
Shaping our future: Our Long-term strategy 2025-2050

NORTHUMBRIAN
WATER *living water*

ESSEX & SUFFOLK
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Contents

EXECUTIVE SUMMARY	4
1. WELCOME	17
1.1. WHO WE ARE	19
1.2. OUR JOURNEY TO NATIONAL LEADER	20
1.3. OUR REGIONS: KEY FEATURES	22
1.4. DEVELOPING OUR LONG-TERM STRATEGY	24
2. AMBITION	26
2.1. SETTING OUR PURPOSE, VISION, AND VALUES	26
2.2. OUR LONG-TERM VISION AND GOALS	28
2.3. LIVING OUR VALUES	29
2.4. AIMING HIGH	30
3. STRATEGY	42
3.1. OUR APPROACH TO PLANNING FOR LONG-TERM CHALLENGES	42
3.2. HORIZON SCANNING	44
3.3. FUTURE CHALLENGES AND OPPORTUNITIES	47
3.4. PLAUSIBLE FUTURE SCENARIOS	49
3.5. INVESTMENT AREAS	53
3.6. CORE PATHWAY	54
3.7. CORE PATHWAY BY INVESTMENT AREA	60
3.8. KEY ENABLERS FOR OUR INVESTMENT	68
3.9. DECISION AND TRIGGER POINTS	79

3.10.	ALTERNATIVE PATHWAYS	96
3.11.	MONITORING PROGRESS AGAINST THE LONG-TERM STRATEGY	98
4.	RATIONALE	105
4.1.	IDENTIFICATION OF CORE AND ALTERNATIVE PATHWAYS	105
4.2.	SCENARIO TESTING	105
4.3.	BUILDING ON PREVIOUS LONG-TERM STRATEGIES	115
4.4.	MAINTAINING AFFORDABILITY FOR CUSTOMERS	117
4.5.	FINANCING DELIVERY OF THE STRATEGY	125
4.6.	INVESTMENT IDENTIFIED FOR PR24	129
5.	FOUNDATIONS	131
5.1.	ASSUMPTIONS AND UNCERTAINTIES	131
5.2.	PERFORMANCE IMPROVEMENTS FROM BASE EXPENDITURE	140
5.3.	PROBABILITY ASSESSMENT OF SCENARIOS	143
6.	BOARD ASSURANCE STATEMENT	145
7.	NEXT STEPS	149

EXECUTIVE SUMMARY

Our long-term vision is to become the national leader in the water sector by working with partners and innovating to deliver effectively and efficiently for our customers and the environment. We will engage with customers, stakeholders, and our investors to make the right investments at the right times to adapt to future challenges and opportunities.

We are privileged to provide water and wastewater services to the communities we serve in the North East, Essex and Suffolk. We must continually improve our business to make sure these essential services can continue to be enjoyed by customers for generations to come and that we can deliver the improvements that Government, regulators, and our customers want to see.

This document presents our long-term delivery strategy for the next 25 years. We consulted on our draft strategy, '[Shaping our future: developing our long-term strategy 2025-2050](#)' in June – July 2023 and we acknowledge and appreciate the feedback we received on that strategy from customers, stakeholders and regulators that has helped inform this revised strategy.

This version of our strategy forms part of our PR24 Business Plan submission to Ofwat and so is more technical in nature. Summaries of our strategy for our Northern and Essex & Suffolk regions are included in our Business Plan customer summaries ([NES78](#), [NES79](#)).

Taking a 25-year view

Our business is inherently long-term. Many of our assets are expected to operate for more than 100 years. We have an enduring presence in the communities we serve and provide services to generations of our customers. In 2014 we completed a major expansion of Abberton Reservoir in Essex, one of the only examples of a major reservoir expansion since the industry was privatised in 1989. This followed several years of discussion with local communities, design and construction, and secured supplies in the region for the last decade.

It illustrates the importance of careful long-term planning to ensure the resilience of the essential service we provide. In developing our Long-term strategy, we have taken a structured approach, starting by identifying the long-term targets, testing these with customers, and working back from these to the actions and investments that we will need to deliver them. We have used analysis and modelling to provide greater rigour to our work, building on the established long term planning frameworks we use for [Water Resource Management Plans \(WRMP NW, WRMP ESW\)](#) and [Drainage and Wastewater Management Plans \(DWMP\)](#), which have also been updated and republished, our [emissions reduction plans](#), and information on the health of our assets.

These frameworks use common assumptions and forecasts, for how growth and climate change could affect the services we deliver and build on multi-sector engagement including through Water Resources East (WRE) and Water Resources North (WReN).

We have examined trends in the water sector and UK productivity to understand what we might be able to achieve in efficiency alongside new investment. But we have also tried to think more expansively about how the future could be different, including for example, the impact of new markets like the trading of carbon and biodiversity credits, and the opportunities for technology like artificial intelligence (AI), robotics, and smart networks. We worked with the Oxford University Futures team and workshopped opportunities with a range of innovation experts across water and other sectors to consider the potential impact of these changes. We have tested our strategy against a range of scenarios developed with ARUP. We considered a comprehensive list of factors that could have an impact on the future and our ability to meet our ambitions goals. We considered the materiality and uncertainty of each of those factors and from this ARUP report identified a range of scenarios that we have used to test our plan. The scenarios also reflect the specific elements that our economic regulator, Ofwat, wanted us to test.

Setting ambitious long-term goals

We set out a series of long-term targets that we want to deliver by 2050. These are based on:

- Commitments we have already made and our existing strategies and plans to deliver those improvements.
- The improvements we are legally obligated to deliver, including from Government and regulators.
- What our customers and stakeholders want to see improvements in and what they are willing to pay for those improvements.

Many of the targets are driven by statutory requirements but where we have choices, we have carried out significant engagement to understand customer and stakeholder priorities including through the [WRMP](#) and [DWMP](#) planning processes and with our [‘People Panels’](#) of informed customers, which we established specifically to consider these long-term issues. We set out the targets that we want to meet in section [2.4: Aiming high](#), these include some of the things outlined in Figure 2 below.

We have engaged further with customers and stakeholders on those targets and the level of ambition that we set within them; now that we can illustrate to customers more clearly the expected cost impacts of the different improvements.

FIGURE 2: OUR TARGETS FOR 2050



Reliable service and unrivalled customer experience

Including continuing to offer excellent customer service ranking us in the top two of the sector, improving our drinking water quality performance to be among the best in the country and reducing internal and external sewer flooding by 60%.



Caring for the long-term needs of the environment

Working with partners to ensure our rivers achieve good ecological status, our combined sewer overflows (CSOs) spill fewer than 10 times a year on average, there are zero serious pollution incidents, significant improvements in biodiversity, a 50% reduction in leakage across our operating areas, achieving a per capita consumption (PCC) reduction to 110 litres per day and achieving Net Zero across all our emissions including scope 1, 2 and 3 by 2050 and having 100% of our energy use coming from renewable sources by 2040.



Sustainability and resilience

Including making sure our water supplies are resilient to a 1 in 500-year drought and securing the long-term health of our assets. Improving the sustainability of our chemicals and energy use.



Affordable and inclusive services

Eradicating water poverty and supporting our customers to make sure bills remain affordable for all.



Efficiency and prudent investment

Including becoming the most efficient water company in the sector in the round by 2030, growing our innovation pipeline to £100m by 2030 and reduce our chemical use by 20% for all new assets by 2035.



Caring for our communities

Spending more than 60 pence in every pound locally in our operating areas and continuing to make sure that our people volunteer locally to support community initiatives.

FIGURE 3: THE CHALLENGES ACROSS OUR OPERATING AREAS



We operate across three regions and the issues and challenges we face are different.

Key enablers for our investment – driving more innovation and partnership working

We are proud but not complacent about our comparative performance. Over time we have delivered some significant improvements to the services we provide, often brought about through step-changes in improvement, driven through our strong focus on innovation and working in partnership and we set some of these out in [section 3.8: Key enablers of our investment](#). Both traits will be critical to meeting the significant challenges of the future.

Through partnerships we can deliver more for less by leveraging expertise, skills, and resources from elsewhere to solve collective problems at lower cost to customers. We have some great initiatives such as our Northumbrian Integrated Drainage Partnership and more recently our North East Catchments Hub partnership with the Rivers Trust and will continue to seek future partnership opportunities, but these take time to deliver. Innovation is central to how we operate.

Through our annual Innovation Festival, we develop opportunities for new technology and approaches to drive transformational change. The festival has grown enormously in reach and attendance with participants from

around the world. Projects jump-started at the festival are nurtured by the business to ensure we realise their potential through innovation seed funding. Our network of innovation ambassadors keeps us continually searching for new ways to deliver material improvements for customers. Our people are key to delivering our strategy. To continue to deliver we need to continue to support and protect our existing passionate employees while making sure we build on our success as a great place to work to attract the talent we need to deliver in an evolving labour market.

Our five key investment areas

To deliver the long-term targets and address the challenges that we have in our operating regions we identified five areas where new investment would be required. These areas are:

Ensuring sustainable water supplies - we will need to invest significantly in our Essex and Suffolk regions to make sure we can maintain supplies. We will need to roll out smart meters across all customers now and reduce our leakage by a further 40% from a position that is already amongst the lowest in the sector. We will further investment in demand reduction for both households and non-households. We will also need to invest in new supply-side schemes including additional water reuse and storage schemes, network enhancements to be able to move water around the region better and potentially a new desalination plant. In the North East we will need to offer smart meters to our customers and take steps to reduce water use and leakage, targeting a 55% reduction by 2050. We should not need to invest in new supplies in the North East. We may have opportunities to trade water with other regions from Kielder Reservoir.

Restoring and enhancing the local environment - we expect a material and lasting step up in the amount of investment required to deliver major improvements to the natural environment. To meet the UK [Government Storm Overflow Discharge Reduction Plan](#) requirements and the wider performance objectives of the [DWMP](#), we will need to invest around £1bn extra every five years for the next 25 years. At the same time, to deliver further improvements to the environment investment in line with the 2025-30 environmental programme will be needed, which is considerably larger than for previous periods. If further pollutants are identified as needing to be treated in wastewater, such as microplastics, then this would require a further step-up in investment.

Delivering net zero - we have already made substantial progress to reduce our emissions. To continue our emissions reduction path over the next five years we will need to continue to invest in renewable energy, decarbonise our fleet and improve our measurement of scope 3 emissions, all from base costs. We will continue to seek innovative opportunities to reduce operational emissions and have some exciting alternative treatment technologies we are developing internally that could deliver material reductions in emissions. If we

can innovate effectively then we expect to be able to reduce costs in future but presently we expect achieving net zero by 2050 will still add significantly to costs.

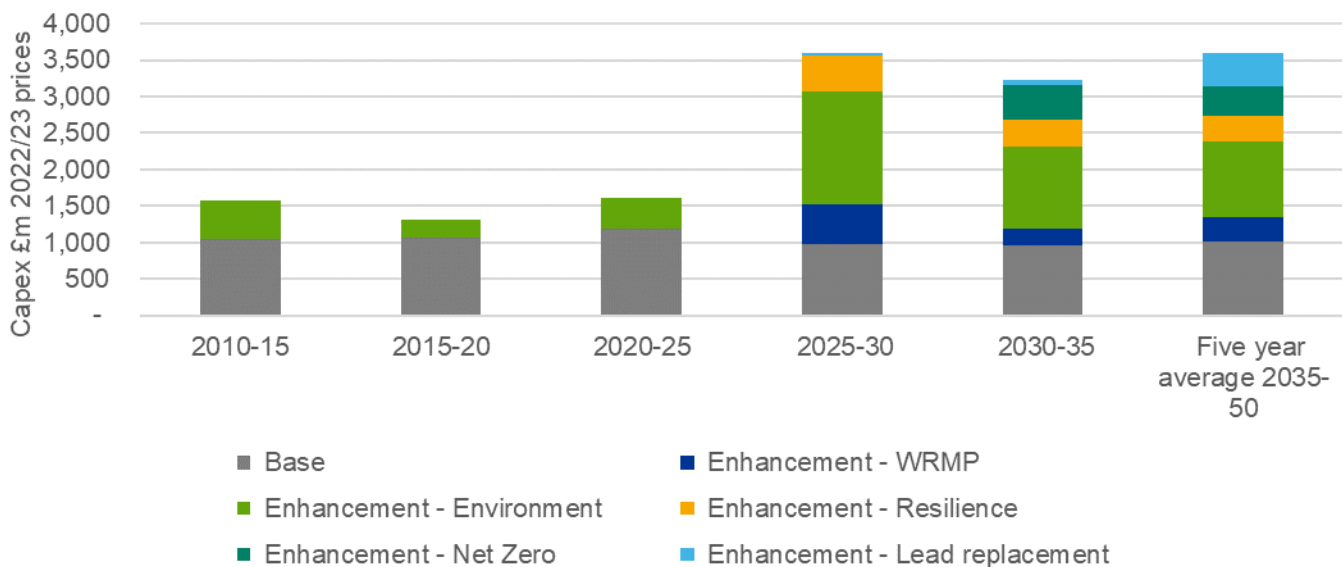
Maintaining resilience - to better protect our assets and the services they provide to our customers from the increasing extreme weather events driven by climate change we will need to invest more, for example in local power supplies and flood protection. We will need to work with others to make sure we maintain cross-sectoral resilience to avoid issues such as we experienced following Storm Arwen, where water supplies were interrupted due to wind taking out power lines. We also envisage a step up in investment required in the general maintenance investment across the asset base, currently the level of maintenance investment across the sector is below the efficient rate of asset replacement.

In addition, the Environment Agency is currently developing a new strategy for sludge to land. That strategy is not yet public, but it could result in us being more limited in our options to dispose of biosolids, and so we will need to invest to maintain resilience by building storage facilities to manage when biosolids are spread to land when restrictions are in place, and potentially incineration if we lose access to the land bank.

Replacing lead - we have a clear vision to work towards the Water UK long-term ambition to be 'lead free' by 2050. This ambition is stretching and will require us to significantly increase our investment beyond. Lead pipe replacement is the preferred approach to eliminating the potential for harm to human health over alternatives such as fitting pipe linings, as the long-term risks are deemed to be lower. To achieve this, we will need to investigate and replace customer side lead supply pipes. Any remaining lead pipes in our network will also need replacing – though we expect this to account for only a small proportion of lead pipes as lead is not well suited to larger diameter pipes that our network primarily consists of. The cost of this replacement work is considerable, but if completed would have both health and environmental benefits in the long term as it would reduce the need for phosphorous dosing in wastewater treatment.

