UUW61

Water (Supply Demand) Enhancement Case

October 2023

Chapter 8 supplementary document

This document sets out the service enhancement expenditure and activity that we will undertake, through our 2025-2030 business plan.

This case includes:

- Case 6: Smart metering
- Case 7: Leakage
- Case 8: Water efficiency

United Utilities

Water for the North West

1. Water (Supply Demand) Enhancements

1.1 Structure

1.1.1 This document contains our Water (Supply Demand) enhancement cases and is structured as below:

- Case 6: Smart metering
- Case 7: Leakage
- Case 8: Water efficiency

UUW61

Smart Metering

October 2023

Enhancement Case 6

United Utilities

Water for the North West

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1. Enhancement submission

<table>
<tr><th colspan="2">Enhancement submission</th></tr>
<tr><td>Title:</td><td>Smart Metering</td></tr>
<tr><td>Price Control:</td><td>Water Network Plus</td></tr>
<tr><td>Enhancement headline:</td><td>UUW's revised WRMP and PR24 business plan require the installation of 501,000 new meters, and upgrading of 420,000 meters to AMI (Automated Metering Infrastructure) technology. The increased meter penetration and capabilities are a key enabler of demand reduction, customer engagement and network management.

In total 921,891 meters will be fitted in AMP8. 54 per cent of these (501,000) will be new meters for existing household (HH) customers, meaning they are not covered by base maintenance costs and will advertently result in a permanent increase in the current service levels. 420,000 HH and non-household (NHH) meter replacements are needed. 202,000 of these are for basic meters. Where a basic meter is being replaced with a smart meter, the cost of replacing like for like is included in base totex allowance and the additional cost of funding the smart element is included in this enhancement case.</td></tr>
<tr><td>Enhancement expenditure

(FY23 prices)</td><td>
<table>
<tr><th></th><th>AMP8 Capex inc TI (£m)</th><th>AMP8 Opex (£m)</th><th>AMP8 Totex (£m)</th></tr>
<tr><td>Pre RPE and Frontier Shift</td><td>234.022</td><td>12.241</td><td>246.263</td></tr>
<tr><td>Post RPE and Frontier Shift</td><td>228.775</td><td>11.913</td><td>240.687</td></tr>
</table>

The table above shows the total expenditure, inclusive of accelerated programme and transitional investment, on both a pre-efficiency (i.e. pre frontier shift and real price effects basis, consistent with the cost data tables), and a post efficiency and RPE basis (i.e. consistent with the value we propose to be recovered from price controls). All numbers referenced hereafter in this enhancement case are on a post efficiency and RPE basis.</td></tr>
<tr><td>This case aligns to :</td><td>WRMP24. For full reconciliation between enhancement costs and data table lines, see enhancement mapping tabs in UUW117 – Project allocations CW3 and CWW3</td></tr>
<tr><td>PCD</td><td>Yes</td></tr>
</table>

2. Enhancement case summary

Gate	Summary	Location reference
Need for enhancement investment	• Population growth has and continues to drive an increase in water demand. In addition we are experiencing a less predictable water supply due to climate change. This calls for enhancement funding for improvements required to meet our statutory obligations. • Smart (AMI) metering provides an opportunity to transform how we look at consumption and customer-side losses (leaks and plumbing losses). The programme we have proposed is focused on the most efficient collection of the rich data on water usage once the water leaves our network. This represents the best value option to maintain a safe and secure water supply. • The billions of meter reads we can expect to receive from AMI meters is a material step up from the millions we receive from AMR and legacy visual meters today. This requires foundational investment in our internal systems and infrastructure to support, in addition to the communications network to collect and transmit reads from the new meters. • UUW's Revised WRMP and PR24 business Plan require the installation of 500,000 new HH meters, 1,000 new NHH meters, and the upgrading of 420,000 HH and NHH meters to AMI (Automated Metering Infrastructure) technology. • Metering will support us in PCC, business use and leakage reduction, by helping us quickly find identify customer-side leaks, and influence customers' water consumption behaviour. • To meet our national targets of reducing PCC to 110l/p/d and leakage to 224Ml/d by 2050, we have to commence delivery of AMI metering rollout in 2025. This means fitting new smart meters to our existing customers, as well as replacing older meters with new AMI meters for our HH customers. • The government has set a business demand reduction target of 9% by 2038. This means replacing all NHH meters with new AMI meters	4 4.6
Best option for customers	• Having completed an extensive review of metering options, taking into account technology options, including Basic, AMR and AMI, we are confident that AMI represents best value for customers. • To ascertain the need for NHH AMI metering, we considered the age profile of our meter assets and took into account the independent research conducted by Artesia on the benefits of enhanced technology on behalf of the Market Operator of England's Non Household Water Market (MOSL), which demonstrated a positive net benefit. • There is strong support for our proposals from most customers. 64 per cent of households and 84 per cent of non-households are supportive of our plans to roll out smart meters. The most attractive aspect of smart metering is fair and accurate billing. • For those customers that remain concerned by the change we are developing a robust engagement strategy to ensure customers are aware of	5.1 5.2

	their right to remain on unmeasured charges and provide reassurance around data protection concerns.	
Cost efficiency	• Following publication of our Draft WRMP we have been reviewing evidence on our proposed Household Smart Metering investment programme. • We have conducted a cost benchmarking study with PwC, and completed our own review of other water companies' current and future metering programmes. • In addition we have taken into account evidence on cost efficiency from third parties, such as MOSL's NHH customer metering cost benefit analysis, and have considered consultation responses from Ofwat and other regulators. • These exercises have supported a revised view of benchmark costs for smart meter installation and upgrades. Overall, on a like for like basis our proposed metering programme is 2.5% more efficient than indicated in our Revised WRMP submission.	6.1-6.2 6.3
Customer protection	• We have proposed a price control deliverable (PCD) covering AMP8 smart metering investment to protect customers	7

3. Introduction

3.1.1 **This document sets out the UUW enhancement claim for £240.7m (totex,2022/3 prices) to allow UUW to roll out smart (AMI) meters to existing customers as well as replace existing meters with new AMI capable meters**

3.1.2 Following a comprehensive supply-demand option development and appraisal process, UUW's Revised WRMP and PR24 Business Planning processes have concluded that the installation of 1,660,000 new household meters, and the upgrading of another 1,000,000 meters to AMI (Automated Metering Infrastructure) technology over the next 15 years represents the optimal best value supply/demand strategy for the North West region. Delivery is a key part of achieving long-term targets for demand reduction, customer engagement and network management. By 2037 the WRMP requires that UUW achieve a smart meter penetration of 84%, reaching economically viable maximum meter penetration levels. This timeline is broadly in line with Ofwat guidance for companies to have full smart meter penetration by 2035.

3.1.3 A total of 921,891 meters need to be fitted in AMP8 at a cost of £240.7m (totex, 2022/23 prices). 54% of these (500,000) will be new meters for existing unmetered household customers. We will replace 202,000 basic meters (meters which require a visual read) and 218,000 AMR (Automated Meter Reading) meters with AMI capable meters.

3.1.4 Going smart requires a step change in how we operate and work. An internal change programme is already underway to establish the right target operating model to support meter fitting in AMP8. We are working with experts to ensure the most cost efficient roll out strategy, as we will build on lessons learnt from water and energy smart metering early adopters.

3.1.5 The benefits of fitting smart meters will be substantial, as previously highlighted by key industry stakeholders, such as the EA and MOSL. The UUW Revised WRMP predicts that fitting a new smart meter at an unmetered household property will, on average deliver a 14 per cent reduction in PCC. Replacing older non-household meters with smart enabled equivalents could deliver 2.5 per cent in demand reduction, as well as benefits from reduced leakage. We anticipate smart meters will enable a wide range of other benefits, see section 3.2. In particular we expect new smart meters to deliver improvements in customer engagement and tariff design, with benefits for household budgeting and bill affordability, which is of high importance in one of England's most deprived regions, see *Chapter 4 – Driving Affordability.* New tariff innovations, such as rising block tariffs are likely to become increasingly practical to implement as smart meters are fitted at scale.

3.1.6 Following publication of our Draft and Revised WRMPs we have been reviewing evidence on our proposed Household Smart Metering investment programme. We have conducted a cost benchmarking study with PwC, and completed our own review of other water companies' current and future metering programmes. In addition we have taken into account evidence on cost efficiency from third parties, such as MOSL's NHH customer metering cost benefit analysis, and have considered consultation responses from Ofwat and other regulators. These exercises has supported a revised view of efficient costs for smart meter installation and upgrades. Overall, on a like for like basis our proposed metering programme is 2.5% more efficient than indicated in our Revised WRMP submission.

3.1.7 We have completed a comprehensive assessment of the relative benefits of various metering technologies, including basic, AMR and AMI options. This assessment has confirmed that AMI capabilities offer the highest long-term benefits driven principally by demand reduction and leakage detection benefits. In recent years we have seen reductions in the marginal cost of delivering AMI capabilities to the point where it now offers a net whole life cost that is around double that achieved by alternative metering technology options. As a result AMI will be the technology of choice for UUW in AMP8. In some specific instances we expect a limited number of meters will be delivered with AMR capabilities, for example in highly rural areas where fixed communication networks are disproportionately expensive.

3.1.8 There is strong support for our proposals from most customers. 65% of households and 82% of non-households are supportive of our plans to roll out smart meters[1]. The most attractive aspect highlighted by customers of smart metering is fair and accurate billing. For those customers that remain concerned by the change we are developing a robust engagement strategy. This will promote awareness with households of their right to remain on unmeasured charges and provide reassurance around data protection concerns.

3.1.9 The North West is assessed as not being an area of serious water stress, which means the natural water supplies in the region are in a healthier sate than in many other parts of England and Wales. However this does mean that UUW cannot compel the majority of unmetered household customers to switch to measured charges.

3.1.10 Therefore to ensure new smart meter installations deliver anticipated benefits we will utilise our Lowest Bill Guarantee (LBG) tariff option to incentive customers to moderate usage, even if they choose to remain on an unmeasured bill. Under the LBG recently metered customers are charged the lesser of their traditional unmeasured charge or a new measured tariff. This tariff option enables customers to 'try before they buy', while retaining incentives to reduce water usage. The tariff has been available in AMP7 for customers switching to a meter through the UUW Free Meter Option, and is proven to help overcome natural customer loss aversion while providing protections for key customer groups that may not benefit from a meter (such as some vulnerable customers or households with high occupancies). In AMP8, as we begin proactively metering large numbers of unmetered customers the LBG will enable us to engage customers with water efficiency and cost saving messages while they formally remain on an unmeasured charge.

3.1.11 In delivering this substantial investment programme we are committing to engage with wider industry efforts to harmonise metering standards, most immediately to support the non-household retail markets. We anticipate that collaborative efforts will, at minimum establish smart meter interoperability arrangements across companies, particularly in terms of data collection to support open data objectives. In developing our PR24 enhancement case we have made extensive use of benchmarking insight from other companies, and plan to continue to work with water companies to identify optimal strategies to design, fit, operate and maintain a new smart metering asset base. In addition we will continue to comply with all appropriate regulations governing cold water meters.

[1] https://uusp/uu/PR24/Business%20Plan%20Submission/04.%20Main%20Submission%20-%20October%202023/02.%20Submission%20Chapters/Data%20validation/Smart%20Metering/Smart%20Metering%20Research%20-%20Integrated%20Findings%20Report%202022.pdf

4. Need for enhancement investment

4.1 Business Case

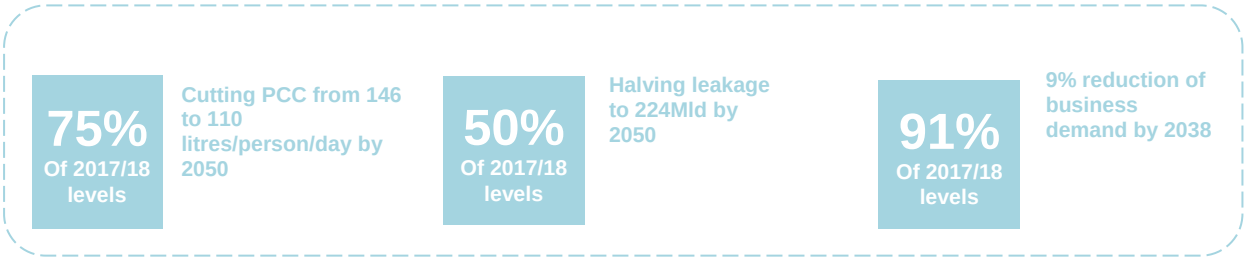
4.1.1 The business case for smart metering is made in our WRMP24 for demand reduction[2] as well as reducing abstraction to protect the environment. There continues to be an increase in water demand due to population growth over the decades. There's a less predictable supply of water due to climate change. This has led to water companies, including UUW, facing increased pressure to manage their water resources in response to governmental and regulatory stretching leakage and consumption targets.

4.1.2 Our WRMP states that the meter penetration within our company supply area is currently around 47 per cent for households and 91 per cent for non-households. This is lower than for many other UK water companies. The introduction of smart metering will help us achieve our strategic objectives on PCC and leakage, which help ensure future water resilience

4.1.3 The National Framework target for England[3] has stipulated specific targets for PCC and leakage reduction.

4.1.4 The government has included a nine per cent reduction in NHH water use by 2038 in its Environment Act target.

Figure 1: PCC, leakage and business demand targets for England



CC Water shared research conducted in January 2023, in association with MOSL, *Smart Thinking – Metering for Business Customers*[4].

4.1.5 The findings of this report largely correspond with our own customer research, covered in section 3.6 below.

4.1.6 The overview states that there is strong support (82 per cent) for a broader rollout of new water meter technologies for NHH customers, with businesses expecting smart water meters to become commonplace, with time and financial savings(for businesses and water companies) strongly outweighing any perceived drawbacks.

4.1.7 91 per cent of those who claim to have a smart water meter find that it provides useful information. The greatest value is placed on benefits facilitating greater financial control, potential for cost-savings, and a reduction in time, thought and effort paid to managing their water billing.

MOSL published the *Interim National Metering Strategy for the Non-Household Market*[5] by their Strategic Panel dated 17 April 2023, developed to support the smart metering business case for water companies' PR24 submissions.

4.1.8 This strategy has been endorsed by UKWRC in a letter *PR24 and Smart Metering in the Non-Household Market*[6] dated 4 July 2023

[2] United Utilities Draft Water Resources Management Plan 2024

[3] Meeting our Future Water Needs: A National Framework for Water Resources

[4] Smart Thinking – Metering for Business Customers (CCWater)

[5] Interim National Metering Strategy for the Non-Household Market

[6] PR24 and Smart Metering in the Non-Household Market

4.2 Benefits

Table 1: Table showing Benefits of Smart metering for HH and NHH properties

Title	Description	Benefits
Smart Metering - Household	Enhancement item included in WRMP1 as enabling us to improve service to customers by providing smart meters to manage water consumption and reduce PCC.	• 14% PCC reduction or 51.2litres/prop/day • 15% leakage reduction or 18.7 litres/prop/day 23.53Ml/d
Smart Metering Non-Household	Enhancement item included in WRMP1 as enabling us to improve service to customers by providing smart meters to manage water consumption and reduce PCC.	• 2.5% business demand reduction or 65.5 litres/prop/day • 15% leakage reduction or 18.7 litres/prop/day 10.65Ml/d

Source: WRMP24.

HH metering benefits

4.2.1 According to Energy Saving Trust how-saving-water-at-home-can-help-you-save-energy-too , an average household will use 16 per cent of its total energy consumption to heat water, therefore using less water means using less energy too, leading to lower energy bills. There are further benefits to derive from smart metering signifying the need for a large scale rollout, mainly, improved environmental outcomes and opportunity to realise operational efficiencies.

(a) In order to reduce PCC and manage, water demand given increased drought risks, AMI metering can reduce PCC by 17 per cent against unmeasured[7]

(b) Reduction in water demand can provide additional capacity to water stressed areas and reduce the need for additional costly supply as well as minimise the deterioration risk of network assets.

(c) Improved data collection can support with forecasting future demand and requirements for further enhancement.

(d) Enhanced customer service, enabling us to support our vulnerable customers, including putting customers in control of their water usage and therefore control of their bills.

(e) Strategic insights to support decision-making

(f) Monitoring for continuous flow can allow for faster detection and resolution of leakage reducing leakage

(g) Greater availability and frequency of data can facilitate improved leakage detection and resolution efficiency

(h) A recent study by Arqiva and Waterwise smart water metering and the climate emergency , found that AMI meters could reduce UK greenhouse gas emissions by up to 0.5% , which is the aggregation of various reductions in carbon footprint, including:

i Reduced PCC means less water being supplied and wastewater treated.

ii AMI meter reading does not require driving to collect data (such as with AMR meters), contributing to a reduced carbon footprint.

(i) In addition to broad ecological benefits, reduced PCC and leakage results in reduced carbon emissions and increased biodiversity through higher availability of water in the ecosystem.

[7] Report: Cost benefit analysis of water smart metering", Produced by Frontier Economics and Artesia, supported by Arqiva, November 2021

(j) Significant reduction in meter reading costs per read.

(k) Greater accuracy in billing customers, as usage data is more current and received quickly. This should help to reduce customer enquiries, and improve customer satisfaction.

(l) Greater detection of 'unoccupied' properties that are actually occupied, leading to revenue generation with an associated cost to bring these properties into charge.

NHH metering benefits

4.2.2 In addition to the above, the Artesia report for MOSL 'A strategy for Enhanced Metering Technology' published 6 April 2022, states the following benefits of enhanced meter technology of NHH customers

Table 2: Table showing Benefits of Smart metering

MOSL	Improved market performance management Long-term direction of travel -> increased certainty & investment Increased accuracy of charges Value-added insights Reduced unplanned settlement costs Reduced long unread meters Consistent reliable accessible data Enabling an effective competitive market Identify areas for investment & gaps in policy More innovation
Retailer	Value added services More accurate and timely data Reduced meter read costs Reduced long unread meters Commonality of data formats Accessible data No stranded assets Settlements based on timely and accurate reads Improve efficiencies Data driven innovation Identify issues more quickly Improved customer experience Reduce cost to serve Reduce barriers to entry
Customer	Identify leaks and wastage more quickly Manage bills more effectively Fewer complaints Multi-site benchmarking Improved access to consistent data Water efficiency Help businesses to deliver carbon reductions Timely data to allow easier switching All bills based on accurate and timely data Customers can choose a retailer based on their needs

Wholesaler	More accurate and timely data for settlements
	All consumption data based on meter reads
	More accurate consumption data
	Sub-daily data across all non-household sites
	Improved data for forecasting future non-household demand
	Ability to target water efficiency interventions to improve the supply-demand balance
	Increased accuracy for reporting water utility leakage
	Improved water balance data
	Improved regulatory reporting
	Improved ODI and performance commitment reporting
	Improved resilience
	Improved meter management and accuracy
	Increased accessibility to data
	Improved non-household segmentation
Regulator	Improved accuracy in water resources plans
	Improved accuracy in regulatory reporting
	Supports future demand reduction targets
	Improved market competitiveness

Source: https://mosl.co.uk/documents-publications/6333-artesia-mosl-enhancing-metering-technology-report/file

4.3 Scale and timing

4.3.1 The pace of technological development was considered in the scenarios in line with guidance published by Ofwat8. The Ofwat faster technology scenario assumes full smart meter penetration by 2035 and implementation of a smart water supply by 2035. The Ofwat slower technology scenario assumes full smart meter penetration by 2045 and implementation of smart water supply by 2040.

4.3.2 These scenarios have, therefore, been implemented using the selection of different demand options within our demand management plan. A smart water supply involves 'automatic detection of potential leaks' and 'robust real-time asset condition information including telemetry, robotic and drone inspection'.

4.3.3 To demonstrate the technology scenarios, we have assumed the roll out of permanent network sensors and dynamic network management in time for the specified dates. In the case of the slow full smart metering scenario, our metering options are selected later in the planning period, and in the case of the fast full smart metering scenario, two new options were generated to demonstrate how a quicker roll-out would impact our plan. All other scenarios, including the most likely, assume metering pace as per our demand options. More detail on this can be found in our *Draft Technical Report – Options Identification1*

4.3.4 We consider 90 per cent meter penetration to be representative of full meter penetration. This takes into account the metering of common supplies in AMP9 and AMP10. We expect to achieve full meter penetration by 2045.

