UUW57

Water Business Plan

October 2023

Chapter 8 supplementary document

This supplementary provides details of our AMP8 delivery plans for the Water Resources and Water Network plus price controls, aligned to our long term delivery strategy. It provides additional details, at a price control level, of the activities we expect to undertake to deliver the targets we have proposed.

United Utilities

Water for the North West

Contents

1. Water Business Plan

1.1 Structure

1.1.1 This document contains our Water Business plan and is structured as below:

- Water Resources Price Control
- Water Network Plus Price Control

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Water Resources Business Plan

October 2023

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Contents

1. Water Resources Business Plan

1.1 Key Messages

- **Value for money:** Our AMP8 business plan for Water Resources outlines £782m of expenditure, from 2025 to 2030, enabling us to meet our stakeholder and customer expectations.
- **Meeting our environmental obligations:** Based on our plan, we will invest £105m to **deliver 110 actions** within our Water Industry National Environmental Programme (WINEP) to protect and enhance the environment in which we operate, ensuring we meet our environmental obligations.
- **Trusted custodians:** We will manage our land and reservoirs responsibly to protect and enhance water quality, improve the environment of the North West and ensure communities and visitors have access to, and can safely enjoy, recreation opportunities in iconic landscapes within our region.
- **Leading the way in water transfers:** Our plan proposes to enable early transfers to test the efficacy of a national water grid. In AMP8, we will introduce new water sources into our system to facilitate a 25 Ml/d water transfer.
- **Best value long-term solutions:** Our Water Resources Business Plan is aligned to our long-term delivery strategy with adaptive planning pathways to focus our investment in the areas that matter the most. We have identified the best value solutions, considering whole life costs and wider environmental and social value

1.2 Purpose of the document

1.2.1 This supplementary provides details of our AMP8 delivery plans for the Water Resources price control, aligned to our long term delivery strategy. It provides additional details, at a price control level, of the activities we expect to undertake to deliver the targets we have proposed.

1.3 Structure

- **Section 2** provides an overview of the context of the North West, including customers, stakeholders and communities; the environment we work within and an overview of our operations.
- **Section 3** discusses our AMP7 track record.
- **Section 4** introduces our AMP8 vision and plan, including a summary of the relevant performance commitments, maintenance, resilience and innovation.
- **Section 5** shares our long term strategy for water services in the North West, including an overview of our core and adaptive pathways for water.
- **Section 6** shares our plan summary.

2. Context of the North West

2.1 Summary of the region

Customers, Stakeholders and Communities we serve

2.1.1 The North West is the UK's third most populous region. Over 7 million people rely on United Utilities Water every day to provide great water services. The population has grown by 8.6% since 2002 and projections forecast around an additional 1 million people by 2050, increasing demand for water services. Additional demands on water infrastructure are expected to be concentrated in certain areas, such as Manchester and Carlisle. Water efficiency is consequently a key priority in the 2025-2030 period, and longer term.

2.1.2 Additionally, we support around 200,000 businesses (non-household customers) across the region that have a range of needs in-terms of scale and complexity of their water supply. The region is home to the largest proportion of manufacturing industry in the UK, with 15,000 manufacturing businesses based in the region. These businesses require robust continuity of water supply and quality as changes in pressure and quality can impact their products.

2.1.3 47% of the most deprived neighbourhoods in the country are in the North West. The risk of poor health is higher when living in deprived areas, as shown in the Office for National Statistics (ONS)[1] figures. Health issues often come hand in hand with additional water needs and a reliable supply of wholesome water is intrinsically linked with good public health. Given that people in deprived areas already have a higher rate of underlying ill health, this is all the more reason why water quality is important.

2.1.4 There is a diverse mix of cultures in the North West and therefore it is imperative that we work with local communities to understand customer needs and manage services in response. For example, making sure water services are not disrupted is even more important than normal for Muslim customers during Ramadan.

2.1.5 Diverse catchments and a rich cultural history make the North West an exciting place to live and visit. Tourism plays a key role in the region's economy and culture. Between April and December 2021, the North West region saw the fourth highest number of day visits in England, over 13 million visits, accounting for some 13% of England's day visit market. Populations can increase by up to 68% during peak periods in some popular towns. This creates challenges in planning for water and wastewater services, with fluctuating demand for water.

The environment we work to protect

2.1.6 The North West is home to some of England's most beautiful landscapes. Diverse geography, topography, land use and the weather all make the North West unique. Historically, carved by glaciers forming upland lakes and over 8,000km of rivers; today, affected by some of the wettest weather in England. The history and geography of our region have fundamentally shaped our approach to delivering water services.

2.1.7 Investment to protect and restore the environment has been wide ranging. Here in the North West, we have led the development of catchment management programmes in the water industry, including our award-winning sustainable catchment management programme (SCaMP) and catchment systems thinking strategy (CaST).

Climate – managing water resources

2.1.8 The relatively wetter climate, geological foundations and the presence of significant upland areas have shaped how we provide customers with water. Approximately 95% of water resources in the North West are surface water sources – lakes, reservoirs and rivers, with a much smaller proportion from

[1] https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthinequalities/bulletins/healthstatelifeexpectanciesbyindexofmultipledeprivationimd/2017to2019#life-expectancy-at-birth-in-england-by-the-index-of-multiple-deprivation

groundwater sources or aquifers compared to the national average. To effectively manage this, we operate the largest fleet of reservoirs in the UK and, through our integrated supply network, have built flexibility into the system to balance supply and demand needs. Additionally, we have the largest amount of owned water catchment land, which we manage and invest in to protect water quality.

2.1.9 A large proportion of our surface water resources are in the upland catchments of Cumbria and Snowdonia, while a large proportion of customers live in the centre of the region, in the populous conurbations of Manchester and Merseyside. We therefore use large aqueducts to transport significant volumes of both raw and treated water from the uplands, to the large population centres in the middle of the region. In AMP8, it will be critical that we maintain and manage these significant assets to ensure resilience for supplies over the long term.

2.1.10 We plan for long-term climate change impacts on water resources. Climate change means that, in the UK, we will have hotter and drier summers, and by 2040 we expect more than half of summers in the North West to exceed temperatures of those experienced in 2003. Sustainability of water resources is a national priority, with the UK climate change risk assessment (UKCRA) highlighting that, by the end of the century, a water resource deficit across the UK of between around 1,220 and 2,900Ml per day could arise. According to the UKCRA, this equates to the daily water usage of between 8.3 million and 19.7 million people.

2.1.11 We work with other water companies through the regional planning group, Water Resources West, to understand and help manage the supply-demand balance, not only for the North West but across the UK. A 2018 report by the National Infrastructure Commission, 'Preparing for a drier future'[2], highlighted the risk of extreme drought, and supported the twin track approach of investing to both enhance supply and reduce demand to manage this long-term risk. Our 25-year Water Resources Management Plan outlines our long-term investment plan for water resources and describes the combination of demand and supply side options we've identified to build long-term resilience of supplies.

Climate – managing water quality

2.1.12 As the majority of North West water resources are sourced from upland surface waters, much of the water we provide is soft, with lower mineral content and lower alkalinity. This makes the water more corrosive to cast iron pipes, contributing to a higher rate of discolouration; consequently, this means we need to invest in and provide additional levels of treatment.

2.1.13 Surface water supplies are also prone to the naturally occurring compounds geosmin and 2-methylisoborneol (2-MIB) that are produced by some algae and bacteria, and can lead to an earthy or musty taste and odour in drinking water. We carefully manage water resources through increased monitoring and intelligent source selection during the warmer, drier months when concentrations of these compounds and demand for water are simultaneously at their highest. In recent years, we have mitigated this risk by removing sources, or in more severe cases where the additional treatment is not an option, entire water treatment works from supply until the concentration of these compounds has reduced to a level that will not impact the aesthetic quality of the water for customers.

2.1.14 We anticipate other impacts of climate change on our water resources, including an increased risk of soil erosion and associated water quality issues resulting from an increase in frequency of short, intense summer storms. Our ongoing investment in nature-based solutions in catchments to slow flows and reduce soil erosion is a critical part of our long-term plan to deliver resilient supplies.

Protected landscapes

2.1.15 There is widespread recognition of the importance of the North West's landscapes, both environmentally and culturally. Many areas have legally protected status, including three National Parks and three Areas of Outstanding Natural Beauty (AONB). The functionality of these landscapes is fundamental to supporting the communities and economy of the North West, including essential natural processes that enable water supplies and reduce the risk of flooding. The North West is also home to

[2] nic.org.uk/studies-reports/national-infrastructure-assessment/national-infrastructure-assessment-1/preparing-for-a-drier-future/

over 200 Sites of Special Scientific Interest (SSSI) and 41 Special Areas of Conservation (SAC). UUW is proud to own and collaborate in the conservation of these protected areas to protect and restore their critical functions in the water cycle and deliver many wider benefits for recreation, nature and climate regulation.

2.1.16 We actively manage some of the most extensive areas of blanket bog and upland peat in the country – areas that have been identified as internationally important for biodiversity and as stores of carbon. Maintaining and enhancing these peatlands is critical in managing the quality and quantity of water we source for public supplies. These environments are vulnerable; wildfires catalysed by warmer and drier weather conditions have occurred more frequently over the last ten years, impacting raw water quality, biodiversity, and releasing natural carbon stores.

Working with the Royal Society for the Protection of Birds (RSPB) to protect landscapes

Our partnership with the RSPB has a long standing history. Joint work at our Haweswater estate over the past ten years has delivered benefits for water quality and biodiversity. The partnership has demonstrated that nature-based solutions make a very real contribution to meeting the challenge of a changing climate and the economic pressures facing upland farmers. Our collaborative project to restore Swindale beck in Cumbria won the River Restoration Centre's UK River Prize 'Project Scale Award' in 2022.

Figure 1: The re-meandering of Swindale Beck

We work together with RSPB at several other sites, including Bowland in Lancashire, Dove Stone Reservoir near Oldham, and Lake Vyrnwy in North Wales. Across these catchments, the partnership delivers activities such as supporting farming tenants, restoring peatland, creating and managing new woodland, and working to improve the visitor experience. In delivering these activities, we increase resilience to climate change, provide access to nature for health & wellbeing and support sustainable farming.

Overview of our operations

2.1.17 United Utilities Water Resources business is the largest commercial land owner in England. We manage 56,000 hectares of catchment land across North West England. Much of our land is home to protected habitats, and we operate significant land holdings in the Lake District and Peak District National Parks.

2.1.18 The majority of our land holdings are the 'catchment land' which drain to our storage and abstraction points (reservoirs, boreholes and rivers) where we obtain the raw water that we treat and supply to customers.

2.1.19 We actively manage our catchment land in order to maximise the quality of the water we supply. Our catchment land is also home to a large number of agricultural tenant farmers, and much of the catchment is open to public access and is widely used for recreation. Our catchment management programme seeks to optimise raw water quality, whilst delivering our obligations under environmental regulations and creating added value for stakeholders and communities.

2.1.20 Our property portfolio includes the largest fleet of reservoirs in the UK. We operate 172 reservoirs, some of which date back to the 18th century. Our reservoirs are key to our ability to supply water to customers, as approximately 60% of the water that we supply comes from our reservoirs. We manage

our fleet of reservoirs to ensure that they can be operated in a reliable and safe way, providing great water for customers now and in the future.

2.1.21 Our reservoirs have associated abstraction licenses which include requirements for us to provide environmental compensation flow and seasonal water bank releases. They play a critical role in protecting the environment of the North West and are a significant regulatory obligation as part of our operations.

2.1.22 In addition to our reservoirs, we also abstract water from groundwater borehole locations, and from streams, lakes and rivers.

2.1.23 We operate an extensive network of aqueducts and pumping stations to enable us to transport water to where it is required for customers. Our Water Resources business area is responsible for the management of this raw water supply infrastructure, and we will ensure the continued resilience and reliability of this system.

2.1.24 The way in which we manage our catchment land, and the act of removing water from the natural environment, can have an impact on sensitive habitats. We have regulatory obligations to manage our operations in a way that protects and enhances the environment.

3. AMP7 Track Record

3.1 Current performance

3.1.1 In planning for AMP7 we established outcomes which encapsulate how we meet customers' expectations.

3.1.2 Chapter 8 describes in detail how we have delivered these outcomes, and our performance against the measureable commitments that we made. Two of these outcomes, however, are particularly relevant to our Water Resources plan so we summarise the current performance to set the scene for our future strategy.

You have a reliable supply of water now and in the future

3.1.3 We have met our performance commitment for drought risk resilience for the first three years of AMP7. The percentage of customers at risk of experiencing a severe supply restriction in a 1-in-200 year drought is zero. In AMP7 we have improved the resilience of our supplies to dry weather events, eg through a significant programme of investment in groundwater sources in north Cheshire. This strategic location is perfectly placed to support the heavily populated central part of our region. We also regularly make use of our ability to move large volumes of water between the east of our region (supplied from the north) and the west of our region (supplied from the south) and vice versa.

3.1.4 This is a reputational performance commitment and Table 1 shows our actual and projected AMP7 performance for this outcome.

Table 1: AMP7 Performance - You have a reliable supply of water now and in the future

Performance Commitment	Units	Actual			Projected	
		2020/21	2021/22	2022/23	2023/24	2024/25
B06 – Drought risk resilience	The percentage of customers at risk of experiencing severe supply restrictions during a 1 in 200 year event, on average over 25 years	0%	0%	0%	0%	0%

Source: Annual Performance Report

The natural environment is protected and improved in the way we deliver our services

3.1.5 We have met the target for the Abstraction Incentive Mechanism (AIM) performance commitment for the first three years of AMP7. We proactively monitor river flows at the AIM sites and seek to reduce abstraction at times of low river flow. AIM relates to a regulatory mechanism to incentivise us to reduce our abstractions at three environmentally sensitive locations in Cumbria. The mechanism enables us to recover costs associated with pumping water from elsewhere to offset that reduced abstraction.

3.1.6 The Improving the water environment measure aims to protect customers from late delivery of our environmental improvement programme. Prior to the start of the AMP, we agreed the programme of work with the Environment Agency and this was published through its Water Industry National Environment Programme (WINEP). The scope of this performance commitment is limited to schemes under the FBG (fisheries, biodiversity and groundwater), WR (water resources) and WQ (water quality) functions on the WINEP. We assess the number of days each scheme is delivered early or late and the cumulative view of this is reported annually. For this measure, the net aggregate position for the first three years of the AMP is reported as 80 days early, when we add the 18 days early from year three to the 62 days early from year two. All schemes expected to be completed later in the AMP are currently forecast to be on track against our delivery plan.

3.1.7 See Table 2 for our actual and projected AMP7 performance for this outcome.

Table 2: AMP7 Performance - The natural environment is protected and improved in the way we deliver our services

Performance Commitment	Units	Actual			Projected	
		2020/21	2021/22	2022/23	2023/24	2024/25
Abstraction incentive mechanism (AIM)	Megalitres (Ml)	-695.9	-134.4	0.0	0.0	0.0
Improving the water environment	Net number of days early (+) or late (-)	0	+62	+80	+80	+80

Source: Annual Performance Report

3.1.8 Performance commitments are reviewed at the end of every AMP period, and UUW will have a different set of performance commitments in AMP8.

3.2 How pilots have informed our AMP8 and longer term business planning

3.2.1 As part of our commitment to using innovative approaches to deliver great service to customers, we delivered a programme of trials in AMP7 that aimed to test new ideas and concepts, and inform our AMP8 plan. A total of 24 pilots were commissioned across the end to end water and wastewater system; from protecting our water resources, to improving the resilience of our wastewater system and optimising our Bioresource assets. We are proud to have worked with over 20 partner organisations and receive more than £900k of partnership funding to support delivering these pilots and trials.

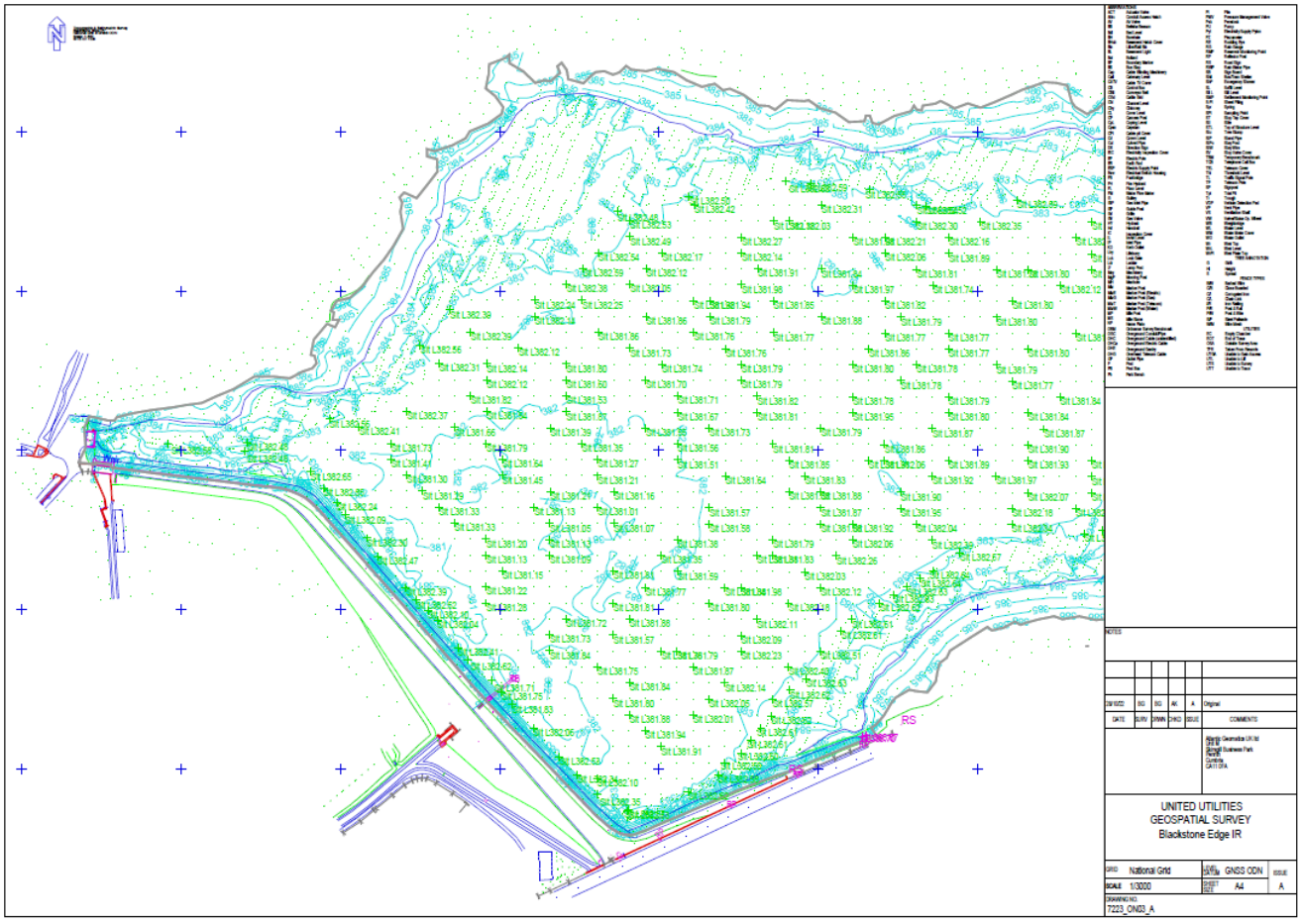
3.2.2 Three of the pilots commissioned have been used to inform our Water Resources strategy. We worked with customers and organisations across the North West to address issues that are important to them through our Water Resource Strategy and related plans and investments. Table 3 provides a summary of our pilots, the learning and what we are doing next.

Table 3: AMP8 Pilot summary

Pilot	What did we do?	What did we learn?	What are we doing next?
Catchment Asset Health	Working with contractors and suppliers, we undertook surveys to gather a baseline of peat depth and condition of land owned by UUW in the Upper Mersey catchment	We can now estimate the extent of our peatland and associated carbon emissions through the use of the Peatland Code. We can more effectively prioritise interventions, reducing the cost to treat and the risk of water quality contacts.	Utilise this data to prioritise areas for further restoration in AMP8 through our WINEP and other raw water quality projects.

Pilot	What did we do?	What did we learn?	What are we doing next?
Reservoir Bathymetry Study	Using drones, we undertook bathymetric surveys at 3 river valley and 3 moorland impounding reservoirs, we then extrapolated this data to understand the overall impact at all of our reservoirs. See Figure 2 which shows the results of the survey.	The percentage of storage lost to siltation is not highly significant and we do not need to enter a desilting programme in AMP8.	We plan to complete the surveys again at the end of AMP8 to inform our plans in AMP9. We can also use the survey findings to inform future engineering works and dam safety activity.
Reservoir Mesocosm	Working with university researchers, we investigated the links between Geosmin and 2-MIB compounds and the nutrients present in water. See Figure 3 which shows the pilot in action.	We learned that temperature is the key factor in influencing Geosmin and 2-MIB Taste & Odour events. We now know that nutrient levels do not significantly impact on these events.	This information will feed into our AMP8 WINEP taste and odour investigations.

Figure 2: Reservoir bathymetry survey results



Source: Bathymetry pilot survey data

Figure 3: Reservoir mesocosm pilot

Source: Mesocosm Experiment on Taste and Odour, Draft 1, the UK Centre For Ecology And Hydrology

4. AMP8 Vision and Plan

4.1 Water for the North West

4.1.1 Over the last five years we've made great progress towards our goals, delivering for customers, communities, and the environment. During this time, we've also been talking with and listening to customers, communities and stakeholders.

4.1.2 Through our customer research and stakeholder engagement we have found:

- Customers expect great water quality, every time they turn on their taps;
- Customers want us to reduce the amount of water that is leaking from our pipes; and,
- Customers and stakeholders agree it's important to see step changes in performance but not any cost, this must balance with affordability.