We carried out modelling to scale the investment requirements bringing together all the elements highlighted above. In each area we identified a series of investments that we considered will be needed in the future. The core plan involves a substantial increase in investment, the chart below illustrates the key drivers of that investment and why we consider it will be needed. It compares those drivers of investment from the historical 2010-25 period with our expectations for the future 2025-50 period. A core part of our strategy is to maximise efficiency through innovation. But even by doing so, affordability is at risk due to the scale of the investment needed. If we chose to invest less, we would put performance, in particular environmental improvement, and compliance with our legal duties at risk.

FIGURE 4: HISTORICAL AND PROJECTED CAPITAL INVESTMENT OVER TIME – CORE PATHWAY



Key decision and trigger points

Our strategy to deliver to 2050 will need to adapt to new information and change as it arises. We have developed an adaptive planning approach to manage future uncertainty and expect to diverge from our core investment pathway as we reach tipping points when we will need to make decisions between investments, or to make new investments. These decisions will then trigger action to deliver a new pathway of investment.

We have identified a series of key choices we will need to make in the future. By building these adaptive pathways into our Long-term strategy we can avoid making the wrong choice too early or stranding investment that might otherwise not be needed and make best use of new information and technologies. And by making these decisions in our adaptive planning approach we can make sure we make decisions at the right time, and so be confident we are investing at the right time to best manage risk. There are many of these choices, but we identify fourteen critical ones that we have in the future and the timescales during which those choices will need to be made.

TABLE 1: KEY CHOICES AND DECISION POINTS

Decision	Decision point	Trigger point
1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir	2027	2028 (Lowestoft) 2036 (North Suffolk)
2. The need for Southend water re-use plant	2027	2031
3. The need for Canvey Island de-salination plant	2027	2031
4. The need for other water supply, transfer and demand-side options	2027-46	2027-46
5. The impact of new demand on Teesside	Annually	Annually
6. A potential trade of raw water from Kielder reservoir	2029, 2044	2040, 2055
7. Speed of delivering storm overflow programme and scale of surface water separation	2024, 2028	2026, 2030
8. Future environmental challenges	2027	2032
9. Potential for a technology step change	2033	2035
10. Reduction in storm overflow discharge reduction costs from monitoring data	2030	2030
11. The need for investment in sludge incineration	2026	2030
12. Level of sustainable long-term capital maintenance expenditure	2028	2030
13. Timing of Net Zero investment	2028	2030
14. Timing of lead replacement	2033	2035

Bringing it all together

Across our core pathway and the key trigger points we see a significant increase in investment required from where we have been in the past for all our four key areas. This varies with each scenario based on the extent to which future trends are better or worse than we expect. Even after assuming significant efficiency and productivity improvement from greater innovation, we expect a material uplift will be needed.

This will significantly increase bills and even if earnings grow more rapidly than historically with more positive improvements in our operating areas, we expect a growing affordability problem. A national social tariff at the

5% income level would significantly help to address this challenge for customers but we will need to find new and different ways to support customers struggling to pay as the affordability challenge grows.

We highlight in this strategy the suite of tools that we think will be needed to support affordability in section [4.4: Maintaining affordability for customers.](#)

At the same time the investment will need to be financed through new private capital. This will need to include both equity and debt financing with the former required to take up a much bigger part of the investment. Under the core pathway we will need to identify around £5bn of new equity capital over the next 25 years. This could be attracted into the sector either through competition for large and discrete new infrastructure projects or through bringing new equity investment into the existing business. For the latter arrangement, that investment will not turn cash positive for more than ten years. We highlight some things that could be done to improve the investability of the arrangements that we could explore.

We must continue to work with our partners, challenge ourselves to innovate and invest in our people to make sure we can deliver this investment as efficiently as possible. If we can manage the affordability challenges and attract the necessary private capital then the plans would deliver the objectives we have set out, including better and more reliable services for customers, massive long-term improvements to the environment and more resilient services.

Guide to this document

In section 1: Welcome, we show what is unique and important about the communities and regions we serve. We describe the journey we are on to becoming the national leader in the water sector, and how we have developed this Long-term strategy.

In section 2: Ambition, we set our Purpose, vision, and values and our long-term ambitions for 2050. We developed our long-term ambitions for 2050 by looking at our existing ambitious goals (set in 2018), considering what we need to deliver to meet our Purpose and legal obligations in the long term and testing this ambition with customers and stakeholders.

In section 3: Strategy, we explain how we have thought about long-term challenges. Our Board worked with experts and water specialists to define plausible future scenarios for 2050 that explore some of these issues focusing on those that could have the most material impact on plans and those that are most uncertain. We explain how we developed our core and adaptive pathways to deliver our ambitious goals. We want to make sure our Long-term strategy and our five-year Business Plan are based on adaptive planning principles, and that we begin to use this more and more to think about an uncertain future. We also set out how we will monitor our progress towards our ambition.

In section 4: Rationale, we set out why we think the strategy we present here is the best it can be. We discuss the results of our scenario testing and the impact of this on our long-term strategy. We compare our revised strategy with our previous long-term strategies. We consider how we will maintain affordability and financeability over an uncertain future. And we explore the impact on our investment plans for 2025-30.

In section 5: Foundations we describe the underlying assumptions made to develop this Long-term strategy.

In section 6: Board assurance statement provides assurance that our Board has sought appropriate advice and has challenged this strategy to ensure it is as good as it can be.

In section 7: Next steps we look to the future and how we will implement and improve this strategy and our approach going forward.

All financial figures in this document are presented in financial year average CPIH deflated 2022/23 prices unless otherwise stated. Where years are referred to as a single number this means the financial year ending 31 March of that year, for example, 2026 refers to 1 April 2025 to 31 March 2026.

This document is supported by a set of annexes, [Long-term strategy annexes](#) (NES_LTDS1) and accompanied by the model used for the supporting analysis (NES_LTDS9).

To search this document for specific words or phrases press CTRL+F and enter your search term into the text box. The first match will be highlighted, and the arrows can be used to navigate results. We have also included links to help you find sections and to other documents you might find useful. [These links look like this.](#)

Ofwat has set out [guidance for long-term delivery strategies](#) that they expect all companies to consider. **Error! Reference source not found.** below describes the requirements for long-term strategies and where we have addressed these in our strategy.

TABLE 1: LONG-TERM DELIVERY STRATEGY REQUIREMENTS

Area	Requirements	References	Where can this be found?
Structure	Long term strategies should be set out in five parts- Ambition, strategy. Rationale, Foundation and Board assurance	p.13	Sections 2 to 6 follow this structure
Customer engagement	Companies should engage customers to inform the design of their long-term strategies. Particularly on ambition and strategy.	p.13-14	Section 3.6, 8, and throughout Annex 1: You Said, We Did summarises customer engagement.
Ambition	Companies should set out their vision, what it means for the 25 year strategy and set out long-term targets for where it expects to be by 2050, covering the common performance commitments and ensuring that these meet all their legal and regulatory requirements (e.g. legislation, strategic planning frameworks, SPS, etc)	p.14-15	Section 2
Strategy	Long term strategies should set out how the vision and ambition will be delivered with a clear narrative and using adaptive planning techniques.	p.16	Section 3
Adaptive planning	Long term strategies should use adaptive planning techniques to identify large new 'no regret' investments where investments are required under all future scenarios. They should identify clear 'decision points' informed by pre-defined 'trigger points'.	pp.16-20	Section 3.10 and throughout

Area	Requirements	References	Where can this be found?
Core and alternative pathways	Long term strategies should set out a core adaptive pathway of enhancement activities and alternative adaptive pathways. Core pathways should focus on low and no-regret activities and adaptive pathways for higher-regret activities.	pp.20-23	Core pathway 3.6 and 3.7 Alternative pathways 3.10
Alignment with WRMPs and DWMPs	Long term strategies should bring together outputs from existing strategic planning frameworks into a consistent and holistic long-term strategy.	pp.23-24	Section 3.7 – core pathways by investment area
Monitoring the long-term strategy	Long term strategies should explain how, during its implementation, the metrics, trigger points and other key elements of the strategy will be monitored and reviewed.	pp.25-26	Section 3.11 – monitoring progress
Impact on bills	Companies should set out the long term bill impacts of their long-term strategies, including separate impacts for core and alternative pathways.	pp.26	Section 4.4 – maintaining affordability for customers
Identification of core and alternative pathways	Companies should clearly set out how the core and alternative pathways have been developed and why the activities in the pathways have been chosen and how choices have been made.	pp.26-7	Section 4.1 – identification of core and alternative pathways
Scenario testing	Companies should test the long term strategy against each of the Ofwat 'common reference scenarios' to demonstrate that, under different plausible futures, the strategy is likely to efficiently deliver the company's ambition. They should also use wider scenario planning as necessary.	pp.27-28 and	Section 4.2 – scenario testing Annex 2: Plausible futures scenario analysis Annex 3: Common reference scenario analysis
Comparing to previous long-term strategies	It is important for long-term strategies to take account of and learn from other long-term forecasting and planning exercises.	p.28	Section 4.3 – building on previous long-term strategies
Impact on affordability and fairness between current and future customers.	Companies should explain how their long-term strategies secure long-term affordability and fairness between current and future customers.	pp.28-29	Section 4.4 – maintaining affordability for customers

Area	Requirements	References	Where can this be found?
Enhancement funding for preparatory work	Ofwat recognises that some enhancement funding may be necessary to keep future options open and this should be set out.	pp.29-30	Section 4.6 – investment identified for PR24
Assumptions	Companies should set out details of the key assumptions that underpin the strategy and to explain the basis upon which the assumptions are made.	pp.30-31	Section 5.1 – assumptions and uncertainties
Performance improvements from base expenditure.	Companies should set out the service improvements they expect to deliver from base funding.	pp.31-32	Section 5.2
Uncertainties	Companies should clearly describe the areas of greatest uncertainty in its strategy and explain how uncertainty has been appropriately accounted for in each area.	pp.32	Section 5.1 – assumptions and uncertainties
Board assurance	The company Board should provide an assurance statement that explains how it has challenged and satisfied itself that the strategy is appropriate.	pp.32-33	Section 6

1. WELCOME

As we look towards the future, we face challenges that are both exciting and daunting. The world around us is changing rapidly, and we must continuously adapt to meet the needs of our customers and the communities we serve, while restoring and enhancing the environment we live in.

One of the greatest challenges we face is the uncertainty of the future. We cannot predict what the world will look like in 2050, but we do know that we must be prepared for whatever comes our way. This means being flexible, resilient, and proactive in our planning and decision-making.

The impact of climate change affects us all, and as a water and wastewater company we are often at the forefront of experiencing these impacts. For example, Storm Arwen in December 2021 was one of the most powerful storms our northern operating region has ever seen and was classed as a Civil Emergency. The summer of 2022 saw Europe's worst drought in 500 years. Rising temperatures, changing rainfall patterns, and more frequent extreme weather events are all putting pressure on our water resources and on our wastewater system. We must be prepared to adapt our operations and infrastructure to make sure we can continue to provide a reliable and sustainable water supply to our customers.

Such challenges also bring opportunities. By embracing innovation and new technologies, we can create a more sustainable and resilient water system for the future. We can work with our customers and communities to promote water conservation and reduce demand, and we can invest in renewable energy sources and new ways of treating and distributing water to reduce our carbon footprint.

This document has been built on significant volumes of data on what we know now about our assets and operations, what experts know about future weather patterns and populations trends, and what our customers and stakeholders believe are the key priorities for our future services. It brings together the outputs from the long-term planning processes across our business, including our [Water Resources Management Plan](#) (WRMP), our [Drainage and Wastewater Management Plan](#) (DWMP) and other strategies. We have taken that complex information and worked with thousands of customers and stakeholders over the course of the last two years to try to synthesise it into a meaningful plan for the future. This work will underpin our more detailed five-year regulatory planning process, starting with our regulatory [Business Plan for 2025-2030](#) (NES01).

As we embark on this journey, we are committed to listening to and understanding the perspectives of our customers and stakeholders every step of the way.

This is important to us because, in addition to providing essential services to our customers, their wellbeing and the environment, it is only by delivering to their expectations and effectively meeting the challenges of the future that we can build trust and maintain legitimacy in their eyes for the years to come.

We want to hear from you and understand your priorities and concerns. Together, we can create a water system that is not only sustainable and resilient, but also meets the needs of all our customers.

Thank you for your interest and support in our Long-term strategy. We look forward to working with you to create a better future for us all.

1.1. WHO WE ARE

We are Northumbrian Water and Essex & Suffolk Water. We provide water and wastewater services in the North East of England, and water services in the South East.

