, then, appropriately fund the meter exchange programme to achieve a near-complete smart metering rollout in line with WRMP plans.

Yorkshire Water proposes the mechanism outlined in section 9.3 above of the metering enhancement representation: 'The change requested'. That is, an allowance for meter relocation is granted at final determination, with the funding adjusted on a regular basis to recover costs for customers or provide additional funding to water companies. This funding would be in line with the actual requirement once meters have had full surveys, exchanges have been undertaken and the number of meters explicitly requiring relocation and new chambers has been derived.

The scale of this level of investment is estimated to be in total £94.13 million, reduced to £68.19 million, adjusted for elements of cost already within the Ofwat model. Where we have been unable to locate known meters through field activities in AMP7, the known costs using tendered rates are estimated to be £30.16 million, reduced to £21.85 million once adjusted for costs already accounted for within the Ofwat model. Costs already allowed include the meter and an exchange cost. However, the abortive costs for visiting the meter and identifying the specific

meters which cannot be located or exchanged need removing. This would total £166.2 per meter, which is already funded after abortive costs are removed.

Table 9-4 Costs for meters requiring new chambers

	Meters requiring new chamber	Total cost (millions)	Minus costs already allowed (millions)
Meters long unread confirmed to not be locatable.	50,000 at £603.17	£30.16	£21.85
3.6% of external meters not locatable	28,050 at £603.17	£16.92	£12.26
15% internal meters not exchangeable	78,000 at £603.17	£47.05	£34.08
Total	156,050	£94.13	£68.19

9.4.3 Best option for customers

The WRMP has optimised the blend of supply and demand options available to meet resilience requirements over the ensuing 25-80 years. Customers supported demand reduction options over additional supply options where possible.

Given the optimised and customer-supported scope of the smart metering plan, Yorkshire Water has undertaken a competitive tender for the scope of work specified within this representation case and the most cost-efficient solution was selected. The accuracy of costs to deliver this plan have been updated since PR24 submission, and the costs submitted within the core representation and conditional PCD-related representation are based on a granular bottom-up build of actual contracted costs.

The Ofwat models do not currently take into consideration the range of variables within a delivery plan to assess cost efficiency on a like-for-like basis. Variables outside of management control are not adequately considered.

9.5 Concluding points

PCD-related representation

Water company submissions at PR24 were based on assumptions about the structure of Ofwat PCDs, and expectations around data success rates. In this case, the Ofwat PCD misaligns significantly with the assumptions made by water companies, and as such, Yorkshire Water is submitting two conditional representations. These are both linked to the PCD, and subject to Ofwat's review of water companies' PCD representations, as well as any amendments to the PCD as currently structured.

We suggest that Ofwat publish a final PCD structure after reviewing the PCD representations across the sector. Ofwat should then allow water companies to resubmit costs, ahead of final determination. This allows companies and suppliers to calculate new costs and deliver in line with Ofwat's revised PCD requirements.

This will help to align expectations around measures of success between regulators, water companies and their supply chains. Currently, water companies are having to guess the financial consequence of any PCDs imposed at final determination.

The current funding model does not support the delivery of the PCD in its present form and will result in a significant under delivery of meter exchange numbers, with subsequent reduced benefits for customers. It also increases the likelihood of Yorkshire Water being penalised with an under delivery fine via the current PCD mechanism. To evidence this, we have demonstrated the unsuitability of the median-based cost model in this representation. Further to this, the PCD being released post-submission has caused misalignment in cost assumptions, which, unless significantly changed, will trigger two conditional enhancement cases.

1. **Achieving 100% of the scope within the cost allocated**

   Condition: If any PCD includes a timeliness of delivery fine and/or a fine related to delivering less than 88% of the smart metering programme.

   Representation case and funding: The cost for relocating meters is not appropriately considered within the Ofwat cost model, given the requirement to achieve a 100% success rate of installation and a 95% ongoing data success rate. Yorkshire Water wishes to trigger a conditional representation, to fund the installation of meters and chambers for 12% of meters within the programme. The cost would be an additional £68.19 million, if above 88% of the meters are required to be installed to avoid PCD clawback, or if a timeliness profile is required to be achieved within the PCD.

2. **Achieving meter install connectivity definition**

   Condition: If Ofwat imposes a data completeness element within a PCD to deem a meter installed or a similar variant.

   Representation case and funding: We wish to trigger a conditional representation, which would address shortfalls in the current methodology for calculating the costs of achieving the Ofwat 95% operability installation definition. This representation would be for an additional £14.32 million in AMP8 and £75.74 million across the 15-year asset life of the delivery programme. This increase in cost is due to the requirement to significantly densify and broaden radiocommunication network infrastructure across the region in order to achieve the Ofwat PCD definition performance level.

   In summary, the PCD is not set correctly to appropriately fund the delivery of the smart metering programme.

   To deliver 100% of the meters committed within the plan and achieve the data connectivity clause, Yorkshire Water would require an additional £82.02 million, made up from £67.70 million for relocating meters, and £14.32 million to ensure 95% connectivity.

   The model used by Ofwat to determine an efficient unit cost does not consider the range of meter sizes and exchange/installation scenarios included within water company smart metering programmes. Nor does it recognise that water companies have undertaken competitive market tendering processes. Any deviation between Ofwat funding models and tendered delivery costs will result in under delivery of the smart metering programmes.

   Ofwat should ensure that it publishes a final PCD ahead of final determination and allows water companies to resubmit metering programme costs in line with the requirements contained within the PCD.

   Yorkshire Water has transitional expenditure in flight for smart metering: supporting process, systems and hardware preparedness to be ready to undertake the significant delivery programme planned in AMP8, peaking at more than 1,000 meters exchanged per day, and also achieving the benefits we have committed from smart metering, namely PCC, leakage and business demand. This work is progressing well with partners in our awarded smart metering framework, with meter orders being made in September 2024 to ensure we have assets ready to deploy in 2025. The uncertainty in PCDs and funding, paired with a global supply chain surge in demand for meters and skilled resources to undertake the AMP8 programme, is a risk which we are managing, to ensure a successful delivery despite the uncertainty in the outcome of our final determination.

Current Ofwat financial model representation

Our representation challenges the cost model Ofwat uses to deduce a single unit rate across base, CAC and enhancement in delivering the smart metering programme. Water companies have competitively tendered unit rates, which they cannot vastly outperform to meet the expectations of Ofwat's current cost model. The model also fails to accommodate meter portfolio variables, which could account for differences in cost efficiency between companies.

10. PFAS investigations

10.1 Overview

Poly and perfluorinated alkyl substances (PFAS) are a wide group of chemical compounds which are known to be very stable in the environment. The presence of PFAS is emerging as a potential health risk worldwide. However, to date, evidence indicates low risk in Yorkshire. Therefore, investment in PFAS was not originally proposed in our original PR24 business plan submission. We chose not to seek support for enhanced investment at the earliest opportunity (March 2023 DWI Appendix B process) because the evidence did not support it at that stage.

However, updated analytical data reviewed in November 2023 showed higher than Tier 1 PFAS levels at one site, and due to a change in Drinking Water Inspectorate (DWI) guidance we have now identified that new investment is required to investigate this emerging risk. Our decision to investigate this risk, through this enhancement case, has been supported by the DWI. It is designed to improve the understanding of PFAS through monitoring and supports collaborative working with relevant partners and stakeholders that could be impacted by PFAS, such as landowners, the farming community, regulators, and other agencies like the fire and rescue services.

10.2 Key messages

1. We are requesting enhancement expenditure to address raw water-quality deterioration caused by PFAS.
2. We wish to develop our knowledge of potentially raised levels of PFAS and acquire additional evidence.
3. The proposed intervention and associated expenditure set out below meets the approach and outcomes / guidelines set out by DWI.

10.3 Change requested

PFAS costs have not previously been included in any of our submissions, or by Ofwat in the draft determination. We are proposing £2.9 million to complete investigation costs during AMP8 under the driver '*Addressing raw water quality deterioration: enhancement totex'*.

The proposed initiative has several goals:

a) to develop and improve our own understanding of PFAS with a particular focus on the Yorkshire region;
b) to engage with stakeholders to promote best practice and encourage measures which can mitigate against water-quality deterioration caused by PFAS as early as possible;
c) to carry out minor intervention (catchment solutions) where effective; and
d) to develop investment programmes for future AMPs where unavoidable.

Table 10-1 Summary of the PFAS Enhancement allowance

	Allowance (£m)
October 2023 business plan submission	0
January 2024 business plan resubmission	0
Ofwat's draft determination	0
YKY draft determination representation	2.900

10.4 Yorkshire Water's response to Ofwat

10.4.1 The need for investment

The presence of PFAS is emerging as a potential health risk worldwide and impacts our customers. Yorkshire Water has been monitoring and reviewing the levels of PFAS in water since this became analytically possible (post-2022). We chose not to seek enhanced investment at the earliest opportunity (March 2023 DWI Appendix B process) as the evidence did not support it at that stage. However, updated analytical data in November 2023 showed levels above Tier 1 PFAS levels on one occasion. In addition, a clarification in DWI guidance, as confirmed in letters to companies in December 2023 and which was incorporated into new Undertakings (YKS-2023-0009), means that we are now expected to investigate this emerging risk and we have identified that new investment is required to do so.

Therefore, in order to have better visibility of our network and thus the possibility to intervene, we are requesting expenditure allowance as part of this enhancement case for the monitoring of PFAS levels within our licence area.

10.4.2 Best option for customers

To remove PFAS from our water network, we considered the following options:

1. catchment management;
2. raw water source selection;
3. minor catchment intervention solutions; and
4. treatment solutions.

At this point, we are proposing to keep the investment to investigation only to avoid unnecessary investment or over-engineering of solutions. The proposed case is explicitly designed to maximise investigation in order to prevent unnecessary future interventions. This provides value to customers, and ensures options are cost-efficient for customers, compared to the impact of constructing new treatment facilities.

For further detail on the options considered, and reasons for choosing the preferred option, please see our PFAS investigations enhancement case (YKY-PR24-DDR-39).

10.4.3 Customer protection

PFAS investigations will be delivered as outlined in the DWI undertaking (ref: YKS-2023-00009) providing customer protection that the proposed work will be completed.

PCD mechanism not required as the cost threshold not met.

10.5 Concluding points

Investment in PFAS was not originally proposed in our original PR24 business plan submission but has become necessary in light of updated data and regulatory guidance. We are proposing £2.900 million to complete investigations into current and emerging PFAS risks to customers' health. The proposed intervention and associated expenditure meets the approach and outcomes/guidelines set out by DWI.

11. Security and emergency planning: SEMD

11.1 Overview

Within the Ofwat Cost Assessment Model PR24CA42 – SEMD (water waste) (002) tab – **YKY (Security & AWS)**, Ofwat has undertaken a deep dive on the Yorkshire Water SEMD programme and adjusted costs down by 20% (across both Security and Emergency Measures). We believe this reduction is not justified and will result in undue and would impose negative consequences, specifically:

A 20% reduction of funding will negatively impact the security of the CNI asset base and will harm future resilience of our Alternative Water Supply strategy.

11.1.1 Security

We are pleased that Ofwat clearly understands the need for investment in this area to ensure that all Critical National Infrastructure (CNI) assets are upgraded to the required security standard. To achieve this, all water undertakers have to comply with section 208 of the Water Industry Act 1991, which is the Security and Emergency Measures Directive (SEMD).

A 2021 CNI Criticalities Review, undertaken and managed by Defra, identified additional CNI assets; assets which do not currently meet the required security standard (Water UK Security Standards) for CNI categorised assets. We are concerned that the 20% reduction of funding proposed by Ofwat will inevitably result in a significantly weakened security posture affecting the newly categorised CNI asset base.

11.1.2 Emergency planning

Yorkshire Water is pleased that Ofwat recognises the need for investment in alternative water supply solutions, as this investment is crucial to ensuring we deliver a reliable, fit-for-purpose service to our customers under the new SEMD guidance. However, the 20% reduction in cost allowance (across both Security and Emergency Measures) compromises our long-term ability to serve our customers effectively. It will drive us to focus on more short-term solutions, further harming our future resilience and service reliability.

The new planning assumption for AWS is the key driver under legislation change of SEMD 2022, and requires an increase from 30,000 rural and 50,000 urban to 82,000 customers within Yorkshire Water. 85,000 customers is the current projection for 1.5% of the population at the end of AMP8.

	AMP7	AMP8
Legislative obligation	Set figures	1.5% of population
Number of customers	30k rural 50k urban	Year 2025-26 = 82,358 Year 2030-31 = 85,000 Year 2040-41 = 89,441 Year 2050-51 = 92,836

Note: Assumption that 10% of customers impacted within any incident are considered vulnerable

As a buffer for population growth protection, our planning assumption for the business case utilises the AMP8 Year 5 figure of 85,000.

Our representation builds on the detail presented in our October 2023 SEMD enhancement case appendix (YKY32_Security - SEMD Enhancement Case – Confidential). Firstly, we address each of the points above to demonstrate why full finding is essential to optimal service delivery, which addresses the needs of the current network, while being alert and responsive to future challenges. Secondly, this representation provides additional information and commentary to demonstrate why the reduction is undue.

11.2 Key messages

11.2.1 Security

This scheme was identified on the back of the CNI Criticalities Review led and managed by Defra. In this review, Defra identified a number of additional Yorkshire Water assets that were to be newly classified as CNI, requiring additional security enhancements to ensure they meet the required legislative standard. Our approach, using an optioneering method, has ensured that this scheme presents value for money for customers by considering multiple methods to achieve the CNI security standard for these newly-classified assets, balancing security posture and cost.

As the security standard is prescriptive about the specification of security products, the estimated costs are well understood. We have benchmarked our costs with peers in the water industry and our costs are slightly below that of the benchmark. When confirming cost for physical security products, we have found our costs to be 5.1% and 7.6% cheaper. This process has been underpinned by further deep dives on the cost estimates and end-to-end second and third line assurance.

We do not, therefore, understand the basis for Ofwat's decision not to grant the funding that was requested.

11.2.2 Alternative water / emergency measures

The increase in customers Yorkshire Water would need to serve during a no water event, in line with the new SEMD guidance, and the limited spend in this area over previous two AMPs means full funding is a necessity. The funding Ofwat has provisionally allowed is not adequate. We are concerned about our ability to offer long-term solutions to the new SEMD requirements and ensure our service is right for all customers, in accordance with required standards. As agreed with Ofwat, 'A service for all' initiative ensures our services and incident responses are fully inclusive by design, particularly for vulnerable customers on our priority services register (PSR). Adequate funding will enable us to build resilience into our operating model, reducing our reliance on supply chains and mutual aid from other water companies – a critical lesson from industry-wide power resilience efforts. Furthermore, funding would also allow us to deliver comprehensive training and exercising programs, and to build resilience of critical infrastructure such as temporary flood defences. The requirement of such infrastructure was further highlighted during the winter of 2023, when back-to-back named storms emphasised the need for robust and adaptable resilience protection measures. Yorkshire Water has recognised the need for new roles and resources to enhance our long-term emergency planning resilience and logistics capabilities, seeing us beyond the AMP period into the future.

- We undertook a rigorous optioneering, cost development, and assurance process to ensure our cost estimates are efficient. This representation includes cost estimates for the AWS contracts, demonstrating the efficiency of our chosen approach.

- Ofwat's 20% cut in cost allowances for alternative water supply (AWS) solutions will drive us to short-term approaches, harming future resilience with potentially serious consequences.

- The increase of customers that Yorkshire Water would need to serve during a no water event, in line with the new SEMD guidance, together with the limited spend in this area over the previous two AMPs, means full funding is a necessity if we are to reduce our reliance on supply chains and mutual aid. We are concerned about our ability to offer long-term solutions to the new SEMD requirements and ensure our service is right for all customers.

