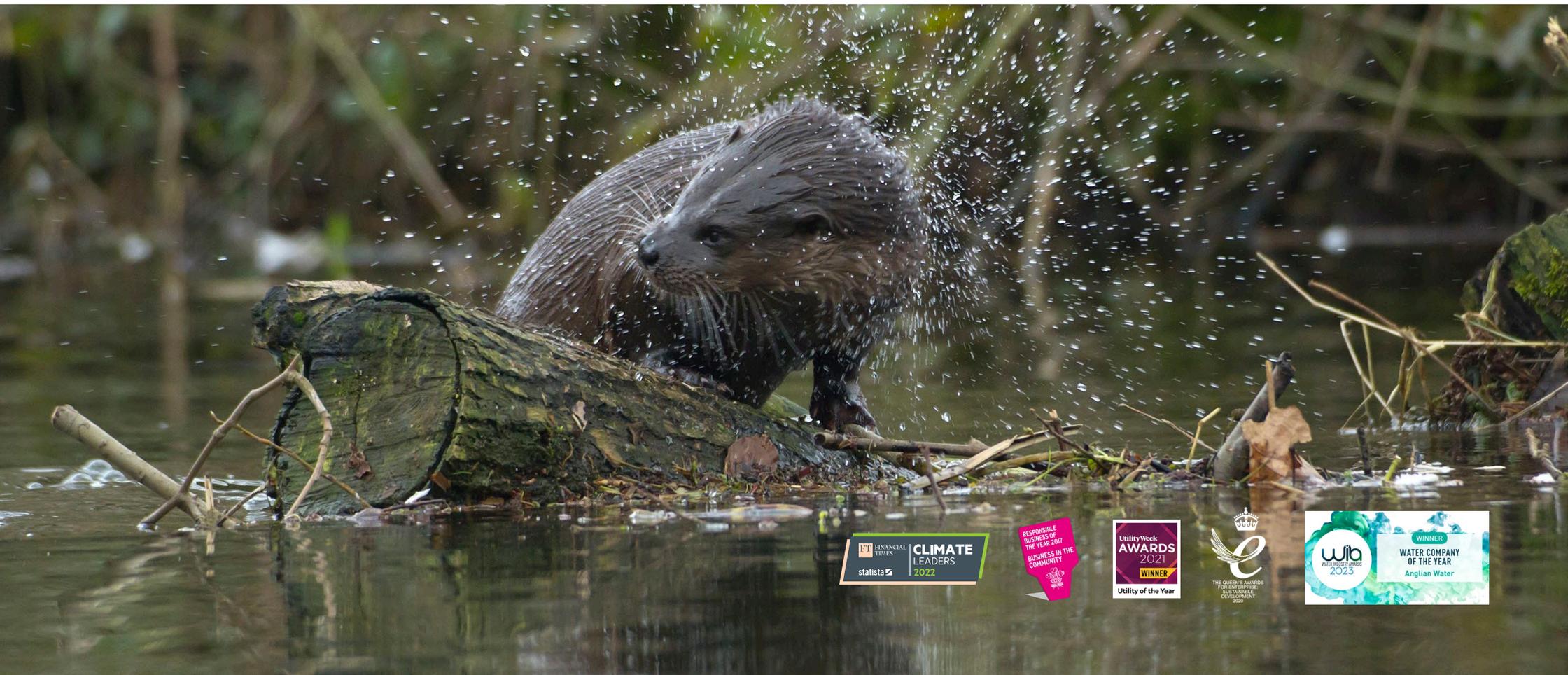


# Long Term Delivery Strategy October 2023



## Long Term Delivery Strategy 2025-2050

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# 1. Introduction

This introduction provides an overview of our Long Term Delivery Strategy, detailing our investment plans in water and water recycling services for Eastern England through to 2050.

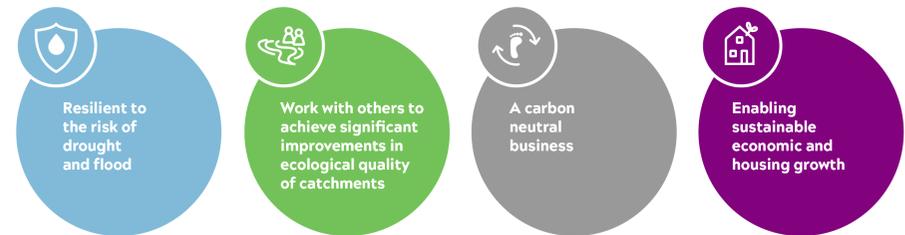
Anglian Water's purpose is to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop. It is deeply embedded across our business, guiding everything we do.

The region that we serve is home to 15% of England's population and rapidly growing in terms of its water needs. The region receives the lowest rainfall in England, making it prone to drought, and yet with 28% of the land here being below sea level, we are also at significant risk of flooding; climate change is already exacerbating both of these risks. Three quarters of the land in our region is used for agriculture, and we are home to some particularly environmentally important landscapes, such as our chalk streams and our beautiful coastline. The way that land is managed for food production and for nature is intrinsically linked to outcomes related to water. Alongside our role of providing safe, clean drinking water and effective water recycling services, we must also protect, restore and enhance the environment and ensure that economy of the region we serve can thrive.

We have long known about these pressures, and in order to deliver our purpose and play a key role in mitigating and adapting to them, it is essential we take a long-term approach to planning investment in water and water recycling services for our region.

Our Strategic Direction Statement (SDS) was developed in 2007 to provide a clear framework for planning for the following 25 years. Our SDS was refreshed in 2017 and reviewed in 2021 and, following extensive consultation with our customers and other stakeholders, we developed four key strategic priorities, each of which continues to guide our planning processes, including most recently our PR24 Business Plan for 2025-2030.

Our 25-year Strategic Direction Statement states what we want to achieve in terms of outcomes for the region, and our Long-Term Delivery Strategy (LTDS) determines how we will get there through a 'core pathway'. Our LTDS also identifies key internal and external factors which could either slow or speed up the delivery of these outcomes, and details the actions we are planning to take via 'alternative pathways' to minimise their risk to protect customers from unnecessary bill increases.

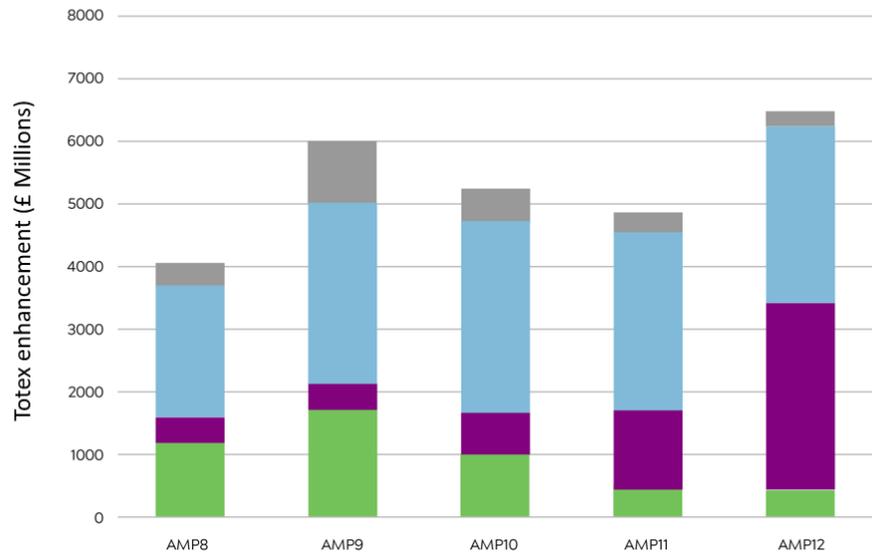


We welcome government targets, but we will need to go above and beyond in order to deliver our ambition. However, we recognise that ensuring our ambitious delivery plans are affordable is crucial both now and for future customers to ensure intergenerational fairness. The LTDS enables us to think beyond 2030, employing different methods and tools to scenario test our plans.

This LTDS seeks to align our existing plans and strategies, including our Water Resources Management Plan, our Drainage and Wastewater Management Plan and our Long-Term Plan for Drinking Water Quality

We have taken on board the valuable feedback from the Ofwat development meeting in February this year and used peer review throughout to refine our approach. We have used Ofwat's common reference scenarios, namely technology, demand, climate change and abstraction reduction, to create and test our LTDS. We have also looked to the future through a variety of lenses including digital, innovation, partnership-working and placed-based approaches, to ensure we have considered every possible solution.

## Core pathway



Achieving our vision will require unprecedented transformation of our organisation and our sector, and associated industries, for example, agriculture, and we will need to embrace new and emergent technologies. Core digital technologies such as the Internet of Things, digital twins, artificial intelligence and advanced sensing, offer serious potential for our industry. In addition to embracing new technologies, we will also need a step change in our approach, driving more cross-sector collaboration, with partners working together to define objectives and adopt a systems-focussed, outcomes-based approach to create the right solutions.

We will continue to build on our key partnerships throughout AMP8, such as Ofwat's Innovation Fund and H2Open and beyond and will also ensure our people, supply chain, partners and the industry at large has the skills and capacity to deliver this change.

## 1.1 Best value plan, informed by our customers

Our LTDS represents the best value plan for our region, and we have extensively tested it to ensure our core pathway is efficient, affordable and fair in both the short and longer-term, setting us up for a range of plausible futures. We have considered numerous solutions to create value across all components of the plan, and we are clear how we will use base maintenance provision alongside enhancement funding in the long-term.

Our LTDS has been informed by customers and stakeholders through extensive consultation. We have listened to their feedback, particularly around

- How ambitious we should be,
- how we should prioritise investment over multiple AMP periods,
- how we can prioritise solutions which deliver wider social and environmental benefits,
- whether customers would be prepared for bills to increase if it meant that more vulnerable people were being supported.

We have taken a robust approach to developing our core and alternative pathways. In addition to Ofwat's common reference scenarios, extensive research led us to focus on two additional scenarios pertinent to our region; The availability of the landbank to enable recycling of bioresources and the expected increase in demand for water from the energy sector in our region.

We have made a series of clear assumptions as we have developed our LTDS relating to:

- Government and regulatory policy
- The environment
- Socio-economic changes
- Our company (costs, base, asset health, skills, supply chain, innovation)
- Other water companies and other sectors

Our LTDS will be closely monitored. Our monitoring plan sets out how we will determine whether, and importantly when, we need to adapt one of more elements of our long-term strategy for changing circumstances. The plan includes the metrics we will use to guide us throughout, the key trigger points or decision points, and the actions we will take when we get to a threshold.



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Our Long Term Delivery Strategy shows clearly how we will deliver our purpose and our ambition in over the next 25 years. It's exciting, and developing it has been a fantastic journey of collaboration and challenge with our customers, our wider stakeholders and subject matter experts right across our organisation and beyond. Our LTDS has informed the development of our PR24 Business Plan, and will continue to be deeply embedded across all our planning and strategy development. Our LTDS is efficient, affordable and fair in both the short and longer term, and sets the blueprint for our ambition to become a global exemplar for a purpose-led business.

**Peter Simpson CEO**

## 1.2 Navigating our LTDS

In the development of our LTDS document we have followed the Ofwat Guidance and have structured the document as follows:

- Ambition: what we aim to achieve over the next 25 years
- Strategy: how we will aim to meet this ambition
- Rationale: why our strategy represents the best way of meeting our ambition
- Foundation: the key assumptions and uncertainties underpinning our strategy
- Board assurance: how our Board has challenged management to deliver a high-quality LTDS.

We signpost below where to find specific guidance requirements:

**Table 1 Document signposting for our Ambition**

Requirement (Ambition)	Signposting
Set out our ambition.	<a href="#">2. Ambition</a>
How we have developed our ambition.	Rationale: <a href="#">4.5 A robust approach to developing our core and alternative pathways</a>

**Table 2 Document signposting for our Strategy**

Requirement (Strategy)	Signposting
The improvements in performance that are expected from base expenditure.	Foundations: <a href="#">5.2 Base</a>
Testing how the company's ambition can be met in different future scenarios, including the common reference scenarios.	Rationale: <a href="#">4.5 A robust approach to developing our core and alternative pathways</a>
Strategy sets out a clear narrative on how the company expects to achieve the ambition and vision.	<a href="#">3. Strategy</a>
Strategy sets out low regret enhancement expenditure required in the core pathway.	<a href="#">3. Strategy</a>
Strategy sets out the 'higher regret' enhancements in the adaptive pathways.	<a href="#">3. Strategy</a>
Strategy is aligned with WRMP and DWMP and 'most likely' approach is shown as an alternative pathway (if not the core pathway).	Strategy: Water Resources and Strategy: Drainage and Water Recycling: <a href="#">3.4.2 Water resources</a> <a href="#">3.4.5 Drainage and water recycling</a>
Decision types are clear and trigger points identified.	Strategy: <a href="#">3.3 Alternative pathways</a>
Monitoring approach is in place (the metrics, frequency of reporting).	Foundations: <a href="#">5.3 Monitoring the plan</a>
Impact on bills set out for core and alternative pathways.	Rationale: <a href="#">4.2 Affordable and fair</a>

**Table 3 Document signposting for our Rationale**

Requirement (Rationale)	Signposting
Scenario identification and development	Rationale: <a href="#">4.5 A robust approach to developing our core and alternative pathways</a>
How options are identified	Rationale: <a href="#">4.1 Best value</a>
Why the strategy is best value	Rationale: <a href="#">4.1 Best value</a>
How customer and stakeholder views have been taken into account in the core pathway	Rationale: <a href="#">4.3 Informed by customers and stakeholders</a>
How sequencing has been considered	Rationale: <a href="#">4.5 A robust approach to developing our core and alternative pathways</a> and <a href="#">4.2 Affordable and fair</a>
Impact on affordability and fairness between current and future customers, including evidence that customers consider the forecast bill impacts of the strategy to be acceptable	Rationale: <a href="#">4.2 Affordable and fair</a>

**Table 4 Document signposting for our Foundations**

Requirement (Foundations)	Signposting
Clearly set out the assumptions underpinning the strategy	Foundations: <a href="#">5.1 Assumptions</a>
Set out the areas with the greatest uncertainty	Rationale: <a href="#">4.4 Robust to future uncertainty</a>

**Table 5 Document signposting for our Board Assurance**

Requirement (Board Assurance)	Signposting
The company Board should provide an assurance statement that meets the criteria set out in Ofwat's final Guidance.	Board Assurance Statement (ANH02): <a href="#">6. Board assurance</a>

**Table 6 Responding to Ofwat feedback**

Requirement (Address Ofwat feedback)	Signposting
Address the Ofwat company specific and industry-wide feedback.	<a href="#">7. Our response to Ofwat feedback</a>

## 2. Ambition

### 2.1 Our purpose

Our purpose is to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop. It drives everything we do, from big strategic decisions to the day-to-day running of the business.

As a monopoly provider of a service which is fundamental to society, we are conscious of the weight of responsibility we bear to deliver safe, clean water and recycle it effectively and to protect and enhance our environment and enrich our communities. That responsibility drove us in 2019 to become the first utility to embed our purpose into our Articles of Association, locking public interest into the fabric of our business and the decisions we make each day.

### 2.2 Our Strategic Direction Statement

To deliver on our purpose, we advocate a long-term approach. Built around Ofwat's guiding principles and governance framework, our Strategic Direction Statement (SDS) was developed in 2007 to provide a clear framework for planning for the following 25 years. Our recognition of these challenges includes our first company-wide climate change risk assessment in 2005, our first Strategic Direction Statement in 2007 and our Water Resources Management Plan in 2009 that first included UKCP02 climate projections.

Our SDS was refreshed in 2017, following extensive consultation with customers and our Customer Engagement Forum, where we co-created four ambitions. In 2021, our Board concluded that our SDS remained fit for purpose to deliver long-term benefits for our business, customers, and the social, economic and environmental ambitions of the region.

We recognise that delivering for the long term in a sustainable way requires an adaptable, multi-layered plan. Our 25-year ambitions continue to guide and inform us on our journey to becoming a global exemplar for a purpose-led business.

### Our 25-year Strategic Direction Statement ambitions:



Resilient to the risk of drought and flood



Work with others to achieve significant improvements in ecological quality of catchments



A carbon neutral business



Enabling sustainable economic and housing growth

## Our vision and ambition for 2050



### Eastern England will be resilient to drought and flooding

- All of our customers will have at least two sources of water supply
- Two new strategic reservoirs will supply 625,000 properties across our region
- Our customers never experience internal or external sewer flooding
- Rota cuts and standpipes are consigned to history as we have a 1 in 500-year resilience to drought
- Storm overflows are no longer required
- Surface water is prevented from entering our waste water network through innovative partnership working and nature-based infrastructure
- Integrated, multi-sector water management systems, embedded within smart cities and communities are the norm
- The risk of exposure to lead in drinking water supplies will be eliminated



### Working with others, we will have delivered significant improvements in ecological quality across our catchments

- Pollutions are consigned to history
- We will enable early delivery of government targets around river health: there will be no additional Reasons for Not Achieving Good Ecological Status (RNAGs) associated with our operations
- River health across the region will be continuously monitored
- Water Recycling Centres and our waste water network will have the same approach to risk management and control as drinking water assets, 'failing safe' to prevent any impact on the environment
- Our region will be regarded as an international exemplar for the use of nature-based solutions to solve water security issues
- We will be 'nature positive': our operations will actively enable nature recovery and biodiversity enhancement
- We will cease all abstraction from chalk aquifers and other sensitive habitats, unless our abstraction provides a positive benefit (e.g. reducing flood risk)
- No effluent will be discharged into the marine environment, it will be reused to support environmental enhancement or to support sustainable growth
- Land and water planning will be undertaken together, with soil health considered alongside river health
- Environmentally damaging substances such as PFAS (forever chemicals) and microplastics will be eliminated at source
- No blockages will occur in our network as a result of customer or food service establishment behaviour



## We will be a net zero carbon business

- We focus on eliminating waste and the root causes, leading to reduced chemical and energy use in our management of the water cycle
- Our global leadership on net zero has enabled us to focus on eliminating waste and the root causes, leading to reduced chemical and energy use in our management of the water cycle
- Our operations enable other sectors (particularly agriculture, and the wider transport and energy sectors) to be closer to net zero through innovative use of waste materials such as treated sludge and effluent
- Our treatment processes do not emit greenhouse gases such as methane and nitrous oxide
- We invest in carbon markets only where we can stack and deliver other environmental benefits
- We have ambitions to move beyond net zero and become a carbon positive business, reducing rather than contributing to the UK's emissions



## Enable sustainable economic and housing growth in the UK's fastest-growing region

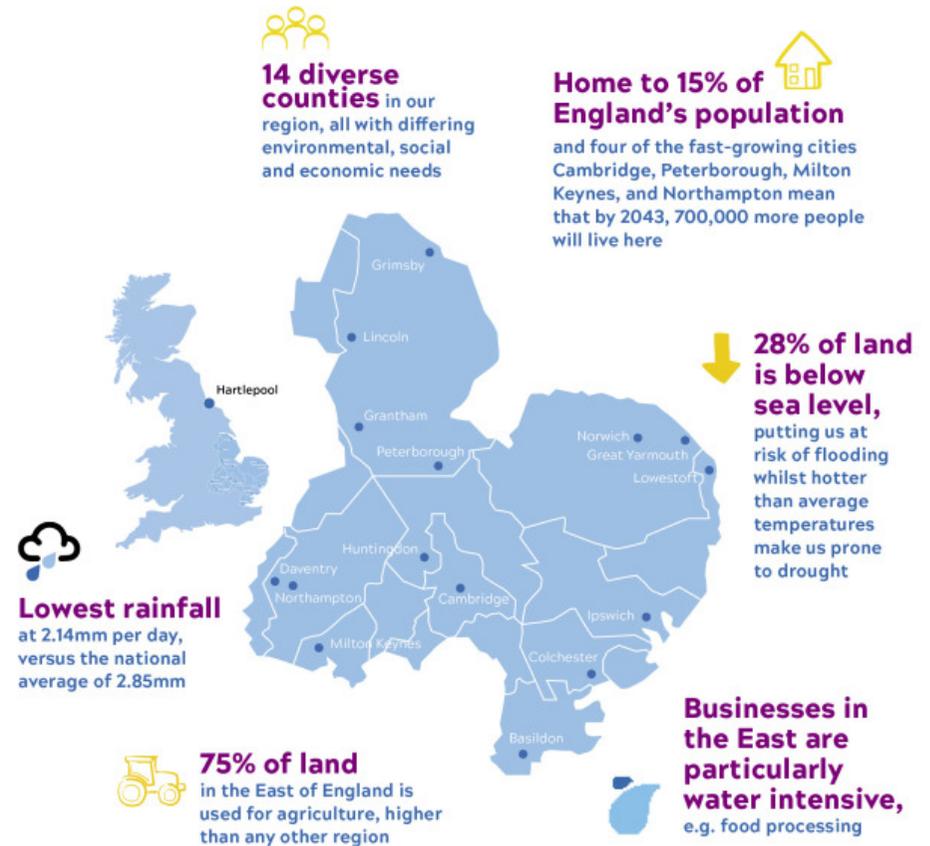
- We will have capacity to support all customers at risk of water poverty
- We are a water neutral region. Customers will have reduced their consumption by 25% compared to 2020, and leakage levels will have reduced to globally leading levels
- The region will have the capacity to support the water demands for new businesses
- Planning requirements will mean that all new housing and commercial developments are built to deliver international best practice around water efficiency
- Coastal and inland bathing water locations thrive due to their excellent water quality
- Water and drainage capacity is considered at least 10 years ahead of major housing and non-household development

## 2.3 Our region's challenges

We have gathered a detailed picture of the specific challenges among the 14 counties we serve, partnering with Capital Economics to develop a broad piece of analysis, Thriving East. On the back of Thriving East, we have run an extensive engagement programme with our region's stakeholders, discussing in-depth the local challenges that our research has exposed, their priorities and how we can work in partnership to get the best possible outcomes. This has helped us build a picture of how our plans can reflect the diverse challenges we operate in and around

Anglian Water is the largest water and water recycling company in England and Wales by geographic area. From the Broads of Norfolk to the hills of the Lincolnshire Wolds, fast-growing cities to the dramatic Suffolk coastlines, our region is highly diverse

Eastern England will see considerable changes in the coming years. Many of these are already being felt today. Our increasingly volatile climate is placing pressure on homes and businesses, while our flat and low-lying region, with 28% of land below sea level, and lower than average rainfall, means we are prone to flooding and drought. Meanwhile, a growing population, drawn by our expanding cities and proximity to London, is placing further pressure on housing and infrastructure. Eastern England's total population is projected to rise by 8% over the next 20 years.



## Climate change

Our analysis shows that risks and impact of climate change varies greatly across our region. Water resources are becoming more precious. Our region already experiences the lowest rainfall in England. In England and Wales, the wettest places are in the Lake District which receive an average of over 3,000mm of rain a year, whilst in the western Scottish mountains, averages of over 4,000mm occur. Much of Eastern England receives less than 700mm per year and includes some of the driest areas in the country, such as Cambridge.

Furthermore, temperature projections for the same period indicate that this region will be hotter than the national average, at 11.4 degrees compared to 11 degrees across the rest of the country. We are already feeling the impact. In 2022, the Met Office recorded the hottest day on record (40.3 degrees) in Coningsby, Lincolnshire, while the drought created operational challenges in other areas. Climate change affects our entire operations. In water resources, not only will there be less water available, but the risk of drought increases. Our Water Resources Management plan outlines in detail our plans to manage the water resource challenges we may face over the next 25 years.

A lack of rainfall also means that in the summer months, many smaller rivers can be entirely dependent on the final effluent flow that comes from our Water Recycling Centres meaning we have to meet high quality standards with little dilution.

Rising sea levels and more intense rainfall mean that at the opposite end of the spectrum, we are also at significant risk of flooding. Over the Christmas and New Year period in 2020/21, significant flooding affected large parts of Norfolk, with terrible consequences for local communities. The low topography of our region makes surface water management more challenging. Increasing heavy bouts of rainfall put increased pressure on our surface water and combined drainage systems, increasing the risk of sewer flooding, storm overflow events and hydraulic overload-related pollutions.

Our 2020 climate change adaptation strategy sets out our assessment of risk and the key actions we are taking to mitigate impact. In 2021, research we commissioned found that some of our assets are particularly vulnerable to hot, dry weather because our region's soil types are susceptible to ground movement when soils dry out, coupled with the rigid water mains material types selected by previous generations of engineers. In periods of extreme heat and drought, these water main materials located in shrinkable soils experience increased levels of mains bursts, coinciding with periods of peak customer usage.

## Reducing our carbon emissions

The water sector is generally one of the most carbon intensive, requiring power to treat and pump water. The rural nature and flat landscape of our region means we need to use a lot of energy to pump water to where it is needed.

We serve more than 1,100 water recycling catchments ranging from small rural catchments with less than 50 people, to larger urban catchments serving more than 300,000. The high proportion of rural areas in our region (89% rural versus 11% urban) means we currently have many unmonitored remote locations across our asset base. To pump water and sewage over vast, flat distances to dispersed communities, our sewer network is the longest in the country. Laid end-to-end our sewerage network is almost long enough to stretch around the world twice, at 76,437km and includes over 6,500 pumping stations.

We are committed to using renewable energies to minimise our footprint. And, we are finding ways to support the circular economy, as getting to net zero is highly reliant on a sustainable, low-carbon approach to treating and recycling our sludge through our bioresources activities.

## Better outcomes for nature and the environment

Eastern England is home to precious habitats, and we must invest in their future prosperity. Our rivers and soils are not as healthy as they could be, and in their current state, they are not resilient to the future shocks and stresses of climate change.

Compared to other regions, we have a high proportion of flat and low-lying areas, including the Fens in Cambridgeshire and the Norfolk Broads. Not only are parts of the region unique, they are also internationally recognised as environmentally sensitive, including 49 designated sites of special scientific interest (SSSIs), including some of the 85% of the world's chalk streams that are found in southern and eastern England. We are also acutely aware of the risk of flooding as a quarter of our region lies below sea level. The heavily drained, flat landscape features many long, narrow watercourses, which means that pollution can spread quickly. And, with so few hills, we must use energy to pump water from place to place.

While customers supported investment to improve the environment at PR19, there has since been a step change in focus and expectations from the public and government, with intense scrutiny in particular on storm overflows and river and coastal health. This was reflected in the Government's Storm Overflow Discharge Reduction Plan. The Environment Act and its associated targets and Environmental Improvement Plan also set a long-term trajectory for environmental action, which our LTDS contributes to.

## Managing population growth sustainably

We operate in a fast-growing region with high levels of economic ambition. Home to four of the UK's fastest-growing cities in the last decade: Cambridge, Peterborough, Milton Keynes, and Northampton, we want to facilitate an increase in new homes and businesses, and an accelerating green energy sector, but in a sustainable way.

By 2043, we will see the biggest growth in our region in comparison to other UK regions, with over 700,000 more people predicted to be living here. That population boom means a growing demand for reliable water supplies and water recycling services. Bedford, for example, has a 17% housing growth rate, the highest in the region. We are working closely with developers to ensure we can manage population growth sustainably.

## Food security for the UK

Water security is essential to food security. Much of the nation's food production starts in Eastern England, with almost 75% of land used for agriculture - higher than any other region in the country. The Fens, spanning parts of Norfolk, Cambridgeshire and Lincolnshire, account for more than half of England's grade one agricultural land, producing one-fifth of the country's crops and a third of its vegetables. Our Future Fens: Integrated Adaptation programme, is seeing us partner with other key stakeholders to protect the Fens from the impacts of climate change.

We have seen a significant increase in demand for water from industry as businesses seek to onshore production following the UK's departure from the EU. Our data shows that Lincolnshire faces challenges and opportunities in water consumption related to growth in agricultural and food production businesses. On average between 2015 and 2019, 5.4% of Lincolnshire's economic output came from the agriculture sector in comparison to 1.4% for the Anglian region, and 0.4% for England in total.

## Supporting broader economic growth

Our region will be an important player in future energy strategies, with Norfolk and Suffolk alone having the potential to supply half of the country's 40-gigawatt power target from offshore wind by 2040. There is also an opportunity to maximise hydrogen production from the water process, particularly at Bacton in Norfolk and the South Humber Bank to support the government's net zero ambition. Our conversation with Peterborough City Council highlighted their appetite for further development in the energy and waste sectors. Our WRMP stakeholder engagement revealed a concern for how non-household supplies would be catered for in

WRMP24 and how net zero would be supported, considering the growth of hydrogen and carbon capture in our region. We are in discussion with government and regulators about how we can create additional capacity for non-household growth. We have therefore added non-household demand management options within our LTDS and we continue to work closely with regional stakeholders to identify opportunities to enable sustainable growth.

## 2.4 Understanding our customers and stakeholders

In addition to solving the region's challenges, it is equally important that our long-term plans respond to what is important to our customers. We are constantly engaging with our current and future customers, with over 1 million direct customer contacts a year, 387 customer panels and over 100,000 responses to our customer feedback surveys.

Our customers repeatedly tell us that they want us to prioritise safe, clean water, for us to secure resources for the future in the face of climate change, to take care of the environment and to support the most vulnerable in society. This builds on and complements the work and insight from Thriving East and the conversations we have had with regional councils, local stakeholders, charities and social enterprises. Collectively, these have enabled us to build an incredibly detailed picture of the unique challenges each of our stakeholders face. These are areas that we have prioritised with investments, as demonstrated in our PR24 Business Plan.

As we look to the long-term, our objectives continue to be informed by customer views. In November 2022, we tested our 25-year SDS with customers. Our four ambitions were generally well received, with widespread approval of the environmental ambition. Our customers believe that achieving environmental targets is crucial, showing real support for nature recovery and sustainable abstraction, minimising our carbon impact and avoiding displacing biodiversity whilst keeping as much water in sensitive areas as possible. However, customers don't believe our environmental ambitions should be achieved at any cost, and quite rightly want us to ensure a sensible balance between ambition and affordability.

Customers are supportive of long-term planning. We have carefully considered intergenerational fairness - that is, striking a balance between burdening future generations with the cost to solve longer-term challenges and asking today's generations to foot the bill for projects that will benefit future generations.

Our independent research across families spanning three generations saw us engage in debates about our LTDS. We explored motivations and priorities among different generations, considering differences across families, appreciating the differing intergenerational views.

The younger generation were environmentally conscious and aware of their future financial burdens, such as the difficulty in getting on the housing ladder. The middle generation were also feeling the pinch, but had more concerns about

short-term economic and political stability, considering recent events. The older generation were particularly concerned for future generations, wanting to see urgent action to improve the world for their grandchildren. All generations were generally impressed with our LTDS, particularly its focus on addressing leakage and adapting infrastructure for future housing needs. Drinking water quality was unanimously viewed as a key area of focus for us. When it came to paying for the high levels of ambition required in our plan, overall, customers want any bill increases to be fair and spread across generations. A 'smoothed out' approach to bill increases seems both fair and easier to plan to current and future customers.

Some of the direct feedback from current and future customers gleaned from our research includes:

“  
It's great that [they] are going to pre-empt stuff breaking, but they should be doing this already... they should know the lifespan of their infrastructure and replace it before it breaks.”

Why is it 2050? Could it not be sooner? Feels like it should be more urgent. In 30 years' time, everything will be different.

I think smoothed out is the most predictable and probably the safest for the economy.

Our ambition is to achieve our long-term vision as quickly as our resources allow. Like all businesses, we must strike a balance between the deliverability, affordability and financeability of our ambition and plans. When customers are told that Anglian Water plans 25 years or more ahead to tackle long-term

challenges, through approaches such as LTDS, it improves perceptions of us as being proactive and forward thinking, increases trust and means customers place more responsibility on us to safeguard services in the future.

#### **Our LTDS customer engagement**

Our research was designed to support customers to engage meaningfully, to challenge our LTDS and inform key decisions around ambition and strategy. Given the long-term nature of our plan, and the complex trade-offs between cost and ambition, we felt it was particularly important to listen to all customer segments. Particularly future customers and customers experiencing financial hardship.

As a result, we undertook some specific pieces of research to support the development of our LTDS. This included:

- The LTDS Focus Groups, where we explored questions around ambition, affordability and intergenerational fairness with future customers and customers currently struggling to pay.
- LTDS Customer Board sessions, where we used six 'live' decisions to explore questions around ambition, affordability and intergenerational fairness.
- The multi-generational focus groups, where we discussed our final ambition, strategy and the acceptability of forecast bill impacts with three generations of the same family.

The results of this research has directly informed key decisions in the development of our LTDS, including how ambitious should we be, what solutions we should select, and how we should profile investment over the 25 years.

Figure 1 Our Customer Board



## 2.5 Government expectations

The political focus on water has increased greatly in recent years and is reflected in the wealth of legislation and government strategy which now applies to the water industry. Government's expectations of water companies have changed and we have raised our ambition to match this. The current government strategy for the water industry has informed the development of our 2050 ambitions, and our plans are designed to make sure we not only meet, but exceed, government expectations where supported by customers.

In October 2020, the Chair of the Environmental Audit Committee, Rt Hon Philip Dunne MP, launched a private members bill which sought to place a duty on water companies to ensure untreated sewage is not discharged into rivers and other inland waters. This prompted much of the public awareness of the issue with the Environmental Audit Committee launching an investigation and a report on the Water Quality in Rivers. The report highlighted the need for better monitoring of storm overflows, a solution to single-use plastic blocking the sewage network and a solution to excess nutrients like phosphorus and nitrogen from treated sewage and animal waste entering our rivers.

In November 2021, the Environment Act passed into UK law. This Act contained new legally binding environmental and water targets, enforced by the new independent Office for Environmental Protection (OEP). The Act included powers and duties that underpin Biodiversity Net Gain requirements for new developments, including major infrastructure projects, and required new Local Nature Recovery Strategies to be created. It also put a variety of new requirements on government and water companies to tackle storm overflows and put Drainage and Wastewater Management Plans onto a statutory footing.

The Strategic Priorities Statement (SPS) for AMP8 was issued to Ofwat in February 2022, and challenged water companies to be more proactive in improving water quality and protecting the environment. It encouraged the consideration of current customers, (by improving customer service and aiding vulnerable customers) and of future customers (by the creation of sustainable, resilient water and wastewater services). The SPS also drove the water sector to think about how competition in markets could inspire innovation and drive long-term sustainable investment.

Under increasing scrutiny from the media and the public, in August 2022 the government then published its Storm Overflows Discharge Reduction Plan. The plan stated that by 2035, water companies will have improved all overflows

discharging into or near every designated bathing water and improved 75% of overflows discharging to high priority sites. Then by 2050, no storm overflows would be permitted to operate outside of unusually heavy rainfall or to cause any adverse ecological harm.

The Storm Overflows Discharge Reduction Plan was republished September 2023. At this late stage we are not able to amend our PR24 plan, but we do not believe that the change affects our ability to hit the statutory targets set out for 2035, and we will take this into account at PR29.

Goal 3 of the government's Environment Improvement Plan published in January 2023 was "Clean and Plentiful Water". This goal looked at not just river water quality but also water quantity. It set out a water efficiency roadmap which outlined 10 actions that the government and industry would take to make new and existing homes more efficient. We will continue to work with government to deliver these actions, including the implementation of Schedule 3 to the Flood and Water Management Act 2010, which will require the use of Sustainable Drainage Systems (SuDS) in new developments.

The government's "Integrated plan for delivering clean and plentiful water" was published in April 2023, with the clear ambition to deliver clean and plentiful water, a healthy environment and a sustainable supply of water for people and businesses. The plan focussed on the need to take an integrated approach across whole catchments, underpinning improvements with a streamlined policy and legal framework and smarter regulation. It called for further action to address the multiple sources of pollution impacting water bodies and for acceleration of new water supply sources (including reservoirs, water recycling and transfers and measures to improve water efficiency).

From May 2022 to the present day we have been following the progress of the Levelling Up and Regeneration Bill through parliament. The issue of nutrient neutrality has great implications for the water sector. Our industry has been successful in ensuring that nature-based and catchment-scale solutions have been included as a possible solution in the bill.

Ofwat's six guiding principles have helped us to shape our ambition and use our purpose to create social and environmental value in delivering our services.

We welcome government targets for our sector to do more, and also believe that we must go further and faster than these targets whilst seeking to minimise the cost for our customers. To ensure our long-term plan is financially viable, we must think beyond 2030: we cannot be constrained by the methods and tools that we know and have in today's context. As it stands, to maintain the level of service we offer now, we will need to invest significantly more into our operations because

of the challenging nature of our region, which is only going to become more difficult as the climate becomes ever more volatile. Our ambition is to offer a better service than we do today, in areas customers want.

To meet and exceed the targets set by government in AMP7, investment will need to ramp up considerably over the period through to 2050. The overall level of enhancement expenditure in AMP8 is almost entirely driven by statutory programmes which are twice the size in comparison to AMP7. The AMP7 enhancement programme is the largest we will have ever delivered, but it will need to almost double in AMP8, and then increase again in AMP9.



## Delivering on our purpose with PAS808

One year on, we are the first company being assessed against PAS 808 by BSI, holding ourselves to account against this specification: using it to inform our ongoing work to put our purpose and environmental, social and governance considerations at the heart of everything we do. We published our initial findings in our Annual Integrated Report 2023.



BSI recently concluded a nine-day (non-certified), organisational-wide assessment of Anglian Water to PAS808 Purpose-Driven Organisations; Worldviews, principles and behaviours for delivering sustainability – Guide. The assessment explored the extent to which the worldviews, principles and behaviours on purpose are embedded in the organisation. It sampled all levels and facets of the organisation; including some strategically important projects.

The final report is still being completed but the initial feedback from the audit team is really positive. The provisional outcomes of the assessment have commended Anglian Water for the extent of maturity seen in relation to the embedment of the purpose-driven principles and behaviours defined by PAS808, but there will no doubt be opportunities for improvement.

**Peter Hickmott, BSI Lead Auditor**

## 2.6 Board Assurance

Our Board has shaped the development and assured our Long Term Delivery Strategy (LTDS), which is designed to mitigate the impacts of future challenges and deliver across all statutory requirements, now and in the future. And it will go further, achieving ambitious improvements in the areas that matter most to our customers.

Over the long-term, we have challenged ourselves to think not just about what is possible today, but what will be possible in the future. We expect that new technologies and approaches will drive efficiencies and improvements in service, allowing us to achieve more for our customers and the environment. Embracing this potential is central to our strategy.

Our full Board Assurance Statement can be found at ANH02.



As a Board we have reviewed the assurance process for our PR24 plan and Long-Term Delivery Strategy. We held nine deep dive sessions on the plan with Management Board and external assurance providers. This has enabled us to really challenge the development of the plan and understand the choices and assumptions that have been made. The positive feedback from our assurance providers gives our Board confidence that the PR24 governance and programme management framework has been effective in developing a high-quality plan that will enable us to deliver social and environmental value and reflects our customers priorities. I personally attended a meeting of the Independent Challenge Group where I was able to hear the positive challenge the management team received.

**Zarin Patel, Chair of Audit Committee**

### 3. Strategy

In this section we set out our strategy for the period 2025 to 2050.

We first provide an overview of our strategy, explaining:

- How it builds upon our Strategic Direction Statement (first published in 2007)
- The no and low-regret investment that makes our core pathway
- Higher regret investment included in alternative pathways

We then provide more detail about the seven sub-strategies, that together make up our company-wide strategy.

#### 3.1 Strategy overview

Our Long Term Delivery Strategy will enable us to continue to transform the way our business operates to deliver our ambitious commitments and vision in the face of the challenges ahead. Our future investment plans build upon the solid foundations of previous AMP periods.

In early AMP periods our plans were focussed the delivery of significant investment in:

- Drinking water quality, reducing the risk of pesticides, pathogens, discoloured water and taste and odour issues, meaning that drinking water quality in the UK now ranks among the best in the world.
- Building resilience into our water supply systems, reducing burst mains and interruptions to supply, developing further infrastructure and ensuring that assets ‘fail safe’ to protect public health.
- Water demand management by being an early adopter of widespread metering and delivering industry-leading leakage levels.
- The reduction of nutrients and other environmentally damaging chemicals at our water recycling centres.
- Managing growth and surface water through the provision of additional hydraulic capacity in wastewater systems.
- Developing assurance processes to ensure that bioresources can be safely recycled to farmland.

In more recent AMP periods, our approach has further developed, and additional investment has been made in:

- New approaches to managing our water networks with technology for active pressure management and control, reducing leaks and burst mains further.
- Rolling out smart meters at pace and scale to further reduce per capita consumption.

- Upstream catchment management approaches to reduce raw water challenges through active engagement with landowners.
- Further water and water recycling infrastructure to deal with raw water deterioration and reduce nutrients further.
- The development new strategic pipelines across our entire region, increasing inter-connectivity to increase resilience and enable reductions in abstraction.
- Using partnership working to manage surface water and flooding more effectively.
- A significant increase in the levels of sensors and monitors within our water recycling centres and our sewerage system, giving us greater insight into levels and flows.
- A transformational approach to managing carbon, delivering industry leading reductions in embodied and operational carbon as we journey towards net zero.

Moving forward towards 2050, our strategy will mitigate the impacts of challenges like climate change and growth to ensure there is no deterioration in the services we provide to customers. It will also ensure we meet all our statutory and licence obligations, now and in the future. Finally, it will go further, driving the positive outcomes that we, our customers and stakeholders want to see. In order to realise our vision and ambition for the region we serve, we will invest even further in:

- Demand reduction through 100% smart metering and further development of intelligent water networks.
- The provision of further significant new water supply infrastructure including additional interconnectivity of our network, along with the development of two new strategic reservoirs.
- Further surveillance around future threats to water supply resilience, including water quality deterioration as a result of climate change.
- Ensuring that our water recycling systems fail safe to protect the environment from harm from pollution and storm overflows.
- A circular economy approach to all waste streams and advancing thermal treatment of wastewater sludges to produce other highly valuable products such as biochar and sustainable fuels, enabling other sectors’ net zero ambitions to be advanced.
- Upstream management of surface water through the provision of sustainable drainage systems.
- Further significant reductions in greenhouse gas emissions from our assets and operations.

- A significant step change in the use of nature-based solutions to solve water security issues such as nutrient removal and flood risk.
- A step change in the use of partnerships with stakeholders across our region, seeking to find ways of delivering greater environmental and customer outcomes for less cost.

AMP8 represents a crucial stage in the delivery of these outcomes, as we invest over £9bn in our region - all in the pursuit of our 2050 ambitions.

The following tables provides specific examples of what we want to achieve under each of our strategic objectives, both for the end of AMP7 (2025) and AMP8 (2030). This merely scratches the surface. In our business plan, we include the full list of metrics and targets.

Our LTDS investment is structured through seven sub-strategy areas of: Water Resources, Drinking Water Quality, Resilience, Drainage and Water Recycling, Bioresources and Net Zero. Each strategy area has been created to come together to meet our vision by mitigating the impacts of long-term challenges, achieving new government and regulatory targets and to meet ambition that is supported by customers, represented in our house diagram below.

**Figure 2 Improving our asset base**





## Make Eastern England resilient to the risks of drought and flooding

### Where our AMP8 Business Plan will take us by 2030

#### Drinking Water Quality

Continued investment in drinking water quality enhancement reducing risk from chemicals like nitrates, lead and PFAS (so-called 'forever chemicals').

#### Strategic Infrastructure

Expansion of our strategic pipeline to connect more of Suffolk and Norfolk.  
Reservoir construction commences before 2030.  
We begin reusing treated effluent from our Colchester works.  
Enhanced levels of climate resilience of vulnerable water mains and sewers.

#### Managing storm water

Further investment in storm tanks and other grey infrastructure, where we are increasing capacity by the equivalent of 112 Olympic-sized swimming pools, will further reduce storm spills.  
Sustainable Urban Drainage Schemes (SuDS) using nature-based solutions in place across 52 catchments, reducing flood risk.  
Storm spill frequencies reduce by a further 17% by 2030, ahead of government targets.  
We continue to remove overflows from our system where practicable.  
Enhanced levels of climate resilience of vulnerable water mains and sewers.  
Southend and Great Yarmouth become international exemplars as we increase the flooding resilience to over 13,500 properties.

#### Landscape-scale planning

FF:IA regarded as a national exemplar for landscape-scale integrated water management and resilience planning.  
A second landscape-scale opportunity will be advanced.



## Work with others to achieve significant improvement in ecological quality across our catchments

### Where our AMP8 Business Plan will take us by 2030

#### Pollution reduction

We further reduce the total number of pollutions by 40%.

We prevent further pollutions through our sensor network supported by AI and machine learning.

We meet Government targets on installation of final effluent and continuous river water quality monitoring, sharing the data transparently to reduce the risk of pollution.

#### Improving the health of rivers

Our aim is to remove all RNAGs associated with our operations and work in partnership to enable other sector's RNAGs to be reduced.

Phosphorus entering rivers and streams in our region will have reduced by up to 25%, compared to the end of AMP7, contributing to achieving Environment Act 2038 target.

A further 17 rural communities will be connected to the main sewerage network for the first time.

Collaboration with the EA on our Chemical Investigation Programme will see us embed actions into Catchment Plans to achieve good chemical status of rivers and streams. We seek to use approaches such as green social prescribing.

Abstraction from environmentally sensitive sites will reduce by a further 89 MI/D. We expect to close a further two sources in the Norfolk Broads.

We build on our work in AMP7 to further improve rivers and streams in our region.

We are a critical, trusted delivery partner in all Catchment Plans across our region.

#### Increasing biodiversity and enabling nature recovery

We innovate to ensure that our capital programme delivers greater than the statutory minimum of 10% Biodiversity Net Gain.

We continue to build strong partnerships with Natural England and local authority partners as a key enabler of LNRS.

Our role in environmental markets will leverage greater value for the environment.

#### Working in partnership

Our A-WINEP Partnership Centre of Excellence established, leveraging over 70% match funding, enabling greater environmental benefits at no additional cost to customers.

The Norfolk Water Strategy is independently governed and delivers nature-based solutions at scale, using blended finance sources.

The Nature Conservancy will regard Norfolk as an international exemplar.