Northumbrian Water Limited (NWL) provides:

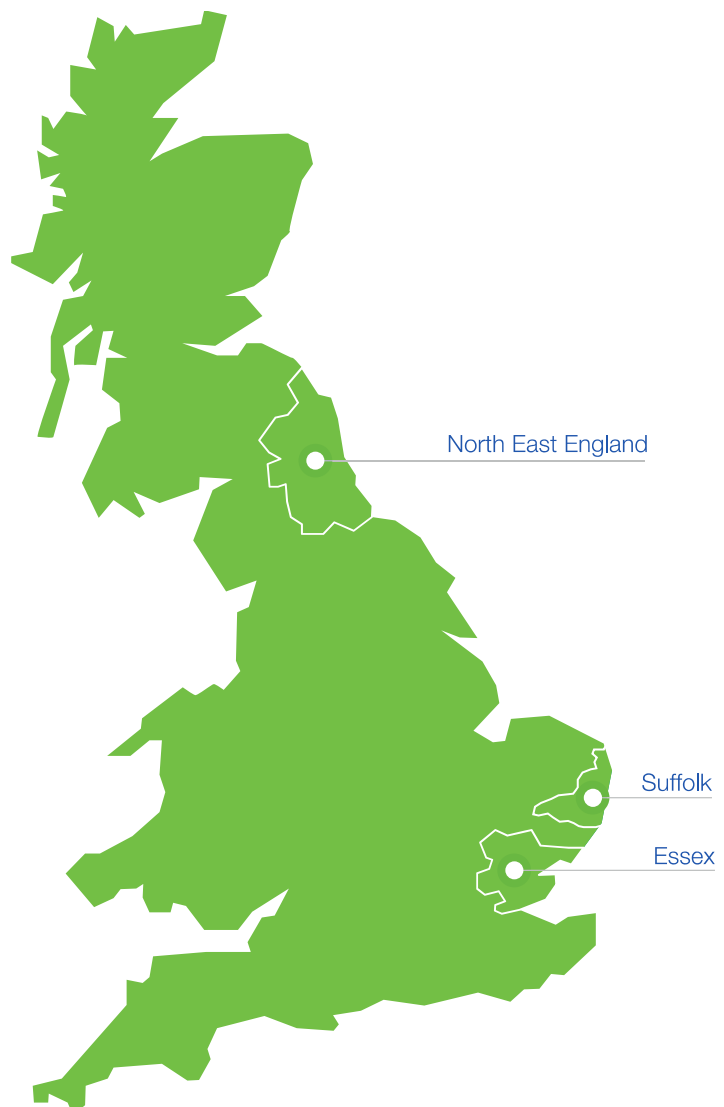
- Water and wastewater services to 2.7 million people in the North East of England, trading as Northumbrian Water (NW).
- Water services to 2 million people in Essex and 0.37 million people in Suffolk, trading as Essex & Suffolk Water (ESW).

ESW is a water only company, while NW is a water and wastewater company. This means that for some aspects of our Long-term strategy we take differing approaches. Much of this strategy relates to both ESW and NW, but where this is not the case, we make this clear.

- We operate and maintain:
- 50 water treatment works;
- 388 water pumping stations;
- 304 water service reservoirs;
- 26,366km of water mains;
- 412 sewage treatment works;
- 966 sewage pumping stations, and
- 30,237km of sewers.

Every day we supply 1.1 billion litres of water.

FIGURE 5: OUR OPERATING AREAS



Building on our strong track record

We frequently innovate to bring about positive step changes in the services we provide to our customers, communities, and the environment, and have a long record of strong performance. We have done this within a framework of being forward thinking, focused on achieving our national leader vision and reflecting feedback from our customers and stakeholders.

Our journey began with our first Strategic Direction Statement in 2009 and was further developed in 2014 with '[Shaping Our Future](#),' a strategy co-created with customers for the period 2018-2040, and which resulted in our ambitious goals for our [PR19 Business Plan](#). We have continued to build on our approach with the development of this Long-term strategy (covering the period 2025-2050) and there is further detail on the steps we have taken in [section 2](#).

1.2. OUR JOURNEY TO NATIONAL LEADER

We measure ourselves across a broad range of customer service and environmental performance criteria in our journey to becoming the national leader in the supply of sustainable water and wastewater services.

Driving forward all those measures at the same time can be hard and the journey often isn't linear, and improvements happen at different times across different performance areas. Often the investments and innovations we make can take a few years to deliver results. We track our progress closely and this chart shows how our performance has improved across several areas due to interventions we have made. It also highlights the challenges we currently face.

FIGURE 6: OUR JOURNEY TOWARDS BECOMING NATIONAL LEADER



1.3. OUR REGIONS: KEY FEATURES

FIGURE 7: THE NORTH EAST

The North East: key features

Customers

- 1.3m households and 70,000 businesses
- Average income: £35k
- Employment rate: 73%*
- Service we provide: water and wastewater to 2.7m people



Geographical features:

- Kielder Water is the largest man-made reservoir in Europe.
- We enjoy unique landscapes and wildlife in the North Pennines, Kielder Forest and Northumberland National Park, and some of the best and cleanest beaches in the UK along the Northumberland Coast.
- Cooler and wetter than most of England, with a higher risk of storms.



Water:

- Your clean clear tap water mostly comes from reservoirs in protected areas – the North Pennines and Kielder Water & Forest Park – and flows to coastal cities (Newcastle, Sunderland, and Middlesbrough).
- No major new supplies needed since the Kielder transfer scheme in the 1980s.
- 44% of occupied households are metered.



Wastewater:

- 30,237km of sewers, 966 sewage pumping stations, 413 sewage treatment works, 1,561 storm overflows, and more than a million manholes.
- Networks dominated by historic investments and geography. The population distribution dictates the design of the sewerage system with large coastal Sewage Treatment Works, particularly Howdon (at the mouth of the Tyne) and Bran Sands (at the mouth of the Tees) which treat around half of the wastewater in the region, with many small rural treatment works inland. Coastal treatment works were mostly built from the 1980s (Howdon) to the year 2000 (Bran Sands, Marske, Seaton Carew).



Environment:

- Highest proportion of rivers in good ecological status in England – but still only 27% in the Northumbria river basin and 44% in the Solway Tweed.
- Pollution from wastewater accounts for about 13% of the problem, with more than half of the issues coming from physical changes made to rivers and lakes over many years (38%), pollution from farming (10%), and pollution from abandoned mines (9%).
- 21,000km of rivers and 34 bathing waters.
- The first and only water company in the UK to use 100% of the sludge from its wastewater treatment to create green power through advanced anaerobic digestion - or as we like to call it, 'power from poo'.



Business:

- Historic heavy industry is now dominated by chemicals, pharmaceuticals, renewable materials and technology – and the impact of industrial restructuring still affects communities.
- Newcastle has vibrant science, education, culture, digital and service sectors.
- Historic Durham is home to a UNESCO World Heritage site.
- Sunderland is renowned for its manufacturing capability, being the home of Nissan's world-leading car manufacturing base and the focus of one of the Europe's leading automotive clusters.
- There are five universities in the North East.



Income and health

- Over 40% of the population lives in households with an income of less than £20k. More than 25% of the households are socially rented, and households containing lone parents occur more in the North East than in Great Britain.
- More than a third of areas in the region are among the most deprived in England, with incomes 15% below the UK average.
- The highest health care needs in the UK, in part due to higher levels of chronic pain, alcohol problems, COPD and cardiovascular disease.
- With both coast and countryside on hand, the population here has better access to parks and outdoor spaces compared to many other regions, and benefits from some of the lowest levels of air pollution in the country.



*Note: as of May 2023; employment rates vary over time.

FIGURE 8: ESSEX

Essex: key features

Customers

- 700,000 households and 32,000 businesses
- Average income: £40k
- Employment rate: 75.5%*
- Service we provide: water to 2m customers.



Geographical features:

- Geography varies widely, from densely populated London boroughs to green belt and estuaries.
- Urgent action is needed by all sectors on water resources – the surrounding areas in the East of England are even more water stressed, with bordering areas in South East England seeing big reductions in the amount of water that can be taken from the environment and potential investments in new reservoirs.



Water:

- Expanded Abberton Reservoir from the 1990s to 2014. We invested £130m and increased its storage capacity by 60% or 15 billion litres, helping to secure the water supply in the region.
- Most of the water comes from outside our area; around 25% of water in a dry year comes from the Ely Ouse Transfer Scheme. Abberton Reservoir is outside our supply area, along with Layer Treatment Works and Langham Treatment Works which provide water for more than a third of the population.



- Our treatment works were mostly built in the 1930s and 1940s (Langham and Layer), 1950s (Hanningfield) and 1960s (Chigwell). These have been significantly improved and upgraded since, including ground-breaking water recycling using reed beds at Hanningfield.
- Langford Recycling Scheme came into supply in 2001 in response to the 1995-98 drought, enabling us to maintain supplies until the Abberton Reservoir expansion was completed.
- 65% of occupied households are metered.

Wastewater:

- Essex & Suffolk Water only provides water services. Wastewater services are provided by Anglian or Thames Water depending on your location.



Environment:

- Both Abberton and Hanningfield are sites of special scientific interest. We work closely with the Essex Wildlife Trust – as Abberton is an internationally important wetland, and both are important sites for birds.
- The rivers we abstract from are at risk from farming, with nitrates and other pollutants entering the rivers.
- We work with the Chelmer and Blackwater catchment partnership to support increased engagement with the public and farmers to reduce this – but algae and nitrates cause problems at treatment works which remain a risk to providing customers with good quality water.



Business:

- Most of the area we serve falls into London's green belt.
- Essex is a significant contributor to the UK, with a diverse and resilient economy.
- Construction, transport and logistics have particularly high relative concentrations of employment.
- The area has strengths in manufacturing and food production, including an extensive and highly productive agricultural sector.



Income and health:

- More than 123,000 people in Essex, including 40,000 children, live in areas that are in the 20% most deprived of the whole UK.
- Essex is also home to a growing gap between the most and least deprived districts.
- 4.3% of the population lives in households with an income of over £100k.
- There are some areas with high income deprivation (such as Barking and Dagenham) alongside relatively affluent areas.



*Note: as of May 2023; employment rates vary over time.

FIGURE 9: SUFFOLK

Suffolk: key features

Customers

- 127,000 households and 10,000 businesses
- Average income: £37k
- Employment rate: 75.3%*
- Service we provide: water to 0.37m people.



- Our three water resource zones (in North Suffolk, Blyth, and Hartismere) are not connected into a single network, so we cannot move water around the region.
- 71% of occupied households are metered.

Geographical features:

- The Suffolk Coast and Heaths area of natural beauty covers estuaries, farmland, salt marsh, mudflats and other natural features.
- Suffolk is at risk from sea level rise – but we don't anticipate this will affect water supply any time soon.
- Our operating area here also includes Great Yarmouth and surrounding villages which are in Norfolk and a significant part of our water comes from Norfolk.



Wastewater:

- Essex & Suffolk Water only provides water services. Wastewater services are all provided by Anglian Water.



Environment:

- Our Ormesby, Lound, and Barsham Treatment Works treat water taken from the River Waveney, Ormesby Broad, and River Bure – which are all part of the Norfolk and Suffolk broads, England's largest protected wetland. These are all at risk from pollution from agriculture.
- A significant proportion of our abstractions are from the Chalk aquifer which extends across the region. Abstractions from this need to reduce to leave more water for the environment.



Water:

- Urgent action is needed by all sectors on water resources – surrounding areas in the East of England are even more water stressed. Our customers told us they want us to invest now for the future to prepare for severe weather. This needs more resilience and additional supplies – with increasingly difficult options.
- We're leading the sector with some of the lowest levels of leakage in the UK.



Business:

- Mostly rural, with Great Yarmouth and Lowestoft as the largest towns – there is large water demand from agriculture and food processing. There is uncertainty regarding the build of a new nuclear power station at Sizewell C, as well as other potential industrial demands.
- Lowestoft offers a wide range of servicing facilities for North Sea oil and gas and offshore wind farms and extensive marine leisure facilities.
- New pig and poultry rearing businesses and meat processing in our Hartismere zone is pushing demand for water up by 35%, meaning we temporarily cannot supply any further new non-domestic customers with water.



Income and health:

- Several areas have the highest deprivation levels in the country, with levels higher than any in the North East.
- Great Yarmouth and Lowestoft are both areas of high income deprivation.
- Suffolk also has a higher proportion of retired people than the rest of the UK
- There is above average representation of health care needs such as arthritis, high blood pressure and heart attack.



*Note: as of May 2023; employment rates vary over time.

1.4. DEVELOPING OUR LONG-TERM STRATEGY

Our strategy builds on key strategic planning frameworks and our previous long-term strategies.

We welcome the focus on the long-term that has been adopted for PR24. The future is increasingly uncertain – climate change is driving a need for adaptation; geopolitical tensions are affecting national and international markets and the pace of innovation is accelerating. Having a robust approach to long-term planning now is therefore more important than ever.

We have developed this Long-term strategy by bringing together our strategic thinking from the relevant long-term strategic planning frameworks we participate in:

- Regional water resource management planning.
- Company water resource management planning (WRMPs).

- Drainage and wastewater management planning (DWMP).
- Flood risk management plans (FRMP).
- River basin management plans (RBMPs).
- Shoreline management plans (SMP).
- Water Industry National Environment Programme (WINEP).

This Long-term strategy also builds on our '[Shaping our future 2018-40](#)' document – referred to by Ofwat as our 'strategic direction statement' – that informed our [2020-25 Business Plan](#), which was informed by our conversations with customers about their priorities for their business. That strategy in turn was an evolution of our 'Future Horizons' document published in 2014 that informed our plans for 2015-20.

To ensure that this Long-term strategy is the best it can be we worked with experts and talked to our customers to develop a draft strategy, '[Shaping our future: developing our long-term strategy 2025-50](#)', which we published for consultation in June 2023. Doing so enabled us to seek feedback on the draft strategy and so improve our understanding of what our customers and stakeholders consider important and the challenges and opportunities they see for the long term.

We gathered feedback by inviting written responses, holding stakeholder workshops, meeting with the Environment Agency and the Drinking Water Inspectorate and running further customer engagement. We also engaged independent expert Martin Hurst to review our draft Long-term strategy and received feedback on specific areas from the Water Forum, our independent customer challenge group. We have used this feedback to make important changes to our approach. We have:

- Replaced our affordability scenario with greater consideration of affordability in all scenarios and the overall strategy.
- Introduced a new scenario to consider the potential for greater technological advancement including AI, and
- Increased our focus on how we will support development of our supply chain and the development of our future workforce.

We summarise the research we conducted to develop our draft Long-term strategy, the feedback we received on it and the changes we have made in [Annex 1: You said, we did](#) (NES_LTDS1).

2. AMBITION

2.1. SETTING OUR PURPOSE, VISION, AND VALUES

Our Purpose is caring for the essential needs of our communities and environment, now and for generations to come. We do this by providing reliable and affordable water and wastewater services for our customers. We make a positive difference by operating efficiently and investing prudently, to maintain a sustainable and resilient business.

Our Purpose is the reason we exist, and it guides our strategy.

We redefined Our Purpose in 2021 by engaging with employees, customers, stakeholders, and our Board to develop a relevant, enduring, and shared understanding of why our company exists. The Our Purpose statement was developed through a workshop with customers in 2021. The strategic themes in Our Purpose and the resulting long-term goals in this strategy are the principles we have extrapolated from this research on which our future plans have been developed. Our Purpose supports Water UK's [Public Interest Commitment](#), which we are [proud to be part of](#). But as society's expectations and our own ambitions develop, we want to go further.