11.3 Change requested

There are no changes to the scope or costs from those in our January 2024 resubmission. We are asking for our original case to be reconsidered, and for the full value of the costs presented below.

Table 11-1 Summary of changes to the security: SEMD enhancement allowance

	Allowance (£m)
October 2023 business plan submission	24.97
January 2024 business plan resubmission	24.97
Ofwat's draft determination	19.98
YKY draft determination representation	24.97

11.4 Yorkshire Water's response to Ofwat

The table below presents Ofwat's commentary from the PR24CA42 – SEMD (water waste) (002) tab – **YKY (Security & AWS),** specifically around cost efficiency, alongside a summary of the rationale underpinning this representation. This is further detailed in the following chapters, firstly by exploring the optioneering process in section 1.4.2, followed by demonstrating our approach to cost efficiency in section 1.4.3.

Table 11-2 Evidence to support the rationale for the SEMD representation

Ofwat concerns	Representation rationale and supporting evidence
Cost efficiency	
We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient.	We undertook a rigorous optioneering, cost development, and assurance process to ensure our chosen option represents the interests of consumers and is costed efficiently. The following information has been provided in this representation to substantiate this process: • Evidence of optioneering – section 11.4.2 • Evidence of external cost assurance – section 11.4.3 • Evidence of increased costs – section 11.4.3 and further detailed in the supporting SEMD evidence appendix YKY-PR24-DDR-27[21]. • Price efficiency reviews for AWS – section 11.4.3. • Evidence of our cost benchmarking process – section 11.4.3. • Evidence of supplier framework rates and historical costs used for this programme can be found in supporting SEMD evidence appendix YKY-PR24-DDR-27.
The company states that CNI and Alternative Water Supplies (AWS) 2025-2030 cost estimates have been developed through engagement with the incumbent security partners for 2020-2025. However, the company does not provide evidence of	Section 11.4.3 includes detail of our cost benchmarking process. This included three rounds of price efficiency reviews with multiple internal stakeholders, marking against all prospective suppliers to determine the efficiency of our proposed approach.

[21] Please note – as this information is confidential we have not provided a link to it within this document

cost benchmarking or external assurance of costs to demonstrate that they are efficient.	We have chosen to move forward with Water Direct as our AWS supplier after a careful process of reviewing cost vs quality of their tender against all other prospective suppliers who bid in the tender process. The process of comparing the costs given to us from all prospective suppliers allowed us to ensure the price we received was in line with market value.
We note that both security and AWS contracts are due for retender before the end of 2020-2025. We note that opportunities may exist to outperform the 2025-2030 cost estimates from the incumbent 2020-2025 partners.	

11.4.1 The need for investment

Security

Section 8 of SEMD requires companies to 'use such up-to-date technologies and systems as are appropriate to ensure the ongoing security of relevant assets, supporting infrastructure and their operations'. Sufficient funding will ensure the optimal delivery of this work, and the realisation the wider benefits that will be seen by enhancing security, including:

- Minimising fly-tipping on our sites.
- Reducing criminal damage.
- Crime prevention through environmental design.
- Protecting water quality – reducing the ability of wildlife entering site.
- Enhanced protection for the public.

1.To adequately protect new assets from threats

Meeting the SEMD in AMP8 will require us to protect the additional, newly-designated CNI assets from physical and cyber threats. Physical and electronic security mitigation measures will be taken, including installing perimeter fence lines, security doors, window bars, intruder detection systems (IDS) and video surveillance systems (VSS).

2. To protect against growing criminal activity

Due to the prescriptive security standards required, regulatory compliance is binary and therefore there is no ability to cut the scope or specify lower grade equipment. We are also experiencing increased levels of criminal activity,. This increasing likelihood of criminality necessitates the requirement to install the correct standards of both physical and electronic security.

3. To manage rising delivery costs

As per the detail found in the supporting SEMD evidence appendix (YKY-PR24-DDR-27), our contract partners are experiencing cost challenges today. These were present at the start of this PR24 work, and this will only increase as we move into the delivery phase in AMP8.

Alternative Water / Emergency Measures

The investment of circa £21.5 million requested for the 2025-2030 regulatory period is critical to meet the new SEMD legislation requirements set in February 2022. The requirement mandates alternative water supply to 1.5% of Yorkshire Water customers (82,000 people) in a no water event, with population growth seeing this rise to 85,000 people by Year 5 of AMP8. This investment is essential due to the significant uplift required in our base capability to respond effectively, particularly as limited funding was allocated for Emergency Planning in AMP6 and AMP7. The scope of investment includes:

- Our obligations and strategy around vulnerable customers and communities, with ongoing activity to obtain the ISO2248 accreditation for inclusive service.

- To maintain focus on our customer-focused licence condition.
- Ongoing consultation with Ofwat around 'Service for all', ensuring our service and incident response are fully inclusive by design.
- Building resilience into our operating model to reduce the need to call upon supply chains and mutual aid from other water companies. Learning from national level exercises (Mighty Oak – power outage and Exercise Marrakesh – Water UK, mass water outage). Significant areas of risk were identified, and we have built controls into our proposals to ensure resilience within our in-house capability.
- Winter resilience equipment, including pumps and generators, which would limit flooding and pollution events, preventing environmental impact.
- Horizon-scanning the national risk picture and shift in threat landscape. We are future-proofing our capability to plan, prepare and respond through this bid.
- Investment in alternative water supplies will drive a combined benefit to our supply interruptions and customer minutes lost (CML) performance commitments.
- Our aspirations to be a net zero carbon business by 2030 with investment in carbon neutral options for fleet.
- Building resilience of critical infrastructure and essential services through investment in emergency response equipment (temporary flooding defences) reducing the impact of external flooding and societal disruption.
- Training and exercising that builds the capability, resilience, multiagency network and safety of our colleagues.

Additionally, our in-house tankering capability is beyond asset life span. While tankers remain compliant through regular maintenance and rigorous checks, they are on average 30 years old, leading to low reliability and frequent availability issues due to repairs and maintenance. While we are currently retendering our alternative water capabilities, this comes at cost. This funding will assure and improve our resilience functionality and SLA commitments across tankering, warning notices, bottled water deliveries and provision, ensuring we deliver service to our customers and the environment and meet our regulatory obligations.

The scope of investment remains aligned with the original enhancement case, focusing on long-term solutions to comply with SEMD requirements, future-proofing our operations and enhancing service reliability and inclusivity.

Below we provide reasoning why full funding is required in order to best serve our customers and to mitigate risk appropriately.

To adequately protect Yorkshire's growing population from a no water event: The investment of circa £21.5 million requested for the 2025-2030 period is critical to meet the new SEMD legislation requirements set in February 2022, which mandates alternative water supply to 1.5% of Yorkshire Water customers (82,000 people) in a no water event, with population growth seeing this rise to 85,000 people by Year 5 of AMP8. This investment is essential due to the significant uplift required in our base capability to respond effectively, particularly as limited funding was allocated for Emergency Planning in AMP6 and AMP7.

To protect against risks relating to underfunded, ageing infrastructure: Our in-house tankering capability is beyond asset life span. While tankers remain compliant through regular maintenance and rigorous checks, they are on average 30 years old, leading to low reliability and frequent availability issues due to repairs and maintenance. While we are currently retendering our alternative water capabilities, this comes at cost. This will assure and improve our resilience functionality and SLA commitments across tankering, warning notices, bottled water deliveries and provision ensuring we deliver service to our customers and the environment and meet our regulatory obligations.

The scope of investment remains aligned with the original enhancement case, focusing on long-term solutions to comply with SEMD requirements, future-proofing our operations and enhancing service reliability and inclusivity.

Security

Surveying the new CNI assets
Our proposal is based on comprehensive security surveys of all the newly-classified CNI assets, to identify where the site's current security standards are not compliant with the regulatory and legislative standards for CNI assets. In meeting the standard, we are taking the necessary action to safeguard the potable water supply for our customers, from source to tap, against malicious and accidental security threats.

Should the funding not be available to complete this scheme, our newly-classified CNI assets will not meet the required security standards; this will increase the risk that these assets are compromised, impacting on our ability to provide safe potable water to our customers.

Alternative water supply/Emergency Measures

We are concerned about our ability to offer long-term solutions to the new SEMD requirements and to ensure our service is right for all customers, should full funding not be received. This is heightened by the increase in the number of customers Yorkshire Water would need to serve during a no water event (in line with the new SEMD guidance) along with the limited spend in this area over the previous two AMPs.

On 12 February 2024, Ofwat implemented changes to water company licences, Condition G: Principles for Customer Care to give Ofwat new powers to act against any water company which fails to appropriately support its customers, following the December 2023 decision under sections 12A and 13 of the Water Industry Act 1991. A 'Service for all' initiative ensures our services and incident responses are fully inclusive by design, particularly for vulnerable customers on our PSR, therefore adequate funding will enable us to build resilience into our operating model. This reduces our reliance on supply chains and mutual aid from other water companies – a critical lesson from industry-wide power resilience efforts. Furthermore, funding would also be used to deliver comprehensive training and exercising programs, and to build resilience of critical infrastructure such as temporary flood defences. The requirement of such infrastructure was further highlighted during the winter of 2023, when back-to-back named storms emphasised the need for robust and adaptable resilience protection measures. Yorkshire Water has recognised the need for new roles and resources to enhance our long-term emergency planning resilience and logistics capabilities, ensuring effectiveness beyond just the AMP period.

11.4.2 Selecting the best option for customers

Security

This scheme was identified as a result of the CNI Criticalities Review, led and managed by Defra (and Cabinet Office) and has subsequently been supported by DWI. In the CNI Criticalities review, a number of Yorkshire Water's assets were newly categorised as CNI; these newly-classified CNI assets require further security enhancements to ensure they met the required legislative standard for CNI assets. Our approach to understanding the need for an enhanced service and developing a plan to meet those requirements have been robust and well-thought-out, utilising real-time data. Using an optioneering method, we have ensured that this scheme presents value for money for customers..

Broadly, cost estimates have been developed bottom-up from a range of quotes and indicative costs from contract partners and suppliers, using the pre-agreed schedule of rates. See supporting SEMD evidence appendix (YKY-PR24-DDR-27) for the breakdown of costs per site against each contract partner.

Based on our cost assurance, in which we assured the costs by undertaking assurance at 2 stages.

- Stage 1 – Atkins assurance prior to delivering the scheme to DWI.
- Stage 2 – Baringa assurance prior to delivering the scheme to Ofwat.

We have established a high level of confidence in our cost estimates for the scheme. Therefore, we are certain that we cannot deliver the scheme with a 20% reduction in funding. The substantial cut in funding will significantly undermine the scheme's ability to deliver the intended

benefits to our customers. For example, the cut in funding will undermine the scheme in the following ways:

- The scheme will not deliver the enhanced security requirements to the additional CNI assets.
- The available funding will be allocated to sites on a risk basis, meaning those customers served by a site that receives no investment will not benefit from any of the security enhancements introduced to other CNI assets

It is therefore imperative that Ofwat reassesses the percentage reduction provided to this scheme to not undermine the outcomes of this scheme.

Alternative water / Emergency Measures

Our optioneering process included, but was not limited to, the following activities. Alongside ensuring compliance with the new AWS planning assumption, these activities helped us to select the preferred option:

- A cross business working group.
- Multiple collaborative workshops.
- Stakeholder engagement.

Atkins Limited was appointed to provide external assurance on Yorkshire Water's PR24 DWI submission, including the SEMD elements. The overall approach to assurance is based around two stage audits: Methodology and Data. The purpose of each audit type was as follows:

- **Methodology Audits**: To assess whether the Company's methodology aligns with appropriate guidance, reporting requirements, licence conditions or industry practice and whether appropriate checks, controls and explanatory documents exist.

- **Data Audits**: To assess whether processes/procedures are applied as indicated including data trailing to source documents to ensure alignment/consistency with the reported number and sampling to confirm rigour of process application, checks and controls.

Through Atkins audits the following was tested:

1. The internal control systems to produce the submission
2. Whether reporting appears to align with relevant guidance; and
3. If data has been compiled in accordance with Company and/or external methods and procedures and can be considered reliable, accurate and complete.

Atkins completed external independent assurance over the SEMD submission, and concluded: We reviewed the submission covering the enhanced requirement for AWS under SEMD 2022 which will be a requirement after March 2025 and concluded that the need for enhancement work is well understood and that a balanced, risk-based approach has been taken in how to proceed with the submission. This accords with the DWI Guidance issued.

Atkins also confirmed: We reviewed the body of supporting information and we concluded that there appears to be a strong body of supporting evidence for the quantification of assets needed and the rates applicable

Due to the evolving nature of the PR24 DWI submission, we combined methodology and data audits into a single exercise.

These activities led to the shortlisting of three feasible options. These options were interrogated by Yorkshire Water to assess the key risks, benefits and critical enablers (as shown below). They were subject to a rigorous risk assessment, modelling and scenario testing, as well as wider business consultation (for example, Atkins third line assurance) and socialisation through our internal governance framework. By developing this holistic understanding of the shortlisted option, we were able to determine the best result for our customers and the environment.

Feasible options considered

Feasible option 1: Continuation of our current operating model		
Option includes: • Small in-house tankering capability, focusing on alternative water supplies via direct inject to the network managing short-term, localised supply interruptions. • Bottled water provision for the first 24 hours, followed by Arlington tanks for any longer duration events. • A third party contractual arrangement for additional bulk tankering provision and large-scale logistical movement of bottled water supplies. • Where demand exceeds our capability, look to mutual aid.		
Risks	**Benefits**	**Critical enablers**
• In-house tankering capability has exceeded asset lifespan • Inflexible internal operating model in terms of resourcing • Driver hours for tankering • Contract performance and cost • Response times slow • Reliance on mutual aid is not certain or resilient	• Compliance and assurance in house, reducing water quality risks • Ability to leverage all capabilities within our company incident management plan framework • Utilisation of internal volunteers	• Contract retender for best cost and SLAs • Review of incident roles and responsibilities as a business operating model

Feasible option 2: Hybrid model		
Option includes: • Increased investment in tankering capability, both assets and resources (drivers) • Bottled water provision for the first 24 hours, followed by Arlington tanks for any longer duration events • A scaled third party contractual arrangement for additional bulk tankering provision and large-scale logistical movement of bottled water supplies • Specific delivery service with shorter SLAs for doorstep deliveries to vulnerable customers		
Risks	**Benefits**	**Critical enablers**
• Cost of 24/7 working and resources • Commercial vulnerability for outsourced model • Audit non-compliance • Contractual management and SLA adherence	• Resilient option, scaled and will drive good customer experience • Potential to be a cost neutral option with avoidance of penalties/fines • Wider ODI and performance commitment benefits • Reliance on mutual aid only in severe incident escalation beyond our reasonable worst-case scenario	• Contract retender for best cost and SLAs • Review of incident roles and responsibilities as a business operating model

Feasible option 3: Outsourced model		
Option includes all service fully outsourced to a third-party supplier.		
Risks	**Benefits**	**Critical enablers**
• Cost and overheads • Regulator concern around assurance and quality	• Drives innovation and forward thinking	• OJEU tender • Amendment of existing contracts

• Security of services if supplier has peak demand with other WASCs • Control and reputation • Time to outsource • Commercial vulnerability for outsourced model • Audit non-compliance • Contractual management and SLA adherence	• Expertise in logistics management and bulk tankering • Scalability • Strategic storage locations will improve • Agile and flexible • Potential to be a cost-neutral option with avoidance of penalties/fines • Reliance on mutual aid only in severe incident escalation beyond our reasonable worst-case scenario	• Redundancy/transfer for in-house capability

In addition to the evidence above, our recent retender of TAWs has allowed Yorkshire Water to gain real-time data and understand the current cost of delivering the desired service for customers and SEMD guidance. Through this tender process, we have ensured efficiency and quality which further highlighted the potential future costs of this service.