## By 2030, be a net zero carbon business and reduce the carbon in building and maintaining our assets by 70%

### Where our AMP8 Business Plan will take us by 2030

<b>Carbon reduction</b>	Our capital carbon will be reduced by a further 5%, to 70% against our 2010 baseline. A 20% reduction in the carbon from concrete will be achieved. Our operational carbon for our water assets will be reduced by a further 2.2%* and for water recycling assets by 3.2%* against our 2025 baseline.
<b>Low carbon infrastructure and nature-based solutions</b>	We will deliver at least a further 54 hectares of treatment wetlands giving us a total of 100 football pitches worth across our region.
<b>Supporting renewable energy</b>	We use 100% renewable energy*. 25% of our electricity will be delivered from renewable sources generated at our own sites. Three sludge treatment centres will be upgraded to export biogas to the grid.
<b>Fleet decarbonisation</b>	The majority of our small vehicles will be replaced with electric equivalents. We gradually move towards lower carbon HGVs, using electric batteries or alternative low carbon fuels.
<b>Process emissions</b>	Investment at 17 of our largest sites reduce fugitive emissions, driving down our overall process emissions. Further rounds of Ofwat Innovation bids, including climate change mitigation projects will further expand industry understanding.
<b>Offsetting approaches</b>	As well as tree planting we seek carbon offset opportunities such as sea-grass and saltmarsh restoration, with wider benefits such as flood resilience and biodiversity improvements. Our understanding of carbon markets will be mature and delivering broader benefits.
<b>Taking a circular economy approach</b>	Our Circular Economy Strategy innovates across sectors to turn waste streams into further high-value, low-carbon opportunities, including hydrogen production from treated effluent.



## Enable sustainable economic and housing growth in the UK's fastest-growing region

### Where our AMP8 Business Plan will take us by 2030

#### Demand reduction

PCC reduces further to 124 litres per person a day, a 6% reduction on AMP7.  
Leakage reduces to 152 ML/d (an 8% reduction), representing industry-leading levels.  
Our smart meter roll out for household and non-household customers is complete.  
Clear water efficiency standards in place with national and local government for new developments, including a retrofit approach.  
We work with retailers to support businesses to be even more water efficient.  
We support the leisure and sports industry to become even more sustainable and water efficient.

#### Delivering growth commitments

We continue building on strong partnerships and relationships with national and local government and other key stakeholders to support the region's economic and housing growth ambition sustainably.

#### Multi-sector regional planning

We support regional planning through WRE, providing further insight into future multi-sector water demand.

#### Bathing and shellfish water quality

100% of coastal bathing waters will be classed as Good or Excellent.  
Further inland bathing water locations will be designated with our support.  
We continue improving bathing water quality.  
A further 35 projects to improve shellfish waters in our region.

#### Nutrient neutrality

Catchment permitting approaches embedded to reduce nutrients in sensitive habitats.  
Wider catchment approaches involving nature-based solutions in place across the region.



## How our sub-strategies deliver our ambition

	Environmental enhancement	Water resources	Drinking water quality	Resilience	Drainage and water recycling	Bioresources	Net Zero
Ambition that goes over and above		<p>100 MI/d PCC</p> <p>20% reduction in NHH demand relative to growth</p> <p>The additional reduction in demand is funded through base and we are not asking for enhancement to deliver this element of our ambition</p>	<p>Eliminate the risk of exposure to lead in drinking water supplies by 2050</p>	<p>Reduction in the number of single points of failure</p> <p>Reduction of flood risk on our assets</p>	<p>Pollutions, sewer flooding and storm overflow spills greatly reduced if not eliminated</p>		<p>Net Zero operational emissions by 2030 (Largely delivered through base and secondary benefits associated with enhancement spend in other strategies)</p>
New government and regulatory targets	<p>Statutory environmental obligations (WINEP). Includes:</p> <p>Catchment options to deliver sustainable abstraction</p> <p>Additional treatment at water recycling centres to provide enhancement environmental protection, including the 2038 Environment Act target for phosphorus</p>	<p>50% reduction in national leakage (note we are planning to deliver a 38% reduction in our leakage)</p> <p>110 MI/d PCC</p> <p>9% reduction NHH demand</p> <p>Resilient to 1-in-500 year drought</p> <p>Supply-side options required to deliver sustainable abstraction</p>		<p>Continue with phased implementation of security standards (SEMD and Cyber Security)</p>	<p>Average storm overflow spills reduced to 10 per year</p>	<p>Changes in interpretation in existing legislation (most notably Farming Rules for Water)</p>	<p>78% reduction in UK territorial emissions between 1990 and 2035</p> <p>100% reduction of GHG emissions compared with 1990 levels by 2050 (Material enhancement investment required)</p>
Mitigating the impacts of long term challenges		<p>Mitigating the impacts of growth and climate change on water resources</p>	<p>Mitigating the impact of climate change on raw water quality</p> <p>Mitigating emerging water quality risks (PFAS)</p>	<p>Mitigating the impact of climate change on water and sewerage mains</p>	<p>Mitigating the impacts of climate change, growth and urban creep on water recycling centres and networks</p>	<p>Mitigating the impacts of climate change and growth on bioresources</p>	

### 3.2 Our core pathway

Our core pathway sets out the package of investments required to meet our 2050 ambitions. It includes investments we know are needed now even when considering a range of possible futures. Additional investments only needed in specific future scenarios is captured in our alternative pathways, described in the section below.

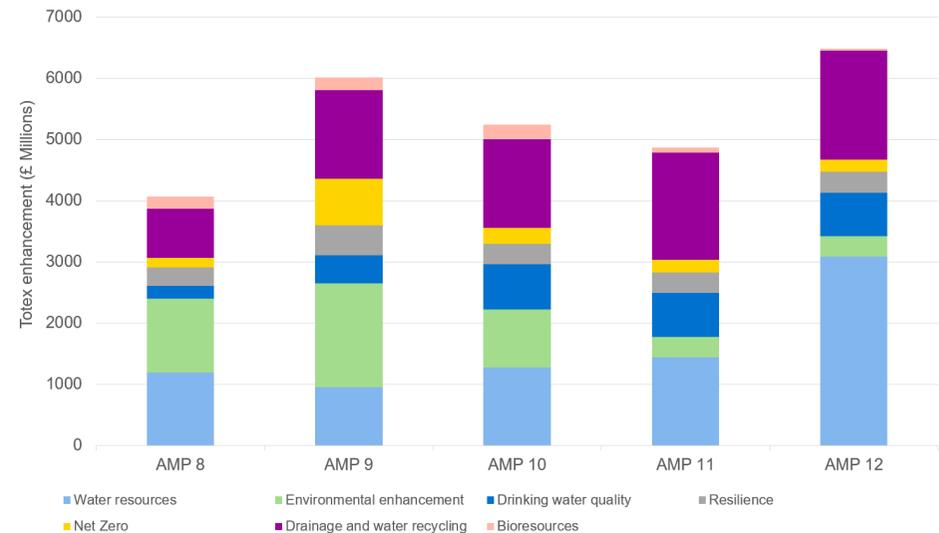
Our core pathway represents a credible indication of required enhancement spend to enable each of our four strategic ambitions between 2025 and 2050. The total estimated requirement is £26.7 billion spread across the period, as shown in the figure below.

In the development of our strategy, we have challenged ourselves to consider a wide range of solution types, including new approaches and emerging technologies that will be possible in the future. Our core pathway places significant emphasis on these new approaches, completely transforming our company and the way we work. Our operations will become highly efficient, optimised using data and analytics, allowing us to cut costs, reduce energy consumption and operational emissions. Working with others, we will establish a systems-based approach to environmental management, where shared solutions are defined at a catchment level, then funded and delivered in partnership. In the short-term, our plan sets out the steps we need to take to proactively establish these new approaches, including a step-change of investment in digital technologies. Over the longer-term, our core pathway provides an indication of the efficiencies these new approaches could drive.

The scale of the challenge, however, is such that we will still need to make significant investment in new infrastructure. This includes:

- The development of new water supplies, including the two Strategic Regional Options (SROs) the Fens and Lincolnshire reservoirs, a water reuse plant in Colchester and significant desalination capacity later in the period.
- New treatment capacity to mitigate known and emerging water quality risks, particularly PFAS.
- A significant increase in the capacity of our water recycling networks and treatment centres.
- New treatment processes to meet environmental and net zero objectives.

Figure 3 Core pathway by 7 sub-strategies



#### 3.2.1 Enabling transformation

Our approach through AMP8 and beyond will be to continue to build resilience to the more adverse scenarios outlined above, reducing levels of uncertainty around them, and minimising the risk of the higher investment scenarios being realised. The decisions that we make now will meet the needs of the future under a range of scenarios through selecting ‘low and no regret’ investment options. Our overall strategy will be to stay as close to our core pathway as we can.

As part of PR24 planning and LTDS development, we have embedded processes to help ensure we consider an appropriately wide range of potential investment options across our enhancement programme, including non-traditional and nature-based solutions. Our option consideration process examined wider environmental and social value to determine the right solutions for progression in our plan.

Having established ‘what’ investment needs exist, we then considered ‘how’ we could deliver these in a way which maximises value for money and benefits for customers and the environment, in addition to the direct benefits of delivering the statutory outcomes.

We recognise that our approach in some investment areas will evolve. In other areas, radical transformation will be required. To enable both the evolution and radical transformation of the plans, and to build resilience to adverse scenarios within our Long-Term Delivery Strategy, we will focus on four key themes to deliver our investments in AMP8 and beyond.

A crucial part of this process is ensuring we have considered as wide a range of options as possible. We've used the lenses of **digital, innovation, partnership-working** and **place-based approaches** to stretch our thinking beyond traditional engineering solutions when considering the range of feasible options.

### Digital

Our society is on the cusp of a technological revolution that will fundamentally change the way we live, work and interact with one another. The water industry is no exception, and over the next 25 years, new technologies will create exciting opportunities to drive a true step change in performance. Our work to date has given us the strong belief that data and digital must be central to our future strategy. In the development of our 2017 SDS refresh, our customers told us that driving digital transformation is a basic expectation of the company.

Our journey in developing digital solutions builds on successes during AMP6 and AMP7 including developing a digital twin for our Strategic Interconnector Pipeline, targeting demand reductions and leakage through smart meters, and smart networks providing dynamic control and visualisation across both our water and water recycling networks.

Our digital journey is exemplified in our Safe Smart Systems project, developed as part of the Ofwat Water Breakthrough Challenge. Through collaboration with UK and worldwide water utilities, globally recognised innovators in digital transformation and leading academics, we are utilising smart technologies and new emerging digital capabilities, such as artificial intelligence, to demonstrate the possibilities offered in the future through a fully autonomous water supply system. Our shared vision is to have built and be operating an automated, connected system that delivers a clean, sustainable supply of water for future generations. This innovative and collaborative approach is not just about technology. The project aims to develop the capabilities and culture required to enable system thinking for optimal complex decision making. The project has four components: building an AI Decision Engine, developing the next generation of infrastructure with sensors and remote control capability, developing new standards and frameworks - an 'Industry Playbook', and exploring new ways of working for water companies to operate systems and work together.

This AMP7 journey in embracing digital technologies has not only paved the way for operational efficiency and improved customer experiences, but it has also fortified our commitment to environmental sustainability and resilience. These initiatives, fuelled by the Ofwat innovation fund, demonstrate our dedication to driving positive change across the industry in the long-term through our LTDS.

We are proud of our achievements so far and believe we can do even more, though we expect the scale of investment in digital technologies will need to increase significantly in AMP9. Although much of this will be funded through base expenditure, we anticipate that it will also require additional enhancement spend, and this is reflected in our core pathway. Over AMP8 we will continue to develop our digital strategy and refine our understanding of the investment required. We will also consider the interdependencies of these technologies, our approach to planning, and ensuring we have the right organisational support at all levels. This investment goes hand-in-hand with transforming behaviours across the business.

Underpinning all of this, our organisational strategy places a strong emphasis on continually evolving and enhancing our data foundations, a crucial element in maximising the potential of future digital innovations.

Our ongoing commitment ensures that we will remain at the forefront of digital, fostering innovation and resilience throughout the water industry for AMP8 and beyond. Some key examples of the digital opportunities we have identified and included in our PR24 Business Plan are:

**Production Planning:** Through strategic investments in Smart Meters, Programmable Logic Controllers (PLCs), advanced modelling, and infrastructure upgrades, we are embarking on a digitisation journey of the water distribution network. The goal is to harness the full potential of digital in production planning, strengthening our resilience and efficiency through seamless site integration, improving output quality reliability, and optimising abstraction to minimise impact on sensitive areas during periods of low aquifer levels.

**Demand Management:** Anticipating 100% smart meter penetration by the end of AMP8 empowers us to manage demand and maintain consistently low leakage rates. Smart meters are a fundamental part of our Water Resources Management Plan and a low-regret option required to secure sustainable water resources in the future.

**Condition and Performance Management:** Expanding the reach of performance and condition monitoring across our networks will provide better visibility of quality challenges, enabling us to be proactive to prevent negative impacts. This data-driven approach will improve maintenance planning, synchronise downtime with low abstraction periods, and elevate overall asset reliability and resilience.

**Dynamic Catchment Management:** Investments in modelling, visualisation, and data management will enable us to optimise existing assets in critical catchments. This reduces the need for carbon-intensive investments, enhancing overall catchment resilience and efficiency.

**Ecological Digital Twins:** Our investments in data management and sources throughout AMP7 will provide real-time insights into catchment conditions. We will further harness the benefits of digital twins through AMP8 and beyond, supporting closer collaboration with partners to safeguard our natural environment

from the combined impacts across many different contributors, saving money, supporting a shift away from carbon-intensive solutions, and delivering better outcomes for customers.

We are proud of our achievements so far and believe we can do even more, though we expect the scale of investment in digital technologies will need to increase significantly in AMP9. Although much of this will be funded through base expenditure, we anticipate that it will also require additional enhancement spend, and this is reflected in our core pathway.

The table below provides an overview of the capabilities we expect to develop:

**Table 7 Development of digital capability in our core pathway**

Capability	Description	Date capability fully realised in the core pathway
Smart maintenance	Risk-based maintenance informed by robust real-time asset condition information. Artificial Intelligence led asset interventions ahead of predicted failures.	2035
Smart networks	Automatic detection of potential leaks	2025 (we have realised this capability early as a result of our industry leading position on leakage and smart-metering)
	Real-time network modelling and control to calm networks for wider benefit (in addition to leakage) including integration with operational response capabilities across all networks.	2030
	Transformational Artificial Intelligence operational management across water and water recycling networks. This includes advanced forecasting of localised surface water rainfall and related water recycling stresses, enabling preventative action or rapid response.	2035
Smart sites	Site digital twin ( basic): Basic digital twins established for all Water/WR/Bioresources sites that allow for process optimisation and capacity management and compliance monitoring and prediction.	2030
	Site digital twin (advanced): Advances in sensor technology and maturing digital twins allow for greater control and management.	2040
	Site Digital Twin (AI): Combination of advanced sensors, IoT infrastructure, digital twins allows for transformational AI operational management across water and WR sites.	2045

Capability	Description	Date capability fully realised in the core pathway
Smart catchments	Advanced sensors: Continuous monitoring of multiparameter inorganics through photonic sensors and of biological parameters through biosensors, as well as sensor platforms such as satellites and drones enable a wide range of monitoring of natural systems.	2030
	Digital twins of the natural environment combine monitoring data from multiple parties to understand and predict impacts on that environment. These will be integrated into digital twins of the water and sewerage systems to provide real time insight into the impact of our operations on the environment.	2035
Smart metering	In home technology combined with smart meter capabilities and innovative customer engagement to deliver greater water efficiency benefits than currently anticipated.	2040

In order to deliver our core pathway, we must forecast which technologies are likely to impact our business and plan ahead. Our extensive research as part of the development of our Long-Term Delivery Strategy technology scenario has highlighted opportunities. We have commissioned Cambridge Consulting and Capgemini to help us to identify the range of technologies we should consider. This project has informed the development of our final Technology scenario (more details can be found in Rationale: Scenario development).

Underpinning all of this, our organisational strategy places a strong emphasis on continually evolving and enhancing our data foundations, a crucial element in maximising the potential of future digital innovations.

Our ongoing commitment ensures that we will remain at the forefront of digital, fostering innovation and resilience throughout the water industry for AMP8 and beyond.

### AI and machine learning moving us from a reactive to proactive approach

We are exploring how technology can support our long-term capital maintenance and asset management. In clean water distribution and water recycling, we are making use of smart sensors to manage pressures and anomalies on our network. These sensors give us a greater understanding of our network performance, enabling us to 'listen' to our physical assets, proactively intervene and minimise impact to our customers and the environment. It also helps us maximise asset life in a more cost-effective way.

One example is our sewer network visualisation tool, which we are using to identify and clear blockages on our sewerage network before they cause pollutions. Blockages typically make up just under half of our root causes of pollutions in our sewers. Installing monitors in our highest risk sewers can help us to detect a blockage forming. The visualisation tool uses the data from these monitors to assess the typical pattern of the sewer level, including the daily changes due to customer activity, and how the level responds during differing intensities of rainfall. When the level in the sewer deviates from what is expected, an alert is raised. This is assessed by one of our analysts, who will combine the alert with additional data, such as historic alarm data and other connecting assets, to build a picture of performance and whether intervention is required. As the technology uses machine learning, the more time we spend using it, the more information the system will learn and build on to bring about positive results.

## Innovation

AMP7 has seen a lot of change in the innovation landscape and a welcome focus from the Ofwat Innovation Fund. We strive to increase alignment, visibility and appetite for innovative change within our organisation and across the water industry's shared supply chain. We are empowering our people to embrace innovation, providing them with the skills and tools they need to transform the water industry.

We have established a centralised structure and processes through an innovation Project Management Office (PMO) to allow us and our supply chain to take on more ambitious, large-scale projects than ever before. Our collaborative partnerships help us to keep abreast of worldwide emerging technologies relevant to our activities and accelerate their development and adoption using our 'Shop Window Incubator' framework.

We are innovative across all areas of our plan - from customer interactions and billing to environmental monitoring and maintenance of our assets. Our teams are always exploring the latest developments that can improve our services, which has influenced the creation of our PR24 plan. The knowledge and insight through our innovation and research work has informed our long-term investment approach.

Visibility of leading innovation work and our biggest opportunity areas has been critical in our approach to our LTDS. Alongside our existing research and innovation, we have engaged with a series of projects supported by the Ofwat Innovation Fund to convert those insights into value for our customers. The Ofwat Innovation Fund has positively turbocharged our sector's approach to innovation, and we are excited by the opportunities it will bring in AMP8 and beyond.

We also welcome the development of the Water Innovation Strategy and the formation of Spring, the water sector's innovation centre of excellence. We have worked closely with other water companies and the Spring team in the design and development of their service to increase visibility, collaboration and accessibility across the sector. Our continued involvement will allow us to expand the breadth and extent of our innovation activity.

One example of how we are empowering our people within Anglian Water to embrace innovation is using a tool called the Game Changers (GC) Index and the Explorers Index (EI). With a unique ability to aggregate profiles, the GC index provides a data point on where individuals, teams or organisations are energised when engaging in the cycle of innovation. Through review sessions, coaching and development we have been able to first measure and then support colleagues to think of how they can be most effective when working with innovative solutions and ways of working, whilst being conscious of potential blind spots. The Explorers Index is the world's first metric for measuring an 'organisations climate', a

sub-category of culture, for innovation. Through this tool, we can measure and adapt the climate of innovation within our organisation to ensure we are creating the right conditions for innovation to thrive.

Key to our success will be our enduring innovation partnerships with other utility companies, academic institutions, consultancies and more. Many of the challenges we face are global, and we will continue to seek to learn from leaders in this space.

### Tackling greenhouse gas emissions

One of the main concerns facing water utilities around the world is the impact of climate change and mitigation of greenhouse gas emissions. There are no established methodologies nor global standards on how Scope 1 monitoring of nitrous oxide should be carried out, and the establishment of a common platform to share efforts on this front and lessons learnt by water utilities, could help develop a framework for monitoring that could be shared more widely with global water community, including IPCC, in the near future.



We are working with VCS (Denmark), Metro Vancouver (Canada), Helsinki Water Board (Finland), PUB (Singapore) and Jacobs to discuss the development of tools to better measure and monitor emissions, which eventually will be recognised and accepted as methodologies in measuring Scope 1 process emissions. This international group will have a global impact through collaboration across a wide range of technologies, operations and other factors. It will to share learning with the Net Zero Partnership (Aarhus Vand, Melbourne Water and Severn Trent) which has already begun collaboration on nitrous oxide emissions.

*“PUB Singapore is keen to forge partnership with like-minded water utilities and companies to find the best solutions in key areas of mitigation of greenhouse gas emissions. Anglian Water’s participation will definitely value add in our collective effort in establishing a globally accepted standards for N2O emission monitoring and mitigation for water utilities”.*  
*Bernard Koh, Assistant Chief Executive, Future Systems & Technology, PUB.*

### 3.2.2 Place-based

Our customers and communities don't perceive our activities through the lens of isolated investments and regulatory directives. They witness them where they live, in their communities. A place-based approach is about understanding the challenges within a specific area and orchestrating action and investments to bring positive outcomes for the environment and the community in that area. A place-based approach will be a fundamental component of how we operate in AM8 and beyond.

A 'place' can be defined differently, such as a town, city or Water Resource Zone. It can represent diverse features, such as river catchment, town or city, and it's important to consider different perspectives when assessing a 'place.'

Place-based approaches offer value and benefits in various ways, including:

- **Understanding connections:** Recognising the connections between our activities, such as in a particular area to identify opportunities for a more effective technical solution.
- **Sequencing Investments:** Planning the order of investments from different organisational units in the same place to minimise impact on local communities, whilst improving communication with local stakeholders.
- **Collaborative potential:** Identifying potential partnerships to foster collaboration for an improved overall outcome.
- **Narrative clarity:** Telling our story in a social context, presenting the sum-total of our interventions, sometimes known as hyperlocal communication.
- **Synergies in Delivery:** Recognising the synergies between investments in a similar area or at the same site generates efficiency.

We are pioneers in taking place-based approaches. We've been the Catchment lead for the Cam and Ely Ouse waterbodies, engaged in community regeneration in Wisbech, and participated in the Climate Resilience Demonstrator (CReDo) where we are analysing the interdependencies between our assets and those of UK Power Networks and BT in the same geography. All of these activities were funded through base expenditure.

We've mapped our planned AMP8 investments using a geographical visualisation tool and through catchment level schematics, showing the connections between our assets and the water bodies in our region.

We have also worked with the Connected Places Catapult (CPC), the UK's innovation accelerator for cities, transport and place leadership to bring our investment data to life (funded through base expenditure). This is enabling us to engage much more effectively with local stakeholders such as Catchment Partnerships and Local Authorities as they develop their own place-based plans.

Figure 4 Our SPA main, allowing us to achieve further place-based initiatives



### Providing the blueprint for a place-based approach: our work in Norfolk

Figure 5 Microsoft UK CEO, Clare Barclay, visits Stiffkey with us as part of our digital twin partnership



Our AMP8 exemplar 'place' will be Norfolk, which will provide a blueprint for our work in other places through to 2050.

Norfolk is a fast-growing area with ambitious local plans to build 80,000 new homes in the next 20 years. It will be home to just under one million residents by 2036. Within Norfolk are two protected catchments, the Wensum and the Broads, which are identified by Natural England as being in unfavourable condition. This is due to nutrient overloading, which is restricting housing growth in the region.

In partnership with Norfolk Rivers Trust, in AMP7, we pioneered an Integrated Constructed Wetland at Ingoldisthorpe near King's Lynn to reduce nutrient loading and ammonia. This is a successful blueprint for nature-based solutions to address nutrient loading and help unlock future growth.

Norfolk is also home to the River Stiffkey where we are developing the world's first ecological digital twin of a chalk stream catchment, in partnership with Microsoft and Avanade with the support of Ofwat Breakthrough Challenge funding.

In addition to our work on the River Stiffkey, we have led numerous projects in the county to provide better outcomes:

- Norfolk is a key area for farmers, which has seen us engage across a range of issues, namely, recycling of Nutri-bio, management of surface water run-off into raw water sources, and abstraction licence restrictions.
- Europe's first 'Water Fund' will be developed with our partners at The Nature Conservancy, Water Resources East, and Norfolk County Council, implementing innovative governance to enable investment in nature-based solutions at scale.
- We are collaborating with others on water management including the Norfolk Strategic Flooding Alliance with Norfolk County Council.
- Norfolk includes a large proportion of the area covered by the adaptation project Future Fens: Integrated Adaption where we are collaborating with the Environment Agency, local authorities and Internal Drainage Boards.
- It has been a focus area for the roll out of demand management initiatives in AMP7 such as smart metering. In Norwich 65% of homes now have smart meters.
- Norfolk County Council has committed to carbon neutrality by 2030, in line with our company goals.
- We have partnered with stakeholders like the Norfolk Rivers Trust and Water Resources East, utilising GIS tools to analyse locations and identify opportunities for synergy and cost reduction. Our commitment to place-based approaches is a testament to our dedication to improving outcomes at a local level, aligning with broader sustainability and resilience goals.

### 3.2.3 Partnership working

We have made significant environmental improvements since privatisation. Our approach to innovation and asset management have delivered efficiencies, cutting carbon and costs. However, the scale and complexity of the challenges ahead; with climate change, population growth, increasing stress on natural habitats and the current pressure on the cost of living, mean that our actions alone cannot achieve the scale of change we need. There is a pressing need for partnering with others.

For us, working with others is not new. Our supply chain alliance model, which has been running since the early 2000s, sees us work closely with our business partners. This approach has several benefits, including keeping costs low for customers and delivering wider environmental benefits. Other key partnerships include:

- We pioneered multi-sector regional water resource planning in the UK when we established Water Resources East (WRE) in 2014.
- Our partnerships can deliver more for less, as evidenced through our experience of delivering flood risk management in partnership with a range of stakeholders.
- Since AMP6, to improve raw water quality, we have taken a catchment management approach working with farmers and local businesses to understand the challenges and opportunities to safeguard raw water sources.
- We work closely with Local Authorities' housing associations to develop lead pipework replacement/modification schemes during refurbishment of social housing association-owned properties.
- We supported the creation of the East of England Planning Hub, a long-term strategic partnership with the national Rivers Trust, bringing together and visualising our investment programmes to enable deeper collaboration with local rivers trusts.

We intend to build on these successes through our LTDS by expanding the scope of partnerships to bring forward more innovative, multi-sector solutions that offer better value and greater benefits. Our aim is to work with others to bring about lasting change and positive outcomes to the communities we serve and habitats areas we need to protect, restore and enhance.

#### Creating a Partnership Centre of Excellence through our Advanced WINEP

In AMP8, we will seek to overcome two of the barriers to greater partnership working:

**A partnership mindset:** Our experience tells us the most important factor for success is the quality of the relationships in a partnership. Developing trust, mutual understanding, flexibility, and a problem-solving attitude need a 'partnership mindset.' We will build this culture into our business through our Partnership Centre of Excellence.

**A longer-term view:** Setting up and maintaining strategic partnerships can be challenging without a consistent resource to support the development of projects and alignment of funding streams. Partnerships can quickly lose momentum or become reactive to short-term funding grants, limiting the full benefits that could be achieved. Establishing longer-term funding opportunities will help to navigate this challenge.

#### Unlocking the power of partnerships in North Norfolk

Building on the fantastic work of the Norfolk Rivers Trust (NRT) in Stiffkey, we pledged £1 million towards an Integrated Constructed Wetland which is providing a sustainable, low-carbon, natural wastewater treatment system that will boost biodiversity and support the four chalk stream catchments in that area.

Water companies, on average, are responsible for 27% of the reasons rivers are not achieving good ecological status (RNAGs). In the Anglian Water region, we are responsible for 17.9% of RNAGs, a number that's reducing as we continue our investment and improvements. Several issues affect the river quality in Stiffkey; from water recycling centre effluent, intensive agriculture, to sediment run-off and septic tanks, meaning it is rated at 'moderate' ecological status.

By feeding our investment into NRT's funding model, it has enabled them to attract additional funding and partners, including the Government's Green Recovery Challenge Fund, the Norfolk Coast Partnership, the Environment Agency, the WWF/Finish partnership, and the Coca-Cola Foundation. The wetland takes treated used water from our Water Recycling Centre, filtering it further before it enters the stream. As a nature-based solution, the wetland will also enhance local biodiversity, through the creation of a richer, varied habitat. The aim is to deliver a water environment improvement plan at a total catchment scale, with benefits to people and nature too.

### A-WINEP: a systems-based approach to environmental enhancement

Climate change will undoubtedly have negative consequences for the environment. Our aim is to enhance the environment, so that it is in a better state in 2050 than it is today. This will deliver a significant improvement in ecological quality across our catchments. This is an ambition that is shared with our regional stakeholders, national government and supported by our customers.

To deliver this shared ambition, we must build upon our approach to environmental improvement via WINEP. To achieve more for the environment, we must reform our traditional approach, expanding the sectors' ability to:

- Take a long-term strategic view
- Realise partnership working to leverage expertise and funding from multiple organisations
- Embed a catchment-based approach that addresses environmental pressures holistically
- Focus on outcomes, rather than specific outputs

The need for reform is widely recognised. In 2020, the Department for Environment, Food and Rural Affairs (Defra), the Environment Agency and Ofwat led a review of the existing WINEP. The review identified several changes for PR24 as well as actions for the longer term, such as enabling a more outcomes-based approach, incorporating long term planning and embedding co-design, co-delivery, and co-funding in the WINEP framework.

As a result of this review, Defra, the Environment Agency (EA) and Ofwat have introduced the Advanced-WINEP (A-WINEP) for PR24. A-WINEP provides an opportunity for companies to go beyond legal obligations by moving towards more catchment and nature-based solutions .

We have developed an A-WINEP proposal that seeks to build on our past successes. We have proposed our new approach over a ten-year time horizon, recognising that effective strategic partnerships take time to establish. The associated expenditure (£26.2m in AMP8) is incorporated into our core pathway. We intend to develop a template for how a systems-based approach to environmental investment planning can work at scale, so that it becomes the standard approach from 2030 onwards.

On 6th September 2023, our A-WINEP proposal (ANH43) was approved for progression to the business plan submission after a review by the EA, Ofwat, and members of the Advisory Group. The progression letter stated:

*“Your A-WINEP has the potential to achieve more for the environment and customers - and provide valuable learnings for the wider industry - than your standard WINEP programme would otherwise be able to do. Thank you for your positive approach and embracing the spirit of collaboration.”*

As a result, our core-pathway assumes that A-WINEP is successfully rolled-out across our catchments from AMP9 onwards. This informs several sub-strategies, particularly Environmental Enhancement, Water Resources and Drainage and Water Recycling. As with any new approach, there is uncertainty. Consequently, we have undertaken a sensitivity test to indicate the potential cost of achieving our ambition via the traditional WINEP approach. More details are set out in the sub-strategy sections below.

In addition to the success of our A-WINEP proposal, the digital capabilities described earlier will be central to the successful delivery of our environmental ambition. The realisation of smart catchments, underpinned by open data arrangements, will likely act as a key enabler to partnership working and catchment-based approaches.

Figure 6 Promoting a catchment based approach



### Further embedding circular economy principles into our business

It has been a long-held belief that our sewage treatment assets are not waste treatment centres, but vehicles through which energy and resources can be recovered and reused. This philosophy drove us to rebrand sewage treatment sites as water recycling assets in 2014.

Over several AMP periods, we have invested to embed circular economy principles into our water recycling processes. Our sludge treatment centres use combined heat and power engines to create energy from gas released as a by-product of the water recycling process. Most of the renewable energy generated is used to power on-site operations, with any extra being exported to the local electricity networks. This process also generates a soil conditioner used by agricultural customers that returns valuable nutrients and organic matter to farmland, and reduces the use of artificial fertilisers. More recently we have been exploring how we can do more, for example, using 'waste' heat from our Water Recycling Centres in Bury St Edmunds to grow tomatoes as part of a low-carbon farming project.

These previous investments represent important first steps, but to deliver our ambition we need to go much further. Over the next 25 years we need to completely transform the way we think about, and approach, water recycling. **By embracing the opportunities associated with new technologies and data, including satellite imagery, and a systems-based approach to environmental enhancement, we will drive a step change in efficiency and performance.** Our water recycling operations will provide a net positive benefit to the environment as a whole.

The WRCs of the future will provide an invaluable source of energy and resources, recovered from what was previously considered a 'waste'. Our large urban WRCs will be carbon positive and routinely recover 'waste' energy in the form of heat, so initiatives such as the low carbon farming project will be the norm. **Our rural WRCs will use nature-based solutions, such as wetlands, integrated into the natural environment and local to source.** They will form an integral part of a catchment-scale approach to the management of the environment, providing habitats for wildlife and amenity for local communities.

Our future networks will be totally closed, eliminating pollutions, sewer flooding and storm overflow spills.

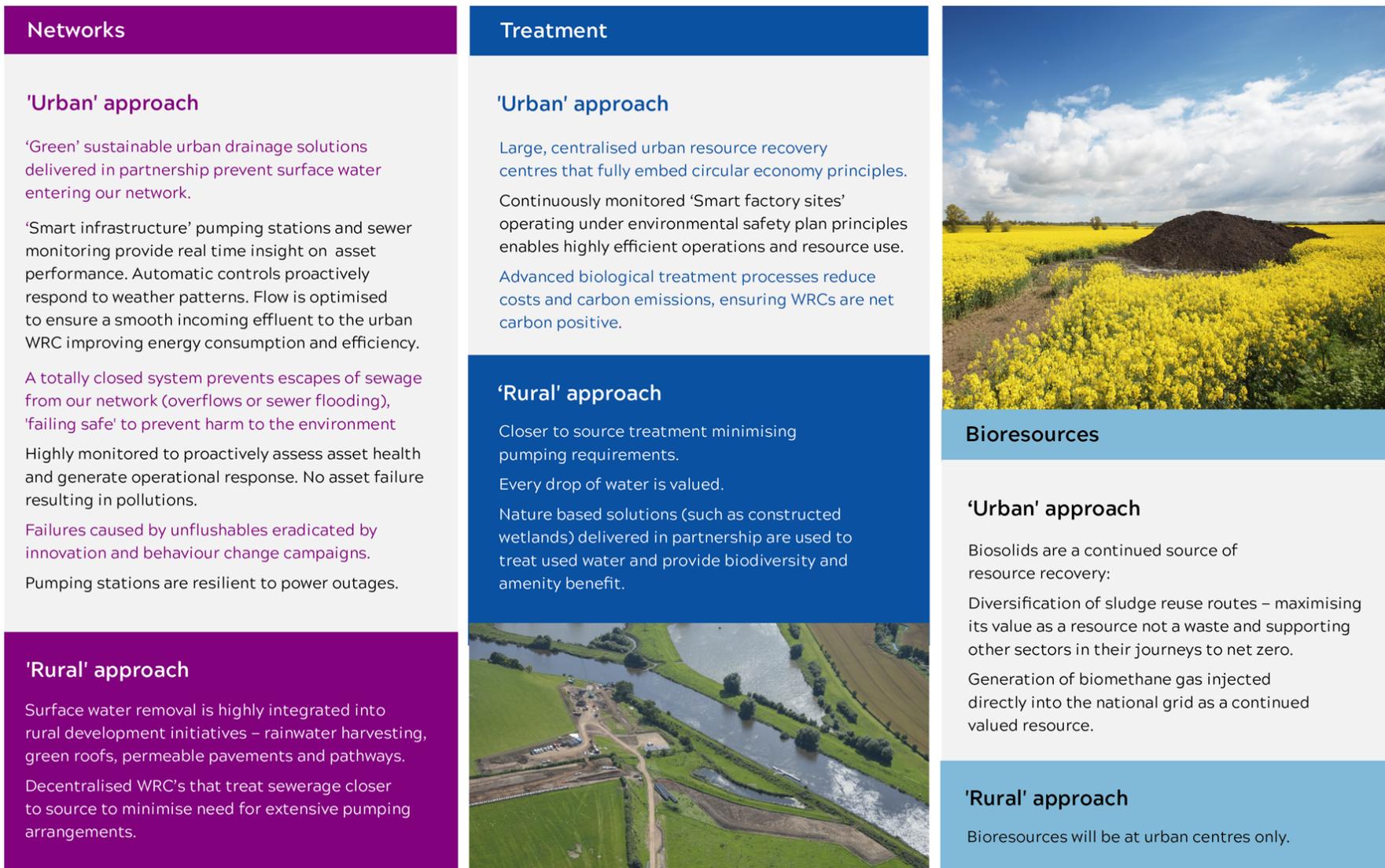
Harnessing data and smart technologies, our operations will become highly efficient. At our WRCs, we will continuously monitor and manage the effectiveness and efficiency of the treatment. Our networks will make best use of available capacity by responding dynamically to weather patterns and asset performance.

**Our entire water recycling operation will follow international best practice on environmental safety planning (mirroring the now mature drinking water safety planning approach), and will automatically 'fail safe' to prevent any harm to the environment.**

In addition, the precious water we treat will become an increasingly valuable strategic resource. The water we discharge to the environment will fulfil an even more important environmental function than it does today, as hotter drier summers place additional pressure on our rivers and streams. The water that we currently discharge to sea, an estimated 34,100 m<sup>3</sup>/day from our 26 largest coastal or tidal works, will instead be used purposefully to support sustainable economic growth in our region, or to enable us to meet our environmental destination.

In our core pathway we set out the low and no-regret enhancement activities that will support this transformation in our approach to water recycling. More details can be found in the detailed sub-strategy sections below.

Figure 7 Our approach to Water Recycling



## 3.3 Alternative pathways

### 3.3.1 Overview

We have developed six alternative pathways using Ofwat’s common reference scenarios (CRS) (climate change, demand, abstraction and technology) and our wider scenarios (water for energy and landbank availability) to identify higher-regret investment not included in our core pathway. Our wider scenarios were developed following a rigorous scenario identification process, described in Rationale: Scenario identification. In line with Ofwat's guidance, we have not combined scenarios but have tested the impact of each scenario individually.

The alternative pathways show where there is greatest uncertainty. Despite operating in one of the UK's fastest growing regions, and growth drives significant investment, we have not developed an alternative pathway associated with Ofwat's Demand CRS. This is because the difference between the benign and adverse scenarios, as described by Ofwat, is relatively small. The additional higher-regret investment driven in the adverse scenario therefore did not meet our materiality threshold, and does not require an alternative pathway.

**Table 8 Alternative pathways**

Alternative pathway			Sub-strategy impacted				
	Environmental enhancement	Water resources	Drinking water quality	Drainage and water recycling	Bioresources	Net Zero	Resilience
High abstraction reductions	Abstraction (Env)	Abstraction (WR)	Abstraction (DWQ)	-	-	-	-
High climate change	Climate change (Env)	Climate change (WR)	Climate change (DWQ)	Climate change (DWR)	Climate change (Bio)	Climate change (NZ)	Climate change (Res)
Slower technology	Technology (Env)	Technology (WR)	Technology (DWQ)	Technology (DWR)	-	Technology (NZ)	Technology (Res)
Adverse landbank availability	-	-	-	-	A Landbank (Bio)	A Landbank (NZ)	-
Benign landbank availability	-	-	-	-	B Landbank (Bio)	-	-
Adverse water for energy	-	Water for energy (WR)	-	-	-	-	Water for energy (Res)

The majority of the alternative pathways are driven by the more adverse scenarios such as more extreme climate change, or slower implementation of technology. The one exception is benign landbank availability. Our benign landbank scenario assumes that the landbank availability risk does not materialise and the existing approach to managing bioresources is broadly continued. We believe this scenario is highly unlikely, as it would require a revision to the Environment Agency’s interpretation of Farming Rules for Water. However, we have developed an alternative pathway to demonstrate to our external stakeholders the consequences of regulatory decisions on our strategy and investment plans.

Our scenario testing confirms that there is less uncertainty in the short-term. Over the long-term, the high climate change, high abstraction reductions and slower technology scenarios drive the most material additional investment requirements. This is because these scenarios have impacts that are felt across our business.

The CRS and our wider scenarios are designed to describe plausible extremes. As such, the alternative pathways represent the top end of the range of potential investment required, rather than a completely separate investment programme. It is likely that actual investment requirements will fall somewhere within this range.

As shown in the table below, we have set trigger points for the majority of alternative pathways for 2030, but we anticipate that we will need to continually monitor our key metrics and adjust and refine our investment proposals accordingly.

**Table 9 Trigger points**

Alternative pathway	Decision point	Trigger point	Rationale
High abstraction reductions	2027-28	2030-31	Approval of enhancement case by Ofwat, following mid-AMP review of environmental metrics
High climate change	2027-28	2030-31	Approval of enhancement case by Ofwat, following mid-AMP review of climate impacts
Slower technology	2027-28	2030-31	Approval of enhancement case by Ofwat, informed by annual technology scan to determine the cost effectiveness and commercial viability of emerging technologies
Adverse landbank availability	2027-28	2027-28	AMP8 trigger point driven by uncertainty over the Environment Agency's interpretation of Farming Rules for Water
Benign landbank availability	2027-28	2030-31	Approval of enhancement case by Ofwat, informed by forecast landbank headroom
Adverse water for energy	2025-26	2025-26	AMP8 trigger point driven by uncertainty about how the water requirement for new hydrogen production or carbon capture, storage and utilisation facilities will be funded

The Adverse Landbank alternative pathway that has a trigger point in AMP8, driven by uncertainty over the Environment Agency's interpretation of Farming Rules for Water. More details can be found in the Bioresources sub-strategy.

The Adverse Water for Energy scenario has a trigger point in 2025. At present there is uncertainty about how the water requirements will be funded, for example through the conventional water company regulated route or via the open market, and what role government will play in defining the need for hydrogen and Carbon Capture Usage and Storage, as well as securing the required water resources. If this additional demand is funded through the conventional water company regulated route we would not be able to meet it until 2037 at the earliest, as it would need to be included in the next round of WRMPs and there is then a lead time of seven years on desalination plants. More details can be found in the Water Resources sub-strategy.

### 3.3.2 Benign and adverse landbank availability

We continually monitor access to available land bank for the recycling of our biosolids products through a number of metrics. These include but are not limited to:

- Farmer satisfaction
- Price point of products
- Input costs to farmers of conventional and other fertiliser/soil conditioner products
- Distance travelled from production to application site (work done to access land)

Recognising these could generally be considered lag measures, we will also:

- Work with the wider water industry and relevant stakeholders to progress and refine national land bank scenario modelling at agreed points within the AMP period.
- Regularly review and update our own landbank modelling, to test the impact of regulatory changes and/or other scenarios, as statutory guidance and regulatory changes occur, or as other information becomes available.

We have assessed the landbank available and landbank we require, under the five scenarios included in the latest landbank modelling, as follows:

**Table 10 Landbank availability scenarios**

Scenario	Landbank available	Landbank required	Headroom %
1	866,000 Ha	204,200 Ha	76.4
2	712,000 Ha	415,100 Ha	41.7
3	635,000 Ha	505,800 Ha	20.3
4	597,000 Ha	2,142,400 Ha	N/A
5	399,000 Ha	3,863,100 Ha	N/A

We currently have access to a total of c.712,000 Ha of agricultural land in our operational area and have a requirement for a total of c.415,000 Ha (i.e. Scenario 2 above).

We assess under the core pathway that our land bank requirement will increase from 415,100 Ha to 505,800 Ha and that our available landbank will reduce from 712,000 Ha to 635,000 Ha by 2030. This represents a reduction in headroom from c41.7% to c.20.3% by 2030.

We have set a trigger for any decision to commence investment for Adverse Landbank (Bio) when we have declining headroom and assessed this to drop below 20%.

This same method will also be used to defer investment in the Benign Landbank (Bio) or the Adverse Climate Change (Bio) alternative pathway.

### 3.4 Enhancement areas

#### 3.4.1 Environmental enhancement (WINEP)

The Environmental enhancement sub-strategy is designed to ensure we deliver against all of our statutory obligations (WINEP). In addition, our ambition is to go beyond what is required of us by law, and to work with others to deliver a significant improvement in ecological quality across our catchments.

We are not, however, proposing to deliver this by increasing the overall level of enhancement spend on environmental enhancement. Instead, we use the opportunity associated with Advanced-WINEP (A-WINEP) to establish a systems-focused, outcomes-based approach to environmental enhancement. Through A-WINEP we will drive a step change in partnership working that includes identifying innovative delivery models for environmental outcomes and funding sources available at catchment and landscape scale, such as our own investment proposals, agricultural grants, the use of environmental markets and wider corporate and philanthropic finance. In this way we will deliver our ambition without having to increase our existing levels of investment. In our core pathway, we assume that all of our statutory environmental obligations will be delivered via an A-WINEP approach.

**Table 11 How the environmental enhancement sub-strategy contributes to the delivery of our ambition**

	Environmental enhancement
Mitigating the impacts of long-term challenges on our services	N/A
New government and regulatory targets	Statutory environmental obligations (WINEP). Includes: <ul style="list-style-type: none"> <li>Catchment options to deliver sustainable abstraction</li> <li>Additional treatment at water recycling centres to provide enhancement environmental protection, including the 2038 Environment Act target for phosphorus</li> </ul>
Ambition that goes 'above and beyond'	Advanced-WINEP programme

#### Core pathway for environmental enhancement

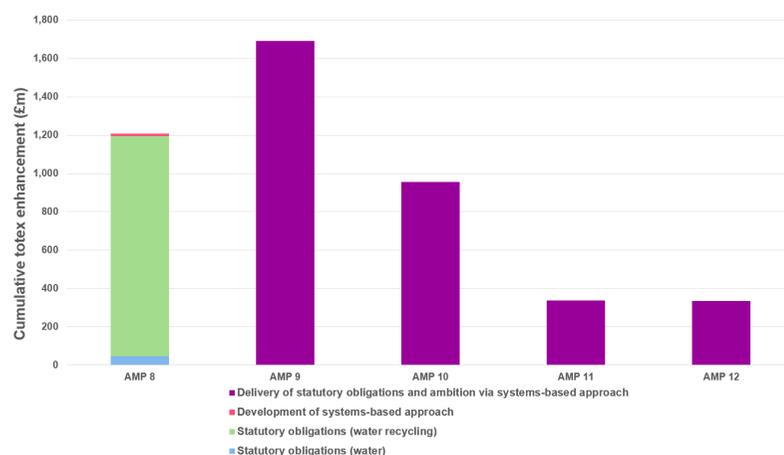
The key enhancement activities included in our core pathway are set out in the table overleaf.