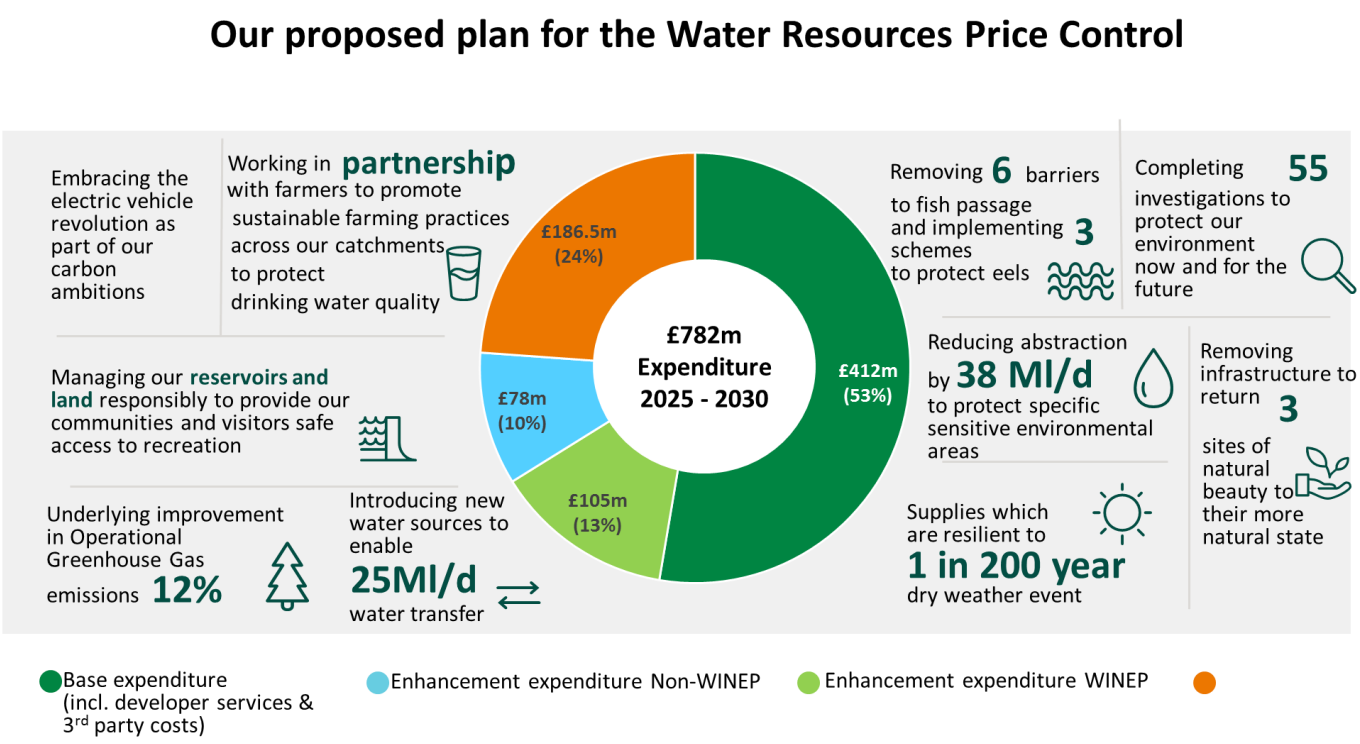
4.1.1 This customer and stakeholder input has shaped our vision and ambitions for the long-term. For more detail on our customer research, see *UUW21 - Customer Research Methodology*.

4.1.2 Our purpose and vision is to provide great water for a stronger, greener and healthier North West. This drives us to deliver our services in an environmentally sustainable, economically beneficial, and socially responsible manner, and create sustainable long-term value.

4.2 Overview of our plan for the Water Resources price control

4.2.1 We have set ourselves stretching targets to ensure we focus on the most valued aspects of the services we provide and Figure 4 illustrates the outcomes we plan to deliver through our AMP8 plan.

Figure 4: Our plan for the Water Resources price control



Source: UUW Internal data

4.3 Current and future drivers for change

Climate change

4.3.1 The Water Resources Long-term Planning Framework 2016, set out by Water UK, highlighted the "significant and growing risk of severe drought impacts arising from climate change, population growth and environmental drivers" in England. Through our leading role in Water Resources West (WRW) and regional planning, we are actively helping to solve some of the largest water supply risks in the country. To aid this, we are seeking funding through our Water Transfer enhancement case, for the progression of two Strategic Resource Options (SROs). For more information see *UUW62 – Water Markets enhancement case 9.*

4.3.2 Increasing concentrations of greenhouse gases in the Earth's atmosphere have and will continue to change the climate of the North West of England. On average the region will experience milder, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extreme events. The water sector is exposed to climate change. Our AMP8 Water Resources business plan, Water Resource Management Plan and Long Term Delivery Strategy have all been informed by climate change projections.

4.3.3 In winter heavy rainfall decreases raw water quality and can cause landslips damaging pipelines or block access to sites. Increase likelihood of storms risk interruptions to supply due to flooding of assets or power loss and increased rainfall volumes can cause increases in calls to drawdown reservoirs.

4.3.4 In summer, prolonged dry weather can lead to lower inflows into reservoirs and an increase of algal blooms in reservoirs. Blooms of algae and cyanobacteria make it harder for us to treat the water to required standards, and can cause unpleasant taste and odours which lead customers to contact us about water quality.

Population growth

4.3.5 The North West is the UK's third most populous region. Over seven million people rely on United Utilities Water every day to provide great water and wastewater services. The population has grown by 8.6% since 2002 and around an additional 1 million people are forecast by 2050, increasing demand for water services. Additional demands on water and wastewater infrastructure are expected to be concentrated in certain high growth areas, such as Manchester and Carlisle. Population growth and associated development of new or extended urban areas means water efficiency and rainwater management are key priorities during AMP8 and the longer term.

4.3.6 Having sufficient raw water sources is pivotal in being able to meet the increase demand for water. Consequently, our AMP8 Water Resources business plan, Water Resource Management Plan and Long Term Delivery Strategy have all been informed by the population growth projections.

4.3.7 One of the themes that emerged from our engagement with customers was that customers placed a high priority on planning for the future. In particular, customers wanted us to ensure that we would have sufficient water supplies available for a growing population for generations to come.

4.3.8 We will ensure that our long-term sustainable water resource capacity is capable of meeting forecast customer needs. We will ensure that future forecasts of demand are built into our plans, and that sufficient capacity is available.

Increased service expectations

4.3.9 New research [3]released in 2023 by the Consumer Council for Water (CCW) has revealed people's expectations for customer service standards. The research is the starting point of CCW's work to help the water industry modernise the Guaranteed Standards Scheme (GSS), based on customers' views. This is important work, as the current standards and payments have seen little change since they were first

[3] ccw.org.uk/news/new-research-reveals-peoples-expectations-for-customer-service-standards/

introduced over 20 years ago. In particular, customers want to see additional standards which focus on water quality and the environment.

Evolving digital world

4.3.10 Government and regulators are expecting a step-change of investment and security maturity to protect national infrastructure and data (particular consumer data) from security threats. As cyber-crime increases in scale, it is highly likely the water industry will become a regular target for both state-sponsored and opportunistic cyber criminals. All enterprises should be prepared for a large scale, sophisticated cyber-attack. Our Network and Information Systems Directive (NIS) enhancement case enables us to improve cyber security to ensure sites are more resilient to external threats. For more information see *UUW60 – Water Quality - SEMD and NIS-D enhancement case 4.*

Asset health & resilience

4.3.11 Our resilience strategy has evolved over time and in response to improved intelligence, threats, trends, and emerging risks as we mature our approach to operational resilience. This approach is detailed in our 2017 paper – Measuring Resilience in the Water Industry[4]. This approach provides better overall systems resilience than simply focusing on asset reliability. We firmly believe that is not good practice to only invest in a more reliable system, while neglecting the capacity to respond and recover from an incident, or to implement insufficient resistance to malicious threats. The reliability of supply can be affected by factors outside our control as our large asset base is exposed to hazards such as extreme weather, security risks and third party damage.

4.3.12 Building on the well-established 4R model, first developed by the Cabinet Office in 2010, we have evolved our risk and resilience framework to include 'review' as a fifth 'R'. We recognise that threats evolve, and we will continue to identify emerging risks; therefore, we must continuously review our risk exposure and learn lessons from incidents and near misses. We target this learning both internally and across other sectors both in the UK and internationally. For more information, see Chapter 7.

4.3.13 The historical legacy of the North-West means that UUW operates the largest fleet of reservoirs in the industry and significantly above industry average when normalised by households. The average age of UUW's reservoir fleet is the oldest in the industry. It would not be cost effective in the round to replace our old fleet with a new fleet or develop alternative sources, so we consider continued maintenance of our existing older fleet to be the most efficient solution.

4.3.14 Reservoirs cost more to operate and maintain than borehole sources, but Ofwat's proposed PR24 water cost models do not differentiate cost allowances based on source type. The Reservoir Dam Maintenance cost adjustment claim seeks an efficient adjustment of £186m to UUW's allowances to enable required statutory maintenance activity. For more information see *UUW44_Cost Adjustment Claims Submission - Update to claims*

Future regulation

4.3.15 Water resources have the potential to be significantly impacted by evolving regulation.

4.3.16 Recommendations from the Balmforth report produced following the Toddbrook Reservoir emergency has seen an increase in the number and scale of reservoir safety actions, issued to reservoir operators by independent safety inspectors. These safety actions are essential to ensure that our reservoirs continue to safely provide great water for generations to come, and UU remain committed to playing a leading role in UK reservoir safety in future. However these new safety measures are not reflected in cost models, which use historic spend as the basis for assessments of future need. To meet the new additional costs associated with these regulations, we are seeking £186m cost allowances through our Reservoir Dam Maintenance cost adjustment case For more information see UUW44_Cost Adjustment Claims Submission_Update to claims

[4] https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/looking-to-the-future/measuring-resilience-in-the-water-industry_final.pdf

4.3.17 UUW must ensure it meets environmental obligations in AMP8, as identified through the Environment Agency's (EA) Water Industry National Environment Programme (WINEP) and Natural Resources Wales' (NRW) National Environment Programme (NEP). We are seeking funding through our Water WINEP enhancement case to ensure these obligations are met For more information see *UUW60 – Water Quality – Water WINEP enhancement case 1*.

4.3.18 We will keep assessing current and future risks through the Drinking Water Safety Plan (DWSP) and wider horizon scanning. This enable effective and efficient risk management, at the right time and right point in the source to tap system, putting us in the best place to meet future regulations.

4.3.19 New drinking water standards are expected to be brought in relating to forever chemicals, such as perfluoroalkyl and polyfluoroalkyl substances (PFAS) and other emerging contaminants. Providing a continual, sustainable supply of clean drinking water to customers is a key priority and our AMP8 Water Resources business plan, Water Resource Management Plan and Long Term Delivery Strategy have all been informed by this driver. Should new standards for PFAS be introduced during AMP8, we would seek an interim determination (IDOC) to address the risk.

4.3.20 More information on these obligations and how we plan to meet then is given in supplementary document *UUW79 Statutory obligations summary*.

Net zero greenhouse gas emissions

4.3.21 The affordability and resilience of our operations and services fundamentally rely on a stable climate and a healthy natural environment. Consequently, greenhouse gas (GHG) emissions management and reduction is of exceptional importance to UUW and customers. We have therefore integrated the goal for net zero throughout our PR24 business plan.

4.3.22 We've developed an ambitious enhancement programme specifically targeting GHG emissions reductions. Undertaking this programme in AMP8 is vital to our low regrets, adaptive long term emissions reduction plan and overall ambition to reach the national legal requirement for net zero 2050 and maintain a science-based trajectory that support the national legal five year carbon budgets. For more detail, see *UUW67 – Cross Price Control enhancement case 25.*

4.3.23 Our Water Resources net zero enhancement programme includes the following project:

- **Transport fossil fuel reductions – green fleet:** this allows us to reduce our emissions associated with the use of fossil fuels in transport. This is achieved by swapping to low/zero emissions vehicles within our fleet.

4.4 Delivering great service – AMP8 Performance Commitments

4.4.1 Performance commitments are the metrics used to measure the service water companies deliver for customers and the environment. Common performance commitments have been selected by Ofwat to address three outcomes:

- Outcome A: Customers receive excellent service every day
- Outcome B: Environmental Impact
- Outcome C: Asset Health

4.4.2 All three categories are required to protect the interests of customers and secure the resilience of companies both in the short and the long term. Performance commitments relevant to the Water Resources price control fall under Outcome B: Environmental Impact, as shown in Table 4.

Table 4: Summary of Water Resources performance commitments

Ofwat Outcome	Performance Commitment	Units	2025-26	2026-27	2027-28	2028-29	2029-30
Environmental impact	Operational Greenhouse Gases (Water)	Percentage reduction from baseline (tCO2e)	10.17	10.54	11.14	11.96	12.37
	Biodiversity	Biodiversity units (cumulative from base year)	0.00	0.00	19.53	111.14	187.84
		Biodiversity units per 100km2 of land in the company's area (Cumulative)	0.00	0.00	0.07	0.38	0.64

Source: UUW Internal table

4.4.3 Our overall package of AMP8 Performance Commitments, alongside our robust forecast of performance for the remainder of AMP7 provides ambitious levels of service at excellent value for money. This demonstrates ambition in our service improvements, whilst being mindful of cost pressures on customers and pace of delivery over AMP8 and the long term. Stretching performance ambitions from AMP7 to AMP8 target sustainable improvements.

Outcome B: Environmental Impact

Operational Greenhouse Gases (Water)

12% reduction on an underlying basis, minimising the impacts of substantial growth pressures by embracing efficiency, the newest technologies and innovation

Purpose and benefits

To incentivise companies to reduce greenhouse gas (GHG) emissions generated, with a view to achieving UK government and Welsh Government's interim and final net zero emission targets by 2050.

Current performance

1. **A new metric.** This is a new performance commitment for AMP8.
2. **Track record.** We have a strong track record of playing our part to mitigate climate change and have reduced our scope 1 and 2 emissions by over 70 per cent since 2005/06.
3. **Future ambition.** This historical information is not reflective of what can be achieved in the future. To reduce the remaining emissions, will require extensive innovation, technological enhancements and investments.
4. **Good historic performance.** Provisional findings suggest we may be performing well against this measure. This is consistent with third-party findings from Frontier Economics.

Our AMP8 Plan delivers against five key themes

Value Robust emission reporting will be build on existing transparent reporting that will improve trust with customers and raise awareness of our contribution to the UK's greenhouse gas management plans.

Risks & resilience There are significant growth pressures which stem from our activities to extend services to the growing population and improve services in response to latest legal and regulatory requirements. This traditionally requires more emissions-intensive materials and operational processes.

Efficiency Our 2025-2030 plan is taking a long term view for greenhouse gas (GHG) emissions with an integrated, prioritised, low regrets approach to develop the most efficient and effective adaptive carbon plan

Customer expectation GHG emissions management and reduction is a priority to our stakeholders because the affordability and resilience of our operations and services fundamentally rely on a stable climate and a healthy natural environment.

Innovation We will build on our experience in renewable technology and self-generation opportunities and also develop our understanding of emissions and robust sampling and reporting of greenhouse gas emissions from our activities.

Our AMP8 performance targets aligned to the long term

Units: : Percentage reduction from baseline (tCO2e)

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
9.56	10.17	10.54	11.14	11.96	12.37	23.82	25.78	27.91	26.14

Biodiversity

Proposing ambitious plans to protect and enhance biodiversity through WINEP.

Purpose and benefits

This new measure incentivises to conserve and enhance biodiversity while delivering service to customers. The benefits are reduced extinction risk, increased resilience to climate and water resources changes and enhancements in ecosystem service provision such as water quality, localised climate regulation, pollination, clean air and physical and mental health benefits.

Current performance

1. **DEFRA metrics.** This is a new measure for AMP8 and utilises the Defra metric for biodiversity assessment which is in itself a relatively new assessment tool.
2. **No industry Upper Quartile.** There is no information on past performance for this measure across the industry and little comparative information to assess levels for upper quartile performance.
3. **Biodiversity assessment.** We have completed a desk top exercise to assess the biodiversity unit assessment.
4. **Best value solutions.** This assessment has been used for the purpose of comparing options to support the selection of the best value solutions.

Our AMP8 Plan delivers against five key themes

Value Large elements of our delivery plans focus our biodiversity efforts on restoring habitats on SSSI sites and the required action to improve the specific features of SSSIs. This will deliver benefits to habitats and quality of place.

Risks & resilience Delivering improvements to biodiversity through the WINEP will add habitat resilience and protection from development activities

Efficiency To ensure efficient and best value actions we plan to complete a pre delivery, on site biodiversity assessment for WINEP schemes that target biodiversity improvement. This will drive a forecast of investment in terms of biodiversity units. This assessment will ensure good value for money and will also be externally validated so we are assured of our efficient and best value actions

Customer expectation Customers place value on biodiversity protection. Although we recognise our role in raising awareness of our contribution to the UK's ambition.

Innovation This is a new measure and we expect to learn a great deal in-terms of effective assessments and cost effective solutions,

Our AMP8 performance targets aligned to the long term

Units: Biodiversity units per 100km2 of land in the company's area

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
0.00	0.00	0.00	0.07	0.38	0.64	6.09	15.48	25.65	35.82
Cumulative	0.00	0.00	19.53	111.14	187.84	916.83	2672.06	4427.70	6183.33

4.5 Environment

Introduction

4.5.1 As one of the country's largest private land owners, with over 56,000 hectares of land, it is UUW's duty to be custodians of the environment in the North West. Much of the land contains protected habitats of global significance and maintaining the health of this land plays a vital part in protecting biodiversity and raw water quantity/quality entering the reservoirs, especially with a view to increasing resilience to climate change.

4.5.2 The water industry has taken steps over the last 4 decades to improve the water environment. However, there is a collective ambition for the WINEP/NEP to deliver more for the environment, for customers and for communities. This reflects society's high expectations and the UK government's ambition to leave the environment in a better state for the next generation.

4.5.3 It has been recognised by the UK government that, without a change in the way water companies operate, by 2050 there could be issues with water availability, increased pressure to meet the demands of customers, industry and agriculture as well as increasing issues with flooding and resilience in the natural environment. Therefore water companies have been challenged to mitigate for their activities and provide a resilient, cost efficient service that benefits both customers and the natural environment.

Water Industry National Environment Programme (WINEP) / National Environment Programme (NEP).

4.5.4 United Utilities Water (UUW) must ensure it meets environmental obligations in AMP8, as identified through the Environment Agency's (EA) WINEP and Natural Resources Wales' (NRW) NEP.

4.5.5 WINEP/NEP is a regulatory obligation, developed as a framework for water companies to deliver requirements against the following environmental priorities (water):

- The Water Environment (WFD) Regulations 2017;
- Drinking water protected areas;
- Habitat regulations;
- Eel regulations;
- Invasive Non Native Species (INNS);
- Sites of Special Scientific Interest (SSSI);
- NERC biodiversity priority;
- Environmental Destination/Water Resource Management Plans;
- Salmon and Freshwater Fisheries Act; and,
- Environmental Permitting Regulations.

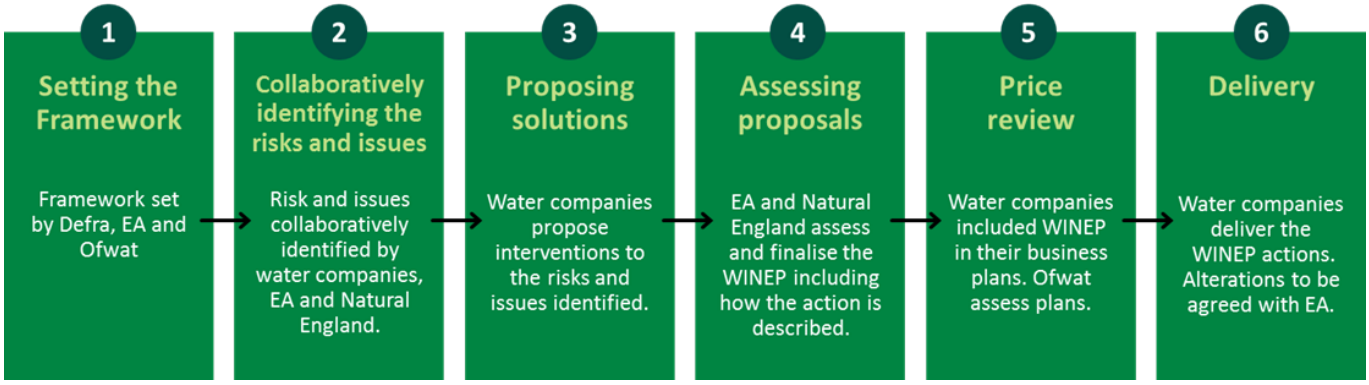
4.5.6 UUW has a statutory requirement to deliver 110 actions (55 implementation schemes and 55 investigations) in AMP8.

4.5.7 Enhancement funding is required in order to deliver our statutory environmental obligations and deliver the forecasted benefits of the programme. For more detail, please see *UUW60 – Water Quality – Water WINEP enhancement case 1*.

4.5.8 WINEP delivery counts towards the EA's Environmental Performance Assessment (EPA) for which the business aims to be 4*.

4.5.9 Figure 5 sets out the WINEP development process as detailed in the EA's WINEP methodology.

Figure 5: Stages set out in WINEP methodology



Source: WINEP methodology

Peatland restoration

4.5.10 According to the International Union for Conservation of Nature IUCN, 70% of drinking water supplied in the UK originates from peatland sources. This value is particularly the case for UU customers, with the majority of England's peat in the North West. Peatland is a hugely important carbon sink holding 550 gigatonnes of carbon globally, more than twice the mass stored in all forests. Restored peat is therefore a significant delivery route for carbon net zero, not just for UUW but for the industry and country as a whole. UUW owns a significant estate (56,000 hectares) of which the majority is situated around the upland reservoir catchments. This provides a unique opportunity for us as a landowner and water utility to maximise restoration effort through WINEP delivery and partnership working to deliver benefits for society.

Catchment Systems Thinking

4.5.11 Of particular relevance to the development of the WINEP is our Catchment simple (CaST) approach which is central to our Better system operation strategy. Through CaST we drive consideration of risks, issues and opportunities across catchments, understanding and aligning the needs of UWW and other stakeholders to deliver interventions which meet multiple drivers, encouraging partnership working and driving greater delivery and efficiencies. CaST will increasingly drive a place-based planning approach to catchments that ensures the activities which are prioritised and aligned to long-term plans for the area – delivering in the present and leaving a positive legacy for the North West.