Cost development for alternative water supply

In response to Ofwat's concerns noted above, this representation includes further details of cost estimates for the new AWS planning assumption. Broadly, cost estimates have been developed bottom-up from a range of quotes and indicative costs from contract partners and suppliers. Please see the supporting appendix (YKY-PR24-DDR-27) for examples. The total cost to meet the new requirements described earlier in this document is circa £21.5 million. We set out how we have built up the costs in the table below and expand on how we have assured the efficiency of our cost profile in the following section.

Table 11-3 Cost estimates from contract partners and suppliers

Cost item	Cost (£)	Approach to developing the cost
Arlington tanks liners	780,000	Based on a quote from Arlington.
Arlington tanks crates	470,000	
AWS (third party)	10,000,000	Based on current framework rates. Now we have moved forward on the AWS contract we are aware of what an enhanced service would cost, which is in excess of £2 million per year. This is in line with our initial PR24 assessment of £10 million over the AMP.
Tankers for alternative supply	3,320,000	Based on the historical costs we have incurred for previous tankers and maintenance activity.
Tanker maintenance	307,500	
Logistic equipment	35,000	Based on historical costs.
People	4,520,000	Based on our experience of undertaking AWS activities and includes additional staff such as: a logistics manager, vulnerability lead, deployment of staff, communications, training, drivers and bronze and silver leads for events.

Total cost	**£21.5m**	-

11.4.3 Cost efficiency

"We have some concerns whether the investment is efficient. The company does not provide sufficient and convincing evidence that the proposed costs are efficient. The company states that CNI and Alternative Water Supplies (AWS) 2025-2030 cost estimates have been developed through engagement with the incumbent security partners for 2020-2025. However, the company does not provide evidence of cost benchmarking or external assurance of costs to demonstrate that they are efficient"

Security

We appreciate Ofwat's encouragement to drive efficiencies and will strive to meet these expectations. However, the PR24 submission was based on actual, bottom-up costs experienced throughout AMP7 between ourselves, our contract partners and their supply chain. Unit costs used in these estimates are in line with the current contracted schedule of rates. In addition to this, Yorkshire Water has benchmarked the physical security costs with another water company, and it was found that the costs Yorkshire Water has submitted as part of this programme are between 5.1% and 7.6% more cost-effective. Moving forward into AMP8, our contract partners are expecting these costs to rise. (Details of this can be found in YKY-PR24-DDR-27).

Due to the prescriptive security standards required, there is no possibility of cutting or reducing the scope. This pressure is emphasised by the frequency of criminal activity we are seeing on a number of our sites in recent years, underlining the urgency of the requirement to install the correct standards of both physical and electronic security.

The cost challenges experienced by our contract partners have risen from the start of this PR24 work and will only increase as we move into the delivery phase in AMP8. When the initial contracts were awarded in 2020, we saw a huge spike in the cost of fuel, copper and steel. There has also been an issue with 'chip sets' for electronic security devices which had a massive impact on lead times, and increasing costs.

Following consultation with a number of the Yorkshire Water security contract partners, it is evident that the raw cost of materials has risen dramatically over the last couple of years and there is potential for more rises as we move into AMP8.

Alternative water / Emergency Measures

During our current TAW's retender process (November 2023 – October 2024), Yorkshire Water went through three rounds of price efficiency reviews with multiple internal stakeholders, marking against all prospective suppliers. During the three rounds of price efficiency reviews, we ensured that the service would always remain optimal, however the price would be reviewed to see if cost savings were applicable. This process established that many suppliers provided similar costs for services, demonstrating that limited savings could be made via going with alternative suppliers.

Market engagement: Yorkshire Water engaged with the supply market early, to understand different operating models and align internally on the final approach to the tender. We considered internal lessons learned from previous tenders, gaining an understanding of other water company strategies, internal capabilities and an overview of the current supply chain landscape.

Tender process: a robust UCR tender process was carried out, which included full evaluation of bidders' capabilities and experience in relevant areas. To ensure best commercial offers and gain confidence in qualitative responses, we gave suppliers the option of either providing a bid for individual service lines in isolation, or a fully managed service covering all requirements.

Three rounds of commercial submissions ensured Yorkshire Water were able to secure best value for the services being offered, with significant cost improvements achieved between first and final offers.

Final contract: to ensure Yorkshire Water meets the commitments set out within the PR24 submission, the supplier is incentivised to meet CML performance with financial penalties for not hitting challenging targets and have secured a first in the market contract for having 24/7 tankers on standby. These are tasked with responding to any incident in Yorkshire within 90 minutes.

The below table shows the basic best price per annum (Minimum cost) tabled to us by prospective suppliers against a service offering. Water Direct has been awarded a fully managed service. 'Lot 1', which is a combination for Lot 2 – 5, has been awarded the contract.

Table 11-4: Minimum cost from prospective suppliers by service offering

			Water Direct	Wincanton	TM Utilities	Harlow Printing	Shepley Spring	Suttons	Larkins
Lot	**Lot Name**	**Min Cost**	**Total Cost**	**Total Cost**	**Total Cost**	**Total Cost**	**Total Cost**	**Total Cost**	**Total Cost**
The Lot the row refers to	*The name of the Lot in question*								
Lot 1	Fully Managed Service	£1,902,710	£1,902,710	£0	£0	£0	£0	£0	£0
Lot 2	Tankering	£1,596,486	£1,654,320	£2,288,706	£0	£0	£0	£2,043,307	£1,596,486
Lot 3	Bottled Water Provision	£122,400	£150,000	£165,000	£127,200	£0	£122,400	£0	£0
Lot 4	Bottled Water Delivery	£63,727	£63,727	£0	£192,170	£0	£0	£0	£0
Lot 5	Warning Card Notices	£34,421	£34,663	£0	£40,873	£34,421	£0	£0	£0

In addition to the three-stage internal review of costs detailed above, we further assessed the efficiency of our costs through external assurance.

Our proposed costs

We appreciate Ofwat's view on driving efficiencies. However, we contend that decreasing the cost of our chosen option is difficult due to the following reasons:

- The increase in costs faced by our suppliers and contract partners (further explored below).
- The prescriptive security standards required, meaning that there is no ability to cut or reduce the scope of our activity. This is furthered by the increased levels of criminal activity we are seeing on a number of our sites in recent years. This only enhances the requirement to install the correct standards of both physical and electronic security.

Increased costs

Our PR24 submission was based on actual costs (bottom-up, through quotes obtained with contract partners already in place with Yorkshire Water) experienced throughout AMP7 between ourselves, our contract partners and our supply chain. Unit costs used in these estimates are in line with the current contracted schedule of rates. Moving forward into AMP8, our contract partners are expecting these costs to rise.

Following consultations, it is evident that our security contract partners are experiencing cost challenges today. These have risen from the start of this PR24 work and will only increase as we move into the delivery phase in AMP8. For example, since the initial contracts were awarded in 2020, we have seen a huge spike in the cost of fuel, copper and steel. There has also been an issue with 'chip sets' for electronic security devices which had a massive impact on lead times, therefore the increase in costs has been witnessed. The following is an excerpt from a letter from one of our incumbent security partners (details of which can be found the supporting appendix YKY-PR24-DDR-27).

> *"Factors have affected costs in the last few years on electronic security equipment. This trend is primarily driven by two major factors: the rise in the Consumer Price Index (CPI) and the escalating manufacturing costs, particularly concerning components and semiconductors (particularly on CCTV). These factors combined have resulted in a noticeable increase in the prices of electronic security equipment. We strive to mitigate these impacts through strategic sourcing and operational efficiencies. However, some cost increases are inevitable due to the broader economic landscape."*

While it will still be a challenge to deliver this scheme with a full financial determination, it would be not possible to achieve full compliance with a 20% reduction, as per the Ofwat draft

determination. The unit rates used from the existing security contracts are likely to increase when retendered, given macroeconomic driven cost pressures facing our supply chain.

11.5 Concluding points

This representation has presented our response to Ofwat's concerns by demonstrating further detail of our optioneering and cost development process to evidence that our chosen approach is the best option for consumers. It is based on a robust cost assessment process to ensure efficiency. Among other evidence, we have supplied the following information:

- Price efficiency reviews for AWS.
- Detail on the optioneering process.
- Evidence of increased costs, details of which can be found in supporting appendix YKY-PR24-DDR-27.

We are confident that full funding will deliver the option that is best for the customer, and gear Yorkshire Water up to a more resilient future. Should full funding not be granted, we have considerable concerns, including:

- Full funding is essential for Yorkshire Water to effectively serve the increased number of customers during a no water event, as stipulated by the new SEMD guidance.
- Adequate funding is critical to our long-term objectives in the emergency planning and alternative water space, ensuring the services we deliver are right for the customer and right for the environment.
- Due to an increase in the CNI asset base (following a review carried out by Defra), additional CNI assets must have enhanced security installed, to ensure regulatory and legislative (SEMD) compliance.

12. Security: cyber and ECAF

12.1 Overview

We are pleased that Ofwat recognises the need for investment in this area and its recognition that these schemes have been reviewed and supported by the DWI is welcome. However, a 30% reduction from our plan is not justifiable, in particular, given the deteriorating global security situation, the need for investment in this area is – if anything – even more justified than it was in January 2023 [redacted] This is further reflected in the increased focus on cyber by government, and the Cabinet Office in particular. The King's Speech also recognised the importance of improving the nation's cyber readiness across all critical national infrastructure, including water – specifically referencing the Cyber Security and Resilience Bill which is the UK's approach to NIS2. This is particularly significant as it introduces additional uncertainty in our business planning that may require addressing via the Uncertainty Mechanism.

Great care is taken to evaluate these schemes in terms of societal risk reduction, cost efficiency, and any overlap with other investment plans – coupled with a stringent assurance process. We are, then, concerned that the 30% reduction of funding proposed by Ofwat will inevitably result in a significantly weakened security stance, affecting the forthcoming and subsequent AMP periods. [redacted]

The following sections provide further evidence to meet the comments made by Ofwat for the six cyber schemes and the one ECAF scheme. The table below provides further information on the categorisation of the schemes.

Table 12-1 Categorisation of schemes

Schemes	Categorisation
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Key Messages:

We believe that these schemes were identified using a state-of-the-art risk assessment methodology (considered best of breed by the DWI as part of the NIS review process). This approach inherently assures value for money for customers by evaluating societal cost associated with supply and water quality risk and ensuring that any resulting investment is commensurate with that level of cost – a process supported by deep dive cost estimates and end-to-end second- and third-line assurance.

12.2 Change requested

There are no changes to the scope or costs from those in the original submission[22].

Table 12-2 Summary of changes to the security: cyber enhancement allowance

	Allowance (£m)
October 2023 business plan submission	£34.513
January 2024 business plan resubmission	£34.513
Ofwat's draft determination	£24.160
YKY draft determination representation	£34.513

12.3 Yorkshire Water's response to Ofwat

The table below presents Ofwat's commentary "**PR24CA39 - Cyber - water and waste.xlsm – Tab: Deep dives >> / YKY:",** alongside a summary of the rationale underpinning this representation. This is further detailed in the following chapters, firstly by detailing how our optioneering process results in the best options for consumers, followed by demonstrating the cost efficiency of the approaches.

Based on our cost assurance, in which we assured the costs by undertaking third line assurance (see below), we have established a high level of confidence in our cost estimates for the scheme. Therefore, we are certain that we cannot deliver the scheme with this 10% reduction in funding (this 10% refers specifically to Assurance and represents a third of the total 30% reduction referred to elsewhere). The substantial cut in funding will significantly undermine the scheme's ability to deliver the intended benefits to our customers. For example, the cut in funding will undermine the scheme in the following ways:

- Pro-rata this will reduce the coverage of intrusion detection – increasing the cyber security to customers from cyber-attack serviced by our smaller treatment works.
- We will be unable to comply with the DWI's January 2024 Reg. 17 enforcement notice.
- Neither will we be able to fully comply with ECAF.

Table 12-3 Projects by third line assurance

NCC, Atkins, and Baringa were undertaken on the following projects.			
	NCC Group	Atkins	Baringa
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			

[22] yky37_security-cyber-ecaf-enhancement-case-redacted.pdf (yorkshirewater.com)

[redacted]

Table 12-4 Evidence to support the rationale for the cyber security and ECAF representation

Ofwat concerns	Representation rationale and supporting evidence
Need for enhancement investment	
1. *The company states that parts of its operational technology need to be replaced. The company does not provide sufficient and convincing evidence that there are no overlaps with base allowances.* 2. *The company also proposes the replacement of its networks. We note that these networks have been extensively replaced throughout the industry with modern equivalent asset solutions as part of base allowances.* 3. *Our base expenditure is for companies to deliver resilient services on a day-to-day basis and to be able meet their statutory obligations. This includes maintaining their security systems.* 4. *Our base expenditure is for companies to deliver resilient services on a day-to-day basis and to be able meet their statutory obligations. This includes maintaining their security systems.*	The concerns have been addressed in section 12.3.1: 1) OT requirements, due to NIS and ECAF regulations run contrary to the engineering and operational strategy that dictates our business plans and need to be treated differently. These are required parts of exceptional investments to upgrade our infrastructure and remain compliant, and do not relate to day-to-day activities. These investments are needed when the threat environment changes, and thus are difficult to accommodate within the business plan. 2) [redacted]
Best option for customers	
1. *The company states the six preferred schemes presented were technically the most viable and provided the best value for money. The company provides commentary and examples of where innovative solutions are proposed. However, the evidence provided by the company is not*	The concerns have been addressed in section 12.3.2: 1) Undertook a 3-step value for money assurance process that involved internal and third-party scrutiny (Atkins and Baringa). 2) Sensitivity around cyber security required us to redact information in

sufficient to fully justify the preferred and rejected schemes. **Note for clarity:** Ofwat only references the six cyber schemes in this clause – there is also a seventh ECAF scheme	relation to the technical nature of some of the options. The proposed schemes were assured by DWI and other third parties on our behalf. 3) Innovative solutions had been explored, however there are limitations to what can be achieved due to existing IT. Examples are provided in section 12.3.2.
2. *The company states that external third-party assurance was provided to the optioneering process. However, the evidence provided by the company is not sufficient to explain the third-party's involvement and challenge across both cyber and eCAF proposals.*	The concerns have been addressed in section 12.3.2: Third parties were contracted to review the: 1) Compliance with guidance 2) All assumptions made 3) Methodology 4) Reported numbers 5) Audit trail supporting reporting 6) Datasets 7) Trends or outliers 8) First and second line assurance checks The final point is significant since first and second line assurance included: 1) The need for the schemes based on risk. 2) The need for the schemes based on regulatory compliance. 3) Regulatory fit (customer benefits, base vs enhancement and efficiency). The auditors 'overall view' was that our PR24 submission was consistent with: "Enhancements, Cost Estimates and Assurance. The robust risk-based approach adopted by Yorkshire Water underpins its submission and demonstrates an in-depth understanding of its assets and systems, as well as associated risks, available treatment options, and gaps in treatment options."
Cost efficiency	
3. *The company states that cost estimates have been developed bottom-up from a range of quotes and indicative costs from partners and suppliers. Whilst the company provides some detail regarding the six preferred schemes, we do not find sufficient evidence that considers cost breakdowns, contingency allowances, benchmarking opportunities and contractual cost efficiencies in the proposals.*	The concerns have been addressed in section 12.3.3, [redacted]

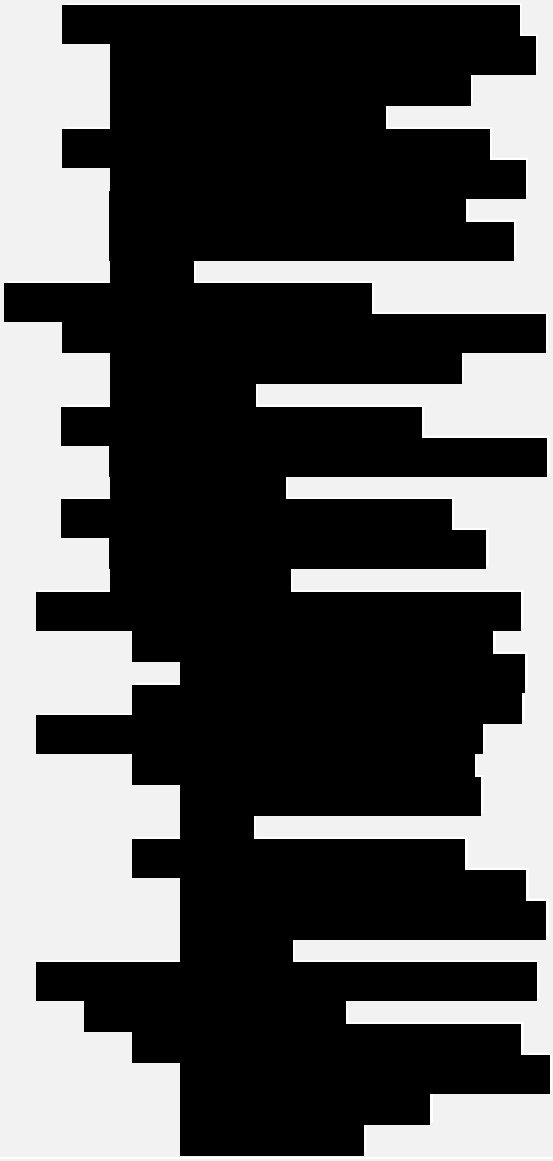
	
4. *The company states that external third-party assurance has been provided, but it is not explicitly confirmed that this included assurance of cyber and ECAF proposals.*	Yorkshire Water engaged with several external consultancies such as NCC, Atkins and Baringa. Their roles are summarised below: 2. NCC: Specific vendor opex/capex benchmarking. 3. Atkins: Assurance on technical options. 4. Baringa: Assurance on regulation.