4.4 Overlap with base activities?

4.4.1 We are confident we have assessed expenditure for base and enhancement and the proposed investment is over and above existing activity funded at previous price reviews.

4.4.2 We have followed the regulatory accounting guidelines (RAG) on allocation of costs between base and enhancement. Base costs are defined as routine, year-on-year costs, which companies incur in the normal running of their business to provide a base level of good service to customers and the

[8] PR24 and beyond: Final guidance on long-term delivery strategies, Ofwat, April 2022

environment and maintain long-term capability of assets. Enhancement costs are capex and opex related to the installing of new meters for customers who don't already have a meter. Replacement of basic meters with AMR or AMI is deemed to be enhancement activity, however, only claiming the additional cost of the enhanced capability.

4.5 Long-term delivery strategy within a core adaptive pathway

4.5.1 Our Water Resources Management Plan (WRMP) is a long-term planning framework and sets out our investment to 2050. Within the design of our demand plan in our WRMP24, we have optimised our demand management strategy to achieve our target glide paths in a best value way. We optimised PCC and leakage plans simultaneously to ensure we had selected the most effective metering options, which have dual benefit in terms of PCC and leakage reduction.

4.6 Customer research

4.6.1 There is clear evidence that customers support our plan for smart metering. Our customer research was conducted by Verve, a Global insights consultancy, autumn 2022 and published in November 2022. The research was conducted in two phases, phase 1 – qualitative and phase 2 – quantitative.

Smart Metering Phase 1 – Qualitative Research

4.6.2 Most customers are supportive of our plans for smart metering. Perceived benefits of smart metering across all customers include fair billing, leakage detection, instilling greater conscientiousness in water usage and efficient meter reading.

4.6.3 The most attractive aspect of smart metering to customers was fair and accurate billing.

4.6.4 HH customers accept that sharing of usage data is part of modern life when it comes to water companies accessing their smart usage data.

4.6.5 However business consumers cited data security concerns where third parties are concerned. Clear communication on data use cases will alleviate the very minor concerns around data security. Preference was for more granular data at 15 min intervals compared to hourly, but sent to customers monthly.

4.6.6 Of the very few that were not supportive, the research gave insight into the reasons why they feel the way they do when it comes to water smart meters.

4.6.6.1 Bill impact was the biggest concern for unmetered customers.

4.6.6.2 We will alleviate any preconceived ideas and dispel any myths or worries around costs, data security, and meter location etc., with effective communications to customers ensuring a successful rollout while minimising the number of customer complaints, which would impact our C-Mex.

Smart Metering Phase 2 – Quantitative Research

4.6.7 What we learnt:

(a) 84 per cent of business customers supported the roll out of smart meters compared to 65 per cent of domestic customers across all groups (metered customers, unmetered customers and future bill payers) in support of the roll out of smart meters with objections focused on cost concerns;

(b) Objections focused on cost concerns, with low;

(c) Awareness of our Lowest Bill Guarantee initiative;

(d) Future communications will need to address data security;

(e) Customers demonstrate increased appreciation of the personal and broader benefits of identifying leaks, and the role digital meters can play in fixing these sooner; and

(f) Most customers are happy to share their data in return for tangible benefits.

Table 3 - Table showing recommendations from customer research

Households	Future Bill Payers	Businesses
• For households, great reassurance is needed to address concerns around increasing bills; 58% of unmetered customers will consider installing a meter if there is some guarantee in place that bills will not increase • Improving awareness of the lowest bill guarantee is essential for this group, better awareness could have a positive effect on meter trial • For those who are metered, it is important to highlight the benefits of a smart water meter, customers may perceive it as a 'nice to have' and as such not fully get behind the rollout	• Tailored messaging is required to encourage uptake. For Future Bill Payers there should be less emphasis on environmental benefits of smart meters and potential contribution to the greater good, and more emphasis placed on how smart meters can help reduce bills and save money. • Future Bill Payers are more likely to feel entitled to use water because they pay for it – immediate motivating benefit will serve well instead of focusing on future environmental implications • The process for meter installation should be flexible; most do not have a smart *energy* meter because of time limitations	• Align meter rollout to business environmental goals with emphasis on how smart meters are essential to achieving business goals • The efficiencies of smart water meters and their benefit to the bottom line could be key to encourage take-up among businesses • While a relatively small concern, it's also important to communicate the implications (if any) of smart water meters when changing retailers, and implementing processes to make this as seamless as possible
72% of Metered HH support the plans 48% of Unmetered HH support the plans	79% of support the plans	84% of support the plans

Source: Smart Metering Customer Reasearch

4.6.8 Based on the recommendations from the customer research conducted;

(a) For unmetered households or metered customers who haven't switched to a measured bill, we will continue to explore further ways to promote and market our lowest bill guarantee initiative;

(b) For metered customers, we will develop appropriate communication material and tools to help them realise the benefits of smart water metering;

(c) For future bill payers, we will continue to share widespread messages on the link between low water use and lower energy bills, given their concern about saving money and reduced bills; and

(d) For business customers, we will communicate and demonstrate the benefits of good data quality in terms of usage and asset data for seamless market operations as well as influencing customer behaviour in tackling leakage and reducing consumption.

4.7 Is investment driven by factors outside of management control?

4.7.1 The need to reduce demand for water is largely driven by factors outside of management control for example, climate change, population growth, Abstraction reform and other government policies. While we operate in an area that is not yet designated water stressed, we have targets to meet as well as the fact that being proactive now with an investment in a full smart metering solution serves to reduce the impact of those factors outside our control in the future.

5. Best option for customers

5.1 Our household metering programme

5.1.1 We have a National Framework target of reducing PCC to 110l/p/d and halving leakage to 224Ml/d by 2050.

5.1.2 With metering penetration of 47 per cent, the lowest in the industry, we need to start rolling out smart meters from year one of AMP8 in order to meet the national targets for 2050.

5.1.3 For our demand management strategy, we optimised PCC and leakage plans simultaneously to ensure we had selected the most effective metering options, which have dual benefit in terms of PCC and leakage reduction.

5.1.4 The table below shows the volume of HH meters for each selected metering programme.

Table 4: Metering programme size

Programme	Number
New smart meters for existing customers (FMO)	75,871
New smart meter for existing customers (Enhanced)	424,129
Replacement of end of life meters with smart meters	250,000
TOTAL	**750,000**

Source: WRMP Demand Options Model

5.2 Our non-household metering programme

5.2.1 Following the recent release of the report 'A Strategy for Enhancing Metering Technology'[9] by Artesia, on behalf of MOSL we revisited the business case for upgrading existing NHH meters to include smart capabilities.

5.2.2 The report identifies a wide range of benefits, including some associated with demand reduction. There is sufficient evidence that allows us to select NHH smart meter upgrades as part of the WRMP investment programme.

5.2.3 The case for holistic benefits from smart metering is strong, including some benefits that have now been accounted for within the WRMP optimisation process. Some examples of wider holistic benefits include, but are not limited to, improved NHH retail market service offerings, higher accuracy meter reading and billing, more effective information flows within the non-household retail market, and reduced meter read cost for retailers.

5.2.4 We have 36 per cent of our NHH meter stock past economic life. We started installing AMR technology in AMP5. At the end of AMP7, an additional 115k meters will be older than 15 years. We believe UUW has the largest volume of very old meters in the industry. Our approach during the most recent AMPs has been to replace broken meters only, with no proactive replacement program that would target meters older than 15 years.

[9] MOSL: A Strategy for Enhanced Metering Technology by Artesia

5.2.5 As shown in the table below, we intend to replace all non-household meters with AMI capable meters in AMP8 because of the demand reduction benefits realised from upgraded meters, in addition to the wider holistic benefits mentioned above.

Table 5: Table showing proposed NHH meter volumes

Programme	Number
New smart meters for existing customers	1,140
Replacement of end of life meters with smart meters	169,751
TOTAL	170,891

Source: WRMP24 Demand Options Model

5.3 Technology options

5.3.1 We've been rolling AMR meters since 2010, having made the business decision to move from installing basic meters, which require eyeball reading.

5.3.2 The main benefit was to improve efficiency and reduce operational costs with regards to meter reading. AMR meters helped facilitate the development of a customer portal supported by more frequent reads (fortnightly), allowing some customers to monitor their own consumption

5.3.3 Our AMR solution came with the capability of a drive by solution enabled by installing remote readers in bin lorries allowing the fortnightly collection of data in sync with the refuse collection cycle.

5.3.4 Table 6 below shows the differences in meter technology i.e. basic, AMR and AMI meters.

5.3.5 We've conducted a cost benefit analysis for the three meter type technologies showing that AMI metering offers a bigger cost benefit ratio compared to both AMR and basic metering as shown in section 6.5

5.3.6 We have been monitoring the development of AMI metering in both the energy and water sector and the benefits smart metering offers, as shown in the table below and further information benefits of smart shown in section 3.2 above.

5.3.7 Our future metering strategy is focused on AMI metering. The plan is to roll out AMI capable meters where the majority of meters will be AMI active from the onset and others can be switched to AMI from AMR mode once a communications network becomes available.

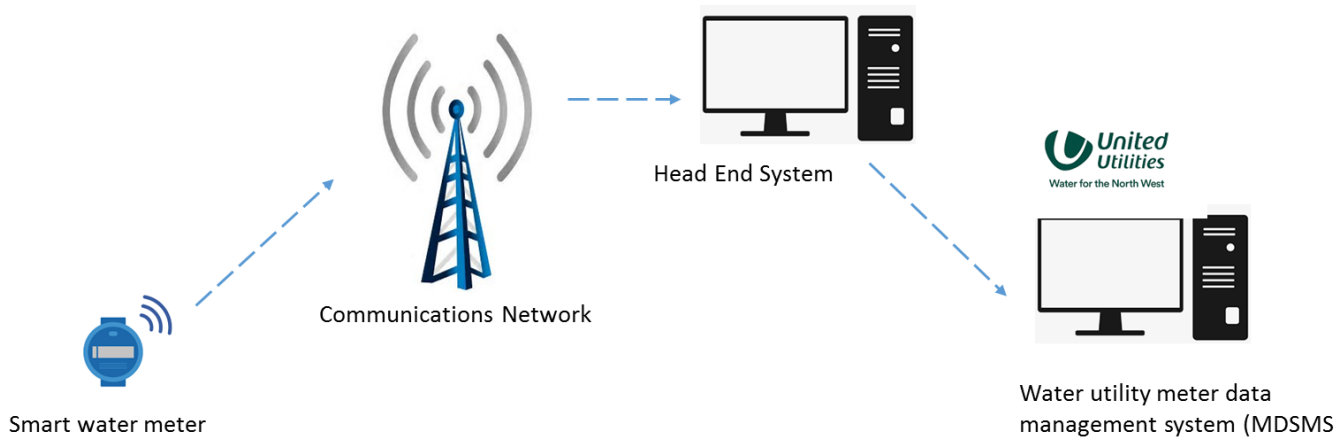
Table 6: Table showing differences by types of meter (basic, AMR & AMI)

	Basic meter	AMR meter	AMI meter
Meter reading	Eyeball reading of physical meter	Walk-by or drive-by close enough to the meter to automatically pick up read on remote device	Reads sent remotely to the utility via a communications network
Frequency of read collections	1-2 times a year	Fortnightly	Daily
Data granularity	Single read	Single bubble up read at time of collection	15mins - Hourly
Asset life	more than 15 years	up to 15 years	up to 15 years
Near real time customer-side-leak alarms	×	×	✓
Network leakage	×	×	✓
Water mass balance	×	×	✓
Tariff innovation	×	×	✓
Targeted water efficiency	×	✓	✓
Customer portal (consumption monitoring)	×	✓	✓

Source: Various

5.3.8 Given the pace of technology development, we recognise that with smart metering, it's not a case of 'one size fits all'. Some technologies will be better suited for certain geographical locations. The image below shows a typical smart metering architecture illustrating how data is transmitted from the smart water meter wirelessly through a communications network (AMI), collected and processed in the head end system and transferred securely to the water utility's meter data management system.

Figure 2: Smart metering architecture



Source: UUW Internal.

5.3.9 Between 2019 and 2022 we undertook proof of concept trials to test Narrowband Internet of Things (NBIoT), a Low Power Wide Area Network (LPWAN) solution in Rialto Gardens and Sandbach with our incumbent supplier Diehl Metering.

5.3.10 We are conducting a large scale smart metering trial using LoRaWAN (Long Range Wide Area Network), a different type of LPWAN, however the purpose of this trial is to establish the detailed requirements encompassing people, processes, data and systems, for UUW to unlock the full value of smart.

5.3.11 We have a good understanding of AMI technologies from the trials as well as knowledge gained through collaboration with industry peers, mainly the early adopters of smart metering. This will enable us to

procure a technology agnostic solution that meets our minimum requirements shown in the table below;

Table 7: Table showing minimum requirements for smart metering solution

Dimension	Requirement
AMI Network	Offers flexibility in choice of metering devices and interoperability among different vendors
AMR	Option to operate in AMR mode if not working in AMI mode without the need to revisit (subject to cost – market to be tested)
Meter	As a minimum is compliant to MID and BS EN ISO4064
Data granularity	Minimum hourly
Data frequency	Daily
Battery life	10-15 years
Data security	Meet UUW data security requirements
Dimensions	Fits in existing boundary boxes/locations
Ease of install	15-20mins for screw in/out replacement and plug and play for AMI connectivity

Source: UUW Smart readiness strategy

5.3.12 With a current meter penetration of less than 50 per cent, for our enhanced metering programme, our roll out strategy will initially prioritise urban areas with low meter penetration, high leakage, high change of occupancy rates and a large number of void properties.

5.3.13 We will continue to revise our strategy in line with technology development, network availability and make decisions at the right time for the most optimal solution for enhanced metering in remote areas. Some of our Free Meter Option (FMO) installations will be in rural areas and our plan is to use AMI capable meters that operate in AMR mode, prior to becoming AMI active.

5.4 Option selection

5.4.1 Our WRMP plan explored a full range of options, including those that seek to reduce the demand for water as well as options for new water supplies, to ensure that our final list is comprehensive and includes options from four categories:

- Resource management: New supply options, including both groundwater and surface water, and abstraction licence trading and imports;
- Production management: Reducing losses on our raw water systems and at our treatment works;
- Customer management: Metering, water efficiency activities and changes to levels of service; and
- Distribution management: Leakage prevention, detection and reduction.

5.4.2 All metering options created for consideration in our WRMP24 involve the installation of AMI meters and provide benefit to leakage and encourage water efficiency

5.4.3 The table below shows the options selected for North Eden (NERZ), Carlisle (CRZ) and the Strategic (SRZ) water resources zones. As a water company in an area not classed as 'water-stressed', there is no capacity to compulsorily bill on a meter that has been installed. Billing can only occur on a meter where customers opt for this, or where a customer has moved into a property with a meter installed. Our metering options are based on proactive metering, which then allows us to bill on meters when customers move house. The water efficiency benefit of these options therefore takes time to grow, while the leakage benefit is immediate.

5.4.4 Achieving 100 per cent metering is difficult for other reasons too. The largest of these reasons is that 22 per cent of properties in the North West are supplied through common supply pipes, making individual meters disruptive and expensive to implement.

5.4.5 Our full metering options currently assume relaying common supply pipes after AMP8 to achieve full metering. This is not considered cost effective, however, we rely on the benefits of this to meet our PCC targets and it is, therefore, selected in our plan. In future, there may be a different more cost effective approach to full metering, but we have built our current options on a present day view of the world.

5.4.6 Some other minor reasons which make 100 per cent metering difficult to achieve are voids and bulk meters, which introduce further complexity to our metering programme.

5.4.7 The options are structured to assume that 'full' metering occurs later in time. For example, the options in the best value preferred plan, selected using ValueStream, achieve full metering by 2049.

5.4.8 The table below shows the best value options selected for out AMP8 programme.

Table 8: Table showing options selected

Option ID	Description	Zone	Number of meters
WR603a	Enhanced metering of households on single supplies (smart meters)	CRZ	21,212
WR603b	Enhanced metering of households on single supplies (smart meters)	NERZ	2,343
WR603e	Enhanced metering of households on single supplies (smart meters)	SRZ	400,575
WR619a	Replace existing household meters with smart meters	CRZ	3,804
WR619b	Replace existing household meters with smart meters	NERZ	469
WR619c	Replace existing household meters with smart meters	SRZ	245,727
WR615a	EMT-CRZ5_Replace existing non-household meters with smart meters	CRZ	4,706
WR615b	EMT-NERZ5_Replace existing non-household meters with smart meters	NERZ	896
WR615c	EMT-SRZ5_Replace existing non-household meters with smart meters	SRZ	164,149
FMO	FMO	All	75,871
NHH Selective	Compulsory commercial installations	All	1,140

Source: WRMP 24.

5.5 Industry collaboration

5.5.1 Smart metering is currently not mandated in the water industry although Defra have made clear their expectations for water companies to install smart meters in their letter to our CEO on 15 March 2023 (Increasing smart metering to manage demand and supply of water). This means water companies are free to use any technical solution they deem fit to support their smart metering roll out.

5.5.2 As more water companies are trialling or rolling out smart meters at scale, there is need to develop and agree a common approach to water smart metering to ensure optimal investment and consistent nationwide benefits for customers.

5.5.3 Introducing national standards for smart metering would ensure a consistent service offering for customers nationally with coordinated investment opportunities by enabling companies to implement localised smart meter roll outs.

5.5.4 While we've fully supported and engaged with industry peers, stakeholders, regulators and suppliers in a variety of ways, we welcome the development of proposals on how to present and standardise data access by the sector.

5.5.5 The activities below demonstrate our willingness to work with industry peers in the development of our smart metering strategy:

- Smart Metering Advisory Group (SMAG), - a platform for sharing best practice and lessons learnt in smart metering, identifying common issues and sharing experiences with suppliers for future product improvements;
- MOSL's Strategic Metering Review, created to define the framework to improve the volume and quality of consumption data available in the market;
- Water UK, as members we attend regular metering focus groups where all things metering are discussed; and
- The UK Water Industry Research (UKWIR), as members we have access to various smart metering research papers and have influence over research topics to be funded each year. We have the opportunity to knowledge share with industry peers.

6. Cost efficiency

6.1 Approach to cost build

6.1.1 Following publication of our Draft WRMP December 2022, we have been reviewing evidence on our proposed Smart Metering investment programme, including conducting a cost benchmarking study with consultants from PwC, considering consultation responses from Ofwat and other regulators, and conducting our own review of other water companies' current and future metering programmes through the Smart Metering Advisory Group (SMAG) and SME input from consultants from Baringa..

6.1.2 We have undertaken the following additional activities in the few months;

- We sent out a Prior Information notice (PIN) out in December 2022 in preparation for the procurement of our smart metering solution for AMP8, to establish market interest and experience in the provision of all or some of the activities that will underpin our smart metering programme; and
- We held workshops with our incumbent suppliers to explore ways in which to make our water network and services more sustainable by future proofing our metering strategy and networks.

6.1.3 We've revised our unit costs from £20.7m per Ml/d of water use reduction in AMP8, in the draft WRMP24 submission, to £9.8m/Ml/d in the revised WRMP24 submission, with a number of changes to our cost and benefit modelling. The most significant of these changes are listed below.