The resulting statement of Our Purpose sets out the reason why we do what we do each day. The role we have as a provider of essential services is a privilege, and it places us at the heart of our communities and environment. Everyone in our operating area makes use of our services, and our assets run up and down every street. We rely on the environment around us for our raw material and have responsibility for returning water back to our environment in a sustainable way, while converting waste into energy and other valuable products; and we must deliver our services in a way that everyone can afford to use them.

Our Purpose is well understood throughout our business, with our dedicated colleagues committed to delivering for our customers, communities, and environment every day. As nearly every one of our employees lives in our operating areas, and is a customer of our services, it's not surprising that they care deeply about the service we provide to our communities. Everything we do is focused on maximising benefits for our customers and achieving the best possible outcomes for our communities and environment.

We report transparently on these outcomes in an annual '[Our Purpose](#)' report, which seeks to measure and communicate how we truly live Our Purpose.

FIGURE 10: OUR PURPOSE, VISION, AND VALUES



2.2. OUR LONG-TERM VISION AND GOALS

We want to leave a positive legacy in the areas we operate. Our role as a water company places us at the heart of our communities and our natural environment and caring for them is always our priority. Taking a long-term view enables us to future proof ourselves, our environment, society, communities, and economies.

Our long-term vision is to be the national leader in the provision of sustainable water and wastewater services - that is, to be the best water company in the UK. We clearly define, with metrics, what this means to us.

How do we define being the national leader?

When we achieve average or better in all the measures that are most important to our customers and have the most measures in upper quartile in the sector (top 25% of companies) we would define this as being the national leader. In addition, we would want to be in the top two for C-MeX (Ofwat's measure of customer service). We have been in upper quartile for C-MeX since its inception.

Our vision is well understood in our business with 91% of our people reporting that they support Our Vision and Our Values¹.

We tested the measures we use to understand and report on our progress in the annual Our Purpose report with customers through a survey in 2022. The survey gathered feedback to explore which measures customers thought should be used to measure our performance against Our Purpose and help improve the explanations of individual measures.

Our vision helps us all to focus and drive towards common goals, enabling us to achieve success where, in some areas, we have already achieved our 'national leader' vision. We are one of the best water companies for customer service and environmental performance.

In other areas, we have improved steadily and will continue to do so. Our 'national leader' vision is the starting point for setting our ambition for 2050.

¹ Our Great Place to Work survey.

FIGURE 11: OUR LONG-TERM GOALS



2.3. LIVING OUR VALUES

If Our Purpose defines who we are, and Our Vision defines what we do, then Our Values define how we do it.

Our Values are:

- **Customer focused** - We aim to exceed the expectations of our external and internal customers.
- **Results-driven** - We take personal responsibility for achieving excellent business results.
- **Ethical** - We are open and honest and meet our commitments with a responsible approach to the environment and our communities.
- **Innovative** - We continuously strive for innovative and better ways to deliver our business.
- **One team** - We work together consistently, promoting co-operation and mutual support, to achieve our corporate objectives.

How every one of our employees behaves underpins our reputation and building trust among our customers and wider stakeholders is crucial to achieving Our Purpose. Our Values set out the behaviours we expect our people to demonstrate, supporting them to take the right decisions and actions to deliver Our Purpose and Vision.

We know that we have a strong positive culture because of our clear Purpose, Vision, and Values. This is evidenced with our appearance 12 times as the only water company named on the Ethisphere Institute’s World’s Most Ethical Businesses list and being the first water company to achieve the Good Business Charter.

This strong culture, underpinned by Our Values, is echoed in how our customers experience our services. We were delighted to be ranked first in the industry for C-Mex (Ofwat's measure of customer experience) in 2022/23 and credit our deeply embedded customer service culture, which has been supported by focused investment on digital, skills/training, new services, and partnerships for taking us from the middle of the industry to the top.

In 2022 we (Northumbrian Water) ranked top water company out of 15 and fourth utility overall out of 35 in the Institute of Customer Service's UK Customer Satisfaction Index (UKCSI), while Essex & Suffolk Water (ESW) ranked seventh water company overall and thirteenth in the utilities sector. These are our highest results to date and ESW was also named as one of the most improved companies.

The Consumer Council for Water (CCW) annually assess how well water companies are performing in several areas that matter the most to customers. In the most recent CCW [Water Matters Report](#), Northumbrian Water is the most trusted water and sewerage company in England. Our trust score in Essex & Suffolk is above the industry average.

2.4. AIMING HIGH

An ambition grounded in what we know, reaching out to an imagined future.

Developing our ambition for the long term

To set our ambition for 2050, we started with a baseline of areas where we have statutory or legal requirements and targets. For example, the [Government's 25 Year Environment Plan](#) sets long-term targets for water demand reduction and improvements to river water quality. Our long-term planning frameworks, including the [Water Resources Management Plan](#) and [Drainage and Wastewater Management Plan](#) also set long-term targets and requirements we must meet. Our long-term strategy also needs to consider how we contribute to the UK government's 2050 net zero target.

In addition, we already have some long-term targets and ambitious goals that we set in 2018 from our [future vision statement](#) and our current [Business Plan](#).

As part of our ambition to be the leading water and wastewater company, we compare ourselves to other water companies and, where we can, to leading companies in other sectors, across performance metrics relating to customers, the environment, quality, risks, and cost.

We considered those areas where we are below average for the water sector and could improve - and where we are above average, but still have ambition to get better. You can read more about our performance in our [Annual Performance Report](#) and [Our Purpose](#) report.

We then discussed these ambitions and requirements with customers and stakeholders and explored their priorities and what they thought about our ambitions. We know it is difficult to engage with customers on long-term issues² and so we established regional '[People Panels](#)' in 2021 following [independent advice](#). In these panels we sought customers' views on long-term priorities and level of ambition. We also looked at [our own research](#) gathered through our WRMP and DWMP plans, our ongoing customer research, Ofwat and CCW research. Using the people panel approach allowed us to root our research on the long term in customers' current and historic experiences by giving us the time to explore current experiences and future aspirations over multiple discussions.

Weighing up the various statutory requirements, alongside our previously established long-term ambitions, our historical and projected operational performance and customer and stakeholder expectations to arrive at a single set of logical long-term ambitions is a challenging exercise.

Thinking about the service needs of our customers 25 to 40 years in advance helps us to set out what we need to do now to keep our water and wastewater systems fit for the future. However, over such a long period there is lots of uncertainty. Global warming is causing more frequent and more extreme weather patterns. The population is growing, and demand for water is increasing. We don't know exactly how these issues will impact us just as we cannot be certain about how much innovation and efficiency we might see in the future.

Statutory Requirements

Our ambition for the future encapsulates the aspirations of our customers and our desire to become the national leader. An important part of this is making sure that we deliver all our statutory requirements - what the law requires of us. Many of these legal obligations include specific long-term targets that form cornerstones of this Long-term strategy.

Our [Water Resources Management Plan](#) (WRMP) sets out how we will make sure that we will continue to meet the national guidelines for drought resilience in the long term. Our WRMP for Essex and Suffolk has been

² See the discussion of this in '[PR24 and beyond Final guidance on long term strategies](#)', April 2022, Ofwat, p0.13-14.

developed in collaboration with [Water Resources East](#), We also must meet targets set under the [Government's 25 Year Environment Plan](#) to:

- Reduce leakage by 50% across the water sector by 2050.
- Reduce household water use to 110 l/p/d by 2050.
- Reduce non-household water use by 15% by 2050 and 9% by 2038.
- Protect and enhance the environment through environmental destination requirements.

Since our Essex and Suffolk regions are seriously water stressed we will introduce compulsory metering of all customers to better manage water consumption.

The [Government's Storm Overflows Discharge Reduction Plan](#) (SODRP) requires us to invest to:

- Protect our designated bathing waters and most of our most sensitive and protected habitats from storm overflow sewage discharges by 2035.
- Eliminate all adverse ecological impact from storm overflows by 2050.
- Make sure that storm overflows discharge in fewer than an average of ten rainfall events per year by 2050.

The [Government's 25 Year Environment Plan](#) (25YEP) also requires us to invest to:

- Reduce nitrogen and phosphorus pollution, through catchment and nature-based solutions where possible.
- Improve drainage and environmental water quality, and reduce surface water flooding risk, through our [Drainage and Wastewater Management Plan](#) (DWMP).

We have other long-term statutory requirements, and must:

- Decarbonise to meet the national net zero target by 2050.
- Adapt to climate change, working with the UK National Adaptation Programme.
- Play our part in implementing the Environment Act 2021, including local nature recovery strategies and delivering biodiversity net gain.
- Deliver the Water Industry National Environment Programme (WINEP) every five years, including our role in protecting and restoring water bodies and blue spaces, protecting from and removing pollutants, biosecurity, flooding, waste reduction, and other priority areas.
- Protect 30% of land by 2030, where we need to invest in habitat restoration across our protected areas and beyond.

We must also maintain our ongoing obligations in the long-term, including:

- Serving and protecting customers – providing a better and fairer water service for all and meeting the needs of vulnerable customers.
- Supporting markets to deliver for customers, especially where these can drive long-term sustainable investment.
- Maintaining a resilient water and wastewater system, including a healthy asset base.
- Delivering high quality water and providing effective drainage.

Our existing ambitious goals

We already have some long-term targets and ambitious goals that we set in 2018 from our future vision statement and our current Business Plan. Many of these extend beyond 2025. Our progress in meeting our existing targets puts us on track to meet our long-term targets.

Unrivalled customer experience

We promised to deliver an unrivalled customer experience through a package of measures which are relevant to our long-term target of delivering leading levels of customer service. We are making good progress as we are currently leading on C-MeX, so we are top in the sector. Our Net Promoter Score is at +50 (2022), compared to an ambitious target for “world class service” of +59.

We have an existing target to be one of the top two performing water and wastewater companies for developer services as measured by D-MeX. We are also committed to providing excellent service to New appointment and variations (NAVs) and business retailers.

Leading in innovation

We committed to be the most innovative company within the water sector and beyond. We measure this in many ways, as reported in our [Annual Performance Report](#). This contributes to our long-term target to have an innovation pipeline of at least £100m by 2030. To date we have won the largest number of bids from the Ofwat Innovation Fund (12 winning bids, 40% of those we have submitted) and have secured nearly £19m in funding. We also have an innovation pipeline valued at more than £66m and are recognised as leaders through our Innovation Festival.

Improving the environment

We committed to creating a step change in our environmental activities. We have already made several environmental improvements that contribute to our long-term targets to reduce sewer flooding, greenhouse gas emissions and pollution incidents:

- Internal sewer flooding has reduced from 2.91 in (2019) to 1.84 (2022) – incidents per 10,000 properties.
- We reduced greenhouse gas emissions (scope 1 and 2) by 46% between 2009 and 2018, and we are already meeting our target for 2024/25.
- We reduced pollution incidents from 156 incidents in 2015 to 60 incidents in 2022. We were the frontier company between 2017 and 2020 but have fallen back slightly in the last few years, mostly due to increasing incidents from power failures at sewage pumping stations (during storms).

We have recently published our [Environment Strategy](#) (NES75), which provides further detail on our environmental ambition, targets and approach.

Building successful economies in our region

We have committed to support our local economies throughout 2025-30 by maintaining spending at least 60p in every £1 with suppliers in our region.

Affordable and inclusive services

We committed to eliminating Water Poverty by 2030. Water poverty has reduced from 22% to 9.6% by 2022, and we are ahead of our expectations on social tariffs. In the short term, we're expecting this to get worse again, and for the cost-of-living crisis to push more people into water poverty, as inflation impacts on the cost of living and some of the impact of reducing bills in 2020 is undone – for example, the 2023 figure is 15.3%.

We explain our approach to water poverty in [A1 – Customer Affordability](#) (NES02). In the context of increasing statutory requirements driving bills, we are considering how this can be achieved. Despite unfavourable economic conditions, we will continue our efforts to eliminate water poverty.

Reliable and resilient services

We committed to continue delivering reliable and resilient services by anticipating change, planning ahead and by making the right long-term decisions about running our business. Our current per capita consumption target of 118 lpd by 2040 is consistent with our new long-term target and we expect to continue making progress in this area despite the challenges we have had since 2020 through the impacts of the pandemic and the delays

to our smart metering programme. Our long-term metering strategy means we will be investing significantly to install meters out to 2035. We are also on track to reduce leakage in line with our long-term ambitions – our leakage levels in Essex & Suffolk are ranked second behind Bristol Water, with a level 33% below the average in England and Wales in 2022.

Our long-term targets build on our existing targets and are set out on the following pages.

Our Vision is to be the national leader in the provision of sustainable water and wastewater services.

To make our goals more tangible we set ourselves long-term targets. We consider these targets to be stretching but achievable. We have developed targets where we:

- Have statutory obligations.
- Consider the area is of high importance to our customers.
- Have the potential to transform our business for the benefit of society.

International comparison

The performance of the UK Water sector is already among the best in the world across a range of indicators. The [Environmental Performance Index](#), prepared by Yale and Columbia University ranks the UK as second internationally on environmental performance and sixth in relation to wastewater treatment and water resources out of 180 countries. In comparison to European countries the UK offers some of the [highest levels of drinking water quality and customer service](#). The UK also invests more than most European countries in the services but the [cost of water services remains close to the European average](#). Leakage or ‘non-revenue water’ percentage losses are better than the European average.

UN Sustainable Development Goals (SDGs)

We aspire to serve our customers and to generate public value for wider society, including the environment. In doing so, we want to challenge ourselves to be leading not just in the water sector but nationally and internationally. We have therefore used the UN’s [Sustainable Development Goals](#) to help develop our long-term targets to ensure we are contributing wherever appropriate to building a better world for all.

Customer and stakeholder priority

We have engaged with our people, customers, and stakeholders to understand their views on priorities and ambitions.

Our initial discussions on long-term targets were ‘unconstrained’ by costs, but nevertheless helped us understand relative priorities. Through these conversations ([NES LTDS5](#), [NES LTDS6](#), [NES LTDS7](#)) customers told us they wanted us to go further – to be more ambitious.