Table 12-5 Cost Efficiencies Achieved For The Six Cyber and single ECAF Schemes

[redacted]

[redacted]

Table 12-6 Schemes by categorisation

[redacted]

[redacted]

[redacted]

[redacted]

12.4 Concluding points

Our proposals are robust and proportionate, underpinned by a thorough understanding of risk to our customers, and the proportionate level of investment necessary to address that risk on their behalf.

Furthermore, we believe that we have adequately addressed the questions of assurance, optioneering and best value for customers, given the unique challenges posed by a rapidly evolving threat environment driven by well-resourced adversaries. The actions of attackers are outside the company's control and cannot be reliably predicted. These unique circumstances do not necessarily align with a five-year investment planning cycle but require an agile approach to investment decision making (sometimes with little or no hard information upon which to make those decisions). They may also require the deployment of novel solutions with few recognised standards to be measured against.

Given these circumstances, we believe that the original submission was based on a firm understanding of the facts as they stood at the time. However, we have invested heavily since then in laying the foundations for these schemes by confirming our original assumptions, their value to our customers and cost estimates.

Our evidence shows that our solutions were appropriately optioneered and that our costs are efficient. In these circumstances, any reduction to our claim will leave us unable to deliver what is required in this area.

13. Water resilience – WTW

13.1 Overview

Ofwat has raised a number of challenges and points of clarification around our water resilience enhancement investment case which we presented in YKY31 Water Resilience Enhancement Case. The enhancement case [redacted] the construction of a new 75 MLD water treatment works and strategic storage reservoirs, [redacted] Ofwat's challenges include evidencing the need, whether our proposed solution represents the best option for customers, whether our costs are efficient and whether the proposed scheme is suitable for delivery through DPC.

Ofwat's challenges and the proposed reductions in costs allowed would render the proposed scheme undeliverable.

We have therefore set out additional evidence which we think should satisfy Ofwat on all the fundamental points they have raised and allow the scheme to progress in line with our original submission.

13.2 Key messages

[redacted]

[redacted] It is imperative that Ofwat allows appropriate funding in such scenarios to enable us to meet water supply demand and ensure our water supply system is resilient and able to withstand exogenous shocks, particularly where alternative short-term solutions are no longer appropriate. Supporting this claim would be fully consistent with Ofwat's duty under the 2014 Water Act to promote the resilience objective.

We supply additional evidence in this document to support the need for this investment, that solution is best option, that costs are efficient and that this scheme is suitable for delivery through DPC. and provide a clear rationale for the solution we propose. We are confident this will satisfy Ofwat's concerns that the costs proposed are efficient and in no way overlap with other base or enhancement funding.

13.3 Change requested

Following its deep dive [redacted] Ofwat proposed to allow 30% of our requested AMP8 totex (amounting to an allowance of £ 40.051 m) while proposing a PCD based on the delivery of a new 75Ml/d water treatment works.

The proposed PCD omitted the additional 150 ML of strategic storage which is a fundamental part of the proposed scheme. Notwithstanding that omission, there is a fundamental disconnect between the allowed funding and the proposed PCD. It would not be possible to deliver a new 75 Ml/d treatment works for the allowed funding, nor would that level of funding enable us to deliver the resilient outcome required for our customers [redacted] through other interventions.

While £40.051m might enable us to undertake some targeted tactical interventions to improve asset reliability and reduce the likelihood of a major outage [redacted], this would fundamentally undermine the concept of our proposed solution, [redacted]

Ofwat's approach in allowing partial funding where they did not feel we had met their evidential standards, results in an irreconcilable outcome, we trust that the additional evidence that we have presented removes the necessity for those reductions.

We trust that Ofwat will find that we have fully addressed the legitimate challenges and points of clarification set out in their draft determination response and will accept in full the need for this investment case and its suitability to be delivered through DPC. We note Ofwat's previous indication that a new, discrete treatment works (and associated storage) was '*likely to be eligible for DPC*'.

For consistency with our cost profile approach to the Elvington DPC scheme, we have added a 40% uplift to the costs of this scheme, to better reflect anticipated 'real' market costs, which is reflected in the increased value proposed for the DPC costs. The actual cost will be determined by the market, through the engagement with candidate Competitively Appointed Partners and subsequent commercial and performance negotiations. See Cost efficiency section for more detail.

We propose to leave the Yorkshire Water direct costs for managing the DPC engagement process unchanged at £24m. We have also updated the delivery programme for this scheme, which is now reflected in the capex and opex allocations across AMP8 to AMP10.

Table 13-1 Costs associated with water resilience at [redacted]

Expenditure Profile	Total (£m)	AMP8	AMP9	AMP10	AMP11-14
Development Costs	£24	£0	£0	£0	£0
Construction Costs	£198	£3	£181	£13	£0
Repeat Capex	£21	£0	£0	£0	£0
Opex	£73	£5	£0	£13	£56
Totex	£317	£33	£181	£26	£77

13.4 Yorkshire Water's response to Ofwat

This response addresses the detailed feedback and challenges set out in [redacted] specifically around:

- Need for enhancement investment,
- Best option for customers,
- Cost efficiency and customer protection.

We provide greater clarity on these points and the proposed scheme definition to support the case for this scheme being delivered through the DPC process.

The table below summarises the evidence provided against the concerns raised by Ofwat.

Table 13-2 Evidence to support the rationale for the water resilience at [redacted] representation

Ofwat concerns	Representation rationale and supporting evidence
Need for enhancement investment	

1. Insufficient evidence supporting key need for evidence. 2. Overlaps with base allowance. 3. Not suitable for DPC based on submitted information.	[redacted] Completed reassessment of the DPC suitability framework completed by our external assurance partners Arup. The new WTW scored highly on this assessment and is evidenced in water resilience DPC appendix (YKY-PR24-DDR-35).
Best option for customers	
1. Insufficient range of options considered (specifically interconnectivity with other sources). 2. Reason for selecting new WTW of 75 MLD + requirement for sub-options.	1. Reiterated purpose of our water supply system strategy workshops and use of supply engineer experts to develop a range of feasible options for improving resilience. And, new supply system modelling evidence presented from decision support and planning tool Decisio™. Considering further range or options including interconnectivity with other sources. [redacted]
Cost Efficiency	
1. Insufficient evidence of benchmarking and third party cost assurance	1. We provide new benchmarking evidence from similarly delivered scheme across industry using the WaterProjectsOnline and TR61 databases respectively. We also provide a detailed cost element breakdown as appendices to show use of our UCD methodology. Application of optimism bias to our solutions due to uncertainty of delivery of large scale scope and delivery through DPC.
Customer Protection	
1. No PCD presented as DPC delivery	1. We will not be including a PCD as the preferred solution meets the DPC assessment criteria and remaining internal YW costs do not meet the PCD materiality threshold.

In the following sections, we set out our detailed response to the specific issues raised by Ofwat in their draft determination.

13.4.1 The need for investment

Since the drought of 1995, Yorkshire Water has significantly invested in developing strategic water transfer capability, creating a regional grid that enables us to provide alternative supplies from multiple sources, for most of our customers.

[redacted]

Having undertaken a systematic assessment of our 8 most critical strategic planning areas (out of 20 in total) during AMP6 we have been able to validate and quantify the risk relative to others across our operating area, consistent with best practice approaches to resilience. Having quantified that risk, it is incumbent on us to take appropriate action and the risk will only increase over time if no action is taken in AMP8[redacted]

[redacted]

[redacted]

[redacted]

Overlaps with base allowances and previously funded enhancement scheme

[redacted]

[redacted]

[redacted]

[redacted]

As such, we are confident that there is no overlap with base allowances or previous enhancement funding.

Suitability for Direct Procurement for Customers (DPC)

We disagree with Ofwat's position that the new WTW is not suitable for DPC. We have engaged our consultants Arup to update their original DPC suitability assessment in relation to this scheme and attach their report in water resilience DPC appendix (YKY-PR24-DDR-35). The high-level findings of the report are summarised in the table below, the new treatment works scores high on 7 out of the 8 test criteria.

Table 13-3 Table 13-3: Extract taken from YKY-PR24-DDR-35 (page 6)

Test Criteria	Sub-Criteria	Scoring Criteria	Score
Ofwat: Scalability	Is Totex>£200m over the proposed DPC duration (default 25 years)?	1-5 (5 for clearly >£200m, 3 for just about £200m (i.e. >£180m)	5
	If less than £200m, can projects be bundled into an aligned programme with a single payment mechanism?	1-5 (5 for clearly >£200m, 3 for just about £200m (i.e. >£180m)	5
Ofwat: Construction	Discreteness test: Is the project/ programme sufficiently separable so there are no significant construction interface issues which cannot be cost-effectively managed or mitigated?	1 - 5 (5 for totally discreet)	4
	Are there any construction risks that cannot be transferred and need to be retained?	1 - 5 (5 for none)	5
Ofwat: Operations & Maintenance	Are there restrictions on the transfer of regulatory obligations and if so is there a restriction on the transfer of the functions to 3rd parties?	1- 5 (5 for none, 1 if there is a restriction on transfer of functions to 3rd parties)	5
	Are there significant customer/ stakeholder interface challenges that cannot be transferred?	1- 5 (5 for none)	3
	Can a DPC deliver required volume and quality outcomes?	1 - 5 (5 for easily)	5
	Are there significant operational interface issues that cannot be cost-effectively managed or mitigated?	1 - 5 (5 for none)	4

We note Ofwat's comments in the PR24 draft determinations Major Projects Appendix that there remained some uncertainty around this as a solution, "*as it might become instead a series of upgrades to the network which are likely to be less suitable for delivery via DPC*".

We believe that there may have been some miscommunication at the time of the original DPC suitability assessment around this issue. For the avoidance of doubt, while we explored such alternative options as part of the development of our preferred solution, we had determined these to be technically and operationally infeasible, and this remains the case. Indeed, we have undertaken further detailed investigation of the scope for such alternative solutions, and this has confirmed our original position (discussed further below). Having exhausted the potential for such distributed/incremental solutions, our proposed solution is a new, discrete treatment works (and associated storage) which we note Ofwat indicated was '*likely to be eligible for DPC*'.

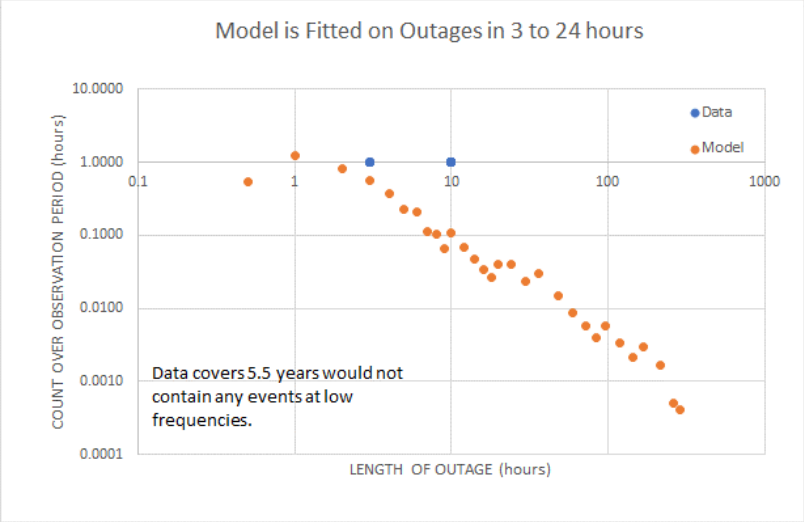
Quantification of risk

Ofwat has suggested that our quantification of incremental risk linked to potential drivers for this resilience scheme, and the rationale for the proposed sizing of the works are not sufficiently well evidenced. We are pleased to have the opportunity to respond to this point in the following sections.

From a resilience planning perspective, our starting premise is that if there is one or more credible failure modes, for which we have no feasible contingency response to protect customers from major disruption to their supplies, then it is incumbent on us to develop appropriate mitigation plans. Unplanned outages in excess of 36 hours are rare but not exceptional events. In the 5.5 years of data analysed as part of our system resilience assessments, there were 64 such unplanned outages for a variety of reasons. [redacted]

[redacted]

Figure 13-2 Figure 13-2: Analysis of the outage duration at [redacted]



[redacted]

[redacted]

[redacted]

Selection of capacity of proposed works

In relation to the proposed sizing of the solution (75 MLD), the rationale for the sizing was twofold.

[redacted]

[redacted]

[redacted]

[redacted]

Figure 13-3 Survival times at WTW

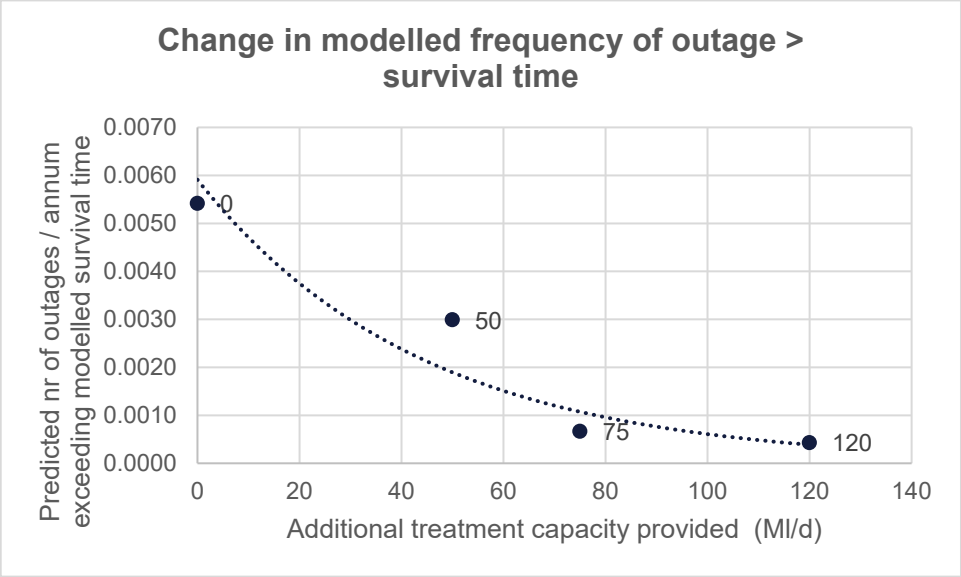
Table 13-4 Table 13-4: Survival times, costs and benefits

As Is			

* Costs used in the above comparison are based on TR61 modelled costs for the 50 MLD and 120 MLD options but as discussed later in this document, there is close agreement between the TR61 WTW models used and our own UCD costs. Manganese contactor costs which form part of the proposed solution for our new WTW are not included in the representative costs for a 75 MLD works above because they are not included in the standard TR61 WTW models. These costs exclude optimism bias uplift.