(a) Including NHH meter replacement with Smart meters. We received significant consultation feedback to include NHH smart metering, and additional government guidance on business demand reduction aspirations. Given the aging profile of our meters, we will replace all 170k NHH meters with smart in AMP8;

(b) Accounting for new evidence on the number of customers that will switch to a measured bill, changing to 30% from an initial 20%, driving an increase in the levels of consumption reduction;

(c) We removed the 20% risk allowance (Optimism bias), reflecting increased confidence in our costs, while recognising that this will now be a delivery risk carried by UUW as we go to market for providers of meters and communication network infrastructure and installation contractors;

(d) The WRMP optimisation process no longer selecting options to meter properties with common supply pipes in Carlise WRZ. This option was particularly expensive, as it required full supply pipe renewals (at £2,000 per meter fitted);

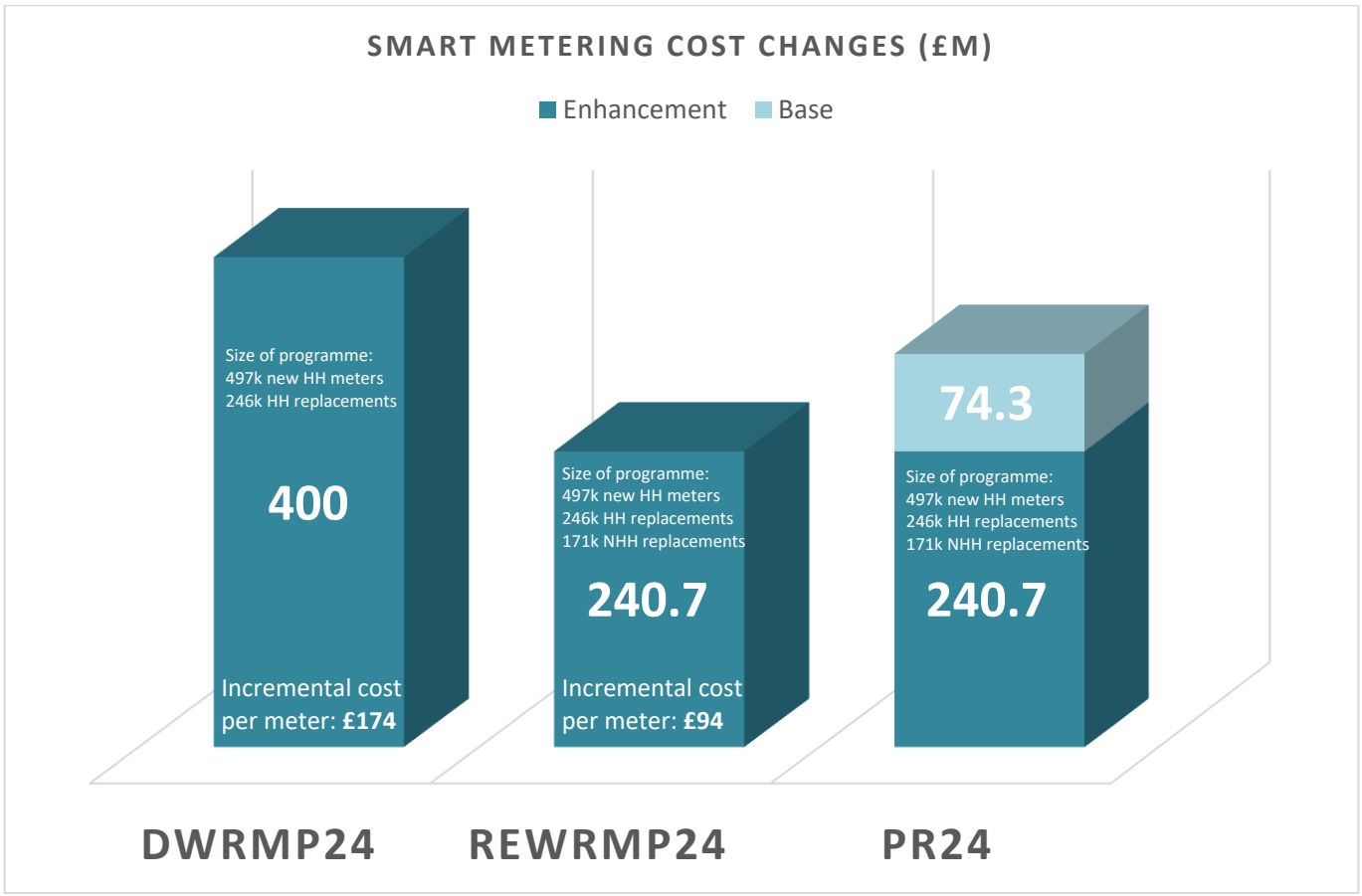
(e) Accounting for new evidence that 10% of our PCC reduction benefit, driven by plumbing losses, can be achieved on meter fitting, regardless of whether the customer chooses to switch to being billed on a measured basis; and

(f) Smart enablement costs (network infrastructure and IT systems) were revised down.

6.1.4 The graphic below shows our proposed costs for smart metering programme delivery, highlighting the change from draft to revised WRMP, aligned with our PR24 plan.

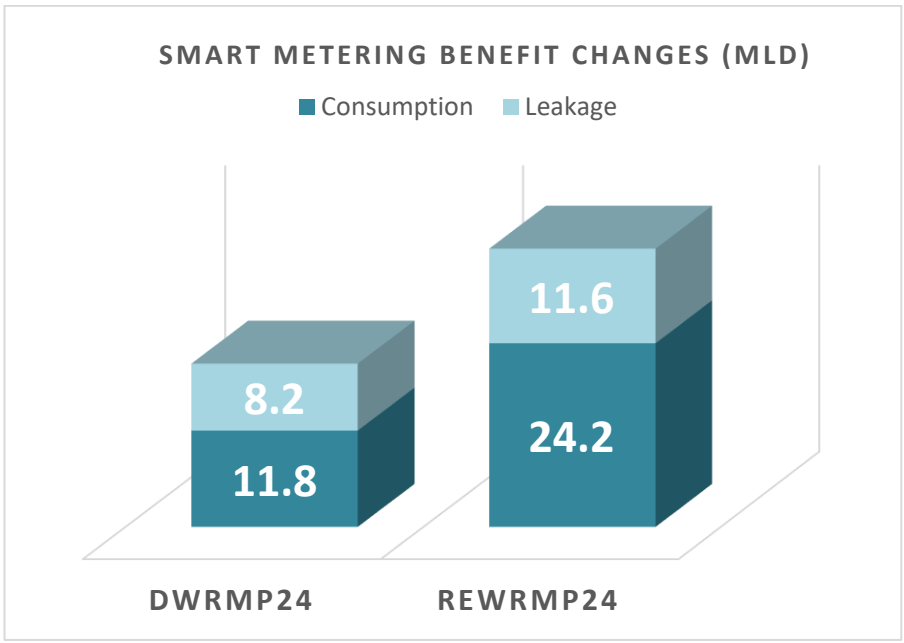
6.1.5 We have calculated that if our metered charging uptake were to increase from 30% to 90%, for example through compulsory metering in line with other companies, our unit cost would drop to £6.9m/Ml/d. This is well ahead of the industry average value of £7.5m/Ml/d cited by Ofwat (in their feedback to our dWRMP24 consultation), further demonstrating that the proposed UUW delivery costs are relatively efficient.

Figure 3: Smart Metering Cost Changes



Source: WRMP24

Figure 4: Smart Metering Benefit Changes



Source: WRMP24

6.1.6 We have worked with our installation partners to determine a realistic cost of installation taking into account efficiencies that come with a proactive programme, allowing for multiple meter installations in a chosen area at a time.

6.1.7 Baringa provided external insight on indicative current market costs for our metering devices and communications network unit rate, over and above basic meter costs.

6.2 Independent review by PwC

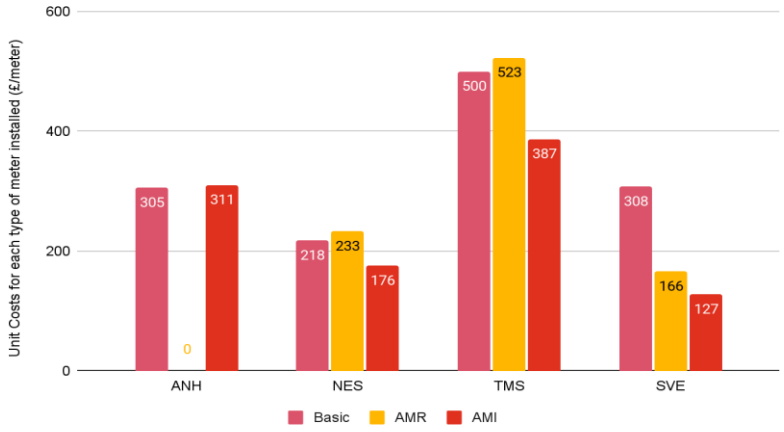
6.2.1 UUW asked PwC to deliver an independent report to support our enhancement case for smart metering. The aims included: Validation of our assumed cost for metering with publicly available data; Provision of an independent opinion whether the metering unit costs are efficient and in line with the wider industry.

6.2.2 Several cost drivers were established, grouped into four main driving forces with the further identification of one main factor driving costs, 'coordination economies'[10].

- Coordination economies – a coordinated roll-out of smart meters is associated with lower unit costs;
- Scale – an important driver of cost is the number of meters to be deployed. We can expect unit costs to decrease as number of meters installed or replaced increases, if the roll-out is coordinated;
- Physical location of meter – The physical location of the meter installation will impact unit costs. Internal installations, while initially cheaper, have the potential to incur extra costs around managing access to customer homes. External installations include digging, installation of a boundary box and reinstatement, and are therefore initially more expensive, but easier to access in future. Companies like us who cannot compulsorily meter domestic customers via our enhanced programme will struggle to install internal meters, leaving us with the more expensive option of external installations;
- Population density – travel time between jobs is a crucial driver of costs, which in itself will depend on the density of the area to be metered. While high density will have a positive impact on reducing unit costs, diseconomies of density may occur due to higher traffic congestion, permit and parking. Density may have an impact on the availability and cost of communications infrastructure; and
- Resource – wages will be a key cost driver. Labour supply shortages and cost of living concerns are likely to push wages up. Regional wage differences may have an impact on unit cost differences between companies.

6.2.3 Companies with large scale roll outs have achieved lower unit costs for installations of AMI and AMR as seen in the table below

Figure 5: Graph showing Meter installation unit costs by meter type (2021/22)



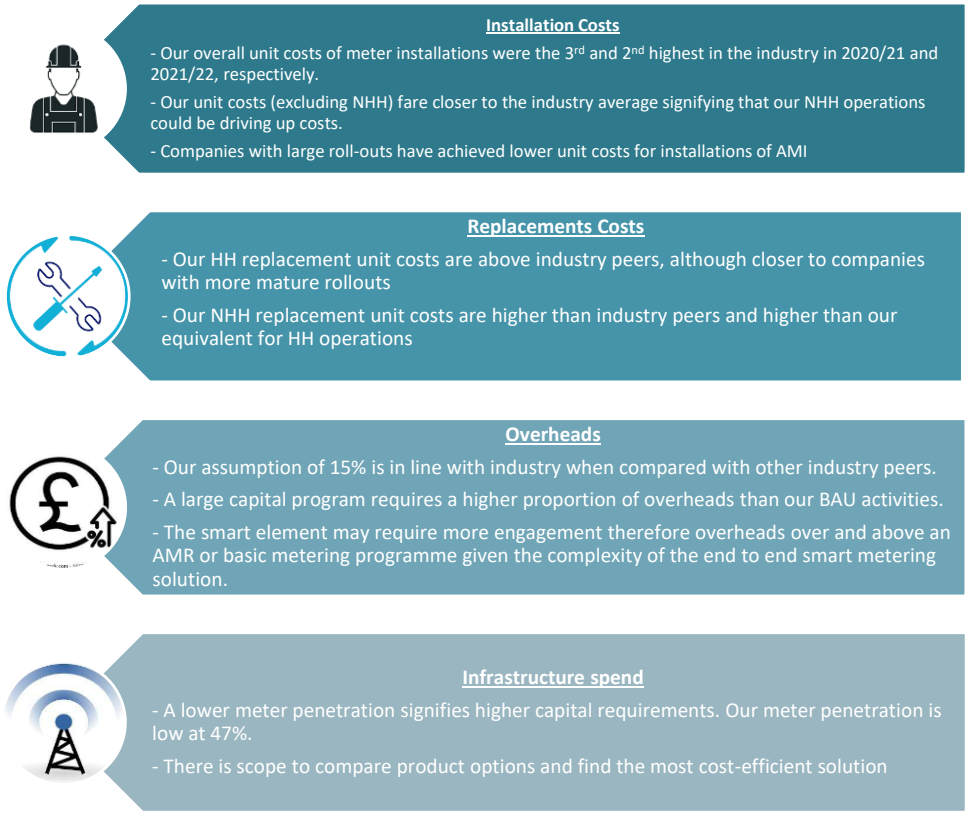
Source: PwC Smart metering costs final report

[10] PwC Report: United Utilities Smart Metering Costs. September 2022.

- Anglian Water has a high meter penetration which has enabled them to pursue a strategy of replacements over new installations allowing them to reach economies of scale with greater ease. They are using Flexnet technology for their communications network provided by Arqiva;
- Northumbrian Water have been installing most meters in existing boundary boxes, installed in prior AMPs under a programme aimed at separating common supply pipes, making current screw in meter installations cheaper. They too are using the Flexnet solution provided by Arqiva;
- Thames Water having been rolling out smart meters since 2015 with large upfront investment in the communications infrastructure (Flexnet) across London; and
- Severn Trent Water have been rolling out smart meters as part of the green recovery scheme, 150k smart meters to be rolled out by 2025. They have targeted a large number of replacements, making for cheaper installations and using the IoT based technology of LoRaWAN provided by Connexin

6.2.4 The independent analysis from PwC concluded the following:

Figure 6: Smart Metering Cost Drivers



Source: PwC Smart metering costs final report

6.3 Metering Expenditure

6.3.1 In order to develop the costs reflected below, we've taken into account our baseline operations for the installation costs. We've worked with our installation partners to determine a realistic cost of installation taking into account efficiencies that come with a proactive programme, allowing for multiple meter installations in a chosen area at a time.

6.3.2 With a large number of installations planned for our enhanced programme, we expect to see the number of FMO applications drop as the enhanced programme will reach some customers who may have requested a meter later. We expect to see the number of reactive replacements drop due to the proactive replacement of end of life meters.

6.3.3 We've been installing AMR meters since 2010, therefore with a battery life of 15 years for AMR meters, AMP8 will see us proactively replace some of our AMR meters, the costs of which are covered in the base programme and have not been included in the enhancement case.

6.3.4 Our enhanced programme of circa 425,000 new meters for existing customers consists of more costly external installations most of which will require ground excavation, a new boundary box and reinstatement. While the option of internal installations would help us to minimise costs, we operate in an area not deemed water stressed and therefore are unable to force customers to accept meters. This would make achieving the scale of rollout required through internal metering highly challenging due to access, as seen through the slow pace of energy smart metering rollout.

6.3.5 The internal installation cost of a new meter is 57% cheaper than an external installation requiring a new boundary box.

6.3.6 The table below shows the expected work mix by type for metering our existing customers for the first time.

Table 9: Metering Installation Fit Type

Fit type of new installations for existing customers	
FMO - Internal %	38.0%
FMO - External (Existing box)	11.6%
FMO - External (New box)	50.4%
Enhanced Carlisle - External (Existing box)	6.2%
Enhanced Carlisle - External (New box)	93.8%
Enhanced Carlisle - External (New Pipework)	0.0%
Enhanced Strategic - External (Existing box)	6.2%
Enhanced Strategic - External (New box)	93.8%

Source: Enhancement Metering Unit Cost Model v10.0

6.3.7 The following cost were used as inputs to determine our meter unit rates with the cost of an AMI meter ranging between £41 and £66 depending on the technology implemented.

Table 10: Smart metering Unit rates

Unit rates (FY23 Prices)	
HH AMI meter cost - (£)	£41 - £66
HH proactive fit cost - new box (£)	£268.83
HH proactive - external fit + new pipework (£)	£2,000.00
Proactive Exchange (Household) - existing basic	40%
Proactive Exchange (Household) - existing AMR	60%

Source: Enhancement Metering Unit Cost Model v10.0

Table 11: Smart Metering Enablement Costs

Infrastructure Cost

	FY26	FY27	FY28	FY29	FY30
Infrastructure - Total	9,666,000	6,611,000	3,141,000	3,141,000	3,141,000

Opex

Opex cost per new AMI meter - (£)	£4 - £5

NHH meter costs for AMI

	AMI METER SIZE	Lowest	Highest
NHH meter cost – (£)	15mm	£41.82	£66.82
NHH meter cost – (£)	400mm	£2,456.72	£2,481.72

Source: Enhancement Metering Unit Cost Model v10.0

6.3.8 For infrastructure costs, we've assumed 20% of the total cost for smart enablement is on capex, 25% on SaaS (software as a service) spent in the first two years of AMP8 and 55% on opex.

6.3.9 We've assumed meter reading costs will be between £4 and £5 depending on AMI technology.

Table 12: Smart Metering Totex (Post Efficiency)

PR24 Analysis - Enhancement

	COST					
	FY26	FY27	FY28	FY29	FY30	AMP8
Total Enhancement Cost	47,416,000	44,361,000	40,895,000	40,899,000	39,904,000	228,775,000
Total Enhancement Cost - Opex	792,845	1,586,706	2,381,566	3,177,405	3,974,194	11,913,000

PR24 Analysis - Base

I th	COST					
	FY26	FY27	FY28	FY29	FY30	AMP8
Total Base Cost	15,337,166	15,095,492	14,864,525	14,646,177	14,428,996	74,372,356
						315,059,803

PR24 Analysis - Enhancement

	VOLUME					
	FY26	FY27	FY28	FY29	FY30	AMP8
Total Enhancement Volume	182,216	182,819	182,778	182,476	182,068	811,950

PR24 Analysis - Base

	VOLUME					
	FY26	FY27	FY28	FY29	FY30	AMP8
Total Base Volume	83,957	83,951	83,948	83,948	83,948	419,751

Source: Enhancement Metering Unit Cost Model v10.0

6.3.10 Due to inherent nature of enhancement and base funding of some of the replacement meters, the total volume shown for enhancement is 811 950 meters of the total 920 891 meter installations for AMP8.

6.3.11 The total base volume is for the total number of meters being replaced regardless of whether they have an enhancement element or not is 419 751 of the total 920 891.

6.4 Approach to challenging our assumptions

Independent review: PwC

6.4.1 In June 2022, UUW asked PwC to deliver an independent report to support our enhancement case for smart metering. The aim was to :

- Validate our assumed cost for metering with publicly available data;
- Conduct research of smart metering cost items for water companies installing smart meters;
- Articulate a range of variables that contribute to the overall unit cost of metering; and
- Provide an independent opinion whether the metering unit costs are efficient and in line with the wider industry.

6.4.2 In the final report issued September 2022, 14 cost drivers were established, grouped into four main driving forces with the further identification of one main factor driving costs, 'economies of coordination'[11].

- Scale of programme, i.e. number of meters;
- Population density of area of operation;
- Resources, cost of labour and regional wage differentials; and
- Physical location of meter with new external installations for existing customers require costly digs, boundary box installation and pavement reinstatement

6.4.3 The independent analysis from PwC concluded that

- Selective metering is the most feasible pathway for UUW to realise economies of scale, with ODI leakage incentives to counterbalance the financial impact of unmeasured billing customers;
- There may be scope for at least 20% reduction in unit costs (vs draftWRMP24) through a coordinated roll-out of smart meters;
- Other cost drivers will be outside of management control for example, pressures on the supply of material inputs and labour; and
- UUW can expect a higher infrastructure spend relative to other players with higher meter penetration rates; however, intensified competition between communications providers could lead to lower unit costs vs previous rollouts.

[11] PwC Report: United Utilities Smart Metering Costs. September 2022.