**Table 12 Key enhancement activities investments included in the Environment enhancement sub-strategy core pathway**

Key enhancement activities	AMP8 2025-30	AMP9 2030-35	AMP10 2035-40	AMP11 2040-45	AMP12 2045-50
Statutory obligations (water)	<ul style="list-style-type: none"> <li>Catchment investigations</li> <li>Catchment management activities</li> <li>Biodiversity enhancements</li> <li>Management of invasive species</li> <li>River restoration activities</li> </ul>	Forecast investment required to deliver statutory obligations and our ambition via a systems-based approach (A-WINEP).  This includes delivering against the Environment Act target to reduce phosphorus loadings from treated wastewater by 80% by 2038 (2023 baseline).  At this stage we do not have certainty over individual scheme requirements.			
Statutory obligations (water recycling)	<ul style="list-style-type: none"> <li>Resolve environmental deterioration risk</li> <li>Treatment upgrades to address water company RNAGS15 by 2030, additional nutrient improvements in environmentally sensitive areas, and chemical improvements (following AMP7 investigations)</li> <li>Wastewater monitoring programme and continuous river water quality monitoring</li> </ul>				
Development of system based approach	Delivery of our A-WINEP proposal				

The expected investment requirements associated with our core pathway are set out in the figure below.

**Figure 8 Sub-strategy core pathway (Environmental enhancement)**



### Delivering our statutory obligations

The key enhancement activities required to deliver our statutory obligations in investments in AMP8 are outlined below.

#### AMP8 Water related activities:

- A programme of catchment investigations to better understand the influence of our operational activities on environmental and conservation objectives (including pollinator investigations, and contributions to industry-wide research into invasive species).
- An expansion of our catchment management activities to target emerging challenges and enable holistic discussions around the impacts of land management on our operations.
- Further biodiversity enhancements to our estate through targeted habitat enhancement and conservation schemes.
- Additional activities to reduce the risk of invasive species from our reservoir sites, with targeted catchment activities on priority species.
- Expansion of river restoration activities undertaken in AMP7, targeting wider environmental improvements within areas impacted by water abstraction. This forms part of a longer-term strategy to deliver our environmental ambition for water resources through our Water Resources Management Plan<sup>1</sup>.

<sup>1</sup> [Water resources management plan \(anglianwater.co.uk\)](http://anglianwater.co.uk)

### AMP8 Water Recycling related activities:

- Immediate action to resolve environmental deterioration risk associated with water recycling operations, including a programme of coastal bathing water and shellfish improvements associated with microbiological removal and overflow spill reduction.
- An overflows improvement programme that will further investigate the impact of all of our overflows on the environment and deliver improvements in priority locations.
- A series of wastewater treatment upgrades to ensure that by 2030 no river, lake, or estuary should be in 'poor' or 'bad' ecological status due to water company activities. This includes ammonia improvements to Barnwell and Gosberton water recycling centres, as well as phosphorus improvements at 35 water recycling centres.
- Further nutrient improvements in environmentally sensitive areas to achieve our fair share of good ecological status (including, for example, nutrient neutrality investments in the Norfolk Broads).
- Advanced treatment to enable chemical improvements following AMP7s chemical investigations, alongside a continuing programme of chemical investigation into emerging and priority substances.
- A monitoring programme providing greater transparency around flows through the water recycling centres, from flows passing through treatment processes to those entering the environment through overflow discharges. This will be supported by a programme of continuous water quality monitoring in rivers upstream and downstream of priority assets.
- An Advanced WINEP approach which focuses on stakeholders working in partnership to deliver efficient cross-sector solutions to challenges in the water environment.

### Development of a systems-focused, outcomes-based approach to environmental enhancement

Water company investment to deliver environmental improvement is largely delivered through the Water Industry National Environment Programme (WINEP). The WINEP sets out the actions we must take to meet our statutory obligations in each five-year planning period (AMP). It is a set of actions and outputs that we agree with our environmental regulators are necessary and sufficient to deliver our obligations. The WINEP is recreated at each Price Review and reflects the obligations we have at the time it is agreed.

Of course, for us, the WINEP has and continues to deliver substantial environmental gain. Recent examples include:

- A programme of river restoration to support the resilience of river ecosystems during periods of low flow, across catchments in the region. This includes action to directly support flows and provide additional habitat and natural processes within priority chalk streams (e.g. River Lark).
- Habitat enhancement on Anglian Water owned sites to support in achieving conservation objective, including Market Harborough wetland creation, biosecurity enhancements at reservoirs, and river connectivity at Taverham Mill.
- Screening of abstraction intakes to protect and enhance the conservation status of eels and priority fish species.
- A programme of catchment management within drinking water safeguard zones to support changes to land management practices to protect drinking water sources from diffuse pollution impacts.

The limitations, however, associated with the traditional WINEP approach are recognised by us and others, including Ofwat and the Environment Agency. Notwithstanding a move to a 10-year view of some obligations, it does not set out a long-term outcomes-based programme or strategy.

There is strong evidence that to deliver a significant improvement in ecological quality across our catchments, we need to work with environmental regulators and others to build on the traditional WINEP, jointly developing a systems-focused, outcomes-based approach to environmental investment planning. This new approach will need to:

- Take a long-term strategic view
- Facilitate a step-change in partnership working that leverages expertise and funding from multiple organisations
- Embed a truly catchment-based approach that addresses environmental pressures holistically
- Focus on outcomes, rather than specific outputs

To support the move to a systems-based approach, we have developed our Advanced-WINEP (A-WINEP) proposal. Our A-WINEP proposal is designed to establish how a systems-based approach can work in practice, providing valuable learning, so that the approach can be rolled out across our region and nationally.

### Taking a long-term strategic view

We will continue to work with local communities and stakeholders to agree the outcomes that are important to them, and what they want for their local rivers, streams and the coast.

### A step change in partnership working

Our A-WINEP plans include the development of a Partnership Centre of Excellence, which will enable us to work more effectively with partners to deliver greater benefits for the environment and society than we could by working in isolation. This includes identifying innovative delivery models for environmental outcomes and funding sources available at catchment and landscape scale, including our own investment proposals, agricultural grants, the use of environmental markets and wider corporate and philanthropic finance.

### A place-based approach

We will support the development of detailed catchment plans, designed to deliver the outcomes communities and stakeholders want to see, aligning to government expectations around the crucial role of catchment planning in driving environmental outcomes.

### Outcomes

Our A-WINEP proposal is designed to provide evidence and assurance that moving to a more ‘outcomes-based’ approach will deliver more than the traditional ‘outputs-based’ regulatory framework that we currently operate in.

The proposal was approved for progression to the business plan submission after review by the EA, Ofwat, and members of the Advisory Group on 6th September 2023. The progression letter stated:

**‘Your A-WINEP has the potential to achieve more for the environment and customers - and provide valuable learnings for the wider industry - than your standard WINEP programme would otherwise be able to do. Thank you for your positive approach and embracing the spirit of collaboration.’**

As a result, our core-pathway assumes that a systems-focused, outcomes-based approach to environmental enhancement is successfully rolled out across our catchments from AMP9 onwards.

### Alternative pathways for environmental enhancement

Of the 12 scenarios tested, our core pathway for Environmental Enhancement delivers our ambition in nine. We have developed three alternative pathways, designed to meet requirements in the Adverse Abstractions, Adverse Climate Change, and Slower Technology scenarios.

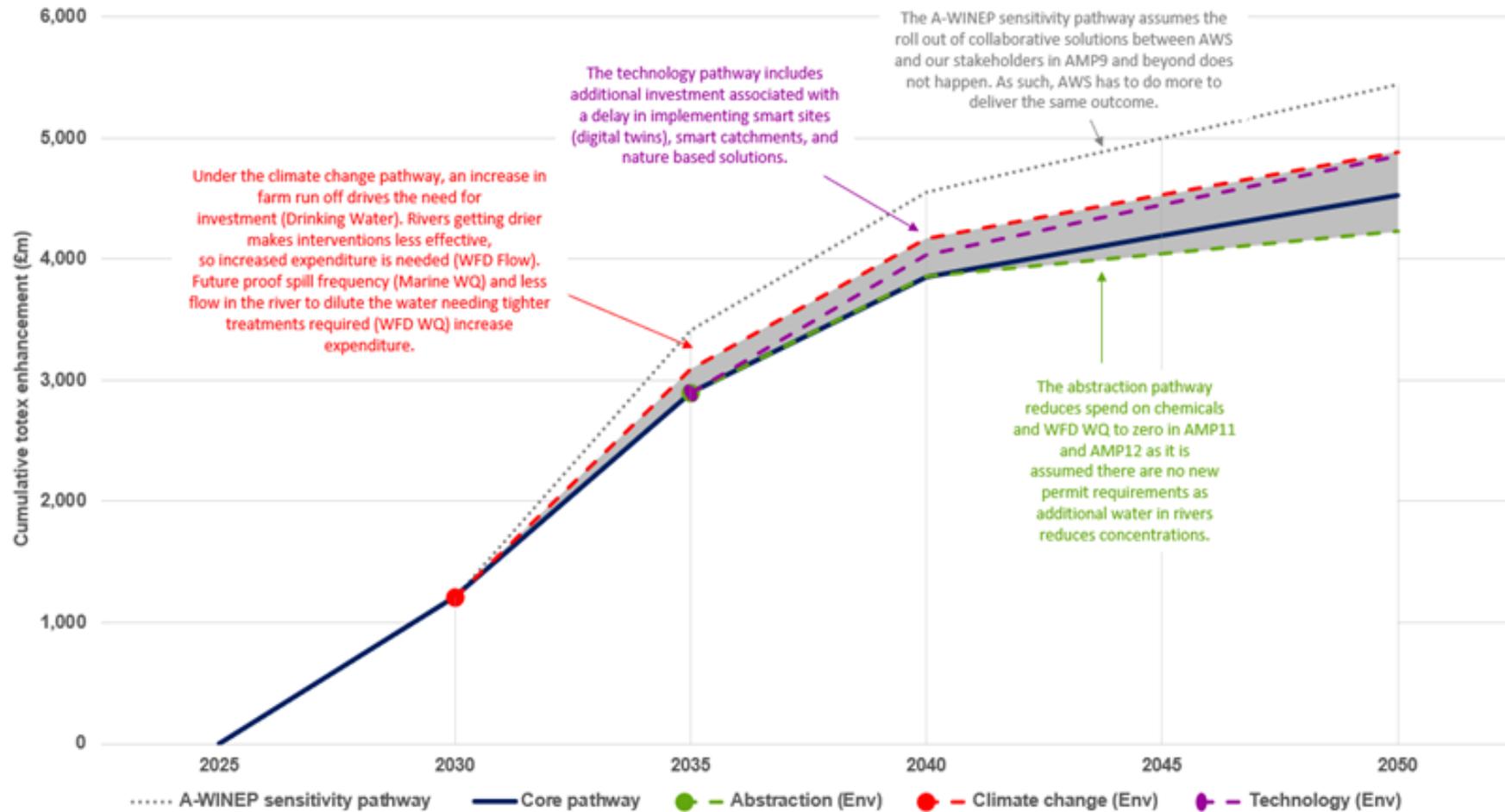
**Table 13 Additional key enhancement activities in the alternative pathways (Environmental Enhancement sub-strategy)**

Alternative pathway	Key enhancement activities (in addition to the core pathway)
Adverse abstractions	As a result of additional flow in rivers, from AMP11 onwards, there: <ul style="list-style-type: none"> <li>• Are no new permit requirements for final effluent, reducing associated spend to zero.</li> <li>• Is reduced expenditure to protect drinking water areas.</li> </ul>
Adverse climate change	<ul style="list-style-type: none"> <li>• Reduced flows in rivers from AMP9 onwards means we need to meet tighter permit standards for final effluent.</li> <li>• Increasing agricultural runoff drives additional costs to protect drinking water areas.</li> <li>• Increasing costs in marine, WFD quality, biodiversity, Invasive Non Native Species (INNS) control, drinking water quality and biodiversity programmes from AMP9 onwards.</li> </ul>
Slower technology	Increasing costs resulting from slower implementation of: <ul style="list-style-type: none"> <li>• Open data arrangements across sectors, which reduces effectiveness of partnership working.</li> <li>• Digital twin technologies, deployed to both our water recycling centres and to catchments.</li> </ul>

We do not believe it will be affordable or even possible to deliver our ambition via the traditional WINEP approach, for the reasons set out above. However, to illustrate the potential associated with the approach, we have undertaken a sensitivity test that explores what it would cost to deliver our ambition through the traditional WINEP approach. This pathway is called ‘WINEP Approach Sensitivity Pathway’ and shown as a dotted line on the pathways figure below.

The investment required in addition to the core pathway is set out in the figure and table below. It is largely based on forecast requirements, because at this stage we have not identified specific schemes. Information regarding trigger points can be found Strategy: Alternative pathways.

Figure 9 Core and alternative pathways (Environmental Enhancement sub-strategy)



### 3.4.2 Water resources

Our Water Resources strategy is based on our revised draft Water Resources Management Plan (WRMP) that sets out enhancement spend required to maintain a sustainable and secure supply of drinking water for our customers over the period 2025 to 2050. In AMP8 our spend remains consistent with the WRMP but through the development of our LTDS, however, we have reduced the total enhancement requirement over the long-term:

- Our WRMP will reduce PCC to 110MI/d and non-household demand by 10% relative to growth. By testing our WRMP against our final Technology scenario, we have identified that smart in-home technologies combined with smart metering will enable a further ambitious reduction in demand. As a result our LTDS Water Resources sub-strategy aims to reduce PCC to 100MI/d and non-household demand to 20% relative to growth.
- The impact of the low Abstraction Reduction common reference scenario was assessed as 241MI/d in our WRMP. By looking holistically across all sub-strategies in our LTDS, we identified opportunities to develop alternative catchment-based solutions that deliver sustainable abstraction, facilitated by the establishment of a systems-focused, outcomes-based approach to environmental enhancement. As a result we have substantially reduced the impact of the low Abstraction Reduction CRS to 120 MI/d.

Our revised draft WRMP is in itself an adaptive plan that sets out a core pathway and a series of alternative pathways. Our WRMP was developed using scenario testing (including the use of Ofwat’s Common Reference Scenarios<sup>2</sup>), and has been informed by an extensive programme of customer and stakeholder engagement (as described in the WRMP Customer and Stakeholder engagement technical supporting document<sup>3</sup>). Our strategy has three-tiers:

1. We will make the best use of our existing resources, building on our industry leading demand management programme and using any surplus water available.
2. We will progress the Strategic Resource Options (SROs): the Fens and Lincolnshire reservoirs as nationally significant supply-side options that are governed by RAPID<sup>4</sup>.

3. We will deploy further supply-side solutions (desalination and water reuse) to meet long-term water needs, largely driven by environmental requirements. In the short-term, we will work with the environmental regulators and others to define this long-term environmental requirements and determine the most appropriate solutions.

**Table 14 How the water resources sub-strategy contributes to the delivery of our ambition**

	Water resources
Mitigating the impacts of long-term challenges on our services	Mitigating the impacts of growth and climate change on water resources
New government and regulatory targets	<ul style="list-style-type: none"> <li>• 50% reduction in national leakage (note we are planning to deliver a 38% reduction in our leakage)</li> <li>• 110 MI/d PCC</li> <li>• 9% reduction NHH demand</li> <li>• Resilient to 1-in-500 year drought</li> <li>• Supply-side options required to deliver sustainable abstraction</li> </ul>
Ambition that goes 'above and beyond'	<ul style="list-style-type: none"> <li>• 100 MI/d PCC</li> <li>• 20% reduction in NHH demand relative to growth</li> </ul> <p>The additional reduction in demand is funded through base and we are not asking for enhancement to deliver this element of our ambition.</p>

<sup>2</sup> In the development of our WRMP we have used Ofwat’s Common Reference Scenarios. The use of the technology scenario was limited to the relevant points defined by Ofwat on pages 38-39 of the Final LTDS Guidance (i.e. smart water networks and full smart meter penetration). It did not include the wider considerations that have been incorporated into our final technology scenario.

<sup>3</sup> [www.anglianwater.co.uk/wrmp](http://www.anglianwater.co.uk/wrmp)

<sup>4</sup> <https://www.ofwat.gov.uk/regulated-companies/rapid/about-rapid/>

### Core pathway for water resources

The key enhancement activities included in our core pathway are set out in the table below.

Table 15 Water resources sub strategy core pathway activities

Key enhancement activities	AMP 8 2025-30	AMP 9 2030-35	AMP 10 2035-40	AMP 11 2040-45	AMP 12 2045-50
Reductions in leakage	12.7MI/d	10.9MI/d	7.3MI/d	8.2MI/d	6.7MI/d
HH water efficiency and metering savings	14.3MI/d	5.0MI/d	1.1MI/d	26.0MI/d	11.0MI/d
NHH water efficiency and metering savings	4.6MI/d	6.9MI/d	5.4MI/d	10.6MI/d	7.1MI/d
Interconnectors	13 interconnectors selected	4 interconnectors selected	4 interconnectors selected	2 interconnectors selected	
Supply-side solutions (year selected)	2032 Colchester reuse	2036 Fens Reservoir 2036 South Humber Bank desal	2040 Lincolnshire reservoir 2040 Lowestoft Water Reuse		

The expected investment requirements associated with our core pathway are set out in the figure below.

Figure 10 Sub-strategy core pathway (Water resources)

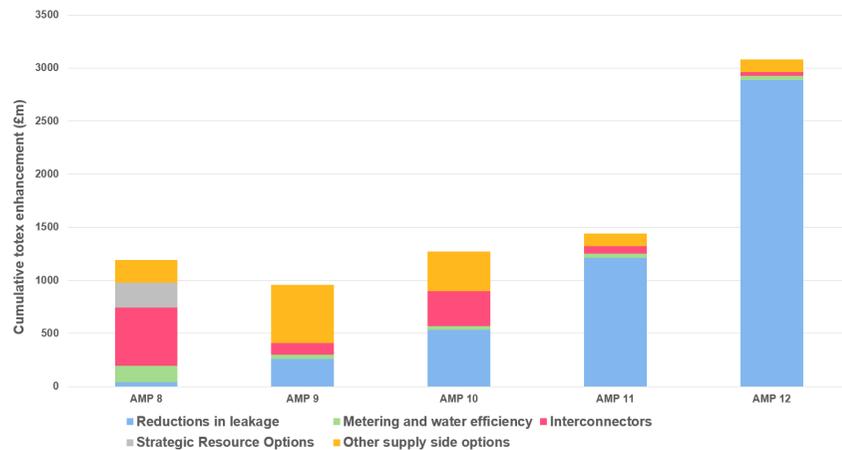


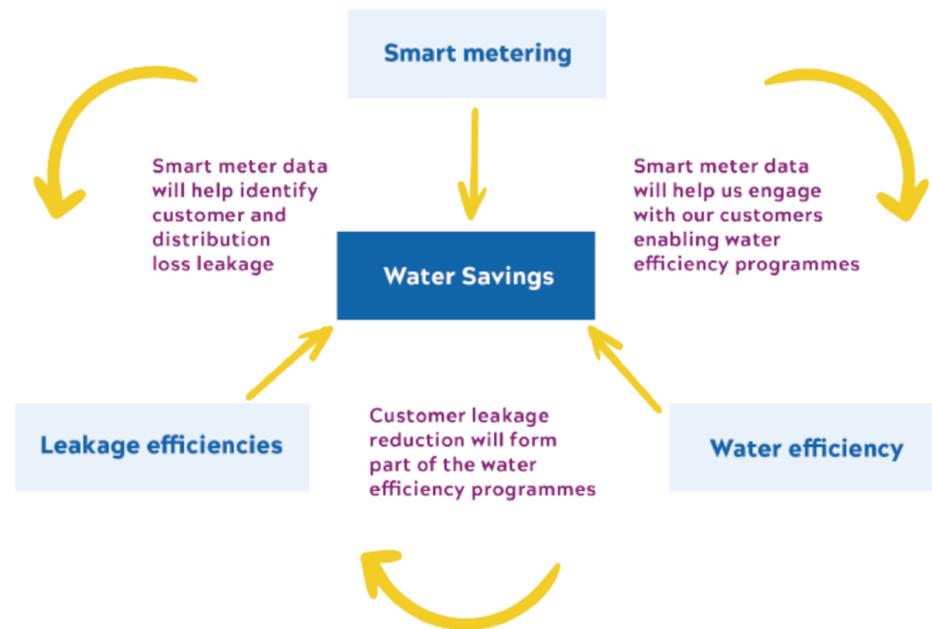
Figure 11 The River Trent, one of surface water abstractions



### Making best use of existing resource

We have always historically focussed on demand management, ensuring we do the best for the environment and our customers. We will continue to build on our historic achievements by implementing a three pillar approach for our demand management strategy, as shown in the figure below.

Figure 12 The three pillars of our demand management strategy



As a result of our demand management strategy, we will:

- Complete our smart meter roll-out by 2030 to achieve maximum feasible meter penetration across our region<sup>5</sup>.
- Explore implementing compulsory metering by 2030.
- Reduce PCC to 100 MI/d by 2050.

<sup>5</sup> Our economic level of meter penetration is 94.8%. We will of course continue to help our vulnerable customers with the range of tariffs and assistance we have available.

<sup>6</sup> It is not possible to meter properties with shared supply pipes, such as flats, without incurring significant cost.

<sup>7</sup> [The Draft Regional Plan - Water Resources East \(wre.org.uk\)](#)

- Reduce non-household demand by 20% by 2050 (after accounting for the impacts of growth).
- Reduce our leakage by 38% from 2017/18 baseline by 2050, the maximum reduction that we believe is feasible without widespread, significant mains replacement.

Our feasible level of meter penetration is 94.8%<sup>6</sup>. We will of course continue to help our vulnerable customers with the range of tariffs and assistance we have available.

- Upgrading water treatment works to make their processes more water efficient.
- Using interconnectors to move water from areas of surplus to areas of deficit.
- The construction of a water reuse plant in Colchester in AMP8, required to meet demand from 2032.

### Strategic resource options development

The scale of the challenge is such that the future needs of the region cannot be just met with demand management and interconnectors, but new supply-side solutions will be required. There are, however, limited types of new water supplies available to us. We are in the driest region in England, and there are few opportunities to take more water from rivers and aquifers. This lack of traditional resource means that the supply-side options available to us such as desalination or water reuse are relatively new to the United Kingdom's water industry. There are limited opportunities to trade and share water resource with other water companies and sectors, as abstraction reform and climate change considerations apply across all water resources.

Possible supply-side options have been considered at both a regional and company level and tested against differing hydrological and environmental scenarios.

Both regional and company water planning resulted in two SROs being consistently chosen as low regret options for our region: the Lincolnshire and Fens Reservoirs (the latter to be delivered in partnership with Cambridge Water). To arrive at the conclusion that the reservoirs are necessary in the context of potential future changes, extensive water resources planning exercises have been completed at the regional<sup>7</sup> and company level. The regional water resources management plan used a multi-objective robust decision-making approach to identify low regret options i.e. options that are selected across a wide range of potential future scenarios of growth, climate change and abstraction reduction. The Fens and Lincolnshire Reservoirs were both selected as low regret options on this basis.

Company level modelling has independently identified the need for the reservoirs based on multi-objective best value criteria and using the Economics of Balancing Supply and Demand (EBSD) model. This model was developed collaboratively across the UK water sector and uses constraints such as the size of deficit in supply vs demand, the timing of when the deficit occurs, and the locations of the deficits in specific water resource zones to identify best value and least cost options to resolve the deficits. Additional considerations include the chemistry of the available water and therefore the ability to blend water in supply. The model uses hundreds of supply options as described in the WRMP including desalination, transfer pipelines from areas of surplus to re-distribute available resources, recycled effluent re-use and more 'exotic' options such as sea tankering water from other countries .

Demand management measures like leakage reduction and smart metering to reduce consumption are appraised separately, with their benefit included in the EBSD modelling. Our WRMP24 modelling confirmed the need for the reservoirs with unconstrained model runs selecting both reservoirs at their adopted capacities. We also found that the reservoirs satisfied more objectives on our best value planning framework than feasible alternatives, such as desalination or water reuse. Additional detail on the options appraisal process for supply side investments is available in chapter 8 of our Water Resource Management Plan.

An independent national model, the Water Resources of England and Wales water resources model, also identified the need for and value of both the Lincolnshire and Fens Reservoirs. This modelling also confirmed that both reservoirs are resilient against uncertainty in supply and demand over the long-term.

Our WRMP24 decision-making process has also identified the SROs as best value solutions, because of the wider benefits they provide to society and the environment. This includes the opportunity to create new recreation facilities and habitat for wildlife (for example, our reservoir Rutland Water is an internationally recognised RAMSAR site). In addition, reservoirs have low operational carbon and can even provide opportunities for carbon sequestration on surrounding land.

#### **Deploy further supply-side solutions to meet long-term water needs**

Our rdWRMP shows that we will need desalination from 2040, particularly to meet our shared ambition for sustainable abstraction. Whilst we recognise the benefits of desalination, it has been assessed as a lower value solution than reservoirs because it has a higher operational cost (and bill impact) and operational carbon impact. An external study of the socio-economic benefits associated with reservoirs in comparison to desalination and reuse options found that the key socio-economic benefits delivered by reservoirs stemmed from recreational activities and public access to green space. These benefits included mental and physical health,

education, tourism and wider economic benefits due to increased visitors to surrounding areas. Desalination and water reuse present far more limited opportunities to create these benefits.

The need and scale of desalination, to be considered at WRMP29, will be determined through a series of scientific investigations being conducted between 2025 and 2030, as part of the Water Industry National Environment Programme (WINEP). These will look to define our long-term environmental destination strategy, investigating the needs of our region's environments. This will also allow us to tailor our approach so that we provide benefit to the habitats that need help the most.

Desalination plants are more scalable and can be sized to provide the exact capacity needed compared to reservoirs. Therefore, to develop an adaptable plan it is preferable to build the reservoirs earlier and add desalination plants later in the plan once the need and scale has been confirmed by the WINEP investigations. Delivering desalination plants later in the plan also provides greater opportunity for technological developments that may increase efficiency, reduce energy requirements and develop circular economy innovation to manage the associated waste streams.

We also plan to develop two innovation funds in AMP8:

- The 'Water Demand Reduction Discovery Fund' is our response to the imperative nature of supply/demand constraints in our region, alongside full smart meter roll-out by 2030 providing new opportunities for water efficiency initiatives. The programme will be used to identify and fill evidence gaps on water demand and help refine future forecasting for our WRMP, Water Resources East and price review submissions along with our Long-Term Delivery Strategy. It will enable rigorously designed trials into the effectiveness of different types of metering, technological and behavioural change interventions over a five-year period. The additional knowledge generated will be key to demand reduction over the long-term. It is envisaged that the program will support research into the long-term effectiveness of demand management interventions. Further detail is available in the 'Revised draft WRMP24 demand management preferred plan report: Section 10.1'
- An adaptive planning fund to focused on new supply side scheme early development especially desalination to research areas like future taste and odour regarding the introduction of more desalinated water resources e.g. understand appropriate blend ratios.

### Alternative pathways for water resources

Of the twelve scenarios tested, our core pathway for water resources delivers our ambition in eight. We have developed four alternative pathways, all of which drive the selection of additional desalination, as set out in the table below.

**Table 16 Water Resources sub-strategy alternative pathway key enhancement activities (in addition to the core pathway)**

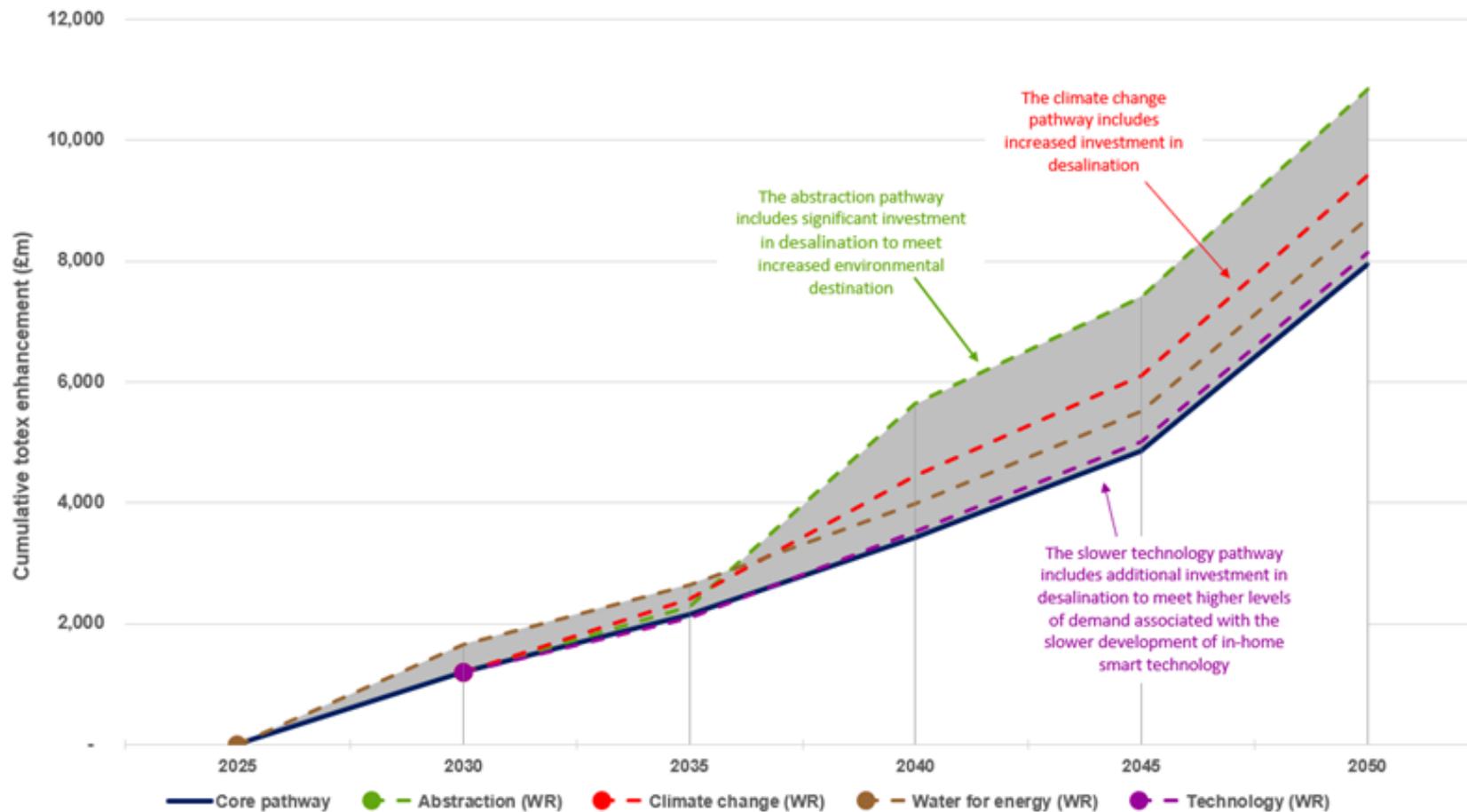
Alternative pathway	Key enhancement activities (in addition to the core pathway)
Adverse abstractions	Significant increase in licence reduction required to deliver sustainable abstraction. Additional desalination required to balance supply and demand.
Adverse climate change	A warmer dried climate reduces the water available for abstraction. As a result we need to invest in additional desalination capacity.
Slower technology	The slower development of in-home technology combined with smart meters means we are unable to reduce demand to the lower levels expected in our core pathway. PCC is 110MI/d in 2050 compared with 100MI/d in our core pathway, and non-household demand reduces by 10% relative to growth, compared with 20% in our core pathway. Additional desalination capacity is required to balance supply and demand.
Adverse water for energy	Increased demand for Public Water Supplies from the green energy sector is met with the development of desalination technology.

**Figure 13 Alton Water, one of our surface water reservoirs**



The investment required in addition to the core pathway is set out in the figure and table below. Information regarding trigger points can be found in Strategy: Alternative pathways.

Figure 14 Core and alternative pathways (water resources sub-strategy)



Note the Adverse Water for Energy scenario drives an alternative pathway starting in 2025. At present there is uncertainty about how the water requirements will be funded, for example through the conventional water company regulated route or via the open market, and what role Government will play in defining the need for hydrogen and CCUS, as well as securing the required water resources. If this additional demand is funded through the conventional water company regulated route we would not be able to meet it until 2037 at the earliest, as it would need to be included in the next round of WRMPs and there is then a lead time of 7 years on desalination plants.

### WRMP to LTDS

In the short-term, our strategy is consistent with our rdWRMP, but over the long-term it differs in two key respects. Firstly, we believe it may be possible to achieve a more ambitious reduction in Per Capita Consumption (PCC) and business demand. This relies on developments in in-home technology combined with smart metering capabilities and innovative customer engagement, as described by our final Technology scenario.

Secondly, we have reduced the expected impact of the low Abstraction Reduction Common Reference Scenario (CRS). Assessing the environmental needs is complex and requires detailed catchment investigations. Our rdWRMP therefore assumes that, where an abstraction has been assessed as being unsustainable over the long-term, we will need to reduce or stop abstraction. This drives investment in

desalination in the 2040s, which has a high operational cost and carbon impact. Using our AMP8 WINEP we will conduct the detailed catchment investigations to confirm the long-term changes to abstraction that are required.

In our LTDS, however, we have assumed that we will be able to find alternative approaches to achieving long-term sustainable abstraction. We expect we will still need to make a significant reduction to our abstractions. In the past, activities such as relocation of abstraction points and river restoration projects have allowed us to reduce the total reduction required. We expect that the potential benefits of these approaches will be enhanced by systems-based approaches (underpinned by the development of digital-twins of the natural environment<sup>8</sup>), allowing us to identify lower cost and better value solutions compared with desalination.

We did not reduce the impact of the high Abstraction Reductions CRS, because the scenarios are intended to represent plausible extremes. The high scenario therefore provides an indication of the full investment requirement if the alternative approaches described above are not realised.

The key differences between our LTDS Water Resources strategy and our WRMP are set out in the table below.

**Table 17 Key differences between our WRMP and LTDS Water Resources Strategy**

	Revised draft WRMP	LTDS Water Resources Strategy
PCC	110 MI/d in 2050	100 MI/d in 2050
Business demand	10% reduction relative to growth by 2050	20% reduction relative to growth by 2050
Impact of the low abstraction CRS	241 MI/d	120 MI/d

<sup>8</sup> Digital twins of the natural environment combine monitoring data from multiple parties to understand and predict impacts on that environment. These will be integrated into digital twins of the water and sewerage systems to provide real time insight into the impact of our operations on the environment.

### 3.4.3 Drinking Water Quality

Our customers consistently tell us that the provision of safe, clean drinking water is the most important thing we do. It's also our priority, and we're proud of our record for excellent drinking water quality. We're one of the top water companies in the UK, and globally.

Our Drinking Water Quality sub-strategy sets out the enhancement investment required to mitigate known and emerging water quality risks, including:

- Rising levels of nitrate in our groundwater sources and seasonal nitrate increases in our surface waters.
- Emerging risks associated with perfluorinated compounds or 'forever chemicals' (PFAS).
- Increasing risk from saline intrusion in our groundwater sources.
- Lead in drinking water from historic lead pipes.

We will also continue to make improvements to the aesthetics of our water, such as undesirable changes to taste and odour which do not affect the safety of the water, but which are unacceptable for our customers.

Note that the assumptions we have made regarding the impact of the low abstractions scenario are consistent with the Water Resources sub-strategy.

**Table 18 How the Drinking Water Quality sub-strategy contributes to the delivery of our ambition**

	Drinking Water Quality
Mitigating the impacts of long-term challenges on our services	Mitigating the impact of climate change on raw water quality Mitigating emerging water quality risks (PFAS)
New government and regulatory targets	
Ambition that goes 'above and beyond'	Eliminate the risk of exposure to lead in drinking water supplies by 2050

#### Water quality risks

##### Nitrate

Elevated nitrate concentrations in drinking water can be harmful to human health, and we must ensure that we comply with the drinking water nitrate standard of 50 mg/l. As a result of historic agricultural activity, there are high levels of nitrate in many of the region's aquifers. Nitrate levels in a number of our groundwater sources are continuing to rise, suggesting they have yet to reach their peak. We are also seeing an increasing trend in seasonal nitrate levels in a number of our surface waters due to heavy rainfall events which exacerbates surface water run off and washes nitrate off crops and soils following agricultural application.

Currently, levels of nitrate in drinking water supplies are partly managed through blending (mixing water from different sources to ensure compliance). Our ambition to achieve sustainable abstraction, however, means we are closing many low nitrate abstraction sources. This will continue to reduce our ability to use blending to manage nitrate levels, meaning we will need to invest in more treatment capability.

##### PFAS

The presence of PFAS<sup>9</sup> in the environment is an emerging concern nationally and internationally. Currently, there is limited understanding of the extent of the problem, the impacts of PFAS on human health (although there is evidence linking PFAS to multiple health problems), or the most effective treatment technology. The 47 compounds listed by the DWI, known as Annex A substances, have been monitored in our raw water sources since 2022 with elevated levels detected at a number. We have been monitoring for PFOS and PFOA, also on the Annex A list, for a significant number of years with specific targeted monitoring at a contaminated source in our region since 2006. We expect that the number of PFAS compounds we need to monitor for will increase as we understand more about the individual PFAS compounds which could be of concern.

The Drinking Water Inspectorate (DWI) has introduced a precautionary margin of safety to reduce the potential for long term accumulation in the human body.

##### Saline intrusion

Saline intrusion is the movement of saline water into groundwater aquifers, which results in the degradation of groundwater quality.

9 PFAS is an umbrella term for a list of Poly and Perfluorinated Alkyl substances

Rising sea levels, as a result of the impacts of climate change, will increase the risk in 26 ground water sources which are at risk from saline intrusion. We are already observing an increased risk from sources which are impacted by estuary water influencing the natural ground water characteristics in one of these sources. Currently, saline intrusion risks are managed through blending, however our ambition to reduce sustainable abstraction means we are closing many lower risk abstraction sources. This is reducing our ability to use blending to manage saline risk, meaning we will need to invest in more treatment capability.

#### Lead

Lead pipework, commonly used before 1970 to connect properties to water networks, is a residual source of lead which can dissolve into water within the pipe. We estimate there are over 515,000 lead communication pipes in our region<sup>10</sup>.

Lead is known to be harmful to health, particularly in children. We are required to keep lead levels in drinking water below 10 µg/l. If this level is exceeded, and our lead communication pipe is found to be lead, then we are required to replace it. We anticipate that the standard for lead is likely to reduce to 5 µg/l during AMP8, with DWI looking at the lead standard as one of the first parameters for review under the Standards Review Board.

#### Taste and odour

Significant investigations have been undertaken at a number of our groundwater treatment sites to understand why we have an increased risk of taste and odour detections from those sites, typically linked to hydrogen sulphide levels in the raw water sources. Existing treatment processes have been optimised to reduce the risks from the hydrogen sulphide levels in the raw water. Additional treatment is required to remove the taste and odour risks from some of our groundwater water treatment sites and to reduce the risk of taste and odour detections from the regulatory final water compliance sampling point.

The requirements of our WRMP means that the impact of licence reductions to realise our ambition on sustainable abstractions, plus the development of new sources and significant mixing of water from different sources presents a potential taste and odour risk meaning we will need to invest in more treatment capability.

10 Reported in our 2022-23 Annual Performance Report

### Core pathway for DWI

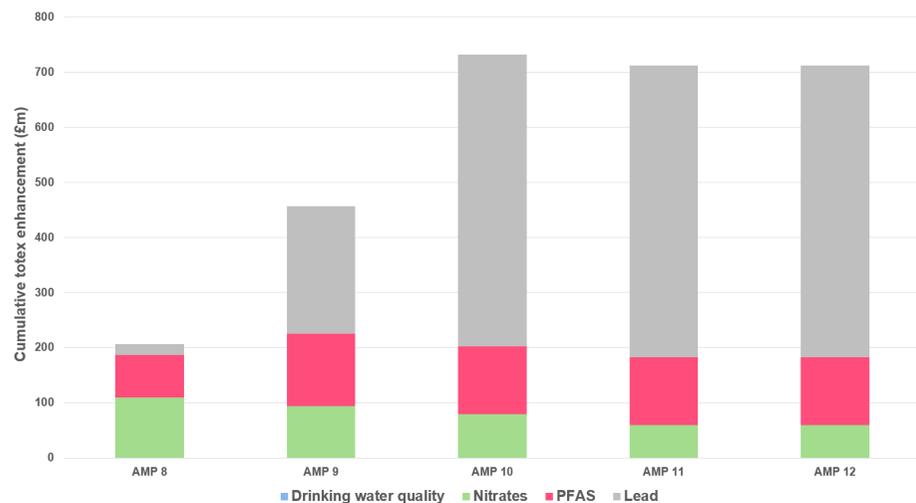
The key enhancement activities included in our core pathway are set out in the table below.

**Table 19 Key enhancement activities included in the core pathway (Drinking Water Quality)**

Key enhancement activities	AMP8 2025-30	AMP9 2030-2035	AMP10 2035-2040	AMP11 2040-2045	AMP12 2045-2050
Nitrate	Additional treatment at 12 sites.	Investment in additional treatment specific schemes yet to be identified.			
PFAS	GAC treatment installation at 3 sites (GAC included in the wash water handling system at one of these). Virgin GAC media installation at 20 sites. Delivery of AMP8 PFAS strategy.	Installation of PFAS treatment, specific schemes yet to be identified, this will be informed by our PFAS strategy and PFAS research.			
Lead	Seasonal orthophosphoric acid dosing. Limited lead pipe removal.	Seasonal orthophosphoric acid dosing. Innovative technology that addresses current DWI concerns around lead pipe rehabilitation.			
Taste and odour	Additional treatment at 3 sites.	Additional treatment to improve taste and odour, specific schemes yet to be identified.			

The expected investment requirements associated with our core pathway are set out in the figure overleaf.

**Figure 15 Sub-strategy core pathway (Drinking water quality)**



### Mitigating raw water quality risks

We have developed a twin-track approach to mitigate raw water quality risk.

1. Manage legacy contamination through treatment.
2. Reduce future risk through catchment management approaches, where we work in partnership with landowners and land users to minimise the contamination of raw water sources.

We have an established approach to catchment management, designed to reduce the use of nitrate on land. From 2020 to 2023 we completed a review of all the previous modelling work with Mott McDonald, producing robust combined vulnerability zones for each nitrate affected groundwater source using multiple modelling approaches, and estimated the accuracy and confidence we can have in the predictive trend models we developed previously. This body of work feeds directly into prioritisation of our catchment engagement, and along with wider analysis of local risk factors and hydrological/pollutant data has helped to determine the most relevant engagement focus at each source for the future. This work will continue into AMP8<sup>11</sup>.

We have been delivering a programme of catchment management within drinking water safeguard zones for 15 years, initially focussed on pesticides such as metaldehyde. We have broadened this approach in AMP7 and will continue to drive this approach forward by continuing to support changes to land management practices to protect drinking water sources from diffuse pollution impacts. The investment associated with this is incorporated in our Environmental Enhancement sub-strategy. Our A-WINEP will explore further how partnerships for nature-based solutions can deliver greater drinking water source protection.

Catchment management alone, however, will not be sufficient to address all raw water quality risks, because it does not reduce pollutants already in the environment such as nitrate. Mobilisation of any contaminant plume will depend on the natural features of the aquifer and thus the positive effects of any catchment management activities can take a considerable number of years to be observed. Within aquifers, for example a reduction in nitrate levels could take anywhere from 20 to 40 years to be realised depending on the aquifer. To meet drinking water standards, we must also investment in treatment capabilities to mitigate the risks associated with legacy contaminants.

As noted above, PFAS is an emerging risk nationally and internationally, and so there are significant uncertainties relating to long-term investment requirements. This includes the timing of interventions, the optimal treatment processes, and the number of recognised PFAS compounds (which is likely to increase as a result of new research). We have taken a risk-based approach to the management of PFAS, whilst seeking to improve our understanding of the problem. The DWI have identified a 48th compound which should be included in companies risk assessments recently.

At high-risk sites, we will manage PFAS risk in AMP8 using Granular Activated Carbon (GAC) (known to be effective at reducing PFAS). This includes more frequent replacement of GAC media at our very high risk sites with existing treatment, the installation of new GAC treatment at our very high risk sites that do not have it currently and where we have identified PFAS levels of tier 2 and a wash water handling system with GAC treatment at a very high risk tier 3 site<sup>12</sup>.

We expect that the investment required in treatment will increase in AMP9 and remain at a similar level through to AMP12, although at this stage we do not have certainty over the schemes that will be required. We are currently supporting Cranfield University (as part of a Defra (DWI) research project) to undertake

<sup>11</sup> The associated investment is not reflected in our core pathway, however, because it forms part of base expenditure.

<sup>12</sup> The DWI has taken a precautionary approach and produced tiered guideline values for water companies. For tier 2 final waters, the DWI requires review of any control measures and existing treatment and the preparation of measures to prevent the supply of water to consumer with levels less than 0.1 µg/l. Tier 3 final waters requires the preparation of emergency contingency measures to prevent the supply of water to consumers with greater than or equal to 0.1 µg/l PFAS.

research into effective PFAS treatment technologies<sup>13</sup>. Along with our AMP8 PFAS strategy, the outputs of this research will inform our future approach to PFAS and investment requirements from AMP9 onwards.

Where possible, we are currently working with others to understand PFAS prevalence in catchments, for example working with our trade effluent permitting team to understand potential contamination routes from industry. In AMP8, we are proposing to undertake a series of catchment investigations, enhanced operational sampling, and further stakeholder engagement and collaborative work. This investment will develop our understanding of PFAS risk, including where catchment management solutions could be viable.

### Managing lead risk

Recognising the health risks associated with lead, we have a Public Interest Commitment to ensure that all our customers have access to lead-free drinking water by 2050. Currently, the only solution to deliver lead-free drinking water is the complete removal of lead pipework, including customers' internal lead supply pipe plumbing. Although there are existing non-invasive technologies to reduce lead exposure, such as relining lead pipes, they are not currently endorsed by the DWI, due to concerns over their efficacy and longevity. We assume that we are able to develop an alternative approach to lead pip replacement and that this is rolled out from AMP9 onwards.

