

SRN-DDR-029: Water Resources - Demand (Leakage) Enhancement Cost Evidence Case

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from
**Southern
Water** 

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1. Introduction

Our PR24 enhancement case “SRN27 Water Resources – Demand Enhancement”, included proposals for 300 km of leakage-driven mains replacement in AMP8. This formed part of a gradual transition during the next two AMPs to a long-term sustainable replacement rate of 200 km per annum by the end of AMP9. Our current plan assumes an ongoing level of base-funded mains replacements of 66 km to address deterioration and water quality issues. We therefore propose to replace 366 km of mains in AMP8 (as set out in CW6.3).

Alongside this intervention we also propose a number of other leakage management interventions including advanced find and fix, digitalisation / smart networks and advanced pressure management which will help us to reduce leakage in line with the requirements of our latest water resources management plan (WRMP24).

Our strategy also includes customer supply pipe leakage benefits which will arise from our roll out of smart metering, but the costs associated with the smart metering programme were accounted for in a separate enhancement case in our October 2023 Business Plan submission (SRN28 Water Resources – Smart Metering). We make representations on smart metering in SRN-DDR-031 Water Resources - Smart Metering Enhancement Cost Evidence Case.

Ofwat’s draft determination has challenged our approach in ways which significantly undermine its deliverability and effectiveness. This document sets out our response to that draft determination and provides additional evidence and argument as to why our enhancement case should be fully funded, for the benefit of current and future customers and the environment. We consider that the implicit allowance concept for mains replacement is flawed, given that the last two AMPs have been focussed on outcomes-based regulation (rather than outputs) but even if the approach was accepted as a pragmatic basis to determine cost adjustment claims, it would be wholly inappropriate to base the assessment of such allowances on industry replacement rates going back to AMP5. We set out our reasoning for this in subsequent sections of this document.

2. Issues

In its draft determination, Ofwat is supportive of the need for enhancement investment in mains replacement to reduce leakage and the need for additional initiatives as set out in our plan. However, Ofwat has proposed several challenging interventions which risk undermining the deliverability and impact of our plan. These include:

- An assertion that modelled base funding would be sufficient to cover replacement of 214 km of water mains in AMP8 (equivalent to 0.3% of our network per annum)
- A requirement to replace an additional 72 km (equivalent to 0.1% of our network per annum) with no commensurate increase in base funding, to address deterioration of the network since PR09
- The application of a unit cost of £292 / m for mains replacement (based on Ofwat’s estimate of industry median rate) which is significantly lower than the rate required to deliver our proposed scope of leakage-driven mains (and communication pipe) replacement.
- The imposition of a flat profile for mains replacement across the 5-years of AMP8 with no incremental, ramp-up from current replacement rates and significant Price Control Deliverable (PCD) penalties for late delivery (relative to Ofwat’s proposed programme). We reject the time incentive

nature of this PCD. It is important that we retain flexibility of delivery throughout the delivery period to be able to benefit from synergies with our pro-active leakage find and fix programme. This will deliver greater benefits to customers in both leakage and asset health without undue financial risk exposure. For more details on our approach to PCDs, please see SRN-DDR-052 Price Control Deliverables.

- The application of an industry wide, average unit cost (per MI/d of reduction) for all other leakage activity of £1.110m, which is insufficient to fund the transitional costs of establishing the new and innovative programme required to drive down historically low leakage levels, still further.

In separate sections below we set out our case for Ofwat's consideration regarding: -

- Our leakage-driven mains replacement enhancement case (and its interaction with Ofwat's assumptions regarding base funding)
- Our other leakage enhancement activities.

3. Our response – Leakage-driven mains replacement

We set out below the basis of our response to Ofwat's draft determination and why we consider it would be detrimental to our leakage and supply demand objectives and not in customers' best interests: -

- **Base vs enhancement** – We disagree with Ofwat's assessment of the scale of mains replacement it deems funded within base allowances (0.3%). This is significantly more than we assumed in our business plan and more than double the industry average over the five-year period which Ofwat have used to set their efficient benchmarks. We consider the overall base funding allowed through the econometric modelling approach is insufficient to accommodate this level of mains replacement, without compromising on other critical areas of activity which would be to the detriment of customers. We have spent over £400m above our AMP7 botex allowance to turnaround our water service performance through a systematic programme of hazard reviews and interventions across our water supply works. Please see our response document SRN-DDR-020 for further evidence as to why our customers are not paying twice for this scope.
- **Asset health catch-up** – Ofwat indicates it has made an uplift to our base funding to address our mains asset health, a cost adjustment which is deemed to cover the replacement of 0.03% of our network per annum, at an assumed unit cost of £292 / m. (This would amount to around 22 km of mains replacement in AMP8 at a total cost of £6.3 m). Although welcome, this adjustment is the lowest adjustment of the six companies receiving this additional allowance, and less than a quarter of the equivalent uplift provided for Thames Water despite us having the second highest average age of network in England and Wales. However, Ofwat is also requiring companies which have seen an increase in mains in condition grades 4 and 5 from PR09 to PR24, (which includes Southern Water), to absorb the cost of a significant programme of additional mains replacement within existing base allowances by way of catch up. This approach fails to take account of the fact that other demands on base funding, particularly in the last two AMPs, and the advent of stretching Performance Commitments and ODI penalties, have limited the scope for companies to replace their mains network at a sustainable rate. Deferring investment in some of our longer life assets, including our mains, in that context is entirely rational but cannot be continued indefinitely. This is clearly a sector-wide issue as illustrated by the AMP-by-AMP halving of replacement rates from AMP5 to AMP6 and from AMP6 to AMP7. Ofwat's approach will further exacerbate the pressure on base funding as mentioned above.
- **Reduced unit cost** - Ofwat's assessment of unit costs for mains replacement which they apply to all mains replacement activity (whether base or enhancement) is significantly lower than the rate we

require to deliver our leakage-driven mains replacement programme. We recognise our initial unit cost in our enhancement case was something of an outlier relative to the rest of the sector (excluding our neighbouring company Thames Water). We have therefore undertaken a further comprehensive cost and benefit modelling approach since submission, to enable us to determine a more efficient unit cost. This is still significantly higher than Ofwat's proposed rate, in part because Ofwat's analysis excludes communication pipe replacement from the rate. In a leakage-driven mains replacement programme we propose to replace all communication pipes when mains are replaced, to ensure all potential sources of leakage up to the customers boundary are eliminated. This would apply to all 300 km of leakage-driven mains replacement.