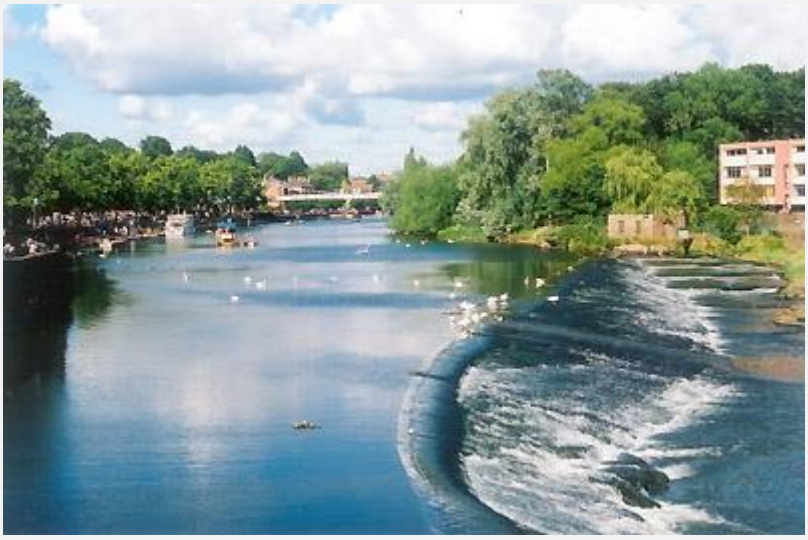
Other environmental requirements

4.5.12 In addition to the above, United Utilities Water Resources will be managed in compliance with a range of environmental regulations. These include, the requirements of our abstraction licenses. Abstraction license compliance, supply demand balance and other metrics contribute towards our company EPA star rating.

Working in partnership – River Dee catchment resilience

The River Dee, shown in Figure 6, is the only Water Protection Zone (WPZ) in the UK. It was set up following the 1984 pollution event where phenol contaminated water was detected in abstractions from the river. The WPZ aims to control the risks to water quality from industrial pollution by limiting the amount of chemicals that may be stored on sites. It has been very effective and over the past two decades, the risk from industrial chemicals has declined while contaminates arising from agricultural activities has increased.

Figure 6: River Dee



The Dee pollution (Deepol) group brings together Hafren Dyfrdwy, United Utilities, Welsh Water, Natural Resources Wales and the Environment Agency to ensure close partnership work to protect water quality. Twice-daily monitoring takes place to check for pollutants and inform action where required. Building on this long-standing partnership we have ambitious plan to deliver a catchment resilience scheme in the Dee beginning in 2025, in partnership with the other water companies, regulators, NGOs, local authorities, land owners and farmers. Based on our plan, we will implement the recommendations of our 2020-2022 turbidity investigation by delivering nature based solutions to reduce erosion in the highest priority areas. Co-funding from partners will enable this project to deliver multiple benefits by combining our resources to engage with farmers and land owners in the catchment to improve the resilience of the Dee catchment to the effects of extreme weather events and turbidity.

4.6 Reservoir dam maintenance

Introduction

4.6.1 Reservoir safety is a legal, social and moral requirement that United Utilities Water (UUW) is entrusted to deliver. As such, dam safety, risk assessment and management is at the heart of our water resources activities and is non-negotiable.

4.6.2 UUW operates the largest fleet of reservoirs of the English and Welsh water companies. These reservoirs require regular maintenance and inspection. These reservoirs were inherited at privatisation and drive higher water resources costs in the round. It is efficient to continue to operate and maintain reservoirs because the cost of developing alternative sources is prohibitively high.

4.6.3 UUW also operates the oldest fleet of reservoirs in the industry. The North West has numerous long sinuous valleys, close to urban areas that began to develop during the Industrial Revolution. This led Victorian engineers to construct chains of reservoirs along a valley to supply the burgeoning urban population with potable water. Upstream reservoirs provide additional water storage and support to the lowest reservoir in the chain, which often feeds a water treatment works and/or supplies water to the downstream watercourse. Figure 7 is an aerial image illustrating the chain of reservoirs in the River Douglas Valley.

Figure 7: The River Douglas Valley chain of reservoirs

4.6.4 Customers place a high priority on receiving a reliable water supply. Approximately 60% of the water supplied to United Utilities' customers begins its journey in one of our reservoirs. Optimising the operation and maintenance of our reservoir fleet is an essential step in ensuring a reliable water supply for customers. Most of our dams date from the period of the Industrial Revolution. Large communities have developed in the valleys downstream of our dams, increasing the consequences of a dam failure, so we proactively monitor and maintain.

Regulations

4.6.5 The Reservoirs Act 1975 dictates the activity reservoir owners must undertake to ensure dams do not pose a risk to the public. Reservoirs registered under the Reservoirs Act 1975 must have an appointed independent Inspecting Engineer undertake a detailed inspection and report of findings every ten years, or sooner if required. This is bolstered by the requirement to have a Supervising Engineer that provides supervision through annual inspection and a report on condition. These inspections notify a reservoir owner if they are required to undertake statutory works, maintenance or monitoring in respect of the reservoir in question and within what timescale. These requirements are classed as statutory actions.

4.6.6 There are eighty (80) statutory ten yearly inspections due to be undertaken within the last two years of AMP7 (from January 2023) and the first three years of AMP8 (by 31st March 2028), which will result in statutory actions to be undertaken during AMP8. Additionally statutory inspections undertaken in 2022, which require studies and investigations works, will likely lead to the requirement for capital works to be delivered in AMP8.

4.6.7 In addition, section 3 of the Health & Safety at Work Act (H&SWA) 1974, places regulatory obligations on the operators of commercial activities, which have the possibility of affecting people outside of the operator's work force, if something went wrong. In the unlikely event of dam failure, water would escape beyond the boundary of the water company site, and would flow downstream. Such an event would have the possibility to impact upon members of the public who are not working for the water company. It is this set of circumstances that gives rise to the legal obligations for dam operators under Section 3 of the H&SWA 1974.

4.6.8 The H&SWA 1974 is accompanied by a statutory guidance document, "Reducing Risks, Protecting People" (also known as R2P2). R2P2 sets out the extensive research carried out by the HSE into the

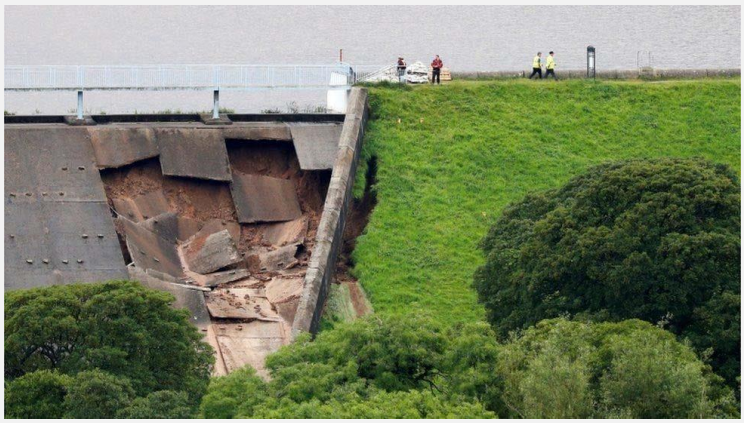
public tolerability of risk, and codifies this into a set of 'risk tolerability' criteria. R2P2 provides a formula by which the risk to the public can be assessed, based on a sliding scale of the number of people potentially impacted

4.6.9 The EA has recently updated its flood risk maps which has, in the main, identified increased population numbers downstream of our reservoirs. This has then increased the consequence of a dam failure and led to increased numbers of UUWs reservoirs falling within HSE defined "unacceptable" risk categories (as described in HSE document R2P2.

4.6.10 We have developed a process of pro-active risk management (the Portfolio Risk Assessment (PRA)) through which we are delivering risk reduction in line with Health and Safety Executive regulations.

The Toddbrook Dam Emergency incident (2019) has increased safety standards

In 2019, following two heavy rainfall events, the spillway at Toddbrook Reservoir in Whaley Bridge, owned by the Canal and River Trust, failed despite being fully compliant with The Reservoirs Act 1975. An emergency was declared and 1,500 Whaley Bridge residents were evacuated whilst water levels in the reservoir were reduced and temporary works were undertaken to stabilise the void in the spillway.



Following the incident the Government asked Professor David Balmforth (the President of the Institution of Civil Engineers) to undertake an independent review, to consider the effectiveness of reservoir safety legislation and regulations. The review (The 2020 Balmforth Report) has led to a more risk averse inspection process and more stringent timescales in which reservoir safety regulations are being enforced under the Reservoirs Act 1975. Consequently, this has led to a significant increase in statutory actions which is driving a significant increase in reservoir maintenance costs.

4.6.11 Prior to the 2020 Balmforth Report, we were industry leading in our approach to reservoir risk management (PRA). However, the 2020 Balmforth Report has led Inspecting Engineers to require reservoir owners to manage forward-looking risk on a statutory basis. This has effectively brought all companies into line with UUW's approach. Therefore, what was once our industry leading approach, is now an industry standard expected of all dam operators.

Cost Adjustment Claim

4.6.12 Reservoirs cost more to operate and maintain than borehole sources, but Ofwat's proposed PR24 water cost models do not differentiate cost allowances based on source type. The Reservoir Dam Maintenance cost adjustment claim seeks an efficient adjustment of £186m to UUW's allowances to enable required statutory maintenance activity.

4.6.13 The claim is made up of three parts:

- Part 1: The relative historic cost of maintaining and operating reservoir and borehole sources;
- Part 2: A rise in the number of statutory actions arising from regulatory safety inspections, since the publication of the 2020 Balmforth Report[1] into the Toddbrook Reservoir emergency; and
- Part 3: A change in the Environment Agency (EA) flood risk maps requiring additional work to remain compliant with the Health and Safety at Work Act 1974.

4.6.14 For more information on our cost adjustment claim see supplementary document *UUW44 - Cost Adjustment Claim Submission - Update to claims*

4.7 Innovation

We are ready to innovate again for AMP8

4.7.1 We are proud of our multi-AMP track record using innovation to deliver efficiencies, customer and environmental improvements. Our innovation portfolio, model and processes has guided us to adopt ideas in AMP7 that will continue to deliver value into AMP8, resulting in sustainable benefit to customers, wider society and the environment.

4.7.2 Our AMP8 innovation effort is directed by what customers tell us is important. They are aligned to Ofwat's core innovation themes, 2050 Water sector strategy and other government and regulatory ambitions – and our ambition for a stronger, greener and healthier North West.

4.7.3 We have an active innovation investment portfolio of new concepts and market-ready ideas for AMP8 adoption; we are excited about the potential of ideas being trialled such as:-

- AMP7-adopted ideas that need optimising – such as using drones for water quality sampling and asset health condition assessments
- New innovations being tested now including our AMP8 pilot portfolio and the outputs for all Ofwat Innovation Fund projects

4.7.4 In addition, we are optimistic of the prospect of finding even more ideas through our future Innovation Lab programmes and other global scouting.

4.8 Water Transfer

Introduction

4.8.1 The Strategic Resource Options (SRO) programme was developed in response to a number of strategic reviews of water resources. The Water Resources Long-term Planning Framework 2016, set out by Water UK, highlighted the "significant and growing risk of severe drought impacts arising from climate change, population growth and environmental drivers" in England. The report recommended that a portfolio of strategic supply side resources and transfers were required by 2065.

4.8.2 Through our leading role in Water Resources West (WRW) and regional planning, we are actively helping to solve some of the largest water supply risks in the country. In particular, we sponsor the North West Transfer (NWT) and Severn to Thames Transfer (STT) SROs, the latter in collaboration with Severn Trent Water and Thames Water. These projects are currently being progressed through a gated assessment process managed by the Regulators' Alliance for Progressing Infrastructure Development (RAPID) to address regional and national water resources planning needs.

4.8.3 At PR19 Final Determination, it was anticipated that SROs would complete the gated process within AMP7 and the funding was accordingly time bound. However, it has become evident that due to the time and seasonal constraints regarding collection of environmental data, along with extensive planning and abstraction licence timeframes, the SRO development process for the STT and NWT SROs will now continue into AMP8. RAPID have confirmed that PR19 funding will be reconciled at the end of AMP7 and any additional funding required during AMP8 to complete the gated process will be funded through PR24. For more detail on the funding we are seeking in AMP8, see *UUW62 – Water Markets enhancement case 9.*

Severn to Thames Transfer

4.8.4 The STT scheme involves transferring water from the River Severn to the River Thames where it can be abstracted by a number of water companies in the Water Resources South East (WRSE) region. When there is insufficient natural flow in the River Severn to meet the abstraction requirements of the South East, support releases can be introduced to augment flows, including from the UUW operating region via the NWT SRO. The STT SRO has been selected by WRSE in two regional plan adaptive pathways and

we will continue to develop the scheme in collaboration with Severn Trent Water and Thames Water as a risk mitigation for these pathways being triggered.

North West Transfer

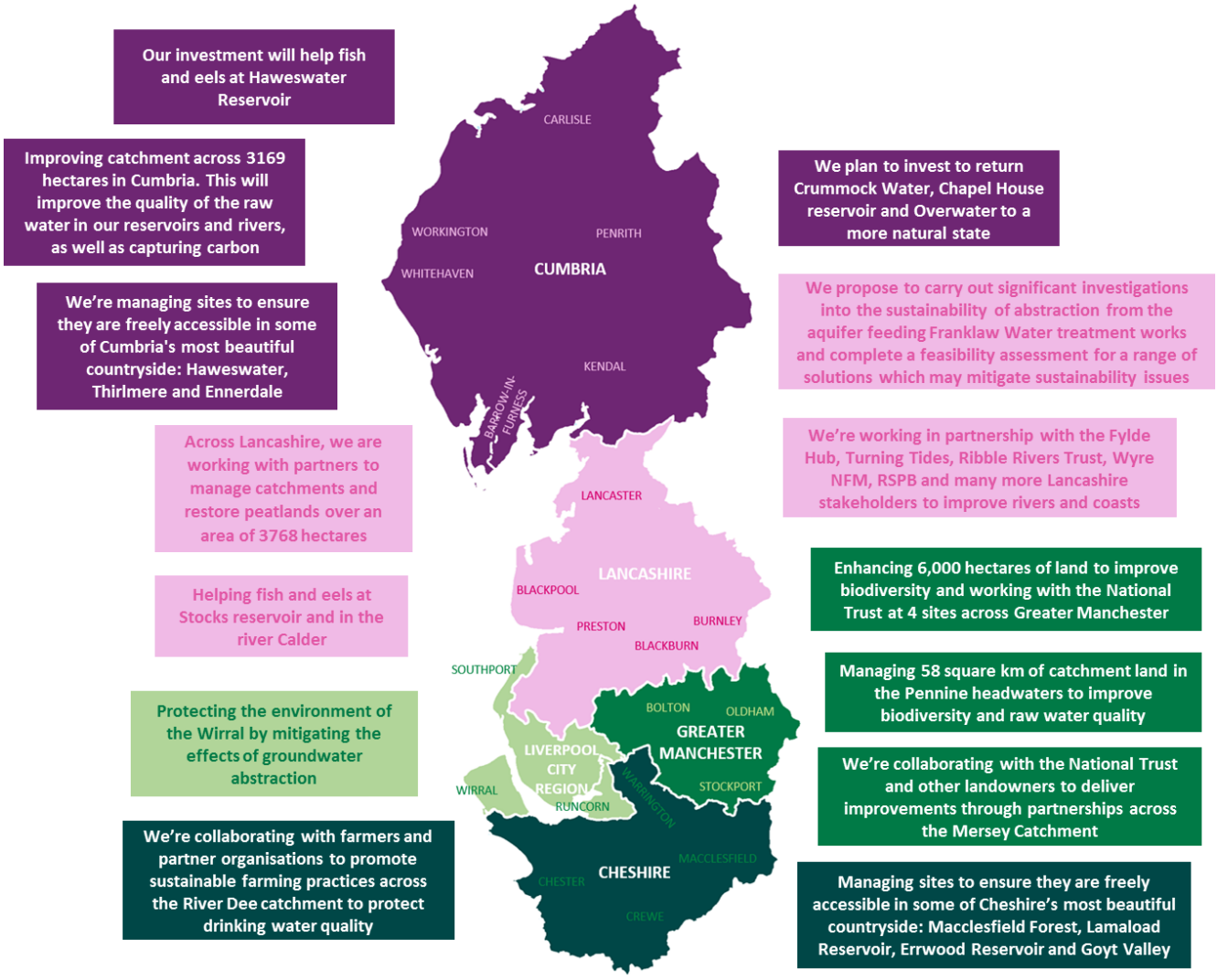
4.8.5 The NWT SRO has the potential to transfer up to 180 Ml/d of raw water from Lake Vyrnwy into the River Severn. In order to mitigate the impact on customers and the environment, the NWT SRO involves developing new water sources in North West England to 'backfill' the volume traded, in addition to engineering modifications to the Vyrnwy Aqueduct system to maintain supply resilience. Support from the NWT SRO would only be required at times when water resources in the Midlands and South East are under stress. In addition to the potential need from WRSE via the STT SRO, Severn Trent Water have selected a 25 Ml/d trade from 2030 in their WRMP preferred plan. We are therefore progressing the NWT SRO to achieve this requirement.

4.9 The North West is made up of diverse counties

4.9.1 We've built our plan for the next 5 years around the five counties of the North West, as each is different with its own particular challenges and opportunities. Through embedding this approach we aspire to deliver outcomes which are tailored for people in the places where they live

4.9.2 Our plan delivers service improvements across all of our five counties although also within our plan are specific schemes with greater importance in a particular county, see Figure 8.

Figure 8: Our plan for the five counties



Source: UUW internal data

5. Our long-term strategy for Water

Summary

- **Invest in assets fit for the future:** Our long-term plan for water outlines around £5.6 billion of enhancement expenditure over the next 25 years to meet our ambitions for water.
- **Safeguarding water resources:** Our plan aims to achieve ambitious targets to halve the level of leakage, reduce non-household demand and reduce water use per person per day to 110 litres by 2050. The reduction in demand for water will contribute to managing supply resilience to climate change and supports our commitment to reduce greenhouse gas (GHG) emissions.
- **Improving water quality:** Our plan delivers on our commitment of excellent water quality. Our proposed long-term investment ensures that drinking water quality will be resilient to challenges, such as climate change, asset health and potential risks from emerging contaminants and associated new water quality standards. We aim to reduce water quality contacts by 63% by 2050.
- **Supporting national needs:** Our plan supports national water supply resilience by developing options which allow us to transfer large volumes of water outside our region during times of need elsewhere in the country.
- **Adapting to the future:** We have tested a range of scenarios to ensure that our plan can adapt to future uncertainty in the face of climate change, population growth and abstraction changes, as well as understanding the opportunities offered by innovation and technology.
- **In summary:** Our proposed best value plan for water is formed of low regrets solutions which are flexible in addressing uncertain futures. They enable us to deliver our ambition of providing broad benefits to customers in the North West as well as supporting national water resource needs and delivering environmental improvements.

5.1 An overview of our long-term plan for water

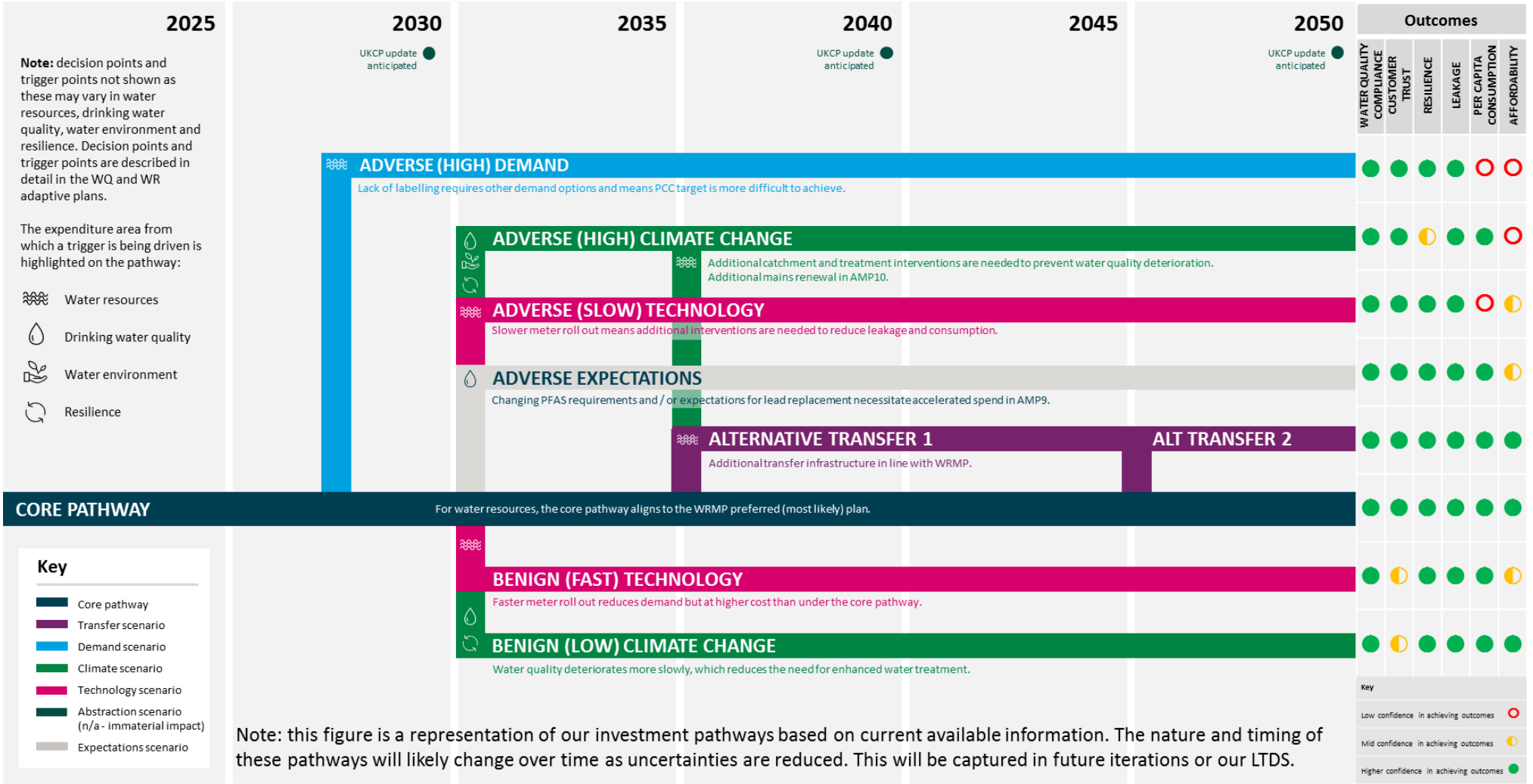
5.1.1 Our adaptive plan for water enables us to deliver our ambition for the North West under plausible extremes of climate change, demand, abstraction reductions, technological development, water transfers and changing customer and stakeholder expectations.