However, through the development of our PR24 business plan and our Long-term strategy, we improved our understanding of the impact of different areas on customer bills. We consulted with customers and stakeholders on our draft strategy, ‘[Shaping our future: developing our long-term strategy 2025-50](#)’ (NES_LTDS3), which included an initial view of these bill impacts and allowed us to test our long-term targets in the context of potential long-term bills.

As part of this consultation, we carried our deliberative research with customers at our 2023 Innovation Festival (IF23) and through our Future Customers People Panel. This enabled us to use customer engagement that explored bill impacts to inform the ambition in this Long-term strategy. We asked customers:

- How they feel about the potential scale of bill increases between now and 2050.
- In the light of these potential bill increases, whether they want a ‘budget service’ or a ‘gold standard’ (more resilient and sustainable) service.
- How they would like us to phase bill increases over the long-term.
- What approach they would like us to take to intergenerational fairness and whether customers would prefer current, future or all customers to bear increases in costs.

We also specifically engaged with customers on customer related long-term targets where:

- We have proposed final targets that are less ambitious than the unconstrained targets that we tested with customers to ensure the targets are deliverable.
- Where we are introducing additional targets that have not been tested with customers through other research.

We learnt from these conversations ([NES LTDS8](#)) that customers do not want the ‘gold standard’ or the ‘budget’ service – they want something between the extremes. We have reflected this in our Long-term strategy and our Business Plan for 2025-30. We are aiming to become the national leader in the sector, as set out in [section 2.2: Our long-term vision and goals](#), rather than the unrealistic target of the ‘perfect’ company that delivers upper-quartile service on all performance commitments and upper-quartile cost performance.

We triangulated the findings from all our research, including the feedback from customers and stakeholders on bill constrained targets. Where views differed, we have given greater weight to findings from research where customers had access to information on costs to arrive at the set of priorities and ambitions. We summarise

the key changes we have made as a result of feedback in [annex 1: You said, we did](#) (NES_LTDS1). As a result of our research, many of our long-term targets are aligned with national statutory targets – which are already stretching – rather than going beyond these levels. Our long-term targets are shown in Table 2.

TABLE 2: OUR LONG-TERM TARGETS

Long-term goal	Long-term targets	UN sustainable development goal	Statutory requirements
Customer service	Consistently deliver high quality water – Compliance Risk Index (CRI) of zero.	3	Ongoing obligations
	Leading levels of customer service – as defined by current metrics (C-MeX, D-MeX and BR-MeX).		Non-stat
	Reliable water supplies – reduce interruptions to supply greater than 3 hours to less than 2 minutes/customer/year on average by 2050.	6	Ongoing obligations
	Eliminate the impact of lead on customers – replace all lead customer supply pipes by 2050.	6	Non-stat
	Reduce internal sewer flooding – by 60% (from our 2024/25 performance levels) by 2050.	6	Non-stat
	Reduce external sewer flooding – by 60% (from our 2024/25 performance levels) by 2050.	6	Non-stat
Environment	Reduce household water per capita consumption – to 122 l/p/d by 2038 and 110 l/p/d by 2050.	6	WRMP
	Reduce non-household water demand – by 9% by 2038, excluding growth (from 2019/20 levels).	6	WRMP 25YEP
	Halve leakage – achieve a 55% reduction in leakage in our North East levels by 2050 (61.1 MI/d) and a 40% reduction in leakage in our Essex and Suffolk regions by 2050 (40.1 MI/d), to achieve the national target of 50% companywide (from 2017/18 baseline).	6	WRMP 25YEP
	Eliminate harm from storm overflow discharges – year on year reductions in number of storm overflows operating more than 10 times a year on average, and none doing so by 2050.	6	DWMP 25YEP
	Leading levels of water quality – eliminate the detrimental impacts of our operations and assets on waterbodies as soon as is practical. Work with partners so that, where possible, waterbodies in our regions can achieve good ecological status.	6, 14, 15	25YEP

Long-term goal	Long-term targets	UN sustainable development goal	Statutory requirements
	Leading levels of pollution incidents – zero serious pollutions now and always, zero pollutions as a result of our assets and operations and reduce the number of category 1 – 3 pollutions by 50% by 2040 (from 2022 baseline).	3, 6, 12, 14	25YEP
	Enhance biodiversity – all our construction activities, including those that do not require planning permission, will result in a net gain in biodiversity of 10% or the local requirement where higher.	6, 15	25YEP
	Excellent bathing waters – all bathing waters at good or excellent status by 2030.	3, 8	25YEP
	Protect water environments – target 100% discharge permit compliance and maintain at least 99%.	14	Ongoing obligations
Affordable and inclusive services	Eliminate Water Poverty – by 2030 no customer will spend more than 5% of their disposable income after housing costs on water and wastewater services and we will maintain this.	1, 10	Non-stat
Sustainability and resilience	Deliver Net Zero – achieve Net Zero Scope 1, 2 and 3 emissions by 2050.	13	Long-term statutory requirements
	Halve carbon impact of new assets – reduce embodied carbon by 50% for new assets by 2040 (from 2025/26 baseline).	13	Long-term statutory requirements
	Increase renewable generation – 100% of our electricity will come from additional* renewable generation by 2040.	7, 13	Long-term statutory requirements
	Reduce chemical and energy use – by 20% for all new assets by 2035 (from 2019/20 baseline).	11, 13	Non-stat
	Resilient water supplies – household customers continue to have a sufficient and secure supply of water by planning to be resilient to 1 in 500-year drought.	6, 11, 13	WRMP
	Leading asset management practices – achieve AMMA assessment of leading or optimising for all measures of asset management maturity by 2030 and leading by 2035.	6, 11	Ongoing obligations
Efficiency and prudent investment	Leading levels of efficiency – be the most efficient company in the sector in the round by 2030 and maintain that position.	8, 9, 12	Non-stat
	Leading in innovation – have an innovation pipeline of at least £100m (including Ofwat innovation fund competition) by 2030 and maintain it.	8, 9, 12	Non-stat

Long-term goal	Long-term targets	UN sustainable development goal	Statutory requirements
Caring for our communities	Support our local economies – maintain spending at least 60p in every £ with suppliers in our region.	8, 9	Non-stat
	Give time back to the community – at least 50% of our employees to spend time volunteering every year.		Non-stat

*Additional = renewable generation that would not have existed if we were not buying the power. This includes Power Purchase Agreements (PPA) with new generation that we guarantee the take-off for, and renewable generation behind the meter.

EVOLVING TARGETS

Most of our long-term targets are new. However, for the following areas we consider our previously stated ambitions need to be adjusted to align with new information.

Water poverty

Rising bills and lower incomes mean that our ambitious goal to eliminate water poverty in our operating areas will be increasingly difficult to meet. Our modelling shows that, with bill increases, it is unrealistic to continue to aim for a definition of water poverty where water bills are more than 3% of household income after housing costs. Instead, we will set this definition at 5% of household income after housing costs. This aligns with the findings of the CCW [affordability review](#) and the Water UK [Public Interest Commitment](#). We remain committed to eradicating water poverty as quickly as possible.

Sewer flooding

The National Infrastructure Commission’s report ‘[Reducing the risk of surface water flooding](#)’ highlighted the importance of a national approach to tackle flooding, and the costs and challenges of eliminating sewer flooding. Given this, and the greater insight we have gained from developing our [Drainage and Wastewater Management Plan](#) (DWMP) we are adjusting our ambition to what we consider a stretching but achievable level that would be economically beneficial to deliver.

Net zero

Our long-term target is to deliver net zero across all of our emissions (scope 1, 2 and 3) by 2050. To deliver this target we will require additional enhancement funding in future price reviews as estimated through our modelling. This long-term target is supported by customers – our future customers panel, comprised of young

people, considered delivering net zero to be the most important aspect of our long-term strategy. Although some customers support going faster on net zero, on balance we consider a 2050 target reflects the best balance of customer views and deliverability, accounting for the fact that customers did not support additional enhancement funding for net zero in 2025-30.

As discussed in our [Business Plan](#) (NES01), we are on track to deliver the absolute reduction in operational emissions on a market basis that we envisaged when we set our ambitious goal of net zero operational emissions (scope 1 and 2) by 2027. However, the science and approach used to calculate emissions continues to improve and evolve. Consequently, our measured emissions - in particular process emissions - are higher than originally estimated. We therefore no longer consider that our ambition to reach net zero operational emissions by 2027 is deliverable but will still seek to reduce our operating emissions by at least the amount that we had estimated when we set the target.

Water Quality

We are working to eliminate the detrimental impacts of our operations and assets on water bodies, helping them to achieve good ecological status in line with the Water Framework Directive. We know that there are many barriers to healthy catchments, and that a key part of regenerating catchments and enhancing the quality of the water environment is reducing negative impacts from different sources. At a national scale, the water industry is responsible for less than one quarter of the reasons why rivers are currently not achieving the desired quality status. This is why working in partnership, such as through the North East Catchments Hub (NECH) or through Local Nature Recovery Strategies, is so important, so we can address these problems collectively.

We have therefore replaced the narrow target from our draft Long-term strategy that focussed only on our activities, with a broader target to eliminate our impact and to work with partners to get waterbodies in our regions to good ecological status. Please see our [Environment Strategy](#) (NES75) for further information.

RESPONDING TO FEEDBACK

We sought feedback from stakeholders and customers on our long-term targets through our consultation on our draft Long-term strategy. We have made changes to several long term-targets as a result. These changes are summarised in [Annex 1: You said, we did](#) (NES_LTDS1).

Additional long-term targets

We have introduced several additional long-term targets that we and/or our stakeholders considered were necessary to ensure that all the areas we should be committing to improve are covered. These are:

- Reduce interruptions to supply greater than 3 hours to less than 2 minutes/customer/year on average by 2050.
- Achieve Asset Management Maturity Assessment (AMMA) assessment of leading or optimising for all measures of asset management maturity by 2030 and leading by 2035.
- Excellent bathing waters – all bathing waters at good or excellent status by 2030 and 100% at excellent by 2040.
- Target 100% discharge permit compliance and maintain at least 99%.
- Reduce embodied carbon by 50% for new assets by 2040 (compared to 2023 baseline).
- Eliminate the impact of lead on customers by replacing all lead customer supply pipes by 2050.

[Annex 4: Delivering our goals – our performance commitments](#) (NES_LTDS1) sets out how these long-term targets are linked in the near term to our performance commitments. It also shows how we expect these will be delivered through a combination of base and enhancement expenditure.

3. STRATEGY

3.1. OUR APPROACH TO PLANNING FOR LONG-TERM CHALLENGES

Our long-term strategy needs to recognise and account for the inherent uncertainty about the future.

The future is unknown. We therefore need to maintain flexibility in our planning approach so that we can take account of new information and respond in a timely manner. That is why we have adopted an adaptive planning approach as set out in Box 1.

Box 1: Adaptive planning approach

The purpose of an adaptive planning approach is to plan for the long-term taking account of uncertainty so we can adapt to new information to act in the short term. To embed this approach into our business, we have developed a set of adaptive planning principles based on those set out in the Government's '[Accounting for the effects of climate change - Supplementary Green Book](#)', pp.18-19.

Our adaptive planning principles:

1. **Focus on outcomes:** Identify and plan to deliver outcomes that matter for customers, the environment and wider society.
2. **Accept and assess uncertainty:** Recognise what we do not know and identify and plan for a broad range of possible futures.
3. **Plan flexibility in:** Develop options that enable us to adapt to new information, for example, modular designs and investing to keep options open.
4. **Monitor continuously:** Gather new information regularly to inform decision making process.
5. **Embed in decision making:** Build decisions on adaptive pathways explicitly into project delivery governance.
6. **Plan investments that are low regret and/or keep options open:** We should invest when the available evidence indicates an investment will be 'low or no regrets' or where investment is required to keep options open or to minimise the cost of future options.

In the previous section we identified our long-term ambitions for where we want to get to. The next step in developing our adaptive plan was to identify the long-term challenges that may make it harder for us to achieve

those goals, and opportunities to deliver them quicker, at greater benefit or at lower cost. This process, known as ‘horizon scanning’, helps identify factors and drivers that could impact on our long-term plans.

In addition to the engagement undertaken to support our [WRMP](#) and [DWMP](#) processes, we engaged with external parties to challenge us to understand the challenges we may face. We ran blue sky thinking workshops with the Oxford University Futures team and worked with ARUP and KPMG to establish a set of scenarios based on future trends and key areas of uncertainty and impact. Our economic regulator, Ofwat, has also identified several areas that it wants us to test called ‘common reference scenarios’. The trends identified within the Ofwat scenarios are built into our five ‘plausible future’ scenarios. These scenarios do not describe all possible futures but give us a consistent framework for developing our adaptive planning approach.

Horizon scanning also allowed us to consider how our approach to partnership working, our people, innovation, and productivity growth – the key enablers for our delivery – may evolve. Thinking about how the way we operate our business will change allowed us to consider what we would be able to deliver from our existing funding (‘base costs’) and what would require further enhancement funding.

Across the key areas of investment, we identified a longlist of the activities required to maintain our trajectory to meeting our long-term ambitions under the different scenarios. From this we have taken the no or low-regret activities that are needed in all or most of the future scenarios to form a ‘core investment pathway’. This is the pathway we start out on towards our long-term ambitions and the pathway we use to develop our immediate next steps on.