- **Onerous Price Control Deliverable (PCD)** - The PCD as defined for mains replacement includes both base and enhancement funded mains replacement activity and assumes a flat profile so that 20% of the programme is delivered in each year of AMP8. This means we would need to deliver more than 85km of mains replacement in 2025-26 (i.e. starting in 9 months' time) and includes annual penalties for under-delivery. Our programme assumes a gradual ramp up of activity over the five years. As Ofwat acknowledges, the implied mains replacement rates across the sector represent a significant increase above AMP7 activity levels. We believe it is unrealistic to expect the supply chain to mobilise and expand the skilled resource levels needed in this timescale. A flat programme also fails to recognise the significant upfront planning and third-party engagement required to successfully deliver large-scale mains replacement programmes. Given this is the start of a multi-decade programme of mains replacement, the marginal benefit of the required step change in output compared to a managed ramp-up will be completely outweighed by the risk of inadequate supply chain capacity and up-front planning. Our proposed delivery profile is consistent with our long-term trajectory to build up to 200 km of mains replacement per annum by the end of AMP9 and maintain these sustainable delivery levels thereafter.
- **Delivery Mechanism** – our mains replacement programme is part of our long term leakage reduction strategy within our WRMP. Defra are yet to approve our final WRMP24 that sets out this need and as such we propose our embarking on a major, multi-AMP programme should be under our special Delivery Mechanism to provide funding when the need is confirmed and on an ongoing basis as we confirm the programme of works for each year.

In the sections below we set out our position in relation to these four key areas of the draft determination and present additional evidence as to why Ofwat should reconsider its approach.

3.1 Supporting Evidence

Base vs Enhancement

Ofwat has analysed water company (base-funded) mains replacement rates since 2011-12 and used this analysis to determine an average mains replacement rate across the sector of 0.3% of the network length per annum. Ofwat asserts that all companies are therefore implicitly funded to replace this proportion of their networks within their modelled base allowances. We think this approach is flawed for two reasons:

- **No asset-specific ring-fencing in base funding** – Within the Water Network plus price control, total expenditure is driven by the scale, condition and complexity of the asset base, the performance expectations set by regulators and customers, the impact of external cost pressures and events which companies must respond to. There is no specific ring-fencing of investment in one particular asset type (i.e., water mains) but rather a dynamic and complex balancing act where priorities must be continuously re-evaluated to deliver the best possible service outcome and compliance levels over the course of an AMP, within a constrained funding level. The variation in mains replacement rates between companies around the average cannot reasonably be characterised as over or

underspending but simply a reflection of the prevailing priorities in the specific context of that company in that period. Ofwat's approach is silent on what areas of investment should have been cut to deliver higher rates of mains replacement and does not offer any insight into what other areas and levels of investment are assumed to have been funded with past allowances.

- **Changing regulatory context** – Ofwat uses the phrase ‘what base buys’ in its analysis of historic spending and assesses that average annual mains replacement rates over the period since 2011-12 have been 0.3%, and therefore all companies’ modelled base allowances are sufficient for them to replace 0.3% of their networks per annum. In addition to the previous point there is a further fundamental issue with this approach that is borne out by inspection of sector-wide mains replacements over that period. Between AMP5 and AMP6 and between AMP6 and AMP7, mains replacement rates have halved across the sector (see figures 1 and 2 below). What base might have bought in AMP5 will clearly not buy in AMP8. The introduction of stretching performance commitments and significant ODI penalties in AMP6 changed the context within which company expenditure decisions were made and the priorities therein. This is a sector wide issue which reflects a trend to defer long-term asset replacement where it will have the least short-term impact. The assertion that companies can absorb 0.3% mains replacement per annum in their base allowances is clearly not sustainable. Given that in setting its base allowances Ofwat bases its efficiency challenge on the last five years of cost data, it is not appropriate to use the full historical mains replacement record when determining its implicit allowance. The purple bars in figure 1 below show the mains replacement levels in the five years over which efficiency benchmarks have been set by Ofwat.

Figure 1: Sector wide length of mains network replaced (through base) from 2011-12

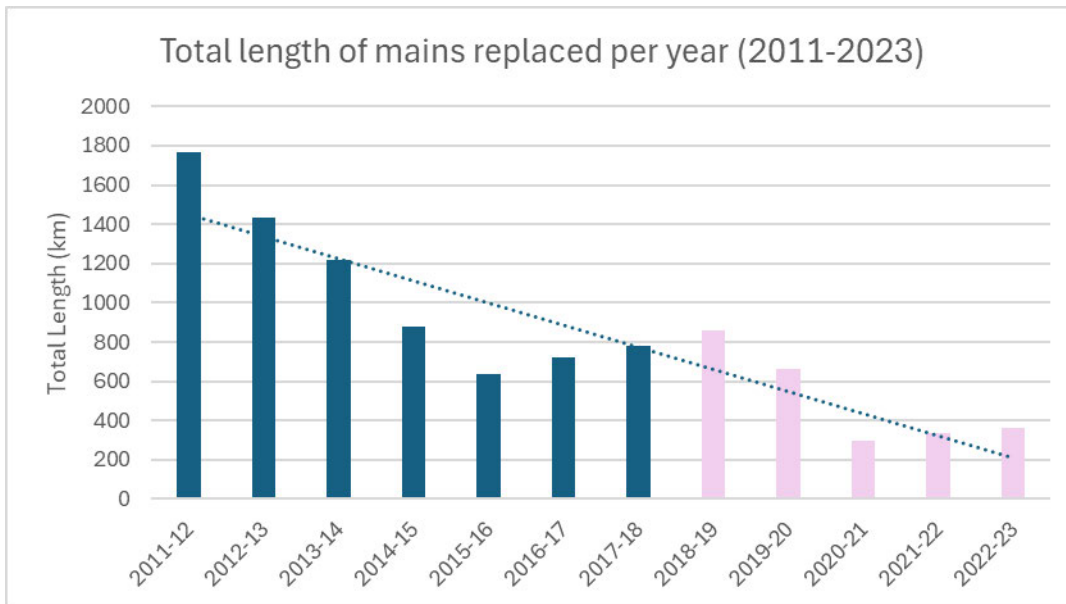
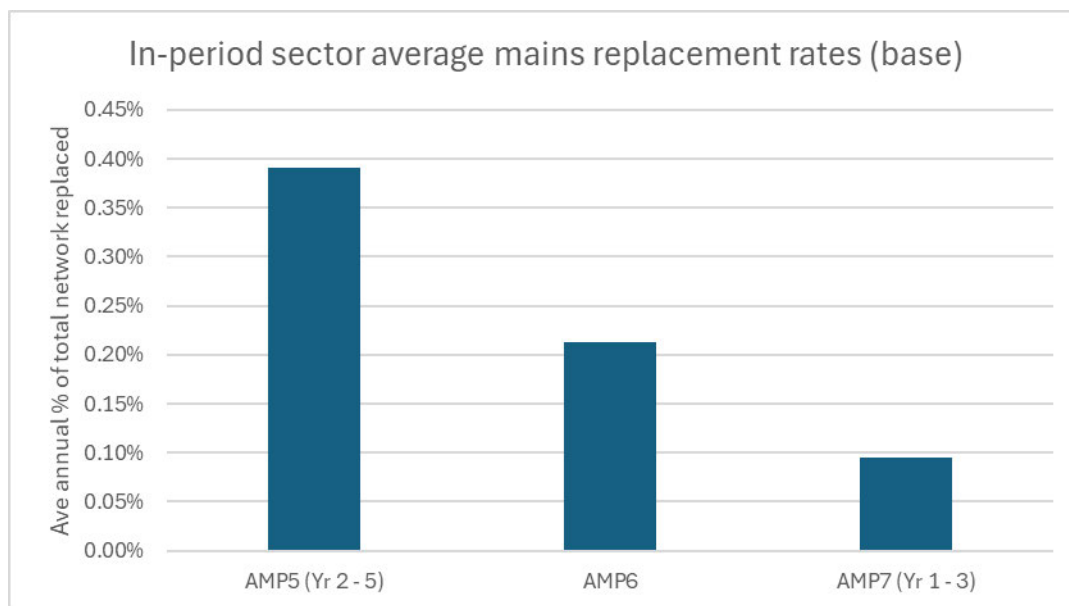