5.1.2 Our AMP8 plan has been developed in the context of our long term delivery strategy (LTDS). The key points from our adaptive plan for water are outlined in this section. For further information on how we've approached the development of our adaptive plan, the impact of scenario testing and full detail on our core and alternative pathways see UUW12_Long Term Delivery Strategy.

5.1.3 Our adaptive plan is comprised of a core pathway of low regrets investment and expenditure that keeps future options open, and alternative pathways containing investments required under more extreme future scenarios. Figure 9 shows under what circumstances we may need alternative pathways to help deliver our ambition and the triggers. Figure 10 highlights some of the investment and outcomes our Core Pathway delivers.

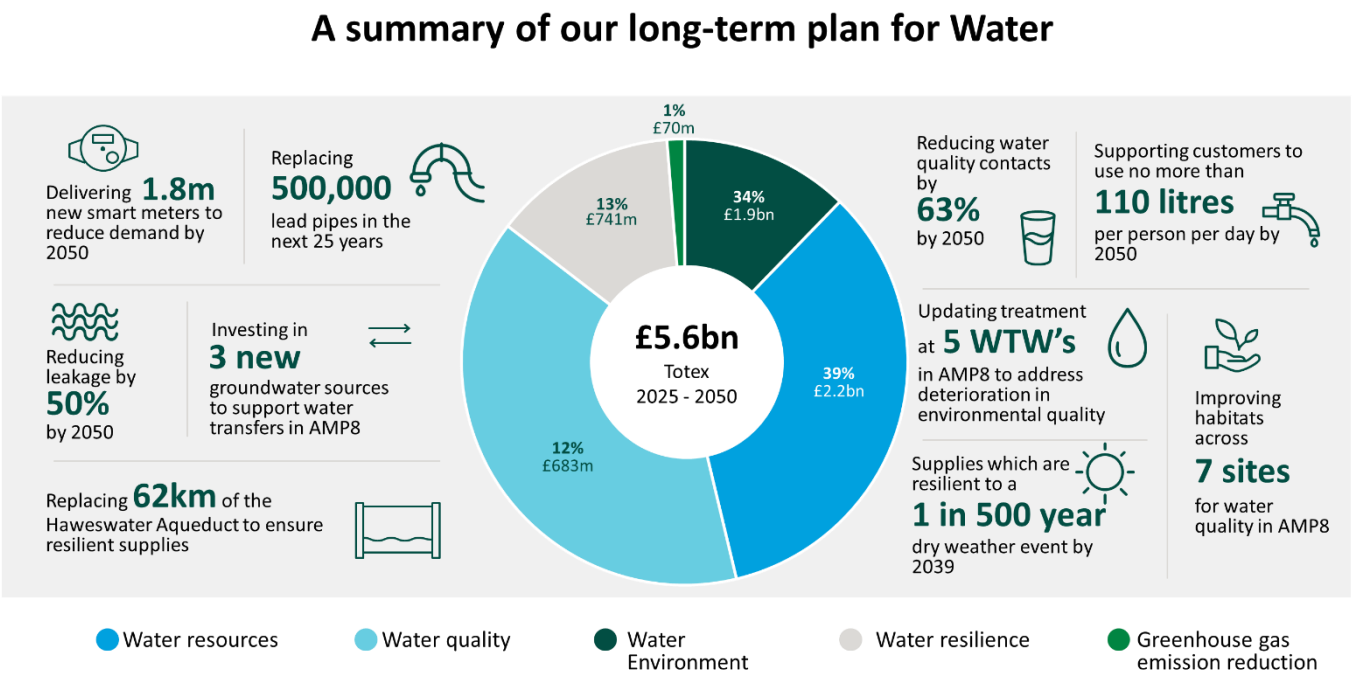
5.1.4 In many cases, alignment of trigger and decision points with regulatory cycles is important to ensure efficiency and best value for customers. For example, a change in supply pipe ownership to aid lead removal at the beginning of an AMP will allow appropriate funding and processes to be put in place.

Figure 9: Our singular adaptive plan for water, combining our Revised Draft Water Resources Management Plan (WRMP) and Drinking Water Quality Plan (DWQP)



Note: this figure is a representation of our investment pathways based on current available information. The nature and timing of these pathways will likely change over time as uncertainties are reduced. This will be captured in future iterations or our LTDS.

Figure 10: A summary of the totex expenditure and outcomes delivered through our long- term plan for water

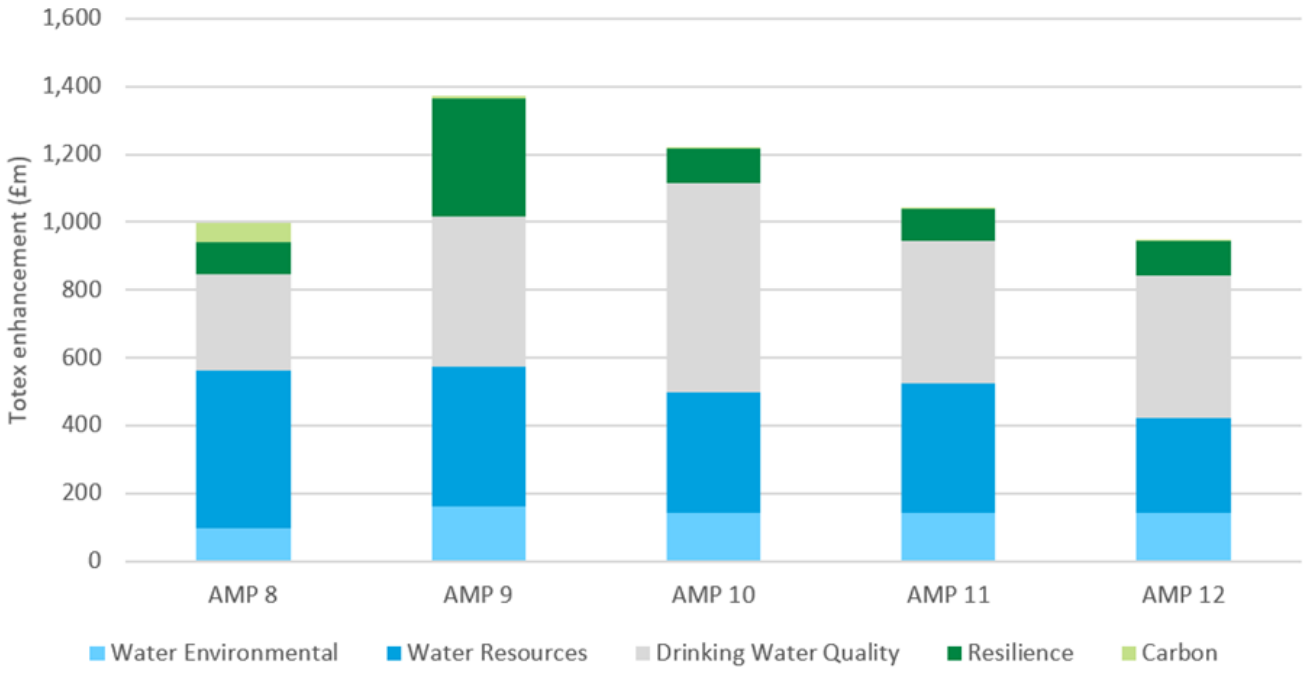


Souce: UUW internal data

5.2 Our core pathway to deliver our water ambition

5.2.1 Our Core Pathway for water is made up of low regrets investment aligned to our strategic programmes (WRMP, DWQP, WINEP) and AMP8 enhancement needs, and tested against the common reference scenarios and our wider scenarios, as shown in Figure 11.

Figure 11: Our Core Pathway of investment to 2050, by expenditure type



Source: UUW internal data

Water resources

5.2.2 Our core pathway embraces national efforts to reduce leakage by 50 per cent, non-household demand by 15% and household consumption to 110 litres per person per day by 2050 through plans to invest in mains renewal and metering. The core pathway includes interventions on leakage and demand reduction such as in-pipe repairs and lining technologies, and water efficiency measures. These interventions will improve the resilience of water supply in a changing climate, protect the environment by reducing abstraction to sustainable levels, and deliver better day-to-day service for customers.

5.2.3 The core pathway also supports the need for national water transfers by delivering three groundwater sub-options. These sub-options introduce additional production capacity to the North West and build the resilience of the system to prepare for times where water transfers are required.

5.2.4 We undertake extensive risk assessment, option development and appraisal, and adaptive planning through our statutory WRMP. We also contribute to the development and delivery of the regional water resources plan and wider national water transfer planning as part of Water Resources West. Both of these documents, like the LTDS, have a long-term planning horizon to 2050 and beyond. Our WRMP is designed to meet the Environment Agency's Water Resources Planning Guideline (WRPG)[5] alongside supplementary guidance and Ofwat's PR24 Guidance on Long-Term Delivery Strategies[6].

Water quality

5.2.5 Our Core Pathway proposes investment in catchments and at treatment works to manage deteriorating raw water quality.

5.2.6 The DWQP is our long-term strategy to secure water quality for future generations. The plan is based upon the requirements of the Drinking Water Inspectorate's long-term planning guidance[7] and includes high level ambitions applicable to the whole water supply system from catchment to customers' taps, for the planning period 2025 to 2050 and beyond.

Water environment (WINEP)

5.2.7 We have completed extensive options development and testing to identify investments to improve the water environment. These fall under the statutory WINEP. Future planned WINEP schemes are concentrated over the period to 2035 (as required by the Environment Agency), however they also provide a starting point for longer-term thinking. Our WINEP programme aligns to the Environment Agency's WINEP Methodology, which in turn addresses relevant aspects of the government's 25-Year Environment Plan.

5.3 Our alternative adaptive pathways for water

5.3.1 Our core pathway for water will allow us to deliver our ambition under most future scenarios. Under a small number of scenarios, we may need to use alternative pathways to deliver our ambition.

5.3.2 We've optimised our plans to prioritise options which deliver cross cutting benefits for example: mains replacement for quality, leakage benefit and resilience/asset health benefit; leakage for demand reduction and thus environmental benefit; and, customer demand management delivering efficiency for water and wastewater.

5.3.3 Notwithstanding its suitability under a wide range of scenarios, the Water Core Pathway will not deliver our stretching ambitions in all scenarios. By testing how our plan responds to a range of future scenarios we have created the alternative pathways of investment.

5.3.4 We have tested the impact of the following benign and adverse scenarios, and considered what expenditure is required under each of these scenarios to deliver our ambition

[5] Environment Agency. 2023. *Water resources planning guideline* (Version 12)

[6] Ofwat. 2022. *PR24 and beyond: Final guidance on long-term delivery strategies*

[7] Drinking Water Inspectorate. 2022. *Guidance Note: Long term planning for the quality of drinking water supplies*

- Demand;
- Climate change;
- Abstraction;
- Transfer needs;
- Technology; and,
- Changing expectations.

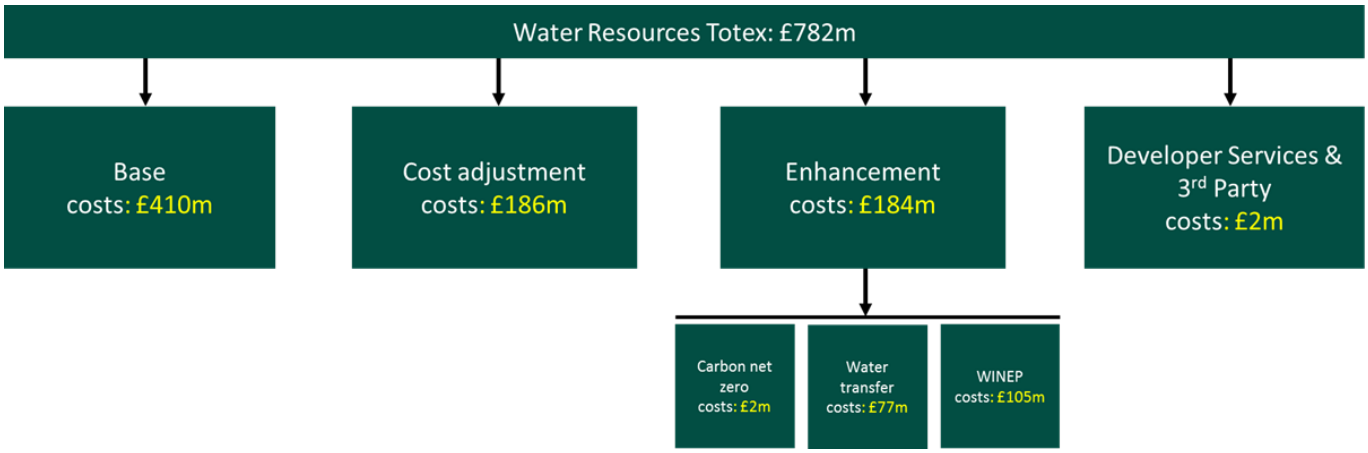
5.3.5 For more detail on our long term and adaptive plans for water, see UUW12_Long Term Delivery Strategy.

6. Plan Summary

6.1.1 Our AMP8 business plan for Water Resources outlines £782m of expenditure, from 2025 to 2030, enabling us to meet our stakeholder and customer expectations. The breakdown of our totex expenditure is shown in Figure 12.

6.1.2 **Water resources** base costs are broadly in line with the AMP7 FD. Enhancement totex relates to our obligations under the WINEP, the need to improve resilience in areas with raw water quality deterioration, and enabling works for future national water transfer. We include one cost adjustment claim reflecting that our higher reliance on reservoirs means we are disproportionately impacted by the increasing costs of reservoir dam maintenance.

Figure 12: Water Resources totex breakdown



Source: UUW internal data

6.1.3 As part of our Water Resources business plan submission we have included a number of cases for enhancement funding and cost adjustment, these are shown in Table 5 below.

Table 5: Water Resources business plan enhancement summary

Enhancement	Summary	Capex (£m)	Opex (£m)	Totex (£m)
WINEP				
Water WINEP – UUW60 – case 1	United Utilities Water (UUW) must ensure it meets environmental obligations in AMP8, as identified through the Environment Agency's (EA) Water Industry National Environment Programme (WINEP) and Natural Resources Wales' (NRW) National Environment Programme (NEP). Through the enhancement funding we forecast to deliver 55 schemes and 55 investigations as well as £651.514M of Wider Environmental Outcomes (WEO) (assessed using the EA's methodology).	71.827	33.667	105.495
Water Resource Management Plan enhancements				
Water Transfer - UUW62 – case 9	This enhancement case encompasses:- Strategic Resource Options Development - In alignment with the RAPID gated process, progression of the existing North West Transfer and Severn Trent Transfer Strategic Resource Options to Gate 4. Water Transfer Enabling Works In alignment with Regional Planning and company Water Resource Management Plans, delivery of infrastructure to develop new water sources and engineering modifications to the Vyrnwy system to facilitate water transfer and maintain supply resilience to customers in the UUW operating region. An additional 22ml/d of water supply will be introduced to facilitate a 25ml/d transfer.	76.722	0	76.722
Carbon reduction enhancements				
Carbon net zero 2050 UUW67 – case 25	11 Projects have been included within the scope of the enhancement. The projects relevant to the Water Price controls include:- Green fleet - Replacing diesel LCVs with EVs.			1.5
Cost adjustment claims				
Reservoirs – UUW44	Reservoir safety is a legal, social and moral requirement that United Utilities Water (UUW) is entrusted to deliver. As such, dam safety, risk assessment and management is at the heart of our water resources activities and is non-negotiable. This document provides advice to regulators about the appropriate means by which they should calculate and provide for the effective cost recovery of this essential activity in line with all legal and regulatory requirements. The claim is made up of three parts: • Part 1: The relative historic cost of maintaining and operating reservoir and borehole sources; • Part 2: A rise in the number of statutory actions arising from regulatory safety inspections, since the publication of the 2020 Balmforth Report into the Toddbrook Reservoir emergency; and • Part 3: A change in the Environment Agency (EA) flood risk maps requiring additional work to remain compliant with the Health and Safety at Work Act 1974.			186.49

Source: UUW internal data

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United Utilities

Water for the North West

UUW57

Water Network Plus Business Plan

October 2023

Chapter 8 supplementary document

This supplementary provides details of our AMP8 delivery plans for the Water Network Plus price control, aligned to our long term delivery strategy. It provides additional details, at a price control level, of the activities we expect to undertake to deliver the targets we have proposed.

United Utilities

Water for the North West

Contents

1. Introduction

1.1 Key headlines

- **Value for money:** Our AMP8 business plan for Water Network Plus outlines £3,119m of expenditure, from 2025 to 2030, enabling us to meet our stakeholder and customer expectations.
- **Delivering customer priorities:** We will continue to deliver a reliable supply of great, wholesome water to homes and businesses across the North West. Public health is our highest priority, and the water we supply will meet all health based water quality regulations. We will ensure that customers have a resilient water supply, by reducing the rate of unplanned outages (shutdowns affecting supply of water) at our water treatment works by 83% in AMP8.
- **Meeting ambitious leakage targets:** We will build on our achievement in AMP7 of meeting our leakage performance commitment to deliver a further 13% leakage reduction in AMP8, reducing leakage by 50Ml/d. This is in line with our Water Resources Management Plan 24 (WRMP24) and long term target of 50% leakage reduction by 2050. To help achieve this we are planning to significantly increase our annual water mains renewal rate in AMP8 to over 0.4%.
- **Protecting customers from supply interruptions:** We will lessen the impact our operations have on customers by reducing the number of supply interruptions by 13%, targeting the industry upper quartile.
- **Reducing demand for water, minimising bill impacts:** Based on our proposed plan, we will install over 900,000 smart meters to homes and business giving them the tools they need to reduce their consumption and manage their bills whilst delivering reductions in per capita consumption in line with stretching government targets, reducing it by 4.5% in AMP8 and 20% by 2050.
- **Focussing on water quality improvements:** Our plan proposes to deliver a step change in Water Quality performance targeting a 26% improvement in water quality contacts, and reduce the risk of discolouration for 1.38m customers in Merseyside and Cheshire through the Vyrnwy modernisation project.
- **Operating efficiently to reduce costs:** We will harness technology, innovation and markets to drive efficiency and benefit for customers and have set ourselves stretching targets to ensure we focus on the most valued aspects of the service we provide.

1.2 Purpose of the document

1.2.1 This document provides details of our AMP8 delivery plans for the Water Network Plus price control, aligned to our long term delivery strategy. It provides additional details, at a price control level, of the activities we expect to undertake to deliver the targets we have proposed.

1.3 Structure

- **Section 2** provides an overview of the context of the North West, including customers, stakeholders and communities; the environment we work within and an overview of our operations.
- **Section 3** discusses our AMP7 track record.
- **Section 4** introduces our AMP8 vision and plan, including a summary of the relevant performance commitments, maintenance, resilience and innovation.
- **Section 5** shares our long term strategy for water services in the North West, including an overview of our core and adaptive pathways for water.
- **Section 6** shares our plan summary.

2. Context of the North West

2.1 Summary of the region

Customers, Stakeholders and Communities we serve

2.1.1 The North West is the UK's third most populous region. Over 7 million people rely on United Utilities Water every day to provide great water services. The population has grown by 8.6% since 2002 and projections forecast around an additional 1 million people by 2050, increasing demand for water services. Additional demands on water infrastructure are expected to be concentrated in certain areas, such as Manchester and Carlisle. Water efficiency is consequently a key priority in the 2025-2030 period, and longer term.

2.1.2 Additionally, we support around 200,000 businesses (non-household customers) across the region that have a range of needs in-terms of scale and complexity of their water supply. The region is home to the largest proportion of manufacturing industry in the UK, with 15,000 manufacturing businesses based in the region. These businesses require robust continuity of water supply and quality as changes in pressure and quality can impact their products.

2.1.3 47% of the most deprived neighbourhoods in the country are in the North West. The risk of poor health is higher when living in deprived areas, as shown in the Office for National Statistics (ONS)[1] figures Health issues often come hand in hand with additional water needs and a reliable supply of wholesome water is intrinsically linked with good public health. Given that people in deprived areas already have a higher rate of underlying ill health, this is all the more reason why water quality is important.

2.1.4 There is a diverse mix of cultures in the North West and, therefore, it is imperative that we work with local communities to understand customer needs and manage services in response. For example, making sure water services are not disrupted is even more important than normal for Muslim customers during Ramadan.

2.1.5 Diverse catchments and a rich cultural history make the North West an exciting place to live and visit. Tourism plays a key role in the region's economy and culture. Between April and December 2021, the North West region saw the fourth highest number of day visits in England, over 13 million visits, accounting for some 13% of England's day visit market. Populations can increase by up to 68% during peak periods in some popular towns. This creates challenges in planning for water and wastewater services, with fluctuating demand for water.

The environment we work to protect

2.1.6 The North West is home to some of England's most beautiful landscapes. Diverse geography, topography, land use and the weather all make the North West unique. Historically carved by glaciers forming upland lakes and over eight thousand kilometres of rivers, and today affected by some of the wettest weather in England. The history and geography of our region have fundamentally shaped our approach to delivering water services.

2.1.7 The relatively wetter climate, geological foundations and significant upland areas have shaped how we provide customers with water. Approximately 95% of water resources in the North West are surface water sources – lakes, reservoirs and rivers, with a much smaller proportion from groundwater sources or aquifers compared to the national average.