6.5 Cost Benefit Analysis

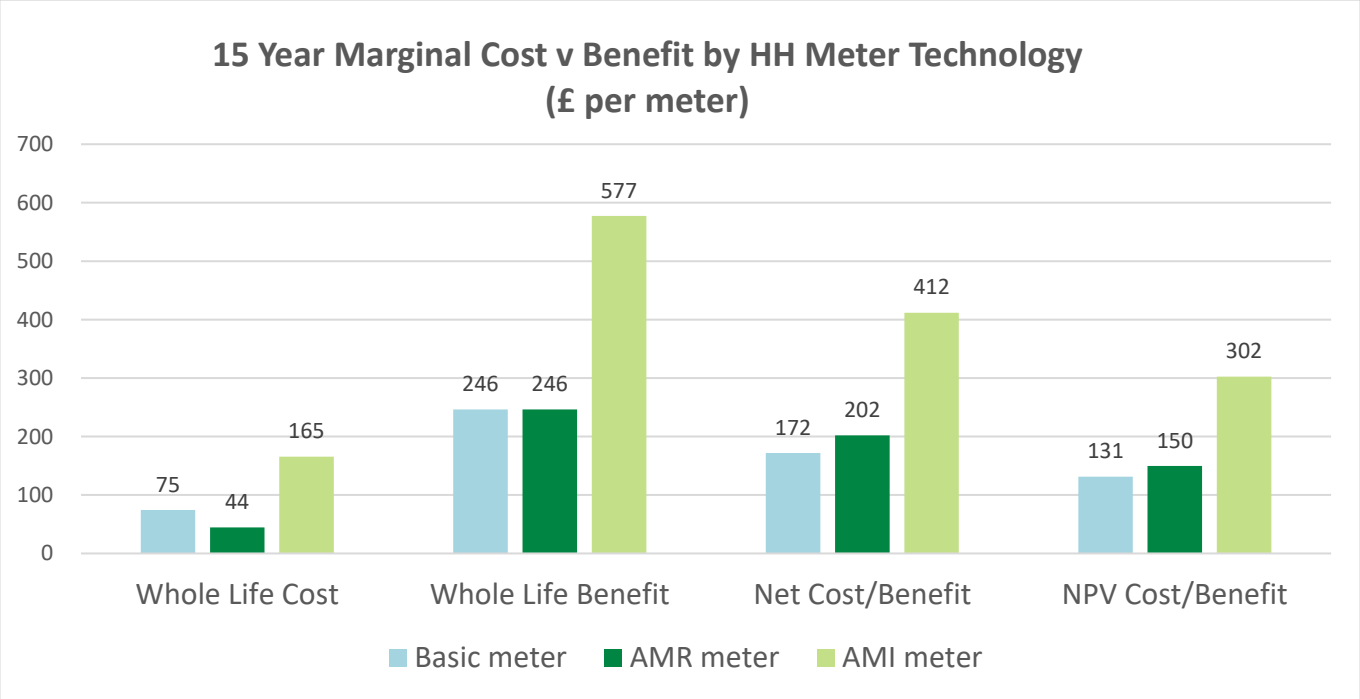
6.5.1 We have carried out a cost benefit analysis to determine if AMI metering offers value for money compared with traditional (basic) and AMR metering. While smart metering come at a higher cost, our analysis has shown a clear positive benefit cost ratio for smart AMI metering compared to other meter types.

6.5.2 We used cost of meter by technology excluding the installation costs and overheads. We included IT system upgrade costs though for AMI metering as well as cost of smart infrastructure for smart enablement

6.5.3 The benefits considered in our analysis were consumption, leakage and water production reduction with a 15 year meter asset life. We used Ofwat's latest PCC and leakage incentive rates for AMP8.

6.5.4 While there's an additional unassessed positive benefit from void management and affordability support, the graph below is highly demonstrative of AMI technology being the most beneficial choice.

Figure 7: Table showing CBA for by meter technology



Source: WRMP24 Demand Options Model

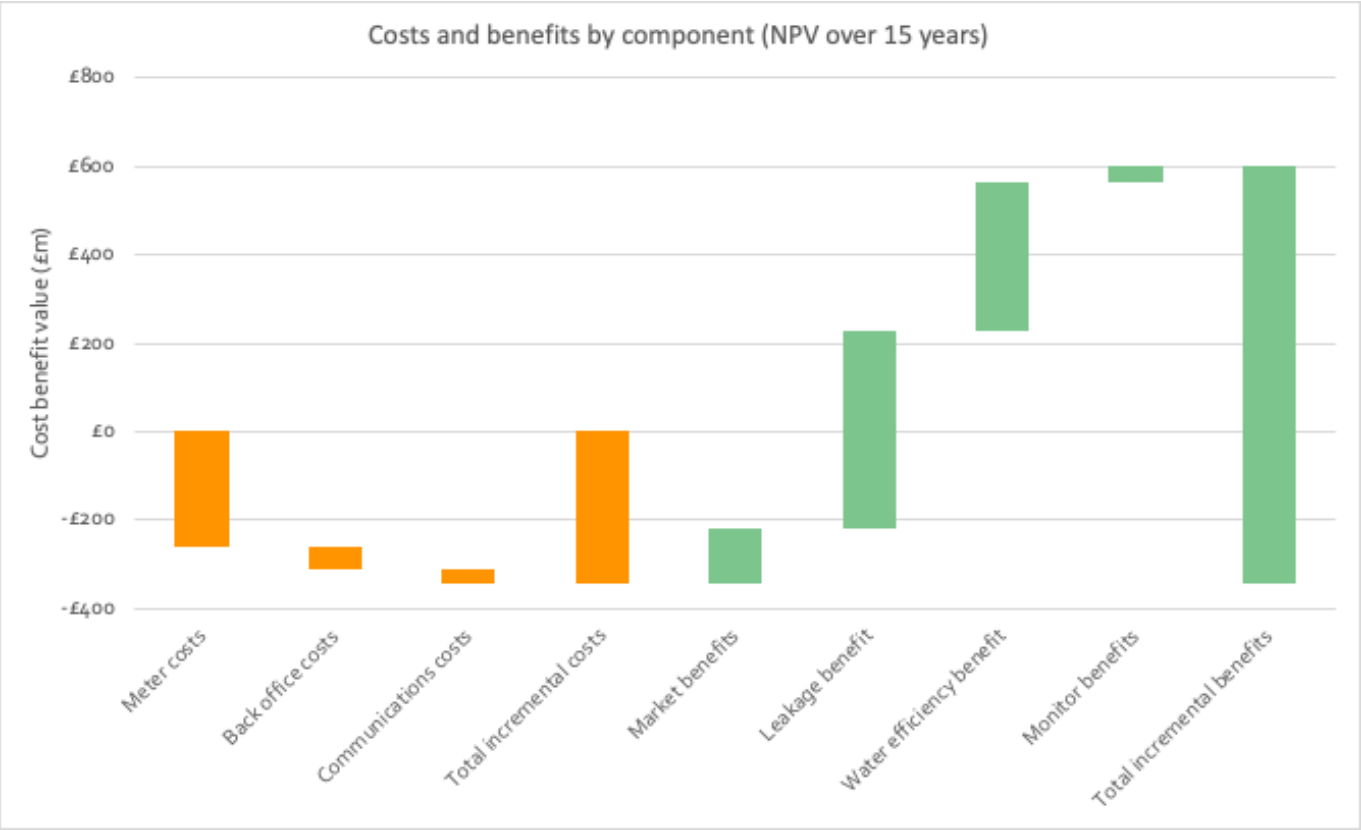
6.6 MOSL Business Case for smart metering NHH Customers

6.6.1 According to MOSL's report12, a third of the country's water is consumed by NHH customers, with 1% of them consuming nearly half. This presents an opportunity for water efficiency savings, thereby having a positive impact on the environment

6.6.2 MOSL/Artesia have developed a wide ranging cost benefit case for upgrading non-household meters. This case considered holistic benefits for non-household meter upgrades. When considering these wider holistic benefits alongside the latest UU meter upgrade costs we observe a net positive CBA meaning the value of benefits outweighs the investment required.

[12] MOSL Report: A strategy for enhanced metering

Figure 8: Smart metering costs and benefits analysis



Source: MOSL report

6.7 Third party assurance of our cost estimates

6.7.1 We commissioned a specific piece of third party work to assure the cost efficiency of our enhancement cases: A bottom-up benchmarking exercise (Faithful and Gould).

6.7.2 We consider that the independent output of these pieces of work demonstrates that our cost estimates are efficient and represent excellent value for money for our customers.

6.7.3 We provide a description below:

Appendix A Bottom-up benchmarking (Faithful and Gould)

6.7.4 Faithful and Gould undertook a bottom-up deep dive into the cost efficiency of our enhancement cases. This involved a close examination of our cost base relating to a sample of our plan, with comparisons made to similar activity carried out by third party companies across a variety of sectors.

6.7.5 F&G looked at our direct costs across each of the following categories:

- Staff including site supervision;
- Mobilisation and site set up, running and removal of site offices and welfare;
- Temporary services for general site use, such as water to wash out concrete skips;
- Attendant plant and equipment, such as cranes, forklift for unloading deliveries, etc;
- Attendant labour, defined as hourly paid operatives not involved in productive works;
- Site consumables, such as waste skips;
- Set-up site compounds, erecting hoardings, etc;
- O&M manuals; and
- Health and safety.

6.7.6 It also looked at the contractor's indirect costs (e.g. overhead and design costs) and UUW's indirect costs (e.g. land acquisition costs). Due to the size of the programme, F&G examined a sample of our enhancement cases. However, this sample included projects from each of our enhancement categories and covered £1.246bn of expenditure.

6.7.7 F&G noted the effectiveness of UUW's cost estimation process:

"In addition to the benchmarking data held by Faithful+Gould we understand that UUW has applied multiple internal and external challenges to progressively refine the cost estimation undertaken to date. In particular we note UUW's use of its Investment Programme Estimating System (IPES) which is a bespoke parametric estimating tool containing data from AMP3 to AMP7, to provide historical cost curves alongside estimated data from third party organisations."

6.7.8 F&G found that our proposed costs are in line with rates typically seen across the industry:

"Overall, UUW's approach of utilising historic cost curves, market testing and obtaining specialist third party quotations demonstrates a sound proactive approach to cost planning. In total £1.2bn of schemes underwent targeted cost assessment with £573m making up the construction works element.

After presenting our initial findings it was encouraging to see UUW's commitment to addressing our findings and applying these to the wider enhancement estimates, charting a strategic route towards greater efficiency and scope clarification.

In light of this Cost Assurance work and evidence of UUW's responsive actions we have concluded that the data we have benchmarked is within a reasonable alignment with anticipated market rates."

7. Customer protection

7.1 Introduction

7.1.1 It is important that customers have confidence that we will deliver the enhancement schemes that get reflected in our PR24 final determinations and they are suitably protected in the event of non-delivery, or if there are material changes to deliverables (including changes to dates), which leads to a change in cost (including changes in the timing of required expenditure). Ofwat proposes that, if companies fail to deliver or are late delivering improvements to customers, then price control deliverables (PCDs) should, where appropriate, be used to compensate customers. In our PR24 *Chapter 8 – Delivering at Efficient Cost, section 8.8.9* we have proposed an approach to PCDs that aims to provide customer protection, such that customers are fairly compensated for non-delivery (such as due to a change in regulatory requirements) or late delivery (including as a result of a change to a regulatory date), between PCDs, any related ODI underperformance payments, and cost sharing arrangements.

7.2 Price control deliverable

Table 13: PCD summary

Scheme delivery expectations	
Description of deliverable	Installation of 920,891 AMI (Advanced Metering Infrastructure) capable meters – Capable of recording hourly consumption and transmitting data daily. Includes new meters for existing customers and replacements of existing meters. Also will deliver a shared smart meter IT support infrastructure, enabling daily metering data to be captured, stored, and made available for billing and operational uses by March 31st 2030. Costs for PCD unit rates include meter purchase, meter fitting, meter commissioning and communications infrastructure. The costs for shared smart meter IT support infrastructure are excluded on the basis that these costs are independent of number of meters installed.
Output measurement and reporting	Delivery of AMI meters in line with profile at final WRMP24 and PR24 - but structured as cumulative to allow flexibility and to mitigate against the risk of factors beyond our control, which may impact on timing of delivery. Delivery of meters will be monitored and delivered through the APR (Annual Performance Reporting) process
Assurance	Meter installation volumes by technology type reported as part of Annual Performance Reporting (APR). Established reporting requirements, assurance and governance processes for the APR will be followed.
Conditions on scheme	Delivery conditional on provision of a shared smart meter IT support infrastructure, enabling daily metering data to be captured, stored, and made available for billing and operational uses by March 31st 2030.
Impact on PCs	PCC: incentive rate = £2,569,662 per l/p/d. 2030 PCC benefit from new meters (including FMO) = 1.55 l/p/d (501k meters). 2030 PCC benefit from replacement meters = 0.70 l/p/d (420k meters). Weighted average ODI impact = £6.29 per meter. Leakage: incentive rate = £364,886 per Ml/d. 2030 leakage benefit from meters = 11.56 Ml/d (921k meters). Average ODI impact = £4.58 per meter. Total = £10.87 per meter.

7.2.1 In our PCD template *UUW32-PCD Excel Sheet* we have assumed a wholesale WACC of 3.23%, in line with Ofwat's guidance. We have assumed a 50% totex cost sharing rate, which is applied before calculating PCDs. We have applied a further 50% for Bioresources (where applicable), to ensure that only 25% of Bioresources totex is at risk from PCDs, given the lack of RCV guarantee, and general uncertainty in cost recovery from future Bioresources price controls. For late delivery we have applied a proportionate value of annual opex, and assumed 3.5% of capex, which provides a fair reflection of the time value of money of any related deferred capital spend.

Table 14: PCD delivery profile

	Unit	AMP8	2024	2025	2026	2027	2028	2029	2030	Ultimate delivery
Cumulative delivery target for PCD	**meters**		**-**	**-**	**4,184**	**368,363**	**552,539**	**736,715**	**920,891**	**920,891**
AMP8 Capex (22/23 pb)	£	187,774,731	-	-	37,749,625	37,750,083	37,754,222	37,758,359	36,762,442	
AMP8 Opex (22/23 pb)	£	11,912,716	-	-	792,845	1,586,706	2,381,566	3,177,405	3,974,194	
ODI impact per unit of PCD volume	£/meters	10.87								

Table 15: Price Control Allocation

Price Control	Unit	Price Control Allocation
Water resources	%	0.00%
Water network+	%	100.00%
Wastewater Network+	%	0.00%
Bioresources	%	0.00%

Table 16: PCD Incentive rates

	Unit	WR	WN+	WwN+	BR
Overall delivery	£/meters	0	98	0	0
Time value rate	£/meters	0	3	0	0
Late delivery	£/meters	0	3	0	0

United Utilities Water Limited
Haweswater House
Lingley Mere Business Park
Lingley Green Avenue
Great Sankey
Warrington
WA5 3LP

unitedutilities.com

United Utilities

Water for the North West

UUW61

Leakage

October 2023

Enhancement Case 7

United Utilities

Water for the North West

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1. Enhancement submission

<table>
<tr><th colspan="2">Enhancement submission</th></tr>
<tr><td>Title:</td><td>Leakage</td></tr>
<tr><td>Price Control:</td><td>100% Water Network Plus</td></tr>
<tr><td>Enhancement headline:</td><td>This enhancement will deliver leakage reductions to help secure longer term water resources resilience. The focus is on water infrastructure renewal as the “best value” solution to deliver leakage reductions that can be maintained to achieve our ambition to halve leakage levels by 2050.</td></tr>
<tr><td>Enhancement expenditure
(FY23 prices)</td><td>
<table>
<tr><th></th><th>AMP8 Capex inc TI (£m)</th><th>AMP8 Opex (£m)</th><th>AMP8 Totex (£m)</th></tr>
<tr><td>Pre RPE and Frontier Shift</td><td>148.070</td><td>-</td><td>148.070</td></tr>
<tr><td>Post RPE and Frontier Shift</td><td>144.297</td><td>-</td><td>144.297</td></tr>
</table>

The table above shows the total expenditure, inclusive of accelerated programme and transitional investment, on both a pre-efficiency (i.e. pre frontier shift and real price effects basis, consistent with the cost data tables), and a post efficiency and RPE basis (i.e. consistent with the value we propose to be recovered from price controls). All numbers referenced hereafter in this enhancement case are on a post efficiency and RPE basis.
</td></tr>
<tr><td>This case aligns to :</td><td>Water Resources Management Plan 2024 (WRMP24). For full reconciliation between enhancement costs and data table lines, see enhancement mapping tabs in UUW117 – Project allocations CW3 and CWW3</td></tr>
<tr><td>PCD</td><td>Applies</td></tr>
</table>

2. Enhancement case summary

Gate	Summary	Location reference
Need for enhancement investment	• Having listened to customer and stakeholder views, we are proposing a further sustained leakage reduction in the period from 2025-26 to 2029-30. • Reducing leakage and overall water demand is critical to securing water resources resilience, as assessed for our Water Resources Management Plan 2024. We are aiming to deliver the long-term and interim leakage targets set out in the Environment Improvement Plan 2023[1]. • Investing in targeted mains renewal, instead of increasing delivery of active leakage control (ALC) of "find and fix", is a long-term solution that will lead to reductions in the leakage natural rate of rise (NRR) over time. • Mains renewal forms part of our strategy to improve resilience including to supply interruptions, low pressure mains bursts and leakage. It will improve the overall base asset health of the network.	4.1 4.2
Best option for customers	• In developing our strategy, and aligned to our Water Resources Management Plan 2024 framework, we have completed an extensive options identification, development and appraisal process. • A number of options to operate more efficiently have been incorporated into our base programme. • The interventions proposed in this enhancement case were selected as the "best value" to deliver enhancements for customers.	5.2 5.3
Cost efficiency	• Our Water Resources Management Plan 2024 has been subject to extensive governance and assurance, including third party appraisals of options by Wood PLC and Jacobs. • The duration threshold for supply interruptions associated with planned works related to this enhancement case will be extended to 8 hours. This allows the programme to be delivered using innovative methods providing cost and time efficiencies for the programme.	6.4 and 6.5
Customer protection	• Our leakage performance commitment, and associated outperformance and underperformance payments, will incentivise efficient and effective delivery. • We also propose a price control deliverable (PCD) to protect customers.	7.1 7.2

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf

3. Introduction

3.1.1 This document sets out an enhancement case of £144.297m to allow UUW to undertake a targeted regional water infrastructure renewal programme across the North West to achieve leakage reductions, aligned to our Water Resources Management Plan 2024.

3.1.2 Over AMP8 (2025-26 to 2029-30), we plan to reduce leakage by 50 megalitres per day (Ml/d) – this will equate to a 23.8% leakage reduction from 2019-20 leakage levels (using three-year average leakage).

3.1.3 This will be delivered through our base programme (delivering a 1.8 Ml/d leakage reduction), a separate smart metering enhancement (delivering an 11.6 Ml/d leakage reduction) and this leakage enhancement.

3.1.4 The leakage enhancement will target and deliver renewal of 641km of water mains, as well as delivering network optimisation, to reduce leakage by 36.6 Ml/d in AMP8. The "best value" leakage reduction options have been selected via our Water Resources Management Plan 2024 decision making framework.

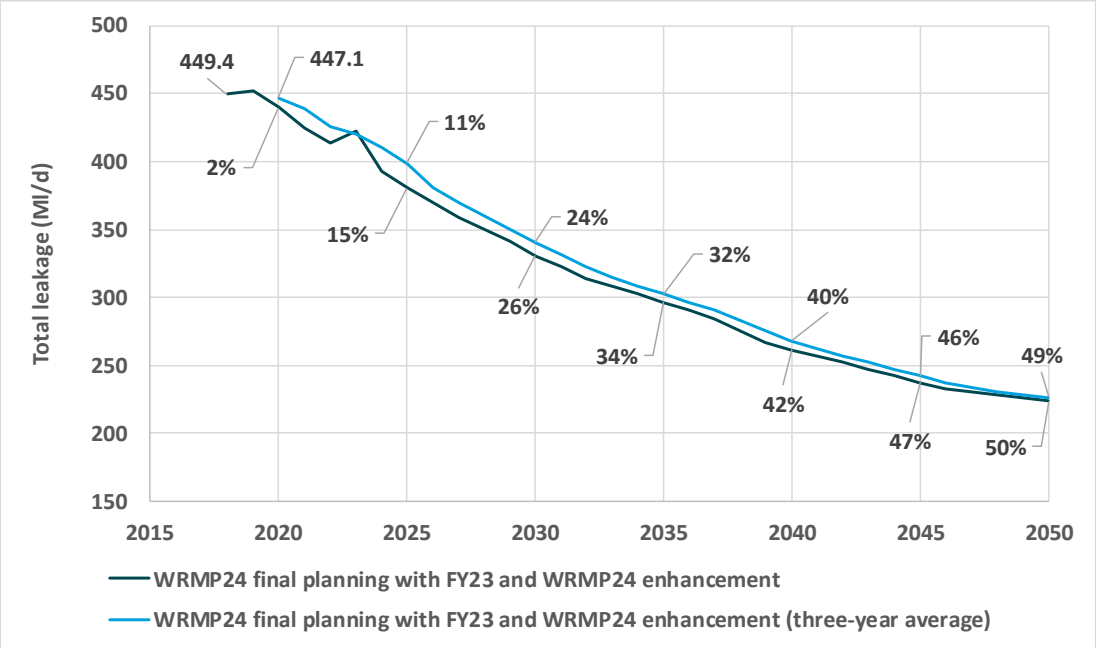
3.1.5 The need to safeguard water resources resilience, combined with strong support from customers for an enhanced level of service, means that we are proposing significant investment to achieve another sustained reduction in leakage.