Figure 2: Average replacement rates over previous regulatory periods



We consider there are some fundamental points of principle which mean Ofwat's proposed 0.3% implicit allowance is not appropriate. Even if the underlying rationale were to be accepted, Ofwat's calculation method inflates the actual industry wide rate. Rather than summing the total length of mains replaced by all companies each year and dividing that by the total length of potable mains in that year, to derive a sector level annual replacement rate and then averaging these, Ofwat has opted to calculate the annual percentage replacement rate for each company, averaged these over the 11-year period and then taken the average of those individual long-term company averages. The resulting 0.3% would imply that 12,373 km of base-funded mains replacement had occurred over that period whereas in practice the actual figure is 9,952 km, the equivalent of 0.24%.

If one were to apply the appropriate method to the period from the start of AMP6, the industry average replacement rate would be 0.17% which is a better approximation of what 'base has actually bought' in recent years but this has been on a continued downward trend. Our planned base-funded mains replacement in AMP8 is 66 km to address water quality and asset health issues. This is an appropriate and affordable level within the context of the wider requirements on our overall base funding in this price control.

Asset Health Catch Up

We are concerned at the implication of the draft determination that in addition to Ofwat's assumption that our base funding should cover 0.3% per annum replacement rate, the draft determination would also require us to undertake an additional 72 km of mains replacement (0.1% per annum) without any additional base funding on the grounds of deteriorating asset health.

We recognise that over the last 15 years there has been an increase in the proportion of our mains reported to be in condition Grade 4 and 5 (from 2.8% at PR09 to 4.3% at PR24). This is the equivalent of an increase of 0.1% of our network per year in these condition grades. As discussed above, the rate of mains replacement has been constrained by other demands for investment within the overall base funding envelope. This trend in mains condition is therefore not surprising and we have sought to ensure it has not adversely affected service to customers. This is evidenced through our mains repair common ODI. In the

most recent year, 2023/24, we had a rate of 121.1 repairs per 1000 km mains. This puts us 9th out of 17 companies with an industry median of 121.1 and the worst performer at 185.3. Performing at the industry median indicates that we have been effective in managing the delivery of outcomes within the constraints of our overall plan. Our mains repair targets in AMP7 were tougher than our peers, as illustrated by 7 of the 8 companies who were deemed to have met their targets whilst performing worse than ourselves.

Ofwat implies this change in mains condition is inconsistent with our duty *to maintain an efficient and economical system of water supply*, including maintaining water mains, and that customers have paid for a mains replacement level in the past which should have prevented any deterioration in condition grade. They argue therefore that we should make good on this perceived shortfall by funding an additional 0.1% of mains replacement per annum, with no increase in allowed base funding. This would amount to around £30m of additional pressure on base funding when the sector's experience over the last 2 AMPs is that base funding is already insufficient to allow sustainable rates of asset renewal.

We take our duty in this regard very seriously, but it is a duty which we exercise in the round across the entire asset base and operations of our company and in perpetuity. Our long-life assets require long-term replacement strategies and the slight decline in condition can be readily and efficiently addressed through the transition to higher replacement rates that Southern Water and many other companies are seeking in this price review. As previously stated, we do not accept Ofwat's position that there is any specific level of mains replacement implied within base funding and if investment in mains replacement has been lower in recent periods, this is because other areas have taken precedence. There is no sense in which customers have paid for a level of mains replacement and not received it or have previously paid for future enhanced levels of replacement.

Requiring us to absorb this increase in mains replacement without a compensating increase in base funding, particularly if covered by a Price Control Deliverable (PCD), will simply prevent other priority areas from receiving investment and perpetuate a short-term approach which fails to deliver value for customers and an unsustainable level of Botex funding for our business.

We set out clearly in our Base Expenditure, Draft Determination representation document (SRN-DDR-004 Base Expenditure) our clear rationale for why the base funding envelope cannot absorb the suggested rates of mains replacement.

Reduced Unit Cost

Ofwat has undertaken an analysis of the unit cost of mains replacement, based on a variety of sources including submitted enhancement cases, some companies' responses to an Ofwat leakage query and other company specific sources. They have selected the median value from 11 companies' data (excluding Thames Water). The analysis is reproduced in the table below.

Table 1: Ofwat Unit Cost Analysis

Company	£/meter	Source
TMS	1458	TMS18
SRN	661	Enh - resilience
WSH	420	WSH62
WSX	350	WSX09
YKY	336	YKY45
SVE	310	Leakage query
SWB	292	Leakage query
BRL	280	Leakage query
SEW	274	Leakage query
NES	274	NES35
ANH	273	Enh - resilience
NWT	218	Leakage query
Mean	335	
Median	292	
UQ	274	

Source: Ofwat PR24-DD-Mains-renewals-adjustments.xlsx

The choice of ‘median’ rather than ‘mean’ is reasonable because our unit cost rate as submitted in our leakage enhancement case is a significant outlier. The median value of £292 / m is the rate from South West Water.

Since the submission of our enhancement case and recognising that our adopted unit cost rate was a significant outlier, we have undertaken a thorough review of our proposed leakage enhancement programme, developed a comprehensive cost benefit assessment framework and a new unit cost model. The unit cost model covers a range of mains replacement techniques including open cut, slip lining, pipe bursting and directional drilling. It also reflects the individual characteristics of our DMAs such that we can match the most appropriate technique to the pipe elements within a DMA and take advantage of the efficiency opportunities that creates. We have tested the outputs with our mains replacement contractor to ensure the predicted mix of techniques is achievable in practice. Based on this revised approach we believe we can reduce the unit cost of our proposed enhancement programme to £416 / m (including communication pipe replacement).

Our unit cost approach has been independently assured by Jacobs and is set out in Appendix A.

Based on the evidence Ofwat has shared (as set out in the Leakage Activity Query tab of the PR24-DD-W-Leakage spreadsheet) in relation to the submitted rates, it is apparent that the rates in Table 1 above, reflect pipe replacement only and do not account for communication pipe replacement. While this may be appropriate for an asset health, or mains burst driven programme it would not be appropriate for a leakage-driven programme. Replacing mains at a DMA level to reduce leakage and then leaving the original communication pipes in place would risk significantly reducing the leakage benefit. Ofwat’s proposed industry median cost (£292 / m) is therefore not the appropriate benchmark for our proposed programme which includes communication pipe replacement.