2.1.8 As the majority of North West water resources are sourced from upland surface waters, much of the water we provide is soft and therefore contains lower mineral content and has lower alkalinity. This makes the water more corrosive towards cast iron water mains, contributing to a higher risk of discolouration in drinking water. Surface water supplies are also prone to the naturally occurring

[1]https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthinequalities/bulletins/healthstatelifeexpectanciesbyindexofmultipledeprivationimd/2017to2019#life-expectancy-at-birth-in-england-by-the-index-of-multiple-deprivation

compounds geosmin and 2-methylisoboreneol (2-MIB) that are produced by some algae and bacteria, and can lead to earthy or musty taste and odour in drinking water. Consequently, many North West water sources require additional treatment and monitoring than other parts of the UK, to ensure good taste, odour and appearance at the tap, and to avoid unplanned outages caused by fluctuating raw water quality.

2.1.9 Many of our surface water resources are in the upland catchments of Cumbria and Snowdonia, while a large proportion of customers live in the centre of the region, in the populous conurbations of Manchester and Merseyside. We therefore use large aqueducts to transport significant volumes of both raw and treated water from the uplands, to the large population centres in the middle of the region. In AMP8, it will be critical that we maintain and manage these significant assets to ensure resilience for supplies over the long term.

2.1.10 Increased coastal and riparian erosion resulting from climate change is expected to put more critical infrastructure at risk, such as pipes situated on eroding coastlines and riverbanks. Flooding from rivers also presents notable risk to a small number of our water treatment works or other network assets. This risk of flooding is increasing with climate change.

Overview of our operations

2.1.11 As the main licensed water company for North West England, on a typical day we provide 1,850 million litres of drinking water to a population of over seven million people and 200,000 businesses. On exceptional days – such as those seen during the recent freeze-thaw and heatwaves - the adaptability of our network allows us to respond to these customers' changing demands. During AMP7 we have experienced 2 dry weather periods as well as the COVID-19 pandemic and have, on occasion, provided in excess of 2 billion litres per day to customers.

2.1.12 We abstract water from a wide range of sources – including boreholes, rivers and reservoirs – across and outside our region. We treat this water to exacting and rigorous water quality standards before delivering it through over 43,000km of mains to customers whenever they need it.

2.1.13 We currently have 86 operational water treatment works (WTWs). Our WTWs have received significant investment since privatisation, to ensure that they meet the existing water quality standards and produce a reliable supply of clean safe drinking water.

2.1.14 Our treated water network supplies wholesome water to homes and businesses across a diverse region from rural countryside to dense urban centres, and historic industrial centres and seaside destinations. Our network comprises eight Large Diameter Trunk Mains (LDTMs), over 43,000km of water mains, 350 Service Reservoirs and 536 clean water pumping stations, and our responsibility for water quality extends beyond our network boundary and up to the customer's point of use.

3. AMP7 Track Record

3.1 Current performance

3.1.1 In planning for AMP7 we established outcomes which encapsulate how we meet customers' expectations.

3.1.2 Chapter 8 describes in detail how we have delivered these outcomes, and our performance against the measureable commitments that we made. Two of these outcomes, however, are particularly relevant to our Water Network Plus plan so we summarise the current performance to set the scene for our future strategy.

Your drinking water is safe and clean

3.1.3 Based on the provisional score calculated by the Drinking Water Inspectorate (DWI), we have not met our performance commitment for water quality compliance (CRI) in FY22/23, achieving 3.67 against a target of 0.00. Whilst infringements have increased in the water network we have seen a reduction in the number of infringements at water treatment works.

Water Quality First

Our Water Quality First programme, which is being delivered throughout AMP7, aims to deliver improvements that will provide customers with industry leading water quality. There are multiple workstreams which have minimised risk of our water treatment works (WTW) and service reservoir (SR) assets causing deterioration in water quality, as well as a comprehensive communication programme focussing on back to basics and improving understanding of how everyone across the business plays a role in securing water quality. In recognition of 26% reduction in Black, Brown and Orange contacts, reduced number of infringements at WTW and SRs and significant reduction in recommendations, the DWI has confirmed we are no longer in transformation with regards to our drinking water quality performance, only the second company to do so. Our focus on water quality continues as we maintain the momentum and continue to deliver water quality performance that customers expect.

3.1.4 We met our performance commitment for reducing water quality contacts due to taste, smell and appearance in 2022. The Water Quality First programme is having a measurable benefit and we have seen over 20% reduction across FY22/23 in the number of customer contacts for taste, smell and appearance of drinking water.

3.1.5 We have been successful in increasing customer awareness of how they can look after water in the home. We are using a multi-channel approach with a particular emphasis on radio advertising, sponsorship and direct communications (email and text) underpinned by the consistent use of local TV weather sponsorship.

3.1.6 We have two further performance commitments that will help improve water quality.

3.1.7 Our programme of lead service pipe replacements has reduced lead risk at 3,487 properties during FY2022/23. This exceeded our performance commitment of 800 properties. A wide range of options for lead pipe replacement have been considered taking into account all factors affecting lead including mitigation through long-term phosphate dosing and alternative techniques such as re-lining of lead pipes. Full lead replacement from the water main to the compliance point (customer's first tap) is our preferred solution because it: Is the most effective way to reduce lead risk; Offers a lower whole life cost; and creates opportunities to achieve multiple benefits through one intervention. We introduced a grant model to support full lead replacement to the customers' first tap. This has had strong uptake - we are on track to fully remove 14,100 customer-side lead pipes in AMP7. The in-year cap on the associated Outcome Delivery Incentive for the remainder of AMP7 has been removed, so we can build further momentum going into AMP8 and protect more customers sooner from exposure to lead.

3.1.8 The second programme of work aims to reduce the risk of discolouration of water from the Vyrnwy treated water aqueduct and will require LDTMs to be cleaned or relined. Work on this is currently being planned which will further improve water quality later in AMP7. We are currently on track against our delivery plan.

3.1.9 See Table 1 for our actual and projected AMP7 performance for this outcome.

Table 1: AMP7 Performance - Your drinking water is safe and clean

Performance Commitment	Units	Actual			Projected	
		2020/21	2021/22	2022/23	2023/24	2024/25
A01 – Water quality compliance (CRI)	Compliance risk index score	2.58	3.02	3.67	3.23	2.74
A02 – Contacts for taste, smell and appearance	Number of customer contacts directly related to the taste, smell and appearance of drinking water that are received in a calendar year (per 10,000 population)	17.7	17.9	14.1	12.0	10.8
A03 – Number of properties with lead risk reduced	Number of qualifying complete lead service pipe replacements completed per year	0	3525	3487	3500	3500
A04 – Helping customers look after water in their home	Percentage increase in awareness of customers (as surveyed) who are aware of water quality and water efficiency (and therefore usage) within the customers' homes	13.8	23.8	31.6	33.6	35.6
A05 – Discolouration from the Vyrnwy aqueduct	Number of kilometres of the Vyrnwy treated water aqueduct clean/relined annually	0	0	0	33.76	39.78

Source: UUW Annual Performance Report

You have a reliable supply of water now and in the future

3.1.10 93% of customers have had no interruption to their supply (greater than 3 hours) since the start of AMP7. However, the majority of the underperformance payment is due to performance on our water supply interruption measure. We have not met our performance commitment to reduce the time that customers' water supplies are interrupted. In 2022, we experienced a long dry summer. During long periods without rain the ground dries out, so when rain eventually falls, there can be significant ground movement which damages pipe work, leading to abrupt mains bursts within the distribution network.

2022 Freeze-thaw

We experienced a significant freeze-thaw event in December 2022, worse than those experienced in 2010 and 2018. Freezing temperatures lasted long enough for the cold to penetrate deep into the ground, causing water mains and exposed private pipe work in properties to freeze. Temperatures then rapidly increased, causing ground movements and thawing of pipe work. This caused leaks in the water network, customer supply pipes and private plumbing. These all contributed to further interruptions to customers' water supplies.

However, recovery was more rapid than the equivalent incidents in previous years.
We believe that this is, at least in part, reflective of improved effectiveness of UUW in responding to the incident and of improved awareness, engagement and activity from customers in preventing and repairing private leaks. For example, we readied and deployed a large number of leakage gangs, repaired private leaks where these were having a significant local network impact and communicated with customers to provide both preventative and restorative advice.

3.1.11 To reduce the impact of the bursts on customers' water supplies, we brought in additional leakage teams working around the clock, repairing around 40 per cent more leaks than normal.

3.1.12 We achieved our leakage performance commitment and are on track to reduce leakage by 15 per cent between 2020 and 2025.

3.1.13 We have met our mains repair targets in the first three years of AMP7 and we continue to manage water network asset health. We continue to optimise pressure across the water network, this helps to support leakage reduction and an associated reduction in mains repairs. Delivered in a targeted way, using the insights gained from the additional network sensors installed in AMP6 and AMP7, mains renewal is critical in enabling us to reduce leakage without the needs for a substantial increase in mains repairs.

3.1.14 We met or exceeded the performance commitment for our resilience measures – Water service resilience and Manchester and Pennine resilience.

3.1.15 We have outperformed our year three target on reducing the number of properties experiencing poor pressure. We have reduced the number of properties that experience low pressure to deliver a performance of 0.462 customers receiving low pressure/poor supply per 10,000 connected properties against a target of 0.670.

3.1.16 This year, we achieved a two per cent reduction in PCC compared to the previous year. However, this is still 0.5 per cent higher than the three year baseline level of performance which, is based on 2017–20 baseline. We have continued to focus efforts on a strategy aimed at increasing meter penetration, supported by a communications campaign to encourage customers to reduce any wasteful usage around the home and in the garden.

3.1.17 We have outperformed our target on unplanned outages. We have sought to prioritise interventions before assets fail to minimise outage duration.

3.1.18 The Thirlmere transfer to West Cumbria project has been completed, securing long-term water supply for the West Cumbria area, whilst continuing to meet our environmental obligations.

3.1.19 See Table 2 for our actual and projected AMP7 performance for this outcome.

Table 2: AMP7 performance - You have a reliable supply of water now and in the future

Performance Commitment	Units	Actual			Projected	
		2020/21	2021/22	2022/23	2023/24	2024/25
B01 – Leakage	% reduction base year 2019/20	1.9	4.7	5.9	8.3	10.8
B02 – Mains repair	Number of qualifying mains repairs per 1,000km of pipe	106.6	96	111.6	102.0	106.5
B03 – Reducing interruptions to water supply	Average supply interruption greater than three hours, measured in minutes and seconds per property per year (hh:mm:ss/prop/year)	00:04:46	00:08:01	00:38:45	00:06:40	00:05:00
B04 – Unplanned outage	Total unplanned outage (%)	1.88	2.07	1.73	2.65	2.34
B05 – Per capita consumption	Percentage reduction from three-year average baseline	-1.7	-1.5	-0.5	3.1	5.1

Performance Commitment	Units	Actual			Projected	
B07 – Reducing areas of low water pressure	Number of customers receiving low pressure/poor supply per 10,000 connected properties	1.114	0.513	0.462	0.620	0.580
B08 – Water service resilience	Reduction in risk of customer water supply service days lost per year or (csd/yr)	106	915	2198	3068	4089
B09 – Manchester and Pennine resilience	Number of control points delivered by the target date	1	0	1	0	0
B11 – Thirlmere transfer into West Cumbria (AMP7)	% of project complete	99	99	100	100	100

Source: UUW Annual Performance Report

3.2 How pilots have informed our AMP8 and longer term business planning

3.2.1 As part of our commitment to using innovative approaches to deliver great service to customers, we delivered a programme of trials in AMP7 that aimed to test new ideas and concepts, and inform our AMP8 plan. A total of 24 pilots were commissioned across the end to end water and wastewater system; from protecting our water resources, to improving the resilience of our wastewater system and optimising our bioresources assets. We are proud to have worked with over 20 partner organisations and receive more than £900k of partnership funding to support delivering these pilots and trials.

3.2.2 Seven of the pilots commissioned have been used to inform our Water Network Plus strategy. We worked with customers and organisations across the North West to address issues that are important to them including;

- Delivering safe drinking water to homes and businesses across the North West
- Reducing leakage
- Giving customers clear insight into their water consumption; helping them use water more wisely

3.2.3 Table 3 provides a summary of our pilots, the learning and what we are doing next.

Table 3: AMP8 Pilot summary

Pilot	What did we do?	What did we learn?	What are we doing next?
Mobile treatment solution	We completed market analysis of mobile treatment solutions available to proactive and reactive deployment.	We identified a small number of market-ready solutions available with Regulation 31 approval.	Deciding which solution best aligns with our strategic objects and then to trial the preferred solution in AMP8.

Pilot	What did we do?	What did we learn?	What are we doing next?
Taste and Odour Compound Removal Techniques	Trialling two new (for UUW) water treatment technologies to help inform our decisions on the most appropriate technology to take forward in AMP8. This trial is also giving us the opportunity to assess different operating parameters and conditions in order for us to optimise the design of the final solution.	The optimal conditions to operate an advanced oxidation treatment plant for the removal of geosmin and 2-MIB from raw water sources. We are also looking to gain a more accurate insight into the operating costs associated with such technology.	Completing the trial and assessing the technologies against our technology approval matrix. Utilising the information we gain from the trial to optimise the design of the advanced oxidation treatment plant at Fishmoor WTW in AMP8.
Catchment to Customer	Applied data analytics to water demand to help us to distinguish between consumption/usage and leakage to support efficient prioritisation and targeting of activities.	We now have central view of water demand and can more accurately target water demand activities and proactively plan outages with minimal impacts to supply.	Explore options to exploit the synergies between other projects such as smart metering to provide a more joined up water efficiency offering to customers in AMP8. Analyse impact of water usage campaigns utilising ability to access data through the demand model. Investigate applications of this solution to other business areas.
Customer visualisation of consumption	We worked with customer focus groups and a contractor to test how to best present consumption information to customers to encourage them to use less water.	Via co-creation we have a water usage visualisation tool that has customer buy-in and evidence that it would be highly used, as well influence customers to attempt to reduce their water usage by changing their behaviour.	We have a proof of concept water usage visualisation tool that is ready for development in AMP8.
Allotments	We are testing various approaches to communal rainwater harvesting solutions to reduce potable water use at community gardens and allotments.	Although we've seen high reputational and brand benefits, we've learned that to see a significant reduction in potable water we would require large investment and therefore we don't see this current solution as cost beneficial.	Re-visit and assess options for scalability whilst ensuring cost benefit.

Pilot	What did we do?	What did we learn?	What are we doing next?
Rossendale Pressure Logging Study	We tested whether pressure loggers could be installed within dual boundary boxes. We also tested to see whether taking water from the network affects the pressure readings at dual boundary boxes.	Pressure loggers can be installed in dual boundary boxes delivering ~20% efficiency per installation. We've learned that pressure readings are not impacted when customers use water inside their homes.	The learnings from this pilot will now inform our planned smart metering roll out in AMP8.
Barrow: Adaptive Systems Planning in Action	UUW and [✂] undertook a systems thinking study in the Barrow area to understand how an Adaptive Systems Planning (ASP) approach could support and differentiate their planning capability.	Enhanced understanding of advanced scenario planning at a system-level (rather than asset-level) to support an improved framework for the development of strategies and adaptive plans.	Use the outputs to inform our framework for longer term strategy development and adaptive planning.

Source: UUW internal data

Pilots with cross-functional benefits

3.2.4 Some of the pilots conducted also had cross-functional benefits, an example being the Smart Water Butts pilot which set out to investigate the effectiveness of smart water butts in reducing pressures on our wastewater network.

3.2.5 Our AMP8 Rainwater Management Programme to address increased flood risk as a result of climate change has been informed by the options development and appraisal process conducted through the Drainage and Wastewater Management Plan (DWMP). In order to manage the step change in challenges posed by climate change, a blend of conventional engineering solutions alongside nature-based solutions is needed. Construction of storage tanks is selected as the best value investment. However, we aim to optimise delivery of this increased capacity through further exploration of customer side management options such as water butts.

3.2.6 A potential benefit of using smart water butts for the Water Network Plus price control, is that it could reduce consumption of treated water by providing the ability to reuse rainwater for non-potable purposes such as watering plants.

4. AMP8 Vision and Plan

4.1 Water for the North West

4.1.1 Over the last five years we've made great progress towards our goals, delivering for customers, communities, and the environment. During this time, we've also been talking with and listening to customers, communities and stakeholders.

4.1.2 Through customer research and stakeholder engagement we have found:

- Customers expect great water quality every time they turn on their taps;
- Customers want us to reduce the amount of water that is leaking from our pipes;
- Customers and stakeholders agree it's important to see step changes in performance but not any cost, this must balance with affordability.

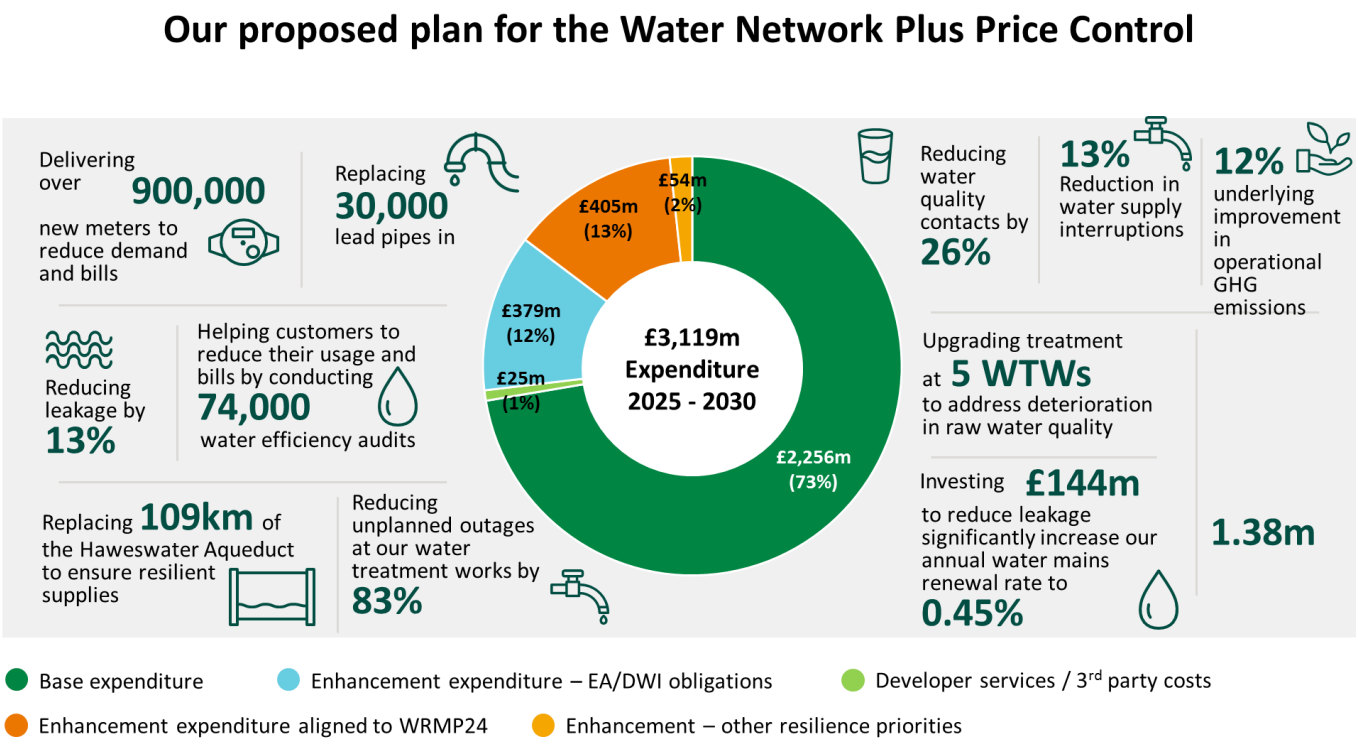
4.1.3 This customer and stakeholder input has shaped our vision and ambitions for the long-term. For more detail on our customer research, see supplementary document *UUW21 - Customer Research Methodology*.

4.1.4 Our purpose and vision is to provide great water for a stronger, greener and healthier North West. This drives us to deliver our services in an environmentally sustainable, economically beneficial, and socially responsible manner, and create sustainable long-term value.

4.2 Overview of our plan for the Water Network Plus price control

4.2.1 We have set ourselves stretching targets to ensure we focus on the most valued aspects of the services we provide and Figure 1 illustrates the outcomes we plan to deliver through our AMP8 plan.

Figure 1: Our plan for the Water Network Plus price control



Source: UUW internal data

4.3 Current and future drivers for change

Climate change

4.3.1 Increasing concentrations of greenhouse gases in the Earth's atmosphere has and will continue to change the climate of the North West of England. On average the region will experience milder, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extreme events. The water sector is particularly impacted by climate change as its assets are directly connected to the environment, the AMP8 investment plan will support assets adapting to climate change.

4.3.2 In winter there is an increased likelihood of storms which risk interruptions to supply due to flooding of assets or power loss. The importance that UUW places on holistic operational resilience is demonstrated by our efforts to embed systems thinking into our operations. The benefit of this approach can be seen in our operational responses to the 2021-22 winter storms (Arwen Nov'21, then Dudley, Eunice and Franklin Feb'22) and in our response to recent freeze-thaw events such as the 2018 "Beast from the East". Ofwat's publication[2] summarising the water industry's response to the 2018 event positively reflects on UUW's use of real time information and monitoring systems, the bedrock of our systems thinking approach.

4.3.3 In summer, prolonged dry weather can increase leak breakout rates as there is a link between soil-moisture deficit and increasing leakage levels, for example, due to increased subsidence of soils.

4.3.4 Extreme weather has also impacted our raw water sources. We have seen a deterioration in raw water quality in a number of our sources and we are continuing to invest in our catchment and work with land owners to address this. Whilst we have slowed down the rate of deterioration, we have now reached the point where we need to invest in the treatment works to be able to process the raw water to an acceptable level for customers. We are planning to invest in a number of our treatment works so that we can continue to provide wholesome drinking water to customers from these sources all year round For more information see *UUW60 – Water Quality Enhancement – Case 5.*

4.3.5 Our AMP8 Water Network Plus business plan, WRMP and Long Term Delivery Strategy (LTDS) have all been informed by climate change projections.