As system survival time increases, so the likelihood of an outage occurring which exceeds that duration decreases (long-term outages are rare events). As the figure below illustrates the likelihood of an outage exceeding the system survival time declines by about half with the installation of a 50 MLD treatment works but by almost 90% when that size is increased to 75 MLD, but the marginal incremental improvement when that capacity is increased to 120 MLD would not be justified form a cost benefit perspective.

Figure 13-4 Change in likelihood of outage > survival time as new works capacity increases



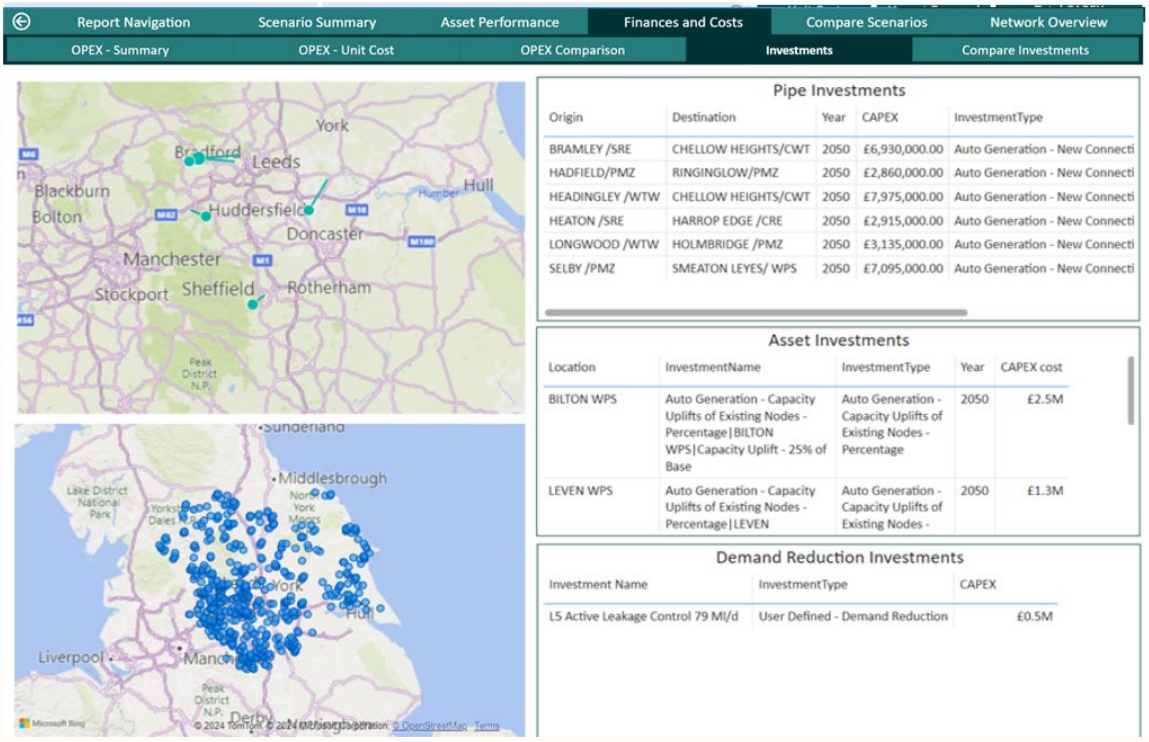
13.4.2 Best option for customers

Our overall approach to assessing supply system resilience and risks is based on our Water Supply System Strategy approach, which we described in detail in our document *YKY31_Water Resilience Enhancement Case*. It involved an extensive process of data collation and structured workshops to identify and rank strategic system risks, followed by solution option identification workshops to brainstorm potential solutions. These were then subject to further cost benefit assessment, considering impacts on potential service interruption risks identified in the earlier workshops.

Our workshops considered grid-based transfer type options and called upon the expertise of key operators in our system, including our supply system engineering team. This team is responsible for the planning and implementation of strategic transfers across our region, including in emergency situations; their knowledge of the capacity and capability of the system draws on decades of experience.

Since our original submission, we have been working with specialist consultants Business Modelling Associates to develop strategic models of our wider supply systems using their decision support and planning tool Decisio™ This is capable of running and optimising multiple planning scenarios involving works upgrades and transfers (existing or new) in response to a given outage scenario. A typical output is illustrated in the figure below.

Figure 13-5 Screen shot of an example from Decisio™



We have applied this tool to assess alternative options to the current proposed solution. [redacted]

The optimum option generated by the model represents a theoretical best value solution to enhance multiple works, and transfer capacities [redacted]
The solution would require the following:

- Capacity upgrades to five existing WTWs, ranging from 10% to 100% increases.
- Installation of 10 new large diameter pipelines [redacted]
- Capacity increases at 10 major water pumping stations.

The modelled cost for the new mains and treatment capacity upgrades would be £155.0 million. In addition, it would be necessary to install additional trunk mains and a water booster station to transfer the imported water through the [redacted] water supply system. The total capex cost would be £306.6 million (including a 40% optimism bias uplift to reflect the maturity of design of the solution). Meanwhile, the capex cost of the preferred solution is £221.9 million (also including optimism bias uplift).

Table 13-5 Modelled costs

Item	Capex (£m)
BMA Modelled Costs	
5 WTW upgrades	£26.37
10 WPS upgrades	£53.86
10 New pipelines	£74.76
Additional unmodelled costs	
Pipeline - Eccup to Bramley	£56.00
New WPS at Bramley SRE	£8.00
Sub-Total	**£218.99**
Optimism bias allowance	40%
	£87.60
	£306.59

While this solution is notionally equivalent to our proposed solution, in terms of providing an equivalent outage mitigation, in practice it would be extremely high risk for a number of reasons. The primary issue is that it would need the instant mobilisation of multiple assets being operated outside of their normal way of supplying customers.

- Existing trunk mains being instantaneously operated at a significantly higher flow rate and/or in reverse direction to their normal mode of operation carries a significant risk of discolouration.

- Contingency mains which are only required in an emergency scenario would, for water quality reasons, require flushing before being brought into service. Given the diameter and length of mains involved, this would take several days to implement, by which time customers would already be out of supply.

- The alternative – to keep those mains live and in service in anticipation of an outage – is not feasible. It would prevent the efficient operation of the grid, transferring water to where it was not required, and using significant amounts of energy to do so.

- The solution would also require the construction of large diameter pipelines through some of the densest parts of the Yorkshire area. This would cause significant disruption to communities during construction and carries a high level of engineering risk.

- Finally, the solution would be dependent on extremely high levels of production headroom being fully available, and able to be mobilised instantaneously across the region. [redacted]

The logistics and risks of implementing such a multi-faceted contingency plan [redacted] make this idea operationally infeasible. [redacted]

Our preferred solution, as presented in our original resilience case, is not only lower cost than the alternative, but critically will be permanently operationally ready for the eventuality it is designed for: to protect customers from losing supply, with minimal disruption. We are confident that this is the best option for customers.

13.4.3 Customer support for this investment

Following Ofwat's guidance, we conducted Affordability and Acceptability testing, including quantitative research with a representative sample of 1,682 household customers, and 696 non household customers. Of those, over a quarter (27% of household customers and 26% of non-household customers) felt that the enhancement case related to water supply resilience, and the investment in the WTW was the most important priority to them, being rated the second highest priority in this part of the plan. We also conducted qualitative research as part of that research, with 92% of the 13 future bill payers we spoke to supportive of us investing in enhancing our water supply resilience. Reasons for support included that the cost was felt to be very reasonable. Furthermore, when asked in the qualitative research which service aspect is the most important, 52% of the non-household business customers we spoke to rated it as the most important, substantially higher than any other service aspect.

In addition, various research has shown that avoiding interruptions or continuous supply is one of our customers' biggest priorities. In our Valuing Water research, 83% of the 391 customers we spoke to selected it as being essential. In Ofwat's preferences study, it was ranked second overall when compared to all service aspects. The WTW will ensure a more resilient supply of

water to 135,000 customers in the Yorkshire region, thereby increasing resilience in our network and avoiding interruptions for customers – meeting customers' top priority.

13.4.4 Cost efficiency

Projects like our resilience scheme, a major new treatment works, and strategic storage, are rarely built in our sector and unique in terms of treatment requirements, location, connectivity and so on. Even if it was possible to derive a realistic cost per MLD of treatment, no two schemes would be comparable. The extent of information available in the public domain, in other words, where companies have published reports on particular schemes (such as in WaterProjectsOnline), is not sufficiently granular to enable definitive comparisons.
In our original submission we explained how unit costs used in our scheme costing were derived, and why we considered them to reflect efficient costs derived from actual outturn costs from competitively tendered frameworks.

However, we are pleased to provide additional, more granular detail on the build-up of our solution costs, and a high-level comparison with independent cost estimation tools (TR61) and publicly available scheme costs, notwithstanding the previous comments about their applicability.

We have reviewed costs published by various water companies for recently completed WTW projects (as published in WaterProjectsOnline). We have rebased the costs to 2022-23 prices based on the stated year of construction. Table 13-6 and figures below summarise the results of this analysis.

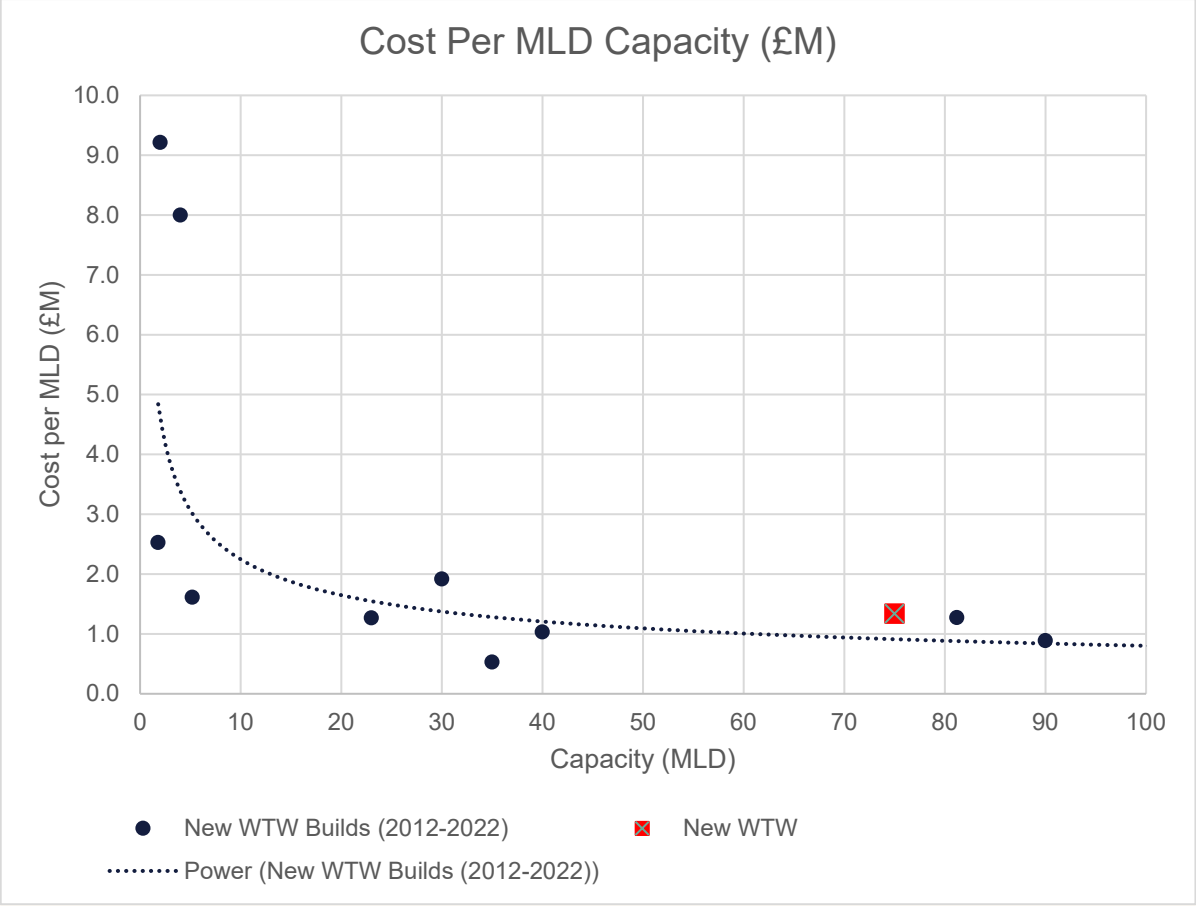
Table 13-6 Cost data from WaterProjectsOnline used for benchmarking

Scheme Name / Company	Year	Works Capacity (MLD)	Cost £m 2022-23 prices	Average Cost Per MLD	Comment
Ardsberg WTW / Uisce Éireann	2020	1.8	4.6	2.53	Full New WTW
Craighead WTW / Scottish Water	2021	2.0	18.4	9.21	Full New WTW
Bonnycraig WTW / Scottish Water	2022	4.0	32.0	8.00	Full New WTW
Syleham WTW / Essex and Suffolk Water	2020	5.2	8.4	1.61	Full New WTW
Bray Keleher WTW / South East Water	2019	23.0	29.2	1.27	Side Stream WTW
Durleigh WTC / Wessex Water	2021	30.0	57.6	1.92	Full New WTW
Acomb Landing WTW / Yorkshire Water	2012	35.0	18.5	0.53	New Full WTW
Lee Road WTP / Uisce Éireann	2022	40.0	41.3	1.03	Full New WTW
Alderney WTW / Bournemouth Water	2023	81.2	103.5	1.27	Partial new WTW
Mayflower WTW / South West Water	2016	90.0	80.1	0.89	Full New WTW - Innovative Process
Frankley WTW (BRP) / Severn Trent	2020	200.0	143.8	0.72	Side Stream WTW

New WTW *	22-23	75.0	100.5	1.34	Full New WTW Excluding additional storage
*** Costs exclude additional treated water storage and are uplifted for optimism bias**					

The data in the above table is also represented in the graph below.

Figure 13-6 Unit cost of WTW construction vs capacity



The graph shows that the unit cost per MLD of our proposed new WTW (including optimism bias) are in line with recent WTW construction costs (allowing for the evident economies of scale effect). It is also important to note that the South West Water 90 MLD Mayflower WTW is a fundamentally different treatment process to the more traditional process proposed for the new WTW.

In addition to the above benchmarking exercise, we also carried out a comparison of our costs for the WTW element of the resilience scheme with costs derived from WRc's TR61 unit cost database. This is a cost estimating tool which is populated on a collaborative basis by water companies across the UK and updated every 2-3 years. It contains actual outturn costs for a wide variety of water sector construction projects and is collected using a rigorous and structured data collection protocol.