We have undertaken a small trial, where we have made a small number of properties lead-free by replacing company and customer pipes by offering to cover part of the cost. This was offered to a broad range of social demographics within Norwich including areas with a higher social housing sector and more affluent areas with detached housing. We have had a very low uptake on the scheme, which is perhaps unsurprising given the amount of disruption it entails. This suggests that despite the associated health risks, lead is not currently a customer priority. Of those that did take us up on the offer, we additionally provided a standard free lead test service pre and post the replacement of the lead service pipe. We have reviewed the success of the trial to understand how we could encourage greater uptake of the offer, and we have plans to do a similar trial in the future.

Replacement of lead pipes is also expensive and carbon intensive. We estimate that the complete removal of lead pipes from our network by 2050 will cost in excess of £2.5bn.

For AMP8, we have adopted a risk-based approach to the management of lead. This includes enhanced plumbosolvency control and the replacement of pipes in high-risk locations, such as schools and nurseries in our high risk public water

supply zones. We will increase the replacement rate in AMP9, and significant investment required to deliver lead-free drinking water will be undertaken in AMPs 10 - 12.

We have phased the investment in this way partly to manage short-term affordability concerns. In addition, we anticipate that we will identify a better value solution in the future as a result of technological developments. This is reflected in the investment required in our core-pathway, where we have assumed an efficiency saving of 10% in AMP9 and 20% in AMPs 10-12.

### Taste and odour

We have identified three sites where we need to make investment in AMP8 to address existing issues with water aesthetics. We do not see an increasing risk in this area, and so we assume a similar level of investment will be required over AMPs 9 - 12. The exact scheme required will be determined at each AMP period.

### Alternative pathways

Overall of the twelve scenarios tested, our core pathway for Drinking Water Quality delivers our ambition in nine. We have developed three alternative pathways, designed to meet requirements in the High climate change, High abstraction and Slow technology scenarios.

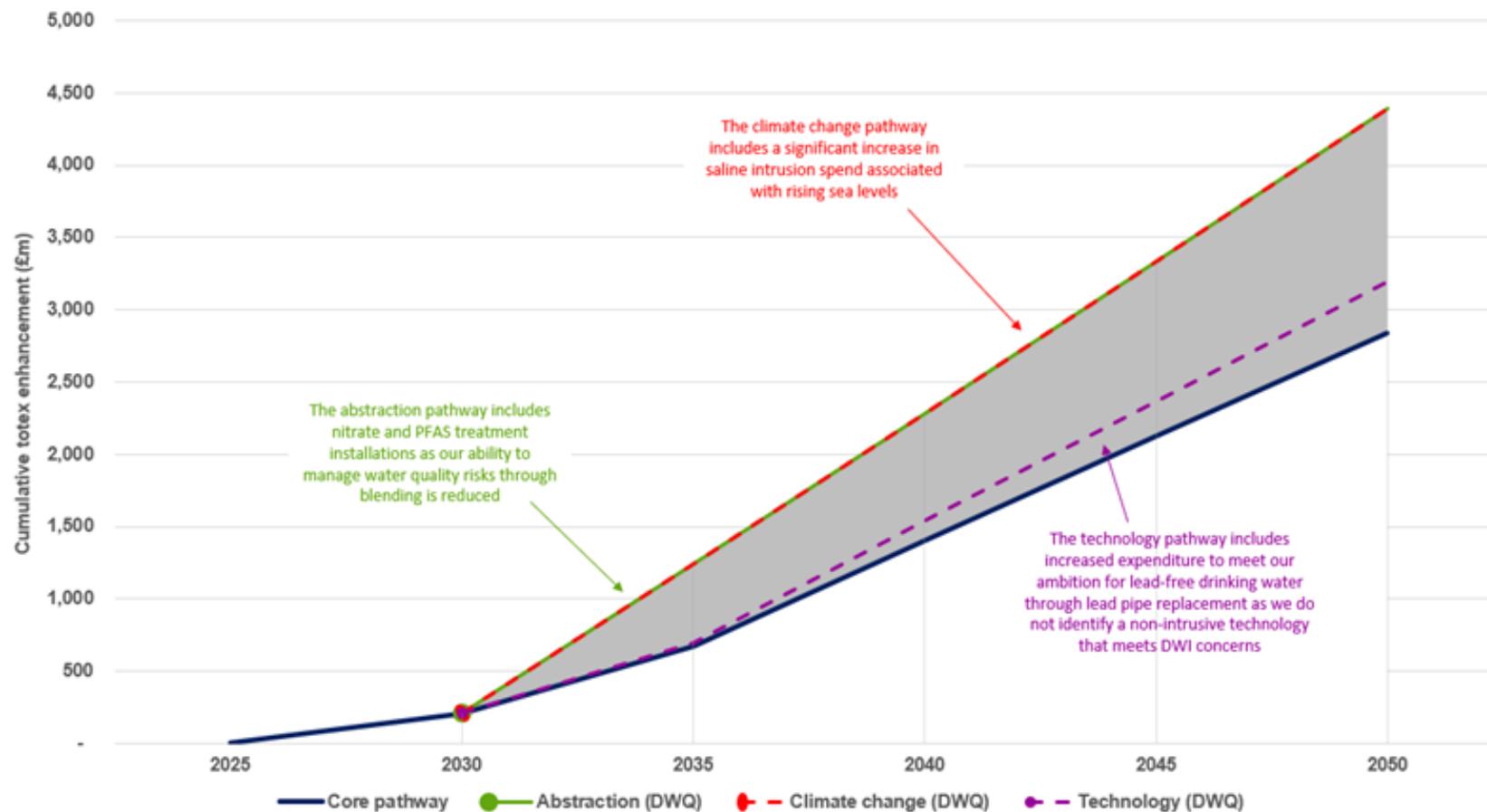
**Table 20 Drinking Water Quality sub-strategy alternative pathway key enhancement activities (in addition to the core pathway)**

Alternative pathway	Key enhancement activities (in addition to the core pathway)
Adverse abstractions	Loss of sources reduces our ability to manage water quality risks through blending. Additional investment in nitrate and PFAS treatment required.
Adverse climate change	Sea level rises cause saline intrusion in our aquifers. Investment in treatment required (membrane technology).
Slower technology	We do not identify a non-intrusive technology that meets DWI concerns. Lead-free drinking water delivered through lead pipe replacement. Increased costs of 10% AMP9 and 20% AMPs10-12.

13 Bench-Scale Water Treatment Efficacy Study of Poly and Perfluorinated Alkyl Substances (PFAS)

The investment required in addition to the core pathway is set out in the figure and table below. It is based on forecast requirements, because at this stage we have not identified specific schemes. Information regarding trigger points can be found in Strategy: Alternative pathways.

Figure 16 Core and alternative pathways (drinking water quality sub-strategy)



### 3.4.4 Resilience

Our Resilience sub-strategy consists of enhancement expenditure that is not captured in other sub-strategies. The core pathway consists of low and no-regret investment.

Resilience features in many areas of our PR24 plan and LTDS. Specific resilience challenges are covered by investments in our Water Resources Management Plan (WRMP), Drainage and Wastewater Management Plan (DWMP) and commitments outlined in the Water Industry National Environment Programme (WINEP). Our WRMP addresses drought and long-term supply resilience, while our DWMP and WINEP commitments include investments to deliver our ambition on environmental resilience. However not all resilience shocks and stresses are reflected in these programmes.

Our Operational and Asset resilience strategy encompasses resilience challenges not covered by these other strategies that present increasing risk to our customers in the future, but which are not covered by these other strategies.

Operational resilience means that our infrastructure and skills can prevent, manage and recover from disruptions in our service to customers. We have used our resilience framework to guide our strategy for delivering a reliable and affordable water supply for our customers.

The interventions we have selected:

- Provide continuity of service to customers and avoid critical service failures.
- Apply a risk-based approach to asset health, that is informed by accurate information on the state of assets and focusses on criticality, protecting customers and the natural environment from exposure to known risks and reduces vulnerability to future uncertainties.
- Integrate operational technology and information technology systems, and ensure cyber security is paramount.
- Comply with the latest requirements to protect our sites from 3rd party interference.

All through embracing technological developments and supporting collaborative approaches to deliver wider outcomes.

Specifically, to achieve this, we aim to:

- Reduce the risk of flooding on our assets.
- Reduce the number of single points of failure (such as water treatment works, water mains and other critical assets) in our systems to mitigate the risk of supply interruptions caused by exogeneous factors.

- Protect our systems from cyber-attacks.
- Protect our supplies from civil emergencies by complying with the Security and Emergency Measures Direction 2022 (SEMD), which requires physical security at Critical National Infrastructure (CNI) designated areas.

Figure 17 Our resilience framework

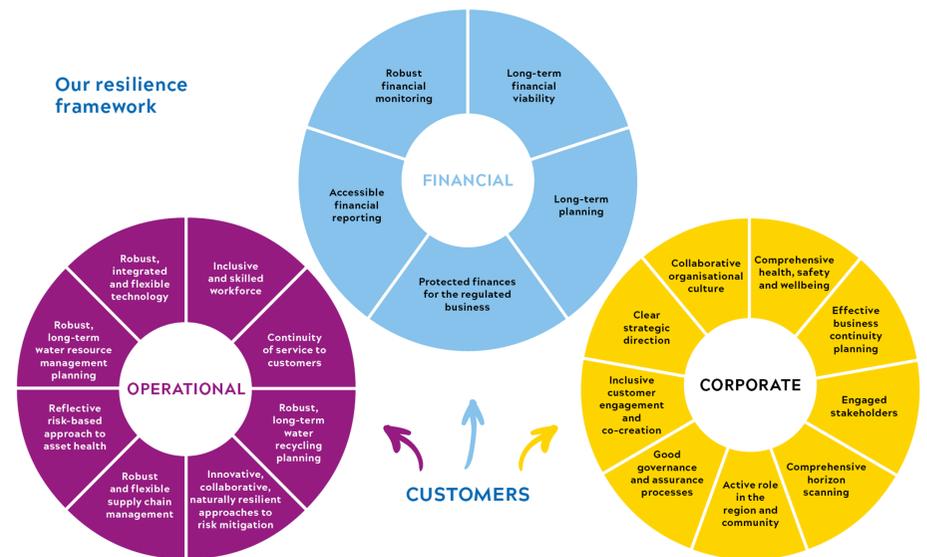


Table 21 How the resilience sub-strategy contributes to the delivery of our ambition

	Resilience
Mitigating the impacts of long-term challenges on our services	Mitigating the impact of climate change on water and sewerage mains
New government and regulatory targets	Continue with phased implementation of security standards (SEMD and Cyber Security)
Ambition that goes 'above and beyond'	Reduction in the number of single points of failure Reduction of flood risk on our assets

### Core pathway

The key enhancement activities included in our core pathway are set out in table 18 below.

**Table 22 Key enhancement investments included in the core pathway**

Key enhancement activities	AMP8 2025-30	AMP9 2030-2035	AMP10 2035-40	AMP11 2040-45	AMP12 2045-50
Climate vulnerable mains	Renew 668km of climate vulnerable water mains Condition and criticality investigations	Renew 918 km of climate vulnerable water mains per AMP. Renewal of climate vulnerable sewers (size of programme per AMP informed by condition and criticality investigations)			
Asset flood protection	We are investing £4.2m to mitigate against the impacts of surface water flooding at 13 key water production assets including boreholes which are highly susceptible to flooding.	Forecast low-regret Investment in additional flood protection, specific schemes yet to be identified			
Critical infrastructure	£28m investment into reducing single points of failure across our water network. This includes where distribution water mains cross over, under and through pieces of critical national infrastructure such as motorways, high speed rail lines and bridges.	Forecast low-regret Investment to reduce single points of failure, specific schemes yet to be identified			
Cyber security	Operational Technology security enhancements at medium risk water supply assets, and high and medium water recycling assets.	Operational Technology security enhancements at low risk water supply and water recycling assets.	Ongoing investment to protect Operational Technology infrastructure against emerging threats, including developments in quantum computing and cryptography.		
Physical security - SEMD	Compliance with SEMD Directive (2022) and 100% of water assets. Compliance at 10 critical Water Recycling Centres.	Address ongoing compliance requirements Compliance at remaining water recycling assets.			

Our long-term Resilience strategy includes:

- A proactive programme of investment to protect our assets against the impacts of increased temperature and rainfall due to climate change. This includes:

AMP8 condition and criticality investigations to assess water mains and sewers that are susceptible to damage under climate change conditions, improvements to our Water Infrastructure Serviceability Performance Assessment (WISPA)

Climatic Mains tool to predict pipe burst locations and drive insight for pipe renewals programme.

- Installing permanent flood defences for our assets where this is cost beneficial. Our cost-benefit assessment is based on extensive risk assessment and modelling analysis.
- Contributing to partnership flood resilience schemes to deliver best value for our customers and wider environmental and community benefit.
- Securing water supply service by linking customers to more than one supply source and reducing the risk of failure of critical infrastructure.
- Driving down business risk in terms of cyber exposure at remote sites, resilience of SCADA systems and critical digital networks and creating security systems that can rapidly respond to cyber threat.
- Installing physical security measures that comply with the Security and Emergency Measures Direction (SEMD) to protect security and resilience at Critical National Infrastructure (CNI) designated sites and other critical operational sites.
- Investing in operational technology / remote operation / self-healing networks to increase the efficiency and resilience of operations and network. We have had regards to Ofwat's Technology CRS and included investment to reflect increasingly higher risks of failure and threats from cybercrime in the fast scenario.

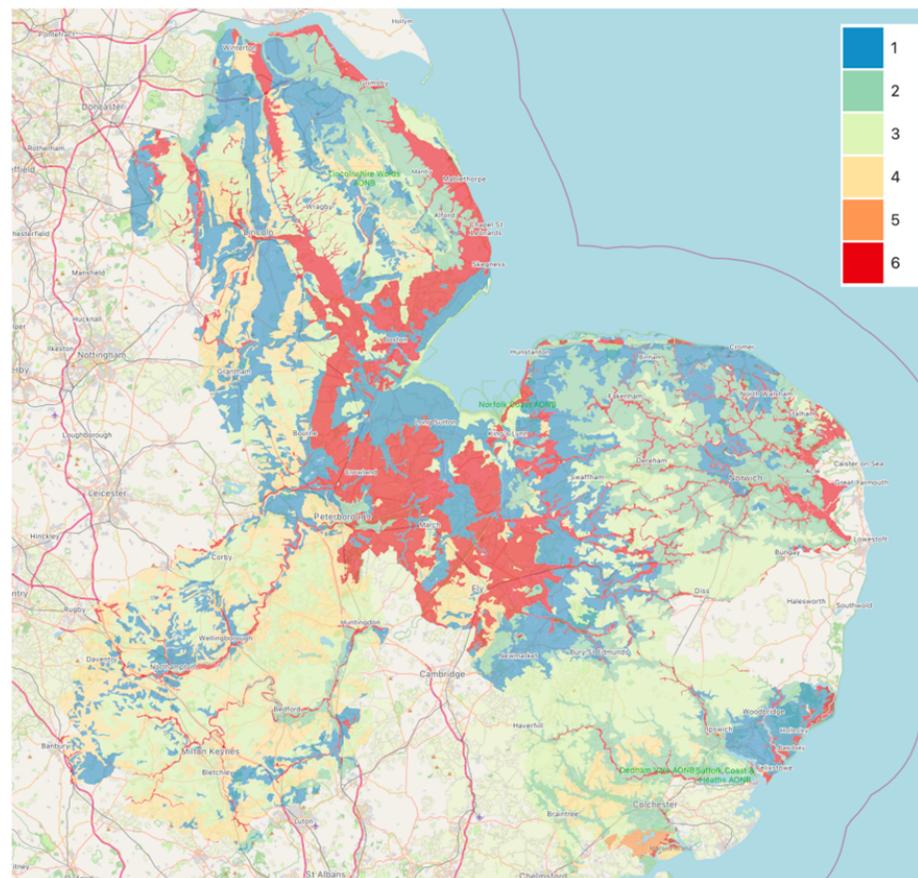
The enhancement investments we have identified are:

**Climate vulnerable mains (CVMs) and climate vulnerable sewers (CVSs)** - It is now clear that climate change and soil type are explicitly affecting a certain subset of distribution assets which we are deeming as climate vulnerable. These are water mains of a smaller diameter, made of various rigid materials with socket type joints, and located in shrinkable soil types susceptible to climate induced ground movement. Class 4, 5 and 6 soil types most prone to skink and swell, are prevalent in large parts of our operating area making this a particularly acute problem for Anglian Water as demonstrated by the image below. This is exacerbated by the fact that several major centres of population are directly within class 6 soil areas, the most problematic soil for our assets.

The impacts of climate change are already affecting the east of England, with a UK temperature record being set at RAF Coningsby in Lincolnshire in 2022. Recent climatic events have shown that the east of England will be disproportionately affected by future climate events, including extreme temperatures and dramatically reduced levels of rainfall, leading to high levels of soil moisture deficit and high levels of movement within susceptible soil types. This increase in soil moisture deficit and associated increase in movement and cracking of susceptible soil types is leading to a premature failure of sub-terrestrial distribution assets within our

region. We are proposing a programme of work to reduce the risk of pipe failure caused by climate change induced soil moisture deficit by renewing distribution assets to reduce their climate vulnerability.

Figure 18 Soil type vulnerable to climate change impacts within the Anglian Water Region



We currently have approximately 8,000km of climate vulnerable main, or 20% of the total length of company mains. Investment increases in AMP9 and then is evenly spread across future AMPs, so that we will have renewed 75% of climate vulnerable mains by 2060. We have spread the investment in this way to manage both the affordability and deliverability of the programme.

The AMP8 programme includes an allocation for condition assessment and monitoring to inform targeted future improvement programmes. This investment includes condition and criticality mains investigations in AMP8 to identify and prioritise high risk mains.

The climate vulnerable sewers AMP 8 investment includes condition and criticality investigations that will inform future improvement programmes. From AMP9 onwards, investment will be prioritised according to the AMP8 investigation outcome and will continue across the planning period at the same annual allocation. The climate vulnerable sewers programme will prioritise rising mains as their pressurised operational status is likely to make them more susceptible to bursts.

The programme for both climate vulnerable mains and climate vulnerable sewers assumes robust real-time asset condition monitoring is available from 2035 to support a targeted mains replacement programme.

**Flood protection** - This consists of protection measures to mitigate the risk of flooding at critical sites such as water treatment sites, water recycling centres, pumping stations and groundwater abstraction bores. This includes permanent flood barriers, such as flood walls and doors and waterproofing buildings, raising electrical panels and ensuring communications and telemetry are maintained during a flooding event.

Our AMP 8 investment completes our current programme to protect critical water assets. Interventions are designed to protect inland assets against a 1 in 100-year flood event and coastal assets against a 1 in 200-year event. The programme includes investment in partnership schemes that will deliver mutual benefits.

**Single point of failure** - We have had a long-term strategy since AMP 4 to remove single points of failure in our supply system. The core of our strategy continues to be to create network interconnectivity to reduce the number of customers supplied by a single WTW. This provides resilience to a wide range of exogenous hazards that may impact the operation of a WTW and affect customers supply. At PR19 the systems thinking approach of our resilience review also highlighted critical single points of failure in our supply networks. This initiated a multi-AMP investment programme of providing resilience to critical infrastructure crossings, where our assets pass under or over other parties' assets such as railways, rivers, or major roads. Failure of these assets would not only lead to prolonged customer interruptions, as these repairs are extremely difficult, but also disruption to other

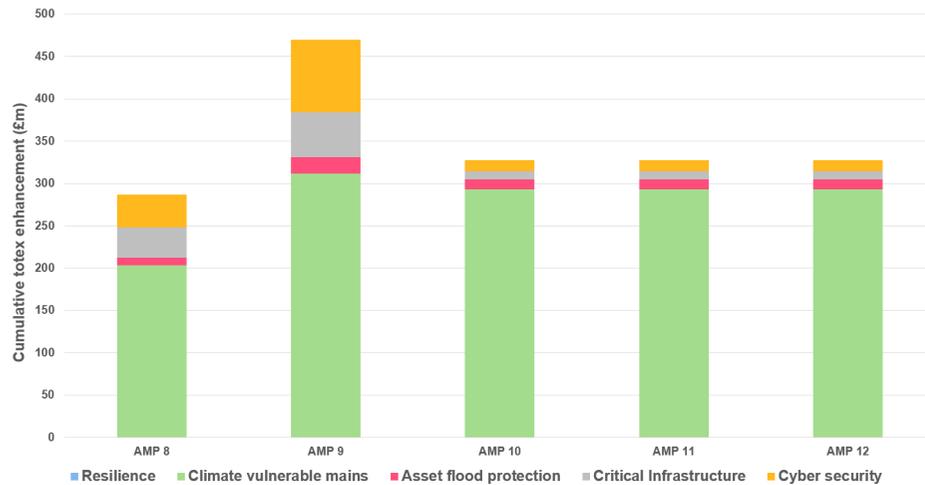
national infrastructure. Our AMP8 investment includes £28m to reduce the risk of failure of single critical transfers and single sources of supply. Our LTDS core pathway includes investments in AMP9 to conclude the strategy to reduce the number of customers supplied by a single WTW and continue the programme of critical crossings which extends into future AMPs.

**SEMD** - This consists of expenditure to comply with the requirements of the Security and Emergency Measures Direction (SEMD) 2022. This includes schemes to protect Critical National Infrastructure (CNI) and National Infrastructure (NI) assets and annual assessments of further improvements to comply with industry protective security and emergency planning guidance and alarm enhancement to ensure compliance with the Water UK Security and Electronic Standards. Our AMP8 investment includes security upgrades at two CNI sites that will address recommendations from an annual independent audit of our CNI sites. Through AMP8 we will also conduct a risk assessment of all water assets to inform an ongoing programme of works that will ensure compliance against the regulatory requirements in the longer term. Aligned with the direction from regulation we will commence implementing SEMD standards at our Water Recycling sites in AMP8 and continue this programme into future AMPs.

**Cyber Security** - This consists of investment to meet regulatory requirements outlined by the Network and Information Systems (NIS) Regulation 2018. Water companies, as an Operator of Essential Services (OES), are required to take appropriate and proportionate measures to measure the risk to their network and information systems and prevent and minimise the impact of attacks on operational technology (OT) to ensure we are still able to fulfil our functions. We have categorised the risk status of sites based on the likelihood and business impact of an attack. We have planned the rollout of controls focused on securing sites with third party network over multiple AMPs in alignment with our risk-based assessment approach. After the delivery of controls to reduce the risk of a remote cyber-attacks at all high-risk sites in AMP7, we will progress to focus on OT security enhancements at medium risk water supply systems.

The expected investment requirements associated with our core pathway are set out in the figure below.

Figure 19 Sub-strategy core pathway (Resilience)



### Making best use of existing resources

We will continue to invest to provide a base level of good service operational resilience and service to customers and the environment and maintain the long-term capability of our water assets. We will fund this through our base expenditure allowances which allow us to:

- Continue to reduce water and sewer main bursts by proactively renewing ageing pipes.
- Upgrade programmable logic controllers (PLCs), providing additional functionality to deliver operational resilience.
- Maintain existing flood protection works.
- Maintain existing SEMD installations and cyber protection tools.

Notwithstanding the significant benefits our base expenditure programme will deliver, the challenges we face necessitate investment to achieve a permanent increase or step change in the current level of service we provide. This will therefore be funded through our enhancement expenditure allowances. To ensure we invest at the optimum time, we have developed an adaptive strategy comprising a core pathway of enhancement investments needed under most future scenarios, supported by alternative pathways of investment we may need to follow if certain future scenarios arise.

### Alternative pathways for resilience

The delivery of our core pathway strategic interventions will meet our ambition to secure a resilient service for our customers and ensure compliance with legislative and regulatory requirements under 11 of the 14 future scenarios we tested. We have developed three alternative pathways for both water and wastewater resilience. These do not require alternative interventions, but rather a different profile of investment that requires an accelerated or delayed programme or an expanded programme to meet our resilience ambition.

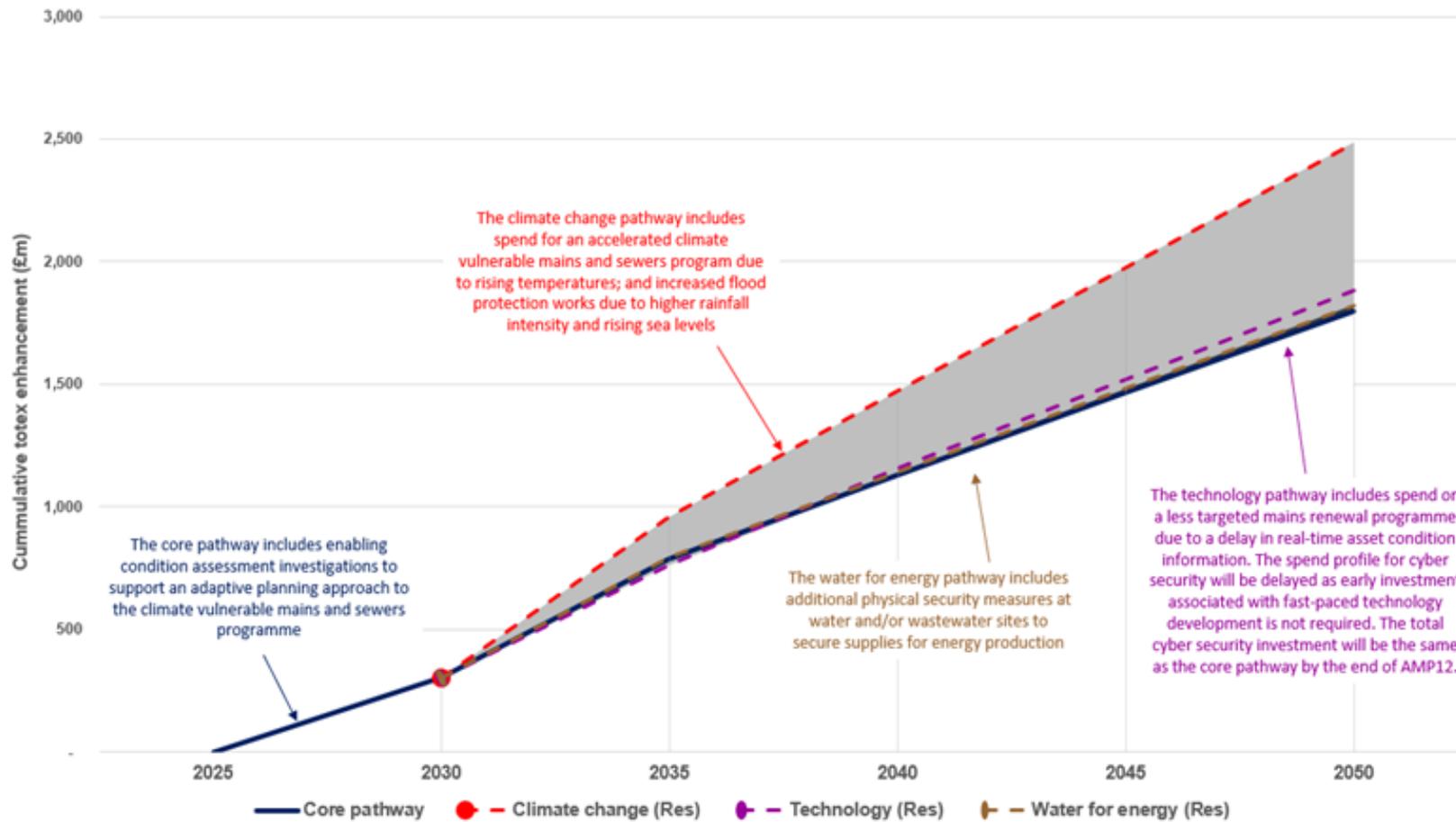
The table below sets out the alternative pathways, description of impact and the expected expenditure change for both water and water recycling assets.

Table 23 Additional key enhancement activities in the alternative pathways (Resilience sub-strategy)

Alternative pathway	Key enhancement activities in addition to the core pathway
Adverse climate change (Res)	Accelerated climate vulnerable mains and climate vulnerable sewers programme due to increased burst numbers under climate change.
Slower technology (Res)	Less targeted climate vulnerable mains programme due to delay in the availability of robust real-time asset condition information and remote sensing technology.  Slower pace of technology developed delays the installation of security tools.
Adverse water for energy (Res)	Faster pace of hydrogen or carbon capture, utilisation and storage (CCUS) development in the Anglian region. Increased expenditure on security measures due to higher risk status of treatment sites supplying new energy producers.

The investment required in addition to the core pathway is set out in the figure and table below. Information regarding trigger points can be found in Strategy: Alternative pathways.

Figure 20 Core and alternative pathways (Resilience sub-strategy)



## Adverse climate change (Res)

### Climate vulnerable mains and sewers

We will accelerate the climate vulnerable mains and climate vulnerable sewers programme to finish by 2050 instead of 2060 to address the higher risk from adverse climactic events under an adverse climate change CRS scenario (4-degree temperature increase). The earlier completion of the programme aims to avoid exposure of vulnerable pipes to the worsening climate conditions forecast later in the planning period.

The £1.64 billion climate vulnerable mains programme addressing 75% of climate vulnerable mains (6,000km of mains) will be continued across four AMPs (AMP 9-12) with an estimated per AMP cost of £364.25m, representing a £121.25m or 50% increase in expenditure per AMP from 2030.

The £300 million CVMs programme completion will be brought forward by two AMPs increasing expenditure per AMP to £75m, representing a £25m or 50% increase in expenditure per AMP from 2030.

### Flooding

We evaluated the potential impact of climate change on the flood risk posed to water assets and determined that while the risk at some sites increased due to the more intense rainfall, this was balanced by the reduction in flood risk at other sites due to lower rainfall. We have assumed the cost impact was balanced.

Increasing sea level rise is expected to increase the risk of flooding to water recycling centres located near coastal areas. We have modelled this increased risk under a 4-degree climate change scenario. The additional expenditure required to protect assets is estimated to increase by £25m per AMP.

### Slower technology (Res)

The adverse (slower) technology scenario assumes the availability of robust real-time asset condition information & remote sensing technology will be delayed from 2035 to 2040. This delay will mean a less targeted mains renewal programme. This is likely to increase the programme cost due to the potential increased frequency of mains failure and length of impacted pipeline. We consider the lack of real-time data and information on asset health and ground conditions would have a material impact on the programme and estimate a 10% increase in cost as we assume that approximately 10% more pipeline length may need to be renewed.

The slower technology scenario will delay the timing of the required investment in cyber security controls across the planning period. For example, the need to investment in agile cryptography may not arise in the near term if developments in quantum computing are delayed. We have developed an alternative pathway

that adapts the investment requirement based on an approximated forecast for the introduction of quantum computing and a time-extended risk based rollout of the secure network standard.

### Adverse Water for Energy (Res)

The Water for Energy wider scenario considers the potential impact of future water supply needs for energy, principally hydrogen production and carbon capture utilisation and storage schemes (CCUS). Potential water sources may include joint investment in new desalination plants to supply both public water supply and energy needs or treated wastewater effluent as cooling water. The reliance of energy providers on AWS operated assets would require increased security provision at the supply sites. The core pathway assumes the development of a single new energy production scheme and the associated additional security provision that would be required for this site.

The adverse scenario assumes hydrogen production/CCUS facilities are developed at several locations across the AWS region. An allowance for the likely increased SEMD risk status at existing and new sites and consequent increased security measures would be required at sites that provide a water supply for energy producers. We have assumed SEMD investment at two sites per AMP from 2030 onwards to align with forecast water supply needs of new energy schemes.

## 3.4.5 Drainage and water recycling

Our Drainage and Water Recycling sub-strategy is based on our DWMP. Through the development of our LTDS, we have reduced the enhancement spend requirements in the short-term.

- Our final DWMP sets out the enhancement required to mitigate the impacts of long-term challenges on water recycling treatment and network capacity. It considers a broad range of grey and green solutions. By testing our final DWMP against our final Technology scenario, we have identified opportunities to deliver against our ambition more efficiently by using digital technologies and partnership approaches to the management of surface water. As a result, we are delaying investment in potentially higher-regret and higher-carbon infrastructure solutions while we deploy emerging digital technologies, develop our partnership approach (through our WINEP) and increase our understanding of long-term climate change impacts.
- Our final Technology scenario, and our commitment to establish a systems-focused, outcomes-based approach to environmental enhancement, have highlighted an opportunity for us to go further to reduce sewer flooding, storm overflow spills and pollutions. As a result we have included a higher level of ambition in our LTDS, and aim to greatly reduce, if not eliminate, storm overflow spills, pollutions and sewer flooding.

Our experience suggests we can deliver much of our vision of an alternative, circular economy and nature-positive approach to water recycling through innovation, culture change and base expenditure, but enhancement investment is needed to deliver the step change in performance that we want to deliver.

Our strategy builds on our DWMP, applies the lessons we are learning from our intensive Pollution Incident Reduction Plan (PIRP)<sup>14</sup> and reflects our ambitions for technological transformation and delivery through partnership. It takes a twin track approach:

- Making the best use of our existing resources by managing demands on our existing networks and Water Recycling Centres (WRC).
- Targeted investments to deliver additional capacity where needed.

**Table 24 How the drainage and water recycling sub-strategy contributes to the delivery of our ambition**

	Drainage and water recycling
Mitigating the impacts of long-term challenges on our services	Mitigating the impacts of climate change, growth and urban creep on Water Recycling Centres and networks
New government and regulatory targets	Average storm overflow spills reduced to 10 per year
Ambition that goes 'above and beyond'	Pollutions, sewer flooding and storm over spills greatly reduced if not eliminated



<sup>14</sup> <https://www.anglianwater.co.uk/siteassets/household/about-us/our-strategies-and-plans/pollution-incident-reduction-plan-2023-2025-final-compressed.pdf>

### Core pathway

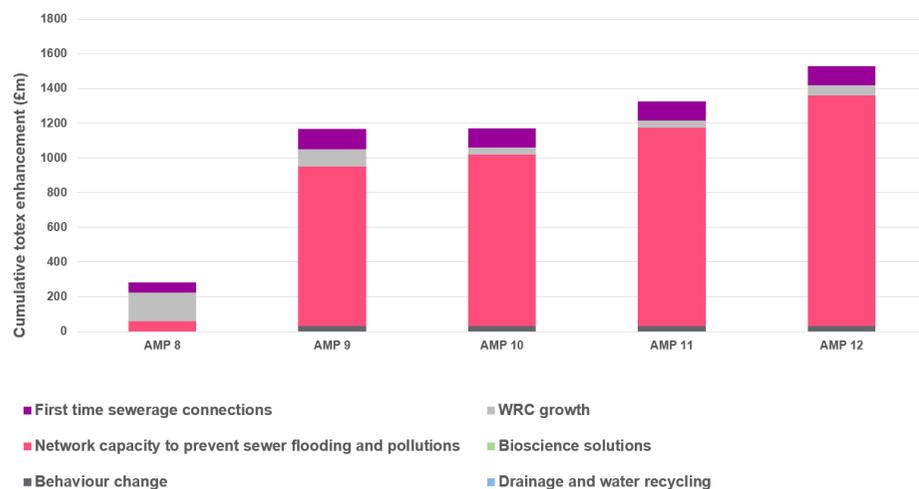
The key enhancement activities included in our core pathway are set out in the table below.

**Table 25 Key enhancement activities included in the core pathway (Drainage and Water Recycling sub-strategy)**

Key enhancement activities	AMP8 2025-30	AMP9 2030-35	AMP10 2035-40	AMP11 2040-45	AMP12 2045-50
Behaviour change	Continuation of behaviour change campaigns delivered through base	Step-change in behaviour change campaigns targeting causes of pollutions not related to hydraulic capacity.			
Bioscience solutions					Deployment of FOG removing enzymes
Network capacity to prevent sewer flooding and pollutions	Investment at over 25 catchments	Grey and green solutions to increase network capacity and remove surface water and smart network solutions to improve catchment management, using nature-based solutions where possible.			
WRC growth	67 WRCs identified at risk	Measures to maintain 100% WRC compliance, including upstream flow management, investigations, permit changes, process optimisation and capital schemes to increase capacity.			
First time sewerage connections	17 schemes promoted in PR24	First time sewerage connection schemes including new foul sewers, pumping stations, rising mains, public lateral drains and treatment plants. Increase use of nature-based solutions as technology improves efficiency and reliability.			
Storm overflows reduction plan	Highest priority overflows targeted first	All storm overflow schemes to be nature-based by preference from AMP9.			

The expected investment requirements associated with our core pathway are set out in the figure below.

Figure 21 Sub-strategy core pathway (Drainage and wastewater)



### Making the best use of our existing resources by managing demands on existing infrastructure

In the development of our strategy, we have prioritised activities designed to manage demand on our existing sewerage networks and Water Recycling Centres (WRCs). This includes:

- Nature-based solutions designed to prevent surface water entering our network, delivered in partnership
- Use of emerging digital technology to manage existing capacity more effectively
- Behaviour change campaigns to reduce Fats Oils and Grease (FOG) and unflushables from entering our network, and minimise third party interference in our sewers
- Bioscience solutions to remove FOG from our network.

### Nature-based solutions delivered in partnership:

Nature-based solutions give an opportunity to provide wider benefits for the environment and local people than more traditional ‘grey’ solutions. In rural catchments, treatment wetlands can provide habitat and biodiversity, and in urban catchments, SuDs can deliver amenity, biodiversity and improved water quality as well as reducing the risk of flooding.

#### Green and grey solutions

Grey solutions are more traditional solutions such as storage tanks, pumps and pipework, which are often thought of as ‘hard’ engineering options. They offer tried and tested interventions to provide flow and treatment capacity within our networks and WRCs. Currently, they tend to have lower up-front costs than green solutions and can usually be delivered by us in isolation. Grey solutions can offer flexibility through modular and scalable design.

Green (or nature-based) solutions such as wetlands and Sustainable Drainage Systems mimic nature to provide more sustainable ways to convey, store and treat surface water and used water. They can offer a wider range of benefits than traditional grey solutions, particularly in terms of social and natural capital and are well-suited for partnership delivery.

Our work on future technologies with Cambridge Consulting highlighted that, in the next 25 years, technological advances will make nature-based solutions increasingly cost effective, reliable, and maintainable. As a result, we expect we will be able to greatly increase the number of green solutions delivered without impacting on affordability.

Drainage is a shared problem and requires a shared solution. Surface water from developments, highways and agricultural land can enter our sewer networks and overwhelm their capacity. We believe that there is great potential for partnership approaches to remove this surface water from our sewer networks reducing the risk of hydraulic overload. Over AMP7, we have led the development of partnership approaches to flooding and surface water removal. As an example, properties in West Deeping have suffered recurrent issues with flooding following periods of heavy rain. Investigative work revealed that there were a number of sources of surface water connected to the foul sewer network, including 27 properties with surface water roof connections, ingress of surface water through manhole lids and chambers partially due to a blocked third-party surface water sewer. Work to restore full capacity of the surface water system and to redirect property surface

water into the surface water system was completed in partnership with Lincolnshire County Council Highways at the end of 2021. Pumping station run times show a significant improvement since this time.

Over AMP8 we plan to build on these successes. Our Advanced-WINEP proposal is designed to drive a step-change in partnership working and delivery of nature-based solutions. It includes a specific proposal to reduce the impact of storm overflows and reduce flood risk across Great Yarmouth and Southend, by retrofitting green infrastructure via partnership funded approaches. In addition, it includes work with the Norfolk Water Fund and the Rivers Trust to map opportunities for nature-based solutions such as wetlands, SUDS and habitat restoration.

We expect that A-WINEP will establish a new way of working that will be rolled out regionally from AMP9 onwards. This new approach will be further enhanced by open data arrangements that support the development of digital twins of the natural environment.

#### **Digital technology:**

We expect that emerging digital technologies will enable a step-change in the efficiency of network management, greatly reducing potential infrastructure requirements in the long-term. Advanced monitoring and forecasting and intelligent sewer technology will reduce costs by improving our understanding of risk and our ability to predict and manage surface water within existing networks, as well as offering increasing confidence around targeted prioritisation of investment. Fully integrated digital twins of our WRCs, drainage network and the natural environment will provide real-time insights into how our systems operate and interact with the environment, enabling efficiencies through improved understanding of risk, greater control and management, and just-in-time solutions.

In AMPs 8 and 9 we are planning a step-change in investment to deliver these capabilities so that they are fully deployed across our business by 2035.

#### **Behaviour change campaigns:**

Blockages on our waste sewer network are the primary cause of pollution incidents. Our Pollution Incident Reduction Plan (PIRP) root cause analysis that showed blockages caused 41% of incidents in 2022 and we believe this is a typical pattern. Our PIRP also showed that nearly half of blockages are caused by 'unflushables' such as wipes, sanitary items and fats, oil and grease (FOG). We already undertake behavioural change campaigns to reduce FOG and unflushables entering our system. We will continue to undertake these campaigns over AMP8, however they are not included in our core pathway as they are funded from base expenditure.

From AMP9 onwards we anticipate a step-change in behavioural change campaigns will be required to deliver our ambition on pollutions, sewer flooding and storm overflow spills. Our core pathway provides an indication of the required enhancement spend, and we will develop more detailed proposals in time for PR29.

#### **Bioscience solutions:**

Our work on future technologies with Cambridge Consulting highlighted bioscience solutions for water recycling as one of the key technologies that could have a significant impact if the future. This included the use of enzymes (such as lipase) to remove Fats, Oils and Grease (FOG) from our network.

Although we have trialled the application of FOG removing enzymes we found that their use is currently impractical due to their solid form, difficult storage requirements and short lifetime. It is possible that, over the next 25 years these barriers can be overcome, facilitating their deployment. In our final Technology scenario we assume they can be readily deployed in 2045, and our core pathway includes an indication of the required enhancement spend from 2045 onwards.

#### **Targeted investments to deliver additional capacity where needed:**

Solutions designed to manage demands on existing infrastructure will make an important contribution to our ambition. The scale of the challenge, however, is such that we expect that significant investment in additional capacity will be required.

In order to deliver our ambition we recognise that we need to completely transform the way we think about, and approach, water recycling. As detailed earlier this includes developing low-carbon solutions that also deliver a net positive benefit to the natural environment. As a result, we have prioritised 'green' over 'grey' solutions where possible (noting that in some locations it is not possible to deliver a green solution).

Our scenario testing, however, demonstrates that there is value in delaying investment in potentially higher-regret and higher-carbon infrastructure solutions while we deploy emerging digital technologies, develop our partnership approach (through our Advanced-WINEP proposal gather more evidence on the effectiveness of nature-based solutions) and increase our understanding of long-term climate change impacts. We have a large programme of SuDS in AMP8, and we will use that experience to inform future widespread roll-out of green solutions. As noted above, we are taking steps to proactively embed these approaches over AMP8. We have therefore reduced investment in AMP8 to create additional capacity compared with our DWMP (which assumes a relatively flat investment profile over the 25 year period).

Over AMP8 we will also take steps to improve our understanding of long-term climate change impacts on our water recycling operations. The new DWMP requirement is an important step forward for the water industry, and we will continue to build on this work, developing our technical capability in AMP8 to refine our understanding of future risks. A key area of focus is to improve where there is currently a limited understanding of how extreme heat will affect our treatment processes. We are participating in an Ofwat innovation project that aims to understand the impacts of extreme heat on treatment processes. The outcome of this work will inform future iterations of the DWMP and LTDS.

Figure 22 Water recycling centre



### Alternative pathways

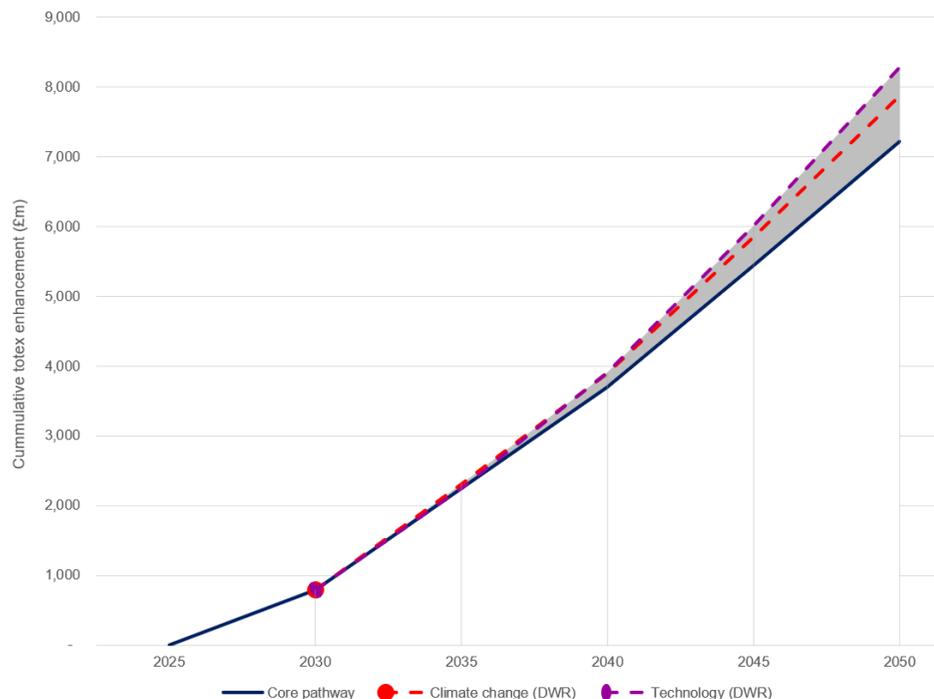
Of the twelve scenarios tested, our core pathway for Drainage and Water Recycling delivers our ambition in ten. We have developed two alternative pathways, designed to meet requirements in the Adverse Climate Change and Slower Technology scenarios.

Table 26 Additional key enhancement activities in the alternative pathways (Drainage and Water Recycling sub-strategy)

Alternative pathway	Key enhancement activities (in addition to the core pathway)
Adverse Climate Change	Higher climate change drives more higher intensity rainfall events. Additional investment in network capacity required to prevent flooding and pollutions. Assumes green solutions are developed where possible.
Slower Technology	Technology required to optimise network headroom is not available or fully implemented across the company until 2045 (compared with 2035 in the core pathway). Additional investment in network and WRC capacity required to maintain compliance and prevent flooding, overflows and pollutions. A higher proportion of solutions are grey reflecting slower development of nature-based solutions.

The investment required in addition to the core pathway is set out in the figure and table below. It is based on forecast requirements, because at this stage we have not identified specific schemes. Information regarding trigger points can be found in Strategy: Alternative pathways.