Population growth

4.3.6 The North West is the UK's third most populous region. Over seven million people rely on United Utilities Water every day to provide great water and wastewater services. The population has grown by 8.6% since 2002 and around an additional 1 million people are forecast by 2050, increasing demand for water services. Additional demands on water and wastewater infrastructure are expected to be concentrated in certain high growth areas, such as Manchester and Carlisle. Population growth and associated development of new or extended urban areas means water efficiency and rainwater management are key priorities during AMP8 and the longer term.

4.3.7 Demand for treated water has increased since our WRMP19 projections and with this it's vitally important we reduce unnecessary demand for our supplies. This means we need to make a step change in leakage reduction, supported by our Leakage enhancement case. For this, we have selected the best value approach as we are focused on future resilience as well as short-term leakage benefits, by upgrading 641km of water mains across the region see *UUW61 - Water Supply Demand enhancement case 7*. We are also maintaining a further 220km of mains, funded through base.

4.3.8 We are also encouraging customers to reduce their consumption through our Smart Metering and Water Efficiency enhancement cases, which will help homes and businesses save 9 million litres of water per day . As part of our Smart Metering enhancement case we propose to install over 900,000 smart

[2] "Out in the cold – water companies' response to the 'Beast from the East'", Ofwat, June 2018, https://www.ofwat.gov.uk/wp-content/uploads/2018/06/Thaw-report-FINAL.pdf

meters. For more information please see *UUW61 - Water Supply Demand enhancement case 8* and *UUW61 - Water Supply Demand enhancement case 6.*

4.3.9 Our AMP8 Water Network Plus business plan, Water Resource Management Plan and Long Term Delivery Strategy have all been informed by the population growth projections.

Increased service expectations

4.3.10 The public health benefits of removing lead pipework for domestic drinking water supplies are clear. The Drinking Water Inspectorate (DWI) expect water companies to make a step-change in lead risk reduction during AMP8. UUW propose to replace up to 30,000 lead pipes from the water main to the compliance point at the customer's tap. We have a residual risk based on age and volume of housing stock in the North West, with high levels of lead service pipes and high levels of economic deprivation. Four in ten of the most deprived neighbourhoods in the country are in the North West. There is a greater risk from lead exposure for those in more deprived areas, due to their higher risk of poor health. Based on our plan, we will expand our existing AMP7 grant model for lead replacement in terms of scale and accessibility to facilitate/incentivise replacement of private lead pipes within the customer property. This will include dedicated support to customers in areas where there is a very high proportion of lead service pipes and economic deprivation which inhibits customers' ability to afford service pipe replacements. This programme of work is enabled by our Lead Replacement enhancement case, see *UUW60 - Water Quality enhancement case 3*.

4.3.11 New research[3] released in 2023 by the Consumer Council for Water (CCW) has revealed people's expectations for customer service standards. The research is the starting point of CCW's work to help the water industry modernise the Guaranteed Standards Scheme (GSS), based on customers' views. This is important work, as the current standards and payments have seen little change since they were first introduced over 20 years ago. In particular, customers want to see additional standards which focus on water quality and the environment.

Evolving digital world

4.3.12 Digitally enable our Network to be the most proactively managed across the Industry and therefore provide first class service at the lowest whole life cost.

4.3.13 Government and regulators are expecting a step-change of investment and security maturity to protect national infrastructure and data (particular consumer data) from security threats. As cyber-crime increases in scale, it is highly likely the water industry will become a regular target for both state-sponsored and opportunistic cyber criminals. All enterprises should be prepared for a large scale, sophisticated cyber-attack. Our Network and Information Systems Directive (NIS) enhancement case enables us to improve cyber security to ensure sites are resilient to external threats. For more information see *UUW60 - Water Quality enhancement case 4*. .

Asset health & resilience

4.3.14 The reliability of supply can be affected by exogenous factors as our large asset base is exposed to hazards such as extreme weather, security risks and third party damage. Our resilience strategy has evolved over time and in response to improved intelligence, threats, trends, and emerging risks as we mature our approach to operational resilience. This approach is detailed in our 2017 paper – Measuring Resilience in the Water Industry[4]. This approach provides better overall systems resilience than simply focusing on asset reliability. We firmly believe that is not good practice to only invest in a more reliable system, while neglecting the capacity to respond and recover from an incident, or to not implement sufficient resistance to malicious threats.

[3] ccw.org.uk/news/new-research-reveals-peoples-expectations-for-customer-service-standards/

[4] unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/looking-to-the-future/measuring-resilience-in-the-water-industry_final.pdf

4.3.15 Building on the well-established 4R model, first developed by the Cabinet Office in 2010, we have evolved our risk and resilience framework to include 'review' as a fifth 'R'. We recognise that threats evolve, and we will continue to identify emerging risks; therefore, we must continuously review our risk exposure and learn lessons from incidents and near misses. We target this learning both internally and across other sectors both in the UK and internationally.

4.3.16 Aligned to the Network Asset Resilience Strategy, we are moving towards a proactive and predictive maintenance regime. Dynamic Network Management (DNM) for water will include sensor deployment and event recognition technology to mitigate and manage potential events on the water network, allowing us to deliver asset resilience through digitally enabled proactive maintenance.

4.3.17 The Haweswater Aqueduct is used to transport and distribute potable water to 2.5 million people every day. At PR19 UUW identified a need to improve the resilience of the continuous supply of potable water from the Haweswater Aqueduct to reduce the risk to water supplies for the long-term. This need will be delivered through the Haweswater Aqueduct Resilience Project (HARP) enhancement case, under Direct Procurement for Customers (DPC). For more information see *UUW62 - Water Supply demand enhancement case 10*.

4.3.18 In response to the security and resilience threats facing UK national resources, the UK government has introduced legislation. For the water industry this takes the form of the Security and Emergency Measures Direction (SEMD). Our SEMD enhancement case enables us to improve physical security to ensure sites are resilient to external threats. For more information see *UUW60_Water Quality enhancement case 4*.

4.3.19 In providing water services, we have an interdependency of power supply and the effects of its failure, and therefore ultimately a dependence on energy providers. This was highlighted during Storm Arwen, where we had a significant amount of customer minutes lost (CML) due to a 3rd party power outage. We have a need to improve power resilience at our water sites through the provision of adequate standby power generation, and this is enabled by the Power Resilience enhancement case. For more information see *UUW67 – Cross Price control enhancement case 26.*

4.3.20 Due to the low alkalinity properties of water from Lake Vyrnwy coupled with the age and high utilisation of the Vyrnwy aqueduct, customers in the areas supplied by the aqueduct experience higher than average instances of discolouration and water quality non-compliance with the iron parameter in comparison to other areas of the North West. The Vyrnwy Treated Water Aqueduct Relining enhancement case enables us to complete the upgrade of 65.6km of the Vyrnwy aqueduct started in AMP7 For more information see *UUW60 - Water Quality enhancement case 2*.

4.3.21 Increased coastal and riparian erosion resulting from climate change is expected to put more critical infrastructure at risk, such as pipes situated on eroding coastlines and riverbanks. Our Coastal and River Erosion enhancement case allows us to protect 5 water mains at risk from river erosion to provide a resilient service to customers. For more information see *UUW65 – Wastewater Quality enhancement case 17*.

4.3.22 The changing climate has led to changes in the quality of the water that we abstract from the environment. We have observed increasing levels of the naturally occurring compounds geosmin and 2-MIB in rivers and reservoirs which feed 5 of our water treatment works. We are actively managing the land around these rivers and reservoirs to reduce the likelihood of further increases in these compounds, and we plan to upgrade these 5 treatment works to enable us to continue to provide water to customers, without impacts on the taste and smell of the water that customers receive. For more information see *UUW60 - Water Quality enhancement case 5.*

Future regulation

4.3.23 We will continuously assess current and future risks through the Drinking Water Safety Plan (DWSP) and wider horizon scanning. This approach will enable effective and efficient risk management, at the right time and right point in the source to tap system, putting us in the best place to meet future regulations.

4.3.24 New drinking water standards are expected to be brought in relating to forever chemicals, such as perfluoroalkyl and polyfluoroalkyl substances (PFAS) and other emerging contaminants. Providing a continual, sustainable supply of clean drinking water to customers is a key priority and our AMP8 Water Network Plus business plan, Water Resource Management Plan and Long Term Delivery Strategy have all been informed by this driver. Should new standards for PFAS be introduced during AMP8, we would seek an interim determination (IDOC) to address the risk.

4.3.25 More information on these obligations and how we plan to meet then is given in supplementary document *UUW79 - Statutory obligations summary*.

Net zero greenhouse gas emissions

4.3.26 The affordability and resilience of our operations and services fundamentally rely on a stable climate and a healthy natural environment. Consequently, greenhouse gas (GHG) emissions management and reduction is of exceptional importance to UUW and customers. We have therefore integrated the goal for net zero throughout our PR24 business plan.

4.3.27 We've developed an ambitious enhancement programme specifically targeting GHG emissions reductions. Undertaking this programme in AMP8 is vital to our low regrets, adaptive long term emissions reduction plan and overall ambition to reach the national legal requirement for net zero 2050 and maintain a science-based trajectory that support the national legal five year carbon budgets. For more detail, see *UUW67 - Cross Price control enhancement case 25*.

4.3.28 Our Water Network Plus net zero enhancement programme includes the following projects:

- **Transport fossil fuel reductions – green fleet:** this allows us to reduce our emissions associated with the use of fossil fuels in transport. This is achieved by swapping to low/zero emissions vehicles within our fleet.
- **Peatland restoration:** this enables UUW to undertake habitat restoration works across 1494 hectares of peatland by 2030, verified by Natural England (or equivalent standard).
- **Woodland creation:** this allows UUW will create 465 hectares of woodland from planting trees by 2030, verified by the Woodland Carbon Code (or equivalent standard).
- **Property emissions reductions:** this is focused on decarbonising heat within our UUW owned property portfolio through using alternative heating systems and efficient boiler replacements.
- **Phase 2 - Further low regrets emissions reductions in AMP8:** this will have GHG emissions reduction as the primary drive. Due to the uncertainty and rapid evolution within the market, the potential cases within our proposed phase 2 require further investigation and will be defined within AMP8.

4.4 Delivering great service – AMP8 Performance Commitments

4.4.1 Performance commitments are the metrics used to measure the service water companies deliver for customers and the environment. Common performance commitments have been selected by Ofwat to address three outcomes:

- Outcome A: Customers receive excellent service every day
- Outcome B: Environmental Impact
- Outcome C: Asset Health

4.4.2 All three categories are required to protect the interests of customers and secure the resilience of companies both in the short and the long term.

Table 4: Summary of Water Network Plus performance commitments

Ofwat Outcome	Performance Commitment	Units	2025-26	2026-27	2027-28	2028-29	2029-30
Customers receiving excellent service every day	Customer contacts about water quality	Number of consumer contacts per 1,000 population	1.02	0.97	0.91	0.86	0.80
	Water Supply Interruptions	Hours: minutes; seconds (HH:MM:SS) per property per year	00:04:52	00:04:45	00:04:37	00:04:30	00:04:22
	Compliance Risk Index (CRI)	Numerical CRI score	0.00	0.00	0.00	0.00	0.00
Environmental impact	Operational Greenhouse Gases (Water)	Percentage reduction from baseline (tCO2e)	10.17	10.54	11.14	11.96	12.37
	Leakage	% reduction base year 2019/20	14.8	17.3	19.6	21.7	23.8
	Per Capita Consumption (PCC)	Percentage reduction from 2019-20 baseline	6.7	7.4	8.1	8.9	9.7
	Business Demand	Percentage reduction from 2019-20 baseline	4.0	4.9	6.1	7.2	8.3
Asset health	Mains Repairs	Number of qualifying mains repairs per 1,000km of pipe	106.5	106.5	106.4	106.4	106.4
	Unplanned Outage	Total unplanned outage (%)	0.65	0.58	0.52	0.46	0.41

Source: UUW internal data

4.4.3 Our overall package of AMP8 Performance Commitments, alongside our robust forecast of performance for the remainder of AMP7 provides ambitious levels of service at excellent value for money. This demonstrates ambition in our service improvements whilst being mindful of cost pressures on customers and pace of delivery over AMP8 and the long term. Stretching performance ambitions from AMP7 to AMP8 target sustainable improvements.

Outcome A: Customers receiving excellent service every day

Customer contacts about water quality

Aiming for our best ever performance building on our 42% improvement step change in AMP7, driven through our Water Quality First programme

Purpose and benefits

To incentivise companies to reduce the number of water quality contacts from customers relating to taste, odour and appearance. This increases the acceptability of water to customers and reduces disruption and other negative social impacts.

Current performance

1. **AMP7 improvements.** We have made significant improvements during AMP7, based on the taste, smell and appearance programme and Water Quality First transformation programme.
2. **Meeting targets.** During AMP7, we are predicted to meet company specific target in this measure showing 23% improvement to taste, smell and appearance 5 year average.
3. **DWI interface.** We have made significant progress against Drinking Water Inspectorate (DWI) notice for discolouration with 22% of Water Supply Zones within notice compared to 40% in when the notice was issued in 2021.
4. **Water Quality First.** The Water Quality First programme has led to recognition by the DWI marking the end of a transformation period.

Our AMP8 Plan delivers against five key themes

Value It is absolutely fundamental that customers have trust in the water we supply. By ensuring we reliably supply customers with water to the standard they expect, we are promoting health and wellbeing, and minimising the cost and disruption of customers feeling they need to purchase bottled water.

Risks & resilience Surface water companies such as ourselves receive more contacts for water quality due to the water chemistry associated with upland sources of water and we are therefore focussing on source to tap interventions to manage this risk.

Efficiency Our Risk Asset Planning (RAP) framework, decision support tools and robust internal cost challenge will guide us to select the best option for customers.

Customer expectation The provision of water that tastes and smells good is by far the top priority and what customers feel UUW need to guarantee.

Innovation Dynamic Network Management (DNM) – our capability to enable a proactive approach to network management. This will include sensor deployment and event recognition technology to mitigate and manage potential events on the water network.

Our AMP8 performance targets aligned to the long term

Units: : Number of customer contacts per 1,000 population (number of contacts)

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
1.08	1.02	0.97	0.91	0.86	0.80	0.70	0.60	0.50	0.40
% imp.	5.2	10.4	15.6	20.7	25.9	34.3	44.4	53.7	63.0

Water Supply Interruptions

Driving and sustaining improvements in water supply interruptions by targeting asset resilience and optimising operational response

Purpose and benefits

To incentivise companies to minimise the number and duration of supply interruptions, improve reliability of supply and reduce the impact on customers having no water supply.

Current performance

1. **Industry performance.** Performance for this measure is highly volatile, which can be seen in the performance across the industry year on year.

2. **AMP7 performance.** In Year 1 of AMP7 we outperformed our performance commitment target, however in Year 2 and Year 3 we failed to meet it.

3. **Impact of incidents.** Performance to date this AMP has been impacted by a significant freeze thaw event in December 2022 and a number of trunk main bursts that were difficult to mitigate with our normal operational response and use of Alternative Supply Vehicles (ASVs), especially in year 3.

Our AMP8 Plan delivers against five key themes

Value Supply interruptions can cause disruption to normal life, including the temporary closure of schools and businesses. Our plan will reduce these disruptive and costly events.

Risks & resilience Significant events, such as freeze thaws, have a large impact on this measure. We will further enhance our systems based approach to ensure that we consistently provide top quality water to customers, and work with our stakeholders and partners to reduce third-party impacts across our network.

Efficiency Our risk-based investment strategy, supported by our Asset Management system, will continue to recognise the importance of asset replacement as a key risk mitigation tool that protects water quality, availability, and the environment.

Customer expectation A reliable supply of water services is a top priority for customers as demonstrated by our customer priorities, Water Resource Management Plan and climate change research projects.

Innovation Investing in sophisticated real time planning and integrated network optimisation so we can start to predict and identify issues before they impact customers, meaning that they do not need to contact us or even know there was a potential issue.

Our AMP8 performance targets aligned to the long term

Units: **:** Hours:Minutes:Seconds per property with lost supply per year (HH:MM:SS)

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
00:05:00	00:04:52	00:04:45	00:04:37	00:04:30	00:04:22	00:03:39	00:03:00	00:02:10	00:01:30
% imp.	3%	5%	8%	10%	13%	27%	40%	57%	70%

Compliance Risk Index (CRI)

Sustaining our dedication to the high standards of water quality as highlighted in the DWI Chief Inspector's July 2023 report

Purpose and benefits

To incentivise companies to fully comply with statutory obligations to promote customer confidence in drinking water quality and to mitigate any issues affecting performance.

Current performance

1. **AMP7 performance.** We have not met the performance commitment in Year 3 of AMP7. In 2022 there have been fewer infringements at water treatment works but infringements in the water network increased in comparison to 2021.

2. **Impact of incidents.** Performance to date this AMP has been impacted by a significant freeze thaw event in December 2022 and a number of trunk main bursts that were difficult to mitigate with our normal operational response and use of Alternative Supply Vehicles (ASVs), especially in year 3.

Our AMP8 Plan delivers against five key themes

Value It is absolutely fundamental that customers have trust in the water we supply. CRI represents a potential risk to customers' health and wellbeing. Protecting and ensuring the health of the community is an absolute priority for UUW.

Risks & resilience Performance for this measure can fluctuate significantly depending which parameters fail, where they fail and how the DWI inspector assesses the fail. This makes this a volatile measure and difficult to assess future performance.

Efficiency Our Risk Allocation Process framework, decision support tools and robust internal cost challenge will guide us to select the best option for customers.

Customer expectation Drinking water quality is a top priority for customers as demonstrated by the UUW customer priorities research, CCW and Ofwat's customer preferences and ODI rates research.

Innovation Dynamic Network Management (DNM) – a capability to support a digital proactive approach to network management. This will include sensor deployment and event recognition technology to mitigate and manage potential events on the water network.

Our AMP8 performance targets aligned to the long term

Units: : Numerical CRI score

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Outcome B: Environmental impact

Operational Greenhouse Gases (Water)

12% reduction on an underlying basis, minimising the impacts of substantial growth pressures by embracing efficiency, the newest technologies and innovation

Purpose and benefits

To incentivise companies to reduce greenhouse gas (GHG) emissions generated, with a view to achieving UK government and Welsh Government's interim and final net zero emission targets by 2050.

Current performance

1. **A new metric.** This is a new performance commitment for AMP8.
2. **Track record.** We have a strong track record of playing our part to mitigate climate change and have reduced our scope 1 and 2 emissions by over 70 per cent since 2005/06.
3. **Future ambition.** This historical information is not reflective of what can be achieved in the future. To reduce the remaining emissions, will require extensive innovation, technological enhancements and investments.
4. **Good historic performance.** Provisional findings suggest we may be performing well against this measure. This is consistent with third-party findings from Frontier Economics.

Our AMP8 Plan delivers against five key themes

Value Robust emission reporting will be build on existing transparent reporting that will improve trust with customers and raise awareness of our contribution to the UK's greenhouse gas management plans.

Risks & resilience There are significant growth pressures which stem from our activities to extend services to the growing population and improve services in response to latest legal and regulatory requirements. This traditionally requires more emissions-intensive materials and operational processes.

Efficiency Our 2025-2030 plan is taking a long term view for greenhouse gas (GHG) emissions with an integrated, prioritised, low regrets approach to develop the most efficient and effective adaptive carbon plan

Customer expectation GHG emissions management and reduction is a priority to our stakeholders because the affordability and resilience of our operations and services fundamentally rely on a stable climate and a healthy natural environment.

Innovation We will build on our experience in renewable technology and self-generation opportunities and also develop our understanding of emissions and robust sampling and reporting of greenhouse gas emissions from our activities.

Our AMP8 performance targets aligned to the long term

Units: : Percentage reduction from baseline (tCO2e)

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
9.56	10.17	10.54	11.14	11.96	12.37	23.82	25.78	27.91	26.14

Leakage

Building on the achievement of our lowest ever levels of leakage we aim to deliver a further 13% improvement in AMP8 to meet or beat our 50% leakage reduction target by 2050

Purpose and benefits

To incentivise companies to reduce leakage, improve water resources supply/demand balance and reduce need for water abstraction and increase water supply network resilience.

Current performance

1. **Good historic performance.** We have met our leakage targets in the first three years of AMP7 and we continue in our efforts to reduce leakage levels.
2. **Delivery activity.** To achieve this performance, a number of key activities/interventions have been implemented.
3. **Impact of incidents.** In 2022-23, a severe freeze-thaw event caused increases in customer-side and distribution-side leakage levels.
4. **Customer engagement.** Customer action can have a significant impact on leakage and we actively engage with customers through campaigns on freeze-thaw preparedness (promoting pipe lagging and tap covers), as a critical part of tackling leakage.

Our AMP8 Plan delivers against five key themes

Value Leakage is a driver of wasted costs in the water sector. By reducing leakage, we are reducing costs of water treatment/distribution and optimising levels of abstraction.

Risks & resilience More extreme weather events (dry weather and freeze-thaw) and customer-side leakage can have a substantial impact on overall leakage levels. Installation of smart meters will enable enhanced targeting of leakage interventions.

Efficiency Our Dynamic Network Management capability will enable better prediction and prevention of leaks through network optimisation, with network sensors used to target and repair leaks based on size and location.

Customer expectation Our leakage targets are supported in our Water Resource Management Plan testing research.

Innovation Using the latest innovations and detection techniques and optimising the deployment of sensors across our distribution network, whilst making best use of machine-learning technology.

Our AMP8 performance targets aligned to the long term

Units: : Percentage reduction 2019/20 baseline

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
10.8	14.8	17.3	19.6	21.7	23.8	32.3	40.1	45.8	49.4

Per Capita Consumption (PCC)

Building on our AMP7 achievements, we will continue working with customers to deliver a further 5% reduction in water demand in line with long terms government targets

Purpose and benefits

To incentivise companies to help customers reduce consumption. To improve water resources supply/demand balance and reduce need for water abstraction and increase water supply network resilience.