3.1.6 Building on the work over the past 5 years, we have identified a number of opportunities to deliver a better service for customers as part of base service costs. However, to deliver the stretching performance, it is critical that we increase investment in water infrastructure renewal.

3.1.7 Whilst our water mains renewal rate since 2015-16 has been lower than other companies, we have still achieved service improvements via network monitoring (e.g. network sensors) and optimisation (e.g. large-scale pressure management, with remote capability), as well as investments in asset resilience (e.g. our service reservoir programme). However, to drive leakage reductions that can be sustained in the longer term, a balanced strategy that includes mains renewal is required.

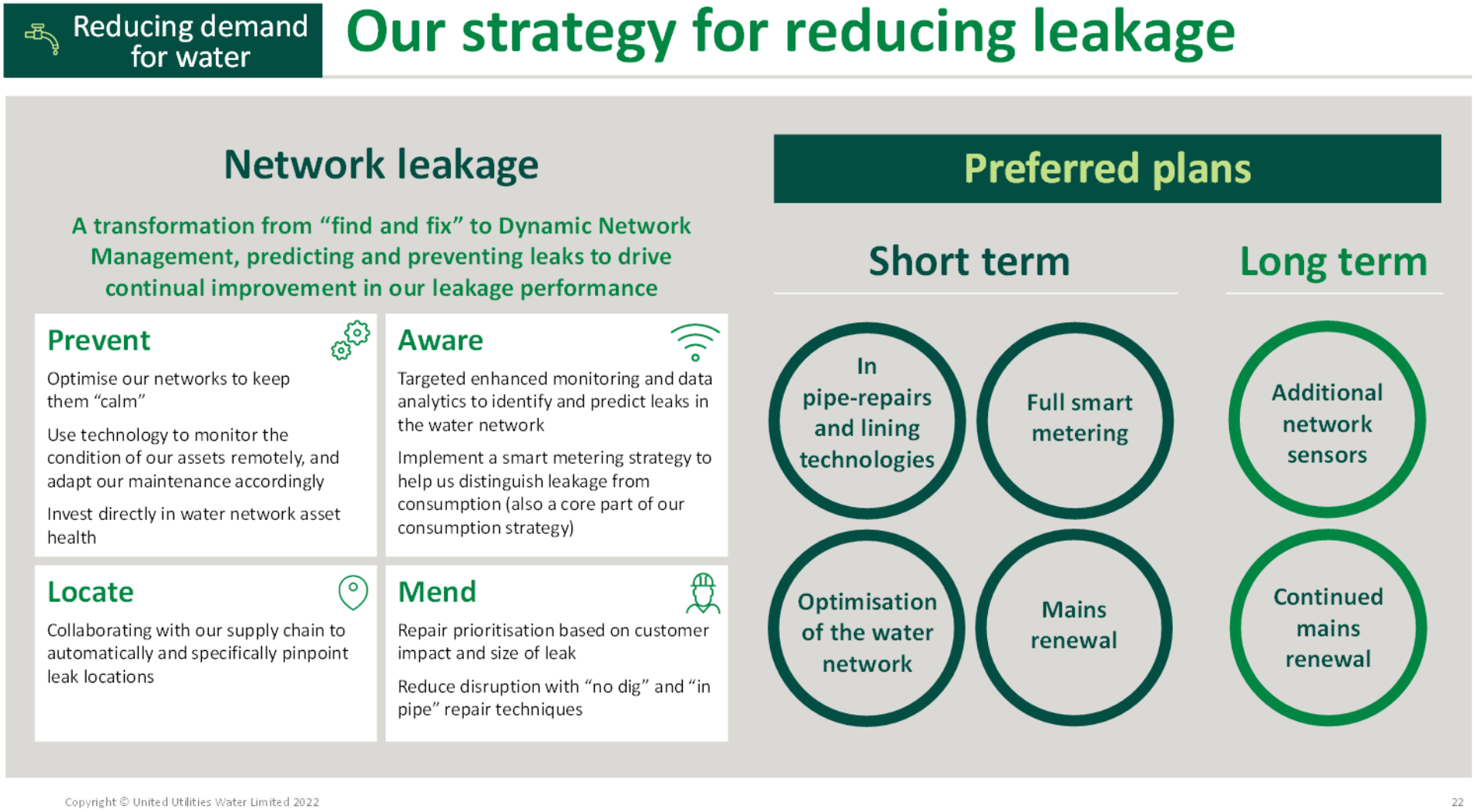
3.1.8 Figure 1 below shows our planned leakage reductions to 2050 and Figure 2 overleaf shows a summary of our overarching strategy to reduce leakage.

Figure 1: Planned leakage reductions to 2050 (annual and three-year average)



Source: Data from our Water Resources Management Plan 2024 (WRMP24) updated with reported data for 2022-23 from our annual performance report (APR)

Figure 2: A summary of our overarching strategy to reduce leakage



Source: UUW visual representation of our strategy for reducing leakage

4. Need for enhancement investment

4.1 Customer and stakeholder support

4.1.1 The desire for a step change in leakage levels is a consistent theme across our conversations with customers. They tell us that a further reduction is a key way they want us to reduce demand for water, lessen environmental impacts and work more efficiently.

4.1.2 Water is a vital but limited natural resource. The pressures of population growth, climate change and environmental considerations mean that it's now more important than ever to plan how we will manage water resources. Leakage is a fundamental component of the supply-demand balance, and in our Water Resources Management Plan 2024 (WRMP24) we highlight the key role leakage management has in our plan to reduce demand. As shown in Figure 3, in the context of water resources planning, the top 2 customer priorities relate to reducing demand for water – promoting water efficiency and tackling leakage and water losses.

Figure 3: Customers' ranked priorities based on immersive research for our WRMP24, April 2021

Ranked priorities (WRMP)	% RANKING 1ST	% RANKING IN TOP 3	% RANKING IN TOP 5
Promoting water efficiency	19%	61%	75%
Leakage and water losses	28%	42%	69%
Water meters	8%	56%	58%
Managing the land to improve water quality	6%	17%	53%
Reusing water	17%	33%	53%
Increasing capacity	6%	25%	47%
Fees, Tariffs and charges	3%	14%	31%
Taking water from surface waters	3%	6%	28%
Transferring water from other areas	0%	8%	25%
Taking water from the sea	3%	11%	14%
Taking water from underground	0%	6%	14%
Drought permits and orders	3%	11%	14%
License trading	6%	6%	14%
Receiving alternative water supplies in drought	0%	6%	6%

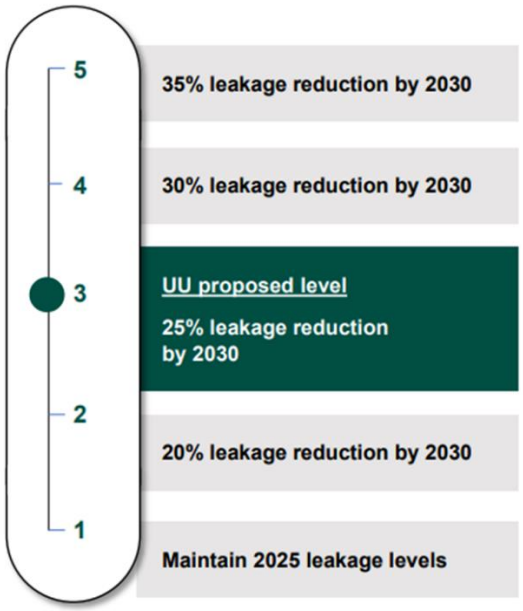
Source: InSites consulting on behalf of United Utilities, WRMP & DWMP Immersive Options Testing[2], April 2021

4.1.3 The specific customer and stakeholder engagement that underpins this plan establishes that there is very strong support for leakage reduction. However, it also revealed a fine balance between the customer valuation of leakage reductions and the associated costs of making these improvements.

4.1.4 In our Water Resources Management Plan Acceptability Testing, customers were presented with various choices for reducing leakage, as shown in Figure 4.

[2] https://www.unitedutilities.com/corporate/about-us/our-future-plans/listening-to-our-customers/insight-and-research-library#immersiveoptionstesting

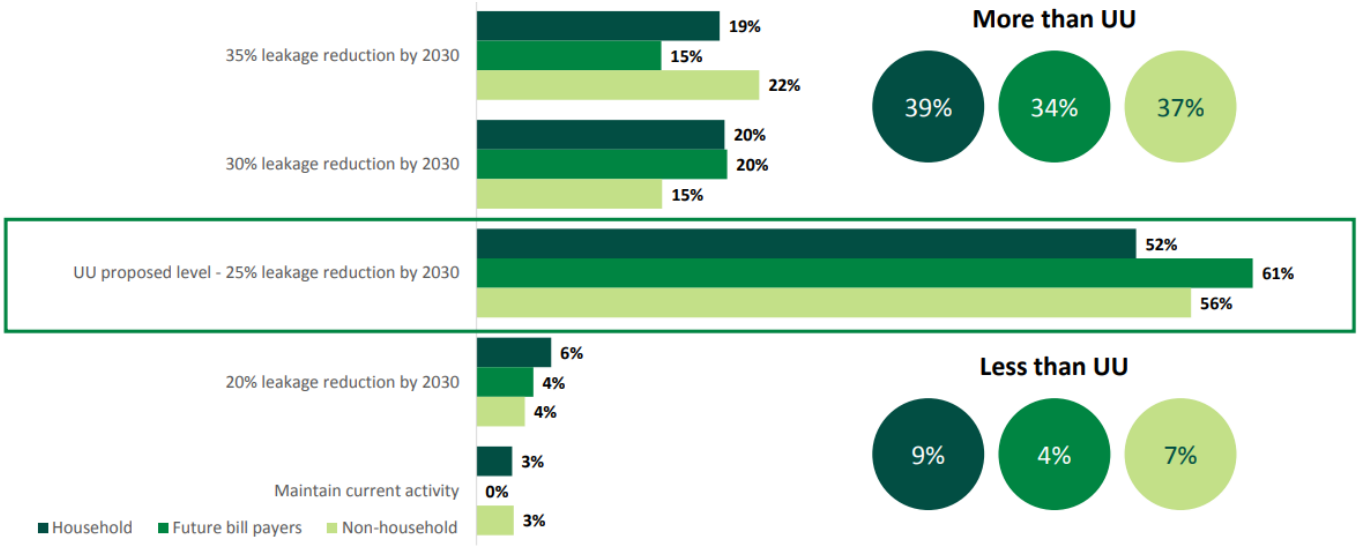
Figure 4: Customer choices for leakage reduction by 2030 in WRMP24 Preferred Plan Acceptability Testing



Source: Water Resources Management Plan Acceptability Testing presentation

4.1.5 As shown in Figure 5, customers generally supported the UUW proposed level of leakage reduction to 2030.

Figure 5: Customer preference for UUW's proposed level of service across all seven categories.



Source: DJS Research on behalf of United Utilities, Water Resources Management Plan Acceptability Testing, 2022

4.1.6 Alongside strong customer support within our region, this is a significant national issue. The National Infrastructure Commission highlighted reducing leakage and a national transfer network as two of their three actions needed to assure a long-term water supply[3].

4.2 Maintaining and reducing leakage

4.2.1 As shown in Table 1, significant expenditure is required to maintain leakage levels and offset the leakage natural rate of rise (NRR), especially following severe weather events (such as the severe freeze-thaw events in March 2018 and December 2022).

[3] https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf

Table 1: Expenditure to maintain and reduce leakage (£m)

FY 22/23 prices	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Maintain expenditure	80.8	97.7	94.8	93.0	87.6	99.9
Reduce expenditure	1.4	2.4	25.8	14.1	16.3	9.4
Total leakage expenditure	**82.1**	**100.2**	**120.6**	**107.1**	**103.9**	**109.3**

Source: UUW Leakage data request submission - April 2022 (with UUW inflation adjustments to present the figures in 2022-23 prices) and data from PR24 table CW19)

4.2.2 It is clear that base expenditure should allow companies to maintain leakage levels. However, as set out by the Competition and Markets Authority in the 2019 price review redeterminations[4], there is likely to be additional cost associated with achieving a step change in leakage reduction. Therefore, to deliver a substantial step change in leakage in a sustainable and "best value" way (e.g. via targeted mains renewal), rather than a "least cost" way, is likely to require investment above base expenditure.

4.2.3 We also note that the final methodology[5] for PR24 states that, at PR19, companies were funded based on plans to renew 0.4% of water mains per year. Our strategy to date has focused on additional strategies to achieve network resilience and performance improvement with lower renewal rates. This includes widespread pressure management including the ability to optimise over 700 pressure areas remotely, development of the Integrated Control Centre (ICC) to enable remote monitoring, control and proactive interventions on the water network, delivery of service reservoir refurbishment programme to improve supply resilience.

[4] https://www.gov.uk/cma-cases/ofwat-price-determinations#main-party-final-submissions

[5] https://www.ofwat.gov.uk/regulated-companies/price-review/2024-price-review/final-methodology/

5. Best option for customers

5.1.1 Our approach to delivering best value is robust and consistent across all of our enhancement cases. Our approach uses a rich mix of metrics to help us drive value and efficiency in developing our business plan. Consistency of the approach is driven through our PR24 Value Tool which allows us to quantify and value environmental and social benefits, costs and risks. For more detail on this approach please see supplementary document *UUW45 – Our approach to deliver best value totex*.

5.2 Options identification and development

5.2.1 We have considered, and will employ, many different leakage management options as part of our base maintenance expenditure. Examples include:

- Dynamic Network Management (DNM): Building on the additional network sensors we installed in our water network in AMP6 and AMP7, and incorporating the learnings from our wastewater dynamic network management (DNM) deployment, water DNM will be transformative to the way we operate and manage our water network. Predictive analytics applied to the vast amount of data we have on our water network will support improved leakage detection targeting and a resulting efficiency.
- Reducing strains on our networks: We have a strong record of managing pressures to reduce leakage and bursts. We will also continue to train our operators and other authorised network users in 'Calm Network' techniques that reduce pressure shockwaves/transients.
- Event recognition and localisation: Through a Knowledge Transfer Partnership with Exeter University we developed an event recognition system for water networks called ERWAN. An Engineering Doctorate project with Exeter University is now developing algorithms that use pressure data to locate leaks within areas.
- Network sensors and sniffer dogs: We have used these innovative techniques in the current period to find leaks faster and gain additional insights into water network operation – we will continue to incorporate the learnings to optimise how we use these techniques in the period from 2025-26 to 2029-30.
- Repair and maintenance (R&M) contract: When we find leaks, it is crucial that we fix them quickly and economically with minimal disruption. Our market testing approach has identified new approaches to work more efficiently with the supply chain.

5.2.2 These options give us exciting opportunities to deliver a better service for customers within our base programme. However, as discussed above, to deliver the stretching performance it is critical that we develop enhanced capabilities to find the leaks that currently escape detection. Not making this investment will limit us to steady incremental improvements, not the step change that customers expect.

5.2.3 In preparing our Water Resources Management Plan 2024, we completed an extensive search for both supply and demand options (see Table 2). We opened up the search for options to third parties, including a Prior Information Notice (PIN) and directly engaged with industry experts to identify the best approach.

Table 2: Final option status breakdown from our Water Resources Management Plan 2024

Option status	Supply options	Demand options
Unconstrained	134	142
Feasible/refined feasible/constrained	121	52
Preferred	17	34
TOTAL	**272**	**228**

Source: UUW Revised Draft Water Resources Management Plan 2024 (WRMP24)

5.2.4 The options considered to reduce leakage can each broadly be aligned to a "PALM" category (Prevent, Aware, Locate or Mend), as shown in Table 3. Table 3 also shows how each area of PALM has been applied to specific interventions or actions within UUW and the benefits of this.

Table 3: PALM approach/categories, with example interventions/options

PALM category	Description	Example interventions/options	Pertinent to UUW
Prevent/ prevention	Ability to stop leaks from occurring or, at least, reduce the size of leaks	Pressure management and/or optimisation, including active pressure and/or remote control (flow modulation) Mains rehabilitation including renewal, replacement and re-lining. Calm networks, including tackling pressure surges or "pressure transients"	In AMP5, we carried out a company-wide desktop modelling exercise and identified a number of existing pressure management valve (PMV) optimisation schemes and over 1,000 new potential pressure management schemes. A number of schemes were delivered in AMP6 or identified to be delivered in AMP7, including the installation of PMV flow modulation/remote control units on over 700 existing PMVs. Our mains rehabilitation/renewal /replacement rate is a key area of focus.
Aware/ awareness	Ability to identify a leak as it occurs	Additional district metered areas (DMAs) and/or DMA optimisation (changing the configuration, metering arrangement and/or size). Optimisation of the areas upstream of DMAs (covering larger service reservoirs, trunk mains etc.). Smart networks (we term this "Dynamic Network Management"), smart meters and network sensors (e.g. acoustic/noise, flow, pressure, strain etc.).	A key area of innovation and investment over AMP6 and AMP7. We invested in approx. 70,000 acoustic sensors that cover approx. 20% of our water network. We combined this with advanced analytics of the sensor sound files to remove "false positives" and ensure we are identifying leaks (pressure management valves and lampposts can sound like leaks).

PALM category	Description	Example interventions/options	Pertinent to UUW
Locate	Ability to find/pinpoint the exact location of the leak	Activity to expedite (or, at least, robustly prioritise) the pinpointing of leaks using: Aerial surveys (drones, planes, satellites etc.) – although, depending on accuracy, these can be considered under "Aware" as well. Automatic acoustic/noise correlation Optical fibres Step testing Surface sounding	Once we are made aware of a potential leak, our highly skilled Leakage Technicians carry out investigations to determine if the issue is related to a leak (or, for example, illegal use) and, if a leak is identified, mark the precise location of the leak for repair. We acknowledge that it can take years to develop the skills required and, therefore, we have sought to ensure that we are "fit for the future" with our Leakage Apprenticeship programme and in-house training suite.
Mend	Action to fix/repair the leak	Activity to expedite (or, at least, robustly prioritise) the repair of: Mains, including trunk mains Mains fittings Communication pipes Supply pipes (assets within the property boundary and owned by the property owner) Reduce disruption via "no dig" and "in pipe" repair techniques	Following leak location, UUW promotes work to our network partners to repair leaks on the various assets. We work with our network partners to prioritise leak repairs, based on customer impact and size of leak, as well as how we can implement innovative techniques (e.g. "live repairs") to reduce repair times generally.

Source: UUW Revised Draft Water Resources Management Plan 2024 (WRMP24)

5.3 Options appraisal and selection

5.3.1 In order to select the best option for customers, we adopted a "best value" approach, with a best value option being one which drives the best outcomes for the environment, society and UUW over the longer term.