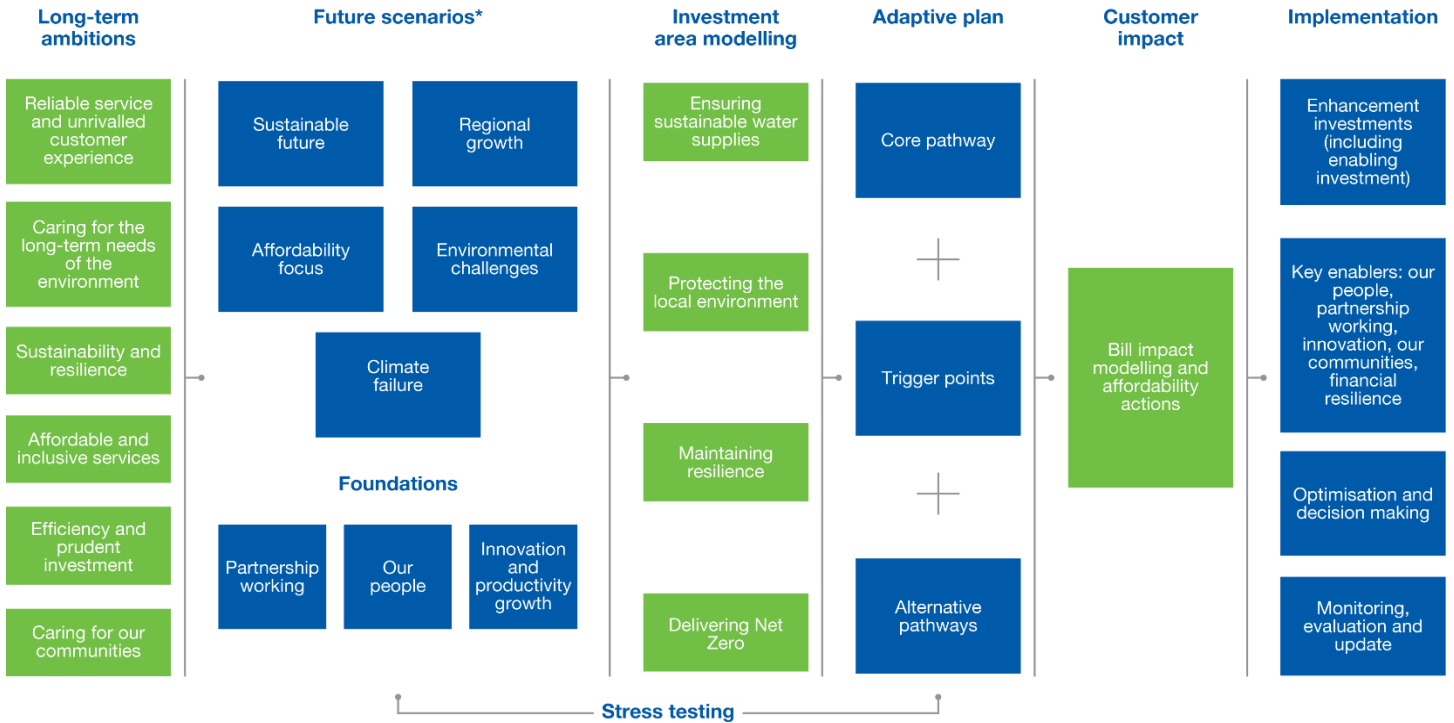
We then used the scenarios to further test this core pathway, and where the scenarios dictate, we need to adapt our plan away from the core pathway. For example, under scenarios where water demand is expected to be higher, we have developed ‘alternative investment pathways’ for additional water resources that still reach our long-term ambitions. The points at which a decision is needed whether to move to an alternative pathway are called ‘decision points’. The points at which we then move to an alternative pathway are called ‘trigger points’. Each scenario sees us making a different set of decisions triggering different investments.

Between the core pathway and the set of alternative pathways, we can maintain our trajectory towards our long-term ambitions despite the uncertainty of the future we will be operating in.

This adaptive planning approach enables us to remain agile to the challenges of the future by investing in no and low-regrets solutions now, while preparing and planning for alternative futures so we can adapt to the challenges that materialise.

We will continually monitor and update our horizon scanning, scenarios, and our set of alternative pathways to remain agile to future challenges that we are not aware of now, but which will become evident in the future. Regular stress testing of our strategy with the scenarios will make sure we have the best plan in place to realise our ambitions.

FIGURE 12: SCENARIO ANALYSIS USED TO INFORM ACTION FOR PR24



*Incorporates and accommodates Ofwat's common reference scenarios

3.2. HORIZON SCANNING

Over the last two years we have engaged with experts, stakeholders, and groups of customers to gain insight into their ambitions for our services now and in the long-term, and to understand what challenges and opportunities the future may hold.

As a long-term business we use several different tools to examine what the future may hold. Our well established WRMP process looks out 40 years to make sure we are prepared to provide sufficient water under different futures. Alongside this we are developing our first DWMP, which takes a similar long-term approach to assess the needs of our wastewater business. Both processes see us engage with local, regional and national stakeholders and our customers.

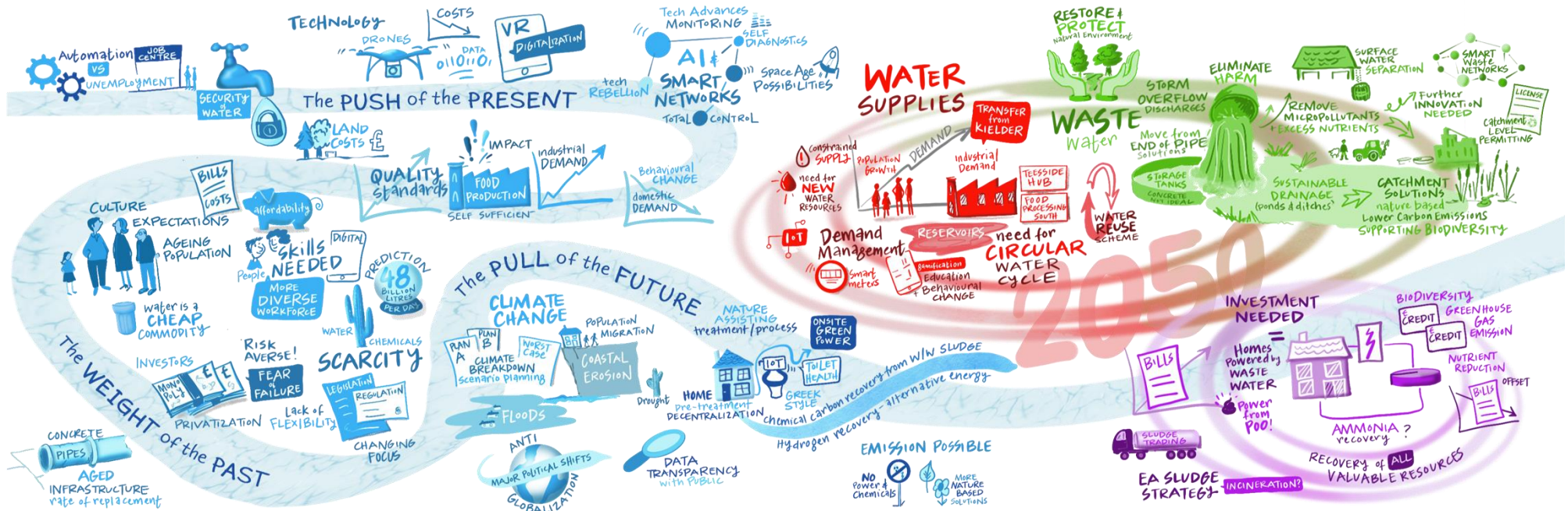
In addition to the extensive engagement in our [DWMP](#) and [WRMP](#), in the summer of 2022 we carried out a series of workshops with internal specialists and external experts from across the energy and water sectors. In these 'Future of Water 2050' workshops, specialist futurologists took the groups through structured exercises to imagine and experience the world in 2050, before working backwards to the present day to plan out what would be needed to deliver the 2050 future state.

We used data and prompts to support holistic and unrestricted 'blue sky' thinking about water and wastewater activities and services. We then stress-tested the ideas from the Future Water 2050 workshops by gathering a group of innovation experts together in a further workshop to consider where innovation could play a role in the future delivery of our ideas.

In contrast to the Future Water 2050 workshop, the innovation workshop's starting point was the 'now' - helping our Executive Team and Operational Leads to look at our existing work on productivity and innovation and challenging us to consider potential opportunities for transformational change. The workshops produced some powerful outputs and great ideas that have found their way into our long-term strategy via an 'execution' exercise. Some examples you will find in this document include setting out our long-term pathway for achieving net zero greenhouse gas emissions (scope 1, 2 and 3), the use of sensors in proactively managing asset health and using open data and citizen science alongside smart networks to monitor our wastewater assets.

Many days were spent in these workshops, with hundreds of fascinating ideas and interesting discussions. The following pages provide an illustration of the rich seam of insights from the discussions.

FIGURE 13: SUMMARY OF OUR FUTURE WATER 2050 WORKSHOP



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3.3. FUTURE CHALLENGES AND OPPORTUNITIES

We have worked with stakeholders to identify the challenges and opportunities we will face in the future.

We have brought together our blue-sky thinking with further work to identify the challenges and opportunities we may face in the future.

In addition to our horizon scanning activity, we engaged ARUP to help us create a framework to understand both what the key drivers and disruptors for our business might be in the future, but also to assess the level of uncertainty around these. We ran workshops on this in 2021 to provide an early long-term direction for the development of our 2025-30 Business Plan. We engaged our customers on the development of the scenarios and personas to understand their impacts ([NES LTDS4](#)). The results are summarised in ARUP's '[Scenarios & strategies' report](#) (LTDS2).

This work identified key factors that have both high uncertainty and high potential impact.

The climate emergency has huge potential to affect our communities and operations through rising sea levels and increased risk from extreme weather including:

- Increased flooding at water and wastewater treatment works.
- Storms causing local and regional power and communications outages.
- Hotter summers potentially causing equipment to fail.

The flip side of managing the impact of climate change is minimising our contribution to it through delivering net zero. To achieve net zero across all our emissions (scope 1, 2 and 3) we will need to fundamentally change the way we operate parts of our business and employ technologies that have not yet been developed.

Population growth, and the consequent increase in demand will create further challenges for ensuring we can provide water sustainably. In addition to demand side solutions such as providing water efficiency advice and smart metering, we will most likely need to invest in at least some new water resources in our Essex and Suffolk supply area – but there are a range of options and more than one may be needed. On the wastewater side, urban creep in the North East may increase the need for additional drainage solutions.

Attitudes to sustainability, the desire to protect the local water environment and the resulting changes to legislation are already being seen to have significant impacts on the investment required between now and 2050, in particular to eliminate harm from storm overflow discharges. Further environmental issues, as they are

better understood, could result in even greater future investment needs and changes to the way we operate. Anti-microbial resistance, persistent organic pollutants and microplastics are all issues currently under investigation that may need to be addressed in this timeframe. On the other hand, changing attitudes may enable greater gains to be made from behaviour change, such as reducing personal consumption.

All these issues raise the prospect of significant future investment requirements, for which investors will need to provide additional private capital. This investment in national infrastructure will need to be efficiently funded and given a reasonable return.

Ultimately bills will need to rise to fund this investment. Economic conditions for customers in the near term necessitate the careful consideration of affordability – as the economy recovers or not from recent world events the situation for customers may get better or worse and so the balance between bills and investment will need to be continually considered into the long term.

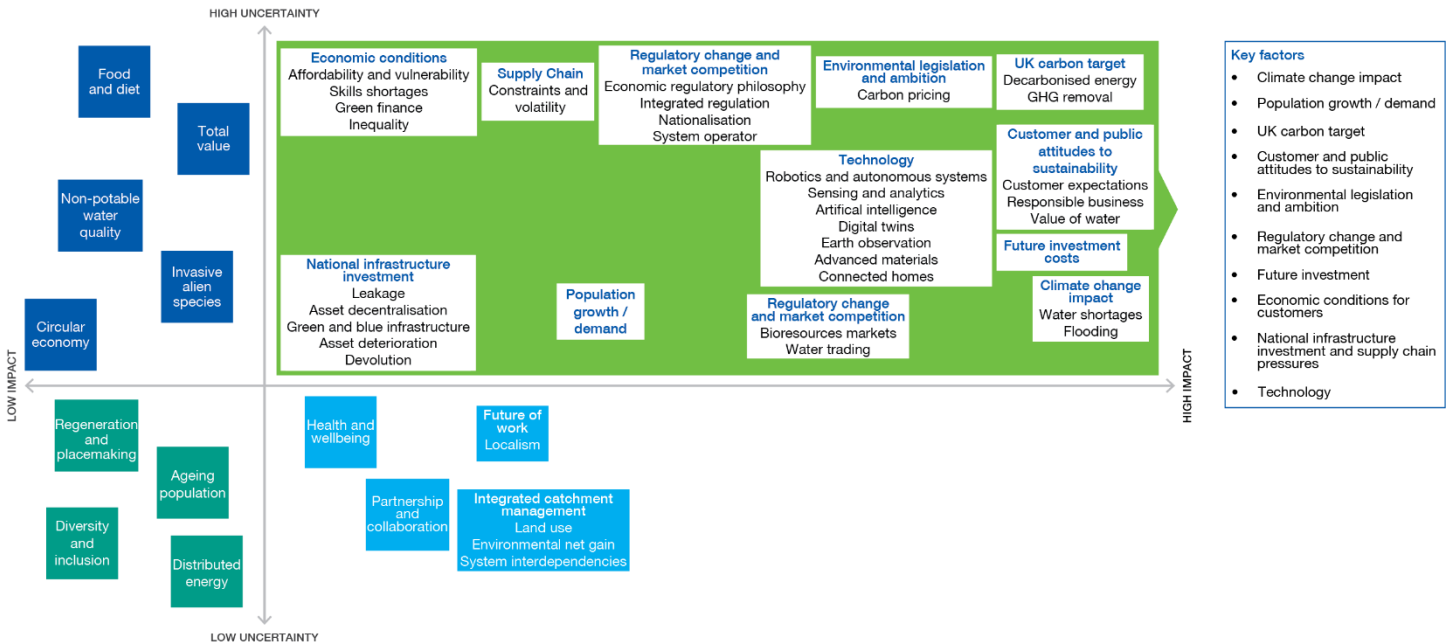
Technology and innovation offer perhaps the greatest potential upside – if innovation can be steered in the right direction, then this could enable us to deliver more for less, both through new technologies such as smart networks, but also new ways of working and adoption of existing techniques that are yet to be scaled up to their potential, such as catchment and nature-based solutions.

Since ARUP completed its report, we have learnt more from our blue-sky thinking workshops and, public perceptions have changed significantly. The key changes we have seen since 2021 are:

- The protection of the local water environment is socially and politically more important.
- The invasion of Ukraine by Russia in February 2022 has further increased uncertainty in international markets, exacerbating supply chain issues created by Covid-19 and international shipping constraints.
- The interest in policy makers of extending the role of markets in the provision of water and wastewater services has reduced.
- The profile and interest in, and to some extent the capability of AI has increased.