Ofwat’s draft determination in effect removes 167.5 km from our proposed enhancement case (of 300 km) allowing 132.5 km as enhancement at the unit rate of £292. This rate is not sufficient to cover communication pipe replacement and would therefore compromise the assumed leakage benefit from this activity.

For reasons set out above we disagree with Ofwat’s assessment of what is included within base but even if the proposed reallocation to base was accepted, there would need to be a cost adjustment to account for the fact Ofwat’s assumed rate does not include communication pipe replacement, otherwise we would not be at

risk of not delivering the leakage benefits assumed in our draft revised Water Resources Management Plan. We maintain that the scope of our leakage driven mains replacement enhancement programme original submission, needs to be funded as enhancement and at a unit cost which reflects the replacement of both mains and communication pipes (see table 2 later in this section).

3.2 Onerous Price Control Deliverable

Ofwat indicated in its PR24 methodology that it would introduce Price Control Deliverables (PCDs) to ensure the scale of proposed enhancement programmes were fully delivered in AMP8, or companies would face penalties for under-delivery.

In the context of mains replacement, Ofwat has deviated from the methodology which it consulted on and published in December 2022. Ofwat has extended its Price Control Deliverables approach to include both base and enhancement funded replacement, which marks a departure from its previous outcomes based regulatory approach. We are already exposed to Outcome Delivery Incentive risks based on leakage reduction shortfalls if we do not deliver our intended mains replacement programme. The proposed extension of the PCD framework to cover the base replacement element would penalise the company twice for any shortfall in outputs delivered. We disagree with Ofwat proposal to include business as usual mains replacement in the PCD. We are of the view that the PCD should only cover our leakage enhancement programme of 300km of mains renewals.

We also take issue with the expectation of a flat delivery profile for mains replacement across AMP8, i.e. an expectation that 20% of the total programme will be delivered each year, from year 1 onwards. In practice this means that not only Southern Water, but the entire sector and its supply chain needs to gear up for a massive increase in mains replacement (more than 120% above current levels) within 9 months.

If our delivery were to lag behind this proposed programme, we would be penalised each year at a rate of £10.37 for every metre not delivered against the cumulative target. We consider this time-related element of the PCD would be extremely counterproductive, compromising the quality of outputs delivered because of the challenge of recruiting and training the workforce to deliver the programme and because of the need to massively accelerate design, planning and third-party engagement. Ofwat's proposals demonstrate a lack of understanding of what is required to deliver such a programme of work and Ofwat has provided no evidence that they have assessed the appropriateness of their proposals. A phased increase over the course of the AMP and beyond will allow for these issues to be addressed and a far more efficient and effective programme to be achieved.

Our plan assumes a gradual ramp up of our enhancement mains replacement programme over the 5 years of AMP8 (continuing to ramp up over AMP9 to a long-term goal of 200 km per annum). Under Ofwat's proposed PCD arrangements this gradual ramp up would be likely to incur time-based penalties of around £2m over the course of AMP8. Ofwat argues its approach will bring forward benefits to customers but when considering a long-term, multi-decade programme those benefits are marginal when compared with the risks referred to above. Provided the overall scale of outputs is delivered, we suggest it should be left to companies to plan the most appropriate roll-out of these complex programmes and propose an end of AMP PCD based on the delivery of our leakage-driven mains replacement in full but with the removal of the time-based penalties. PCD's should provide a safety-net to ensure companies make good on the enhancement commitments included in their plans and not stray into micro-management of capital programme delivery.

As such, we are proposing that our mains replacement PCD is designed as follows. For more details on the principles and conditions we set out across our PCDs, please see -DDR-052 Price Control Deliverables.

Table 2: Mains replacement PCD

Component	Output based on length of mains renewals
Description	Delivery of mains replacement programme to reduce leakage.
Output – length of mains renewals	Output: 300 km of leakage-driven mains renewals (The expected impact on leakage reduction is 4.29MI/d)
Total Cost	£124.8m
Unit cost	£416 per meter of leakage-driven mains renewals
Penalty rate	Same as unit costs
Materiality of future scope alterations	£1.248m (1% of total cost)
Output delivery date with current scope	31/03/2030
Conditions on allowance	Should we receive confirmation from a regulator of a necessary change to the timing or scope of a scheme, or in fact the change of scheme design to address the core issue being it, either change in the benefit delivered or the solution being more expensive, the implication of this change would be reflected in the PCD. Where this change leads to a material variance greater than 1% of the original enhancement investment, then the PCD would symmetrically account for this change in a reconciliation at the end of the AMP.
Assessment of PCD	In the event of not delivering the output by the end of AMP8 (i.e., by 31 March 2030), but the need is still required, this PCD remains in place until the end of AMP9 (i.e., 31 March 2035). Ofwat will assess the completion of this PCD by 31 March 2035 as part of the PR34 process.
Late penalty	No late penalty is applicable as being late would mean non-compliance with WRMP statutory requirements.
Measurement	Performance reported in APR
ODIs to be netted off in the event of non-delivery	Leakage (part), mains repairs (part) Water supply interruptions (part) Operational Greenhouse gases (part)
Assurance	Third party assurer will assure conditions have been met

Forecast deliverables

Deliverable	Unit	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35
Enhancement leakage renewals	km	20	40	60	80	100	120	140	160	180	200

3.3 Conclusion – Leakage-driven mains replacement

In our October 2023 PR24 business plan enhancement case “SRN27 Water Resources – Demand Enhancement”, we proposed a 300 km, leakage-driven mains replacement programme in AMP8, at a cost of £198m. This would be in addition to replacement funded through base allowances. Our WRMP assumes that our enhancement mains replacement programme would ramp up gradually, from 20 km in year 1 to 100 km in year 5.

Since submitting our enhancement case in October 2023, we have taken the opportunity to thoroughly review the costs of our programme and developed a comprehensive main replacement assessment



framework and improved unit cost model, we have tested several scenarios and developed a geographically optimised programme, underpinned by leakage reduction cost-benefit prioritisation. Based on this reassessment we can deliver the enhancement programme at a lower cost of £124.8 m (equivalent to a unit cost of £416 / m). Our approach has been subject to independent assurance by consultants Jacobs.

Ofwat's draft determination represents a major challenge to the deliverability of our enhancement programme and the associated leakage benefit. It assumes a significantly greater rate of replacement to be funded through allowed base funding, including an unfunded 'asset health catch-up' which would add more than £20m pressure to already stretched base funding. Ofwat applies a common unit rate to all mains replacement activities of £292 / m. This does not allow for communication pipe replacement which is integral to our leakage-driven enhancement programme. It also applies an unrealistic and unnecessary PCD delivery profile which would require us to deliver 88 km of mains replacement in year 1 of AMP8. This would be counterproductive. The table below summarises our response and position in relation to Ofwat's draft determination.