Current performance

1. **AMP7 performance.** We have not met our PCC targets in the first two years of AMP7 due to Covid19 related impacts on consumption.
2. **Customer engagement.** We have risen to the challenge with substantial investment in individualised customer engagement campaigns, water saving devices and an increased focus on customer side leakage.
3. **End of AMP target.** As a result we are on track to achieve the AMP7 closing target position by 2024/25.
4. **Long term average.** We anticipate that the three year average value will remain above target in 2024/25 as higher usage in 2022/23 and 2023/24 impacts final year values.

Our AMP8 Plan delivers against five key themes

Value Reducing demand for water reduces abstraction therefore protecting our environment, and reducing the costs of treating and pumping water that is no longer needed by customers. Metered customers will benefit from lower bills.

Risks & resilience The ongoing changes in demand patterns due to Covid related impacts, such as on working locations, has introduced substantial uncertainty to future demands.

Efficiency As part of our Water Resource Management Planning we have selected the most cost effective interventions to achieve our AMP8 and longer term targets.

Customer expectation A reliable supply of water services is a top priority for customers as demonstrated by Our customer priorities, Water Resource Management Plan and climate change research projects.

Innovation Our work to reduce per capita consumption relies on constant innovation and fresh ideas to maintain and increase engagement. We are also rolling out new smart meters.

Our AMP8 performance targets aligned to the long term

Units: : Percentage reduction 2019/20 baseline

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
5.1	6.7	7.4	8.1	8.9	9.7	13.7	18.1	22.8	24.7

Business Demand

Supporting businesses and water supply retailers to reduce demand by a further 6%, conserving vital water supplies to make the North West stronger and greener

Purpose and benefits

To incentivise companies to promote water efficiency to business customers to improve water resources supply/demand balance, reduce the need for water abstraction and increase water supply network resilience

Current performance

1. **WRMP alignment.** This is a new performance commitment for AMP8 and the proposed PCL aligns with Revised WRMP forecasts.

2. **Historical performance.** Historically business demand has been stable with a temporary reduction due to the impact of Covid19.

3. **Demand reduction plans.** Following non-household retail market separation UUW stopped investment in business demand reduction activity. Following updates and clarifications to non-household retail market codes UUW has begun limited engagements with non-household customers and retailers to develop demand reduction propositions from 2024/25.

Our AMP8 Plan delivers against five key themes

Value Reducing demand for water reduces abstraction therefore protecting our environment, and reducing the costs of treating and pumping water that is no longer needed by customers. Metered business will benefit from lower bills.

Risks & resilience The volume of water used by a small number of very large users has the potential to materially alter performance against this measure in a way which is wholly outside of company control.

Efficiency As part of our Water Resource Management Planning we have selected the most cost effective interventions to achieve our AMP8 and longer term targets.

Customer expectation A reliable supply of water services is a top priority for customers as demonstrated by Our customer priorities, Water Resource Managemt Plan and climate change research projects

Innovation By embracing technology and installing smart meters across all non household customers we will enable business to reduce demand.

Our AMP8 performance targets aligned to the long term

Units: : Percentage reduction 2019/20 baseline

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
2.5	4.0	4.9	6.1	7.2	8.3	10.8	11.7	12.9	14.1

Outcome C: Asset health

Mains Repairs

Optimising delivery of mains repairs to maintain upper quartile performance whilst delivering our stretching leakage target in AMP8

Purpose and benefits

To incentivise companies to appropriately maintain and improve the asset health of its infrastructure or below-ground water assets and demonstrate its commitment to its asset stewardship responsibility.

Current performance

1. **AMP7 performance.** We have met our targets in the first three years of AMP7 and we continue in our efforts to manage water network asset health.
2. **Impact of FY22/23.** Although we outperformed our target on mains repairs, 2022/23 has been a challenging year.
3. **Impact of incidents.** In 2022, we experienced a dry summer, which caused the ground to dry and pipes to move. This movement led to an increase in pipe failure. In December 2022, we experienced a significant freeze-thaw event. This gave rise to ground movement generating mains bursts on our network due to the extreme changes in temperatures.

Our AMP8 Plan delivers against five key themes

Value Repairing mains offers multiple benefits, including reducing the likelihood of leaks, improving water quality, and extending the life of our network.

Risks & resilience Changes in weather driven by climate change could cause increased mains failure rates. We will improve resilience through targeted, proactive investment exactly where it is most needed, helped by cutting-edge risk modelling.

Efficiency Our Risk Allocation Process framework, decision support tools and robust internal cost challenge will guide us to select the best option for customers.

Customer expectation Customers expect us to continue to deliver services for current and future generations, and support phased investment in our assets to deliver this.

Innovation 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.

Our AMP8 performance targets aligned to the long term

Units: : Number of repairs per 1,000 km of mains

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
106.5	106.5	106.5	106.4	106.4	106.4	100.8	96.4	92.9	89.3

Unplanned Outage

Meeting or beating upper quartile performance building on a strong track record in AMP7 to deliver water system resilience

Purpose and benefits

To incentivise the company to appropriately maintain and improve the asset health of non-infrastructure or above ground assets and demonstrate commitment to asset stewardship responsibility.

Current performance

1. **Good AMP7 performance.** Historic performance has outperformed targets set for AMP7.
2. **Outage prevention / response.** This is due to concerted effort within UUW to closely manage outages relating to asset failure, and enabling the prompt reinstatement, repair and recommissioning of assets in the event that they do fail.
3. **Prioritisation.** We have sought to prioritise interventions before assets fail to minimise outage duration.
4. **Root cause analysis.** We undertake root cause failure analysis of outages and further develop operational best practice.

Our AMP8 Plan delivers against five key themes

Value Outages at our Water Treatment Works can add costs to our business, as we need to pump water from elsewhere to make up any shortfall caused by the outage. By reducing unplanned outages, we reduce those unwelcome costs.

Risks & resilience Resilience improvements, in line with our 5Rs approach, will be delivered through highly targeted investment programmes into critical assets such as chemical storage, control infrastructure and filters.

Efficiency Our Risk Allocation Process framework, decision support tools and robust internal cost challenge will guide us to select the best option for customers.

Customer expectation Customers expect us to continue to deliver services for current and future generations, and support phased investment in our assets to deliver this.

Innovation management have allowed us to develop a strategic level oversight of asset outages; allowing us to effectively mitigate outage risk and respond more quickly to production capacity restrictions.

Our AMP8 performance targets aligned to the long term

Units: : Percentage of peak week production capacity

AMP7	AMP 8					AMP9	AMP10	AMP11	AMP12
2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2034-35	2039-40	2044-45	2049-50
2.34	0.65	0.58	0.52	0.46	0.41	0.36	0.31	0.26	0.21
%imp	72.2	75.2	77.8	80.3	82.5	84.6	86.8	88.9	91.0

4.5 Asset Health and Resilience

Haweswater Aqueduct Resilience Programme (HARP)

4.5.1 Under the Water Industry Act 1991, UUW has a duty to supply drinking water that is safe and of a quality acceptable to consumers.

4.5.2 The Haweswater Aqueduct (HA) is owned, operated and maintained by UUW and is used to transport potable water from Cumbria to Manchester, distributing to 2.5 million people every day, as illustrated in Figure 2.

4.5.3 Around half of the length of the HA system is made up of pressurised multi-line siphons, which are inherently resilient to service interruption due to there being [✂] siphons running in parallel. As they are made largely of steel and are near to the surface, they lend themselves to effective repair in the event of maintenance works being required. The remainder of the aqueduct (52km) is provided via [✂] flow and single line siphon tunnels, made from a cast-in-situ reinforced concrete. They represent single points of system failure and are often deeply buried making them difficult to repair without a full system shutdown.

Figure 2: Haweswater aqueduct route

[✂]

4.5.4 At PR19 UUW identified a need to improve the resilience of the continuous supply of potable water from delivered via the HA to reduce the risk to water supplies for the long-term. This need will be delivered through HARP under Direct Procurement for Customers (DPC) (link to enhancement case).

4.5.5 The enhancement case covers the next phase of activity as we move into AMP8, allowing UUW to deliver its obligations set out within the Competitively Appointed Provider (CAP) Agreement and Allowed Revenue Direction (ARD), including management of the CAP (who is responsible for the financing, design, build and maintenance of the replacement tunnel sections) and interaction with the Independent Technical Advisor (ITA).

4.5.6 Based on UUW's preliminary delivery programme, which will be superseded by the successful bidder's programme, the total expected project cost for managing the CAP is £39.5m. This cost will be split across multiple AMPs of which £1.8m is forecast in AMP7, £24.8m in AMP8 and £12.9m in AMP9. This cost position is consistent with separate Ofwat discussions in preparation for our Full Business Case submission (which will be made in 2024). For more information see *UUW62 – Water Markets enhancement case 10.*

Vyrnwy aqueduct relining

4.5.7 The Vyrnwy aqueduct comprises three parallel 42" diameter pipelines made from a combination of steel and cast iron. The aqueduct is an integral part of the UUW regional supply network, transporting water which originates from Lake Vyrnwy in North Wales to supply over 1.38 million customers in Cheshire and Merseyside. Constructed between 1881 and 1938, at ~240km combined length, the aqueduct was the longest in the world on its completion.

4.5.8 Over time, the internal surface of the aqueduct has become home to significant amounts of iron oxide deposits, formed through a combination of historic poor performance with respect to metals removal at the upstream WTW and corrosion of the cast iron sections due to prolonged contact with low alkalinity water. Enhancement investment in AMP8 is required in order to complete the final phase of the Vyrnwy aqueduct relining programme which will improve downstream water quality for customers through improved compliance with the iron standard and reduced risk of discolouration (water appearing black / brown / orange). To date, a significant portion of the steel sections of the aqueduct have been refurbished through the employment of various cleaning techniques. The final phases of the project involve slip-lining the cast iron sections of the pipeline – a proven technique for reducing discolouration which involves inserting a plastic pipe into the existing cast iron pipe. An overview of the Vyrnwy aqueduct siphons and associated refurbishment delivery timeframe is shown in Figure 3. For more information see *UUW60 – Water Quality enhancement case 2*.

4.5.9 Our approach to the prioritisation and sequencing of renovation work has been determined through the utilisation of a hydraulic modelling tool and consideration of other statutory projects within the system and associated systems to ensure the best outcome for customers with respect to lowest risk to supplies and most efficient project outcomes.

Figure 3: Vyrnwy aqueduct siphons and associated refurbishment delivery timeframe

Source: UUW internal data

Maintenance Excellence

4.5.10 Our maintenance excellence strategy is about keeping our assets and equipment as safe, cost-effective and reliable as possible. An efficient maintenance strategy is vital for providing the high-quality services customers depend on. And for our colleagues, it is key that we minimise labour-intensive, unplanned and potentially hazardous work.

4.5.11 To achieve maintenance excellence, we aim to minimise asset failure and avoid expensive repairs or short-term fixes. We are doing this by optimising the scheduling of routine maintenance work, prioritising our most critical assets and investing in innovative technology. We have dedicated teams working in new ways to prevent asset failure across the business.

Incident response and recovery

4.5.12 Although we have a robust plan to avoid disruption and unpredictable events, incidents can happen. How quickly and effectively we respond to these events can impact the customer experience or the environment.

4.5.13 We will maintain our response and recovery capabilities, maintaining the largest fleet of alternative supply vehicles in the UK sector, and continue to develop and test our contingency plans for system outages.

4.5.14 Our Integrated Control Centre (ICC) is core to our response and recovery capability. The ICC provides situational awareness of how the water business streams are performing in real time. This enables a timely and coordinated response, prioritising our resources to minimise the impact upon customers and the environment.

Asset risk modelling

4.5.15 Future investment requirements may be different from those in the past and our PIONEER system is used to help identify these future peaks and troughs. PIONEER supports us in applying the common framework for capital maintenance planning and was jointly developed prior to PR09 between UUW and Tynemarch, one of the leading UK risk management consultants. PIONEER is a modelling tool that uses asset, service and performance data to predict the long-term performance of company assets based against expenditure and service risk targets typically over a 25-year forecast. The programme is used to model and predict optimal refurbishment, replacement, and other interventions for our assets. PIONEER has been further developed and improved over time, enabling more sophisticated asset risk modelling, including via harnessing greater volumes of data/information that we now have available.

4.5.16 PIONEER models have been used to build the proactive water mains programme for AMP8. This programme trades off future deterioration of individual mains with their risk of causing service disruptions, such as discoloured water contacts, interruptions and poor pressure as well as health measures such as bursts, fittings failures and leakage rates against the future costs of repair and replacement.

Criticality assessments

4.5.17 Common criteria has been developed for identifying critical network assets in order to help assess the condition of these assets and inform inspection, maintenance and investment requirements. This criticality rank is based on: business impact, social impact and repair complexity. An example of the outputs of these assessments is shown in Figure 4.

Figure 4: Map of critical assessment outputs for Macclesfield

[✂]

Source: UUW internal mapping system

Power Resilience

4.5.18 In our increasingly interconnected business, without a secure power supply we would likely lose any unprotected IT services, data servers, and functionality of our Integrated Control Centre (ICC) and water and services.

4.5.19 A number of our water assets are categorised as Critical National Infrastructure (CNI) and are deemed essential for the day-to-today functioning of society and the economy. Therefore, it is essential that we understand our own energy infrastructure vulnerabilities, but also any cascading interdependences on other third-party CNI assets, such as water for the cooling of power generation assets and telephone exchanges. We need to take appropriate steps to ensure that they are robust and have the appropriate level of resilience to power disruption.

4.5.20 To achieve our long-term ambitions of minimising service disruptions to customers and protecting the environment, we need our most critical assets to be supported by a reliable back-up source of power. This solution will deliver resilience now and in the future, accounting for climate change in both a benign and extreme future.

4.5.21 As part of our base expenditure, all of our operational sites that require power have contingency plans associated with their operation. To help to manage and reduce the risk that power interruptions pose, enhancement expenditure is now being sought to provide an improved level of resilience in response to the changing risk landscape. We have specifically targeted our investment to our most critical sites, through the completion of an assessment of our asset base to reach a shortlist of sites that would benefit from having a permanent form of power resilience present. This investment in generator power will help to provide continuity of service at these sites in the event of a supply-side power interruption or disturbance to bridge the time between a mains power loss and grid power being restore. For more information see *UUW67 – Cross Price control enhancement case 26.*

Physical and Cyber Security

4.5.22 Based on our plan, we will further harden our sites against malicious attack as we face increasing cyber-security and ongoing physical security risks. Our plan proposes to protect our assets to the latest protective standards guidance issued by the National Protective Security Authority (NPSA) and in accordance with the Security and Emergency Measures Directive (SEMD), which was revised in March 2022. More details on the scope of this programme of investment can be found in our enhancement case See *UUW60 – Water Quality enhancement case 4*.

4.6 Innovation

We are ready to innovate again for AMP8

4.6.1 We are proud of our multi-AMP track record using innovation to deliver efficiencies, customer and environmental improvements. Our innovation portfolio, model and processes has guided us to adopt ideas in AMP7 that will continue to deliver value into AMP8, resulting in sustainable benefit to customers, wider society and the environment.

4.6.2 Our AMP8 innovation effort is directed by what customers tell us is important. They are aligned to Ofwat's core innovation themes, 2050 Water sector strategy and other government and regulatory ambitions – and our ambition for a stronger, greener and healthier North West.

4.6.3 We have an active innovation investment portfolio of new concepts and market-ready ideas for AMP8 adoption; we are excited about the potential of ideas being trialled such as:-

- AMP7-adopted ideas that need optimising – such as using drones for asset health condition assessments
- New innovations being tested now including our AMP8 pilot portfolio and the outputs for all Ofwat Innovation Fund projects

4.6.4 In addition, we are optimistic of the prospect of finding even more ideas through our future Innovation Lab programmes and other global scouting.

Satellites for leak detection

4.6.5 At the start of AMP7, we had an ambitious innovation trial underway to use satellite imagery for leak detection with a company called [✂] They use ground-penetrating radar from Japanese satellite ALOS 2 to detect water just below the ground. Taken from satellite-mounted sensors, the raw imagery is then overlaid on GIS systems and processed by unique algorithms to generate points of interest that are used to direct our leakage teams.

4.6.6 In areas where loggers are not suitable, satellite data allows us to survey a large geography and plot areas of interest. We hoped to then dramatically improve the efficiency of our leakage technicians by directing them to specific locations where there is a high probability of finding a leak. We knew satellite sweeps would be faster – but we needed to know if was accurate as conventional methods.

4.6.7 We ran a series of trials but this technology was not advanced enough for us to displace or supplement existing detection techniques – the AMP7 trial and concept was not successful and we have moved away from this idea during AMP7.

4.6.8 Learning from failure: At the time we explored this idea, the solution was not ready, needing significant development time which we could not afford to give on our own and not enough traction from others. Combining forces with others might allow this idea to become more affordable and efficient. For AMP8, we plan to resurrect this idea as the satellite technology and their detection accuracy has been improving every year.

4.6.9 We know that other water companies are taking this same approach. Our innovation scouting and feedback from other water companies leads us to believe it could work well in the future when combined with other technologies. We have allocated investment for further tests; this time in partnership with other companies and on a "no win – no fee" basis – with results in time for AMP8 start.

Water DNM

4.6.10 UUW recognises that mains repairs can be disruptive and reducing the requirement to repair mains is part of our longer term strategy to transition from "find and fix" to Dynamic Network Management: predicting and preventing leaks to drive continual improvement in our leakage performance and water network asset health.

4.6.11 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 improved asset understanding. This will support proactive interventions (e.g. network and pressure optimisation) and should, over time, support a reduction in mains repairs.

4.6.12 Outputs from the Leakage Hackathon in 2021/22 and our work with [✂] will be used to form the foundations of Water DNM. This utilised a collaborative "hackathon" type delivery model between framework partners, subject matter experts, and UUW Data and Analytics team. The aim of the project was to use historical incidents, additional data and open source data to:

(a) Understand root cause and modes of failures

(b) Inform on factors that determine the leak size, or likely size

4.6.13 And then, use the understanding obtained to:

(a) Model/predict pipe failures

(b) Inform shorter term operational response and/or medium to longer term strategic programs of work

4.7 Growth

Development within the North West

4.7.1 The North West has a diverse geography from densely populated urban centres such as Manchester, Liverpool and Preston as well as rural conurbations across places like Cumbria, Lancashire the Pennies and Cheshire. All of these areas have high demand for new homes from registered providers (social housing), the private rental sector and mortgageable properties.

4.7.2 New homes and properties are provided by a range of organisations from FTSE 100 companies such as Barratt Developments, Persimmon and Taylor Wimpey, large, locally based home builders such as Story Homes and Wain Homes through to a range of smaller builders. General construction also continues to contribute to the North West with construction companies developing commercial and industrial premises as well as high density residential developments, usually in city centres.

4.7.3 The number of new connected properties within the North West increased by over 50% since the beginning of AMP6 from around 16,000 to a peak of 33,000 in FY20. In recent years, economic factors such as the impact of COVID-19 Brexit and the cost of living crisis appears to have stalled this year on year growth reaching circa 27,000 properties in FY21 and FY22, and 23,000 in FY23.

4.7.4 New appointments and variations (NAVs) are limited companies which provide a water and/or sewerage service to customers in an area which was previously provided by the incumbent monopoly provider. NAVs provide competition in a market which is inherently monopolistic. This can provide a number of benefits for society, end-customers and developers. The benefits include serving a site at a lower cost, facilitating multi-utility developer service and encouraging innovation. Ofwat is actively encouraging an effective market, resulting in an increase in NAV activity.

4.7.5 We have forecast a profile for the number of new properties based on the assumption that the current economic climate will sustain for the next 2 years meaning minimal change within the housing sector. It is also assumed that home building will increase in-line with economic recovery into AMP8 with profiles set against this forecast. The total volume of new residential connections is aligned with overall Water Resources Management Plan (WRMP) forecast volume. Adjustments have been made for forecasting year on year connected property volumes and also increasing NAV activity at the assumed rate of growth of 10% year on year.

4.7.6 To ensure we continue to meet our demand forecasts, we plan to increase production capacity by 22Ml/d, in line with our WRMP requirements and restore production capacity at existing sites. To complement this, we plan to deliver water efficiency campaigns to reduce water usage, reducing overall demand on production capacity and increasing headroom to be able to absorb and recover from acute shocks to the system.

4.8 The North West is made up of diverse counties

4.8.1 We've built our plan for the next 5 years around the five counties of the North West, as each is different with its own particular challenges and opportunities. Through embedding this approach we aspire to deliver outcomes which are tailored for people in the places where they live

4.8.2 Our plan delivers service improvements across all of our five counties although also within our plan are specific schemes with greater importance in a particular county, see Figure 5.

Figure 5: Our plan for the five counties

Source: UUW internal data

5. Our long-term strategy for Water

Summary

- **Invest in assets fit for the future:** Our long-term plan for water outlines around £5.6 billion of enhancement expenditure over the next 25 years to meet our ambitions for water.
- **Safeguarding water resources:** Our plan aims to achieve ambitious targets to halve the level of leakage, reduce non-household demand and reduce water use per person per day to 110 litres by 2050. The reduction in demand for water will contribute to managing supply resilience to climate change and supports our commitment to reduce greenhouse gas (GHG) emissions.
- **Improving water quality:** Our plan delivers on our commitment of excellent water quality. Our proposed long-term investment ensures that drinking water quality will be resilient to challenges, such as climate change, asset health and potential risks from emerging contaminants and associated new water quality standards. We aim to reduce water quality contacts by 63% by 2050.
- **Supporting national needs:** Our plan supports national water supply resilience by developing options which allow us to transfer large volumes of water outside our region during times of need elsewhere in the country.
- **Adapting to the future:** We have tested a range of scenarios to ensure that our plan can adapt to future uncertainty in the face of climate change, population growth and abstraction changes, as well as understanding the opportunities offered by innovation and technology.
- **In summary:** Our proposed best value plan for water is formed of low regrets solutions which are flexible in addressing uncertain futures. They enable us to deliver our ambition of providing broad benefits to customers in the North West as well as supporting national water resource needs and delivering environmental improvements.