TR61 has high level cost curves for various types of standard water treatment works designs. The closest model to the proposed new WTW was used (DAF/contact tanks/RGF/ treatment buildings/chemical dosing/coagulant dosing/chlorine dosing/phosphate dosing/picket fence thickeners/sludge tanks/sludge dewatering centrifuge/water distribution pumping stations). This model does not include manganese contactors which are an essential part of the new WTW design. For comparative purpose therefore the YW costs below exclude those elements of cost which cover the Mn contactors. The costs are also shown without the optimism bias uplift which has been applied to our final costs in our draft determination response submission. The table below illustrates the outcome of this exercise.

Table 13-7 Comparison of costs

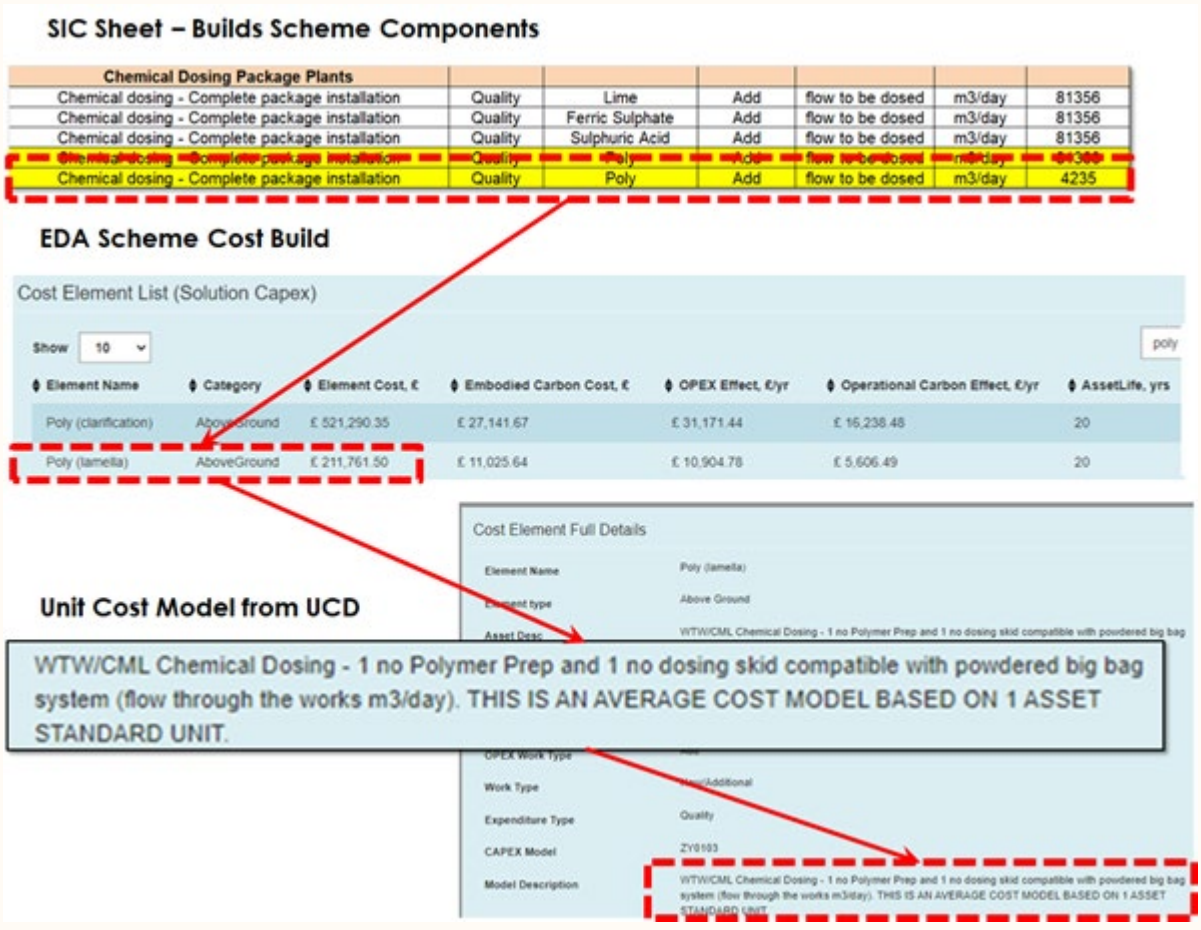
NEW WTW SIZE	TR61 v15 COST (CPIH Oct23)	EDA Equivalent Cost (excluding scope not included in TR61 Model)	Difference
75 MLD	**£59,849,791**	**£57,629,426**	**-3.9%**

On a like for like comparison, our proposed WTW costs align very closely with the TR61 benchmark, marginally lower (-3.9%) giving us confidence that our overall costs generated from our internal costing systems are efficient.

We provide as an appendix to this document full details of the cost build-up for our proposed resilience scheme. This shows an appropriate level of design definition and scoping commensurate with the business planning stage of a scheme's development (See clean water enhancement cost evidence (YKY-PR24-DDR-26), and also clean water cost evidence asset breakdown (YKY-PR24-DDR-57).

The figure below illustrates how our Solution Information for Costing (SIC) sheets, link to our Unit Cost Database and EDA solution build.

Figure 13-7 Illustration of how we develop our scheme costs



We trust that the details outlined above, together with the supporting information included in our clean water enhancement cost evidence appendix (YKY-PR24-DDR-26), demonstrate a level of detailed and diligent assessment of efficient costs, appropriate to the business planning stage. We would also emphasise that having demonstrably met the requirements for a DPC scheme,

cost efficiency will be driven through the competitively appointed partnering arrangements, which are part of the DPC, ensuring that customers receive value for money.

Optimism Bias - As detailed above, we have applied a 40% uplift on the new WTW cost breakdown. Below we have summarised the rationale for application.

Our approach to Optimism Bias is based on HM Treasury Green Book guidance, including the Supplementary Guidance on Optimism Bias, as well as the All Company Working Group (ACWG) guidance produced by Mott MacDonald.

Project Type - The relevant project type for the scheme is 'Standard Civil Engineering Projects', which we consider to be the appropriate type for the scope of the proposed DPC schemes. This aligns with the Elvington WTW DPC included in the WRMP. As described in the guidance, standard civil engineering projects involve the construction of infrastructure facilities, in addition to buildings, that do not require special design considerations. We interpret this as meaning design considerations beyond what YWS as a utilities sector provider commonly delivers. Based on the current stage the projects are we do not envisage that there are special design considerations, whether related to constraints such as space, or unusual output specifications or innovations, as would be the case with non-standard civil engineering projects as noted in the guidance.

Key Contributory Factors - We have assessed the following as the key contributory factors to uncertainty, and therefore to the selection of the level of optimism bias. The factors are taken from Supplementary Green Book guidance and are assessed based on current understanding of the project proposals and future uncertainties.

a. **Procurement factors**

These relate primarily to the potential complexity of the contract structure, especially where Direct Procurement for Customers (DPC) delivery is concerned. This is a new delivery mechanism for the water sector and may present a material level of risk due to this being a new, innovative approach to funding large water infrastructure assets. The Ofwat stages and DPC procurement process provide a suitable mitigation approach; however, the details of risk transfer are yet to be worked out and clarified. In addition, payment mechanisms are to be defined as part of the contract set up, and there is an unknown (but likely significant) amount of contract negotiation required on terms of the contract.

b. **Client-specific factors**

The factor considered is the approval processes taking longer due to the number of parties involved, funding availability (YWS versus DPC investors, or DPC investor market interest) and complexities that are likely to be associated with confirming availability of finances for the projects in a timely manner.

c. **Environment factors**

Obtaining planning permission is expected to be onerous, the projects will also be influenced by the findings of environmental investigations, particularly under the WINEP programme, and therefore there is some risk associated with environmental impacts, as well as stakeholder opposition in regard to the project construction phase (for example traffic and construction noise).

d. External influences

Key, external influences leading to uncertainty include the broad economic context, including ongoing price inflation which has been a significant feature of AMP7. The economic context could influence changes in market demand resulting in changes in funding priorities and DPC delivery.

Selected Optimism Bias Bound

We have based the selected optimism bias level on our assessment of the contributory factors outlined above. We have also carried out an internal review of our internally generated costs versus contractor costs across a range of our infrastructure and non-infrastructure projects. The review showed that for most clean water projects our generated costs are lower than contractor costs. We have therefore taken this into account in setting an appropriate level.

We have concluded that the appropriate capex optimism level for all our DPC projects is 40%. This is based on or assessment above and is comparable to the upper bound of 44% for standard civil engineering costs, as shown in Table 3-1 of the Green Book (see extract below).

As a further check, we have carried out a high-level review of 5 ongoing SRO projects, for which the Gate 2 submissions bias ranged from 26% to 51%, with an average of 38.2%.

We conclude, therefore, that we have set an appropriate and reasonable optimism bias based on the key contributory factors we have assessed as most likely to affect cost uncertainty.

13.4.5 Customer protection and company incentives

Given that DPC is appropriate for delivery of this scheme and that the value is below the threshold for Price Control Deliverables in a DPC scheme, we trust that Ofwat will agree that no PCD is required in this context.

The DPC regulatory mechanism provides customer protections to ensure the company is incentivised to run and complete an effective DPC delivery and CAP sourcing exercise. Our customers will benefit from these protections against late delivery and poor-quality submissions at key stages within the DPC regime.

Below, we present the DPC incentives mechanism as proposed by Ofwat at the PR24 draft determination within its 'major projects development and delivery annex' (see Table 13-2) and then the Yorkshire Water view of suitable DPC incentives with lower cumulative penalty costs (see Table 13-3). We welcome the structure Ofwat sets out but consider the incentive values (penalties) should be reduced under DPC Stages 2-4. We would welcome further engagement with Ofwat on the criteria to be used for awarding a 'success fee' at the financial closure stage for the scheme under DPC.

Table 13-8 Ofwat illustration of proposed DPC incentives

Ofwat proposed DPC incentives	Stage 2 (applicable for non-RAPID DPC projects only)	Stage 3	Stage 4	Financial close
Example activities/ deliverables as per DPC guidance	High-level contracting strategy covering payment, termination/exit/ asset management, etc.	Detailed payment mechanism, draft CAP Agreement.	Final version of CAP agreement; programme plan covering the construction period.	Entering into CAP agreement and provision of project handbook within 6 months of CAP agreement signing.
Quality weighting	60%	50%	40%	Single success fee on entering CAP agreement, calculated as **4%** of the project's whole life totex.
Timeliness weighting	40%	50%	60%	
Penalty (cumulative)	**20%** of Stage 2 DPC related costs funded in PR24	**25%** of Stage 2 + Stage 3 DPC-related costs funded in PR24	**40%** of Stage 2 + Stage 3 + Stage 4 DPC-related costs funded in PR24	N/a

Table 13-9 Yorkshire Water proposal for DPC incentives

Yorkshire Water proposed DPC incentives	Stage 2 (applicable for non-RAPID DPC projects only)	Stage 3	Stage 4	Financial close
Example activities/ deliverables as per DPC guidance	High-level contracting strategy covering payment, termination/exit/ asset management, etc.	Detailed payment mechanism, draft CAP agreement	Final version of CAP agreement; programme plan covering the construction period.	Entering into CAP greement and provision of project handbook within 6 months of CAP agreement signing.
YW view - Quality weighting	**70%**	50%	40%	Single success fee on entering CAP agreement, calculated as **4%** of the project's whole life totex.
YW view - Timeliness weighting	**30%**	50%	60%	
YW view - Penalty (cumulative)	**10%** of Stage 2 DPC related costs funded in PR24	**10%** of Stage 2 + Stage 3 DPC-related costs funded in PR24	**20%** of Stage 2 + Stage 3 + Stage 4-DPC related costs funded in PR24	N/a

13.5 Concluding points

We welcome Ofwat's feedback and constructive challenges in relation to this important scheme. We trust that we have addressed Ofwat's concerns, particularly in relation to this scheme's suitability for delivery via DPC. It [redacted] would make an attractive package for potential competitively appointed providers to deliver.

[redacted]

We have also responded to Ofwat's challenge in relation to wider consideration of options through the application of the innovative investment decision support tool and endeavoured to provide benchmarking to demonstrate that all of our solution costs are realistic and efficient. Ofwat and Yorkshire Water's customers can be confident that we will drive an efficient cost through the DPC process and deliver the long-term resilience that the people of Yorkshire expect and deserve.

14. Resilience (water)

14.1 Overview

In the draft determination, Ofwat proposed a sector-wide enhancement uplift (using 0.7% of base allowances) for companies to prioritise and address their biggest risks due to climate change impacts. Ofwat has requested companies set out what they will deliver for the additional funding in their responses to the draft determination, with a focus on addressing additional flood and power resilience requirements from climate change.

The reliability and quality of our services is essential to the people, economy and environment of Yorkshire. We have invested to create a resilient business, successfully maintaining services through many extreme events over recent years as well as responding to long-term trends. However, there are always limits to levels of resilience, particularly given the growing climate-related risks facing our business.

The detail in the resilience appendix – clean water (YKY-PR24-DDR-37) and resilience appendix – wastewater (YKY-PR24-DDR-38) explains our approach to improving our resilience to climate related events, including flooding, power outage and drought.

14.2 Ofwat action reference

For the draft determination, Ofwat proposed a sector-wide enhancement uplift (using 0.7% of base allowances) for companies to prioritise their biggest climate related risks.

14.3 Key messages

We welcome Ofwat's proposed uplift and for clean water, propose £12.7m to improve resilience in a discrete area of Yorkshire identified as being at the highest risk of loss of water supply following the drought in 2022, along with interventions to improve our resilience to power outages.

The business case for addressing the risk of loss of supply is not directly related to flood and power resilience, however, it is related to climate change resilience. We have chosen to include the business case in this section rather than a specific resilience case as a result of being a single source of supply, as the underlying issue leading to a requirement for intervention is climate change.

We have also included an enhancement case to improve resilience in the wastewater programme, please see our representation on Expenditure allowances – wastewater (YKY-PR24-DDR-04)' for more details.

14.4 Change requested

We support Ofwat's draft determination to award 0.7% of base allowance to improve resilience and have included this within our representation.

Table 14-1 Summary of changes to resilience (water) enhancement costs

	Allowance (£m)
October 2023 business plan submission	0
January 2024 business plan resubmission	0
Ofwat's draft determination	12.7
YKY draft determination representation	12.7

14.5 Yorkshire Water's response to Ofwat

14.5.1 The need for investment

Our customers highlight resilience as a top priority, with the most important issue being able to receive reliable, uninterrupted services. However, our resilience is particularly stretched when hazards beyond our control impact on our activities. Risks that impact the resilient supply of our services are increasing in the face of climate change.

We are already seeing the impact of climate change on our natural environment, which in turn affects our customers, the communities we serve, and the way we operate our business. Five of the ten wettest years for the UK have occurred in the 21st Century and we have experienced widespread flooding on several occasions across both our water and wastewater assets in recent years. The winter of 2023 was the second wettest on record for the UK. Storm Babet resulted in fluvial flooding which breached Environment Agency defences and exceeded the level of protection previously installed on our asset base.

As well as the physical risks posed by climate change (such as flooding), we also face a number of risks related to the process of transitioning away from reliance on fossil fuels and toward a low-carbon economy. In particular, increasing demand for electricity and volatility in renewable energy generation and loads places strain on electricity transmission systems and increases the risk of unexpected outages. We experience a significant number of site shutdowns resulting from power outages with a typical range of 120 to 230 power outages per year across all of the Clean Water assets. In discussions with our Distribution Network Operator, it is expected that there will be a greater number of short duration power outages, and we need to invest in our assets in order to avoid site shutdowns as a result of this.

The summer of 2022 was one of the driest on record and as a result of this we had to deploy emergency measures, via installation of 2km of overland pipework, in order to maintain raw water supplies to support two of our water treatment works in order that they could continue to supply our customers. We are proposing the permanent installation of a treated water main in order to improve resilience in the event of another drought or major outage at these treatment works.