Table 3: Leakage-driven mains replacement – Southern Water DD position vs Ofwat's DD

Category	Ofwat DD Position	Southern Water Position	Comment
Base - replacement deemed to be funded through base	213.6 km	44 km	We have included a total of 66 km in our base programme after allowing for the 22km additional asset health allowance this <u>represents</u> the net amount to cover WQ and deterioration-based replacement.)
Base - Asset health - 'catch up'	72.2 km	-	We do not accept the justification for this catch up, and would not be able to absorb the pressure on base
Base - Asset health – additional allowance	21.7 km	22 km	We accept the principle of this adjustment (0.03% p.a.) and its inclusion within base
Enhancement - Leakage driven mains replacement	132.5 km	300.0 km	We are now seeking £124.8 m for a 300 km programme based on improved unit cost analysis (£416 / m including CP replacement)
Price Control Deliverable – penalties in relation to non-delivery or late delivery	£283.4 / m £10.37 / m Flat programme	As per the mains replacement PCD table above	We are happy to be accountable for the overall delivery of our mains replacement programme but this needs to allow the flexible delivery of an efficient programme
Total	440.0 km	366.0 km	

4. Our response – Other Leakage Enhancement Activities

In addition to the mains replacement and smart metering programmes (and associated benefits) our leakage reduction plan included the following leakage enhancement activities summarised in the table below.

Table 4: Our other leakage enhancement activities in the plan

Activity	Benefit (MI/d)	Totex cost (£m)	Unit Rate (£m/MI/d)
Comms Pipes Renewal	1.77	13.590	7.678
Pressure Management Schemes	1.80	1.830	1.017
Enhanced Find and Fix	5.61	9.770	1.742
Other - Digital Networks	0.84	15.830	18.845
Total	10.02	41.02	4.094

Although the average cost of these activities is £4.094m per MI/d, funding has only been provided at a unit rate of £1.110m per MI/d, based on analysis of enhancement activity completed in 2019-20 and 2021-22. These two years were preceded by significant events, Beast from the East (2018-19) and the Covid Pandemic (2019-20), which impacted annual average leakage performance and hence created a backlog of standard activity that was then required to bring leakage back down. Taking two isolated years therefore fails to account of the enhancement effort required to reduce leakage from one steady state level to another and sustain that in the long term.

The analysis also fails to take account of the mix of activities undertaken by individual water companies or their relative leakage position. This “one size fits all” approach was found to not be appropriate by the Competition and Markets Authority review of the PR19 price control determinations which stated that “it is appropriate to tailor our approach to reflect their very different positions”.¹ This was also reiterated in the conclusions of the report “A leakage Routemap to 2050” published in 2022 through WaterUK. This report concluded that it becomes increasingly harder to achieve leakage savings with active leakage control when approaching nearer to the level of background leakage².

Ofwat has recognised Southern Water’s leakage reduction programme as being “sector leading”³ but has failed to back this up with additional investment to reflect the challenges associated with our plan and the leakage levels being targeted. Southern Water has the 2nd largest reduction from the Base Year target, with a 31.3% target reduction compared to the average reduction for the industry of 24.3%.

The figure below shows the proposed unit expenditure (£/MI/day) for those companies proposing enhancement expenditure to further reduce leakage levels, compared with the average AMP8 leakage levels (m3/km/day). This demonstrates a good correlation of increased unit cost enhancement expenditure and low leakage levels. Those companies with leakage levels <5.0 m3/km/day (upper quartile performance) proposing an expenditure of £3.9m/MI, similar to Southern Water’s assessment of unit cost (£4.1m/MI) to

¹ Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – Final Report – 17 March 2021. Page 716, paragraph 8.106

² A leakage routemap to 2050, published 2022, WaterUK, page 102 Conclusions

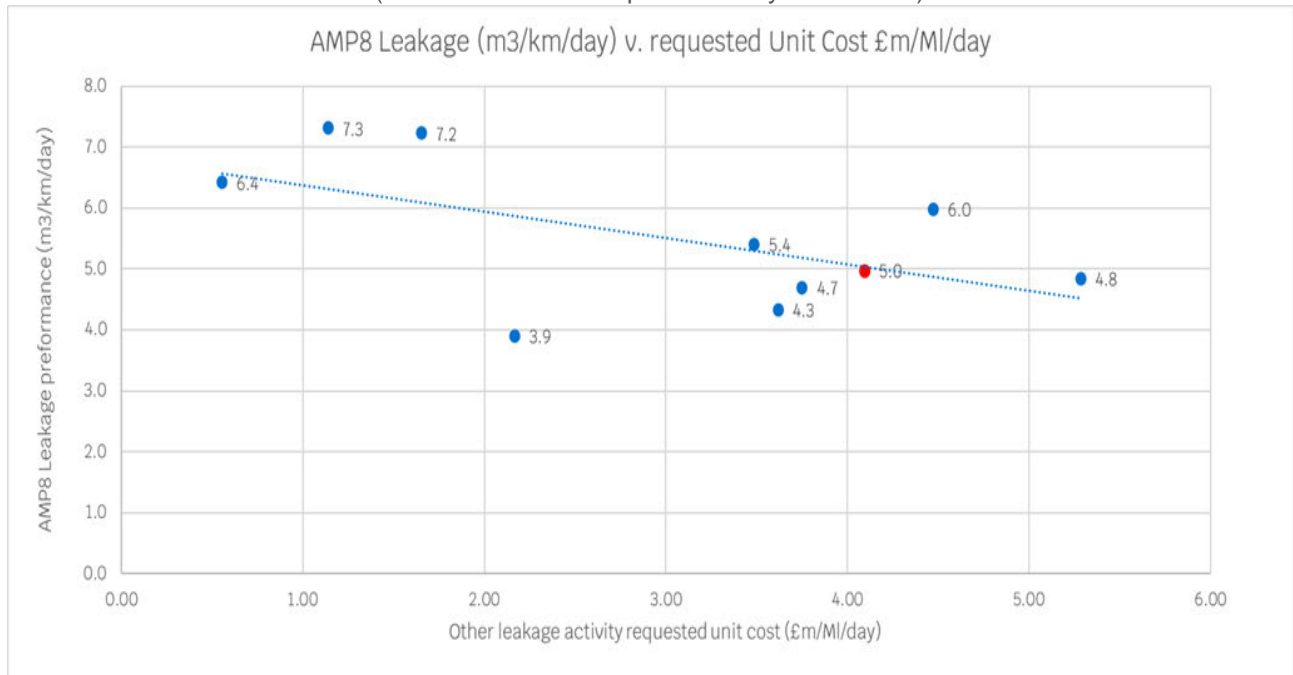
³ Southern Water – Quality and ambition assessment appendix – July 2024. Page 2, 2nd bullet point



achieve 5.0 m³/km/day. This analysis excludes Wessex Water which has a unit cost more than twice the cost Southern Water has determined to achieve a similar leakage performance level.