5.1 An overview of our long-term plan for water

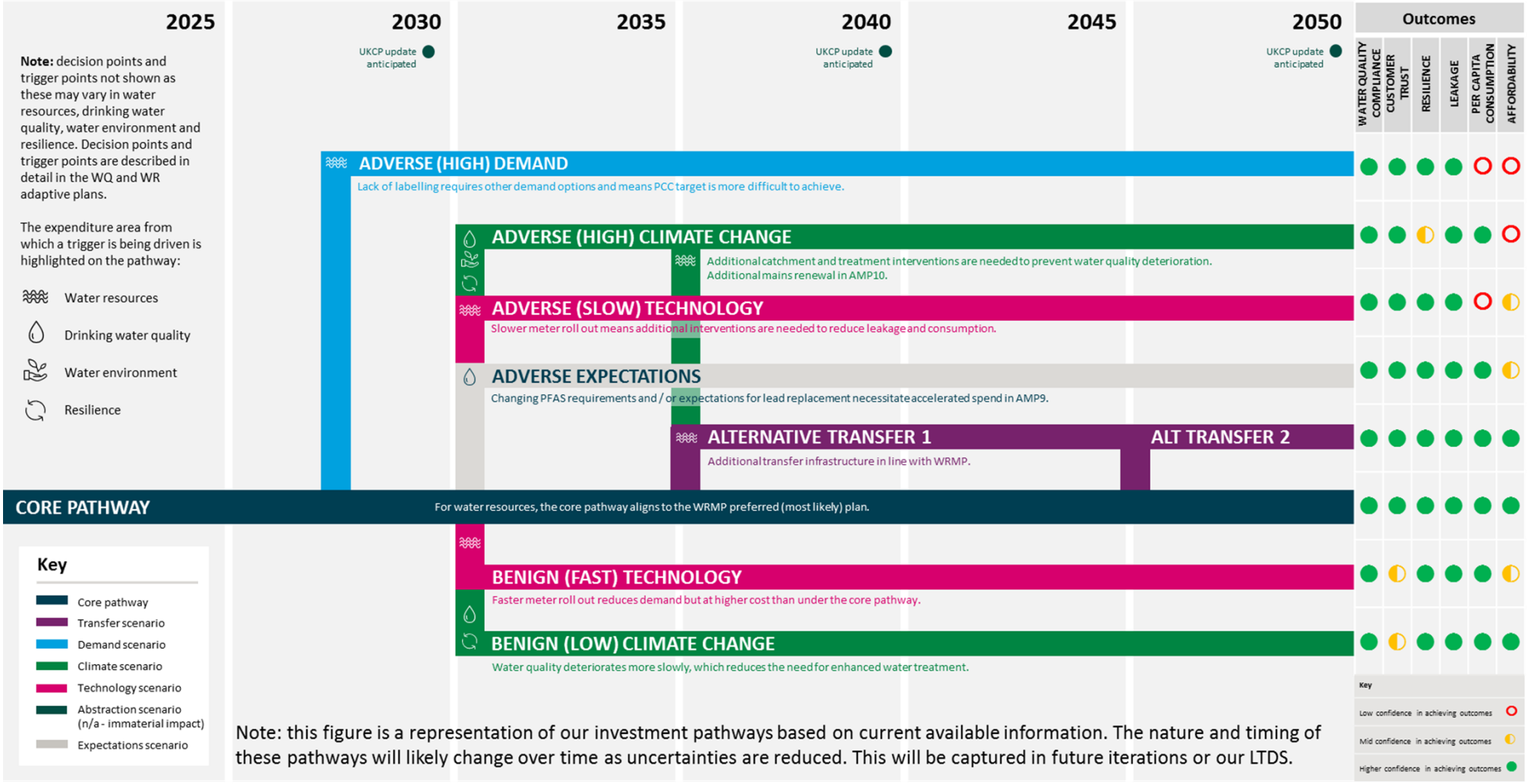
5.1.1 Our adaptive plan for water enables us to deliver our ambition for the North West under plausible extremes of climate change, demand, abstraction reductions, technological development, water transfers and changing customer and stakeholder expectations.

5.1.2 Our AMP8 plan has been developed in the context of our long term delivery strategy (LTDS). The key points from our adaptive plan for water are outlined in this section. For further information on how we've approached the development of our adaptive plan, the impact of scenario testing and full detail on our core and alternative pathways see *UUW12 - Long Term Delivery Strategy*.

5.1.3 Our adaptive plan is comprised of a core pathway of low regrets investment and expenditure that keeps future options open, and alternative pathways containing investments required under more extreme future scenarios. Figure 6 shows under what circumstances we may need alternative pathways to help deliver our ambition and the triggers. Figure 7 highlights some of the investment and outcomes our Core Pathway delivers.

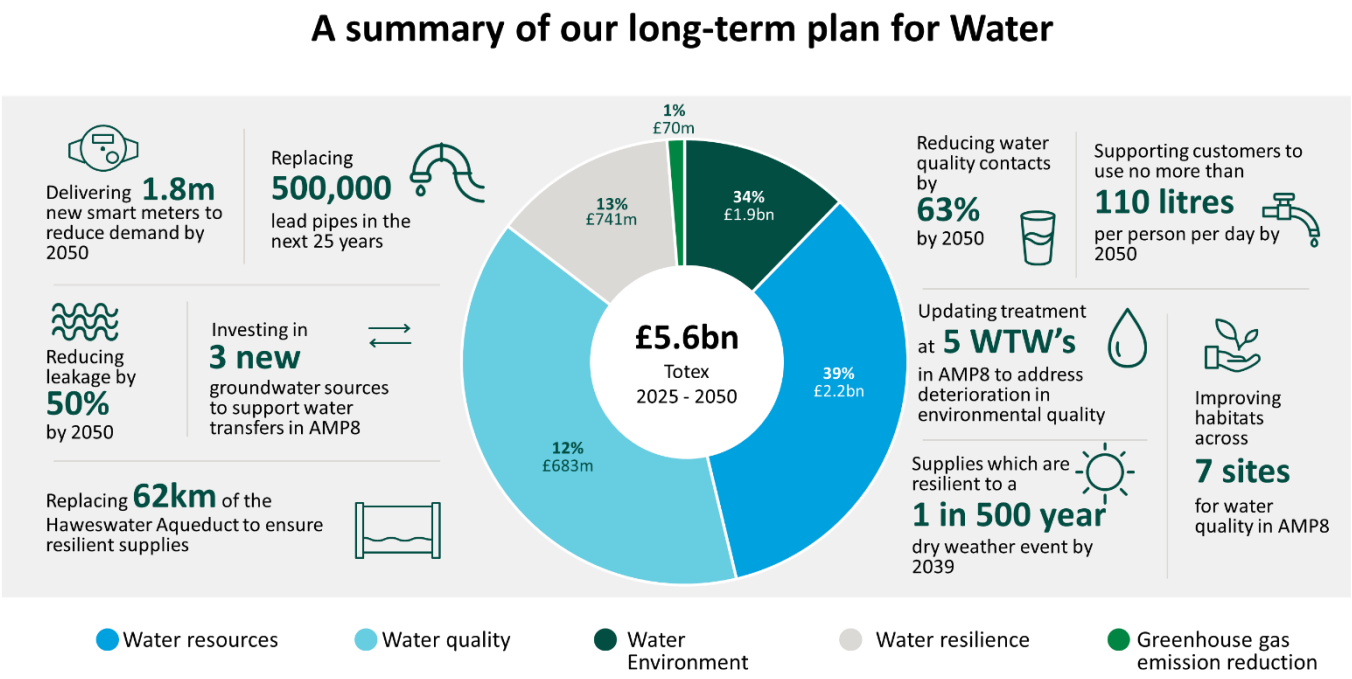
5.1.4 In many cases, alignment of trigger and decision points with regulatory cycles is important to ensure efficiency and best value for customers. For example, a change in supply pipe ownership to aid lead removal at the beginning of an AMP will allow appropriate funding and processes to be put in place.

Figure 6: Our singular adaptive plan for water, combining our Revised Draft Water Resources Management Plan (WRMP) and Drinking Water Quality Plan (DWQP)



Note: this figure is a representation of our investment pathways based on current available information. The nature and timing of these pathways will likely change over time as uncertainties are reduced. This will be captured in future iterations or our LTDS.

Figure 7: A summary of the totex expenditure and outcomes delivered through our long-term plan for water

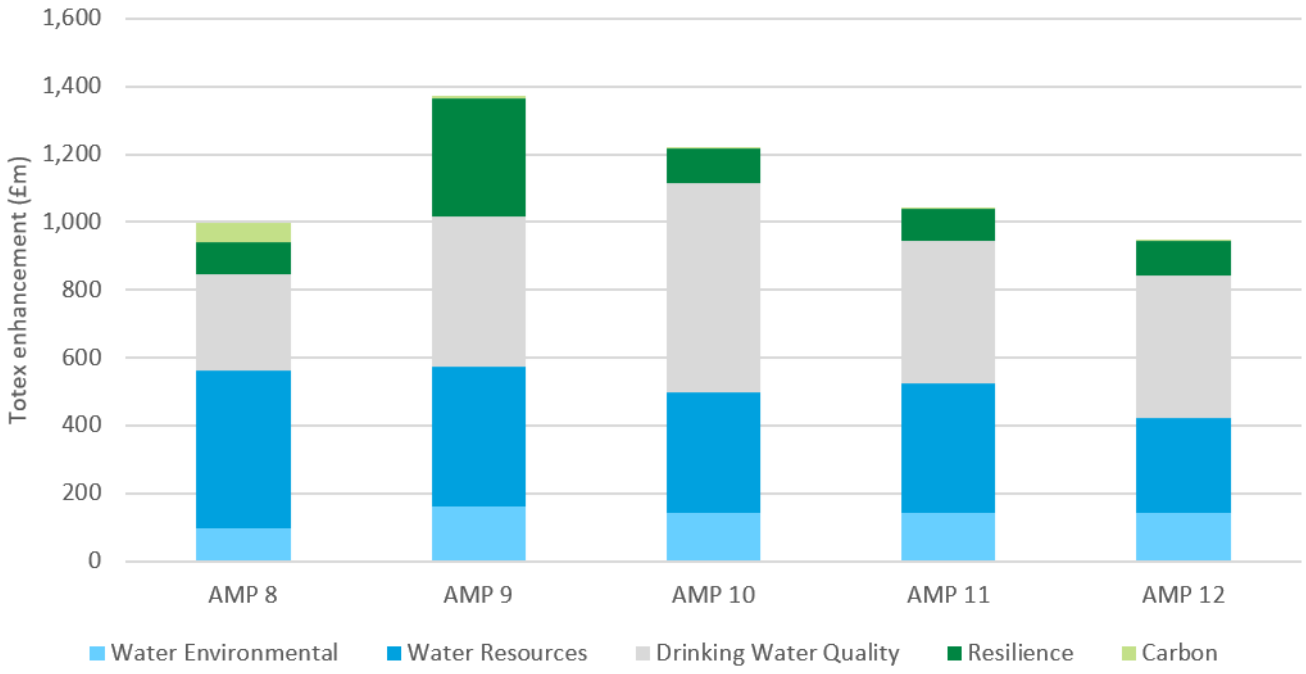


Source: UUW internal visual of Water long term strategy

5.2 Our core pathway to deliver our water ambition

5.2.1 Our Core Pathway for water is made up of low regrets investment aligned to our strategic programmes (WRMP, DWQP, WINEP) and AMP8 enhancement needs, and tested against the common reference scenarios and our wider scenarios, as shown in Figure 8.

Figure 8: Our Core Pathway of investment to 2050, by expenditure type



Source: UUW internal data

Water resources

5.2.2 Our core pathway embraces national efforts to reduce leakage by 50 per cent, non-household demand by 15% and household consumption to 110 litres per person per day by 2050 through plans to invest in mains renewal and metering. The core pathway includes interventions on leakage and demand reduction such as in-pipe repairs and lining technologies, and water efficiency measures. These interventions will improve the resilience of water supply in a changing climate, protect the environment by reducing abstraction to sustainable levels, and deliver better day-to-day service for customers.

5.2.3 The core pathway also supports the need for national water transfers by delivering three groundwater sub-options. These sub-options introduce additional production capacity to the North West and build the resilience of the system to prepare for times where water transfers are required.

5.2.4 We undertake extensive risk assessment, option development and appraisal, and adaptive planning through our statutory WRMP. We also contribute to the development and delivery of the regional water resources plan and wider national water transfer planning as part of Water Resources West. Both of these documents, like the LTDS, have a long-term planning horizon to 2050 and beyond. Our WRMP is designed to meet the Environment Agency's Water Resources Planning Guideline (WRPG)[5] alongside supplementary guidance and Ofwat's PR24 Guidance on Long-Term Delivery Strategies[6].

Water quality

5.2.5 Our Core Pathway proposes investment in catchments and at treatment works to manage deteriorating raw water quality.

5.2.6 The DWQP is our long-term strategy to secure water quality for future generations. The plan is based upon the requirements of the Drinking Water Inspectorate's long-term planning guidance[7] and includes high level ambitions applicable to the whole water supply system from catchment to customers' taps, for the planning period 2025 to 2050 and beyond.

5.3 Our alternative adaptive pathways for water

5.3.1 Our core pathway for water will allow us to deliver our ambition under most future scenarios. Under a small number of scenarios, we may need to use alternative pathways to deliver our ambition.

5.3.2 We've optimised our plans to prioritise options which deliver cross cutting benefits for example: mains replacement for quality, leakage benefit and resilience/asset health benefit; leakage for demand reduction and thus environmental benefit; and, customer demand management delivering efficiency for water and wastewater.

5.3.3 Notwithstanding its suitability under a wide range of scenarios, the Water Core Pathway will not deliver our stretching ambitions in all scenarios. By testing how our plan responds to a range of future scenarios we have created the alternative pathways of investment.

5.3.4 We have tested the impact of the following benign and adverse scenarios, and considered what expenditure is required under each of these scenarios to deliver our ambition

- Demand;
- Climate change;
- Abstraction;
- Transfer needs;
- Technology; and,

[5] Environment Agency. 2023. *Water resources planning guideline* (Version 12)

[6] Ofwat. 2022. *PR24 and beyond: Final guidance on long-term delivery strategies*

[7] Drinking Water Inspectorate. 2022. *Guidance Note: Long term planning for the quality of drinking water supplies*

- Changing expectations.

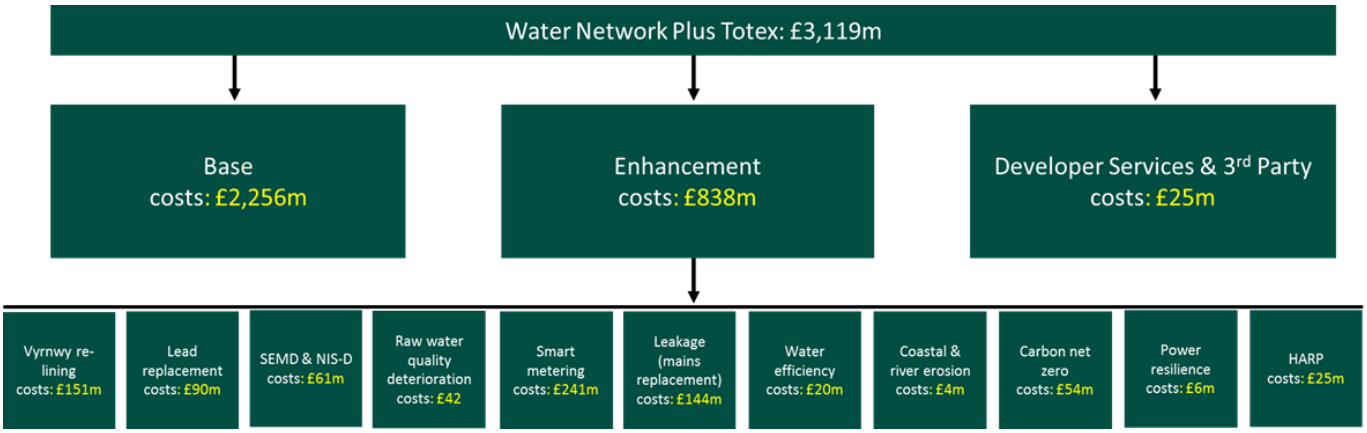
5.3.5 For more detail on our long term and adaptive plans for water, see *UUW12 - Long Term Delivery Strategy*.

6. Plan Summary

6.1.1 Our AMP8 business plan for Water Network Plus outlines £3,119m of expenditure, from 2025 to 2030, enabling us to meet our stakeholder and customer expectations. The breakdown of our totex expenditure is shown in Figure 9.

6.1.2 **Water network plus** base costs are broadly in line with the AMP7 FD. Enhancement totex largely relates to installation of smart metering, re-lining the Vyrnwy aqueduct, targeted mains replacement to reduce leakage, lead pipe replacement, critical security upgrades required under new directives, and reducing carbon emissions.

Figure 9: Water Network Plus totex breakdown



Source: UUW internal data

6.1.3 As part of our Water Network Plus business plan submission we have included a number of cases for enhancement funding and cost adjustment, these are shown in Table 5.

Table 5: Water Network Plus business plan enhancement summary

Enhancement	Summary	Capex (£m)	Opex (£m)	Totex (£m)
Water Resource Management Plan enhancements				
Leakage – UUW61 case 7	We propose an investment of £156m to deliver 695km of targeted mains renewal as part of a wider leakage programme renewing ~926km of mains. The enhancement will deliver leakage reductions to help secure longer term water resources resilience.	156.055	0.000	156.055
Smart Metering – UUW61 case 6	In total 921,000 meters will be fitted in AMP8. 54 per cent of these (500,000) 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. 421,000 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 the enhancement case	228.775	11.913	240.687

Enhancement	Summary	Capex (£m)	Opex (£m)	Totex (£m)
Water Efficiency – UUW61 case 8	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.			20.0
Drinking Water quality enhancements				
Vyrnwy – UUW60 case 2	Enhancement investment is required in order to complete the final phase of the Vyrnwy aqueduct relining programme we plan to reline 65.6km of the Vyrnwy Treated Water Aqueduct in AMP8 to improve the service to customers while addressing the provisions of the DWI Enforcement Order before 31 December 2028	151.128	0.000	151.128
Raw water quality deterioration – UUW60 case 5	Investment is needed to enhance removal processes of the secondary metabolites geosmin and 2-methylisoborneol (2-MIB) at five water treatment works (WTW), where current treatment processes are insufficient as a result of increased concentrations and frequency of geosmin and 2-MIB in raw water sources. The sites within the scope of this investment are:- Cowpe, Fishmoor, Hurleston, Lamaload and Ridgegate.	41.179	0.407	41.586
Lead – UUW60 case 3	Replacement of 30,000 lead pipes from the water main to the compliance point at the first customer tap to reduce the risk of customer exposure to lead.	73.500	16.500	90.000
Carbon reduction enhancements				
Carbon net zero 2050 UUW67 case 25	11 Projects have been included within the scope of the enhancement. The projects relevant to the Water Price controls include:- Green fleet - Replacing diesel LCVs with EVs. Woodland creation - As part of this enhancement case UUW will create 465 hectares of woodland from planting trees by 2030, verified by the Woodland Carbon Code (or equivalent standard). This enhancement case is aligned to our long term delivery strategy to reach net zero, therefore carbon reduction benefits will be phased beyond AMP8 due to tree lifecycles Peatland restoration We propose to undertake habitat restoration works across 1494 hectares of peatland by 2030, verified by Natural England (or equivalent standard). This enhancement case is aligned to our long term delivery strategy to reach net zero, therefore carbon reduction benefits will be phased beyond AMP8 due to the length of time involved in restoring natural process in peatland hydrology and ecology; needed to have fully functioning, low emissions peatland.			54.0
Resilience enhancements				

Enhancement	Summary	Capex (£m)	Opex (£m)	Totex (£m)
SEMD & NIS – UUW60 case 4	n response to the security and resilience threats facing UK national resources, the UK government has introduced legislation to ensure providers of essential services and operators of Critical National Infrastructure (CNI) adhere to a common standard for security, resilience and emergency planning. For the water industry this legislation takes the form of the Network and Information Systems Directive (NIS) and the Security and Emergency Measures Direction (SEMD). This enhancement will ensure UUW are compliant with the new legislation. The AMP8 NISD enhancement programme is proposing to deliver 13 individual enhancement projects. The AMP8 SEMD enhancement program is building a program of work focused around UU's 25 Critical Nation Infrastructure (CNI) assets.	53.097	7.755	60.852
HARP – UUW62 case 10	At PR19 UUW identified a need to improve the resilience of the continuous supply of potable water delivered via the Haweswater Aqueduct (HA) to reduce the risk to water supplies for the long-term. This need will be delivered through Haweswater Aqueduct Resilience Programme (HARP) under Direct Procurement for Customers (DPC). This enhancement case covers the next phase of activity, allowing UUW to deliver its obligations set out within the CAP Agreement and Allowed Revenue Direction (ARD), including management of the Competitively Appointed Provider (CAP) (who is responsible for the financing, design, build and maintenance of the replacement tunnel sections) and interaction with the Independent Technical Advisor (ITA)	24.772	0.000	24.772
Power resilience UUW67 – case 26	To achieve our long-term ambitions of minimising service disruptions to customers and protecting the environment, we need our most important sites to be supported by a reliable back-up source of power. This solution will deliver resilience now and in the future, accounting for climate change in both a benign and extreme future. With wetter winters and more extreme weather predicted, the likelihood of power disruptions and their impacts is heightened, with the increasing frequency and severity of storms and flood risk. Our most important sites would have an extra layer of protection through the provision of a back-up power supply	5.399	0.672	6.071
Coastal & river erosion – UUW65 case 17	UUW is situated in an operating region that is especially susceptible to coastal and river erosion. Climate change projections indicate that the North West will experience more frequent and intense winter storms, storms that can be expected to accelerate the rate of erosion of the land supporting our critical infrastructure. The enhancement case covers the Water & Wastewater Price Controls (totex reflects the full case). For Water, to secure the long-term resilience of our coastal and riverine asset base against accelerated erosion rates, we set out an enhancement case that will allow us to protect approximately five (0.6 km) clean water mains from increasing erosion risk	4.447	0.000	4.447

Source: UUW internal data

United Utilities Water Limited
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United Utilities

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