Figure 23 Core and alternative pathways (drainage and water recycling sub-strategy)



### Differences between our LTDS Drainage and Water Recycling Strategy and our DWMP

Our Drainage and Water Recycling sub-strategy is informed by our DWMP<sup>15</sup>, which sets out a best value, flexible plan to manage future risk. Our DWMP was informed by an extensive programme of stakeholder engagement (as described in Chapter 4 of the final DWMP Technical Report).

Our strategy differs with our final DWMP in several respects.

**Ambition:** Our final DWMP seeks to mitigate the impacts of growth, climate change and urban creep where it is assessed as cost beneficial to do so. Our customers, however, have been clear that we need to take preventative action to address future challenges, and that we must do more to protect and enhance the environment (more details can be found in Rationale: Informed by customers and stakeholders). As a result, our long-term ambition for 2050 is to protect services into the future and to greatly reduce (and ideally eliminate) storm overflow spills, pollution incidents and sewer flooding. This ambition is reflected in our Drainage and Water Recycling sub-strategy, detailed above.

**Technology:** The LTDS, and the common reference scenarios have given us the opportunity to consider a wider range of options than we were able to include in the DWMP. Our work on technology has identified additional solutions that were not considered in our final DWMP. This includes advances in green and nature-based solutions and the development of digital twins, smart networks, sites and catchments. These solutions have been incorporated into our core pathway.

**Investment profile:** Our DWMP assumes a relatively flat investment profile over the 25 years. However, in our LTDS we have adjusted the profile, reducing the investment required in AMP8, then scaling up the investment requirement from AMP9 onwards.

**Ofwat’s Common Reference Scenarios:** We have developed our strategy using Ofwat’s Common Reference Scenarios. In contrast, our final DWMP used an alternative growth scenario (ONS+) and was not tested using our final Technology scenario.

**Additional enhancement:** Our Drainage and Water Recycling sub-strategy incorporates elements of enhancement spend not covered by our final DWMP. This includes first time sewerage applications and odour.

15 Our final DWMP can be found at: <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-wastewater-management-plan/final-plan/>

### 3.4.6 Bioresources

Our Bioresources sub-strategy sets out the enhancement required to mitigate the impacts of long-term challenges on bioresources and respond to changes in existing legislation. It sets out how we will maximise the beneficial outcomes that can be supported by effective management of bioresources using the principles of circular economy, by managing nutrient content whilst working within the framework of our regulators. Our strategy aligns with our vision for a resilient asset base and operation by promoting innovation in how bioresources are managed to deliver adaptive, best value solutions.

National landbank modelling shows there is a risk of insufficient agricultural landbank for around 2.5 million tonnes of biosolids per year. We anticipate this change may materialise within AMP8 prompted by a Defra review of the Farming Rules for Water (FRfW) regulations and a second review of the statutory guidance issued in relation to the regulation's enforcement (Grievs Strategic, 2022). Should this risk materialise, the only viable technology currently available for the management of bioresources is incineration. We would need to start investing in this technology from AMP8 as we estimate the lead time is 6-10 years to allow for design, planning and construction.

Adoption of incineration as the primary means of bioresources management has several significant disadvantages and as such, we do not consider it to be a best value solution:

- It would result in foregoing the significant natural capital benefits, through recycling of nutrients, that bioresources recycling to agriculture provides to national food security.
- It would jeopardise our net zero strategy.
- It would lock us in to a low value, high regret solution into the long term.

In the face of this significant and sector-wide issue, we have worked closely with our regulators and other WaSCs to develop a long-term strategy that invests in research and innovation in the near-term to reduce, as far as is possible, the need to deploy incineration as a bioresources management technology.

Our strategy addresses the significant uncertainties in the external factors that influence bioresources management in England and presents a core pathway of investments which are resilient to most of the plausible future scenarios we have identified. We have also developed a number of alternative pathways to address specific, more extreme future scenarios, should clearly defined decision and trigger points be reached.

**Table 27 How the bioresources sub-strategy contributes to the delivery of our ambition**

	Bioresources
Mitigating the impacts of long-term challenges on our services	Mitigating the impacts of climate change and growth on bioresources
New government and regulatory targets	Changes in interpretation in existing legislation (most notably Farming Rules for Water)
Ambition that goes 'above and beyond'	

#### Core pathway

The key enhancement activities included in our core pathway are set out in the table below.

**Table 28 Key enhancement activities included in the core pathway**

Key enhancement activities	AMP8 2025-30	AMP9 2030-35	AMP10 2035-40	AMP11 2040-45	AMP12 2045-2050
Bioresources	<p>Enhanced dewatering to minimise diffuse pollution risk from biosolids.</p> <p>Additional sludge treatment capacity to ensure we have no need to store raw sludge cake.</p> <p>Delivery of three gas to grid plants</p> <p>Phase 2 of the National Bioresources Strategy (CIWEM project)</p>	<p>Four new plants to produce bioresources products using new technology proven through the research project delivered over AMPs 9 and 10.</p>	<p>Four new plants to produce bioresources products using new technology proven through the research project delivered over AMPs 9 and 10.</p> <p>Additional treatment capacity at existing sites to mitigate growth and climate change impacts.</p>	<p>One new plant to produce bioresources products using new technology proven through the research project delivered over AMPs 9 and 10.</p>	<p>Additional treatment capacity at existing sites to mitigate growth and climate change impacts.</p>

In AMP8, we will invest £10 million alongside the other WaSCs in England and Wales to generate a £100 million research fund to explore the potential for emerging technologies to mitigate the national landbank availability risk. We consider this a low-regret investment as it will provide further evidence to potentially avoid the need to commit to and invest in incineration.

Through Phase 2 of the National Bioresources Strategy (CIWEM project), we will explore the potential for emerging technologies to optimise the management of nutrients through management of bioresources. It will focus on:

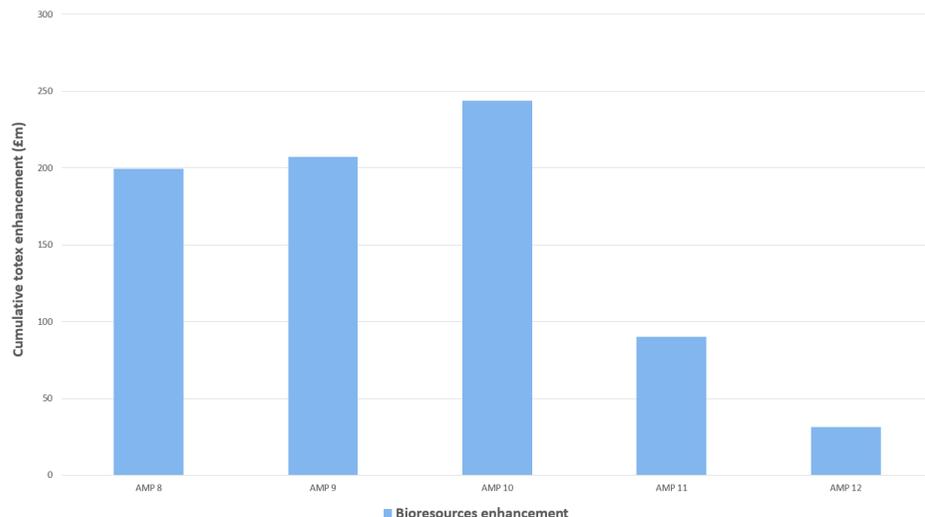
- Identifying an alternative to incineration. This could be new technology pathways to full commercialisation of Advanced Thermal Conversion (Gasification, Pyrolysis for example) to provide a robust alternative to recycling to agriculture.
- Developing new revenue opportunities, such as upgrading bio-gas to biomethane fuel for grid injection or use as a transport fuel, and resource recovery including phosphate and nitrogen.
- Reducing greenhouse-gas emissions from bioresources management.
- Research to better understand potential risks and impacts of PFAS and micro-plastics and other forever chemicals as a result of biosolids application to farmland. This needs to be balanced against the risks associated with the alternatives, e.g. emissions to air via thermal conversion technologies.
- Research into enhanced product streams from bioresources (for example products that can alter/control the nutrient content that could open up more landbank or a wider variety of outlets such as sustainable fuel sources).

The Resilient Bioresources research project will complete by mid-AMP8 and inform a decision point on our strategy. Other enhancement investments we will make in AMP8 include:

- Implementing enhanced dewatering to minimise diffuse pollution risk from biosolids. We will implement enhanced dewatering at three STCs to increase dry solids to >35%, with optimisation of dewatering plant at the other STCs to ensure we meet >25% at all times. Our programme of work on enhanced dewatering is industry leading.
- Investing in additional sludge treatment capacity to ensure we have no need to store raw sludge cake.
- Understanding how markets can support bioresources management and applying the use of markets where appropriate.

Our Core Pathway involves application of a new technology to manage bioresources, proven through the Resilient Bioresources research project. The costs of this technology will be assessed through the research project however it is currently assumed these will be comparable to incineration. An estimate of approximately £400 million has been allocated to AMP9 and AMP10 to deploy this new technology. A further investment of £90 million in the new technology is forecasted for AMP11 to manage additional wastewater sludge arising from growth and quality enhancements from 2030. Our core Pathway also includes investment in additional STC capacity to address growth.

Figure 24 Sub-strategy core pathway (Bioresources)



### Alternative pathways

The core pathway delivers our bioresources ambition under the following future scenarios:

- Benign Climate Change CRS.
- Benign Demand CRS (we see the potential for some change in expenditure to address growth in the longer-term but do not consider it to be significant at this stage).
- Benign Technology scenarios.
- Benign and Adverse Abstraction Reductions CRS.
- Benign and Adverse Water for Energy wider scenario.

Alternative pathways are required under other scenarios of the future.

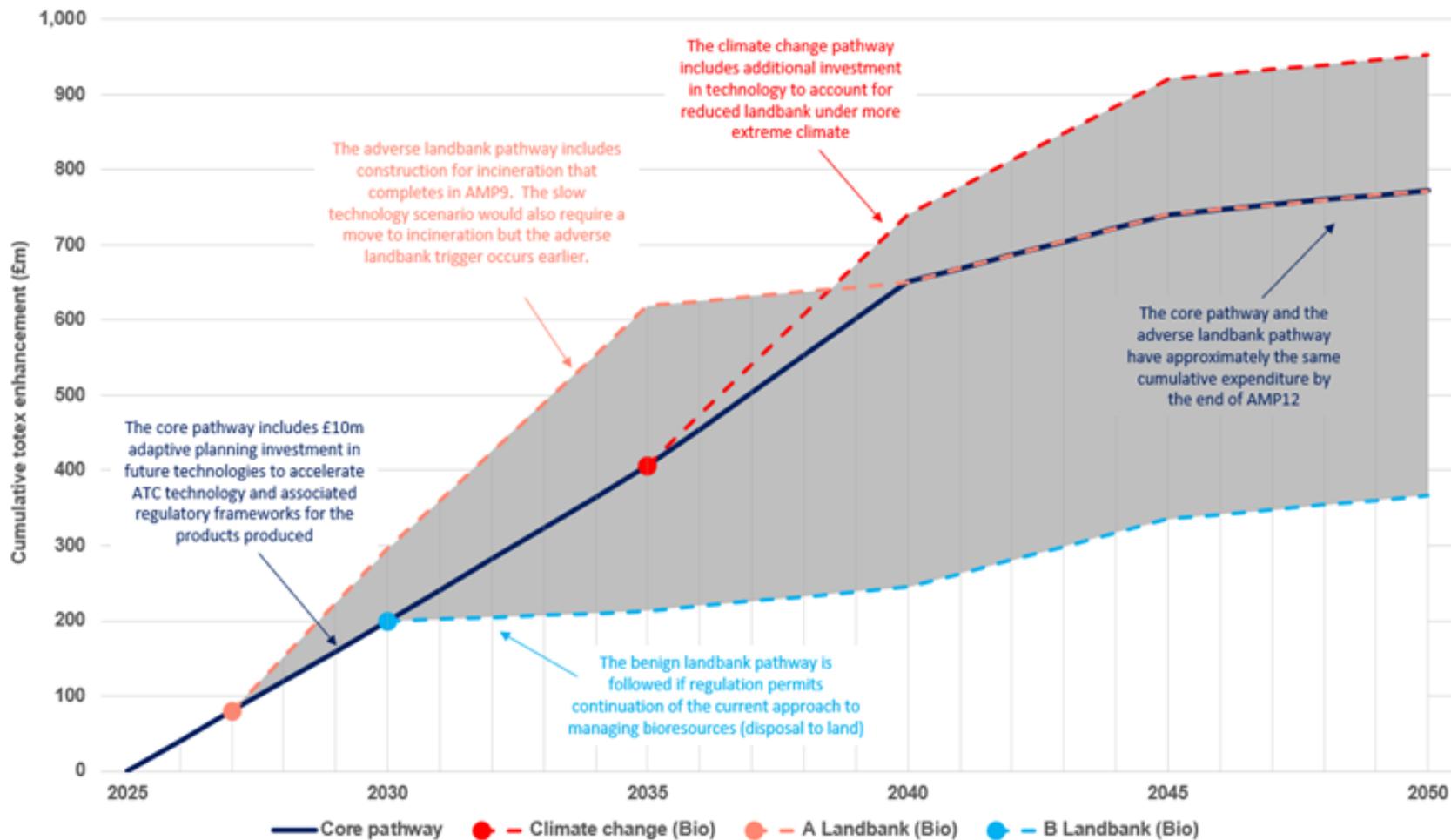
Table 29 Additional key enhancement activities in the alternative pathways (Bioresources sub-strategy)

Alternative Pathway	Key enhancement activities (in addition to the core pathway)
Adverse climate change (Bio)	Reduced landbank availability as a result of climate change. Additional investment in new plants in both AMP11 and AMP12.
Adverse landbank availability (Bio)	Investment in incinerators instead of preferred technology. Four incinerators delivered in AMPs 9 and 10 and one in AMP11.
Benign landbank availability (Bio)	Reduced need due to favourable interpretation of Farming Rules for Water. Investment to deliver a single new plant using new technology proven through the research project in AMP11.

The investment required under our alternative pathways in addition to the core pathway is set out in the figure and table below. Information regarding decision and trigger points can be found in Strategy: Alternative pathways.

Our benign Landbank Scenario assumes that the landbank availability risk does not materialise and the existing approach to managing bioresources is broadly continued. We believe this scenario is highly unlikely, as it would require a revision to the Environment Agency’s interpretation of Farming Rules for Water. However, we have developed an alternative pathway to demonstrate to our external stakeholders the consequences of regulatory decisions on our strategy and investment plans.

Figure 25 Core and alternative pathways (Bioresources sub-strategy)



Though the specific wording of Ofwat’s CRS for technology does not include factors related to bioresources management, the development of technology and its associated trends have important influences on our long-term strategy. We have considered these by testing our final Technology scenario. This testing process found that:

- Improved condition-based maintenance in 2030 would mean better optimisation of maintenance to improve uptime - make better use of existing capacity.
- We already use basic digital twins through our production and tactical system models and transport logistics models however the addition of live data (assumed in 2027 in our wider scenario) would provide further benefits.
- Extending digital twins to incorporate natural assets (assumed from 2027) has the potential to improve the representation and management of available landbank. The potential for a national bioresources system twin with landbank included has already been discussed with Ofwat and we continue to promote it.
- Wastewater treatment innovation has the potential to impact on the quantity and quality of sludges produced in treatment that are treated and recycled by bioresources. This could have both positive and negative impacts across the price control in the longer term but in near to medium term we consider them unlikely to be significant.

The most significant factors that result in a change to the core pathway are monitored through changes to agricultural land bank availability. We continually monitor access to available land bank for the recycling of our biosolids products through a number of metrics. These include but are not limited too:

- Farmer satisfaction.
- Price point of products.
- Input costs to farmers of conventional and other fertiliser/soil conditioner products.
- Distance travelled from production to application site (work done to access land).

Recognising these could generally be considered lag measures, we will also:

- Work with the wider water industry and relevant stakeholders to progress and refine national land bank scenario modelling at agreed points within the AMP period.
- Regularly review and update our own land bank modelling, to test the impact of regulatory changes and/or other scenarios, as statutory guidance and regulatory changes occur, or as other information becomes available.

We have assessed the landbank available and landbank required by Anglian Water, under the five scenarios included in the latest landbank modelling, as follows:

**Table 30 Landbank availability scenarios**

Scenario	Landbank available	Landbank required	Headroom %
1	866,000 Ha	204,200 Ha	76.4
2	712,000 Ha	415,100 Ha	41.7
3	635,000 Ha	505,800 Ha	20.3
4	597,000 Ha	2,142,400 Ha	N/A
5	399,000 Ha	3,863,100 Ha	N/A

We currently have access to a total of c.712,000 Ha of agricultural land in our operational area and have a requirement for a total of c.415,000 Ha (i.e. Scenario 2 above).

We assess under the core pathway that our land bank requirement will increase from 415,100 Ha to 505,800 Ha and that our available landbank will reduce from 712,000 Ha to 635,000 Ha by 2030. This represents a reduction in headroom from c41.7% to c.20.3% by 2030.

We have set a trigger for any decision to commence investment for Adverse Landbank (Bio) when we have declining headroom and assessed this to drop below 20%.

This same method will also be used to defer investment in the Benign Landbank (Bio) or the Adverse Climate Change (Bio) alternative pathway.

### 3.4.7 Net Zero

The UK Government has committed to the following targets for carbon emissions:

- To reduce UK territorial emissions by 78% between 1990 and 2035 (6th Carbon Budget)
- To reduce UK territorial emissions by 100% by 2050 (Climate change Act 2008)

We need to ensure that we play our part to support the delivery of these targets. But more than this, as the largest energy consumer and emitter in the East of England, we have a responsibility to reduce our ecological footprint. This is part of being a purposeful business. Our customers, particularly future customers, want us to take tangible action to reduce our carbon footprint<sup>16</sup>.

Our Net Zero sub-strategy sets out the material enhancement spend required to play our part to deliver against the UK's 6th Carbon Budget and Climate Change Act. Our wider ambition to deliver operational Net Zero by 2030, to reduce our waste and support other sectors to reduce their emissions (as set out in our vision for 2050), are delivered through base, efficient running and innovation across our value chain (including net zero and secondary enhancement spend in other strategies). This includes upgrading assets at the end of their life with more energy efficient equivalents and using digital capabilities to drive further efficiencies in our operations.

In the development of our strategy we have had regard to the government target to decarbonise the UK power system by 2035, and the substantive actions we are taking are consistent with it.

Our Net Zero sub-strategy builds upon our Net Zero strategy published in July 2021<sup>17</sup>.

The challenge of achieving net zero requires us and the wider industry to think and operate differently. Our journey to carbon neutrality to date has not only been inward looking. We have also supported the system-wide decarbonisation of our region through initiatives such as exporting 'waste' heat to greenhouses in our region, supporting changes to land management practices to ensure additional carbon sequestration and our recent research into the conversion of bioresources into sustainable fuel. Working collaboratively with wider stakeholders we will be seeking to utilise emerging and proven technologies across our business to help us tackle the challenges we face, and we will be investing in trials and pilots including with other organisations

The challenges and opportunities we face in achieving our net zero strategy remain broadly in line with those we identified when we developed our net zero 2030 strategy back in 2021 and highlights the need for our robust monitoring strategy to continue to ensure that we meet our ambitions whilst addressing these challenges and opportunities.

To ensure we invest at the right time and stay on a trajectory towards our ambition, we have developed an adaptive strategy comprising a core pathway of enhancement investments needed under most future scenarios, and alternative pathways of investment we may need to follow if certain future scenarios arise.

To reduce our greenhouse gas emissions and ultimately achieve net zero, our strategy is aligned to good practice hierarchy of decarbonisation, that is:

- Reducing/avoiding greenhouse gas (GHG) emissions.

- Using green electricity and investing in renewable energy systems.
- Removing any residual and difficult to avoid or remove emissions through natural sequestration measures within our operational site boundaries and land holdings and through assured offset credits. Our approach to offsetting will prioritise supporting offsetting schemes in our region, then in the UK and finally, only where not economically or technically possible within the UK, in the international offset credit markets.

Our adaptive core pathway in the short term (AMP8 and AMP9) for net zero builds on our ongoing corporate net zero strategy, and focuses on our low regret strategic interventions that reduce our operational emissions, primarily through:

- Management of our process emissions.
- Investment in lower carbon chemicals for our treatment processes.
- Investment in gas to grid schemes.
- The transition of our HGV fleet to low carbon emission alternatives.

**Table 31 How the net zero sub-strategy contributes to the delivery of our ambition**

	Net zero
Mitigating the impacts of long-term challenges on our services	
New government and regulatory targets	78% reduction in UK territorial emissions between 1990 and 2035 100% reduction of GHG emissions compared with 1990 levels by 2050 (Material enhancement investment required.)
Ambition that goes 'above and beyond'	Net Zero operational emissions by 2030 Delivered through base, efficient running and innovation across our value chain (including net zero and secondary enhancement spend in other strategies).

17 <https://www.anglianwater.co.uk/siteassets/household/environment/net-zero-2030-strategy-2021.pdf>

### Core pathway

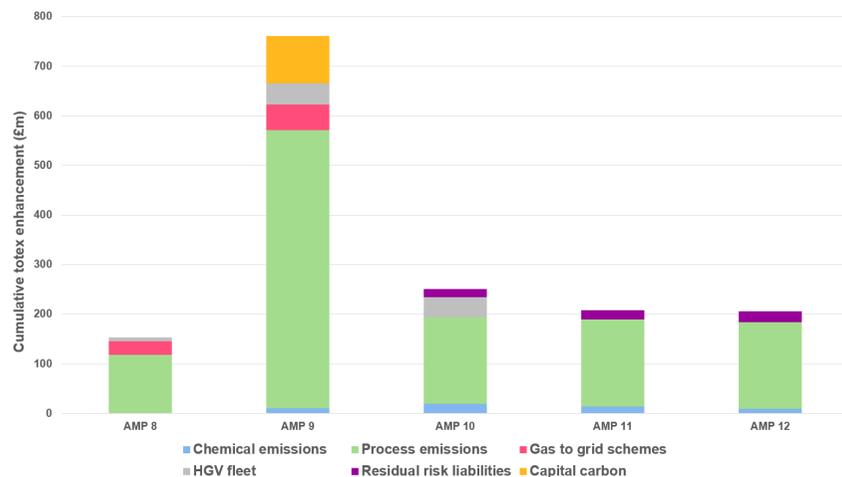
The key enhancement activities included in our core pathway are set out table 28 below.

**Table 32 Key enhancement activities includes in the core pathway (Net Zero)**

Key enhancement activities	AMP8 2025-30	AMP9 2030-35	AMP10 2035-40	AMP11 2040-45	AMP12 2045-50
Process emissions	Reduce process emissions at 17 of our largest Water Recycling Centres	Larger targeted reduction in process emissions informed by AMP8. Specific schemes yet to be identified.	Further reductions in process emissions. Specific schemes yet to be identified.		
Gas to grid	Three gas-to-grid projects	Further investment in gas-to-grid projects.	-	-	-
Switching HGV fleet to low carbon alternatives	Replacing 12 HGVs, 26 tractor units, four hook-lifts and four tippers with electric equivalents	Ongoing investment in HGV fleet as old fleet reaches the end of its asset life.			
Additional cost of low carbon chemicals	-	Additional costs of low carbon chemicals (assumed to reduce over time)			

The expected investment requirements associated with our core pathway are set out in the figure below.

Figure 26 Sub-strategy core pathway (Net zero)



Our chemical emissions strategic interventions are focused on the replacement of existing chemical stocks with modern, lower emission chemicals. In the near term these are assumed to be more costly than traditional chemicals whilst they become more commercially available.

Investments in a low emission HGV fleet will be a key element in delivering our net zero ambitions. As our current HGV fleet ages and is replaced over time we will need to make significant investments in new low carbon alternatives to ensure that we can continue to provide a reliable service. This will involve switching vehicles away from diesel to run on alternative fuels such as electricity. In the long term as technology commercialisation allows other fuels such as hydrogen may be employed.

Our gas to grid strategic interventions are focused on switching our biogas/combined heat and power (CHP) generation capacity to operate as biomethane plants where we will inject the biomethane product to the national gas grid.

Whilst these capital investments will make significant progress against our net zero target we recognise that they will not solve our net zero ambition alone which is why we also have investments in our core pathway associated with residual risk liabilities which close the remaining gap.

### Making best use of existing resource

To date we have made significant investment in delivering against our corporate net zero strategy through base expenditure. We continue to make investments in greenhouse gas emission reductions through investments that have primary drivers other than greenhouse gas emission reductions; for instance, with our commitment to support and maintain energy efficiency measures. There are key investments in other sub-strategies that will contribute to reducing our carbon emissions, for example:

- Upgrading Combined Heat and Power engines approaching their end of life, with newer technology gas to grid plants in AMPs 8 and 9. The Gas to Grid plants use new technology.

We continue to make sure that our investments allow us to be flexible to new or emerging needs and changes in situation, including development of technologies. For instance, our gas to grid investments, if necessary, may be re-engineered to provide the necessary gas for incineration purposes should an incineration pathway become necessary in our bio resources strategy.

### Alternative pathways

Of the twelve scenarios tested, our core pathway for Net Zero delivers our ambition in nine. We have developed three alternative pathways, designed to meet requirements in the Adverse Climate Change, Slower Technology and Adverse Landbank scenarios.

Table 33 Additional key enhancement activities in the alternative pathways (Bioresources sub-strategy)

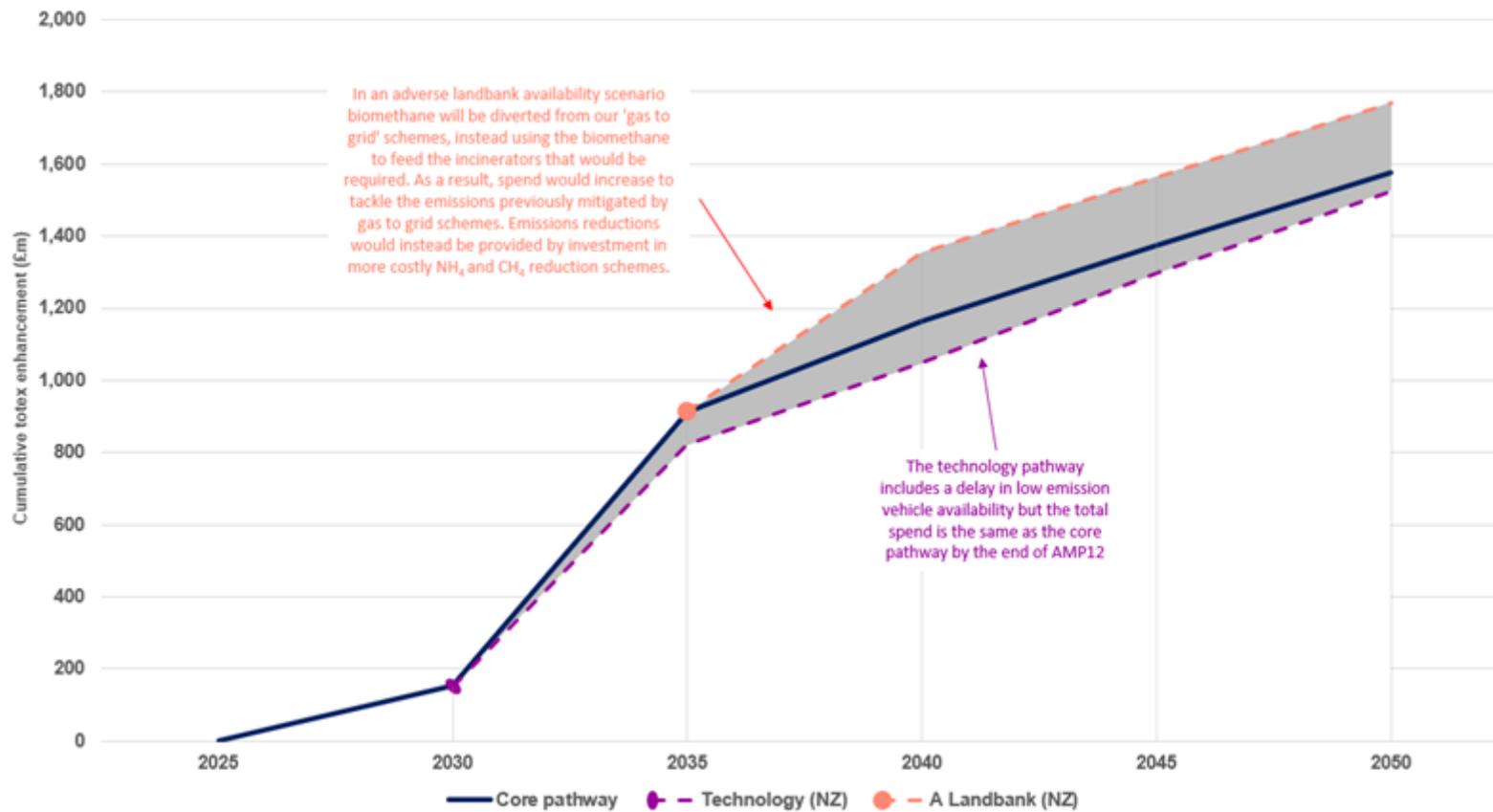
Alternative Pathway	Key enhancement activities (in addition to the core pathway)
Adverse climate change (NZ)	Climate change drives the volume and quality of water that we recycle as a result requiring an increased volume of lower emission chemicals
Slower Technology	Slower commercialisation of biogas or hydrogen low carbon HGVs would lead to slower realisation of our greenhouse gas reduction ambitions.

Alternative Pathway	Key enhancement activities (in addition to the core pathway)
Adverse landbank availability (Bio)	Investment in incineration in the Bioresources sub-strategy will divert the biomethane from being sent to the national grid, instead routing it to the incinerators for power. The reduction in gas to grid export would reduce CO2e emissions mitigation provided by this solution and would therefore increase AWS's CO2e emissions in AMPs10-12. Specifically, it would mean that the biomethane emissions from 4 large water recycling sites would need to be mitigated by other means (since AW has already invested in gas to grid at all other sites). This would equal 40,000tCO2e/annum.

The investment required under our alternative pathways in addition to the core pathway is set out in the figure below. Information regarding decision and trigger points can be found in Strategy: Alternative pathways.

Our core pathway for net zero water has been designed to cover as many possible futures as possible without including costs that may not be required except in certain very specific futures. To manage these more extreme possibilities we have created an alternative pathway that contains the investment we would need from 2030 if climate change increases the volume and quality of water that we treat, which in turn means we require a significantly greater volume of lower emission chemicals.

Figure 27 Core and alternative pathways (Net Zero sub-strategy)



## 4. Rationale

We are confident that our strategy represents the best possible approach to deliver our ambition in the short- and long-term because it:

- Is best value
- Takes steps to secure affordability and fairness over the long-term
- Reflects customer and stakeholder concerns
- Is robust to future uncertainty
- Is technically robust

### 4.1 Best value

Our strategy is designed to deliver our ambition as efficiently as possible, given future uncertainties. It is best value, by which we mean:

- We have first challenged ourselves to understand how base expenditure can support the delivery of our ambition (as set out in Foundations: Base).
- We have challenged ourselves to consider a wide range of solution types, including new approaches and emerging technologies
- We have considered factors other than cost, including opportunities for solutions to deliver wider value to society and the environment

Our core pathway is efficient, in that it consists of:

- Low and no regret investment.
- Activities required to keep future solutions open.
- Activities required to develop ‘new’ approaches that could deliver our ambition more efficiently or generate wider value to society and the environment.

In developing our strategy, we have built upon outputs from key strategic planning frameworks: our Water Resources Management Plan (WRMP), Drainage and Wastewater Management Plan (DWMP) and Water Industry National Environment Programme (WINEP). More details regarding option identification and appraisal within the context of these plans can be found in:

- Revised draft WRMP24 supporting technical documents, Demand Management Options Appraisal, Supply-side Option Development, and Decision Making<sup>18</sup>.
- Our DWMP Technical Report<sup>19</sup>.
- The WINEP Option Development Report (ODR) submitted to the Environment Agency as part of the WINEP progress.

<sup>18</sup> Available at: [www.anglianwater.co.uk/wrmp](http://www.anglianwater.co.uk/wrmp)

<sup>19</sup> Available at: <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-wastewater-management-plan/final-plan/>

<sup>20</sup> To inform strategy development, we do not believe it is necessary or even helpful to characterise solutions in high-levels of detail. This is in contrast to the information required to develop our Business Plan for the next 5 year period.

### 4.1.1 A wide range of solution types

A strategy cannot be considered ‘best value’ unless a wide range of potential solutions have been identified and given full consideration. We have done this through the development of a long list of potential solutions defined at a strategic level (for example a major programme of mains replacement or the development of smart network capabilities)<sup>20</sup>.

Initially, we drew upon the outputs of our WRMP, DWMP and WINEP, which have robust established processes in place for options identification. This includes developing a long list of unconstrained options using generic option types, learning from other companies and sectors, and outputs of innovation projects. For example, in the development of our WRMP24 we identified over 1,500 unconstrained supply-side options. These unconstrained lists were then refined with input from a broad range of external stakeholders to create shorter lists of feasible options that feed through into options appraisal processes. For example, in the development of WINEP option lists we worked closely with the Environment Agency and Natural England, and 48 organisations<sup>19</sup> were involved in the identification of DWMP options.

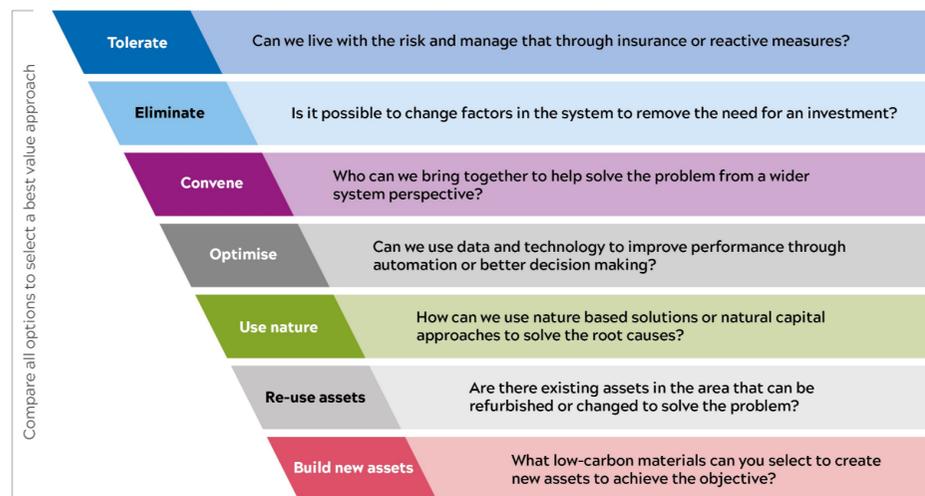
The Bid Assessment Framework is in place for water resources, that allows third parties to ‘bid in’ potential solutions. Through this framework we received two proposals, both of which were evaluated as part of the WRMP development process.

In addition to the Bid Assessment Framework for water resources we also have a similar process that covers activities in the Bioresources price control. The aim is to encourage third parties to come forward and ‘bid in’ potential solutions that support us in delivering against our long-term bioresources, net zero and circular economy ambitions for activities of logistics, sludge treatment and recycling across the bioresources value chain.

For short-term enhancement activities that lie outside of these frameworks, we have drawn upon outputs from our established business planning process. We are proud to have a high level of maturity in all questions relating to decision making, as demonstrated by Ofwat’s assessment of either ‘competent’ or ‘optimising’ in the 2021 the Asset Management Maturity Assessment (AMMA). This includes using a hierarchical approach to identify a wide range of potential solutions, as set out in the figure below.

Figure 28 Hierarchical approach to option identification

Once you've really understood the problem, could you...



We recognise, however, the solutions required in the longer-term may be very different to the solutions we understand today. To avoid thinking too narrowly or becoming trapped in preconceptions, we have applied four ‘themes’ to our ambition, innovation, digital, partnership working and place-based approaches which are detailed earlier. This helped us to identify wider solutions based on emerging approaches, or solutions that span across multiple strategic areas. In order to develop and refine these, we held several key workshops where colleagues from across our business, our alliances and the Connected Places Catapult worked collaboratively to identify potential solutions that should be taken forward for further consideration.

We commissioned Cambridge Consulting and Cap Gemini to help us to identify the range of technologies we should consider in developing of our strategy. This work identified nine key technologies that should be taken forward for in-depth review, together with 11 other technologies for a high-level analysis. As a result of this work, we are confident we have considered a full range of solution types, including the examples described below.

21 Where possible, our core pathway consists of defined solutions, such as the Fens and Lincolnshire reservoirs. In some instances, however, it has not been possible to define specific solutions and our pathway is based instead on projected spend. For example, we do not have long-term view of statutory environmental requirements up to 2050 as these are normally defined in the WINEP in advance of each price review. Over the last three AMP periods, however, the scale of investment required to meet WINEP obligations has expanded considerably. This reflects increasing environmental ambition nationally. We expect we will need to continue to make significant investment in environmental enhancement up to 2050, and consequently have forecast spend requirements based on expert judgement.

The full detail of our option long-list can be found in the LTDS Technical Annex.

## 4.1.2 Creating wider value

In line with our company purpose, we have developed a strategy that seeks to maximise the overall value generated to society and the environment, rather than focussing on cost in isolation.

We have applied best value decision making to our WRMP, DWMP, WINEP and AMP8 Business Plan, all of which use different forms of cost benefit analysis. They have also had regard to Ofwat's Public Value Principles. The frameworks to develop these plans, however, are not suitable for use in our LTDS as the best value decision-making frameworks require high levels of detail on solution costs and benefits. As noted above, in the LTDS we have defined solutions at a high level and have not sought to develop the high level of detail required to undertake this kind of best value assessment. In addition, the frameworks have been developed to fulfil different and sometimes conflicting guidance requirements, and so are not directly comparable.

Consequently, for our LTDS core planning we have developed a qualitative assessment that considers the expected impact of each solution against a set of best value planning criteria. This has provided a consistent framework to compare alternative solutions across the different sub-strategies. Our best value planning criteria were informed by our six capitals framework and the best value frameworks used in the WRMP, DWMP and WINEP (all of which were informed by customer insight). The assessment is based on expert judgement.

The full results of this assessment, together with the long list of solutions identified, can be found in the LTDS Technical Annex.

We have aimed to incorporate solutions assessed to be better value into our strategy where possible<sup>21</sup>. For example, our Water Resources sub-strategy first prioritises solutions that make best use of available resource including demand management. However, we have had to balance the opportunities to generate wider value against other relevant considerations, such as certainty of outcome, cost and long-term efficiency. In some instances, this has led us to adopt lower value options. For example, in our Bioresources sub-strategy we have included incineration in the Adverse Landbank alternative pathway (see Strategy: Bioresources). Although incineration has been assessed as comparatively low value, it is the only viable solution in this scenario.

### 4.1.3 An efficient pathway

Using the outputs of the strategic planning frameworks and our long list of potential solutions and qualitative best value assessment, we developed an initial sequence of solutions for each sub-strategy. This formed our 'emerging core pathway'. We then refined our emerging core pathway by testing it in the Ofwat Common Reference Scenarios (CRS) and our wider scenarios. We have set out low and no regret investment in our core pathway, and additional activities that would only be undertaken under certain circumstances into alternative pathways. Full details of our approach to scenario testing can be found in Rationale: A robust approach to developing core and alternative pathways.

We have also considered investment required to keep future options open. This includes enabling work, but we have also thought more broadly to understand the steps we need to take now to develop 'new' solutions and approaches. As described above, we have also challenged ourselves to think rigorously about what will be possible in the future.

## 4.2 Affordable and fair

We have sought to manage affordability over both the short and long term to balance the needs of current and future generations. Where possible, we have phased investment over the 25 year period to manage affordability.

### 4.2.1 Affordability in the short-term

Over the short-term, we have taken steps to secure the affordability of our plans through two routes. Firstly by seeking to minimise the cost of our plans and secondly by expanding our industry-leading support to vulnerable customers and those who struggle to pay their water bills. Our PR24 Plan (Chapter 3, Customer bills and affordability) sets out our approach but an overview is given here.

To minimise bill increases, we have worked with regulators, stakeholders and our Board to balance the demands for AMP8 alongside customer priorities and affordability. We have sought to minimise the investment required in AMP8. We have thoroughly reviewed our investment proposals to ensure that customers have not previously funded the investment and that we have taken account of what should be delivered from base allowances. 87 percent of our planned enhancement projects are those required to meet statutory objectives.

Nevertheless, the scale of investment required means that the average household bill will increase by 21 a day from 1.36 a day. We have taken a series of measures to manage the impact of this rise. Our affordability strategy and the support provided directly from shareholders means we will be able to provide direct financial support to 280,000 householders predicted to be at risk of water poverty in the period to 2030 as well as increasing the scope of our budgeting support to many more customers through increased flexibility to manage their accounts via self-service to the billing and payment options available.

We have an industry leading track record of supporting people who struggle to pay their water bill and are at the forefront in using data to identify customers facing difficulty. The targeted help we provide has encouraged further strong support from customers for a doubling of the cross subsidy to support customers through our social tariff in AMP8. Our owners will fund a new Medical Needs Discount for eligible customers, without any bill increase for other customers. Our ambition is to deliver a revolutionary change to the control and flexibility customers have in managing and understanding their usage; not just industry leading but as a pathfinder for all utilities. Combined with a holistic approach to the support developed from our extensive partnership with other support agencies, we are confident that despite increasing average bills, our strategy means our plan should see significantly improvement in overall affordability and see fewer customers struggling to pay their bills as we move forwards.

Finally, we have included customer protection mechanism. Please refer to Chapter 8: Our commitment to our customers in our PR24 Plan.

### 4.2.2 Affordability in the long-term

#### Balancing ambition with affordability

Recognising customer concerns over cost, the majority of investment in our core pathway is designed to maintain services (ensuring we can continue to meet our licence obligations in the future) and deliver new targets set by government and our regulators. We are aiming to go beyond statutory requirements in a small number of targeted areas that reflect key customer concerns (more details can be found in Informed by customers and stakeholders section). These include:

Our ambition for the environment:

- Greatly reducing the number of storm overflow spills, pollution and sewer flooding incidents
- Meeting our Public Interest commitment to ensure all customers have access to lead-free drinking water by 2050
- Meeting our Public Interest Commitment to achieve net zero operational emissions by 2030

Although we are planning to go 'above and beyond' in these targeted areas, we have considered how we do so in a manner that minimises cost for customers. This includes thinking about the performance improvements that can be delivered through base before defining enhancement requirements.

Our ambition for the environment in particular seeks to go beyond the legal minimum. We aim to secure the long-term sustainability of our business by actively enhancing the environment, so that it is in a better state in 2050 than it is today. We will achieve this primarily through the development of a systems-focused, outcomes based approach to environmental enhancement, that seeks to deliver greater value for society and the environment for every pound spent. This means that the quantum of spend on the environment will not increase, but our investment will go further. Please refer to environmental enhancement sub-strategy for more details.

Related to our environmental ambition, we aim to greatly reduce the number of pollution incidents, sewer flooding and storm overflow spills by 2050, whilst aspiring to eliminate them completely. Pollutions and storm overflows are key concerns of our customers and priority areas for investment. This will require an increase in enhancement spend, however, much of the improvement on pollutions will be delivered through base funding, particularly in the short-term.

The investment required to deliver net zero operational emissions is largely made up from base funding and through the efficient running of our business. Although there is a sizable amount of enhancement within our net zero sub-strategy, this is material enhancement required to support the target set out in the UK's 6th Carbon Budget to reduce investment in national emissions by 2035.

In other areas we have balanced our ambition, most notably leakage. The National Infrastructure Commission (NIC) has set a target to reduce national leakage levels by 50% by 2050, based on the 2017/18 baseline for England and Wales. We believe that reducing leakage is the right thing to do and so we have invested significantly to achieve this over the last 20 years. We now lose approximately 25% less water through leaks than we did in 1998, despite connecting over 500,000 new properties. Although we have explored the potential to make a further 50% reduction, our analysis shows this would be extremely expensive, costing over £20 billion in total. We do not believe these excessive costs would be supported by our customers, who want to see a cost-effective balance of ambition and cost.

Instead, we aim to deliver a 38% reduction by 2050 (from our 2017/18 baseline). Given the work we have done already in this area, we believe 38% is an ambitious target that strikes the right balance between cost and ambition.

### **An efficient core-pathway**

As described in the Best Value section, we have sought to ensure our core pathway is as efficient as possible. We have done this by:

- Challenging ourselves to consider a wide range of solution types, including new approaches and emerging technologies
- Considering factors other than cost, including opportunities for solutions to deliver wider value to society and the environment
- Developing an efficient core pathway consisting of:
  - Low and no regret investment.
  - Activities required to keep future solutions open.
  - Activities required to develop 'new' approaches that could deliver our ambition more efficiently or generate wider value to society and the environment.

Our PR24 business plan chapter 7 'Driving cost efficiency' explains how we have ensured our AMP8 investments are cost efficient, through our 'double lock', which consists of:

1. Bottom-up benchmarking of costs by building market rates and scheme outturn costs into the individual component cost build-up of enhancement investments.
2. Top-down external benchmarking of costs to cross-check the bottom-up build up of cost against the external environment.

Both stages of our cost efficiency 'double-lock' have been subject to assurance by third-parties. Where external benchmarks differ from the bottom-up costs, we have sought to understand the underlying driver of this difference and either a) reduce the unit costs of our plan to align with the external benchmark, or b) set out why our unit costs reasonably differ from the benchmarks (e.g. due to factors outside of management control).

The impact of this approach has been to remove £485 million of cost from our plan. This is a highly stretching cost challenge, going well beyond the unit rate we have previously delivered and will require new approaches to delivery in AMP8.

Looking beyond AMP8, in a small number of cases, we have delayed investment to ensure we are able to take full advantage of future technological developments. This includes investment in water recycling network capacity and eliminating lead-risk.

In the Drainage and Water Recycling sub-strategy we have delaying investment in potentially higher-regret and higher-carbon infrastructure solutions while we deploy emerging digital technologies, develop our partnership approach (through our Advanced-WINEP proposal) and increase our understanding of long-term climate change impacts. We have a large programme of SuDS in AMP8, and we will use that experience to inform future widespread roll-out of green solutions. We are taking steps to proactively embed these approaches over AMP8.