14.5.2 Best option for customers

The most cost beneficial solutions have been selected and options that were considered but discounted are covered within the resilience appendix – clean water (YKY-PR24-DDR-37) supporting this case.

14.5.3 Cost efficiency

Further information on cost efficiency is provided within the resilience appendix – clean water (YKY-PR24-DDR-37) as well as evidence of third party assurance to provide evidence of efficient costs.

14.5.4 Customer protection

We do not propose any customer protections for this base adjustment over and above the existing sharing mechanisms

15. WINEP: biodiversity

15.1 Overview

Within the Cost Assessment Model PR24-DD-W-Biodiversity.xlsm, Ofwat has undertaken a deep dive on the Yorkshire Water WINEP Biodiversity and Conservation programme and adjusted costs down by 40% due to:

a) Concerns over the programme being the best option for customers (20% reduction).
b) Cost efficiency (20% reduction).

We believe this reduction is not substantiated for the following key reasons, which are further detailed throughout this representation.

15.2 Key messages

- Our optioneering process was robust and considered a large number of alternative options, with the final programme selected representing the best option for customers and the environment. Our approach to optioneering aligned strongly with the collaborative approach set out in the WINEP and WISER guidance.

- The Environment Agency (EA) supported our optioneering process, agreeing that our extensive engagement and collaborative approach meant that the least cost/best value option had been identified, and therefore only one option should be included within the submitted Options Appraisal Reports.

- If we are penalised on the collaborative process that developed the preferred options, we believe this will reduce future stakeholder participation in the WINEP process, and reduce trust in the benefits of co-creating the WINEP programme. The stakeholders involved strongly support our position and have provided letters of support which are included in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29)– section 1.7.

- Our costs are based on proven, efficient delivery models and developed in line with good practice where we have shown how working with 'Catchment-Based Approach' (CaBA) partnerships and NGO partners is more efficient than the use of consultants and Tier 1 partners. Where Ofwat has challenged the lack of evidence on benchmarking and cost breakdown, we have provided further evidence for the largest WINEP actions under this programme.

- In addition to undertaking CBA, we ensured that the programme delivers value to customers by co-creating the programme and subjecting it to external assurance and customer 'willingness to pay' surveys. On specific enhancement cases, customers were highly supportive and agreed that the case represented good value for money (Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29)– section 1.9)

- Outcomes for biodiversity will be compromised by this reduction in allowance. As approved by our environmental regulators, the WINEP biodiversity programme is costed to help us mitigate biodiversity decline, delivering benefits to over 950 ha of priority and protected habitat, 20km of priority river habitat and to deliver direct conservation benefits to 11 legally protected species. We are in the midst of a biodiversity crisis, and our key habitats like chalk streams, blanket bog and floodplain meadows need action now.

Our original Biodiversity enhancement case from the October submission can be found in Chapter 6 of the WINEP enhancement case.[23]

15.3 Change requested

We believe the two 20% allowance reductions against the biodiversity enhancement case should be reversed, based on the evidence below. The following sections present evidence and information to provide Ofwat with sufficient certainty that a 40% reduction is not appropriate.

Table 15-1 Summary of changes to the WINEP Biodiversity Enhancement allowance

	Allowance (£m)
October 2023 business plan submission	20.43
January 2024 business plan resubmission	20.43
Ofwat's draft determination	12.26
YKY draft determination representation	20.86

15.4 Yorkshire Water's response to Ofwat

Below is a summary of the comments and concerns made by Ofwat in **the PR24-DD-W-Biodiversity.xlsm Yorkshire Water Deep Dive tab** and where and how we have addressed them. This is further detailed in the following chapters, firstly by detailing how our optioneering process results in the best options for consumers, followed by demonstrating the cost efficiency of the approaches.

Table 15-2 Evidence to support the rationale for the waste investigations representation

Ofwat concerns	Representation rationale and supporting evidence
Best options for customers	
1. *We have some concerns whether the investment is the best option for customers. Evidence of alternative options being considered was provided for only a limited number of schemes and the company does not provide sufficient optioneering to demonstrate that the chosen option is the right solution.* 2. *The company has not provided sufficient and convincing evidence to demonstrate that the proposed schemes are the most cost beneficial and best value for customers. The company has not provided evidence to support the decision for*	We believe that our optioneering process was robust and did consider all alternative options, with the final selected programme representing the best option for customers and the environment: ✓ We implemented a robust optioneering process, embracing the WINEP and WISER guidance which encouraged collaborative programme design. ✓ We collaborated with two key groups comprising of regional stakeholders/catchment partnerships and environmental regulators. ✓ We implemented a three-stage process, which took over a year, and involved six iterations of the plan with 26 major stakeholders and regulators. This gives confidence that the programme is robust and meets both legislative needs and stakeholder priorities.

[23] yky43_winep-enhancement-case.pdf (yorkshirewater.com)

preferred solutions, and little evidence has been provided of cost-benefit or best value analyses.	Additional information has been provided to further detail and evidence how our decision-making process resulted in cost beneficial schemes, including the following: • **Evidence of the EA agreement of the optioneering approach:** This concurs that our extensive engagement and collaborative approach meant that the least cost/best value option had been identified, and therefore only one option should be included. • **Letters from stakeholders:** Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.7. These demonstrate support for the preferred option, which is representative of our collaborative approach to optioneering wherein stakeholder views were duly considered and accounted for. • **Customer Willingness to Pay Surveys**: Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.9. YW utilised surveys to ensure that the programme delivers value to customers.
Cost efficiency	
3. *The company has provided a high-level explanation of its costing approach, stating historical unit-cost benchmarking has been applied to all WINEP categories. This process is described, but no additional evidence has been provided in the submission.* 4. *It is unclear how the company has arrived at its option costs for its biodiversity specific schemes or whether these costs are efficient.*	Our costs are based on proven, efficient delivery models and developed in line with best practice where we have shown how working with CaBA partnerships and NGO partners is more efficient than the use of consultants and Tier 1 partners. To demonstrate the robust development and efficiency of our costs, the following new information has been provided as part of this representation: • Section 7.5.2 evidences our robust approach to costing through the examples of our **three largest WINEP actions** under this programme. Further detail is provided in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – sections 1.4 to 1.6 for each example and the remainder of the programme (including specific actions and delivery methods) is covered within their respective Action Specification Forms on the Defra PR24 SharePoint. • **Examples of quotes from potential providers:** Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.10. These quotes support our costing process wherein costs are based on transposition from similar AMP6 and 7 projects and through quotes from potential providers.
5. *Options Development Reports (ODRs) and OARs present detailed cost breakdowns for preferred options for most schemes, including the 'Chalk Streams Restoration' flagship project and the wider 'Yorkshire Water Biodiversity Programme'. However, for the most material scheme (08YW100316a), no additional cost breakdown*	Site-specific cost build-ups for scheme 08YW100316a have been provided in Supporting evidence for biodiversity enhancement (YKY-PR24-YKY-DDR-29) – section 1.8.

has been provided in the submission.	
6. *The company states that third-party assurance of its data tables has been conducted, however no evidence of this has been provided in the company's submission.*	To ensure cost efficiency, the WINEP NERC programme received third-party assurance by Atkins, focusing on the methodology behind the WINEP option development and the data underpinning it. The programme received a green rating against methodology, documentation and data, and it was noted that "*A reasonable approach to costing has been adopted and it is well documented*" and that: "*The Company have taken a sensible approach to completing Options Assessment Reports, with one Options Assessment Report proposed per WINEP action which is consistent with the WINEP guidance.*" Further detail about the assurance process was provided as part of our PR24 Business Plan submission in the appendix YKY61_PR24 Assurance:

15.4.1 Best option for customers

"We have some concerns whether the investment is the best option for customers. Evidence of alternative options being considered was provided for only a limited number of schemes, and the company does not provide sufficient optioneering to demonstrate that the chosen option is the right solution."

We believe that our optioneering process was robust and did consider all alternative options, with the final selected programme representing the best option for customers and the environment:

- We implemented a robust optioneering process, embracing the WINEP and WISER guidance which encouraged collaborative programme design. For example, delivering strongly against the WISER requirement to "develop... a shared vision and understanding with catchment partners to help water companies optimise their investments…" or WINEP's principle six, of collaborating with regulators and stakeholders to understand environmental risks and issues for inclusion within the WINEP.

- We collaborated with two key groups comprising of regional stakeholders/catchment partnerships and environmental regulators.

- We implemented a three-stage process, which took over a year, involved six iterations of the plan with 26 major stakeholders and regulators. This gives confidence that the programme is robust and meets both legislative needs and stakeholder priorities.

Our optioneering process is summarised below, with a full description provided in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29)– section 1.2.

Optioneering against our NERC programme was predominately completed in collaboration with our external Biodiversity Advisory Group (BAG). This comprises of representatives of the Rivers Trusts, Wildlife Trusts and CaBA partnerships within our operational area.

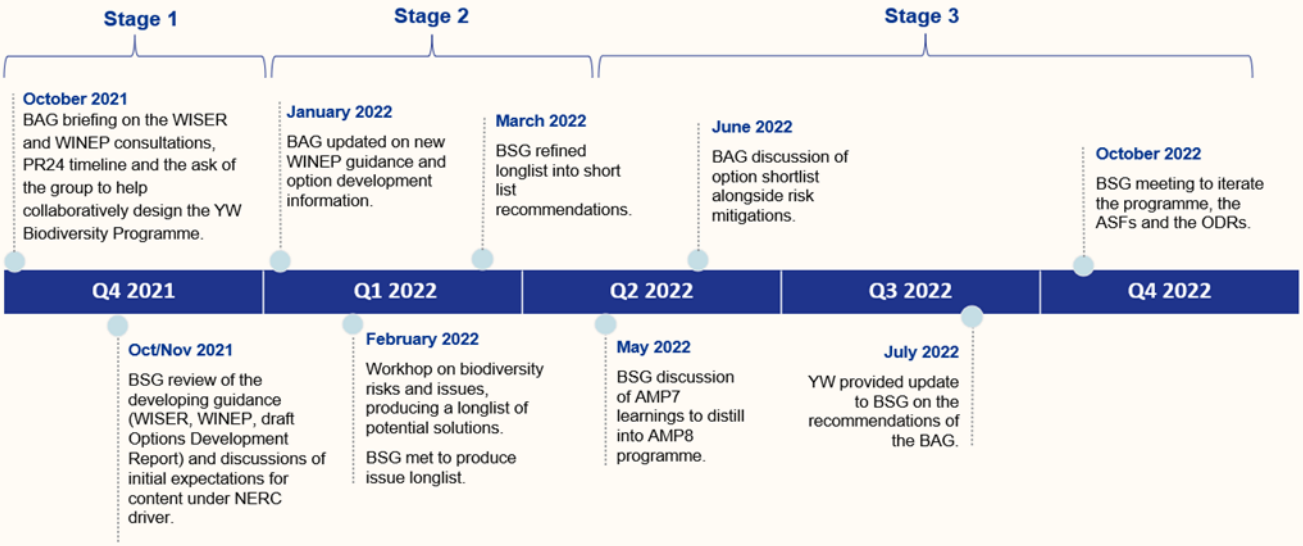
Additional consultation took place with other key stakeholders such as the four lead authorities for Local Nature Recovery Strategies in the Yorkshire area, representatives of the National Parks, and national NGO groups such as the RSPB and Freshwater Habitats Trust.

The programme was co-developed through an iterative process involving Yorkshire Water specialists, the BAG and technical specialists from the Environment Agency and Natural England through a pre-existing YW/EA/NE Biodiversity Steering Group (BSG).

The BAG and BSG worked with us throughout stages 1, 2 and 3 of the WINEP development process, to ensure a shared understanding of process, risks, our responsibilities and the required solutions.

We implemented a robust optioneering process, consistent with the WINEP and WISER guidance encouraging co-design, in line with the timeline provided below.

Figure 15-1 Optioneering process



Stage 1: Setting the framework

October 2021 – the BAG was briefed on the WISER and WINEP consultations and PR24 timeline, and the group was invited to help collaboratively design the Yorkshire Water biodiversity programme.

October/November 2021 – the BSG met to review the developing guidance (WISER, WINEP, draft Options Development Report) and discussed initial expectations for content under NERC driver. Stage 1 enabled us to inform our major stakeholders of our method for collaboratively ideating and co-creating the options. Additionally, it set the baseline with regards to the guidance that will need to be followed, and how we will adhere to it.

Stage 2: Collaboratively identifying risks and issues

January 2022 – BAG updated on the new WINEP guidance and options development information was shared to enable them to consult with internal staff and key partners, leading to a workshop in February 2022 where there was a discussion of biodiversity ‘risks’ and ‘issues’.

This workshop produced a longlist of potential solutions for inclusion in the AMP8 programme (detailed below) and Yorkshire Water encouraged additional thoughts during a consultation phase that also included external partners like Local Authorities and national NGO groups.

February 2022 – BSG met to produce a similar longlist of risks and issues based on prior investigations, policy changes and professional judgement.

March 2022 – BSG met again to refine the longlist into a likely shortlist for presentation to the BAG. At the BAG meeting, Yorkshire Water summarised the feedback received and reflected what elements aligned with policy drivers and Yorkshire Water's corporate aspirations for biodiversity, to be clear which elements were not likely to be taken forwards at this stage and explain why.

A key theme running through the majority of suggestions from stakeholders, was that in our role as a water company, we have a disproportionate ability to impact on key habitats and species – particularly wetland and aquatic ones. The Environment Agency notes that as well as over 90% already being lost, over 10% of our freshwater and wetland species are threatened with extinction, with two thirds of our existing wetland species being in decline. It also notes that wetlands make up only three percent of the UK but are home to at least 10 percent of our species.

The stakeholder engagement was broader than that of the participants in our workshops, as we involved them beforehand and encouraged them to consider and identify potential options within their internal groups. As a result, we can confidently assert that our method of identifying possible options encompassed all possible interventions for this Enhancement Case.

Stage 3: Proposing solutions

May 2022 – BSG met to discuss learning from AMP7 that could feed into the AMP8 programme, and compared feedback received from other national and industry colleagues.

June 2022 – BAG met to discuss the shortlist that had been created from the longlist which pinned down the risks and issues being met by the programme. Subsequent meetings in June/July discussed the potential solutions to meet these 'risks' and then defined the solutions and the scale of the solution required.

July 2022 – BSG meeting where Yorkshire Water updated on the recommendations of the BAG to ensure in principle acceptance from our environmental regulators. To help define the solution, the content of draft Action Specification Forms was discussed and Yorkshire Water undertook the action of drafting these in advance of deadlines for the NERC programme, to allow the regulatory outcomes of the programme to be defined to give sense to the ODR and OAR.

July and October 2022 – The programme as a whole, the ASFs and ODRs were then iterated at meetings of the BSG as well as general discussions to share intelligence on good practice across the water industry, and guidance from regulators. The options that were taken forwards were then progressed with the Environment Agency via the Action Specification Forms.

We adopted an iterative approach to evaluate how the shortlisted options would mitigate the risks and address the issues and required scale of the solution. This approach allowed us to identify the optimal scale required for the intervention, as the scale directly influences the overall cost. This helped ensure that the proposed intervention is not only the least cost/best value but also proportionate to the problem.

Cost benefit and best value for customers of proposed schemes

"The company states that most of planned works are derived from investigations in the 2020-2025 period. An options appraisal report (OAR) has been provided for each action. However,

there is little evidence to demonstrate that the proposed schemes are the most cost beneficial and best value for customers."

In identifying risks and issues, Yorkshire Water has built on the findings of AMP7 investigations and implementation plans. For example, the current investigation into Freshwater Pearl Mussel (FwPM) on the River Esk, ongoing implementation work on white-clawed crayfish, and particularly, the AMP7 programme to map and value our landholdings for biodiversity.