5.3.2 Table 4 below shows the leakage reduction options selected to be "best value" via our Water Resources Management Plan 2024 decision making framework. It's worth noting that several of the metering options selected as "best value" will also support the efficient delivery of leakage reductions. For more information please see the WRMP24 'Deciding on future options' technical report.[6]

[6]https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp24-drafts/revised-draft-wrmp24-technical-report---deciding-on-future-options.pdf

Table 4: Leakage reduction options selected to be "best value" via our Water Resources Management Plan 2024 decision making framework

Option name	Option code/ID	Year selected	Leakage reduction over AMP8 (Ml/d)	Length of mains renewal/replacement (km)	Totex for AMP8 2022-23 prices (£m)
LEA-SRZ15_In-pipe repairs and lining technologies	WR510	2026	1.5		2.3
LEA-SRZ5_DMA optimisation	WR520c	2030	0.4		0.4
LEA-SRZ10_Upstream tile optimisation	WR524d	2027	2.4		2.5
LEA-SRZ10_Mains rehabilitation/renewal/replacement	WR516h1	2026	31.7	641	136.0
LEA-CRZ10_Permanent network sensors	WR502a	2029	0.1		0.4
LEA-CRZ5_Pressure management	WR511a	2026	0.1		1.4
LEA-CRZ5_DMA optimisation	WR520a	2027	0.4		1.3
Total enhancement			**36.6**	**641**	**144.3**

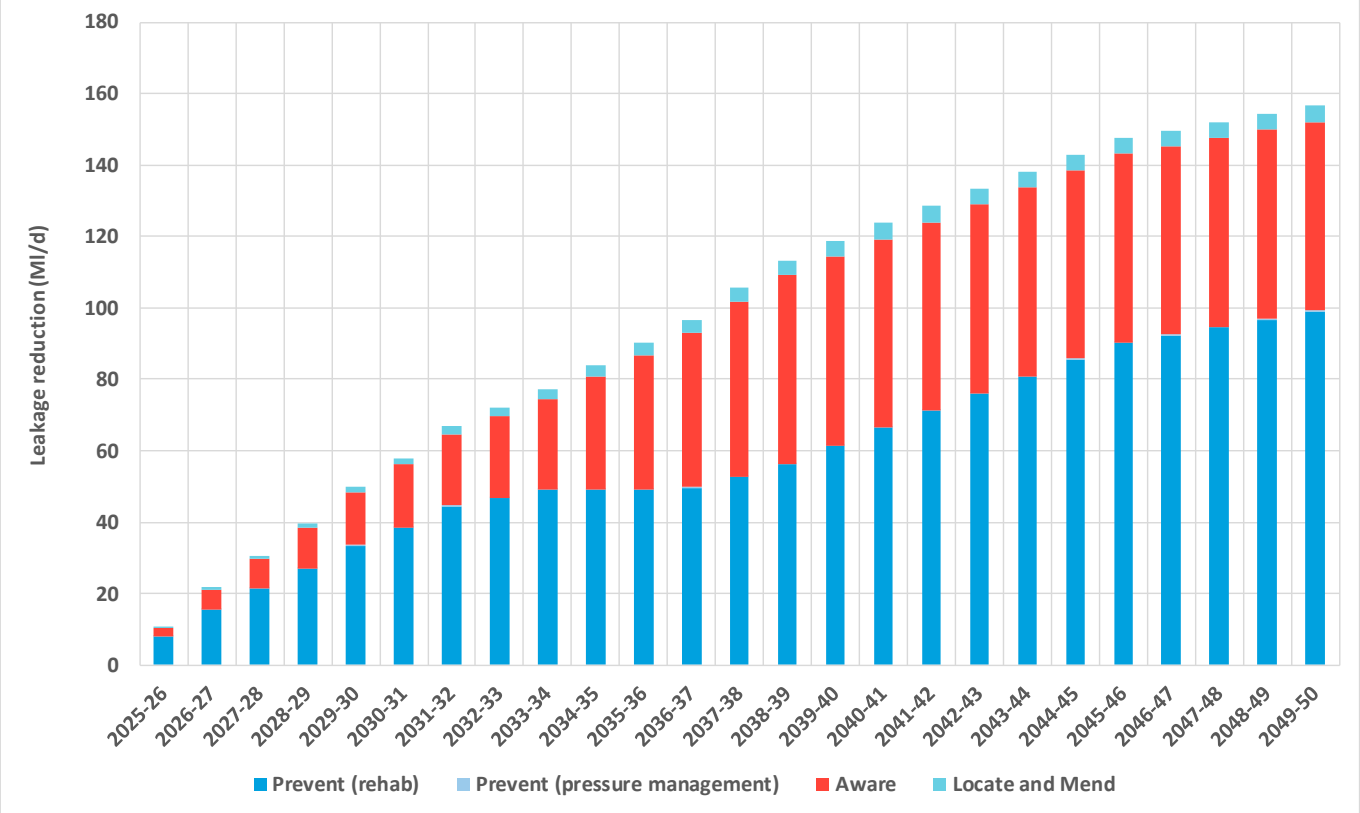
Source: Revised Draft Water Resources Management Plan 2024 (WRMP24) with additional information on length of main and Totex in 2022-23 prices

5.4 Benefit monitoring and adaptive planning

5.4.1 Adaptive planning supports a framework for future decision making to help manage uncertainty. Decision points are set out that are timely enough to adapt our plans and strategies if the options/solutions selected are not producing the expected benefits.

5.4.2 Figure 6 shows how we plan to deliver leakage reduction to 2050 (represented using the PALM model of "Prevent", "Aware", "Locate" and "Mend") in a "best value" way.

Figure 6: How we will deliver leakage reduction to 2050 (represented using the PALM model of "Prevent", "Aware", "Locate" and "Mend")



Source: UUW analysis of data published in Revised Draft Water Resources Management Plan 2024 (WRMP24)

5.4.3 Our strategy to is transition from "find and fix" or "locate and mend" to an increased awareness (through network monitoring), which will support the prediction and prevention of leaks (through mains renewal, pressure management and optimisation etc.).

5.4.4 We will monitor the benefits of our options/solutions through our weekly, monthly and annual performance reporting. This will be supported by additional data available through the installation of over 920,000 smart meters during AMP8, enabling more localised benefits assessment.

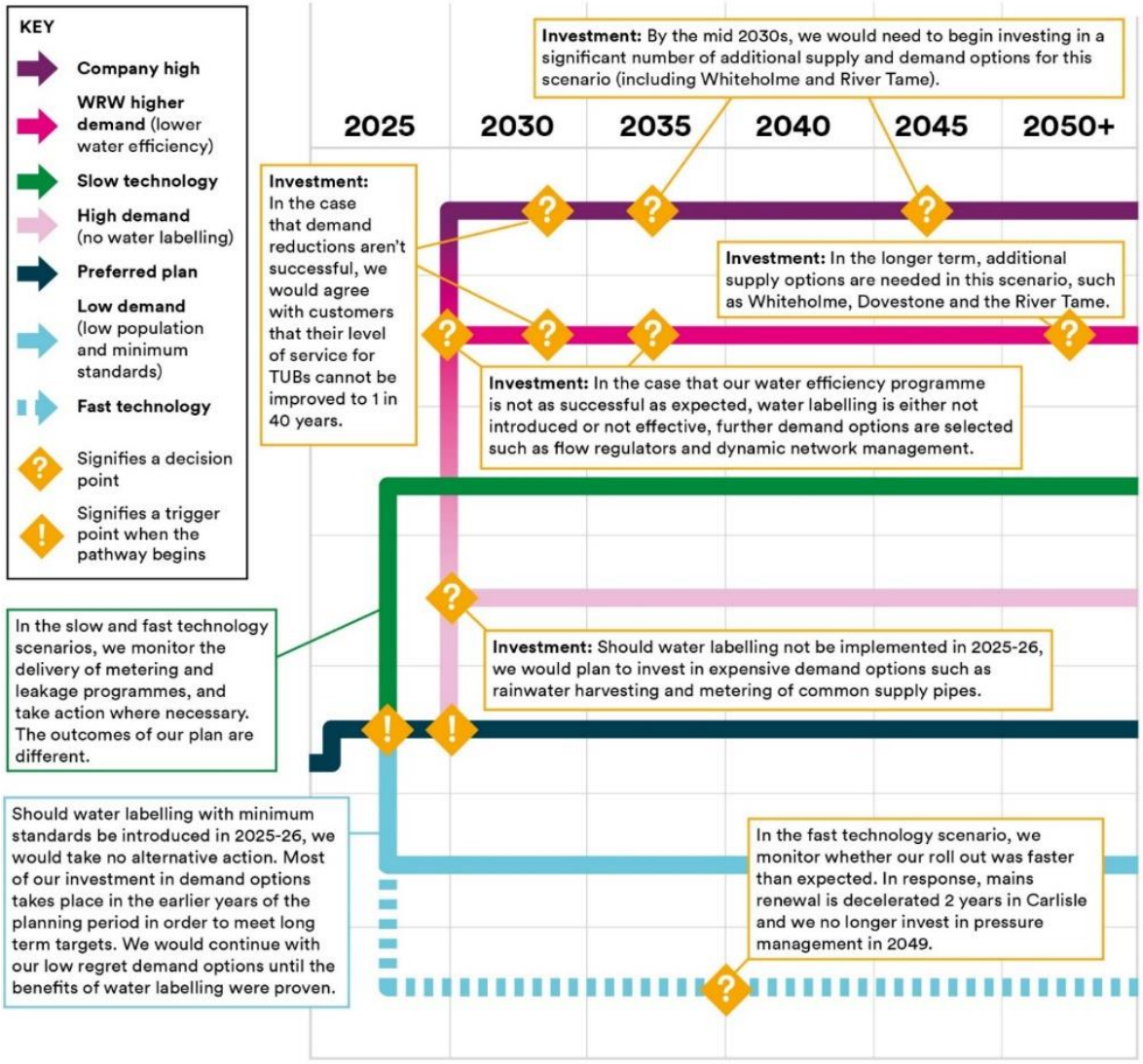
5.4.5 As part of our Water Resources Management Plan 2024 decision making approach[7], we have developed an adaptive plan for water demand more widely.

5.4.6 This includes a number of scenarios/pathways that change the pace of delivery, based on consumption/usage patterns and leakage/losses, as well as the influence of potential policy (e.g. water labelling) and technology changes on the timeline.

5.4.7 These alternative plans are illustrated by the annotated timelines in Figure 7, showing how and when we will adapt our plans to achieve the expected outcomes.

[7] See our *Revised Draft WRMP24 Technical Report - Deciding on future options* – under "Supporting technical documents" on our external website here… https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/developing-our-water-resources-management-plan/

Figure 7: WRMP24 demand and technology adaptive plan



Outcomes				
PCC in 2050 (l/p/d)	Leakage reduction by 2050	NHH reduction by 2050	Potential TUBs LoS in 2031	Investment compared to preferred plan
134	53% (significantly larger leakage options are selected early)	15%	> 5% annual chance	+ > £5bn 80 yr NPV
117	51%	12%	5% annual chance	+ £150m 80 yr NPV
106	52%	15%	2.5% annual chance	> £1bn 80 yr NPV if the scenario is no more cost effective
115	52%	15%	2.5% annual chance	+ £700m 80 yr NPV
110	50%	15%	2.5% annual chance	Preferred plan
99	50%	15%	< 2.5% annual chance	- £7m 80 yr NPV
104	52%	15%	< 2.5% annual chance	£1bn 80 yr NPV if the scenario is no more cost effective

Source: UUW Revised Draft Water Resources Management Plan 2024 (WRMP24)

6. Cost efficiency

6.1.1 This section demonstrates how we have ensured the costs put forward in this enhancement case are efficient and represent best value for money. To do this we:

- Challenge the scope and/or scale;
- Optimise the potential solutions; and,
- Undertake robust cost challenge and assurance.

6.2 Challenge scope and/or scale

6.2.1 To deliver our commitment of halving leakage by 2050, we must continue to deliver leakage reductions at pace, but also consider critical factors such as the longevity of interventions and their impact on leakage natural rate of rise (NRR).

6.2.2 A balanced programme of longer term interventions (such as targeted mains renewal) and shorter term interventions (such as active leakage control and network sensors) is required to deliver sustainable reductions in leakage.

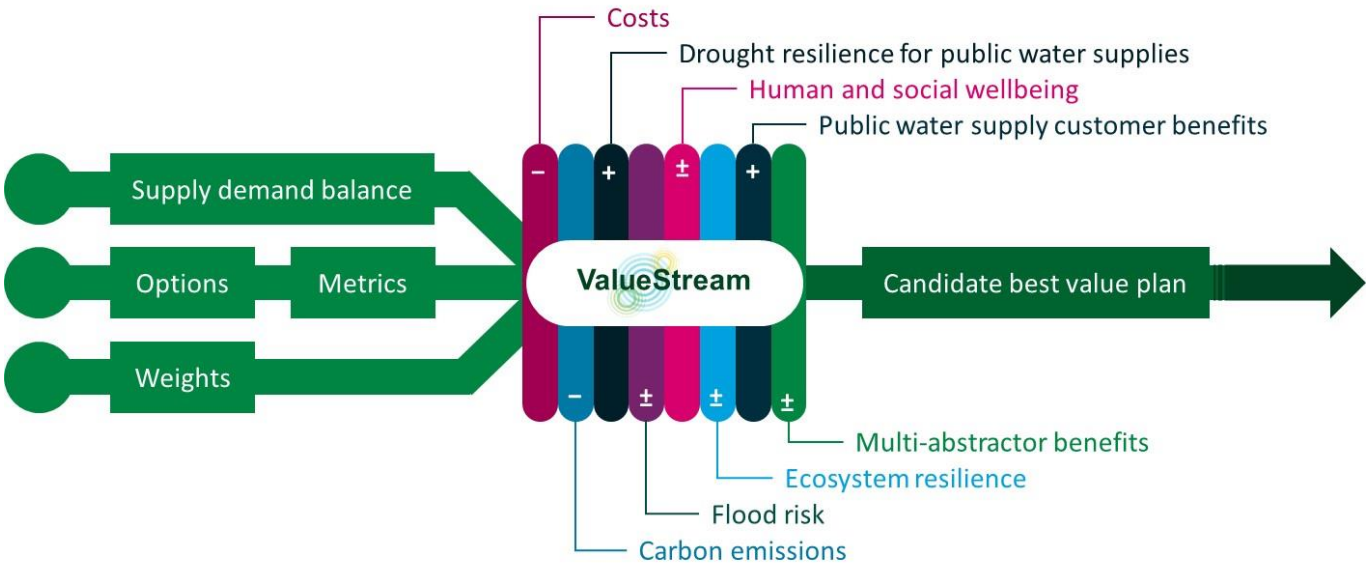
6.3 Optimise the potential solutions

6.3.1 Section 5 illustrates the wide range of demand options identified as we developed our Water Resources Management Plan 2024.

6.3.2 The options used information from our various pilots and trials, as well our Innovation Lab (collaborative innovation development process) and projects funded from Ofwat's innovation fund such as the 'Dark Fibre project' to enhance detection innovation.

6.3.3 Our Water Resources Management Plan 2024 decision making framework, supported by the Value Stream approach (see Figure 8) and design support tools allow solution optimisation to determine the "best value" and "least cost" set of options.

Figure 8: The ValueStream approach



Source: UUW Revised Draft Water Resources Management Plan 2024 (WRMP24)

6.4 Robust cost challenge and assurance

6.4.1 Comprehensive assurance activities have accompanied the development of our Water Resources Management Plan 2024. In addition to robust internal processes (including Board level approval), we have sought external expertise to ensure that we select the best options for customers and include accurate costs in our plan.

6.4.2 We engaged Wood PLC to provide an objective appraisal of all the options, comparing on a transparent and equal footing both supply and demand side options that were developed internally and by third parties. This produced a list of feasible options for which we compiled detailed costs assessments. The breadth and diversity of opportunities gathered in the options identification stage greatly assisted this process; as each provides an initial assessment of costs we have a large dataset against which to benchmark the efficiency of the options that we developed further.

6.4.3 This provides robust assurance that the costs we have included in our plan achieve a high level of efficiency.

6.4.4 The duration threshold for supply interruptions associated with planned works related to this enhancement case will be extended to 8 hours. This allows the programme to be delivered using innovative methods providing cost and time efficiencies for the programme.

6.4.5 We have spoken to customers in the North West to get their views on "planned interruptions[8]". Customers have told us they were supportive of longer duration planned supply interruptions if the additional time allowed for greater innovation and reduced general disruption (e.g. traffic disruption).

6.5 Third party assurance of our cost estimates

6.5.1 We consider that the complementary and independent output of assurance activity demonstrates that our cost estimates are efficient and represent excellent value for money for customers.

Bottom-up benchmarking (Faithful and Gould)

6.5.2 Faithful and Gould undertook a bottom-up deep dive into the cost efficiency of our enhancement cases. This involved a close examination of our cost base relating to a sample of our plan, with comparisons made to similar activity carried out by third party companies across a variety of sectors.

6.5.3 F&G looked at our direct costs across each of the following categories:

(a) Staff including site supervision

(b) Mobilisation and site set up, running and removal of site offices and welfare

(c) Temporary services for general site use, such as water to wash out concrete skips

(d) Attendant plant and equipment, such as cranes, forklift for unloading deliveries etc.

(e) Attendant labour, defined as hourly paid operatives not involved in productive works

(f) Site consumables, such as waste skips

(g) Set-up site compounds, erecting hoardings etc.

(h) O&M manuals

(i) Health and safety

6.5.4 It also looked at the contractor's indirect costs (e.g. overhead and design costs) and UUW's indirect costs (e.g. land acquisition costs). Due to the size of the programme, F&G examined a sample of our

[8] InSites Consulting on behalf of United Utilities, October 2022 unitedutilities.com/corporate/about-us/our-future-plans/listening-to-our-customers/insight-and-research-library#serviceresponse

enhancement cases. However, this sample included projects from each of our enhancement categories and covered £1.246bn of expenditure.

6.5.5 F&G noted the effectiveness of UUW's cost estimation process:

"In addition to the benchmarking data held by Faithful+Gould we understand that UUW has applied multiple internal and external challenges to progressively refine the cost estimation undertaken to date. In particular we note UUW's use of its Investment Programme Estimating System (IPES) which is a bespoke parametric estimating tool containing data from AMP3 to AMP7, to provide historical cost curves alongside estimated data from third party organisations."

6.5.6 F&G found that our proposed costs are in line with rates typically seen across the industry:

"Overall, UUW's approach of utilising historic cost curves, market testing and obtaining specialist third party quotations demonstrates a sound proactive approach to cost planning. In total £1.2bn of schemes underwent targeted cost assessment with £573m making up the construction works element.

After presenting our initial findings it was encouraging to see UUW's commitment to addressing our findings and applying these to the wider enhancement estimates, charting a strategic route towards greater efficiency and scope clarification.

In light of this Cost Assurance work and evidence of UUW's responsive actions we have concluded that the data we have benchmarked is within a reasonable alignment with anticipated market rates."

7. Customer protection

7.1 Leakage performance commitment

7.1.1 It is important that customers have confidence that we will deliver the enhancement schemes that get reflected in our PR24 final determinations and they are suitably protected in the event of non-delivery, or if there are material changes to deliverables (including changes to dates), which leads to a change in cost (including changes in the timing of required expenditure). Ofwat proposes that, if companies fail to deliver or are late delivering improvements to customers, then price control deliverables (PCDs) should, where appropriate, be used to compensate customers. In our PR24 *Chapter 8 – Delivering at Efficient Cost, section 8.8.9* we have proposed an approach to PCDs that aims to provide customer protection, such that customers are fairly compensated for non-delivery (such as due to a change in regulatory requirements) or late delivery (including as a result of a change to a regulatory date), between PCDs, any related ODI underperformance payments, and cost sharing arrangements.

7.2 Leakage enhancement price control deliverable

Table 5: PCD summary

Scheme delivery expectations	
Description of deliverable	Our leakage enhancement case constitutes targeted mains renewal and network optimisation. As targeted mains renewal makes up the vast majority (~94%) of the expenditure related to our leakage enhancement, we have used kilometres of mains renewal as the deliverable for the price control deliverable (PCD).
Output measurement and reporting	Kilometres of mains renewed
Assurance	Kilometres of mains renewed is reported in the APR (currently table 6C line 6C.3) with the reported figures captured on water network activity trackers, verified by the reporting team and externally assured by our assurance provider. As it is likely that the mains renewed line will report on activities not covered by this leakage enhancement case, it may be more suitable to have a separate APR line that is completed and externally assured in the same way as the existing APR line.
Conditions on scheme	None
Impact on PCs	Failure to complete the programme related to this leakage enhancement case will impact on performance against our leakage PCL, resulting in underperformance payments. The value of £24,139 below reflects the annual leakage impact per km of mains renewed, multiplied by the AMP8 leakage ODI rate of £364,886 per megalitre per day (Ml/d). It's worth noting that the leakage benefit delivered by 2030 will broadly reflect 4.5 years of delivery, as mains renewed in 2030 will have less than a years impact on AMP8 leakage performance.