Figure 3: Enhancement unit cost against AMP8 leakage levels

(Southern Water is represented by the red dot)



The costs associated with the activities in our plan are largely based on current unit rates. For example, the costs associated with replacing rather than repairing a communication pipe are based on the current Repair and Maintenance framework rates. Find and Fix costs reflect the current expenditure we are incurring as part of our AMP7 plan to reduce leakage. Around 20% of the Digital Networks cost is based on current framework rates for the procurement of pressure loggers.

When considered as individual activities, our costs are in line or lower than other water companies. For example, in the case of comms pipe activities our cost per MI/d is around half that of the two other water companies who have included this activity in their plans. For our enhanced Find & Fix programme of work we are c. 55% of the average cost per MI/d and for Pressure Management we are c. 30% of the average cost per MI/d (55% of average cost, excluding United Utilities).

The use of a single rate across all water companies also fails to account for the difference in labour rates across the country, which, in the case of activities such as comms pipe renewals and Find and Fix, result in differences in company expenditure that are independent of leakage levels.

Appendix A – Technical Report on Mains Replacement Unit Cost and Prioritisation Methodology

Executive Summary

This Appendix presents Southern Water's updated analysis of the mains rehabilitation component of our PR24 Water Resources enhancement submission. It sets out our revised assessment of the preferred programme and associated costs to meet our long-term leakage and supply demand objectives and to return to a sustainable infrastructure renewal rate over the next two AMP periods.

In our original submission we adopted a single unit rate for mains replacement, based on an analysis of historic industry rates, resulting in an assumed unit cost of **£676 / m**. Although significantly lower than the unit costs from our neighbouring company, Thames Water, this rate appears to be significantly above the average rate for other companies (as determined from their business plan submissions).

Given this position, since we submitted our original PR24 enhancement case in October 2023 (*SRN27 Water Resources – Demand Enhancement*), we decided to undertake a comprehensive review and overhaul of our approach to developing our AMP8 mains rehabilitation enhancement case. This comprises: -

- Development of a bottom-up unit cost model, incorporating a range of different mains rehabilitation techniques, with allowances for overheads and risk, consistent with our PR24 policies as set out in *SRN15 Cost and Option Methodology, Technical Annex (October 2023 business plan submission)*.
- Development of a mains rehabilitation cost benefit assessment framework, a tool which allows us to select the most appropriate rehab techniques based on DMA characteristics and prioritise DMAs based on the unit cost of leakage reduction

The cost benefit assessment framework allowed us to create alternative scenarios for different mains replacement strategies. This included a notional best value programme which selected the most cost beneficial DMAs in descending order and our preferred programme which sought to group DMAs (within the top 10% of cost beneficial DMAs) based on geographical proximity.

The best value programme resulted in a wide geographical distribution of isolate DMAs across our region, which in practice would be impractical and inefficient to deliver. Our preferred, geographically consolidated programme should enable programme level efficiencies to be achieved, such as having local compounds to serve several DMAs and streamlining local authority liaison to effectively manage streetworks and traffic management costs.

This approach has enabled us to reduce our overall unit cost to **£416 / m**, a 38% reduction from our PR24 submission. Although this unit cost is somewhat higher than the apparent industry average, since we are not privy to the assumptions in other company's programmes, we cannot be sure that this is a like for like comparison.

It is possible that other companies have not allowed for replacement of all communication pipes within their costs or have made insufficient allowance for factors such as provision of continuous water supplies to ensure the 3-hr supply interruption threshold for planned interruptions is not exceeded. Regional differences in supply chain pressures may also be a factor.

Nevertheless, we consider that our revised approach has resulted in a realistic and efficient unit cost, appropriate to our programme and intended scope of works.

Introduction

In Southern Water's PR24 enhancement case for supply demand balance improvements (*SRN27 Water Resources – Demand Enhancement*, dated 2nd October 2023), we set out our plans to replace 300km of distribution mains to achieve our long-term leakage reduction targets, and as the first step towards a more sustainable, long-term infrastructure renewal rate over subsequent AMPs.

Our PR24 submission adopted a simplified high-level approach to costing our programme (based on the use of a long-term industry median cost). We have subsequently revisited this programme and developed a more granular set of unit costs and a cost benefit assessment framework which allows us to evaluate a range of alternative mains replacement scenarios.

This report sets out how we have developed from our previous approach to provide greater levels of confidence in the scale, costs and beneficial impacts of our proposed AMP8 mains replacement programme.

Development of Revised PR24 Mains Rehabilitation Cost Model and Programme

In this section we provide a recap of the approach we adopted for the PR24 enhancement submission and then describe how we have developed an improved approach to cost modelling, which takes account of the variation in costs associated with different rehabilitation techniques and identifies opportunities to deploy lower unit cost techniques in appropriate contexts. This provides greater confidence in the cost-benefit ratio (leak reduction per unit cost) of interventions in different DMAs allowing us to develop a range of scenarios with a clear understanding of value as well as cost.

Overview of Original PR24 Enhancement Case

In our PR24 enhancement case submission "*SRN27 Water Resources – Demand Enhancement*", dated 2nd October 2023 we described our approach to developing and costing our enhancement case including the costs for our proposed 300 km mains replacement programme for AMP8

Our submission used pipe-level burst and leakage forecast data as predicted by our [REDACTED] model, and adjusted to reflect anticipated AMP7 exit leakage levels, together with an average unit cost per meter for replacement based on Ofwat published benchmark data (a long-term median of £676/m).

The limitation of this approach is that it will tend to prioritise high leakage DMAs because the unit cost of mains replacement is assumed to be the same in all cases. In practice some DMAs offer opportunities for lower unit cost techniques, for example slip lining which could lead to a reduced cost per MI of leakage saved and therefore to an overall reduction in cost for a given leakage reduction (or increased leakage reduction for a given length of mains replaced).

Development of Updated Mains Rehabilitation Unit Cost Model

Since the submission of our PR24 enhancement case we have revisited our approach moving away from a single 'global' unit cost value and developing a more granular cost model reflecting differences in unit cost between different mains rehabilitation techniques. This has enabled us to explore opportunities to increase

efficiency or productivity by targeting areas where lower cost techniques might result in more cost beneficial outcomes.

Below we set out how we have approached this exercise.

Direct Costs

The construction cost elements of our programme are referred to as Net Works Direct Cost (NWDC) and exclude any on-costs or overheads.

For mains replacement programmes we maintain a set of unit cost curves for different rehabilitation techniques and a range of pipe sizes and surface conditions (i.e. highway, footpath or verge / grassland). The unit costs curves are derived from actual project costs delivered in AMP6 and AMP7.

Our unit cost model incorporates an allowance for communication pipe (CP) replacement, valves and fittings at expected intervals. This assumes that we will replace all communication pipes by default when carrying out mains rehabilitation in any area, which we consider to be best practice to effectively tackle leakage at a DMA level.

Indirect Costs

There is a range of indirect costs associated with the delivery of a mains rehabilitation project which will be incurred by the contractor or by Southern Water. These are covered by a project level uplift of 33.1 % applied to the NWDC. The detailed explanation of the derivation of our indirect cost allowance is provided in section 4 of our document SRN15 Cost and Option Methodology, Technical Annex.