We have updated our analysis and scenarios to reflect these changes. Figure 14 below summarises our assessment of the impact and uncertainty of the drivers and disruptors identified. In the following pages we construct plausible future scenarios in which what happens for the key factors identified here varies.

FIGURE 14: KEY DRIVERS AND DISRUPTORS WITH SIGNIFICANT IMPACT ON OUR LONG-TERM PLANS³



3.4. PLAUSIBLE FUTURE SCENARIOS

We have developed five plausible future scenarios to help determine and stress test our Long-term strategy.

Detail behind the development of our scenarios can be found in the ARUP report published alongside this document. As a result of further scenario development work, we introduced an additional scenario work, we introduced an additional scenario on Environmental Challenges in our draft LTS. We retain that scenario here. We have also reinstated scenario 5 from the ARUP report as the ‘Technological Advance’ scenario in response to stakeholder feedback, as many of those we talked to considered that there was scope to consider technologies that could offer a step change in cost, beyond the improved total factor productivity that we considered in our modelling.

We have removed the ‘Affordability Focus’ scenario that we included in our draft LTS. This scenario differed from the others in that its primary purpose was to examine the impact of pushing back investment from 2025-30. As we have now finalised our Business Plan for this period the trigger point for this scenario has effectively passed, and so the scenario is no longer necessary. The affordability challenge is however no less, and we

³ Source: ‘Scenarios & Strategies - 2050 Scenarios’, ARUP, July 2022.

discuss our strategy to address long term affordability in [section 4.4: Maintaining affordability for customers](#).

In our draft Long-term strategy, we accommodated Ofwat's 'common reference scenarios' and the trends identified within them within our five plausible futures scenarios. We have since adapted these scenarios to ensure we cover all pathways included in our DWMP and WRMPs in our Long-term strategy and so the assumptions in our plausible futures scenarios now diverge from the common reference scenarios. We therefore present analysis of the common reference scenarios individually in [Annex 3: Common reference scenario analysis](#) (NES_LTDS1).

Our scenarios include assumptions we are making about the future we will be working in. These assumptions include wider economic conditions, attitudes to sustainability, customer affordability, the potential to delay or bring forward investment among other trends. This helps us to examine how our plans might need to change, depending on the risks and opportunities in the future. This also helps us to consider what we can do to help to change that future – and what we should do now to be ready if we can't.

These are not intended to capture all possible eventualities, but to identify a broad range of potential futures that include company-specific and/or local factors so that we might learn from this. Our scenarios are:

Sustainable future scenario

The UK is on a climate change pathway with greenhouse gas emissions peaking before 2040. We don't see significant increases in extreme weather events and global temperature rise expected to stay well below two degrees. Changing attitudes from customers towards water use lead to lower consumption, allowing us to avoid the need for some expenditure on new water supplies and climate change adaptation.

Customer expectations on environmental protection are increasing meaning the UK government brings forward the requirement to deliver our storm overflows programme to finish in 2040. Considerable climate finance investment was put into technology innovation which was rapidly taken up across the UK and across the water sector. Although the trend of urbanisation continues across the UK, its impact on the water sector is mitigated by government legislation on sustainability-focused decision making as the country develops.

Early in the period there was a rapid improvement in economic conditions due to the influx of investment and the creation of new jobs, but this levels off later in the period as the UK has reached a stable point in the green transition which leads to steady growth. This is supported by the development of technologies such as AI, supported by Open Data, that allow us to make better use of monitoring data to deliver environmental gains

more efficiently. From a regulatory perspective, water companies have a stronger mandate for action, driven by public preferences. A systems thinking approach across sectors results in changes in other sectors reducing the pressure on the water system, for example rainwater harvesting for toilets is included as standard in all new build properties.

Climate failure scenario

A lack of meaningful action has resulted in a trajectory towards four degrees of global warming by the end of the century. The North East and Essex and Suffolk regions see significant changes in weather with increased rainfall intensity and longer periods of drought, the latter more prevalent in the South East.

Although the period starts with a time of high growth, due to growth being prioritised over environmental outcomes, economic conditions quickly decline putting significant pressures on the disposable incomes of customers. This pressure leads to further disregard of the environment and sustainability and as such, customer demand for water increases as consumption reduction is not a priority.

The priority for growth over environmental outcomes within legislation was accompanied by greater regulatory intervention that limited the response of water companies to the impacts of climate change. This means there was a lower uptake of green and blue infrastructure and less focus on asset health. Solutions remain conventional or outdated with limited innovation, leading to more expensive solutions. The lack of technological progress means no solutions are developed to eliminate micro-pollutants and incineration of bioresources is an accepted alternative. The cost of investment has also increased, largely due to the regulatory burden.

Regional growth scenario

The North East and Essex and Suffolk regions see an extended period of economic growth due to more focus on regional government spending and investment. This leads to higher population growth in these areas and customers having more disposable income. However, this growth also leads to increase in demand in these areas, particularly from industrial customers, putting increasing pressure on water resources.

While the focus has been on economic growth, environmental ambitions have slipped. This has led to less stringent abstraction and bioresource restrictions compared with other scenarios. Climate change is on a moderate pathway leading to an increase in weather variability.

Environmental challenges scenario

There is increasing pressure from government and society to invest in more advanced wastewater treatment, water treatment, sludge incineration and sewer flooding to align with more stringent environmental ambitions. The additional treatment requires more power and chemicals, creating an additional environmental challenge. While there is increasing pressure, the ability to affordably invest in solutions is limited by slow economic growth and slow technological advancement. Regulatory and economic pressures also increase the cost of capital. This leads to solutions being more costly to customers in the long term compared to the sustainable future scenario. Water demand in the North East and Essex and Suffolk continues to grow at a moderate level and the impacts of extreme weather are also considered moderate in this scenario.

Technological advance scenario

Rapid technological progress across the economy increases the efficiency of many companies. This supports a prosperous economy, and so customers feel able to support higher bills to increase environmental expenditure. The world is on a moderate climate change impact projection and the UK is ahead on carbon targets due to investment in climate change related technology and pressure from the public to act sustainably. The impact of economic growth on water demand is tempered by the development of more water efficient domestic and commercial appliances.

The maturation of AI enables its application across several different use cases relevant to the water sector, including improving the effectiveness of self-serve customer service and leak detection. These technologies and in particular AI assisted smart network control that reduces the cost of storm overflow discharge reductions reach maturity in the mid-2030s after ongoing testing and innovation projects across the water sector. In rural areas green/blue infrastructure options are effective and widely deployed. This coincides with advances in construction, including robotic concrete 3D printing, that significantly reduce capital project costs. Increased monitoring, Open Data and AI allow for more efficient management of asset health across the sector.

The efficiency of investment is further supported by government funding and incentives that support the widespread adoption of a systems thinking approach to infrastructure investment that results in conventional capital intense solutions often being avoided. This scenario is well aligned with the Defra plan for water.

Ofwat common reference scenarios

In our draft long-term strategy consultation, we did not use Ofwat's common reference scenarios directly – instead, we incorporated these into our five plausible futures scenarios. However, we have now assessed

these scenarios as additional standalone scenarios; we have included our analysis of these in [Annex 3: Common reference scenario analysis](#) (NES_LTDS1).

3.5. INVESTMENT AREAS

The focus of this Long-term strategy is how we can deliver our long-term goals in the face of future challenges.

This allows us to understand the potential trajectory of customer bills under different scenarios and so understand whether different investment decisions are needed, and what key enablers we need in place to achieve our ambitions.

We have therefore considered what investment will be needed to deliver our long-term goals and have identified four key investment areas. For each of these investment areas we then assess what the key trigger points are and what the different possible pathways of investment could be to reach our ambitions.

We consider these investment areas capture the most important areas of investment for the long-term. However, we recognise there is some overlap between them, and there are probably some smaller areas of investment that we do not capture in this analysis. We have high confidence in our analysis of this area as it is underpinned by the [WRMP](#) and [DWMP](#) process.

FIGURE 155: INVESTMENT AREAS



3.6. CORE PATHWAY

Our core pathway includes all the activities and investment we know are no- or low-regret as they are required under a wide range of the future scenarios discussed in the previous section.

It comprises investment to meet short-term requirements, and to keep the necessary options open for potential longer-term investments. It ensures greater cost effectiveness and efficiency by allowing for optimising the timing of future investment which would be higher regret in the near-term.

Our core pathway includes significant enhancement investment we will need in 2025-30 across our four investment areas (excluding investment we will need, but on which we will have to take a prioritisation

decision, as set out in the adaptive pathways). It is what is required to make sure we continue to meet the targets and ambitions that our customers and wider stakeholders want us to achieve.

Our core pathway of enhancement investment is built on a foundation of:

- Pushing and challenging ourselves to make sure we achieve as much as we can from our base expenditure before looking for enhancement investment.
- Driving through efficiencies from different ways of working – with a strong focus on partnership working and innovation.
- Challenging ourselves to ensure investments for the short-term are also the efficient investments over the long-term.
- Phasing and smoothing investment over the long-term to create a sustainable and deliverable investment pipeline that underpins affordable bills.
- Monitoring and investigating where uncertainty could lead to high regrets investments.
- Maintaining strong, long-term financial resilience, helping to make sure we remain an attractive investment proposition and can continue to attract the necessary investment capital.

There is a level of enhancement expenditure that we consider is core up to 2050. A lot of the investment activities we know will be required as no or low-regrets have been phased over consecutive five-year price review periods as part of the core pathway. Further potential investment requirements, which are uncertain or where the timing has flexibility, have been included in alternative pathways.

To develop this core pathway and the alternative pathways that follow, we have made broad assumptions about the wider world, the UK's economy, and our own costs. While every effort has been made to ensure the assumptions are reasonable and robust, these are not predictions, and we expect actual future costs and bills to vary significantly from these projections, given the 25-year period we are examining.

Climate change

Our core pathway and alternative pathways need to take account of climate change as it will fundamentally alter the environment on which we rely and in which we operate. The extent of the impact will depend on how much we can reduce greenhouse gas emissions, and how much warming affects climate patterns, such as the Gulf Stream, that directly drive the weather we experience.

To understand the potential impact of climate change on our resilience we have carried out two studies. The first was a high-level study focusing on the changes England will experience nationally and how our regions may be affected differently. This has highlighted the following.

- Droughts will intensify, above all in the South-East, where the increase in temperatures will be greater. However, annual rainfall is expected to decrease more in the North-East. This will also have an impact in soil moisture deficit.
- Heatwaves like the ones in summer 2018 will become more frequent and hotter, above all in the South-East.
- Floods will become significantly more extreme in the North-East associated with large scale storms, whereas in the South-East, summer convective rainfall will increase, potentially leading to localised flooding.
- Winter storms with associated high winds, which occurred during storms Desmond and Arwen will be more frequent and intense in the future.
- Sea level will continue to rise, in particular in the South-East, and storm surges will be more frequent, although their intensity will probably remain the same.
- Freeze-thaw events and snow will decrease with global warming.
- Lightning projections are inconclusive but there is some indication their frequency would decrease.

These changes in climate hazards have been compared to the magnitude of the consequences of past extreme weather events to establish the magnitude of the risk to the company. This has resulted in the identification of:

- Two very high risks in the North-East: flooding and wind, followed by droughts, water quality deterioration and soil moisture deficit as high risks.
- Three very high risks in the South-East: droughts, soil moisture deficit and wind, followed by heat and flooding as high risks.

The second study looked at each of these risks in detail to identify service impacts. Where we found correlations, we estimated the value of those impacts. For example, the soil moisture deficit will increase the burst rate of our distribution pipes and projections have been made under the low and high emission scenarios to estimate the scale of that increase.

Flooding, coastal erosion and wind

To better understand the projected flood risk in both regions and sea level rise and storm surge in the South East, we used the GIS information for every water treatment works, service reservoir and pumping station. This was then compared to Environment Agency Flood Maps for Planning and Risk from Surface Water Flooding.

The Environment Agency (EA) published flood zones are available to inform local flood risk assessments for all three pluvial, fluvial, and coastal flood sources. It also enables a consistent approach and use of validated data when undertaking a review of flood risk at a regional scale.

We obtained Flood Depth data from Fathom for our assets in the North East. However due to a combination of reasons we had low confidence in this data set and so have only been able to use it to confirm EA inundation map predictions.

We carried out an evaluation of the sites at most immediate risk of flooding by identifying those at risk under a current 1 in 100-year pluvial or fluvial (defended) scenario or under a 1 in 200-year tidal (defended) scenario. We assessed these sites as high-risk and put forward investment in 2025-30 to ensure a 1 in 100-year standard of protection. We excluded assets that have already been protected. We consider those sites identified as at risk of a future 1 in 100-year pluvial or fluvial (or 1 in 200-year tidal) flooding event for future investments to protect from flooding. This has identified sites that may need protecting over future periods. We will continue to update this analysis as new data becomes available to inform future investments.

Our Business Plan for 2025-30 uses this work to identify where low/no regret investment is needed now. We have mapped the sites identified as at risk during 2025-30 and compared the mapping to aerial imagery and discussed with the site owner to understand the assets at risk and suitable interventions to protect any key assets. Our plan includes solutions for the assets requiring protection in this period to enable services to continue in the event of a flood.

We have analysed the impact of climate change on our wastewater assets in our DWMP following the Met Office United Kingdom Climate Projections 2018 (UKCP18) representative concentration pathway (RCP) 8.5 and created new rainfall models. The work we are doing on wider resilience and specifically climate resilience affecting our asset base is a core element to our alignment with the Flooding and Coastal Erosion Risk Management (FCERM) strategy.

Our DWMP examines the impact of climate change on the wastewater network, including considering the impact of increased flooding at wastewater treatment works, storms causing local and regional power and communications outages, hotter summers causing equipment to fail and rising sea levels.

The DWMP takes account of our Business Plan for 2025-2030 includes investment to ensure we can continue to maintain current levels of service against increasing levels of risk. Our short-term investment will be focused on “no regrets” investments – repairing and replacing the poorest condition assets at water and wastewater treatment works and service reservoirs and protecting equipment from flooding and power failures in storms. These investments tackle issues now that are well understood, and that have an immediate impact on risk and service for customers.