7.2.1 In our PCD template *UUW32-PCD Excel Sheet* we have assumed a wholesale WACC of 3.23%, in line with Ofwat's guidance. We have assumed a 50% totex cost sharing rate, which is applied before calculating PCDs. We have applied a further 50% for Bioresources (where applicable), to ensure that only 25% of Bioresources totex is at risk from PCDs, given the lack of RCV guarantee, and general uncertainty in cost recovery from future Bioresources price controls. For late delivery we have applied a proportionate value of annual opex, and assumed 3.5% of capex, which provides a fair reflection of the time value of money of any related deferred capital spend.

Table 6: PCD delivery profile

	Units	AMP8	2024	2025	2026	2027	2028	2029	2030	Ultimate delivery
Cumulative delivery target for PCD	**km mains**		**-**	**-**	**73**	**209**	**331**	**465**	**641**	**641**
AMP8 Capex (22/23 pb)	£	144,297,075	-	-	16,139,175	28,233,075	27,757,275	30,206,475	41,961,075	
AMP8 Opex (22/23 pb)	£	0	-	-	-	-	-	-	-	
ODI impact per unit of PCD volume	£/km mains	24,139								

Table 7: Price Control Allocation

Price Control	Unit	Price Control Allocation
Water resources	%	0.00%
Water network+	%	100.00%
Wastewater Network+	%	0.00%
Bioresources	%	0.00%

Table 8: PCD Incentive rates

	Unit	WR	WN+	WwN+	BR
Overall delivery	£/km mains	0	88,384	0	0
Time value rate	£/km mains	0	2,855	0	0
Late delivery	£/km mains	0	2,855	0	0

United Utilities Water Limited
Haweswater House
Lingley Mere Business Park
Lingley Green Avenue
Great Sankey
Warrington
WA5 3LP

unitedutilities.com

United Utilities

Water for the North West

UUW61

Water Efficiency - Household & Non Household

October 2023

Enhancement Case 8

United Utilities

Water for the North West

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1. Enhancement submission

<table>
<tr><th colspan="2">Enhancement submission</th></tr>
<tr><td>Title:</td><td>Water Efficiency – Household and Non Household</td></tr>
<tr><td>Price Control:</td><td>Water Network Plus</td></tr>
<tr><td>Enhancement headline:</td><td>AMP8 requires a step change in demand reduction for both household and non-household customers. We need to help customers use water more efficiently which will safeguard our long term water supplies, protect our environment and benefit customers through reduced bills.

The stretching demand reduction targets for AMP8 and beyond require a significantly more ambitious water efficiency programme than in previous AMPs. This document sets out an enhancement case of £20.020m to allow us to achieve this.</td></tr>
<tr><td>Enhancement expenditure

(FY23 prices)</td><td>
<table>
<tr><th></th><th>AMP8 Capex inc TI (£m)</th><th>AMP8 Opex (£m)</th><th>AMP8 Totex (£m)</th></tr>
<tr><td>Pre RPE and Frontier Shift</td><td>0.000</td><td>20.502</td><td>20.502</td></tr>
<tr><td>Post RPE and Frontier Shift</td><td>0.000</td><td>20.020</td><td>20.020</td></tr>
</table>

The table above shows the total expenditure, inclusive of accelerated programme and transitional investment, on both a pre-efficiency (i.e. pre frontier shift and real price effects basis, consistent with the cost data tables), and a post efficiency and RPE basis (i.e. consistent with the value we propose to be recovered from price controls). All numbers referenced hereafter in this enhancement case are on a post efficiency and RPE basis.
</td></tr>
<tr><td>This case aligns to :</td><td>Water Resource Management Plan (WRMP). For full reconciliation between enhancement costs and data table lines, see enhancement mapping tabs in UUW117 – Project allocations CW3 and CWW3</td></tr>
<tr><td>PCD</td><td>None</td></tr>
</table>

2. Enhancement case summary

Gate	Summary	Location reference
Need for enhancement investment	We have a statutory duty to i) promote water efficiency and ii) provide a resilient water supply to customers. We need a plan which will enable us to meet the government demand reduction targets. These will only be achieved with a step change in demand reduction activity. This document sets out an enhancement case of £20.020 to allow us to achieve this, alongside a substantial investment in the UUW metering base. Customer support for water efficiency measures is high as it is seen as a way to provide a reliable supply of water now and in the future and due to the part it plays in protecting the environment. In order to meet the government demand reduction targets we need to invest in these activities immediately. Failure to act will result in a failure to meet the demand reduction targets and will result in a supply demand deficit. We propose to meet the required reduction in per capita consumption (PCC) through a combination of household water efficiency visits, water efficiency devices, flow regulators and rainwater harvesting and water re-use in new builds. We propose to meet the required reduction in non-household (NHH) demand for water during AMP8 through a combination of NHH water efficiency visits and *UUW61 – Water Supply Demand case 6.*	4.1.1 4.1.2 Table 3 4.4.3
Best option for customers	In line with industry guidance, we have considered a full range of possible options in the development of our business plan and our water resources management plan. We are putting customers and retailers at the heart of our decision making, using the outcomes of our latest customer research to shape our plan to their preferences. In order to meet the government demand reduction targets we need to invest in these activities immediately. A plan which purely relies on our base activity for water efficiency will result in a failure to meet the demand reduction targets and will result in a supply demand deficit. We have performed a number of pilots in AMP7 to inform our future strategy for household water efficiency. We have piloted a water efficiency programme of business visits in AMP7 to inform our future strategy for non-household water efficiency.	5.2.1 5.2.6 5.3.1 5.4.1
Cost efficiency	We have considered a number of different options for water efficiency in order to meet our targets for household and non-household demand reduction in AMP8 and beyond. The interventions detailed in this enhancement case offer the least cost, best value option.	6.1.1
Customer protection	Our per capita consumption (PCC) and Business Demand performance commitments, and associated outperformance and underperformance penalty payments will incentivise efficient and effective delivery and will directly measure the effectiveness of our interventions. We assess these measures as providing robust customer protection, and we do not believe that introducing a PCD in this area is in customers interest as it will further constrain company opportunities to innovate, without delivering further outcome protections.	7.2

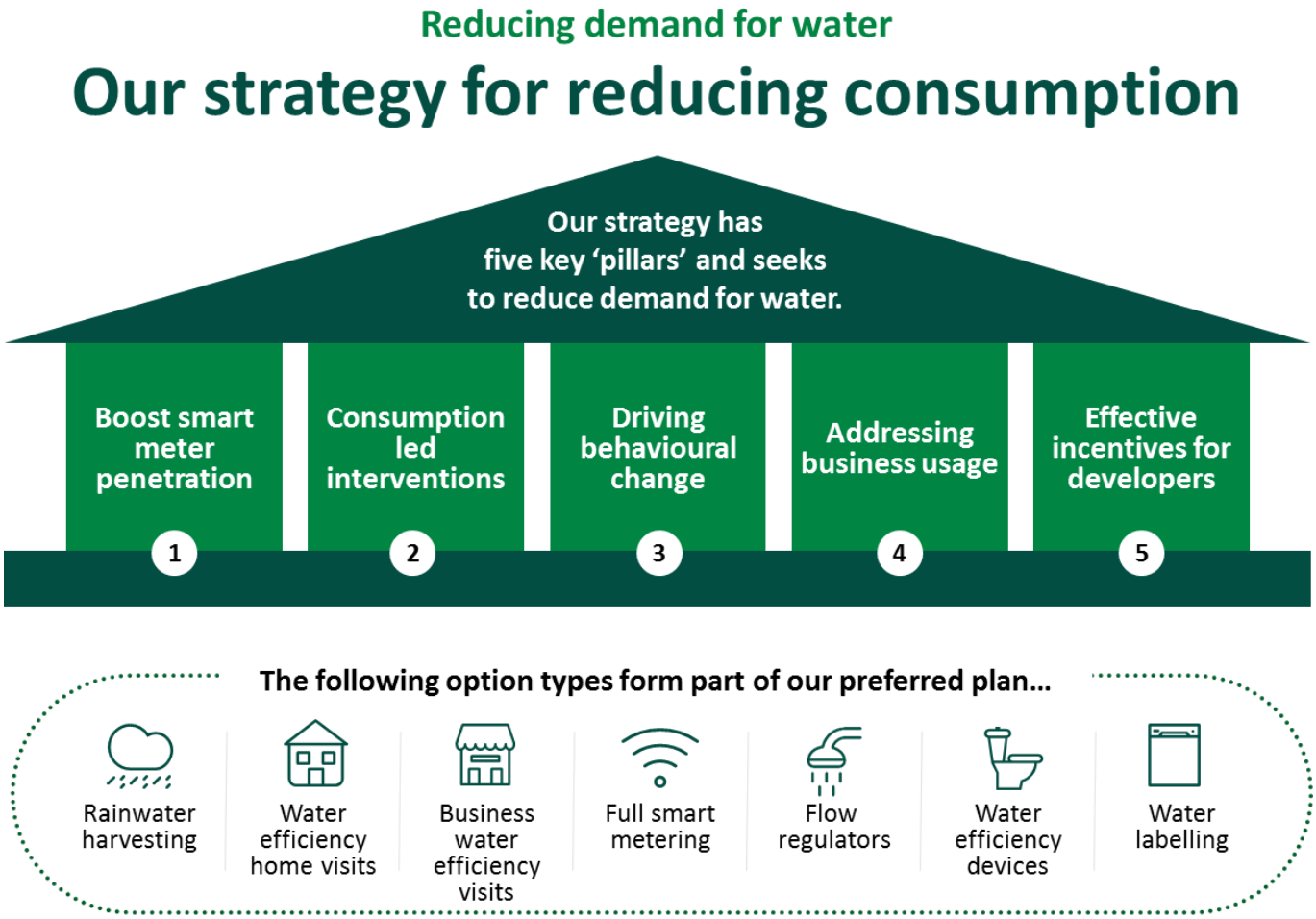
3. Introduction

3.1.1 This document sets out an enhancement claim of £20.020 million to allow UUW to help customers to use water more efficiently which will safeguard our long term drinking water supplies across the North West.

3.1.2 Future growth in the region and the pressures of climate change both increase the need for UUW to reduce the demand for water from both our household and non-household customers in order to safeguard long term water supplies for all customers, protect our environment and benefit customers through reduced bills. Protecting our supply of water could allow water transfers to areas suffering from a supply deficit.

3.1.3 In order to meet the government demand reduction targets UUW needs to deliver a step change in demand reduction in AMP8 for both household and non-household customers.

***Figure 1*: Our strategy for reducing demand for water for both household and non-household customers has five key 'pillars' as detailed below.**



Source: UUW strategy.

3.1.4 We have identified a number of opportunities to build on and improve our current water efficiency work with households and we will be applying this learning to non-household customers in AMP8. However delivery of the demand reduction targets for AMP8 and beyond requires us to deliver a more ambitious water efficiency programme.

Table 1: **Our AMP8 water efficiency enhancement is a gross totex value of £20.020 comprising of 4 elements as follows:**

Intervention	Cost
Household water efficiency visits	£5.39m
Water efficiency devices	£7.03m
Flow regulators	£0.11m
Non Household water efficiency visits	£7.50m
Total	£20.02m

Source: UUW analysis of TOTEX.

4. Need for enhancement investment

4.1.1 We have a statutory duty to i) promote water efficiency and ii) provide a resilient water supply to customers and retailers. We need a plan which will enable us to meet the government demand reduction targets. Customer support for water efficiency measures is high as it is seen as a way to provide a reliable supply of water now and in the future and due to the part it plays in protecting the environment.

4.1.2 In order to meet the government demand reduction targets we need to invest in these activities immediately. Failure to act will result in a failure to meet the demand reduction targets and will result in a supply demand deficit.

4.1.3 Demand management initiatives including water efficiency promotion, leakage reduction and metering are generally the most favoured options by customers and retailers.

Table 2*: *Breakdown of PCC interventions and impact from 2024-25 to 2029-30

Change from 2024-25 to 2029-30 (normal year) – figures quoted relate to annual figures and not three-year average	Household consumption impact (Ml/d)	PCC impact (l/person/d)
Natural trends in HH demand (what would happen if we did nothing)	+20.05	(1.10)
Base investment reduction / holds stable		
Government interventions	6.40	0.86
Smart metering	16.74	2.25
Water Efficiency Enhancement case interventions	8.17	1.10
Rainwater harvesting and water re-use in new builds	0.06	0.01
Total	**11.31**	**5.32**

Source: WRMP24.

4.2 Household Water Efficiency

4.2.1 Our supply and demand forecast includes the continuation of our long-term plan to reduce per capita consumption (PCC) on average by 0.8 litres per person day every year of AMP8 through a combination of: interventions:

- a continuation of the 'always-on' communication plan we have developed during AMP7 funded from our base service costs
- a data driven approach to customer communication including improved visualisation of consumption
- support and promotion of water labelling funded from our base service costs
- the interventions outlined in this document

Table 3: In addition to our base activity, in AMP8 we will deliver the following household interventions:

74,233 Household water efficiency visits, at a cost of £5.39, delivering benefits of 4.61 Ml/day
318,410 Water efficiency devices, at a cost of £7.03m, delivering benefits of 3.47 Ml/day
14,970 Flow regulators, at a cost of £0.11m, delivering benefits of 0.09 Ml/day

Source: WRMP24.

4.2.2 We have identified a number of opportunities to build on and improve our current water efficiency work with households and we will be applying this learning to non-household customers in AMP8. The scale and timing of the investment is aligned to our Water Resource Management Plan (WRMP) which models the required interventions to most cost effectively reach a PCC of 110 litres per person per day by 2050. All of the above activities will be required in order to deliver the step change required in per capita consumption.

4.3 Household Customer Support

4.3.1 Customer support for water efficiency measures is high. When customers were asked about which WRMP initiatives they thought were most acceptable, 76% of customers ranked 'promoting water efficiency' as second and deemed it very acceptable. When asked to rank the long-term challenges, 62% stated 'the amount of water people use' within their top three. 96% felt that ways to help educate and change behaviour was an important factor to consider when implementing new initiatives *(WRMP & DWMP Immersive Options Testing, April 2021)*.[1] Furthermore 59% of household customers said they were concerned about the availability of future water supplies *(Water Resources Management Plan acceptability testing, August 2022)*.[2]

4.3.2 In research exploring customer priorities all current household customer groups said that *'having enough water to meet demand'* was the most important. Future customers ranked *'encouraging water efficiency'* as the most important priority *(Customer Priorities, December 2021).*[3]

4.3.3 To inform our AMP8 strategy we asked household customers how they would want support from United Utilities in relation to small leaks in the home:

- 57% would like to be provided with tips on how to detect leaks themselves
- 49% would like to be educated on ways they can fix leaks themselves
- 47% would like UU to find and fix the leak

4.3.4 This research has informed our household visit intervention approach.

4.4 Non Household Water Efficiency

4.4.1 Reducing non-household (NHH) demand for water during AMP8 is a fundamental element not only in contributing to Defra's proposed national water consumption reduction target of 9% by 2037/38 but in reducing overall water demand.

4.4.2 At the opening of the NHH water retail market in April 2017, one of the desired outcomes was to save customers water, with market guidelines clearly indicating that this activity should be undertaken by retailers. However the take up of the 'value added' services offered by many retailers has been low. A recent report commissioned by the Retail Wholesale Group (RWG) – Water Efficiency Subgroup and produced by Economic Insights concluded the following:

- Customer's willingness to pay (WTP) for water efficiency is below the efficient cost to supply these services.
- Achieving water efficiency in the NHH water retail market can be either wholesaler- or retailer-led.
- To ensure water efficiency delivery in line with targets in the short term, we recommend that a predominantly wholesaler-led approach is taken.

[1] InSites Consulting on behalf of United Utilities, WRMP & DWMP Immersive Options Testing, April 2021

[2] DJS Research on behalf of United Utilities, Water Resources Management Plan acceptability testing, August 2022

[3] Impact Research on behalf of United Utilities, Customer Priorities, December 2021

4.4.3 As a result our AMP8 water efficiency strategy to enable us to deliver a 9% reduction in business demand by 2037/38 will be delivered through a combination of:

- NHH water efficiency visits
- Smart metering rollout – see *UUW61 –Water Supply Demand case 6.*

4.4.4 Our WRMP sets out that we will deliver 5,498 NHH water efficiency visits in AMP8 to save 9.9 Ml/day to meet future demand targets. The cost of the visits will be £7.50m. There is no cost in our base allowance as in AMP7 it was expected that retailers would carry out water efficiency activity as a value added service and that take up rates from customers would be high.

4.4.5 We have consulted with retailers to gauge the level of support for a business visit programme and to work through possible ways to structure an incentive to encourage retailers to offer the water efficiency visit to customers. Retailers have shown support for our intended approach.

4.4.6 In areas where retailer take-up is low we would structure the scheme so that we can offer the visits directly to customers ourselves or with the help of trusted partnerships. We have piloted the delivery of NHH water efficiency visits, as well as the promotion and joint funding in our schools pilot. The results, see 5.4.3, delivered significant savings.

4.5 Non Household Customer Support

4.5.1 Non household customers' priorities are similar to household customers. 'Current and future environmental concerns' is the second highest ranked priority, just above 'reliable supply of water now and in the future' *(Customer Priorities, December 2021)*.

4.5.2 Customer research on smart metering found that businesses are actively trying to become more sustainable, this provides an opportunity for United Utilities to encourage a focus on reducing their water usage as part of their sustainability initiatives *(Smart Metering Research, November 2022)*.[4]

4.5.3 We conducted robust quantitative research with NHH customers across a range of sectors, backed up with qualitative research, to understand their comprehension, interest, and barriers to business water efficiency visits proposition. Whilst NHH's may claim that water efficiency is important to their organisation, this does not necessarily translate into sustained action, with an average of only 1.3 water efficiency measures taken in the past 5 years, highlighting the need for wholesalers, in collaboration with retailers, to take action. Our research showed that the overall response to the proposition from NHH's was positive, with 61% interested in having a water efficiency visit and the biggest driver of interest was to save money *(NHH Water Efficiency Visits, April 2023)*.[5]

4.6 Management Control

4.6.1 Future growth in the region and climate change are putting increasing pressure on water availability, increasing the need to reduce demand for water in order to safeguard long term water supplies for all customers. We have taken steps to reduce demand through our base allowance but we do not consider this sufficient if we are to reduce demand further in line with regulatory targets. Steps taken to reduce demand to date include:

- An always on communications strategy which aims to encourage customers to avoid waste, use less and connects them to where their water comes from and the broader impact of their behaviour on their local environment. We will carry this forward into AMP8, evolving our messaging to ensure it remains relevant and effective, whilst expanding our focus to include non-household customers.

[4] Verve Research on behalf of United Utilities, Smart Metering Research, November 2022

[5] Trinity McQueen on behalf of United Utilities, NHH Water Efficiency Visits, April 2023

- Our research has shown that customers respond far more actively to water efficiency messages when water saving measures are presented as an aid to managing their water bill *(Water Saving Communications Research, July 2020)*.
- Highlighting the link between water efficiency and energy efficiency, noting that heating hot water is an important driver of energy bills. According to the Energy Saving Trust, on average, 16% of a household's energy bill is from heating water *(Energy Saving Trust)*. This has helped persuade customers to save water and realise cost savings regardless of whether they have a water meter installed.
- Targeting water efficiency communications using household income, occupancy and consumption data, and utilising continuous flow alerts to identify instances of high consumption and/or leaks at lower income properties as a way to help customers lower their water bill charges and manage their household budget.
- In 2022/23 we've focused activity on the hidden costs of a leaking toilet and how much that could cost. This integrated campaign has run from April 2022 across radio, PR, digital, face-to-face and social media and aimed to raise awareness of the issue, giving customers the tools to spot if they have a leaky toilet by providing 'Leaky Loo' strips via the Get Water Fit platform, in addition to direct messages and then giving hints and tips on how to fix it through YouTube videos.
- We continue to actively promote 'Get Water Fit' as a tool to help customers understand their own usage with tips to save water and order free water saving tools.
- We welcome the potential introduction of water efficiency labelling and we would make efforts to communicate to customers what the new standards mean through our base spend.