The table below provides an indication of the costs which are covered by this component of our overall programme cost.

Table 1: Components of Indirect Cost Allowance

Component	Description	Value
Client On-Costs	Client Design	33.1%
	Operations Cost	
	Third Party/Pass Through Costs	
	Client Management	
	Other - Cannot be benchmarked	
Contractor On-Costs	Contractor Design	
	Contractor Preliminaries	
	Construction Management	
	Insurance & Bonds	
	Contractor OH&P	

Risk

In addition to the indirect cost element of our overall delivery cost, we make a programme specific allocation for risk, which reflects the level of design / cost estimation maturity that is possible at business planning stage as well as the complexity of the project. Again, the detailed explanation of the derivation of this risk allowance is provided in our document SRN15 Cost and Option Methodology, Technical Annex (Section 5).

In line with that methodology, at business plan stage, we assess the maturity level of our design as low and the project complexity as medium, resulting in an overall risk allowance of 9.87%. The risk allowance is applied to the direct and indirect costs.

Corporate Overheads

The final adjustment that we make is to allow for recovery of corporate overheads in line with the methodology set out in SRN15 Cost and Option Methodology, Technical Annex (Section 6), from our October 2023 Business Plan submission. Having uplifted the direct costs by 31.1% and applied a further 9.87% risk allowance to that uplifted cost we then apply a further uplift of 11.7% to that combined cost in line with our standard approach.

The combination of indirect costs, risk and corporate overhead result in a net uplift of 163.3% to our initial NWDC.

Validation of Unit Cost Modelling Approach

Following the methodology outlined above we have built up a set of unit costs for each mains rehabilitation technique (i.e. open cut, slip lining, pipe bursting and directional drilling) for a range of pipe sizes and surface types.

To provide greater confidence in our modelling approach, we applied these unit costs to a recently completed AMP7 project (in Rownhams RW11 DMA), for which our CIT team conducted a separate Level 2 (L2) cost estimate. An L2 estimate requires a sufficiently defined scope of work to enable our Engineering Technical Services team (ETS) to generate a Level 2 scope sheet, which itemises the quantity and scale of each type of new or refurbished asset, lengths of pipework and other ancillaries, as well as any other project specific costs.

The scheme costs using the unit cost modelling approach was slightly lower than the L2 estimate (7% below the L2 cost). Given the greater granularity and accuracy of the L2 estimate, we applied a final global adjustment of 7% to our modelled unit costs such that the resultant cost for the scope of works delivered in RW11 matched the L2 estimate.

Outputs of Updated Mains Rehabilitation Unit Cost Model

In conjunction with our more granular unit cost model, we have also developed a mains rehabilitation assessment framework, to enable us to rapidly evaluate alternative mains rehabilitation scenarios. The framework comprises the following: -

- a rules-based approach to identify the extent of mains and CPs to be replaced in each DMA (essentially all non-preferred materials up to 200 mm diameter and all connected CPs assumed to be replaced)
- an algorithm to determine the most appropriate rehab technique for pipe elements based on DMA characteristics (i.e. dense urban, urban, sub-urban, rural, sparse rural) and the surface type associated with each pipe element (road, footpath, verge / grassland)
- includes the 'available leakage' which could be addressed through mains replacement (i.e. the distribution leakage excluding supply pipe leakage).
- includes a residual leakage allowance based on typical leakage levels for new PE pipe systems – i.e. does not assume leakage reduces to zero in those systems which are renewed.
- determines the cost benefit ratio for each DMA based on the potential leakage reduction per £ of expenditure on mains replacement and uses this as the basis for prioritisation.

We have used the framework to identify the notional best value programme, ranking DMAs in priority order based on estimated leakage reduction per £ spent. This results in a wide geographical distribution of DMAs, with isolated DMAs spread across the whole of our operating area.

In practice this would be likely to increase programme risks and overhead costs and complicate the logistics of delivering such a large programme. We have therefore created an alternative scenario in which we have consolidated DMAs based on geographical proximity. Having ranked the first 1000 km worth of DMAs (which would be candidates for replacement in AMP8 or AMP9) we have then grouped them by Water Resource Area and then prioritised these groupings rather than individual DMA.

This results in a more realistic and practical distribution of activities over the two AMP periods. Through this reprioritisation approach, there is small reduction in the forecast AMP8 leakage saving relative to the theoretical best value programme, but this is outweighed by the opportunities for efficient delivery. Over two AMP periods the most cost beneficial DMAs would all be addressed.

Average Unit Costs

Based on the methodology described above, and assuming an overall programme of 300 km of mains to be replaced in AMP8, the total cost of our geographically consolidated programme would be £124.8 m and achieve a leakage reduction of 6.4 MI/d. This equates to an average unit rate for mains replacement of **£416** / m and a cost per MI/d of leakage reduction of £20.2 m.

This is significantly lower than our original 'industry median' value of **£676** / m (a 38% reduction). A key reason for the reduction in average unit cost is that the more granular and targeted approach adopted within our framework allows us to benefit from opportunities to deploy lower cost, trenchless techniques in suitable DMAs and bring down the overall cost per MI/d for leakage reduction.

The table below compares our original programme as submitted in our PR24 enhancement case (SRN27 *Water Resources – Demand Enhancement*) with the revised case derived using our mains rehabilitation assessment framework.

Table 2 - Comparison of original and revised mains rehabilitation enhancement cases

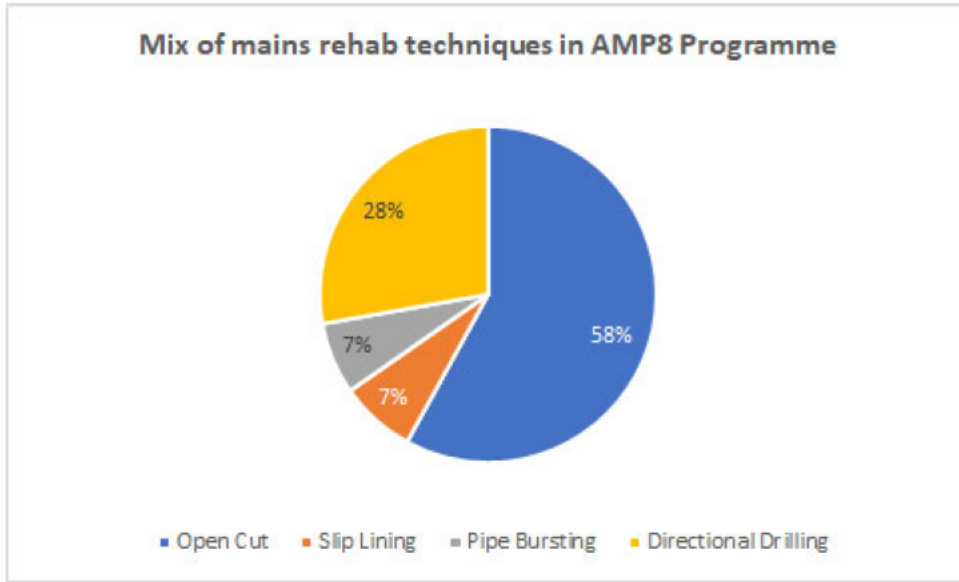
Scenario Details	Baseline Scenario = PR24 Enhancement Case	Results for this scenario	Change in Outcome	Units
AMP8 Mains Length Replaced	293.1	309.9	16.8	Km
Leakage Benefit	4.3	6.4	2.1	MI / day
Burst Reduction Benefit	64.2	59.4	-4.9	Nr / annum
Est. Nr of Lead Comms Pipes Replaced	4,475	3,919	-556	Nr
Total Cost	£198.0	£129.1	-£69.0	£m
Cost per MI / day	£46.1	£20.2	-£25.9	£m /MI / day
Average Unit Cost (£/m)	£416.4			