We have made a Public Interest commitment to ensure all customers have access to lead-free drinking water by 2050. Currently, the only way to effectively tackle lead risk is to remove and replace lead pipes, including customers' internal plumbing. This is a high-cost, high-carbon solution that is very disruptive for customers. Our strategy is therefore to take a risk-based approach to managing lead risk in the short-term, delaying significant investment until AMP10. This will enable us to take full advantage of technological advances that may happen in the short-term, as well as helping to smooth the profile of our core pathway.

### **Supporting the most vulnerable**

As noted above, we have set out an ambitious programme of support for customers struggling to pay in AMP8. As a result of this additional support, we expect to be able to support nearly all customers experiencing water poverty. We have committed to maintain this level of support into future AMPs so that, as far as possible, water poverty is eliminated from our region.

### **Fairness**

In the development of our LTDS, we have had to make decisions about the optimum timing of investment. There are many complex issues bound up in these decisions relating to the balance of costs and risks across generations.

In many areas our strategy is designed to invest proactively in future challenges, whilst managing affordability concerns. This includes:

- Our Water Resources sub-strategy, that is designed to mitigate the impacts of growth, climate change and sustainable abstraction on water supplies
- Investment in climate vulnerable mains and sewers (in our Resilience sub-strategy), that is designed to prepare for climate change impacts and avoid a future deterioration in service
- Our Drainage and Water Recycling sub-strategy, that is designed to mitigate the impacts of climate change and growth on our water recycling network

### 4.2.3 Long-term impact on customer bills

As explained further in our business plan the AMP8 the average household combined bill will increase by 15.5 percent. This means that the average household bill in 2029/2030 will be £1.57 a day, only a 21p increase from bills in 2024/25.

Since privatisation, our bills have risen little more than 10 percent (excluding inflation), against an industry average increase of 40 percent. Where we have needed to increase charges, we have matched this with a strong package of support for vulnerable customers. Last year, in response to the cost-of-living crisis, we supported more than 334,000 customers with discounts, temporary payment plans, debt support schemes, payment breaks and hardship funds. By 2030 we will have the capacity to support all customers at risk of water poverty, a commitment we want to continue into the long term. In addition to our social tariff our owners will fund a new Medical Needs Discount for eligible customers to provide direct support to households with specific medical needs which may pit them at risk of water poverty.

The bill impacts for 2025-30 are based on the PR24 business plan, with longer-term bill changes based on the forecast impact of enhancement expenditure, using PR24 assumptions on areas such as return allowances as set out in appendix 2 of the LTDS guidance.

The bill impact calculation is, as noted in the guidance, subject to limitations, such as uncertainty in predicting asset utilisation over long-term frames, potential uncertainty in delivery costs and forecasting population change. The impacts represent only part of the wider factors which determine the household bill, as other contributions to the bill may also go up or down over time. The results are not therefore definitive prediction of cost per household. They do however show an indicative relative difference between plans and pathways for planning, customer engagement and decision-making purposes. All costs are presented as 2022/23 price base, and do not include the effects of future inflation.

The calculator shows us that bills will need to increase over time to fund long-term enhancement requirements leading to the forecast household bill in 2049/50 of an extra 77p a day.

**Table 34 Indicative long-term bill impacts**

	AMP8	AMP9	AMP10	AMP11	AMP12
	2029/30	2034/35	2039/40	2044/45	2045/50
Average household bill (£ annual)	571	701	898	1131	1411
AMP change		22.8%	28.0%	26.0%	24.8%
Increase on daily household bill	21p	33p	54p	64p	77p

In the multi-generational focus groups, customers welcomed our LTDS, although all generations wanted to see faster delivery of at least some areas. The presented impact on bills was acceptable to the majority across the generations. Despite the current cost of living crisis, the majority across the different generations would rather see bill increases sooner, driven largely by a sense of intergenerational fairness and the need to address investment areas promptly<sup>23</sup>.

Ofwat's final guidance states that we should provide evidence that customers consider the forecast bill impacts to be acceptable. We have thought carefully about how to discuss long-term forecast bill impacts in a meaningful way. Our qualitative research shows that customers are unsure of what the future holds for them, and this makes it difficult to comment on the acceptability of bills in AMP8, and even harder to consider bills impacts over the 25 years<sup>22</sup>.

In the development of our Affordability and Acceptability research, we piloted a question that asked customers the acceptability for forecast bill impacts. This showed that customers did not find the question meaningful and were not able to answer. For this we concluded that the question was better discussed in a qualitative setting, where we could discuss the context and nuances associated with it in more depth. This approach was supported by our Independent Challenge Group (ICG). Consequently, the multi-generational focus groups were designed to discuss our final ambition and strategy, and then explore the acceptability of forecast bill impacts.

<sup>22</sup> Faldrax Consulting, September 2023, Customer principles report, Page 10

<sup>23</sup> Accent, 2023, LTDS Qualitative Research: Intergeneration Family Groups

## 4.3 Informed by customers and stakeholders

At PR19 we undertook an extensive and sector-leading programme of customer engagement. Our customers were involved in 36 research projects, that ranged from small exploratory qualitative studies to quantitative studies with large, statistically representative samples. The findings from these engagements were assessed by an independent author into our Synthesis report before being fed back into our business planning process. As a result of this work, we were the only company to be awarded the top A rating by Ofwat.

The PR19 Synthesis report provided an excellent starting point for the development of our Business Plan and LTDS, particularly as it incorporated a significant amount of research on long-term issues<sup>24</sup>.

We have taken the lessons learnt at PR19 and built upon our existing body of insight to inform the development of our LTDS. Our PR24 customer engagement strategy is designed to deliver meaningful research targeted at the key decisions facing our business. More details about our customer engagement strategy, together with how we have met Ofwat's quality standards for customer research, can be found in the Customer Engagement Technical Annex.

In total, we have spoken to over 34,900 household customers and over 2,500 non-household customers over the last two years. This new research has been independently synthesised into our existing body of customer insight to provide a comprehensive evidence base. Through this research we have explored the full range of areas where customers and communities can have meaningful views, including:

- Water and wastewater services
- Customer services
- Significant investment (large one-off schemes)
- Performance levels
- Bill impacts.

As well as engaging with customers, we have engaged with our stakeholders, both regionally and nationally, for our DWMP, our WRMP and for the LTDS as a whole. On the back of our Thriving East project, which created a detailed picture of the specific challenges among the 14 counties we serve, we've run an extensive engagement programme with our region's stakeholders. This has allowed us to discuss in-depth the local challenges that our research has exposed, their priorities and how we can work in partnership to get the best possible outcomes. This has helped us build a picture of how our plan can reflect the diverse challenges we operate in and around.

<sup>24</sup> Long-term issues that we engaged upon included outcomes for customers and the environment, drought resilience and proactive investment to mitigate climate change impacts

Our LTDS has drawn on our entire body of customer insight. We also identified that some specific additional research was required to support customers to engage meaningfully in our LTDS, to inform key decisions and challenge our ambition and strategy. Given the long-term nature of our plan, and the complex trade-offs between cost and ambition, we felt it was particularly important to listen to all customer segments. We especially want to hear from future customers and customers experiencing financial hardship.

As a result, we undertook some specific pieces of research to support the development of our LTDS. This included:

**The LTDS focus groups**, where we explored questions around ambition, affordability and intergenerational fairness with future customers and customers currently struggling to pay. This research also included a series of depth interviews with customers in Hartlepool.

**LTDS Customer Board sessions**, where we used six 'live' decisions to explore questions around ambition, affordability and intergenerational fairness.

**The multi-generational focus groups**, where we discussed our final ambition, strategy and the acceptability of forecast bill impacts with three generations of the same family.

The results of this research has directly informed key decisions in the development of our LTDS, including how ambitious should we be, what solutions we should select, and how we should profile investment over the 25 years.

Our DWMP was also co-created with over 100 stakeholder organisations, having engaged with all our county councils, district councils, Lead Local Flood Authorities (LLFAs), the Environment Agency, Internal Drainage Boards (IDBs), River and Wildlife Trusts, Natural England and Ofwat, as well as local river and environmental groups. We consulted widely on our WRMP, receiving 50 representations from stakeholder organisations.

Our water resources management plan is derived from the regional plan developed by Water Resources East. The regional plan was co-created with WRE's almost 200-strong membership of organisations from the water, agricultural, environment, energy local authority and charities sector from across our region. To ensure that

our 2050 vision contributes effectively those of our regional stakeholders, we engaged Biodiversify to analyse stakeholders' ambitions and plans. They analysed 63 stakeholder plans and drew on previous work for WRE's Natural Capital Plan.

In line with our customer engagement strategy, we first undertook a mapping exercise to identify key decisions associated with our LTDS. These were assessed to understand the materiality of each decision and to what extent customers could be expected to have a meaningful view. The table below provides a summary of the decisions identified as priority areas for customer engagement research.

**Table 35 LTDS decisions identified as a priority for customer engagement research**

Reference	Decision
1	Should we continue to rely on conclusions from PR19?
2	How ambitious should we be?
3	Should we prioritise certain solutions over others, such as solutions that can also deliver wider environmental benefits?
4	How should we profile investment across AMP periods?
5	Would customers be prepared for bills to go up, if it meant more vulnerable people were being supported?

In line with Ofwat Guidance, our LTDS has drawn on our Water Resources Management Plan (WRMP) and Drainage and Wastewater Management Plan (DWMP). Customer and stakeholder insight was central to the development of these plans. The full details of how customer insight has informed decisions can be found in the WRMP Customer and Stakeholder Engagement<sup>25</sup> and the final DWMP Technical Report<sup>26</sup>.

The details of how customer and stakeholder engagement has informed decisions 1-5 is provided next.

#### Decision 1: Should we continue to rely on conclusions from PR19?

As already noted, the PR19 Synthesis report provided an excellent starting point for the development of our LTDS. We recognised, however, that since its development there have been significant changes to the political and economic

<sup>25</sup> Available at <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/water-resources-management-plan/>

<sup>26</sup> Available at: <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-wastewater-management-plan/final-plan/>

<sup>27</sup> Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Pages 18 and 35

<sup>28</sup> Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Pages 15 and 26

<sup>29</sup> Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 15

<sup>30</sup> Biodiversify, July 2023, Qualitative Analysis Report, Page 5

<sup>31</sup> Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 46

<sup>32</sup> Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Page 61

<sup>33</sup> Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Pages 9 and 10

context that have affected customer attitudes and priorities. The experience of the pandemic, the recent cost of living crisis and the increasing importance of the environment have all resulted in important shifts in customer priorities. As a result, we needed to 'check-in' with our customers, and understand if the conclusions in the PR19 Synthesis report still held true.

#### Our key conclusions

Our customers' priorities have remained largely unchanged since PR19. They consistently tell us that the provision of safe, clean drinking water is the most important thing we do<sup>27</sup>. Other core responsibilities include reducing leakage, protecting the environment, maintaining our assets, and ensuring bills are affordable<sup>28</sup>.

However, the importance of both affordability and improving the environment has increased notably since PR19<sup>29</sup>.

Stakeholders are also still focused on the importance of ensuring sufficient water supply for the future in Eastern England, particularly through sustainable and efficient water supply and use, sustainable abstraction, and avoiding deterioration of water resources<sup>30</sup>.

Recent events, particularly the pandemic, the cost of living crisis and political instability, have led to a sense of 'permacrisis'<sup>31,32</sup>. Our customers are feeling uncertain about the future and unable to make plans beyond the short-term. Whilst current customers have concerns about the future they are more focussed on getting by day to day, and future customers feel they have little control over the long-term<sup>33</sup>.

Customers' priorities have remained largely unchanged since PR19, the key exceptions being affordability and the environment. While we have reduced the weight that can be placed on the PR19 conclusions to reflect their age, we assume they are largely still valid unless there is specific evidence to suggest otherwise. For more details on our approach to weighting research findings and drawing conclusions please refer to the PR24 Synthesis Report.

## Decision 2: How ambitious should we be?

### Customer support for our strategic ambitions

In the development of our ambition, we first wanted to test if customers still support our four ambitions as set out in our Strategic Direction Statement (SDS) in 2017: a carbon neutral business, resilient to the risk of drought and flood, enabling sustainable economic and housing growth, and working with others to achieve significant improvements in ecological quality of catchments.

#### Our key conclusions

- Customers continue to support our four ambitions. A minority, however, feel that they are missing quantifiable measures<sup>34</sup>. Some customers are concerned that our ambition is unachievable, and are unsure as to the specific impact we can have without input from other organisations<sup>3536</sup>.

Regarding sustainable economic development:

- Population and housing growth is a key concern for many customers who are worried about the impact on local services and infrastructure<sup>37</sup>. Future customers are concerned about the availability and affordability of housing, and their ability to get on the housing ladder<sup>38</sup>.
- Economic growth and development was a frequently mentioned objective amongst local governments. Themes around economic growth included sustainability, skills development, rural economy, tourism and leisure.<sup>39</sup>

Regarding environmental enhancement:

- There is widespread approval of the environmental ambition among both customers and stakeholders. Most want water companies to be ambitious and deliver enhanced protection for the environment, to support nature recovery and sustainable abstraction<sup>40</sup>.

- Customers are eager to see us implementing processes and taking actions that benefit and safeguard wildlife and boost biodiversity across the region<sup>41</sup>.
- Our stakeholders want us to achieve wider environmental outcomes where possible. Partners involved in the development of the Fens and Lincolnshire reservoirs have challenged us to deliver greater environmental and social benefits such as flood protection and recreational value.
- Water management stakeholders frequently mentioned biodiversity; specifically, ensuring that water use and management in the region does not deplete, or even enhances, the natural environment<sup>42</sup>.
- The importance of increasing and improving access to green space and nature was emphasised by a range of stakeholders<sup>43</sup>.
- The importance of the coastline to the East Anglia region was noted across the board by stakeholders, in a variety of contexts - protecting biodiversity, managing for flood protection and against erosion, recreation, and aesthetics<sup>44</sup>.

Regarding carbon reduction:

- Customers feel that reducing our carbon footprint should be essential, since climate change is a major threat<sup>45</sup>. In addition, climate change and the environment are top of mind for future customers who, when asked about their concerns, mention them spontaneously<sup>46</sup>.
- Decarbonisation and net zero were noted as objectives by a range of water management, private sector, and government stakeholders<sup>47</sup>.
- Carbon storage and sequestration were priorities for many, with stakeholders noting their desire to support, protect, maintain, or increase

34 Faldrax Consulting, September 2023, Customer Principles V10, Page 4

35 Faldrax Consulting, September 2023, Customer Principles V10, Page 4

36 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Page 32

37 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Page 32

38 Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Pages 9 and 22

39 Biodiversify, July 2023, Qualitative Analysis Report, Page 6

40 Faldrax Consulting, September 2023, Customer Principles V10, Page 31

41 Faldrax Consulting, September 2023, Customer Principles V10, Page 31

42 Biodiversify, July 2023, Qualitative Analysis Report, Page 5

43 Biodiversify, July 2023, Qualitative Analysis Report, Page 5

44 Biodiversify, July 2023, Qualitative Analysis Report, Page 6

45 Faldrax Consulting, September 2023, Customer Principles V10, Page 14

46 Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Page 11

47 Biodiversify, July 2023, Qualitative Analysis Report, Page 5

elements that have the potential to store and sequester carbon such as soils, peatlands, wetlands and farmland<sup>48</sup>.

Regarding resilience to climate change, drought and flooding:

- Our customers told us we should be planning for the long-term and taking preventative action to build resilience to future challenges<sup>49</sup>. When customers are told that we plan 25 years or more ahead to tackle long-term challenges it improves perceptions of us as a proactive and forward-thinking company, and means they place more responsibility on us to safeguard services in the future<sup>50</sup>.
- Stakeholders noted the importance of ensuring sufficient water supply for the future in East Anglia, particularly through mentions of sustainable and efficient water supply and use, sustainable abstraction, and avoiding deterioration of water resources<sup>51</sup>.

Regarding cost:

- Customers are unsurprisingly concerned about cost. While they support our ambition, they do not believe it should be delivered at any cost<sup>52</sup>.

We have kept the four SDS ambitions in place and used them to frame our LTDS ambition. Recognising customer concerns around cost, we have taken steps to secure the affordability of our plans through two routes. Firstly by seeking to minimise the cost of our plans and secondly by expanding our industry-leading support to vulnerable customers and those who struggle to pay their water bills. Through this we expect to be able to provide direct support to almost all customers experiencing water poverty by 2030, and we have committed to maintain this support in future AMP periods. More details on our approach to securing affordability is set out in Section 3.2: Affordable and fair.

### Would customers accept a deterioration in service in the future?

Our business is facing significant future challenges. Without action, these pressures will have a significant negative impact on our services. We have strong evidence from PR19 to suggest that customers do not want to see a deterioration in service, and we wanted to test if this had changed.

48 Biodiversify, July 2023, Qualitative Analysis Report, Page 5  
49 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Pages 25 and 30, 38, 39, 40, 41, 72 and 77  
50 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 82  
51 Biodiversify, July 2023, Qualitative Analysis Report, Page 5  
52 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 101  
53 Faldrax Consulting, September 2023, Customer Principles V10, Page 36  
54 Faldrax Consulting, September 2023, Customer Principles V10, Page 8  
55 Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Pages 36 & 52

### Our key conclusions

New evidence from PR24 suggests that customers have strong preferences for avoiding deterioration in service levels, especially in relation to environmental outcomes (as well as aspects of the service that have a high and direct impact on customers, e.g., internal sewer flooding)<sup>53</sup>.

In our ambition we have been explicit that we aim to mitigate all impacts of future challenges, including growth and climate change. Our investment plans are designed to protect services, ensuring customers experience no deterioration in service in the future.

### Areas for improvement

In the development of our ambition, we needed to consider:

- What does 'good' look like from a customer perspective? What needs to improve, and what is already good enough?
- Are there areas where customers think we should go beyond statutory requirements?
- We also recognised that there is a trade-off between ambition and cost, and we wanted a customer perspective on how ambitious we can afford to be.

### Our key conclusions

What are the priority areas for improvement, and what is already good enough?

- Leakage remains a consistent priority for investment. Other consistent priorities include supply interruptions, river water quality and pollutions<sup>54</sup>. However, there is strong evidence to suggest there is a common misconception that reducing leakage will also reduce bills, and this colours customer views<sup>55</sup>.
- The majority of insight suggests that, although drinking water quality is consistently ranked as the top service priority, it is not a priority area for

investment, certainly in the short-term. It is likely customers feel it is already good enough so does not require the same level of investment as other areas<sup>56</sup>.

Should we go beyond statutory requirements in areas that matter to customers?

- There is evidence to suggest that, in some areas, customers would like us to go beyond statutory requirements, for example to reduce leakage, sewer flooding, spills from storm overflows, and pollutions. As ever, the additional investment requirements would need to be balanced against costs.
- Anglian Water's customer board unanimously agreed that a 38% reduction in leakage was preferable to 50%, given the extremely high costs involved. Regarding reducing abstraction to protect the environment, the majority felt that it was important to go beyond the legal minimum to either restore or improve all rivers across the region. Opinion was more mixed when discussing reducing storm overflows<sup>57</sup>.
- Lead pipes is a priority, and an area of concern, but the only viable option (replacing all lead pipes) is currently not supported<sup>58</sup>.

How ambitious can we afford to be?

- Household and non-household customers are prepared to pay more to improve service in areas that they care about<sup>59</sup>.
- Keeping prices affordable, however, is one of our customers' top priorities<sup>60</sup>.
- Although many customers will support bill increases to see improvements in things they care about, they are clear we need to first fulfill our responsibilities<sup>61</sup>
- Across a range of strategic decisions, customers want us to ensure a sensible balance between ambition and cost. Other considerations, such as reliability and environmental benefit, are also important.
- In the multi-generational focus groups, our LTDS was widely welcomed, although all generations wanted to see faster delivery of at least some areas. The presented impact on bills was acceptable to the majority across

the generations. Despite the current cost of living crisis, the majority across the different generations would rather see bill increases sooner, driven largely by a sense of intergenerational fairness and the need to address investment areas promptly<sup>62</sup>.

Recognising customer concerns over cost, the majority of investment in our core pathway is designed to maintain services, ensure we can continue to meet our licence obligations and deliver new statutory targets. We are aiming to go beyond statutory requirements in a small number of targeted areas that reflect key customer concerns. This includes:

- Our ambition for the environment.
- Reducing the number of storm overflow spills, pollution and sewer flooding incidents.
- Meeting our Public Interest commitment to ensure all customers have access to lead-free drinking water by 2050.

Our ambition for the environment in particular seeks to go beyond the legal minimum. We aim to secure the long-term sustainability of our business by actively enhancing the environment, so that it is in a better state in 2050 than it is today. Our research shows that this ambition is shared with our customers and stakeholder (as evidenced in the text boxes above). By focussing on the development of a new approach to environmental investment planning, that seeks to maximise partnership working and shared investment, we believe that will be able to balance our ambition against cost. Please refer to our Environmental Enhancement sub-strategy for more details.

Related to our environmental ambition, we aim to greatly reduce the number of pollution incidents, sewer flooding and storm overflow spills by 2050, whilst aspiring to eliminate them completely. Pollutions and storm overflows are key concerns of our customers and priority areas for investment. Although the insight regarding storm overflows is more mixed, we do not believe their use will be acceptable to customers in the future. By 2050 we aim to deliver the following improvements:

- Zero serious pollution incidents by 2025.
- 87% reduction in pollution incidents with minor environmental impact by 2050.

56 Faldrax Consulting, September 2023, Customer Principles V10, Page 8

57 Anglian Water, Customer Board responses to survey on Long-term Ambition Plan, Pages 6 to 9

58 Faldrax Consulting, September 2023, Customer Principles V10, Page 19

59 Faldrax Consulting, September 2023, Customer Principles V10, Page 20

60 Faldrax Consulting, September 2023, Customer Principles V10, Page 17

61 Faldrax Consulting, September 2023, Customer Principles V10, Pages 16, 18, 25, 30, 30, 31 and 37

62 Accent, 2023, LTDS Qualitative Research: Intergeneration Family Groups

- 90% reduction in spills from storm overflows by 2050.
- 88% reduction in internal sewer flooding by 2050.

In other areas we have balanced our ambition, most notably leakage. The National Infrastructure Commission (NIC) has set a target to reduce national leakage levels by 50% by 2050, based on the 2017/18 baseline for England and Wales. We believe that reducing leakage is the right thing to do and so we have invested significantly to achieve this over the last 20 years as detailed earlier. We now lose approximately 25% less water through leaks than we did in 1998, despite connecting over 500,000 new properties. Although we have explored the potential to make a further 50% reduction, our analysis shows this would be extremely expensive, costing over £20 billion in total. We do not believe these excessive costs would be supported by our customers, who want to see a cost-effective balance of ambition and cost.

Instead, we aim to deliver a 38% reduction by 2050 (from our 2017/18 baseline). Given the work we have done already in this area, we believe 38% is an ambitious target that strikes the right balance between cost and ambition.

Although we have not set out an ambition to improve performance in other areas, our strategy will result in performance improvements across our business, particularly as a result of investment in digital capabilities. This includes, for example, supply interruptions, where we forecast a 68% reduction by 2050.

We have made a Public Interest commitment to ensure all customers have access to lead-free drinking water by 2050. Currently, the only way to effectively tackle lead risk is to remove and replace lead pipes, including customers' internal plumbing. This is both very expensive and disruptive. Recognising that this is a low priority for customers, our strategy is therefore to take a risk-based approach to managing lead risk in the short-term, delaying significant investment until AMP10. This will enable us to take full advantage of technological advances that may happen in the short-term, as well as helping to smooth the profile of our core pathway.

### Decision 3: Should we prioritise certain solutions over others, such as solutions that can also deliver wider environmental benefits?

Many of the decisions relating to strategy development are complex and technical by nature. These types of decisions can be difficult for customers to engage with in a meaningful way, and overwhelming for all but the most enthusiastic respondents. Rather than asking customers to 'sign-off' the technical aspects of our strategy, we have sought to understand the broad principles that customers want us to uphold in our decision making.

#### Our key conclusions

Regarding our strategy in general:

- Customers want us to develop a solid, innovative future proofing strategy that reduces risk or the need to further invest later down the line<sup>63</sup>.
- Our customer board asked us to consider the role that technology can play in delivering our ambition more efficiently<sup>6465</sup>.

Regarding partnership working:

- Customers expect us to be working in partnership with other organisations to learn from others' experiences and resolve shared issues collaboratively<sup>66</sup>. There is a sentiment that others, such as local government, local planning authorities and housing developers, should be contributing financially to solutions<sup>67</sup>.
- Our stakeholders expect us to work collaboratively and are actively seeking opportunities to work in partnership with us<sup>6869</sup>.

Regarding environmental impacts:

- Across a range of strategic areas, customers and stakeholders want us to look for 'green' or nature-based solutions that benefit the environment and wildlife. This includes solutions designed to tackle pollutions, reduce spills from storm over-flows, and balance supply and demand<sup>7071</sup>.

63 Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Delivery Strategy, Page 19

64 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 15

65 Anglian Water, 19<sup>th</sup> June 2023, Customer Board minutes, page 2

66 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Pages 52, 71 and 77

67 Trinity McQueen, June 2023, Shaping Anglian Water's Long Term Deliver Strategy, Page 56

68 Anglian Water, August 2023, Revised draft WRMP24 Customer and stakeholder engagement technical supporting document

69 Anglian Water, May 2023, Our Drainage and Wastewater Management Plan- Technical Report

70 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Pages 35, 55, 64, 100 and 107

71 Biodiversify, July 2023, Qualitative Analysis Report, Page 7

- Our Customer Board also highlighted the need to prioritise investment in solutions that deliver the best environmental benefit, as opposed to responding to current 'hot topics'<sup>72</sup>.
- There is a wide desire for outdoor spaces and the value of recreation and open areas on both physical and mental wellbeing. However, added benefits are not seen as a preference ahead of the 'core' services<sup>73</sup>.
- Stakeholders frequently mentioned implementing natural capital actions to enhance biodiversity, mitigate the effects of climate change on the environment, and enhance ecosystem services.<sup>74</sup>.
- Our Customer Board also highlighted the need to prioritise investment in solutions that deliver the best environmental benefit, as opposed to responding to current 'hot topics'<sup>72</sup>.
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- Stakeholders frequently mentioned implementing natural capital actions to enhance biodiversity, mitigate the effects of climate change on the environment, and enhance ecosystem services.<sup>74</sup>.

Our strategy reflects these customer views in several respects, for example:

- It includes a significant investment in digital technologies, which will enable us to drive efficiency and performance improvements across our business.
- Where appropriate, we have delayed investment decisions to enable us to take full advantage of potential technological advances in the short-term. This includes investment biosolids treatment, lead pipe replacement and PFAS treatment (noting we have interim solutions in place to manage water quality risks). More details can be found in the Safe, Clean Water and Bioresources sub-strategies.
- We agree with our Customer Board that we should prioritise environmental investment that delivers the maximum benefit. We plan to deliver our environmental ambition through the development of a systems-focused, outcomes-based approach to environmental enhancement. This includes a

<sup>72</sup> Anglian Water, 19<sup>th</sup> June 2023, Customer Board minutes, Pages 2 to 3

<sup>73</sup> Faldrax Consulting, September 2023, Customer Principles V10, Pages 14 and 19

<sup>74</sup> Biodiversify, July 2023, Qualitative Analysis Report, Page 6

<sup>72</sup> Anglian Water, 19<sup>th</sup> June 2023, Customer Board minutes, Pages 2 to 3

<sup>73</sup> Faldrax Consulting, September 2023, Customer Principles V10, Pages 14 and 19

<sup>74</sup> Biodiversify, July 2023, Qualitative Analysis Report, Page 6

step-change in partnership working, designed to leverage expertise and investment from multiple organisations.

- Our Drainage and Water Recycling sub-strategy places a focus on 'green' and nature-based solutions, and we expect that where possible, all solutions to increase network capacity will be 'green'.
- Our Water Resources sub-strategy has prioritised options that make best use of existing resource, particularly demand management. In addition, the Strategic Resource Options (the Lincolnshire and Fens reservoirs) will be designed to provide new habitats for wildlife and recreation facilities for our communities.

#### Decision 4: How should we profile investment over AMP periods?

In the development of our LTDS, we have had to make decisions about the optimum timing of investment. There are many complex issues bound up in these decisions relating to the balance of costs and risks across generations. As there are many trade-offs involved, we felt it was important to understand customer perspectives.

#### Should we invest proactively to address future challenges?

We identified two broad approaches, which is a simplification, but a useful way to make the discussion accessible to our customers:

- Investing proactively to prepare for future challenges.
- Wait to see how future challenges develop, responding to reactively to issues as they occur.

### Our key conclusions

- Our customers told us we should be planning for the long-term and taking preventative action to build resilience to future challenges<sup>75</sup>. When customers are told that we plan 25 years or more ahead to tackle long-term challenges it improves perceptions of us as a proactive and forward-thinking company, and means they place more responsibility on us to safeguard services in the future<sup>76</sup>.
- Evidence from both PR19 and PR24 suggests the majority of customers support us taking preventative action to prepare for future challenges<sup>77</sup>. Many customers recognise that tackling a problem proactively helps to find the most efficient solution over the long-term and reduces the risk of disruption and deterioration in service in the future<sup>7879</sup>.
- Customers want to see an efficient investment approach. They believe that tackling the bigger structural problems first will have a positive knock-on effect on other areas<sup>8081</sup>.
- Stakeholders want to see us take an adaptive approach in our WRMP and DWMP that allows us to take advantage of future technologies and is responsive to different climate outcomes<sup>828384</sup>.

In many areas our strategy is designed to invest proactively in future challenges, whilst managing affordability concerns. This includes:

- Our Water Resources sub-strategy, which is designed to mitigate the impacts of growth, climate change and sustainable abstraction on water supplies.
- Investment in climate vulnerable mains and sewers (covered in our Resilience sub-strategy), which is designed to prepare for climate change impacts and avoid a future deterioration in service.
- Our Drainage and Water Recycling sub-strategy, which is designed to mitigate the impacts of climate change and growth on our water recycling network.

75 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Pages 25 and 30, 38, 39, 40, 41, 72 and 77

76 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 82

77 Faldrax Consulting, September 2023, Customer Engagement Synthesis report V10, Page 82

78 Faldrax Consulting, September 2023, Customer Principles V10, Page 8

79 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Pages 40, 69 and 87

80 Trinity McQueen, 2023, Shaping Anglian Water's Long Term Deliver Strategy, Page 62

81 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Page 82

82 Biodiversify, July 2023, Qualitative Analysis Report, Page 12

83 Anglian Water, August 2023, Draft WRMP24 Statement of Response

84 Anglian Water, May 2023, Our Drainage and Wastewater Management Plan- Technical Report, Page 22

85 Trinity McQueen, 2023, Shaping Anglian Water's Long Term Deliver Strategy, Page 57 and 62

86 Faldrax Consulting, September 2023, Customer Engagement Synthesis report, V10, Page 82

87 Faldrax Consulting, September 2023, Customer Principles V10, Page 8

What does 'fairness' mean to our customers?

We have evidence from PR19 that suggests customers generally prefer bill increases to be smoothed and predictable, as this supports household budgeting. We wanted to test if this conclusion held true when considering investments over a longer time horizon. We also wanted to explore what intergenerational fairness means to our customers, and if there are differences across customer segments.

### Our key conclusions

Customers want any bill increases to be fair and spread across generations. A 'smoothed out' approach to bill increases seems both fair and easier to plan to current and future customers<sup>8586</sup>. Bills need to be reasonably predictable for households to budget<sup>87</sup>.

Recognising customers preference for a 'smoothed out' approach to bill increases, we have sought to smooth investment over the 25-year period where possible. We have found, however, that opportunities to move investment across AMP periods are limited because the majority of investment is required to meet statutory targets. Examples of where we have smoothed investment include moving the majority of investment in lead pipe mitigation into AMPs 10 and 12.

### Decision 5: Would customers be prepared for bills to go up, if it meant more vulnerable people were being supported?

As a company, we already provide an industry-leading package of support to customers struggling to pay their water bill. Water and water recycling are essential services, and we believe that nobody should have to face water poverty (water poverty is defined as customers spending between 3% and 5% of their disposable income on water bills). The support for customers struggling to pay is funded through a cross-subsidy and it was important for us to understand if our customers support the extension of this package to reach almost all customers in water poverty in AMP8.

### Our key conclusions

- There is a core desire for bills to be fair and affordable and real concern for those who are financially vulnerable, meaning it is important to protect those on lower incomes<sup>88</sup>.
- Recent engagement for the cross subsidy for the social tariff shows support for an increase<sup>89</sup>.
- . This will double the amount of support for customers, so we should be able to eliminate water poverty.

As a result of the strong support from our customers, we will double of the cross subsidy from the present £12 to £24 to support customers through our social tariff in AMP8. In addition, our owners will fund a new Medical Needs Discount. This will provide direct financial support to those with specific medical needs that create a higher water dependency and who do not otherwise currently receive any support for this extra financial burden. We therefore expect to have capacity to provide direct financial support to almost all customers in water poverty in AMP8, and we are committed to maintaining this support in future AMP periods.

88 Faldrax Consulting, September 2023, Customer Principles V10, Page 14

89 Faldrax Consulting, September 2023, Customer Principles V10, Page 17

## 4.4 Robust to future uncertainty

We face a high degree of uncertainty over both the short and long-term. These uncertainties can affect our business, our region and our customers, but our plans need to be robust and continue to deliver good performance under a wide range of conditions.

**Table 36 Alternative pathways**

Alternative pathway			Sub-strategy impacted				
	Environmental enhancement	Water resources	Drinking water quality	Drainage and water recycling	Bioresources	Net Zero	Resilience
High abstraction reductions	Abstraction (Env)	Abstraction (WR)	Abstraction (DWQ)	-	-	-	-
High climate change	Climate change (Env)	Climate change (WR)	Climate change (DWQ)	Climate change (DWR)	Climate change (Bio)	Climate change (NZ)	Climate change (Res)
Slower technology	Technology (Env)	Technology (WR)	Technology (DWQ)	Technology (DWR)	-	Technology (NZ)	Technology (Res)
Adverse landbank availability	-	-	-	-	A Landbank (Bio)	A Landbank (NZ)	-
Benign landbank availability	-	-	-	-	B Landbank (Bio)	-	-
Adverse water for energy	-	Water for energy (WR)	-	-	-	-	Water for energy (Res)

The majority of the alternative pathways are driven by the more adverse scenarios. The one exception is Benign Landbank Availability. Our benign Landbank Scenario assumes that the landbank availability risk does not materialise and the existing approach to managing bioresources is broadly continued. We believe this scenario is highly unlikely, as it would require a revision to the Environment Agency's interpretation of Farming Rules for Water. However, we have developed an alternative pathway to demonstrate to our external stakeholders the consequences of regulatory decisions on our strategy and investment plans.

Our scenario testing confirms that there is less uncertainty in the short-term. Over the long-term, the high climate change, high abstraction reductions and slower technology scenarios drive the most material additional investment requirements. This is because these scenarios have impacts that are felt across our business.

The CRS and our wider scenarios are designed to describe plausible extremes. As such, the alternative pathways represent the top end of the range of potential investment required, rather than a completely separate investment programme.

As detailed throughout our LTDS, we have developed six alternative pathways to manage the major sources of uncertainty in the short and long-term. These pathways set out the investment that is higher regret because it is only needed in a single scenario. The alternative pathways, and the sub-strategies that they impact, are detailed in the table below.

It is likely that actual investment requirements will fall somewhere within this range. We have set trigger points for the majority of alternative pathways for 2030, but we anticipate that we will need to continually monitor our key metrics and adjust and refine our investment proposals accordingly.

We have two alternative pathways with trigger points in AMP8: Adverse Landbank availability and Adverse Water for Energy. More details can be found in the Water Resources and Bioresources sub-strategy sections. Over the long-term, the high climate change, high abstraction reductions and slower technology scenarios drive the most material additional investment requirements, as demonstrated in the figure below. This is because these scenarios have impacts that are felt across our business.

Additional sources of short-term uncertainty not captured in our alternative pathways include:

- Energy prices
- Inland bathing waters designation
- Norfolk groundwater licence review

Energy prices are a material component of our expenditure and future market prices are very uncertain. We have generally achieved the full potential benefit available from price hedging, managing our demand and increasing our own energy generation, so the scope for further expenditure savings is, based on our experience, very small. We have therefore proposed a formulaic uncertainty mechanism dependent on the fuel price index for the industrial sector, published quarterly by the Department of Energy Security and Net Zero.

At the time of writing there are eight communities in our region who are applying for inland bathing waters designation but have not yet been successful. We have proposed an uncertainty mechanism for our associated sites, which would enable investment to be available should these become designated and therefore a statutory requirement to invest at our sites if we are the cause of poor water quality.

The Environment Agency has informed us that it has formally started a review of groundwater licences in the Norfolk Broads Special Area of Conservation, which effectively includes our entire water sources for public water supply in Norwich and North Norfolk. The extent of licence change is potentially so significant there is no effective mitigation to the closure or substantial reduction in these sources in the short-term. We expect that it would lead to the acceleration of the desalination option currently shown in our revised draft Water Resource Management Plan for Norfolk in AMP10. We have proposed that should the Environment Agency notify us that our abstraction licenses in this area will be capped or removed, the cost allowance for Water Resources and Water Network Plus is increased to provide the development cost for the Norfolk Desalination project.

For more details on how we are managing short-term uncertainty over AMP8 please refer to Chapter 10 'Dealing with Uncertainty' in our PR24 Business Plan Narrative.

Figure 29 Grafham Water solar project



## 4.5 A robust approach to developing our core and alternative pathways

In the development of our LTDS we have used adaptive planning principles and complied with Ofwat’s final guidance. The over arching process that we followed is set out in the figure below. For simplicity we have described it as a largely linear process, in practice it has been very iterative. For example, in order to determine and appropriate level of ambition we had to consider what it would cost to deliver and what sort of solutions would be required.

Figure 30 Our process to develop our core and alternative pathways



### Development of our ambition

Our Strategic Direction Statement (SDS) was developed in 2007 to provide a clear framework for planning for the following 25 years. We then refreshed it in 2017, following extensive consultation with customers and our Customer Engagement Forum, where we co-created four ambitions.

- Eastern England will be resilient to drought and flooding
- Working with others, we will have delivered significant improvements in ecological quality across our catchments
- We will be a net zero carbon business
- Enable sustainable economic and housing growth in the UK’s fastest-growing region

In 2021, our Board concluded that our SDS remained fit for purpose, and more recent research confirms that customers still support our four ambitions.

We then set out to understand what the company aims to deliver under each of the four SDS ambitions by 2050, and to define our vision statement in collaboration with senior leaders across our business. For details of how customer engagement informed our strategy please refer to Rationale: Informed by customers and stakeholders.

### Identification and development of scenarios

More details on our scenario identification and development process can be found in the sections on Rationale: Scenario identification and Rationale: Scenario development.

### What will base deliver over the longer-term?

More details on base can be found in Foundations: Base.

### Identify solutions

More details on how we have considered a wide-range of solutions can be found in Rationale: Best Value.

### Develop emerging pathways

Using the outputs of the strategic planning frameworks, our long list of potential solutions and qualitative best value assessment, we developed an ‘emerging core pathway’ for each sub-strategy. In areas where we have mature long-term planning frameworks in place the emerging core pathway was built up from a sequence of specific solutions. In other areas, for example future WINEP obligations, it is a forecast of anticipated enhancement requirements. The emerging pathways were designed to ensure we could meet all short-term requirements and statutory obligations.

### Scenario testing to develop core and alternative pathways

We then refined our emerging core pathway by testing it in the Ofwat Common Reference Scenarios (CRS) and our wider scenarios. In our core-pathway consists of low and no regret investment, and investment required to keep future options open. Additional activities that would only be undertaken under certain circumstances are set out in our alternative pathways. More details on our scenario testing methodologies and the development of an efficient core-pathway can be found in Rationale: Scenario testing and Rationale: An efficient core pathway.

### Programme consolidation

We then aggregated the sub-strategy pathways to create a company level core and alternative pathways. These pathways were then challenged and refined:

- Non material alternative pathways (less than 10% of the value of the core pathway) were discounted.
- Where possible, we sought to smooth investment in the core pathway across AMP periods.

## 4.5.1 Scenario identification

Ofwat has stated that for companies to ensure that their LTDS is robust, it must be subjected to wider scenario testing beyond the CRS. Ofwat expects companies to use wider scenario planning, as necessary, to:

- Test against any relevant factors not specified in the CRS, such as company-specific or local factors
- Demonstrate that the strategy is resilient to a range of risks
- Demonstrate that risks are understood and have been considered in the development of the strategy
- Help to validate the strategy, and to test whether alternative options and programmes would be more appropriate, including the different adaptive pathways set out in the strategy.

Following a process of scenario identification, we have identified two ‘wider’ scenarios that incorporate specific regional uncertainties likely to impact and inform our strategy. To identify the scenarios, we used a structured approach based on techniques from The Futures Toolkit (The Futures Toolkit: Tools for Futures Thinking and Foresight across UK Government (publishing.service.gov.uk)), a government guidance document that provides a set of tools and techniques support long-term strategic thinking in policy making.

We initially undertook a horizon-scanning exercise to develop a long-list of over 280 external factors. This list was then consolidated and screened according to the following criteria:

- Are the factors identified as unique and plausible?
- Are they addressed by a CRS?
- Are they testable?
- Are they within management control?

Working with subject matter experts from across the business, we then used a Wilson Matrix, a tool used to evaluate and prioritise the influence and impact and uncertainty of each scenario driver, to map the shortlisted trends according to their potential impact and uncertainty. 18 factors were identified as being high impact and high uncertainty. We then considered the suitability of scenario testing to deal these key factors, using five tests:

- Material - is the scenario likely to have a material impact on key enhancement expenditure?
- Exogenous - is the scenario driven by factors external to the company and outside its control?
- Plausible - does the scenario reflect plausible events?
- Simple - can the scenario be clearly defined and tested?
- Regionally specific - does the scenario reflect an issue which is specific to the company or region?

This process identified two scenarios to be taken forward for development:

- Landbank availability - to assess the potential impact of reduced landbank availability on sludge disposal and our strategy for net zero.
- Water for energy - to assess the impact water requirements associated with the projected increase in hydrogen production and carbon, capture and storage in our region.

We discussed these wider scenarios with Ofwat at our LTDS Development meeting on 9th February 2023 and were advised that they were consistent with the final guidance.

More details in our scenario identification process can be found in the LTDS Technical Annex.

### 4.5.2 Scenario development

We have used scenario planning to inform the development of our strategy, including using Ofwat’s eight CRS. The CRS, offer plausible ‘benign’ and ‘adverse’ assumptions around the future trajectories of climate change, technology, demand and abstraction reductions

Figure 31 Common reference scenarios

	Climate change	Technology	Demand	Abstraction reductions	Wider scenarios
‘Adverse’ scenarios	High: RCP8.5	Slower: slower development than expected	High: higher growth forecasts	High: ‘Enhanced’ scenario (in England)	Material local or company-specific factors, as appropriate
‘Benign’ scenarios	Low: RCP2.6	Faster: faster development than expected	Low: lower growth forecasts and legislation on building regulations and product standards	Low: Current legal requirements (in England and Wales)	Parameters between the reference scenarios, e.g. a ‘medium’ scenario, as appropriate
<b>Mandatory</b> Impacts presented separately					<b>Discretionary</b> Can be combined if plausible

## Climate change

In accordance with Ofwat’s Guidance, we have used the UKCP18 projections for RCP2.6 (low Climate Change) and RCP8.5 (high Climate Change) to test our sub-strategies. We have used the 50th percentile probability level for each projection. These scenarios align with global temperature rises of 2 degrees and 4 degrees respectively.

## Demand

We have developed demand scenarios for our region that are consistent with Ofwat’s definition of the Demand CRS:

- Low demand - population, property and occupancy forecasts derived from ONS population and household projections. These include policy lead interventions as described in the ‘Water labelling only (with minimum standards)’ scenario used in the Water UK study, ‘Pathways to long-term PCC reduction.’
- High demand - population, property and occupancy forecasts derived from local plans published by the local council or unitary authority.

Note that the Demand CRS does not include the following:

- Impacts associated with the Oxford - Cambridge Growth Area, either in terms of additional household and non-household demand, or in terms of the re-distribution of anticipated housing development across the region.
- Increased demand from the green-energy sector (covered in the water for energy scenario).
- Increased demand from the agricultural sector (the adoption of new farming technologies - such as hydroponics, aquaponics and vertical farming - are likely to impact future water demand, and could potentially increase demand significantly or change the nature of market needs).

## Abstraction

The Environment Agency’s National Framework sets out a new requirement for regional water resource groups to take a long-term approach to planning for the environment’s water needs, known as the environmental destination. It sets out three scenarios that describe the different levels of potential abstraction recovery required in the future:

- Business As Usual (BAU)
- Enhanced
- Adapt

Our regional water resource group, Water Resources East (WRE), has worked with the environmental regulators to build on and validate the scenarios, using additional local and regional analysis. The three scenarios developed by WRE, used in the development of our revised draft WRMP and our LTDS are summarised in the figure below.

**Table 37 Environmental Destination scenarios developed by Water Resources East**

Business as usual (BAU)	Business as usual (BAU+)	Enhanced
Achieves flows to support 'Good Ecological Status' under the Water Framework Directive	Achieves flows to support 'Good Ecological Status' under the Water Framework Directive.	Achieves flows to support 'Good Ecological Status' under the Water Framework Directive
Excludes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)	Excludes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)	Includes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)
	Further protections for European Protected Sites (riverine and Groundwater Dependent Terrestrial Ecosystems)	Further protections for European Protected Sites (riverine and Groundwater Dependent Terrestrial Ecosystems)
		Further protection for chalk streams, sensitive headwaters and Sites of Special Scientific Interest

The Business As Usual (BAU) and Enhanced scenarios are consistent with Ofwat’s definition of the Abstraction CRS. The BAU scenario represents the lowest plausible abstraction reductions that meet currently known legal requirements. We have therefore used the BAU scenario for the ‘low’ abstractions CRS and Enhanced scenario for the ‘high’ abstractions CRS.