***Figure 2**: Example of customer communication campaigns.*

Source: UUW

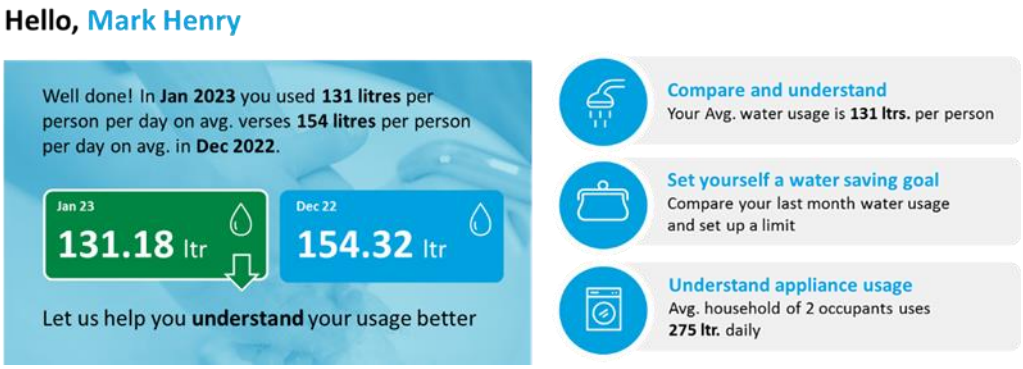
4.6.2 The pilots in AMP7 – see 5.3 for detail – have proved the benefits of data driven insights and interventions and in AMP8 it is our intention to build on this learning by using advanced analytics and exploiting data to better target our leakage and water efficiency activities.

4.6.3 This work will involve increasing the level of personalisation and visualisation of data that we provide to customers. To understand the appetite for this from customers and to learn what data customers want to see, at what frequency and through what platform, we undertook a customer visualisation pilot:

- The first step in the customer visualisation pilot was to undertake customer research through focus groups. During these sessions customers were questioned about how much they understood about their current water usage, the level of interest for more personalised information about their water consumption, how they would prefer to receive this and their preferred frequency.
- These customer outcomes fed into a sprint to design and build a water visualisation proof of concept to demonstrate the value of providing customers with an enhanced view of their water usage across digital touch points.

4.6.4 The final part of the trial was to run a second set of customer focus groups to playback the visualisation to the customers to gauge their reaction and to understand how likely the provision of data in this format would be to make them change their water usage.

Figure 3: An example of the customer visualisation tested with customers.



Source: UUW Customer Visualisation Trial project.

4.6.5 Whilst the above measures have allowed us to effectively manage water demand in AMP7, continuing in this way with our base allowance is not sufficient to manage our water resources in line with the new and stretching regulatory targets.

5. Best option for customers

5.1.1 This sections sets out why this enhancement case is the best option for customers.

5.2 Options Development

5.2.1 In line with industry guidance, we have considered a full range of possible options in the development of our business plan and our water resources management plan. We are putting customers and retailers at the heart of our decision making, using the outcomes of our latest customer research to shape our plan to their preferences.

5.2.2 Our water resources management plan explored a full range of options, including those that seek to reduce the demand for water as well as options for new water supplies, to ensure that our final list is comprehensive and includes options from all of the four categories listed in the UKWIR report:

- Resource management: New supply options, including both groundwater and surface water, and abstraction licence trading and imports;
- Production management: Reducing losses on our raw water systems and at our treatment works;
- Customer management: Metering, water efficiency activities and changes to levels of service; and
- Distribution management: Leakage prevention, detection and reduction.

5.2.3 500 supply and demand options were considered as part of the WRMP process and 228 of these were demand side options

Table 4: **Final option status breakdown from our water resources management plan**

Option status	Supply options	Demand options
Unconstrained	134	142
Feasible/refined feasible/constrained	121	52
Preferred	17	34
TOTAL	272	228

Source: WRMP24.

Options identification process

5.2.4 Following the assembly of a list of unconstrained options, primary screening criteria were applied to discount options that were considered infeasible and/or with immitigable risks to produce a list of feasible options. Each feasible option was then assessed to provide costs (monetary and carbon) to construct and implement the option. To arrive at a more manageable list of feasible options for further assessment, a refined list of feasible options were produced by filtering out low cost/benefit options but ensuring that sufficient options remain in the process to allow real choices when assessing the preferred programme. Detailed screening refines the list of refined feasible options to a constrained list to be used in decision making to arrive at the preferred programme of options. To support this, a suite of environmental assessments are completed to understand the potential impacts of the options and the environmental and social monetised cost impacts.[6]

5.2.5 In order to meet the government demand reduction targets we need to invest in these activities immediately. A plan which purely relies on our base activity for water efficiency will result in a failure to meet the demand reduction targets and will result in a supply demand deficit.

[6] United Utilities, Revised Draft WRMP24 Technical Report – Options identification, June 2023

5.2.6 We collaborated with Water Resources West to develop a set of 'best value metrics' to quantify and maximise the benefits of our plan. We developed a best value optimisation tool, named ValueStream, to use as part of our decision-making methodology to create a best value plan.

5.2.7 In addition to our household water efficiency base activities and the interventions outlined in this enhancement case we are reliant on the roll out of smart metering *UUW61-Smart Metering* to achieve our targets and we note the support of the Department for Environment Food & Rural Affairs for smart metering to manage demand and supply of water in their letter to water company chief executives on 15th March 2023.

5.3 Household Water Efficiency

5.3.1 We have performed a number of pilots in AMP7 to inform our future strategy for household water efficiency. All water efficiency interventions will be applied in both our strategic water resource zones and our Carlisle resource zone, covering 99% of customers with the exception of the flow regulators intervention which is targeted at our Carlisle water resource zone.

Household Water Efficiency Visits

5.3.2 In AMP7 we have analysed metered customer data to identify properties with unusually high consumption and/or continuous consumption, potentially indicating a leak at the property. Customers were contacted to inform them of their high consumption. Where our data indicated a potential leak the communication contained a leaky loo strip to check for a leak in the toilet alongside information on how to fix any potential leaks.

5.3.3 The high consumption campaign was highly successful, driving customers to register for the Get Water Fit platform and resulting in a 6% reduction in consumption.

5.3.4 Where our consumption data indicated a leak, 70% of customers fixed the leaks themselves saving on average £313 on their annual water bill.

5.3.5 Where no customer action was evident we partnered with [✂] to offer a household water efficiency visit. The visit identified and wherever possible fixed leaking toilets, taps and showers, where appropriate water saving devices were installed and water efficiency advice was given to the customer.

5.3.6 In 2020/2021, using our enhancement funding, we trialled our household water efficiency visit offering completing 1,502 visits in West Cumbria. Insight from these visits told us that 85% of leaks are internal and 87% of these are toilets. We have used the findings of this pilot to inform our approach for AMP8.

Partnership opportunities

5.3.7 We're piloting a partnership with [✂] to develop a proposition to work collaboratively with social housing landlords to identify and fix leaks in low income tenanted households. This will help our mutual customer base to save money on both the water and energy bills. Since February 2023 we have offered 380 customers a water efficiency visit, completed over 100 including the installation of water saving devices and provision of water saving advice.

Utilities Together

5.3.8 In partnership with Electricity North West, Cadent Gas and Groundwork Greater Manchester we offered 150 free water and energy saving advisory visits to priority service customers in the Manchester area.

5.3.9 During the visit we assessed the efficiency of a customer's home, offered efficiency advice and installed water and energy saving products. Where internal leaks were identified, we sent a plumber for a follow up visit to repair the leak at no cost to the customer.

5.3.10 The water efficiency devices reduce the amount of water wasted in the home, helping vulnerable customers make a saving on water bills (if they have a water meter) and energy bills too (around 16% of energy bills come from heating water).

5.3.11 To further help the customer with utility bills the energy saving devices and advice on how to save energy resulted in savings on energy bills.

5.3.12 The water and energy saving visit offering has had a 3% take up, of which 38% were unmeasured customers.

5.3.13 We have saved on average 117 litres of water per property per day from tap flow rate reduction, save a flush bags and leak fixes on toilets and taps. In addition to this 110 energy interventions have been carried out.

5.3.14 This visit allows us the opportunity to access both metered and unmetered customers, the latter would be unlikely to engage with a water only visit.

5.3.15 Water efficiency visits and devices will be a key activity in AMP8 to ensure we can deliver the step change required in household consumption demand. We will deliver this programme through a combination of water only visits provided directly to our customer or through partnership arrangements to ensure we reach all customers who will benefit most from this service. In addition we will assess opportunities to offer joint water and energy visits maximising water and energy savings for metered customers and allowing unmetered customers the ability to save on their energy whilst educating them around using less water.

Flow Regulators

5.3.16 Following a small volume trial of flow regulators with employees during the current AMP we plan to scale up this activity considerably installing 14,970 flow regulators within the Carlisle water resource zone. This trial resulted in average savings of 42 litres of water per property per day without customer behavioural change nudges.

Rainwater harvesting and water re-use in new builds

5.3.17 We have included an option within our WRMP, targeted at the Carlisle water resource zone, to work collaboratively with Carlisle city council and private or public developers to investigate the option of rainwater harvesting / re-use in new housing developments. This work will enable us to understand the current blockers to wide scale adoption of rainwater harvesting systems in new builds and ways to overcome them, thereby informing investment plans for future AMPs.

5.3.18 We have not included the funding for this trial in our enhancement case, we will look to fund this separately looking at innovation fund options or 3rd party funding.

5.3.19 Customer research has told us that once customers have been educated on how the sewage network operates, the vast majority (90%) agree there is a need to manage the amount of rainwater that goes into our sewers, through collective action with a number of agencies including United Utilities *(Rainfall Management Research)*.[7]

5.4 Non Household Water Efficiency

5.4.1 We have piloted a water efficiency programme of business visits in AMP7 to inform our future strategy for non-household water efficiency.

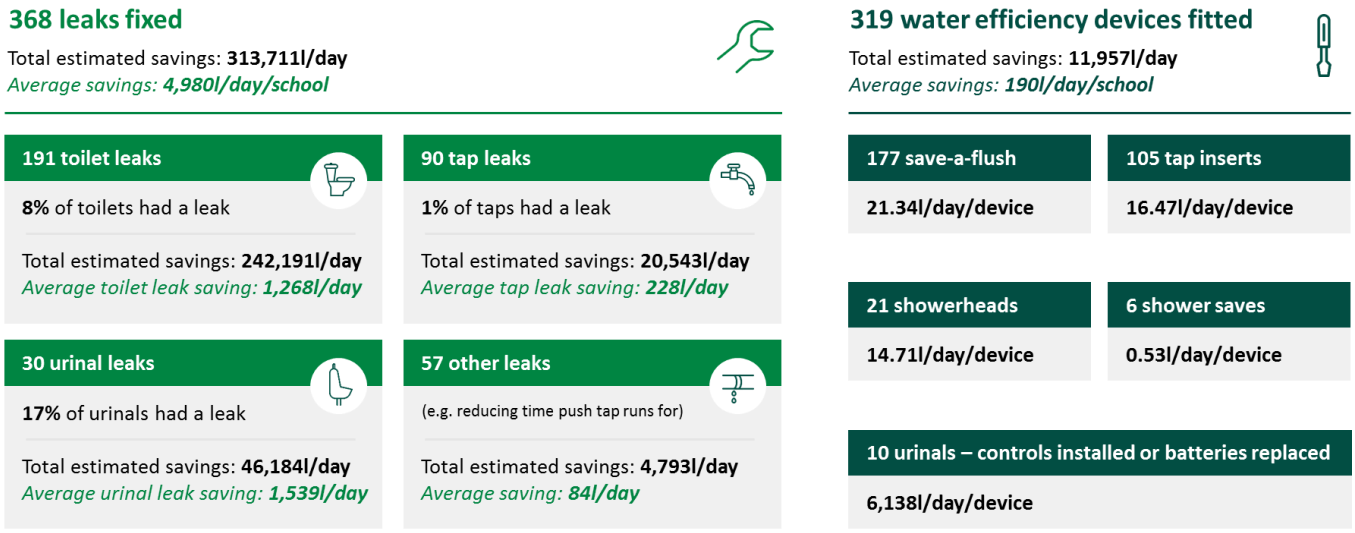
Schools Pilot

5.4.2 As part of our PR24 preparation we have trialled a NHH water efficiency visit to understand a suitable delivery mechanism, efficient costs and potential benefits.

5.4.3 In collaboration with the Department for Education and Groundwork we have delivered 63 water saving visits to schools in Manchester and Sefton between April 2022-March 2023. During the visits leaks were identified and fixed and water saving devices were fitted.

[7] DJS Research on behalf of United Utilities, Rainfall Management, August 2022

***Figure 4*: Results from 63 school water efficiency visits.**



Source: UUW internal.

5.4.4 The take up rate for our schools proposition was high at 54%, we strongly believe that this was due to the proposition being jointly branded, and funded, with the Department for Education and due to Local Authority support given to the proposition, particularly in the Sefton area. We do not expect a take up rate as high as this in other sectors but do recognise the importance of partnership working and are looking to develop strategic partnerships with trusted trade bodies and customer representative groups to support NHH visit success.

Business Visits

5.4.5 Taking the learning from our own water efficiency visits to schools and our home visit results, alongside the learnings of other water companies in particular Thames Water's Smarter Business Visits programme, we believe that a programme of NHH water efficiency visits is the most effective and cost efficient way to deliver the required reduction in NHH demand. It offers support to business customers through reduced bills in a difficult economic climate.

5.4.6 Aligned to our WRMP24, we have forecast that 5,498 business visits will save 9.90Ml/day at a cost of £7.50million. The visit will identify and where possible fix leaking toilets, taps, urinals and showers, where appropriate we may choose to fit water saving devices. In addition we will offer the customer water efficiency advice.

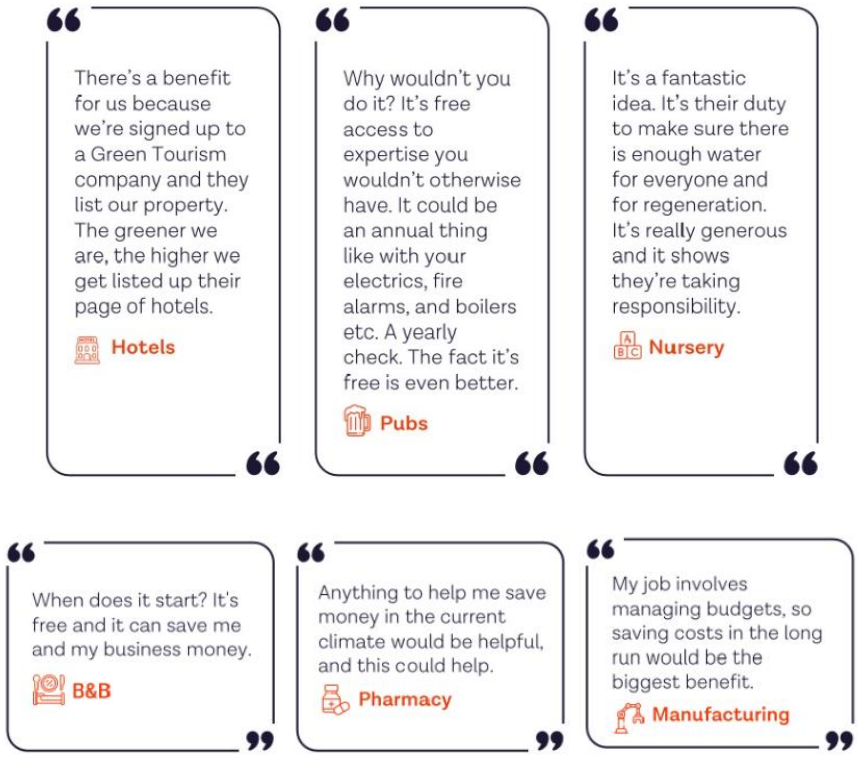
5.4.7 We will target those business types where we believe the biggest water savings can be achieved – those with high numbers of taps, toilets and showers.

5.4.8 As previously mentioned, take-up rate is increased with a trusted partner involved – we will build on existing relationships and explore new relationships to help promote and deliver business visits across the North West e.g. Department for Education, local councils, British Retail Consortium. We have anticipated a take up rate of 10% for our visits which is in line with that experienced by Thames.

5.4.9 Customer consumption will decrease meaning demand for water will be reduced benefiting the environment and reducing operational costs as less water is treated. The majority of our NHH customers are metered, so as consumption reduces they will benefit from a reduction in their water bill and a subsequent reduction in energy bills if heated water is used in their business.

5.4.10 Customer research into our proposed business visit proposition showed that many NHH's immediately see the benefit of having a visit and responses to the proposition were overwhelmingly positive. A range of factors will drive interest in the proposition, but for 51% of NHH's saving money was the main driver.[8]

Figure 5: Quotes captured during customer research with 327 business customers exploring the water efficiency visits proposition.



Source: UUW Customer Research

5.4.11 We will work with Retailers to structure a scheme which ensures businesses across our region have access to a free of charge water efficiency visit. The scheme will be structured to encourage retailers to engage with their customers directly however if take up of the scheme by certain retailers or particular areas or sectors is limited then we will deliver the visits ourselves.

5.4.12 The incentive to the retailer will be structured to encourage visits to businesses where the visit may be time consuming but the resulting demand savings will be sizeable thus avoiding a situation where incentive payments are claimed for performing a visit but with little consumption reduction as a result.

5.4.13 We have consulted with retailers and they have shown support for our intended approach.

5.4.14 NHH water efficiency visits alongside smart metering for NHH customers are the two NHH interventions to enable us to deliver a 9% reduction in business demand by 2037/38.

[8] Trinity McQueen on behalf of United Utilities, NHH Water Efficiency Visits, April 2023

6. Cost efficiency

6.1.1 We have considered a number of different options for water efficiency in order to meet our targets for household and non-household demand reduction in AMP8 and beyond. 500 supply and demand options were considered as part of the WRMP process and 228 of these were demand side options (Table 4).

6.1.2 Our 2024 Water Resources Management Plan process has prioritised the interventions detailed in this enhancement case as offering the least cost, best value option. We used a best value optimisation tool, named ValueStream, as part of our decision-making methodology to create an optimal plan. Comprehensive assurance activities have accompanied the development of our plan.

6.1.3 As described in Section 5 we have run a number of trials in order to determine the most cost efficient delivery mechanisms alongside the most favourable customer journey. These trials have enabled us to forecast the benefits, namely consumption reductions, that we believe are possible from each of our interventions.

6.1.4 We have used market testing and competitive commercial frameworks to inform the costs for our household water efficiency interventions.

6.1.5 We have sought to benchmark cost benefit ratios against other companies' published Draft WRMPs where available *(Table 4 Options Appraisal Summary)*. Whilst data sets from other water companies are limited, when considering the North West context and WRMP selected programme the indications are that our proposed cost position is efficient relative to other companies.

6.1.6 When viewed as a whole all of this activity provides a measure of assurance that the costs we have included in our plan achieve a high level of efficiency.

7. Customer protection

7.1 Introduction

7.1.1 It is important that customers have confidence that we will deliver the enhancement schemes that get reflected in our PR24 final determinations and they are suitably protected in the event of non-delivery, or if there are material changes to deliverables (including changes to dates), which leads to a change in cost (including changes in the timing of required expenditure). Ofwat proposes that, if companies fail to deliver or are late delivering improvements to customers, then price control deliverables (PCDs) should, where appropriate, be used to compensate customers. In our PR24 *Chapter 8 – Delivering at Efficient Cost, section 8.8.9* we have proposed an approach to PCDs that aims to provide customer protection, such that customers are fairly compensated for non-delivery (such as due to a change in regulatory requirements) or late delivery (including as a result of a change to a regulatory date), between PCDs, any related ODI underperformance payments, and cost sharing arrangements.

7.2 Price control deliverable

7.2.1 We have not included a PCD for this area as it is small in size, and below Ofwat's indicated threshold.

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