Scope of Our Preferred Programme

As described above the notional best value programme would result in a wide distribution of isolated DMAs for mains rehabilitation spread across our whole region. Our geographically consolidated programme groups DMAs that are within the top 10% of DMAs based on leakage reduction cost benefit (160 DMAs representing the first 1,000 km of our long-term mains replacement strategy) and prioritises on a Water Resource Area basis, whilst ensuring a reasonable spread of activity across our three regions (Hampshire, Sussex and Kent).

drilling where appropriate. The figure below illustrates the split between different techniques which is assumed within our preferred AMP8 programme.

Figure 2 – Mix of Mains Rehabilitation Techniques in our AMP8 Programme



It is worth noting that opportunities to use trenchless techniques such as slip lining and pipe bursting would be greater if Ofwat adopted a more pragmatic approach to the inclusion of planned interruptions within the overall supply interruptions performance commitment. The inclusion of planned interruptions greater than 3 hours within this measure, adds significant additional cost to these techniques due to the need to provide rider pipes to maintain supplies during rehab activity.

Benchmarking

Given that individual company's cost models are commercially confidential to each company, it can be challenging to find publicly available benchmarking data which is fully comparable with our own data. The only basis publicly available data upon which we can base some comparison is the data submitted by our peers as part of their own PR24 submissions. We have undertaken an analysis of such data to identify the implied average unit costs for mains rehabilitation within each company's submission.

What we cannot verify is whether those companies make similar assumptions about the inclusion of communication pipe replacement within their unit costs (our rates include replacement of CPs alongside mains replacement). Companies' programmes may include different size ranges within their assumed rehab programmes which will influence the average unit cost.

We cannot be certain what assumptions other companies make about additional costs such as the cost of maintaining continuous water supplies during mains replacement to avoid exceeding the 3-hr threshold for supply interruptions. The latter can be a significant cost and not fully reflected in historic cost data. There will also be different regional supply chain pressures and constraints which affect both historic and future costs in the sector as well as the potential impact of programme scale on efficiency.

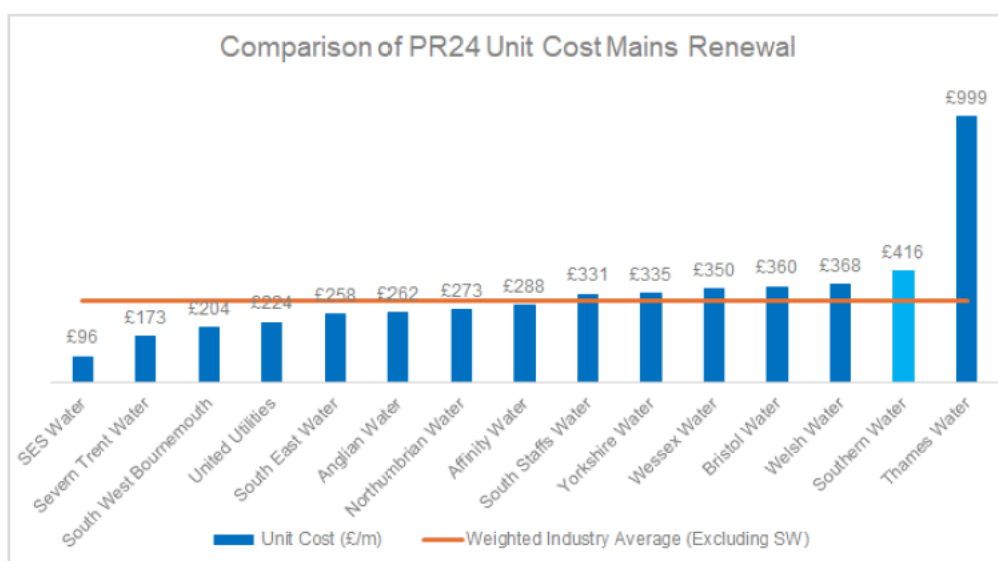
The table below shows our revised unit cost in comparison to other companies based on the analysis of business plan totex and replacement lengths stated by those companies. Based on this comparison our rates would still be the second highest in the sector although by a much smaller margin than our previous assumed unit cost.

Table 4 - Comparison of Implied PR24 Mains Replacement Unit Costs

Company	Mains length (km) AMP8 only	From Business Plan totex (£m)	Unit Cost (£/m)
SES Water	104	£10	£96
Severn Trent Water	1,300	£225	£173
South West Bournemouth	850	£174	£204
United Utilities	695	£156	£224
South East Water	276	£71	£258
Anglian Water	695	£182	£262
Northumbrian Water	503	£138	£273
Affinity Water	170	£49	£288
South Staffs Water	254	£84	£331
Yorkshire Water	746	£250	£335
Wessex Water	246	£138	£350
Bristol Water	139	£50	£360
Welsh Water	174	£64	£368
Southern Water (Revised)	300	£125	£416
Thames Water	500	£614	£999
Total / Average (Excl Southern)	6,951	£2,329	£306

The figure below shows this comparison in graphical form.

Figure 2 - Benchmarking of Unit Costs against PR24 Values



The above comparison suggests that our unit costs are almost 36% above the industry weighted average

Conclusions

We have undertaken a rigorous and detailed review of our approach to building and costing our AMP8 mains replacement enhancement programme. This has resulted in a 38% reduction in our average unit costs for this activity compared to our original PR24 submission.

Comparison with our industry peers, based on our interpretation of their business plans, suggests that our rates are higher than the implied average unit costs for their programmes. That could be because other companies have not allowed for replacement of all communication pipes within their costs or are targeting a smaller diameter range than we have assumed or have made insufficient allowance for factors such as provision of continuous water supplies to ensure the 3-hr supply interruption threshold is not exceeded.

Regional differences in supply chain pressures may also be a factor. Without detailed insight into the underlying assumptions behind the other companies plans it is not possible to fully explain the variances between our rates and the implied industry average. Nevertheless, we consider that our revised approach has resulted in a realistic and efficient unit cost, appropriate to our programme and intended scope of work.