## Technology

We warmly welcome the development of the Technology CRS, as it provides an opportunity for water companies to systematically consider technology in their future plans for the first time.

In its final guidance, Ofwat has set out a list of key technological developments inside and outside of the sector that companies should consider. It also states: ‘Beyond those set out in the reference scenarios, companies should consider a

wide range of technological developments when forming their strategies.’ We have embraced this requirement in the development of our final technology scenario.

To develop our final technology scenario, we first commissioned Cambridge Consulting and Cap Gemini to help us to identify the range of technologies we should consider in the development of our strategy. This project identified the key technologies with the greatest potential to impact our business over the long-term. It first undertook a horizon scanning activity that identified a long list of over 90 technologies, which was then refined using analysis and workshops. The project then conducted an in-depth review of nine key technologies, and a

high-level review of a further eleven technologies. More details can be found in the AMP8 Long Term Delivery Strategy for Anglian Water - Final Integrated Technology Report.

This report informed the list of technological developments we wanted to consider. To develop our final technology scenario we then had to describe the potential application of the technology, and consider when the full adoption and operationalisation would become cost beneficial in the fast and slow scenarios. We did this through a series of collaborative workshops with subject matter experts from across the business. Our final technology scenario incorporates all the technological development identified in Ofwat’s final guidance as well as the additional technologies identified through this process. The details of our final fast and slow scenarios are set out in figure 24 on the next page.

Figure 32 Final technology scenario (fast)

## Final technology scenario (fast)

- Technology identified by Ofwat
- Wider technologies
- Proposed tech after 2045

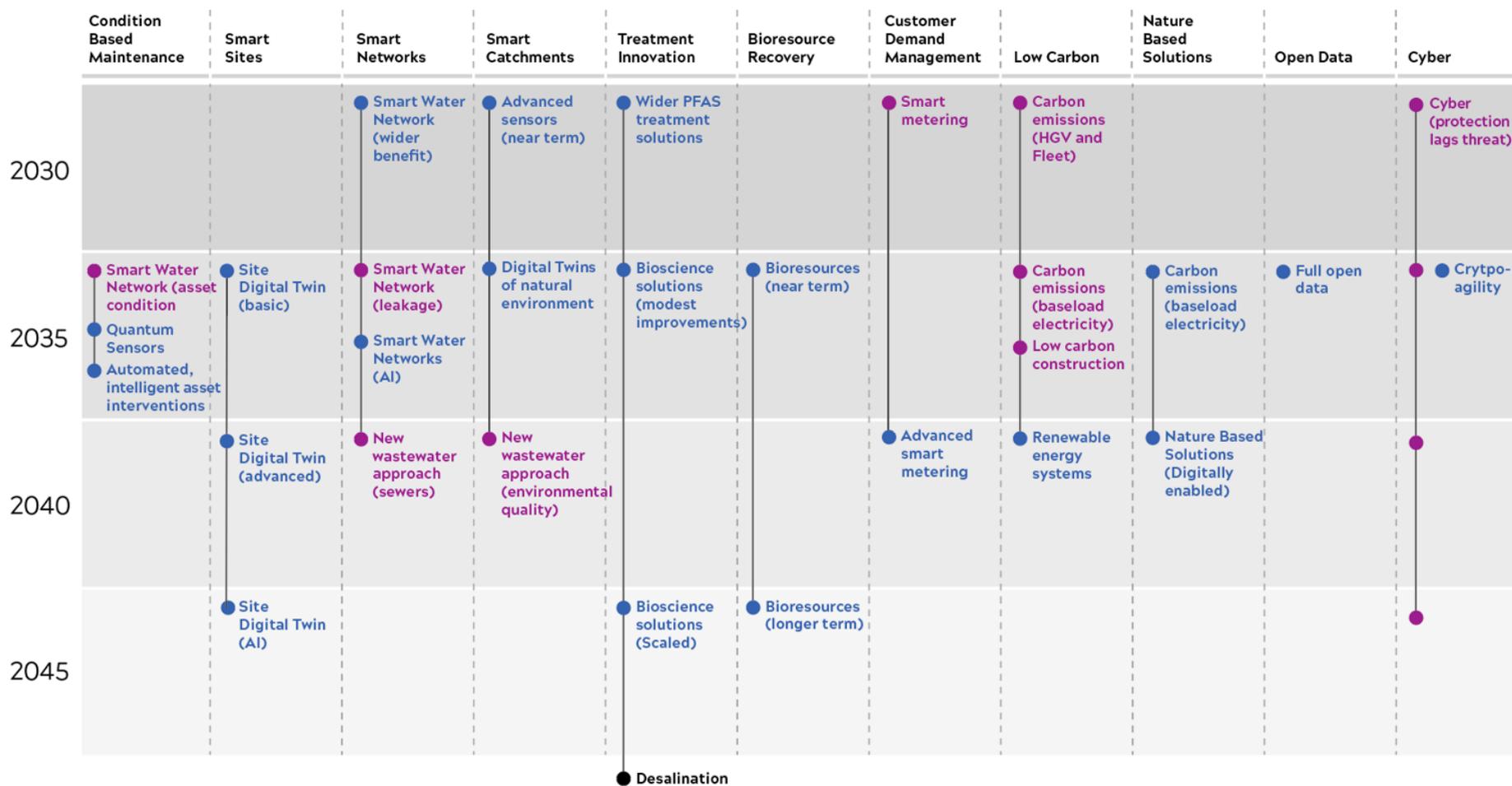
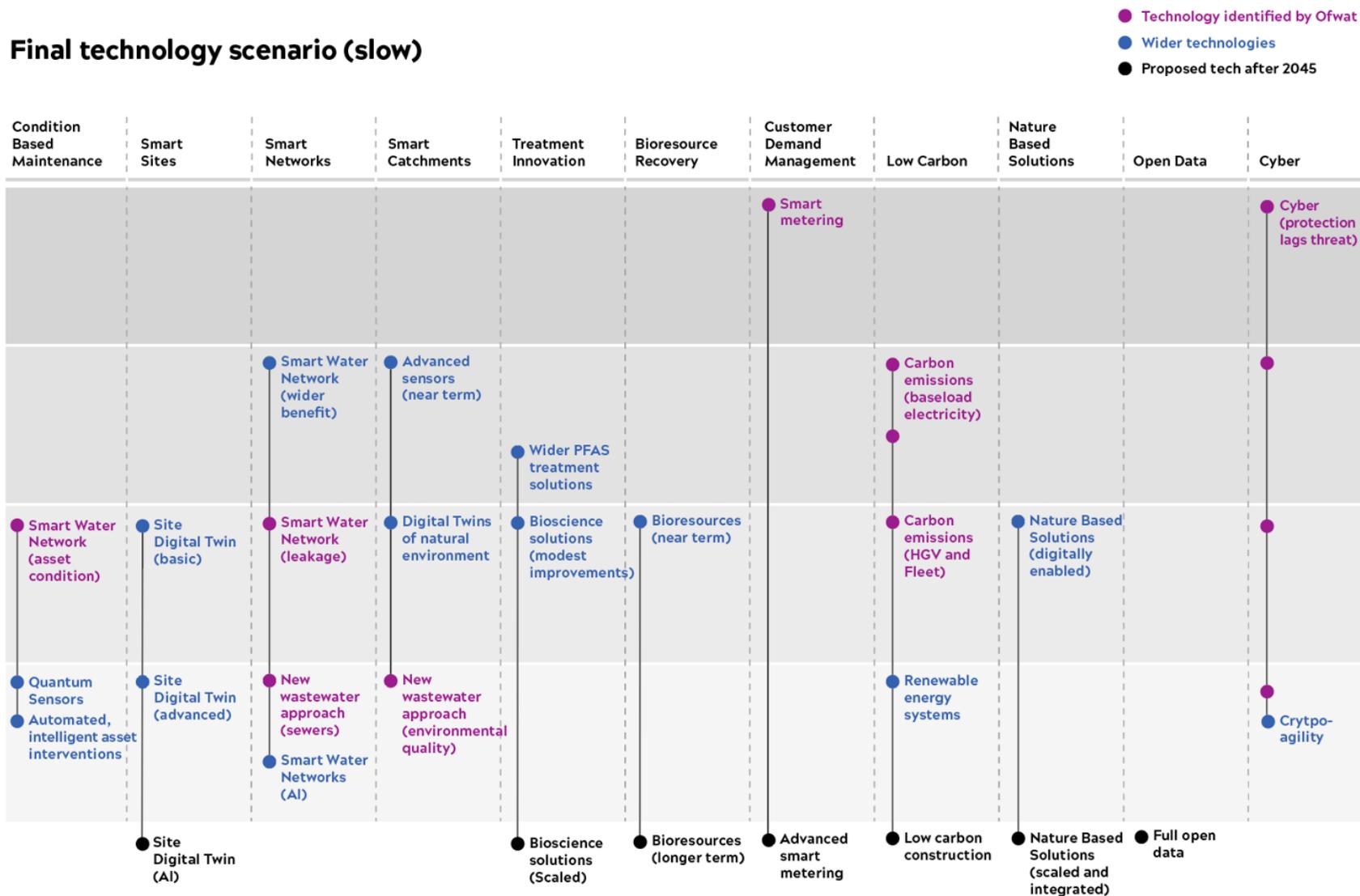


Figure 33 Final technology scenario (slow)



We note that in Ofwat’s final guidance full smart meter implementation and smart water networks are expected to be fully operational by 2035 in the fast scenario. We have, however, set them to 2030 in our final scenario. This reflects the date when we expect them to be fully operational in our strategy which is also consistent with our revised draft WRMP. Smart meters are a central part of our strategy to ensure secure water supplies. The selection of smart meters in our WRMP was subject to a robust cost benefit test, the details of which are set out in the Demand Management Option Appraisal technical document<sup>90</sup>.

### Landbank availability

We dispose of treated biosolids via use on agricultural land as fertiliser. Autumn application to land typically takes 85% of our biosolids. The availability of land for this purpose is referred to as the landbank and the size of the landbank can vary based on a number of factors including government policy and agricultural demand.

The Farming Rules for Water (FRfW) (Defra, 2022) require changes in the application of fertiliser and organic materials to land, to avoid risk of agricultural diffuse pollution. They cover applying and storing these materials and the management of soil and livestock, and places restrictions on the timing and amount of nutrients farmers can apply to land. These rules will impact the management of bioresources by water companies.

We have developed an adverse and benign scenario on landbank availability using outputs from the national landbank assessment undertaken by Grieve Strategic & ADAS. This study considered the remaining landbank available for applications and biosolids storage capacity required, aligned to different scenarios that reflect alternative ways the Environment Agency may implement FRfW.

#### Benign Scenario - Slight decrease in available land

**Land area available:** Scenario 3 of the national landbank assessment - 10-year minimal change in landbank availability compared to baseline.

**Application rules:** No change to current processes.

#### Adverse Scenario - Moderate decrease in available land

**Land area available:** Scenario 4 of the national landbank assessment - 10-year most likely change in landbank availability compared to baseline.

This represents a decrease in available land assuming a minimum 6-months storage to allow: logistics flexibility (longer haulage runs), over-winter storage (when farm access is limited), and inter-spreading season closed periods.

For this scenario there is insufficient available agricultural land to recycle all biosolids nationally.

**Application rules:** Biosolids application in Autumn months is prohibited (except for a very small proportion, where crops have an immediate fertiliser requirement). Autumn application to land typically takes 85% of AWS’ biosolids.

### Water for energy

Water Resources East (WRE) estimate that future water need for energy (principally for hydrogen production) could increase by about 140 MI/d in the East of England by 2050 resulting in greater pressure on water sources. Potential water sources for hydrogen production include treated wastewater effluent and water from desalination. The utilisation of effluent at inland locations, would have implications for wastewater treatment facilities and the receiving waterways. Desalination could require the development of additional infrastructure, but also presents opportunities for joint public water use and energy production.

Our potable public water supply network is unlikely to provide sufficient water for energy production. The system is already under significant pressure from population growth, climate change, sustainability reductions and the need to increase supply resilience due to severe drought. Without enhancement expenditure to address the deficit, the WRMP predicts a total regional deficit of 514 MI/d by 2049 .

The scenarios for future water demand for energy are defined based on profiles for power sector projected annual consumption in the WRE Region, as outlined in the draft Regional Water Resources Plan in the Eastern Region. Three potential profiles of power sector projected annual water consumption are presented in the draft WRE Regional Plan. These reflect the Future Energy Scenario 2021 (FES21) produced by the National Grid Electricity System Operator, which represent credible pathways for the development of energy by 2050.

There are six potential hydrogen projects located within Anglian Water’s operational area that are being (or have been) considered under government funding schemes (HM Government, 2023). These include sites in our region near South Humber Bank, Great Yarmouth and Felixstowe.

90 Available at: <https://www.anglianwater.co.uk/siteassets/household/about-us/wrmp/rdwrmp24-demand-management-option-appraisal-technical-supporting-document.pdf>

### Adverse Scenario - High energy sector growth

**Demand:** Use Water Resources East (WRE) power sector projected annual consumption, 97.5th percentile probability level (2025 - 2050) - based on FES21.

**Location:** Assume hydrogen production facilities are developed at South Humber Bank and the tidal Trent, as well as plants at other locations within our region identified as potential sites in the Government's Hydrogen Net Zero Investment Roadmap.

**Source:** Demand met from desalinated water developed by AWS and/or treated wastewater.

### Benign Scenario - Low energy sector growth

**Demand:** Use Water Resources East (WRE) power sector projected annual consumption, 2.5th percentile probability level (2025 - 2050) - based on FES21.

**Location:** Assume hydrogen production facilities are developed at South Humber Bank and the tidal Trent only.

**Source:** Demand met from desalinated water developed by an energy developer and/or treated wastewater.

## 4.5.3 Scenario testing

We firstly applied subject matter expert expertise and judgement to complete a high-level assessment of the likely impacts of the CRS and wider scenarios against each enhancement line. Only where the scenario was assessed as having a 'high' potential impact was the line taken forward for scenario testing. The impact was assessed as 'high' where the scenario was likely to have a direct and material impact.

A number of different methods can be used to test expenditure and generate the core pathway and alternative pathways. These can be broadly grouped into models and judgement-based approaches:

- Models: such as network models.
- Judgement of subject matter experts: in some cases, bringing together a group of subject matter experts may be the only way to explore and test a scenario.

Where possible, we have sought to use modelling capabilities to undertake the scenario testing. In the instances where it is not possible, because there is not existing model that can be readily used or adapted, we have relied on subject matter expert judgement to make reasonable assumptions about how enhancement might be affected in the scenario. Note that, in line with Ofwat's Guidance we have not combined scenarios but have tested the impact of each scenario individually.

Testing against our final Technology scenario in particular presented challenges. Through the process of testing against our final Technology scenario, we sought to identify:

- How emerging technologies may impact option selection in the short-term.
- Where there may be opportunities to keep options open to benefit from future technological advances.
- How enhancement requirements would be affected in the slower scenario.

As noted in [3.2 Our core pathway](#), we believe that the delivery of our ambition will require us to embrace new and emerging technologies. Our core-pathway includes an indication of the enhancement required for full adoption and operationalisation of key technologies. For example, it includes significant investment in AMPs 8 and 9 in digital technologies, and as a result we expect that smart sites, networks and catchments will be fully operational by 2035.

When testing against the slower technology scenario, we needed to consider how slower technological development would affect forecast enhancement requirements. Although the Cambridge Consulting and Cap Gemini project listed existing case studies, there is limited evidence to understand the scale of efficiencies that emerging technologies might be expected to deliver in the future. Given this uncertainty, we felt that the most appropriate approach to testing our final Technology scenario was in a workshop setting that brought subject matter experts together from across our business. We have sought to make reasonable assumptions, and these are listed in [5.1 Assumptions](#).

More details on our scenario testing methodologies can be found in the LTDS Technical Annex.

## 5. Foundations

### 5.1 Assumptions

In the development of our strategy, we have set out to make reasonable assumptions about how certain factors will change over time. We have set out the most material assumptions in the tables below.

#### Government and regulatory policy

Table 38 Key assumptions relating to government and regulatory policy

Ref	Assumption	Reasoning
1	Changes relating to future government and regulatory policy would be introduced within a reasonable timeframe to allow for adjustment, with any material additional cost impacts being fully funded through existing regulatory mechanisms.	Changes to government and regulatory policy would have far reaching consequences for our strategy. However, we do not believe it possible to anticipate future policy in any meaningful way, other than to recognise general trends as a 'direction of travel'.  In the absence of any expected reforms, it is reasonable to assume that the existing regulatory mechanisms continue to operate in the same way.
2	The new targets introduced by government and the regulators (for example the Environment Act and the Storm Overflow Discharge Reduction Plan) are not subject to change.	
3	There are no changes to water company ownership structures as a result of government policy.	
4	Ofwat, the Environment Agency and Natural England will continue the move towards Outcomes Based Environmental Regulation (OBER).	

#### Stakeholder support and engagement

Table 39 Key assumptions relating to the environment

Ref	Assumption	Reasoning
5	Without concerted collaborative action, the condition of the natural environment will continue to deteriorate as a result of growth, climate change and human activities.	See, for example the 3rd Climate Change risk assessment.
6	Over the last 15 years, the environment has become an increasingly important government, stakeholder and customer priority. We expect that this trend will continue, and the government will be driven to introduce tighter standards and increased protections for the environment. In particular, we think that storm overflow spills, pollution incidents and sewer flooding will become increasingly unacceptable over time.	This assumption seems reasonable given the changes we have experienced in recent years.

Ref	Assumption	Reasoning
7	Through the A-WINEP, we will establish a systems-based approach to environmental enhancement that will become established practice from AMP9 onwards.	We are committed to the success of the A-WINEP proposal, as we believe there is potential for the systems-based approach to deliver more for society and the environment. There is also appetite from our regulators and partners to realise it.
8	We will be able to find alternative ways of delivering our ambition on sustainable abstraction, such as river restoration schemes or landscape scale initiatives. As a result, the impact on our supply-demand balance is reduced (compared with our WRMP), and less investment in desalination and treatment (reflecting loss of water for blending) is required.	This assumption is informed by past experience. For example, at WRMP19, activities such as relocation of abstraction points and river restoration projects have allowed us to reduce the total reduction required. We expect the potential benefits of these approaches will be enhanced by systems-based approaches (underpinned by the development of digital-twins of the natural environment), allowing us to identify lower cost and better value solutions compared with desalination.
9	Contamination of water sources with PFAS will become an increasing concern and priority area for investment.	The presence of PFAS in the environment is an emerging concern nationally and internationally. It seems reasonable to assume that as our understanding develops we will discover the problem is more widespread than currently understood.

## Socioeconomic factors and vulnerability

Table 40 Key assumptions relating to socio-economic changes

Ref	Assumption	Reasoning
10	Without action, the proportion of customers experiencing water poverty will increase in the short-term.	This assumption is informed by the project we completed with Experian, 'Household water affordability analysis with Economics Insight'. Please refer to The future affordability context in our PR24 Business Plan Narrative.
11	We already have an industry-leading package of support in place to support customers struggling to pay. In AMP8 we will extend the package of support available and expect to be able to provide direct financial support to almost all customers in water poverty in AMP8.	
12	Demographic changes that can affect demand, such as population age, ethnicity, working patterns and lifestyles, occur gradually and do not result in a step-change in demand.	This assumption seems reasonable given past experience.
13	Regional economic growth is broadly stable over the period.	It is not possible to develop long-term forecasts for economic growth, so it seems reasonable to assume it is broadly stable.
14	There are no demand impacts associated with the Oxford Cambridge Growth Area, either in terms of additional household and non-household demand, or in terms of the re-distribution of anticipated housing development across the region.	Although this remains a stakeholder priority it's future is uncertain given recent political developments.

Ref	Assumption	Reasoning
15	There is no increased demand from the agricultural sector resulting from new farming technologies, such as hydroponics, aquaponics and vertical farming.	There is a lot of uncertainty associated with future agricultural practices. If agricultural demand increases it may be met by other sectors other than public water supply.
16	Unforeseen changes to customer attitudes do not result in the need for us to change our ambition.	It is not possible to foresee step-changes in customer attitudes.

### Our company

Table 41 Key assumptions relating to our company (costs, base, asset health, skills, supply chain, innovation)

Ref	Assumption	Reasoning
17	Over the long-term, however, we expect growth, climate change and asset age to result in a deterioration in performance against a range of PCs.	This assumption has been informed by our ASRAP assessment. For more details please refer to Rationale: Base
18	The rising cost of energy could impact on the overall affordability of our strategy, however energy costs are already addressed through real price effects (RPEs) and we have assumed that this will continue to be the case.	This is consistent with our PR24 Plan.
19	Our workforce, and that of our supply chain and partners, has the skills and capacity required to deliver our strategy.	We are already facing skills and labour shortages due to regional recruitment difficulties exacerbated by the impacts of Brexit and Covid, however we have ongoing management actions in place to mitigate this through long-term recruitment and planning.
20	We will continue to use the Ofwat innovation fund to deliver key pieces of innovation that underpin our strategy.	This is consistent with our PR24 Plan.
21	The cost of carbon offsets will increase over time.	As the 2050 deadline for Net Zero approaches, the demand for offsets will increase and this will drive cost increases.

### Activities of other water companies and sectors

Table 42 Key assumptions relating to other water companies and other sectors

Ref	Assumption	Reasoning
22	Collaboration will increase over the period with partnership working becoming established practice .	This is in line with government and regulatory policy.
23	The industry will meet 50% leakage reduction	This is a requirement set out in the National Framework.

Ref	Assumption	Reasoning
24	<p>Special Infrastructure Provider (SIPR)/ Direct Procurement for Customers (DPC) costs for known schemes not included in core pathway but are for bill impact. Likely pass through costs will be collected by Anglian Water but are not part of totex plan.</p> <p>Other future schemes that could be DPC full costs included as assessment not yet made.</p>	This is in line with Ofwat guidance.

As noted in Rationale: Scenario testing, there is limited to evidence to understand the scale of efficiencies that emerging technologies might be expected to deliver in the future. When testing our final Technology scenario, we have tried to make reasonable assumptions informed by subject matter expert judgement, where possible informed by case studies captured in the Cambridge Consulting and Cap Gemini project. Although Ofwat state that we do not need to specify assumptions relating to the Common Reference Scenarios in this section, we felt it was important to include those relating to technology. This is important to help stakeholders understand how the strategy has been built up.

## Technology

Table 43 Assumptions relating to technology

Sub-strategy	Technology	Impact	Assumption
Environmental enhancement	Open data	Enables more efficient delivery of partnership schemes	20% reduction in costs from AMP10 onwards
	Digital twin (site)	More efficient design and delivery of wastewater treatment upgrades and new facilities	10% reduction of enhancement costs from AMP9 onwards
	Digital twin (catchment)	Enables more efficient delivery of partnership schemes	10% reduction of enhancement costs from AMP9 onwards
	Nature-based solutions	Widespread use of nature-based solutions enables more efficient management of nutrients and reduction in treatment requirements	25% cost reduction in AMP10 in nutrients and overflows category
Water resources	Desalination	There will not be a step-change in desalination technology before 2050. As a result, we expect that the current issues relating to high energy consumption (and therefore cost) and safe disposal of waste products remain a consideration in our option selection process.	None
	Household and consumer technology	New and emerging technologies will reduce household and non-household demand. For example, customers will adopt smart appliances that will reduce water and energy consumption. Development level rainwater and greywater harvesting systems will become increasingly widespread.	<p>This enables a reduction of:</p> <ul style="list-style-type: none"> <li>PCC from 110 MI/d (as per our rdWRMP) to 100 MI/d</li> <li>Business demand, from 10% reduction relative to growth to 20%.</li> </ul>

Sub-strategy	Technology	Impact	Assumption
Drinking water quality	Mitigating lead risk	Currently, the only accepted solution to mitigate lead risk is lead pipe replacement. This is high cost, high carbon and not acceptable to our customers.  Advances in technology will provide an alternative solution that meets DWI concerns and reduces costs.	Reduction in cost of 10% in AMP 9 and 20% in AMPS 10 - 12.
Resilience	Condition-based maintenance	Better targeting of mains replacement results in efficiency savings	10% reduction in costs from AMP10 onwards
	Quantum computing	Adjusted cost profile to account for delayed technology development. Total spend over the planning period remains the same.	Change to investment profile.
Drainage and water recycling	Digital technologies that enable proactive maintenance, smart sites, catchments and networks	Advanced monitoring and forecasting and intelligent sewer technology will reduce costs by improving our understanding of risk and our ability to predict and manage surface water within existing networks, as well as offering increasing confidence around targeted prioritisation of investment.  Fully integrated digital twins of our WRCs, drainage network and the natural environment will provide real-time insights into how our systems operate and interact with the environment, enabling efficiencies through improved understanding of risk, greater control and management, and just-in-time solutions.	WRC growth cost reductions: 10% AMP10, 15% AMP11 onwards  Network capacity cost reductions: 15% AMP10, 20% AMP11, 20% AMP12  Storm overflows cost reductions: 5% AMP9, 10% AMP10, 15% AMP11, 20% AMP12
	Nature-based solutions	Advances in green and nature-based solutions will make solutions such as wetlands and SuDS increasingly cost effective, reliable, and maintainable, enabling us to increase our ratio of green to grey solutions to deliver a much wider range of ecosystem services without impacting on affordability.	No impact on costs
Bioresources	New technologies will have a significant impact of our Bioresources sub-strategy. In AMP8 we will participate in Phase 2 of the National Bioresources Strategy (CIWEM project), and this will determine our preferred technology with which to replace existing Combined Heat and Power engines nearing the end of their asset life. We have a decision point in mid-AMP8 informed by this project. As a result, we have not quantified any impacts on Bioresources planned expenditure when testing against our final Technology scenario as the changes included within this scenario are preceded and superseded by the earlier decision.		
Net Zero	Low emission HGVs	Low emission HGV not available until 2040 in the slow scenario compared with 2035 in the fast scenario	Adjusted profile of investment

## 5.2 Base

Ofwat expects companies to form a view of what base can deliver over the long-term before determining the additional enhancement required to meet their ambition. In addition, companies have been asked to set out forecast performance improvements from base against common and bespoke Performance Commitments (PCs) to 2050 in table LS2.

Given the expected scale of AMP8 enhancement programmes, and current concerns over affordability, we agree that companies should consider what can be delivered through base before determining enhancement requirements. As is clear from our PR24 submission, base already delivers a lot and the link to enhancement is limited.

### 5.2.1 How base contributes to the delivery of our long-term ambition

In the past, we have delivered performance improvements through base cost allowances and ongoing technological improvements. For example, over AMP7 we have used smart sensors and control systems to manage pressure across our water networks. This reduces stress on the network, decreasing failures and extending asset life in a much more cost-effective way than asset renewal alone.

This is consistent with Ofwat's general approach, whereby it has only allowed specific targeted expenditure to improve service. For us, this most specifically relates to leakage. For the vast array of other performance drivers Ofwat assumes that stretching performance (including upper quartile for some measures) can be delivered through base.

In the development of our LTDS we have not assumed the delivery of our ambition should be paid for through enhancement funding but thought first about the contribution made by base and other areas. This supports the development of a strategy that is both efficient and best value. Our work is summarised in the tables below. For each point in our vision statement, we explain what base could deliver over the long-term and where we will need additional enhancement. We have also considered where enhancement driven by other needs will deliver secondary benefits that support the delivery of our ambition.

Finally, we have highlighted specific examples where our owners are supporting the delivery of our ambition through the provision of additional investment. There are many examples of when our shareholders have supported us to deliver on our purpose, including funding the new East Hills treatment works in 2014, designed to the security of water supply to Norwich and the surrounding area. More recently,

shareholder investments are driving new approaches to environmental enhancement and river health, with our Get River Positive campaign being entirely funded by our owners at no cost to our customers.



## Make Eastern England resilient to the risks of drought and flooding

Vision statement	Base	Investor funding	Secondary benefit from enhancement in other areas	Additional enhancement
All of our customers will have at least two sources of water supply.	<p>Operational response that minimises disruption to customers when incidents occur.</p> <p>Project CREDO to work with other sectors and understand single points of failure considering asset interconnectivity.</p>	Investors have previously reinvested dividend to construct new WTWs for this purpose (East Hills WTW) and will keep this under review.	Some secondary benefit from interconnectors required in rdWRMP where the route of strategic transfers passes close to isolated rural communities.	Additional enhancement required to address remaining population centres and single points of failure. (Resilience sub-strategy).
Two new strategy reservoirs will supply 625,000 properties across our region.	<p>We created Water Resources East back in 2014 to test the concept of regional multi-sector water resource planning. We then took this concept through to the creation of an independent membership organisation enabled by funding for senior staff secondments.</p> <p>Costs of Regional Planning, RAPID and WRMP development have been, and will continue to be, funded from base.</p>	Investors are funding the financing cost of AMP7 RAPID costs ahead of customer funding via PR19 reconciliation in 2025/26.	We are working to integrate the SROs with wider work on Future Fens Integrated Adaptation (FFIA).	Additional enhancement required for the AMP8 development costs to secure the Development Consent Orders and appoint the Infrastructure Providers.
Our customers never experience internal or external sewer flooding.	Our transition to smarter operations will result in a 30% and 25% improvement in internal and external sewer flooding respectively from base. (Our transition to smarter operations will be funded in part through base, as part of regular upgrades to our assets.)	In AMP6 between 2017-2020 our investors reinvested over £4.5m of dividend into our Optimised Sewer Networks (OSN) programme, upgrading control systems to reduce flood risk.	<p>A-WINEP programme will develop a partnership approach to development of landscape-scale solutions to stop surface water entering our network.</p> <p>Investment in reducing spills from storm overflows.</p>	<p>The 'over and above' costs of digital capabilities targeted at reducing sewer flooding. (Drainage and Water Recycling sub-strategy).</p> <p>Increasing capacity in sewer networks to address flooding resulting from hydraulic overload. This includes no-regret investment to mitigate the impact of climate change. (Drainage and Water Recycling sub-strategy).</p>
Rota-cuts and standpipes are consigned to history as we have a 1-in-500 year resilience to drought.	<p>Operational response to drought, including smarter restrictions that avoid the need for standpipes and rota-cuts (e.g. extreme pressure management, use of smart meters and innovative communications).</p> <p>Our Director of Water Services and key senior staff are members of the National Drought Group.</p>	In 2019-20 (AMP7 transition), and again now in 2023-2025 (AMP8 transition), our investors have funded the financing costs of the programmes, which include tens of millions of early-start work on major water resources schemes ahead of customer funding.	Smart metering programme. Leakage reductions.	The cost of developing additional supplies in vulnerable water resource zones to move from 1-in-200 (minimum standard in 2025) to 1-in-500 year resilience. (Water Resources sub-strategy).

Vision statement	Base	Investor funding	Secondary benefit from enhancement in other areas	Additional enhancement
Storm overflows are no longer required.	<p>Our transition to smarter operations will result in 20% of our improvement coming from base in storm overflow discharges. (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p> <p>Within base costs we have a significant cost pressure to eliminate infiltration into our sewer network ahead of enhancement spend.</p> <p>Our Director of Water Recycling chairs the National Pollution Steering Group.</p>	In AMP7 between 2020-2023 we have been able to fund 100% coverage of Event Duration Monitors at sewer overflows, requiring over £14m of investment that was not part of our PR19 Final Determination.	Investments installed in AMP7 to increase storm tank capacity and full flow to treatment are already reducing overflows from our networks.	<p>The 'over and above' costs of digital capabilities targeted at reducing storm overflows. (Drainage and Water Recycling sub-strategy).</p> <p>Enhancement required to increase sewer network capacity. This includes no-regret investment to mitigate the impact of climate change. (Drainage and Water Recycling sub-strategy).</p>
Surface water is prevented from entering our wastewater network through innovative partnership working and nature-based infrastructure.	<p>Our 'make rain happy programme' has been promoting surface water removal since 2015, promoting the use of waterbutts, and working with schools to create rainwater harvesting features in playgrounds.</p> <p>We also work closely with other Lead Local Flood Authorities (LLFAs) such as councils, regularly sharing information and implementing action plans after flooding incident reviews.</p> <p>Senior staff are members of several Regional Flood and Coastal Committees, engaged in key decisions around funding for local authorities and other agencies.</p>		We have pioneered working with developers to separate surface water on new developments, being the first company to release a standard for adoption manual <sup>2</sup> of surface water systems.	<p>A-WINEP programme will develop a partnership approach to development of landscape-scale solutions to stop surface water entering our network. (Environmental Enhancement sub-strategy).</p> <p>Through innovative approaches to partnership working we will leverage multi-sector funding and this will allow us to deliver more for customers, communities and the environment. This supports the delivery of our ambition without having to request additional enhancement.</p>
Integrated, multi-sector water management systems, embedded within smart cities and communities are the norm.	<p>We have led the formation of the Future Fens Integrated Adaptation (FF:IA) programme working in partnership with the EA, Water Resources East and the Cambridgeshire and Peterborough Combined Authority. FF:IA seeks to bring together water resource and flood planning together, alongside strategies around carbon reduction and improved environmental and economic outcomes at landscape scale.</p> <p>FF:IA was used as a global exemplar at COP26 in Glasgow. We continue to fund senior staff time to chair key strategic groups.</p>	Our Get River Positive campaign, where we are trialling new approaches to integrated water management, is funded by our investors.	Managing water quantity and flood risk in an integrated manner delivers wider social and environmental benefits, eg amenity value and biodiversity net gain.	<p>Our A-WINEP programme will provide a blueprint for future investment by trialling of this approach in our two flagship urban catchments, Southend and Great Yarmouth.</p> <p>FF:IA will provide a blueprint for landscape scale integrated water planning.</p>
The risk of exposure to lead in drinking water supplies will be eliminated.	<p>Maintenance of orthophosphoric acid dosing equipment across many of our sites is funded through base along with operational costs of purchasing the chemical.</p> <p>Senior Water Quality staff play key roles in national steering groups around lead.</p>		Lead communication pipes are sometimes replaced by mains renewal teams as part of the replacement of the water main.	Lead pipe replacement in the short-term. Over the long-term, use of a non-invasive technology to address lead risk that meets DWI concerns. (Drinking Water Quality sub-strategy).

1. [make-rain-happy.pdf \(anglianwater.co.uk\)](https://www.anglianwater.co.uk/make-rain-happy.pdf) 2. [aw\\_suds\\_manual\\_aw\\_fp\\_web.pdf \(anglianwater.co.uk\)](https://www.anglianwater.co.uk/aw_suds_manual_aw_fp_web.pdf)



Working with others, we will have delivered significant improvements in ecological quality across our catchments

Vision statement	Base	Investor funding	Secondary benefit from enhancement in other areas	Additional enhancement
<p>Pollutions are consigned to history.</p> <p>Water Recycling Centres and our wastewater network will have the same approach to risk management and control as drinking water assets, 'failing safe' to prevent any impact on the environment.</p> <p>No blockages will occur in our network as a result of customer or food service establishment behaviour.</p>	<p>Our transition to smarter operations will result in</p> <p>51% improvement from base in total pollutions. (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>	<p>Get River Positive commitment to eliminate serious pollutions by 2025 is funded by our owners.</p>		<p>The 'over and above' costs of digital capabilities targeted at reducing pollutions. (Drainage and Water Recycling sub-strategy).</p> <p>A step-change in customer behaviour change campaigns. (Drainage and Water Recycling sub-strategy).</p>
<p>We will enable early delivery of government targets around river health: there will be no additional Reasons for Not Achieving Good Ecological Status (RNAGs) associated with our operations.</p>		<p>This is a Get River Positive commitment and is funded by our owners.</p>		
<p>River health across the region will be continuously monitored.</p>	<p>Our transition to smarter operations will support the delivery of this ambition. (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>			<p>Delivery of WINEP obligation to install river water quality monitors (Environmental Enhancement sub-strategy).</p>
<p>Our region will be regarded as an international exemplar for the use of nature-based solutions to solve water security issues.</p>			<p>A-WINEP (Environmental Enhancement)</p> <p>Delivery of nature-based solutions at scale to increase capacity of our WRCs and wastewater networks (Drainage and Water Recycling sub-strategy).</p>	

Vision statement	Base	Investor funding	Secondary benefit from enhancement in other areas	Additional enhancement
We will be 'nature positive': our operations will actively enable nature recovery and biodiversity enhancement		We have a Get River Positive commitment to plant 111,000 trees (52 hectares) by 2030. This is funded by our owners.	Investment in new water supplies to deliver sustainable abstraction (Water Resources sub-strategy). Best value design of reservoirs maximises biodiversity benefit. Delivery of nature-based solutions at scale to increase capacity of our WRCs and wastewater networks (Drainage and Water Recycling sub-strategy). Embedding circular economy principles into bioresources (Bioresources sub-strategy).	Delivery of WINEP. A-WINEP programme will develop a systems-based approach to environmental enhancement. Through innovative approaches to partnership working we will unlock multi-sector funding allowing us to deliver more for customers, communities and the environment. This supports the delivery of our ambition without having to request additional enhancement. (Environmental Enhancement sub-strategy).
We will cease all abstraction from chalk aquifers and other sensitive habitats, unless our abstraction provides a positive benefit (e.g. reducing flood risk).			A-WINEP programme will develop a systems-based approach to environmental enhancement. This will support the delivery of sustainable abstraction by identifying alternative solutions to achieve sustainable abstraction. (Environmental Enhancement).	Low-regret investment in new water supplies to deliver sustainable abstraction (Water Resources sub-strategy). Delivery of catchment solutions to achieve sustainable abstraction. (Environmental Enhancement sub-strategy). Decisions to go beyond the legal minimum this will be subject to cost benefit assessment and tested with customers.
No effluent will be discharged into the marine environment, it will be reused to support environmental enhancement or to support sustainable growth.			Options considered as part of the WRMP process. Development of Colchester reuse plant in AMP8. (Water Resources sub-strategy).	
Land and water planning will be undertaken together, with soil health considered alongside river health.	Continuation of existing multi-sector planning, including Water Resources East (WRE) and establishment of new approaches such as Systematic Conservation Planning.			A-WINEP programme will develop a systems-based approach to environmental enhancement. (Environmental Enhancement sub-strategy).
Environmentally damaging substances such as PFAS (forever chemicals) and microplastics will be eliminated at source.	Continuation of catchment management approaches.			Twin-track investment in water treatment to eliminate PFAS risk while we wait to see the benefits of catchment management. (Drinking Water Quality sub-strategy).



## We will be a net zero carbon business

Vision statement	Base	Investor funding	Secondary benefit from enhancement in other areas	Additional enhancement
<p>We focus on eliminating waste and the root causes, leading to reduced chemical and energy use in our management of the water cycle.</p> <p>Our global leadership on net zero has enabled us to focus on eliminating waste and the root causes, leading to reduced chemical and energy use in our management of the water cycle.</p>	<p>Our transition to smarter operations will support the delivery of this ambition allowing us to optimise our operations making them much more efficient (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>		<p>The 'over and above' costs of digital capabilities (spread across multiple strategies)</p> <p>Lead pipe replacement will reduce phosphate dosing costs.</p> <p>By keeping surface water out of sewers we reduce pumping.</p> <p>Demand management reduces the water we would need to otherwise abstract from the environment, then pump and treat.</p>	<p>This will also rely on elements of enhancement funding such as nitrous oxide real time control, releasing the opportunity for digital optimisation.</p>
<p>Our operations enable other sectors (particularly agriculture, and the wider transport and energy sectors) to be closer to net zero through innovative use of waste materials such as treated sludge and effluent</p>	<p>Initiatives such as the Oast House low carbon farming project, where 'waste' heat is recovered from our treatment processes and used to grow tomatoes.</p>		<p>Advances in bioscience will create new opportunities for bioresources to recover valuable resources and energy. (Bioresources sub-strategy)</p>	
<p>Our treatment processes do not emit greenhouse gases such as methane and nitrous oxide</p>	<p>Our transition to smarter operations will support the delivery of this ambition allowing us to optimise our operations making them much more efficient (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>		<p>The 'over and above' costs of digital capabilities (spread across multiple strategies)</p>	<p>New treatment processes to tackle process emissions. (Net Zero sub-strategy)</p>
<p>We invest in carbon markets only where we can stack and deliver other environmental benefits</p>				
<p>We have ambitions to move beyond net zero and become a carbon positive business, reducing rather than contributing to the UK's emissions</p>	<p>Our transition to smarter operations will support the delivery of this ambition allowing us to optimise our operations making them much more efficient (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>	<p>Investment in renewables</p>	<p>The 'over and above' costs of digital capabilities (spread across multiple strategies)</p> <p>Delivery of nature-based solutions at scale to increase capacity of our WRCs and wastewater networks (Drainage and Water Recycling sub-strategy).</p> <p>Embedding circular economy principles into bioresources (Bioresources sub-strategy)</p>	<p>In addition to tackling process emissions (described above), investment in:</p> <ul style="list-style-type: none"> <li>• Low carbon chemicals</li> <li>• Gas to grid schemes</li> <li>• The transition of our HGV fleet to low carbon emission alternatives.</li> </ul> <p>(Net Zero sub-strategy)</p>



## Enable sustainable economic and housing growth in the UK's fastest-growing region

Vision statement	Investor funding	Base	Secondary benefit from enhancement in other areas	Additional enhancement	Rationale for additional enhancement
We will have capacity to support all customers at risk of water poverty	Medical needs tariff	Continue to drive efficiencies across our business			
We are a water neutral region. Customers will have reduced their consumption by 25% compared to 2020, and leakage levels will have reduced to globally leading levels		<p>Working with developers and government to establish Water Neutrality in our region</p> <p>Smart metering programme partially funded through base</p> <p>Further water efficiencies 'unlocked' by smart meters as customers able to invest in smart home appliances etc</p> <p>Base water efficiency campaigns</p> <p>Maintain existing leakage levels</p>		<p>Delivery of our demand management strategy:</p> <ul style="list-style-type: none"> <li>· 'Over and above' costs associated with smart metering programme</li> <li>· Additional water efficiency campaigns that build on smart metering</li> <li>· Further reduction of leakage levels from baseline</li> </ul> <p>(Water Resources sub-strategy)</p>	An integral part of our WRMP
The region will have the capacity to support the water demands for new businesses		Continuation of existing multi-sector planning, including Water Resources East (WRE)		Development of new supplies to meet additional water demands for energy (Water Resources sub-strategy)	WRMP
Planning requirements will mean that all new housing and commercial developments are built to deliver international best practice around water efficiency		<p>Lobbying local and national government to impose tighter water efficiency standards</p> <p>Collaboratively working with developers</p>			

Vision statement	Investor funding	Base	Secondary benefit from enhancement in other areas	Additional enhancement	Rationale for additional enhancement
<p>Coastal and inland bathing water locations thrive due to their excellent water quality</p>	<p>We have Get River Positive commitments to:</p> <ul style="list-style-type: none"> <li>· Ensure that within 10 years, 90% of the population in these regions will live within an hour's drive of a bathing site.</li> <li>· Work with local river groups and communities to prioritise at least two river water bathing sites for early implementation.</li> <li>· Continue to promote the use of our existing inland bathing water at our Rutland Water reservoir and will look for opportunities to further increase recreational access to our reservoir sites.</li> <li>· Eliminate serious pollutions by 2025</li> </ul> <p>These will be funded by our owners.</p>	<p>Our transition to smarter operations will result in and improvement of 3% and 51% in storm overflow discharges and total pollutions. (Our digital transformation will be funded in part through base, as part of regular upgrades to our assets.)</p>	<p>Enhancement investment aimed at reducing pollutions and storm overflow spills. (Drainage and Water Recycling sub-strategy)</p>	<p>Deliver our WINEP obligation to ensure that all our storm overflows are fitted with screens. (Environmental Enhancement sub-strategy)</p> <p>As part of our AMP8 WINEP programme, install disinfection of final recycled water at water recycling centres discharging into two inland bathing waters at Rutland Water and the River Deben at Woodbridge. (Environmental Enhancement sub-strategy)</p> <p>At the time of writing we are supporting eight other sites which are applying for designation as bathing waters, but have not yet been successful. Currently no enhancement investment in our plan associated with these sites. We are proposing this bespoke uncertainty mechanism to fund the necessary actions we will need to take at these locations if and when the sites are designated.</p>	<p>Meeting WINEP obligations.</p>
<p>Water and drainage capacity is considered at least 10 years ahead of major housing and non-household development</p>		<p>Further development of our strategic planning capabilities and the DWMP framework</p>			

## Our approach to Asset Management

Our assets are a vital part of our ability to deliver our purpose of bringing environmental and social prosperity to the East of England. Every day our teams use them to provide safe clean drinking water, protect the environment and deliver excellent service. Central to this is ensuring we take the time to understand asset health and potential consequences of failure, in order to prioritise activity and target investment in the right places.

Our Asset Systems Resilience Appraisal (“ASRAP”) is a central part of how we will deliver against the four long term ambitions set out in our Strategic Direction Statement and informs the development of our understanding of how the performance of our assets, and by extension, the service we provide to customers and the environment, is expected to change both in the short and longer term. The ASRAP helps us to understand the long-term risks of asset failure to customers and the environment.

The ASRAP outlines our long-term strategic plan for asset health related activity. It is central to our LTDS and the wider links into the strategic frameworks of Water Resource Management Plan (WRMP), Drainage and Wastewater Management Plan (DWMP) and the Water Industry National Environment Programme (WINEP).

In developing the ASRAP, we have completed the most holistic review of the resilience of our entire asset base we have ever attempted. This review has been timed to inform the Price Review 2024 PR24 and our LTDS.

Subsequent to PR19, we have worked collaboratively with Ofwat and other water companies to co-create and complete the Asset Management Maturity Assessment (AMMA)<sup>91</sup>. This was a significant undertaking for the sector, seeking to understand the respective maturity and leadership of Asset Management approaches across a suite of relevant factors.

Figure 34 Our Asset Management Maturity Assessment (AMMA)



This AMMA assessment demonstrates the maturity of our approaches to Asset Management across the Board, highlight our strengths and leadership in this area.

We have followed the principles of this framework in our asset system resilience appraisal, and supplemented the engineering assessments with financial measures of sustainability, and believe the evidence we have assembled is consistent with Ofwat’s expectations to demonstrate the need for increased maintenance allowances in the period beyond 2030, and for increased spending to tackle specific resilience threats in the period 2025-2030.

We have used this detailed analysis, informed by an assessment of forward-looking asset health in the ASRAP to inform the assessment of how existing base expenditure will impact service in the longer term.