With Biodiversity and SSSIs being Statutory+ drivers for the WINEP, all projects went through CBA following an EA mandated process in order to determine that they were cost beneficial, with benefit to cost ratios ranging from 16 to 2,000.

Notwithstanding this positive CBA, the nature of the biodiversity actions is such that we did not want to overly rely on CBA, due to the difficulty in placing a defined value on the worth of individual species being safeguarded through a conservation project. As such, we took the view that by co-creating the programme with regulators and stakeholders, and subjecting it to external assurance and customer willingness to pay surveys, we could be confident that it delivered value for customers.

We worked collaboratively with stakeholders to assess how to share the costs of intervention
Example: Freshwater Pearl Mussel Investigations

As an example, our AMP7 Freshwater Pearl Mussel (FwPM) investigations have concluded that we are one factor amongst other catchment pressures that is preventing the last remaining pearl mussel population in Yorkshire from breeding. Investigations have shown this is both due to point source continuous discharges (e.g our Danby WwTW which is being upgraded via the 25-year plan driver) and through our more diffuse permitted pressures, such as descriptive WWWTW operations.

In collaboration with other members of the Esk and Coastal Streams CaBA, we identified elements of the 25-year Esk Freshwater Pearl Mussel Strategy where some responsibility falls on Yorkshire Water.Then, together with regulators from these groups, we agreed which would be our fair share of actions to mitigate our pressures on FwPM. The split of responsible bodies across the different elements of the strategy can be found in sections 1.1 to 1.5 of the strategy (available on the Esk CaBA website).

Costs to deliver these actions were then built up transparently in line with the provisional costs already specified in the CaBA strategy. These were around paying a proportion of captive breeding costs for the FwPM, and funding National Park officer time to undertake monitoring surveys and working with landowners upstream of our descriptive works to reduce high turbidity inputs at key times of the mussel breeding cycle.

We recognise that biodiversity and conservation is a complex topic with value often being a subjective or ill-defined term. As such, we were careful to always involve external stakeholders representing thousands of customers (for example, The Yorkshire Wildlife Trust) and conducted our own customer engagement research to ensure our selected actions were delivering value.

We conducted an extensive programme of research to gauge levels of support and perceived value for money for our enhancement cases.
Example: Freshwater Pearl Mussel Investigations

Earlier this year, we conducted an extensive programme of research (engaging with 1,967 household, future and non-household customers) to gauge levels of support and perceived value for money for our enhancement cases. Specifically, with regard to FwPM (and including reference to the larger scale c. £4 million, 25-year plan spend), both current and future customers were highly supportive of this enhancement case, with support levels of 87% from household customers and 96% support from future customers and non-households respectively. The majority of all customer groups also agreed that the case represented good value for money. Agreement ranged from 56%, from household customers, to 81% from future customers. Around three-quarters (74%) of non-household customers agree the case represents value for money.

Customers support the case largely because they feel it is important to help protect rare and endangered species, and particularly those that are historically significant to the region. They also feel the amount of investment results in a negligible impact on bills. Some customers also believe that the water quality improvements may help benefit other species and wildlife in the Esk.

Cost-benefit analysis

"Limited comparative cost benefit analysis data is presented, and whilst the enhancement case sets out the optioneering process, only one option has been presented for most schemes."

The Environment Agency (Area and National) supported our optioneering approach, agreeing that our extensive engagement and collaboration had determined that, against this WINEP driver, the least cost option was also the best value option (detailed in the efficiency case below), and therefore only one option should be included within the OAR.

This was confirmed to us by email from the Environment Agency in August 2022 and via the BSG in October 2022.

As the largest single action against the biodiversity outcome, we have provided additional specific information in relation to our SSSI Moorland management programme below and in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.8.

In terms of optioneering, the widely agreed moorland restoration model is to revegetate, re-wet and biodiversify, in other words covering bare peat, blocking grips, planting with sphagnum/dwarf shrub plugs. We also aim to diversify some of the larger, Molinia-dominated blocks. Natural England (NE), as regulator of SSSIs, has agreed that this is the quickest way to try to turn around our degraded moors.

NE have assessed just under half of our owned SSSI units and are undergoing ongoing assessments of the remainder. The outcomes of these site-specific reports form the overall works and direction of management needed on our SSSIs. Therefore, the single option presented directly represents the Natural England-directed requirements to move our moorland SSSI units into unfavourable-recovering condition. As the relevant regulator and expert government body relating to moorland ecology, we feel it would be inappropriate to challenge their recommendations with alternative options.

Habitats Regulations WINEP investigation

"Additionally, one scheme (08YW103700) has been included as a holding line, pending the results of a PR19 investigation, and scheme scope, cost and benefit is therefore uncertain at the time of draft determinations."

This allowance is required in event that a statutory AMP8 Habitats Regulations WINEP investigation (08YW103007) concludes that compensatory measures are required.

This was included by request of Natural England and the Environment Agency, such that measures can be implemented in-AMP, following conclusion of the WINEP investigation in December 2026.

15.4.2 Cost efficiency

"The company has provided a high-level explanation of its costing approach, stating historical unit-cost benchmarking has been applied to all WINEP categories. This process is described, but no additional evidence has been provided in the submission."

Our costs are based on proven, efficient delivery models developed in line with best practice. Our costs have been built up based on transposition from similar AMP6/7 projects and through quotes from potential providers (please see Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.10 for examples). To evidence our robust approach to costing, we have provided details below of our three largest WINEP actions under this programme. Further details of the examples are provided in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – sections 1.4 to 1.6. In addition, these three examples, and the remainder of the programme (including specific actions and delivery methods), are covered within their respective Action Specification Forms on the Defra PR24 SharePoint.

Example 1 – River resilience WINEP action: £3.2m

This WINEP measure has a regulatory commitment to deliver 130 ha of priority habitat conservation and 100km of river habitat restoration, to unlock £2m in match funding and to facilitate 15,000 volunteer hours.

Previous quotes from our countryside management supply chain and Tier 1 partners to deliver AMP6/7 schemes give costs of £50-100k per ha. Delivering this through our existing supply chain would therefore lead to costs in the order of £6.5-13m.

Instead, the programme is costed (£3.2m) to be delivered via our Yorkshire CaBA partnerships, with funding being provided to employ project officers to help us deliver these regulatory targets. Providing £40k per annum to a partnership host not only allows the facilitation of our required outcomes, but encourages cross-organisational working, brings in significant external funding, and enables delivery of greater environmental, financial and social outcomes for customers. A case study describing the costs, outcomes and benefits is provided in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.4.

Example 2 – Water and wetland WINEP action: £3.5m

This programme includes our work to restore Yorkshire's chalk streams (additional to the Defra Flagship Chalk Stream, which is a separate WINEP line) as well as work including river restoration of priority habitat headwaters and lowland wetland creation.

Our regulatory WINEP targets are to deliver 200 ha of wetland habitat improvements and 85km of river habitat restoration and to facilitate 12,000 volunteer hours.

During AMP4 and AMP5, we used our framework partner supply chain to deliver interventions to benefit natural habitats or species. For example, during AMP5, three river restoration projects were delivered at a cost of c.£15m via our Tier 1 frameworks.

From AMP6, Yorkshire Water took an alternative approach to delivering our duties in collaboration with eNGO groups. This led to a significant cost saving of 70-90% for similar scale projects, as well as generating additional 'Six Capitals' value. This is the model we have used for the cost build-up of this action.

Unit costs were provided by groups working on river restoration in the area and from existing pipeline project outlines (for example from EA Medium Term Plan costs). Our cost build-up was based on the unit costs provided below:

- £800k to deliver 150 ha of lowland wetland habitat enhancement
- £600k to restore 40km of headwater streams
- £200k to deliver 12km of river restoration and 15 ha of habitat creation on chalk streams.

If required, we can request permission from our partners to share the detail behind these unit costs. These efficient costs can be achieved because of the specialist knowledge brought by local NGO groups who provide landowner and recreational group relationships, site specific technical expertise and access to trained volunteers. Further detail is in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.5.

Example 3 – Species Conservation WINEP action: £2.1m

As well as specific species targets aligning with this WINEP action, at a programme level additional regulatory targets have been set. These have been created to deliver works benefiting 30ha of habitat associated with priority species, 30km of river, to work with 20+ stakeholder groups and to have facilitated 850 volunteer hours.

Our costs are based on delivery via partnerships with local or regional NGO groups. For example, our Freshwater Pearl Mussel conservation is costed on the basis of supporting the Freshwater Biological Association's licensed pearl mussel hatchery, at a cost of £45k p.a.

Our work on the tansy beetle is based on costs provided by St Nicks Environment Group in York, who take a lead on delivering the York Tansy Beetle strategy.

Our white-clawed crayfish conservation work is conducted via the Yorkshire Crayfish Forum, an organisation bringing together government, local authority, private and NGO partners with a shared desire to conserve crayfish.

Employing an officer to coordinate this forum will cost £40k p.a. which is significantly cheaper than unilaterally progressing via consultant resource. For example, consultant quotes we received in AMP6 and 7 included £2k to attend a single angling event to talk about biosecurity and £11k to undertake a crayfish survey at a reservoir, all of which have been done repeatedly per year by the forum partnership, at no cost.

Cost breakdown of SSSI Moorland management programme

"Options Development Reports (ODRs) and OARs present detailed cost breakdowns for preferred options for most schemes, including the 'Chalk Streams Restoration' flagship project and the wider 'Yorkshire Water Biodiversity Programme'. However, for the most material scheme (08YW100316a), no additional cost breakdown has been provided in the submission."

As the largest single action against the biodiversity outcome, we have provided additional specific information in relation to our SSSI Moorland management programme (08YW100316a), including a cost breakdown.

Moors for the Future (M4tF) in the South Pennines, Dark Peak and Yorkshire Peat Partnership (YPP) in the north are used as our preferred suppliers for moorland restoration, and represent a better choice than setting up numerous contracts with other companies able to carry out the works but not able to provide the added benefits. They were pioneers of moorland restoration at scale and have many years of experience between them. Within their areas, they work with other water companies, some of which have neighbouring land to Yorkshire Water, and therefore manage peatland restoration, as well as ensuring the limited number of contractors can cover a large area more efficiently and help us to achieve economies of scale.

Many moorland contractors are procured by these companies, and every job undertaken across our estate is tendered for, thereby securing the best price and availability. These not-for-profit organisations can also attract a large amount of funding that benefits us, and therefore our customers. For example, by using match funding in AMP7, YPP generated an extra £4m to invest in our catchment in the north, and M4tF generated an extra £880k to spend at Snailsden.

We include below a detailed breakdown of costs showing the scale of works needed in the South Pennines and the Dark Peak. We believe that, currently, this is the most efficient way to run this programme of works due to the economies of scale, visibility of wider contractor availability and ability to attract external funding.

If the efficiency cuts are not reversed, we will have to put off the early intervention of restoration. The earlier intervention is carried out, the sooner we can see the effects; and the less degraded these landscapes are, the more resilient and biodiverse they become exponentially. The moors may improve naturally over time, but they need to be able to withstand future extreme events and climate change. This can only be done by helping to speed up this healing process.

Table 15-3 Costs by site

Site	Sum of Total Cost £ (ex.VAT)
Bodkin Farm	£375.00
Butterly	£1,876.40
Deanhead	£2,670.00
Haworth	£37,839.63
Heptonstall	£251,886.50
Higher Moor	£55,539.81
Keighley Moor	£50,880.00
Keighley Moor non catchment	£68,065.00
Nab Water	£4,905.00
Rishworth	£1,017,978.47
Snailsden	£987,722.00
Soyland	£668,583.35
Soyland Building Blocks	£56,209.00
Stanbury	£109,409.28
Thornton	£1,624.00
Thurlstone	£94,828.00
Turley Holes	£670,836.03
Twizle Head	£127,474.38
Twizle Head SSSI non catchment	£10,498.90
Walshaw Dean Reservoir	£4,000.38
Warley Moor Reservoir	£19,095.60
Wessenden Head SSSI	£1,269,165.50
Wessenden Head SSSI non catchment	£515,105.00
White Moss	£32,530.19
Widdop	£335,054.20
Wrigley's Piece Midhope	£50,434.75
Grand Total	**£6,444,586.35**
YW overheads	£1,446,413.65
Inflation	£391,393.60
Total	£8,282,393.60

Detailed cost build up for SSSI implementation:

Example cost build up behind the above table (in this case the £55k spend at Higher Moor SSSI Unit):

Table 15-4 Example cost build up at Higher Moor SSSI

Site	Works	No. Units	Unit Cost £ (ex. VAT)	Total Cost £ (ex.VAT)
Higher Moor	Bunding (ha)	0.76	1110	843.6
Higher Moor	Dense sphagnum clump translocation (@2000 p	0.03	1524.4	45.732
Higher Moor	Footpath works (m)	53	190	10070
Higher Moor	Grip/Gully Blocking: Heather/coir (Bale/log)	76	96	7296
Higher Moor	Grip/Gully Blocking: Peat (Dam)	5	28	140
Higher Moor	Grip/Gully Blocking: Stone (Dam)	6	175	1050
Higher Moor	Heather Brash (Bags)	9	70	630
Higher Moor	Molinia Cutting (ha)	4.31	1030	4439.3
Higher Moor	Re-profiling (m)	470	7	3290
Higher Moor	Sedge/dwarf shrub Plug plants (@2,500 per ha)	6.51	2832.5	18439.575
Higher Moor	Sphagnum planting (@1250 plugs per ha) (ha)	9.58	812.5	7783.75
Higher Moor	Sphagnum planting (@4000 plugs per ha) (ha)	0.39	2636.8	1028.352
Higher Moor	Year 1 Lime, Seed & Fertiliser (total) ha	0.05	3670	183.5
Higher Moor	Year 2 Lime and Fertiliser (total) ha	0.05	3000	150
Higher Moor	Year 3 Lime and Fertiliser (total) ha	0.05	3000	150

Further information is contained in Supporting evidence for biodiversity enhancement (YKY-PR24-DDR-29) – section 1.8.

Third party assurance

"The company states that third-party assurance of its data tables has been conducted, however no evidence of this has been provided in the company's submission."

To ensure cost efficiency, the WINEP NERC programme received third-party assurance by Atkins, focusing on the methodology behind the WINEP option development and the data underpinning it. The programme received a green rating against methodology, documentation and data, and it was noted that "*A reasonable approach to costing has been adopted and it is well documented*" and that "*The Company have taken a sensible approach to completing Options Assessment Reports, with one Options Assessment Report proposed per WINEP action which is consistent with the WINEP guidance*." Further detail about the assurance process was provided as part of our PR24 Business Plan submission in the appendix YKY61_PR24 Assurance.

15.5 Concluding points

In our view, our responses to each of Ofwat's concerns demonstrate that the 40% efficiency reduction applied to our enhancement case is not substantiated.

Our schemes are the best option to customers. We have engaged in *"sufficient optioneering"* through the use of a robust, three-stage optioneering process approved by the Environment Agency. Our process is consistent with WINEP and WISER guidance and guided by good practice by reflecting the priorities of our CaBA catchment partnerships who strongly support our position.

Our proposed schemes are *"the most cost beneficial and best value for customers"* as demonstrated by our CBA, external assurance and customer willingness to pay surveys, with customers agreeing that several enhancement case schemes represented good value for money. We go further in demonstrating the detailed work done to cost our schemes by providing evidence for our three largest WINEP actions and further information on our SSSI Moorland management programme, including a full cost breakdown.

To ensure cost efficiency, the WINEP NERC programme also received third-party assurance by Atkins, focusing on the methodology behind the WINEP option development and the data underpinning it.

We trust we have addressed each of Ofwat's concerns. Biodiversity plays a crucial role in our environment and Yorkshire Water's proposed schemes allow for immediate, much-needed action in our key habitats.