**We understand our asset base and have robust systems in place to understand the impact of risks on these assets and their ability to provide service to our customers.**

We were the first water company to achieve ISO55001 accreditation, and for many years lead the Asset Management workstream at UKWIR, as well as being active participants in the International Water Association LESAM (Leading Edge Strategic Asset Management). This demonstrates our track record of experience which we have used to lead the industry in how to assess asset health risks.

91 [Asset management maturity assessment \(AMMA\) - Ofwat](#)

In 2021, Ofwat's assessment Management Maturity Assessment (AMMA) demonstrated that we are leading in the UK Water Sector. We have established forward-looking engineering models which have been progressively improved since PR09, and can now predict performance further into the future, helping inform projections of company performance in our new Long Term Delivery Strategy (LTDS).

We have also developed tactical models such as WISPA (Water Infrastructure Serviceability Performance Assessment), which use detailed analysis of real world failure data to provide month by month predictions of burst rates by pipe, linked to soil condition and climatic changes, demonstrating our deep knowledge of the asset health of our water mains.

Our customers tell us that they trust us to understand these issues and expect us to be good stewards for future generations.

#### **We understand the long-term impact of a changing climate on our assets**

As part of our delivery process we routinely assess the risk of climate change on assets so that future climate impacts can be avoided in the design phase. In practice most of our asset base is already witnessing climate change impacts now. As part of our Climate Adaptation Strategy 2020, we sought to better understand the risk to our historic asset base and have combined our strategic and tactical models to improve our forecasts and take account of our changing climate. Working with expert academics we are now able to isolate vulnerable assets and predict the impact of climate change on likelihood of failure into the long term. This includes pipes affected by increasing ground movement and mechanical and electrical assets that require new cooling systems to avoid overheating.

We use industry leading tools such as Copperleaf Predictive Analytics (PA) to help develop our understanding further, by predicting the effect on long term performance of different investment strategies.

#### **Our systems and approaches are subject to external assurance and scrutiny**

We undertake an annual external review by the British Standards Institute (BSi) to retain our ISO55001 accreditation. Our Business Plan has also included external assurance by Jacobs on the use of Predictive Analytics to model climate change impacts. In addition, we have been externally recognised as winners of the 2022 Asset Management Initiative of the year at the Water Industry Awards. We also sought the views of Dr Harry Bush in light of his PR19 work (with John Earwaker) on forward looking capital maintenance assessments<sup>92</sup>.

#### **These approaches inform our capital maintenance activity and how this has evolved over time**

We have always spent our base allowances in the past. Over that period base expenditure delivered historical service levels alongside historical demands on our assets as witnessed through the performance metrics of the time.

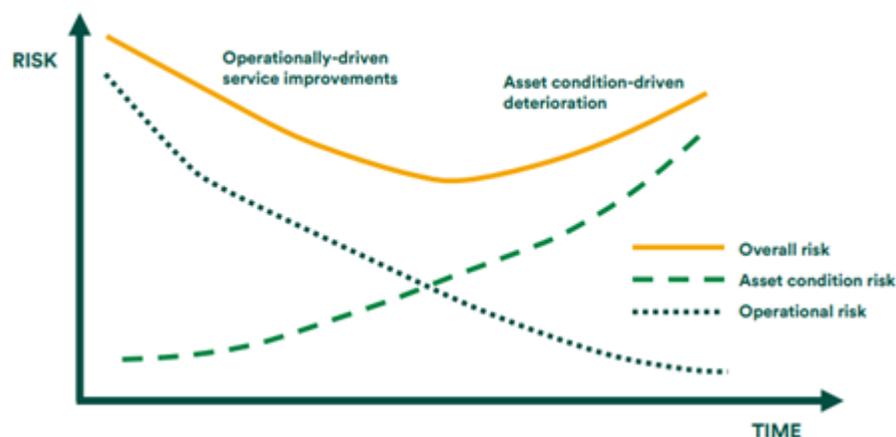
We don't just focus on "traditional" proactive and reactive maintenance of assets. Rather, we have been able to smooth some of this impact over time using operational interventions and state-of-the-art risk evaluation and decision making. We are transitioning to more digital ways of managing the performance of our assets - for instance sewer monitors that provide early warning of blockages that could cause pollutions, catching them before they happen, or using machine learning to monitor pump performance and call for proactive maintenance before failure.

However, whilst these interventions improve service, they don't improve underlying asset health and don't last forever as a strategy. Once all of the network is smart and optimised there are diminishing returns. We see this in practice as we have installed advanced pressure management or variable speed pumps to reduce pressure transients in most of our treated water network. This effect is echoed by others in the sector, in particular United Utility's paper on asset health submitted to the Future Ideas Lab which contained this illustration:

92 4a-providing-appropriate-regulatory-funding-for-capital-maintenance-activity.pdf (anglianwater.co.uk)

Figure 35 United Utility’s paper on asset health submitted to the future ideas lab

Figure 3: Operational improvements and innovation can mask underlying asset condition deterioration – for a time



## 5.2.2 Our approach for PR24

We have set out to improve our approach to assessing the long-term performance of our assets

In response to Ofwat’s ask to define ‘what base buys’ in the long term, there is an expectation of companies to take account of the approach set out in LTDS guidance<sup>93</sup>. This proposed approach to determining future performance delivered from base is backward looking only in nature, using historic observed performance trends.

We believe to assess the role of existing base expenditure on service requires a detailed analysis, informed by an assessment of forward-looking asset health. These findings can then be considered as well as using top down backward looking econometric approaches. The Final Methodology notes that bottom-up approaches would be taken into account when setting Performance Commitment Levels for 2030. Fundamentally, the stability of future performance is a function of whether maintenance levels are sustainable. The future is different to the past, and will lead to different demands for maintenance.

93 PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies\_Pr24.pdf (ofwat.gov.uk)

To complete the forward-looking assessment we have grouped our vast £68bn asset base into nine asset classes that share common characteristics so they can be modelled together using statistically significant drivers of likelihood of failure.

This does not cover our whole asset base; we have significant capital maintenance expenditure requirements on other unmodelled assets; water meters and meter chambers, long sea outfalls, overflow screens, pipe bridge structures, back-office IT systems, fleet vehicles, emergency response equipment, recreation assets, and health and safety assets like ladders, walkways, hatches, access roads, fencing, security systems. It also doesn’t cover investment in new assets deemed to be base to comply with existing permits.

### Developing the unmitigated risk position

In our unmitigated risk assessment we generate a modelled likelihood of failure using deterioration curves, combined with consequence models that predict the likely impacts of asset failure.

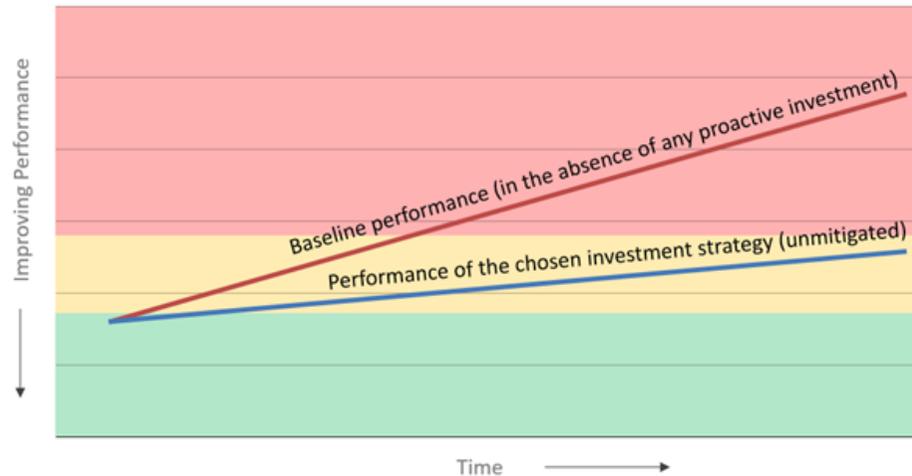
We do this for each asset using hydraulic and process models, GIS analysis and simulations of failure of equipment on our sites.

**This assessment tells us that not all assets have the same unmitigated risk position now or in the future**

Using this unmitigated risk assessment we have derived a Red/Amber/Green for each of the asset classes. The unmitigated RAG is based on the long term trend in residual performance. If residual performance remains flat over time then it’s assessed as green since performance at that base level of funding is expected to be stable.

If the residual is increasing over time then it’s assessed as amber or red since the base level of funding is not expected to be enough to hold performance stable, instead deteriorating over time. The risk of asset failure is summarised in the following format throughout the document:

Figure 36 Presentation of results



**We have a comprehensive approach to understanding the mitigations we can make to our assets**

For each of the nine assessed asset classes we have set out clear explanations of the major mitigations that we have considered (operational practices, smarter interventions, or changes into expenditure focussed on these particular asset classes).

We use the impact of these potential “mitigations” by asset class to derive the mitigated positions presenting in the ASRAP.

For example, on water mains we have assessed the impact of mix of operational interventions such as installation of pressure management schemes and optimisation of existing ones in the short term to achieve burst reduction. In other areas, such as storage point maintenance, we have assessed the impact of increased activity and expenditure as a mitigation.

We have conducted this analysis over 3 time periods: 5-year, 10-year and a longer term 25-year horizon to align with our Strategic Direction Statement and Long Term Delivery Strategy.

- Green denotes our assessment of stable performance;
- Amber denotes worsening performance; and
- Red denotes severe deterioration in performance.

We have summarised our findings in the table below. Further detail is provided in the following sections of the ASRAP.

Our analysis shows that after mitigations from operational practices, reallocation of resources and the adoption of smart approaches to network and asset management, asset performance can be held stable and deliver some performance improvement in AMP8 at current capital maintenance expenditure levels, with the addition of enhancement allowances to tackle specific threats relating to climate risk, physical and cyber risk, flooding and single points of failure.

However, from AMP9 we expect to need to increase spending on asset replacement and renewal, as we illustrate for the longer term below:

Figure 37 Modelled prediction of asset performance - summary over 25 years

Asset class		Unmitigated			Mitigated		
		5 year	10 year	25 year	5 year	10 year	25 year
Pipelines	Treated water mains	↘	↓	↓	↔	↘	↓
	Gravity sewers	↘	↓	↓	↔	↘	↓
	Rising mains	↔	↔	↔	↔	↔	↔
Treatment	Water treatment works	↔	↔	↘	↔	↔	↘
	Water recycling centres	↔	↔	↘	↔	↔	↘
	Bioresources	↔	↔	↘	↔	↔	↘
Pumping	Boosters	↔	↔	↔	↔	↔	↔
	Sewage pumping stations	↔	↔	↔	↔	↔	↔
Storage	Storage points	↘	↓	↓	↔	↘	↓

These findings suggest that asset classes that are primarily dependent on short life mechanical and electrical assets to achieve performance have been prioritised in maintenance budgets, with longer lived assets such as buried pipelines and concrete or steel tanks having expenditure levels that appear unsustainable in the long term.

We've also thought about resilience in broader terms not just asset failure, and have outlined our strategies that address other asset shocks and stresses that could impact performance, for example risks of power outage to the site, flooding of the site, or security breaches.

### **This has informed our mitigated view of balanced interventions**

This view of predicted performance in the analysis we have conducted forms the basis of our plan for AMP8. We believe we have followed a thorough process, and competently and comprehensively demonstrated our bottom-up view at an asset class level of detail. We are not looking at this in an alarmist way, with only today in mind but have placed immediate requirements in the context of a mature long-term strategic approach in line with the recommendations of the AMMA process, that will benefit our customers and the environment in the long term. We will continue to update this view at future price reviews and make the case for increased base expenditure where the evidence shows this is required to sustain performance.

### **We plan to work constructively with Ofwat and other companies to prepare for PR29**

In 2022 we responded to Ofwat's consultation on Assessing Base Costs, providing suggested alternate approaches to determining future maintenance allowances. Advances in widespread asset monitoring mean that we now have more data available than ever before. Where we have gaps in our understanding we will work to close these and iterate our appraisal, working closely with Ofwat and other stakeholders to prepare for future price reviews, adopting a forward-looking approach to determining appropriate levels of base activity to ensure performance is sustainable in the long term.

## **5.2.3 Forecast performance improvements from base**

We have used the ASRAP appraisal to inform our projections of forecast performance improvements from base against each of the performance commitments. In addition, we have worked with Reckon LLP to develop an approach to setting targets using trend analysis and econometric modelling. This has helped us to develop a robust backwards-looking understanding of our own performance trends and what other companies have delivered, as per Ofwat's guidance for assessing performance from base.

As noted in ASRAP, there is a limit to what can be achieved through smart approaches to network management and condition-based maintenance. For example, pressure management reduces the stresses placed on assets meaning that they should deteriorate more slowly, avoiding bursts for longer. Eventually the asset still needs to be renewed, since deterioration is slowed not avoided completely. Condition based maintenance may also help to target maintenance activity to assets most at risk of failure based on sensors that directly or indirectly monitor condition, as opposed to time-based maintenance activity. This will mean that a given level of maintenance spend is more effective in avoiding asset failure, but again the assets still reach a point where they must be renewed.

### **Following Ofwat's advice<sup>94</sup>, our assessment of forecast improvements from base expenditure does not show forecast deterioration in performance resulting from asset health, climate change or other pressures.**

Instead, we assume that capital maintenance allowances will increase sufficiently to maintain stable performance from AMP9 onwards. The increase in capital maintenance will be at least partially offset by the performance improvements from base, reducing the total uplift required. As a result, we will hold performance steady in a number of areas, rather than delivering incremental improvements on today's performance.

In some cases, where the net effect of our forward look of asset performance and impact of future technologies is positive, we've identified these as performance improvements from base and accounted for this improvement before considering the need for additional enhancement. Where we have identified that current base funding levels would result in performance deterioration over the longer term, and that the potential mitigations provided by advances in technology are unlikely to fully offset this, we have followed the guidance to assume capital maintenance funding would increase to maintain performance. In such cases, what base buys is a lower capital maintenance uplift and overall performance is assumed to remain stable, rather than improving.

To develop a final view of forecast performance, we then needed to understand the impact of our core pathway on our performance trends. In defining our ambition, we considered the outcomes we hope to achieve, as opposed to setting a specific level of performance for individual PCs. As a result, our ambition does not define a target for every PC, although in some cases there is a direct overlap, as shown in the table below. In some instances, although our ambition is related

<sup>94</sup> Table query 272: 'For table OUT2 we expect companies to stretch themselves on what they can deliver from base, assuming they will receive efficient cost allowances to address any deteriorating performance (e.g. allowances for growth in network). Therefore, we do not expect companies to show performance degradation due to these factors in table OUT 2

to a PC, because of the specific way the PC is defined there is not a direct relationship. For example, our ambition to become a carbon neutral business is related to, and partially reflected in, the Operational Greenhouse Gas PC.

**Table 44 Performance commitment and ambition targets**

Common performance commitment		2050 target defined in our ambition
Water	Business demand	20% reduction (relative to growth)
	Leakage	38% reduction from 2017-18
	Mains repairs	-
	PCC	100MI/d
	Quality contacts	-
	Supply interruptions	-
	Unplanned outage	-
Water recycling	Bathing water quality	-
	External sewer flooding	Greatly reduce, if not eliminate
	Internal sewer flooding	Greatly reduce, if not eliminate
	River water quality	-
	Serious pollutions	Zero
	Sewer collapses	-
	Storm overflows	Greatly reduce, if not eliminate
	Total pollutions	Greatly reduce, if not eliminate
Cross business	Biodiversity	-
	Operational greenhouse gasses	-

Our strategy is designed to deliver our ambition however, it will also drive efficiencies and performance improvements across our business. So, although our ambition does not directly set a target for each PC, we expect to see an improvement in performance in many areas.

<sup>95</sup> Particularly advanced sensing, digital twins, the Internet of Things and artificial intelligence

In particular, our core pathway also includes a significant investment in digital technologies<sup>95</sup> that will completely transform our company and the way we work. Our operations will become increasingly efficient, optimised using data and analytics, allowing us to cut costs, reduce energy consumption and operational emissions. It will also allow us to increasingly move away from a reactive maintenance regime, responding to incidents as they occur and repairing on-failure. Instead, we will move to a preventative and proactive maintenance regime, fixing problems before they occur and driving performance improvements across our business.

Some of these future technology improvements will be delivered through base as we upgrade our existing assets with smarter and more efficient equivalents. In other cases investment in new technologies will be required to deliver enhancement improvements. In these cases only the 'over and above' costs will be funded through enhancement, in the same way smart meters are being funded in AMP7 and AMP8.

The table below sets out the ambitious performance improvements we expect to deliver from base.

**Table 45 Forecast performance improvements from base**

Common performance commitment		Forecast performance improvement	
		AMP8	2050
Water	Business demand	None	None
	PCC	None	2.4% reduction
	Quality contacts	8% reduction	29% reduction
	Supply interruptions	49% reduction	62% reduction
	Unplanned outage	24% reduction	51% reduction
	Water recycling	External sewer flooding	Stable
Water recycling	Internal sewer flooding	Stable	20% reduction
	Storm overflows	3% reduction	18% reduction
	Total pollutions	35% reduction	51% reduction

Common performance commitment		Forecast performance improvement	
		AMP8	2050
Cross business	Biodiversity	22 biodiversity units created	76 biodiversity units created
	Operational greenhouse gases (water)	2% reduction	Emissions expected to increase in the long term from base
	Operational greenhouse gases (water recycling)	Emissions expected to increase in AMP8 from base	Emissions expected to increase in the long-term from base
	Low carbon concrete	20% reduction	70% reduction

The nature of our large and predominantly rural networks makes this a particularly challenging measure compared to our peers. Nevertheless, since the introduction of the water supply interruptions measure in AMP6 we have delivered a step-change in performance over two AMPs from base expenditure.

This has primarily been achieved through a focus on restoration and through our pressure management strategy that helps to calm networks and prevent bursts in the first place. Our leading approach to developing Smart Networks underpinned both our ability to prevent bursts and to identify them and respond quickly.

Technology and innovation will be even more critical for success in driving further improvements from base allowances in AMP8 - particularly through condition based monitoring and maintenance, increasingly optimised smart networks and digitally supported operations that help our field teams to respond.

We're actively looking to other sectors such as Oil & Gas to adopt and adapt innovations to support improvements to water supply interruptions through four main improvement areas:

- Maintaining asset uptime.
- Proactive identification of issues.
- Rapid response and repair.
- Incident management.

### Pollutions - 35% reduction from Base in AMP8

Our Pollution Incident Reduction Plan, updated in 2023<sup>96</sup>, shows how we are committed to achieving significant reductions in pollution incidents in AMP7 and beyond and outlines our strategy to achieve this. These reductions are being delivered within base allowances.

Investing in digital capabilities is a key part of this strategy including:

- Dynamic sewer visualisation combining network monitors with weather data to identify blockages using Storm Harvester. We will have installed around 22,000 monitors by the end of 2023. During AMP8 we will expand this considerably, and expect to have visibility of another 23,000km of sewers.
- Pressure monitoring of rising mains to identify bursts using Syrinix which automatically sends live alerts for our Tactical Operations teams to investigate. More than 660 monitors have already been installed
- In addition to new physical monitors, we are applying machine learning algorithms to data from a wide range of existing telemetry sources using Ovarro to identify deviations from normal behaviour across our rising mains and pumping stations.
- Transition of maintenance activity to condition based maintenance.

In addition we are currently trialling a number of innovations that, if successful, we will roll-out in AMP8:

- Early warning of biofilter performance using Info-Tiles
- Final Effluent Pod Monitors to provide mobile real time visibility for sites without permanent, continuous final effluent quality monitoring.

96 <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/pollution-incident-reduction-plan/>

## 5.3 Monitoring the plan

The monitoring plan below sets out how we will determine whether, and when, we need to adapt one or more elements of our long-term strategy for changing circumstances. The plan includes the metrics we will monitor for each scenario we have identified as potentially triggering an alternative adaptive pathway, how these will be calculated where appropriate and any relevant data sources. Each metric will be monitored against a specified threshold and the actions needed in the event of this threshold being reached are clearly stated.

**Table 46 High abstraction reductions**

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
Long term Environmental Destination	Review Environmental Destination scenarios in accordance with the outcome of WINEP investigations	Mid-AMP review to inform the following price reviews	More ambitious Environmental Destination set by WRE	Enhancement case submission	<b>Water resources</b> Increased use of desalination to maintain the supply/demand balance in a warmer, drier environment	Approval of relevant enhancement case by Ofwat
	Review environmental destination scenarios in accordance with the outcome of WINEP investigations	Mid-AMP review to inform the following price reviews	More ambitious Environmental Destination set by WRE	Enhancement case submission	<b>Drinking water quality</b> - Investment to install additional membranes at water treatment works. - Additional investment to address saline intrusion to water sources - Additional treatment to address nitrate and PFAS levels	Approval of relevant enhancement case by Ofwat
	Review environmental destination scenarios in accordance with the outcome of WINEP investigations	Mid-AMP review to inform the following price reviews	Change in water resources options and timing to achieve Environmental Destination	<b>Environmental enhancement</b> Reduce spend in AMP11 and 12 on nitrate and phosphorus removal and ecological status improvement under WFD		Tighter abstraction licences imposed by the EA or improvements to the ecological status of water courses
River flow and water quality	Review of observed river flow and water quality data within environmental models	Mid-AMP review to inform the following price reviews		<b>Wastewater treatment</b> Reduced spend in AMP11 and 12		No change in permit requirements

Table 47 High climate change

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
Change in rainfall patterns/drier, hotter summers and intense rainfall causing run off	AWS monitoring	Mid-AMP review to inform the following price review.	Change in water resources options and timing to achieve Environmental Destination	Enhancement case submission	<b>Water resources</b> Significant increased use of desalination to ensure supply/demand after additional licence caps are implemented to support the enhanced ED scenario	Approval of relevant enhancement case by Ofwat
Intense rainfall events and dry periods	AWS monitoring	Ongoing, with mid-AMP review to inform following price review.	Increased numbers of sites with adverse impacts - e.g. increased nitrate and PFAS levels in water sources.	Enhancement case submission	<b>Drinking water quality</b> - Investment to install additional membranes in water treatment activity - Additional investment to address saline intrusion to water sources - Additional treatment to address nitrate and PFAS levels	Approval of relevant enhancement case by Ofwat
Intensity and frequency of rainfall.	AWS monitoring	Mid-AMP review to inform the following price review.	Increased rainfall	Enhancement case submission	<b>Net Zero</b> Additional spend in treatment chemicals	Approval of relevant enhancement case by Ofwat
Number of bursts linked to rainfall events, increases in temperature or extended dry periods	Operational data on the number of bursts compared to rainfall and temperature data	Mid-AMP review to inform the following price review.	Operational data on the number of bursts compared to rainfall and temperature data	Enhancement case submission	<b>Resilience (water)</b> Additional per AMP expenditure to support an accelerated climate vulnerable mains renewal programme	Approval of relevant enhancement case by Ofwat
	Operational data on the number of bursts compared to rainfall and temperature data	Mid-AMP review to inform the following price review.	Operational data on the number of bursts compared to rainfall and temperature data	Enhancement case submission	<b>Resilience (water recycling)</b> Additional per AMP expenditure to support an accelerated climate vulnerable sewers renewal programme	Approval of relevant enhancement case by Ofwat

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
Environmental quality	Review observed environmental quality data	Mid-AMP review to inform the following price review.	Environmental deterioration risk (observed or modelled)	Enhancement case submission	<b>Wastewater treatment</b> Increased costs in marine, WFD quality, chemicals removal and urban wastewater quality from AMP9 onwards	Approval of relevant enhancement case by Ofwat
	Review observed environmental quality data	Mid-AMP review to inform the following price review.	Environmental deterioration risk (observed or modelled)	Enhancement case submission	<b>Environmental enhancement</b> Increased costs in WFD flow, drinking water quality and biodiversity programmes from AMP9 onwards	Approval of relevant enhancement case by Ofwat
Rainfall and intensity frequency	Review long term trends in number of spills, pollution and flooding incidents	Ongoing	Deteriorating performance	Enhancement case submission	<b>Drainage and water recycling / environmental enhancement</b> Increased spend on networks and storm overflows to provide additional capacity. Delayed investment brought forward from later AMPs.	Approval of relevant enhancement case by Ofwat
Flow volumes	Review of WFD datasets to assess the impact of drought on flow volumes	Mid-AMP review	Decline in observed conservation status / environmental quality associated with climate change	Enhancement case submission	<b>Environmental enhancement</b> Increased spend on WFD flow and biodiversity programmes	Approval of relevant enhancement case by Ofwat
Forecast landbank headroom	Landbank modelling review	Mid-AMP review	<10%	Enhancement case submission	<b>Bioresources</b> - AMP10: additional plant using new technology - AMP11: additional plant using new technology	Approval of relevant enhancement case by Ofwat

**Table 48 Slower technology**

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached	Trigger point
Compliance with NIS	Review of changes to regulatory requirements	Ongoing	Change in NIS requirements	<b>Resilience - cyber</b> Adjust expenditure profile to account for delayed technology development	Change in NIS requirements
Availability of improved real-time condition-based monitoring and remote sensing	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Resilience (water)</b> 10% increased expenditure from AMP10 due to a less targeted mains replacement	2035
	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Resilience (water recycling)</b> 10% increased expenditure from AMP10 due to a less targeted sewer replacement	2035
Smart sites, digital twins, nature based solutions	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Wastewater treatment</b> Increased spend in chemical removal, marine and WFD quality	2035
Smart catchments	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Environmental enhancement</b> Increased spend on WFD flow, eels, drinking water quality and biodiversity programmes	2035
Commercial viability of low carbon HGVs	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Net Zero</b> Adjusted (timing) profile of spend to account for changing timing of commercial viability low emission HGV investments	2035
Desalination, technology, household and consumer technology	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Water resources</b> Additional activities identified the WRMP preferred pathway to mitigate supply losses due to Environmental Destination	2035

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached	Trigger point
Availability of a viable alternative for lead pipe replacement	Technology scan to determine cost effectiveness and commercial viability of emerging technologies	Annual	2035	<b>Drinking water quality</b> Increased costs to remove lead from our network - up to 10% additional costs in AMP 9 and 20% in AMPS 10 - 12	Technologies available, deliverable and cost effective. Evidence that they deliver assumed benefits
Smart sites, catchments and networks. Nature-based solutions	Technology scan to determine cost effectiveness and commercial viability of emerging technologies and feedback from pilots and innovation projects	Annual and ad-hoc	2035	<b>Drainage and water recycling</b> Additional investment required across networks, WRCs and storm overflows.	

**Table 49 Adverse landbank availability**

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
Identification of a feasible alternative to incineration	Outcome of Resilient Bioresources research project	Mid-AMP review	Research fails to confirm a feasible alternative to incineration	Enhancement case submission	<b>Bioresources</b> - AMP8-9: 4x incinerators - AMP11: additional incinerator	Approval of relevant enhancement case by Ofwat
				Enhancement case submission	<b>Net Zero</b> Additional spend in treatment chemicals	Approval of relevant enhancement case by Ofwat
Forecast landbank headroom	Landbank modelling review	Mid-AMP review	<20%	Enhancement case submission	<b>Bioresources</b> - AMP8-9: 4x incinerators - AMP11: additional incinerator	Approval of relevant enhancement case by Ofwat
				Enhancement case submission	<b>Net Zero</b> Increased N2O and CH4 emission reduction interventions	Approval of relevant enhancement case by Ofwat

**Table 50 Benign landbank availability**

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
FRfW interpretation	FRfW interpretation clarified by EA	Ongoing	FRfW interpretation enables continued disposal to land	Enhancement case submission	<b>Bioresources</b> AMP11: new plant using new technology proven through the research project	Approval of relevant enhancement case by Ofwat
Forecast landbank headroom	Landbank modelling review	Mid-AMP review	>40%	Enhancement case submission	<b>Bioresources</b> AMP11: new plant using new technology proven through the research project	Approval of relevant enhancement case by Ofwat

**Table 51 Adverse water for energy**

Metric	Calculation and source of data	Date / Frequency of review	Monitoring threshold / Decision point	Action taken once threshold reached		Trigger point
Development and location of new hydrogen production or carbon capture, storage and utilisation facility	Review planning for hydrogen production or carbon capture, storage and utilisation facilities	Ongoing	>1 site approved requiring desalinated water developed by AWS and/or treated wastewater	Enhancement case submission	<b>Water resources</b> Increased desalination to provide additional water required	Approval of relevant enhancement case by Ofwat
SEMD risk status related to approved energy production facility	SEMD audit to comply with revised security status	Ongoing	Increased SEMD risk status	Enhancement case submission	<b>Resilience - SEMD</b> Increased SEMD expenditure from AMP9 due to higher risk status of sites supplying energy providers	Approval of relevant enhancement case by Ofwat

We plan to monitor our progress of our long-term adaptive strategy as part of our wider risk management processes. Reviewing our progress against decision points, the scenarios and sensitivity testing assumptions annually as part of our internal annual performance review process will inform any in-AMP adjustments or switches to alternative pathways needed to deliver our ambition. Understanding how scenarios are evolving will be captured through our business-wide horizon and technology scanning, including feedback from our pilots and innovation fund projects. We will undertake a full review of the LTDS as a whole as part of our PR29 submission. Reporting will be aligned to existing publications to show how our progress towards our ambition relates to performance as a whole.

**Comparing to our plan to previous long-term strategies.**

In preparing the LTDS we have drawn on our experience of long-term planning and forecasting across our business to continue to improve our capability, for example:

**Strategic Direction Statement**

Our Strategic Direction Statement (SDS) was developed in 2007 to provide a clear framework for planning for the following 25 years. Our SDS was refreshed in 2017 and reviewed in 2021 and, following extensive consultation with our customers and other stakeholders, we developed four key strategic priorities, each of which continues to guide our planning processes, including most recently our PR24 Business Plan for 2025-2030.

**Long-term performance commitments forecast produced at PR19**

We revisited our long-term performance commitments from PR19 as part of establishing our ambition and view of performance from base for the LTDS. The most robust projections were those derived for strategic planning frameworks, particularly leakage and PCC. Outside of the strategic frameworks, the PR19 forecasts were developed without the context of long-term investment decisions and the adaptive planning framework that our LTDS provides. In our LTDS, our proposed level of PCC (100 l/p/d) is more ambitious than our long-term projection from PR19 (120 l/p/d) however our leakage forecast is less ambitious.

Since developing our PR19 business plan over five years ago, we have developed our capability in long-term planning. There is also the observed industry performance in AMP7 in the face of available totex allowances and challenging targets. This results in a mixed picture for other performance commitments. The following performance commitments are more ambitious in our LTDS than our long-term PR19 forecasts:

- CRI
- Total pollution incidents
- Unplanned outage (noting the change in definition from PR19 to PR24)
- Internal sewer flooding
- External sewer flooding
- Customer contacts about water quality (noting the change in definition from PR19 to PR24)

### **Strategic planning frameworks produced at PR19**

As the first water company to publish a 25-year Water Recycling Long Term Plan (WRLTP) in 2019, we are well placed to understand the immediate and longer-term challenges facing our region. The DWMP expands on our previous assessments by following the DWMP framework to understand the risks in our region, including due to growth and climate change. We have used the LTDS approach to introduce common reference scenarios and expand our understanding of the role of technology.

For Water Resource Management Plan (WRMP), we have continued to refine our approach to meet updated guidance and the introduction of the regional water resource planning groups. Our revised draft WRMP sets out key changes from WRMP19, including the impact of Covid-19 on consumption, abstraction reduction and our understanding of business and housing growth. These have been used to inform our approach to uncertainty testing, including specifically understanding the future of water use for energy projects such as hydrogen.

## 6. Board assurance

We are committed to the highest standards of corporate governance. Our Board has in place a well-established and effective set of policies and procedures covering corporate governance, internal control and risk management.

The Board has considered the LTDS alongside PR24 taking them hand in hand to ensure PR24 ensures we can deliver the Long Term vision. As well as discussing the LTDS and Business Plan in Board meetings and workshops, members of the Board have undertaken nine deep dives on the Strategic Plans and key building blocks of PR24 and LTDS. The Chairman attended a deep dive session with the LTDS technical team and was able to further challenge the management team regarding the development of the Company's level of ambition and how it is reflected in the LTDS itself. This has enabled a deeper understanding of the process followed to develop the Plan and LTDS, and has enabled Directors to understand the assumptions used and their implications. This engagement has also provided an opportunity to talk directly with the assurance providers, Jacobs, to understand the scope of their work and to discuss their findings.

As set out in more detail in our Board Assurance Statement the board and management are confident that decisions taken by the business with respect to the LTDS, as well as the Plan for PR24:

- Reflects a shared view of long-term vision and ambition.
- is high quality, and represents the best possible strategy to efficiently deliver its stated long-term objectives, given future uncertainties,
- is based on adaptive planning principles,
- has been informed by customer engagement, and
- has taken steps to secure long-term affordability and fairness between current and future customers; and
- will enable the company to meet its statutory and licence obligations, now and in the future

## 7. Our response to Ofwat feedback

Ofwat's feedback from the development meeting, together with how we addressed it, is set out in the section below.

### 7.1 Ambition

#### Ofwat development meeting feedback

'Your presentation demonstrated a good understanding of how to set your ambition in line with our guidance. In line with that, in your PR24 submission we expect you to use the factors listed in our guidance to inform your ambition.'

We have used the factors listed in Ofwat's Guidance to inform our ambition. This includes:

- Government and regulatory policy
- WINEP, WRMP and DWMP
- Issues facing the company
- Customer and stakeholder preferences

Our Ambition is set out in our Ambition Chapter.

We explain how:

- We developed our ambition in Rationale: A robust approach to developing our core and alternative pathways
- Customers and stakeholders informed our ambition in Rationale: Informed by customers and stakeholders.

### 7.2 Core and alternative pathways

#### Ofwat development meeting feedback

We did not see sufficient and convincing evidence that you are developing a core pathway in line with our definition. The core pathway should set out low-regret investments, i.e. those that can deliver outcomes efficiently under a wide range of plausible scenarios, or need to be undertaken to meet short-term requirements. It should also include investment required to keep future options open or is required to minimise the cost of future options.

While your presentation recognised the core pathway's emphasis on low regret investment, we noted that you intend to test potential investment options first against the benign scenarios, and then against the adverse scenarios at a later stage. You should ensure this approach does not constrain the options available for selection in the core pathway, compared to testing across a wide range of plausible scenarios.

In your PR24 submission, you should clearly explain how you have identified and prioritised low-regret investment. This includes showing that the selected investment, and the timing of that investment, is optimal given a wide range of plausible scenarios and their likely occurrence. Where possible, low-regret investments should be flexible and modular.

It may be the case that a large infrastructure solution can be the most efficient solution, even if it goes beyond the actual capacity requirement in the near term. This possibility is not ruled out by adaptive planning. However, you should explain how you have explored options to meet long-term outcomes using flexible, modular or adaptive solutions where possible and efficient to do so. This helps provide evidence that this is the case. These solutions can later be expanded as new information arises and there is a higher level of certainty around the impact of external factors.

Our core pathway consists of low-regret investments, actions needed to meet short-term requirements, and investment required to keep future options open or is required to minimise the cost of future options.

In Rationale: A robust approach to developing our core and alternative pathways, we set out how we have developed our core pathway in line with Ofwat's definition. Before developing our core pathway, we first undertook a wide-ranging option identification process. This was designed to consider all the options listed in

Ofwat's Guidance (modular and adaptive solutions, behavioural change, operational solutions, partnership working, learning, testing and interventions at a systems level). To ensure that we did not constrain our thinking to the options possible in today's context, we also used four themes, innovation, digital, partnership and place-based approaches to consider our ambition through different lenses. In this way we ensured that our approach did not constrain the options available for selection in the core pathway.

We then used a best value approach to combine solutions into initial sequences (emerging pathways), before testing them in the benign and adverse scenarios. Where possible we have prioritised best value solutions, including those that make best use of our available resources, are flexible or generate wider benefits for the environment or communities.

The majority of the enhancement investment in our core pathway is driven by statutory requirements, new targets from government and our regulators, and mitigating the impacts of long-term challenges.

#### Ofwat development meeting feedback

It was not clear from your presentation how you are formulating alternative pathways in line with our guidance. The strategy should identify a relatively small number of alternative pathways, focused on the key areas of risk and uncertainty. In your long-term delivery strategy, you should clearly describe the decision and trigger points associated with each alternative pathway. You should also explain how you have decided on the optimal timing of these points. This is particularly important if you plan to request enhancement expenditure at PR24 to support one of more of these pathways, in which case you should present compelling evidence and align with our key principles for enhancement funding for preparatory work.

We formulated alternative pathways by testing our emerging pathways in the adverse scenarios. This allowed us to identify additional high-regret investment only required in a small number of scenarios. We then excluded additional investment requirements that did not meet our materiality threshold. Finally, we consolidated the material additional investments into six alternative pathways.

## 7.3 Scenario testing

#### Ofwat development meeting feedback

In your presentation, you set out how you are using the full range of common reference scenarios to inform your strategy. Scenario testing is important to evidence that you have identified low-regret investment and that you are able to efficiently meet long-term outcomes in a range of plausible futures. We expect you to use scenario testing to inform the development of your strategy, including the selection and timing of activities in your core pathways and the development of alternative pathways. In your PR24 submission, you should also demonstrate the sensitivity of your proposed enhancement investments to future needs and uncertainty.

However, you should note it is essential that only plausible scenarios are used to develop the core and alternative pathways. We noted from your presentation that you are considering testing wider scenarios on hydrogen economy and alternative growth. Wider scenarios should be measurable factors with clear and observable metrics that can be used to define decision and trigger points. We will expect you to clearly demonstrate in your business plan that your proposed investments are required across a wide range of plausible scenarios. Where a wider scenario is driving an alternative pathway, based on potential changes in local or company-specific factors, you should clearly set out the associated decision and trigger points, and explain how you will monitor, review and report the relevant metrics over time.

We have used two wider scenarios to develop our strategy:

- Water for energy
- Landbank availability

Our approach to scenario identification is set out in Rationale: Scenario Identification. We used a structured approach based on techniques from The Futures Toolkit. This included horizon scanning, screening and consolidation, then testing impact and uncertainty to identify candidate trends for wider scenario development. In total, 18 candidate trends were identified.

These candidate trends were subject to five tests:

- **Material** - is the scenario likely to have a material impact on key enhancement expenditure?
- **Exogenous** - is the scenario driven by factors external to the company and outside its control?

- **Plausible** - does the scenario reflect plausible events?
- **Simple** - can the scenario be clearly defined and tested?
- **Regionally specific** - does the scenario reflect an issue which is specific to the company or region?

As a result of this rigorous process, only two trends were taken forward for development into wider scenarios, and the other 16 were discounted.

The two wider scenarios drive three alternative pathways, that are set out in the table below.

**Table 52 Alternative pathways driven by the wider scenarios**

Alternative pathway			Sub-strategy impacted				
	Environmental enhancement	Water resources	Drinking water quality	Drainage and water recycling	Bioresources	Net zero	Resilience
Adverse landbank availability	-	-	-	-	A Landbank (Bio)	A Landbank (NZ)	-
Benign landbank availability	-	-	-	-	B Landbank (Bio)	-	-
Adverse water for energy	-	Water for energy (WR)	-	-	-	-	Water for energy (Res)

The associated trigger points are set out in Strategy: Alternative pathways. Our monitoring plan is set out in Foundations: Monitoring the plan.

#### Ofwat development meeting feedback

We saw only limited evidence that you are testing the common reference scenarios for technology in line with our guidance. We expect you to use the technology scenarios to test the sensitivity of options to different futures and justify the optimal timing and sequencing of activities in your strategy. The scenarios describe futures where the adoption of the listed technologies becomes cost-effective at different dates, as a result of technology developing faster or slower than expected. The adoption of the listed technologies should be assumed to reduce the costs of meeting long-term outcomes.

In your PR24 submission you should clearly set out all assumptions you are making about the impact of the scenario. If there are specific technologies where you consider it implausible that their adoption could be cost-effective

in your region by the dates in the scenarios, you should clearly explain the reasons why. You should also consider a wider range of technological developments, beyond those set out in the reference scenarios.

Our approach to scenario development is set out in Rationale: Scenario development. In the final guidance, Ofwat has set out a list of key technological developments inside and outside of the sector that companies should consider.

It also states: ‘Beyond those set out in the reference scenarios, companies should consider a wide range of technological developments when forming their strategies.’ We have embraced this requirement in the development of our final technology scenario. Working with Cambridge Consulting and Cap Gemini we identified key technologies that are likely to have the greatest impact on our company, and this informed the development of our final Technology scenario.

In testing our emerging pathways against our final Technology scenario, we have identified where there is value in delaying investment to take full advantage of technological developments. Most notably, in our Drainage and Water Recycling sub-strategy, we have delayed short-term investment in potentially high-cost and high-carbon ‘grey’ infrastructure. In the short-term we plan to develop our digital capabilities, develop a partnership approach to addressing surface water at a landscape scale, and improve our understanding of long-term climate change impacts.

The adoption of these technologies reduces the cost of meeting long-term outcomes. The additional cost incurred in the slow scenario is set out in the Slow Technology alternative pathway. All of the assumptions we made regarding the impact of the scenario are set out in Foundations: Assumptions.

## 7.4 Base expenditure

### Ofwat development meeting feedback

We saw only limited evidence that you are considering long-term performance improvements from base expenditure. It is important that you develop your own forecasts of improvements expected from base expenditure, and clearly set these out for each of the outcomes and metrics that make up your ambition. Enhancement investments should build on these activities to meet your long-term ambition. We expect you to challenge yourself to deliver stretching levels of performance from your base expenditure allowance, and to reflect this in your long-term delivery strategy.

Given the expected scale of AMP8 enhancement programmes, and current concerns over affordability, we agree that companies should consider what can be delivered through base before determining enhancement requirements. In the development of our LTDS we have not assumed the delivery of our ambition should be paid for through enhancement funding by default, but thought first about the contribution made by base. This supports the development of a strategy that is both efficient and best value.

We have also completed the most comprehensive forward-looking assessment to date of the long-term performance achievable through base, known as the Asset System Resilience Appraisal (ASRAP), appended to our plan. We have challenged ourselves to deliver stretching levels of performance improvements from base, some examples of which are set out in the table below. Our approach to base expenditure is set out in Foundations: Base.

**Table 53 Forecast performance improvements from base**

Common Performance Commitment	Forecast performance improvement from base	
	AMP8	2050
Supply interruptions	49% reduction	62% reduction
Unplanned outage	24% reduction	51% reduction
External sewer flooding	Stable	25% reduction
Internal sewer flooding	Stable	20% reduction
Total pollutions	35% reduction	51% reduction
Low carbon concrete	20% reduction	70% reduction

## 7.5 Engagement

### Ofwat development meeting feedback

We are encouraged to see that customer engagement is informing your ambition and the selection and sequencing of key investments. In your PR24 submission, you should clearly explain how your strategy has been informed by customer preferences, and provide sufficient and convincing evidence that your customer engagement activities meet our standards for research, challenge and assurance. As part of our ambition assessment we will consider how far you have engaged meaningfully with your customers on their preferences and affordability concerns to inform your PR24 submission.

At PR19 we were the only company to be awarded an A rating by Ofwat for our customer engagement research. We have taken the lessons learnt at PR19 and built upon our existing body of insight to inform the development of our LTDS and Business Plan.

In total, we have spoken to over 29,700 household customers and nearly 2,000 non-household customers over the last two years. This new research has been independently synthesised into our existing body of customer insight to provide a comprehensive evidence base.

In the development of our LTDS, we identified five key decisions that were priority areas for customer engagement research.

**Table 54 LTDS decisions identified as a priority for customer engagement research**

Reference	Decision
1	Should we continue to rely on conclusions from PR19?
2	How ambitious should we be?
3	Should we prioritise certain solutions over others, such as solutions that can also deliver wider environmental benefits?
4	How should we profile investment across AMP periods?
5	Would customers be prepared for bills to go up, if it meant more vulnerable people were being supported?

Our research was targeted to provide meaningful insight to inform these key decisions. Although it drew in insight from all the engagement undertaken, it included a series of engagement driven primarily by LTDS.

### LTDS Focus Groups

- A total of 12 focus groups
  - 4 x future customers
  - 4 x customers currently struggling to pay
  - 4 x mixed groups
- Focus groups were designed to explore:
  - How ambitious should we be
  - Phasing of investment and intergenerational fairness
  - Proactive investment to address long-term challenges

### Engagement with our customer board

- Two meetings in June 2023
- Through six 'live' examples, we explored:
  - How ambitious should we be? Should we go beyond statutory targets in a small number of areas?
  - Phasing of investment and intergenerational fairness
  - Proactive investment to address long-term challenges

### Multi-generational focus groups

- A total of six focus groups, each with three generations of the same family
- Focus groups were designed to explore:

- Acceptability of long-term bill impacts
- Customer views on our final ambition and strategy

The key conclusions, and how they informed our ambition and strategy, are set out in Rationale: Informed by customers and stakeholders.

Our customer engagement is high quality and independently assured, taking a multi-challenge approach, and incorporates a targeted societal valuation framework to inform the prioritisation of investments. It has been subject to rigorous challenge from our Independent Challenge Group. The evidence that sets out how our customer engagement activities meet Ofwat's standards for research can be found in the Customer Engagement Technical Annex.

#### Ofwat development meeting feedback

We are pleased to see that you are engaging your Board and senior management in the development of your strategy. In your PR24 submission, we expect your Board to provide an assurance statement that explains how it has challenged and satisfied itself that the strategy is the best it can be.

Our Board has shaped the development of our ambitious PR24 Business Plan and LTDS to ensure we deliver across all statutory requirements.

*“As a Board we have reviewed the assurance process for our PR24 plan and Long-Term Delivery Strategy. We held nine deep dive sessions on the plan with management board and external assurance providers. This has enabled us to really challenge the development of the plan and understand the choices and assumptions that have been made. The positive feedback from our assurance providers gives our Board confidence the PR24 governance and programme management framework has been effective in developing a high-quality plan that will enable us to deliver social and environmental value and reflects our customers' priorities. I personally attended a meeting of the Independent Challenge Group where I was able to hear the positive challenge the management team received.”*

Zarin Patel, Chair of Audit Committee

Our Board has provided an assurance statement that explains how it has challenged and satisfied itself that the strategy is the best it can be.



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