Extreme Drought

Climate change will increase the likelihood of extreme drought in our regions. We have modelled the impact of climate change on a forward-looking basis using statistical analysis in line with national guidance. We will always strive to supply our customers with the water they need, but to maintain a resilient water supply during a drought, we may sometimes need to impose restrictions on water use. These are outlined in our Drought Plan and are summarised in Table 3.

TABLE 3: DROUGHT PLAN SUPPLY RESTRICTIONS

	ESW	NW
Level Appeal for restraint	Suffolk: 1 in 5 years until 2033/34 then 1 in 10 years Essex: 1 in 10 years	1 in 20 years
Level 2: Phase 1 Temporary Use Ban	Suffolk: 1 in 10 years until 2033/34 then 1 in 20 years Essex: 1 in 20 years	1 in 150 years
Level 3: Phase 2 Drought Order Ban	1 in 50 years	1 in 200 years
Level 4: Reduced supply at customer tap	1 in 200 years until 2033/34 then 1 in 500 years	1 in 500 years

The most severe restriction is known as a Level 4 drought action and includes rota cuts - this action would only be needed in the most extreme droughts. Currently we will not impose a Level 4 restriction more than once every 200 years on average. Thanks to investment in demand management planned in our WRMP24 for the Northumbrian region we will improve this level of service to once every 500 years on average from 2025. We can offer this level of resilience in large part because our region benefits from both Kielder Reservoir and the Tyne Tees transfer.

We will also increase our service commitment to 1 in 500-year drought resilience in our Essex & Suffolk regions. Climate change on its own will not require new water resource investments, but the high demand and current restrictions on supply will mean we will need to bring new water supply schemes online. It will therefore take a little longer to reach the improved 1 in 500-year service level here; we will most likely be able to have the water supplies in place to reach this service level by 2033/34. In both regions we will deliver this higher level of service ahead of the Defra deadline of 2039.

Customer engagement to develop our core pathway

We have used evidence from customer engagement as described in [Annex 1: You said, we did](#) (NES_LTDS1), to understand customer priorities and preferences to inform the selection and sequencing of key enhancement investments for the core pathway up to 2050.

[Section 2.4: Aiming high](#) describes how we have used customer engagement to develop our long-term targets. Our core pathway has been developed to deliver those long-term targets and so deliver customer priorities. The impact of customers' views can therefore be seen throughout the strategy.

Following engagement with our customers on our draft strategy, '[Shaping our future: developing our long-term strategy 2025-2050](#)' (NES_LTDS3), we identified three key areas of focus for customers that we felt needed to be reflected in the core pathway.

- Affordability, and the impact of bills rising for the next 25 years is a major concern. Customers described the potential bill rises as 'scary' and 'overwhelming'. Customers expressed a preference for costs rises to be borne equally by different generations. We have therefore looked for any areas where we could reduce costs, seek alternative funding, and keep bill changes fairly constant over time.
- Delivering net zero by 2050 is a priority (it is the highest priority amongst our youngest customers). But customers do not support us spending more to deliver net zero in the short term. Our Business Plan and this Long-term strategy therefore does not include enhancement investment to deliver net zero in 2025-30, but we expect to need to ramp this spend up from 2030.
- Eliminating the harm from lead in the network (predominantly in customer-side pipes) is seen as a higher priority than some of Ofwat's prescribed common performance commitments, such as biodiversity and bathing waters. We have therefore included lead replacement as the fifth major investment area in this Long-term strategy.

We have incorporated these changes into our core pathway, and into our adaptive plans.

3.7. CORE PATHWAY BY INVESTMENT AREA

Our core pathway brings together the low and no regret investment we will need over the next 25 years across five areas of investment to ensure sustainable water supplies, restore and enhance the local environment, maintain resilience, deliver net zero and replace lead.

Ensuring sustainable water supplies

Our core pathway excludes the big supply-side investments, such as reservoirs we will or may need to make. These are set out as alternative pathways in our adaptive plan. There are choices to be made on these, including in terms of the timing and sequencing of those investments.

Our core pathway still includes a necessary level of enhancement investment to ensure sustainable water supplies, with a strong focus on demand-side solutions but also major strategic mains investments in Suffolk to be able to move water around the region more effectively.

We have near industry leading levels of leakage reduction that are amongst the best in the world, and we plan to reduce leakage by a further 40% in Essex and Suffolk. Our customers would still like to see us go further, but we do not consider it is economically viable to reduce leakage by the industry target of 50% as we have exhausted the cheaper leakage reduction options. The difference in cost between 40% and 50% leakage reduction options is around £240 million. Ultimately, we don't want to waste water through leakage, and we know this is very important to our customers too. At a company level, we will deliver a 50% reduction in leakage, as we have higher leakage levels in the North East and have set ourselves the target of reducing leakage in this area by 55%.

We will also continue to invest in technology and programmes that promote and enable reduced consumption by household and business customers, including through upgrading all our meters to smart meters by 2035.

We will continue to raise awareness of the benefits of metered supply and will support all our customers who want to switch onto a smart meter.

Our modelling for Essex & Suffolk suggests there is an urgent need for new water supplies to be developed in 2025-30. Our assessment found that using the low or medium climate change scenario did not affect our core pathway investment as the need for this investment is generally being driven by new non-household demand and sustainability reductions for abstraction. Under the low climate change scenario, the Langham nitrate removal and Langford UV schemes in Essex are not selected based on demand alone. However, these are important schemes for reducing unplanned outage and therefore utilisation of the Ely Ouse to Essex Transfer

Scheme and so are included in our core plan. The Environment Agency said in its response to our draft WRMP24 consultation that we need to reduce both and should consider schemes in our WRMP24 to do this. We therefore consider that although our WRMP24 baseline central supply forecast is based on the medium climate change scenario, our core plan would be the same for low climate change scenario.

We may need additional water supplies over the long-term depending on the performance of demand-side interventions and leakage reduction. These investments are set out under our alternative pathways. Under our core pathway, we will invest in preparatory expenditure including feasibility studies to keep our options open in terms of the timing and nature of these investments. However, we will need either a new water re-use scheme and/or a new winter storage reservoir in our Essex and Suffolk region. That will need to be confirmed in 2024 once the Environment Agency has concluded its Habitats Regulations investigations and confirmed the size of further sustainability reductions and in 2026/27 following further detailed design work.

Our core pathway also includes water supply investments that will be required under all scenarios. These are:

- Suffolk Strategic Pipelines including:
 - Barsham to Saxmundham treated water pipeline.
 - Holton to Eye treated water pipeline.
- Bungay to Barsham raw water pipeline.
- Barsham nitrate scheme.

We also include several schemes that, although they are not required under all scenarios, we do consider are low regret investments. These are:

- Langford water treatment works Ultra-violet treatment.
- Langham water treatment works nitrate scheme.
- Langford water treatment works nitrate scheme.
- Abberton raw water pumping station and Langford clarifiers.
- New Linford water treatment works and borehole(s).
- Lowestoft water reuse and pipeline to the River Waveney.

Details of how we have developed these and alternative options, and how we have selected the can be found in our [Water Resource Management Plans](#).

Additional investment is included in our core pathway to address deteriorating raw water quality. This will address issues increased algal growth due to climate change and excess nutrients. This investment will also reduce water quality risks from onsite activities.

Restoring and enhancing the local environment

Our core pathway reflects the ‘best value’ approach to achieving statutory environmental requirements including marginal green investments for storm overflows. Under this pathway, we would meet our environmental goals and assume that the current appetite for (and scale of) environmental investment remains constant in future. This still involves very significant investment, including to meet the requirements and timetable as currently set out under the [Government’s Storm Overflows Discharge Reduction Plan](#).

To deliver storm overflow discharge reductions our core pathway includes investment in surface water separation, nature-based solutions that support biodiversity and smart networks. We had proposed investment in smart networks and increased sewer capacity in the last price review covering 2020-25, but these investments were rejected by Ofwat and the CMA. We were disappointed that the regulators took this position as we consider this investment was important to customers and would have supported a more sustainable future. These investments are planned for taking account of the modelled potential impacts of climate change.

This investment will deliver multiple benefits because we are taking a long-term view and considering customer and environmental priorities together. Surface water separation investment in our core pathway will deliver not only benefits to the environment by reducing storm overflow discharges but will also reduce internal and external sewer flooding risk by 60% in line with our ambitious long-term targets that have been informed by the National Infrastructure Commission’s report [‘Reducing the risk of surface water flooding’](#).

Our plan aims to maximise the benefits we deliver by using catchment and nature-based solutions. For example, we have proposed an innovative hybrid approach to address nutrient neutrality in the Tees. The proposed package of solutions includes reducing Nitrogen at our largest wastewater works where this is an efficient way of delivering reductions married with several nature-based regenerative schemes on the Tees estuary, including seaweed farming and shellfish restoration. This approach will deliver more for the environment at lower costs to customers than traditional solutions.

We have considered phasing of investment, relating to storm overflows in our DWMP and as discussed in section 3.10: Alternative pathways. It would still be possible to decide on alternative pathway now ahead of 2025.

Details can be found in our [Drainage and Wastewater Management Plan](#).

Maintaining resilience

Our core pathway provides the lowest necessary investment to shift us towards a sustainable level of asset maintenance expenditure, with investment in asset health and climate change adaptation required to meet our legal obligations⁴. We have selected 'no regrets' investments for 2025-30. Beyond 2030, we expect further assessment and monitoring of our asset base to increase the sustainable investment required in asset health considered 'no regrets'. Adaptation to increasing temperatures and more variable weather will be required in all scenarios, with only the scale of these investments changing.

Our core pathway assumes that we will see some innovation in asset health, particularly for underground assets such as mains and sewers where recent innovation projects (both our own and across the sector) have shown this should be possible soon. From modelling the costs of maintaining resilience under different scenarios we know that the potential benefits of innovation could be very high – but delaying investment too much to take advantage of this could mean higher replacement and deliverability costs in the future. We can take a balanced approach by making investments now where there are likely to be limited gains from innovation and where there are known climate risks with an immediate impact.

Estimating the correct level of additional investment in capital maintenance to support resilience is challenging. As discussed in '[Regulating for the long-term: resilient essential services require healthy assets](#)', NWL, July 2022, the level of sustainable long-term asset health investment could be as high as three times our current investment rate. The Water Industry Commission for Scotland (WICS) has allowed a 78% increase in Scottish Water's capital maintenance spend in its latest [Strategic Review of Charges SR21](#). Our PR24 business case for asset health ([A3-21 Base uplift case - asset health](#), NES35) provides evidence to support a lower increase in capital maintenance expenditure in 2025-30. We do not know for certain what a no regret level of increase in capital maintenance spend would be in the long-term. We tested a 78% increase in our draft Long-term strategy. Stakeholders agreed an increase was necessary but could not provide a view on the appropriate scale. We consider 40%, or half of the WICS uplift, represents a reasonable lower bound for an increase in capital maintenance expenditure from 2020-25 levels. We therefore include this uplift in our core pathway and consider higher levels in alternative scenarios.

Investing in innovation and understanding the impact of extreme heat on water and wastewater networks and processes, especially biological processes, is likely to support lower costs in the future. Inter-sector resilience

⁴ We have previously explored the need to increase asset health investment in '[Regulating for the long-term: Resilient essential services require healthy assets](#)', Northumbrian Water, July 2022

will become increasingly important as extreme weather events become more likely. Our dependence on the power grid, gas grid and communications networks in particular are important aspects of our resilience. This has been highlighted by the National Infrastructure Commission and the Climate on Climate Change – see for example their [joint letter](#) to the government published 27 April 2023. The Environment Agency also highlighted the importance of investing in climate change resilience, operational resilience, and supply chain resilience when we spoke to them about our draft Long-term strategy.

We have carried out analysis to support our 2025-30 Business Plan to understand the impact of climate change on resilience and have identified a number of investments that we consider necessary in relation to resilience to power outages and flooding.

We would expect that individual components of the plan, such as the selection or sizing of particular schemes, will change over time to reflect different climate change scenarios. However, we have not identified any substantial changes that would require specific and discrete alternative pathways.

Our core pathway also includes investment on bioresources, to reflect likely changes to how we dispose of our sludge. Currently we use advanced anaerobic digestion to create biogas, and the end products – biosolids – are used as a fertiliser for agriculture. Restrictions on biosolids disposal may be introduced to prevent deterioration in soil or water quality. These decisions have not yet been made, and so our core pathway would be to continue with our 2020-25 strategy. However, it is very likely that at least some changes are necessary – and so our core pathway for 2025-30 is to make a gradual transition to adapt to future restrictions by providing storage for bioresources during the Autumn months (when we are prohibited from putting bioresources to land and soil and water quality are most at risk), and to reduce the volumes of biosolids that we produce through dewatering. This is a ‘low regrets’ option, as this would be required under any likely future scenario and would provide additional resilience.

Delivering net zero

We have already made good progress towards reducing our operational and embedded carbon emissions. But as we explored in [‘Regulating for the long-term: Completing Emission Possible’](#), NWL, July 2022, there are still many challenges ahead to delivering net zero water and wastewater services.

We consider that to deliver a just transition, we should aim to deliver a relatively straight-line reductions in emissions between now and 2050.

Our core pathway assumes that in the 2025-30 period emissions reductions are achieved without additional enhancement expenditure. This reflects customer preferences – while customers consider delivering net zero a key or even the top priority for the long-term, customers did not support the additional enhancement expenditure we put forward for net zero in 2025-30.

Our core pathway for 2025-30 focuses on decarbonising in those areas where we have the most information and direct control over emissions. We will progress decarbonise our vehicle fleet, maximise emissions reductions from grid electricity use, increase our solar generation capacity and bring the Kielder Hydro generation back in-house. And we will work with our customers to reduce their demand and the consequential emissions from supply. A focused measurement programme will be implemented at Howdon, one of our largest wastewater treatment works, to quantify our actual process emissions in parallel with measurement at our Birtley BEWISe Water Innovation Centre - assessing emissions from trickling filters - allowing us to be fully informed of our impact from major asset classes. We will aim to have accredited emissions reporting from all our large suppliers by 2026.

This approach is underpinned by a strong focus within our core pathway on trialling innovations in one five-year investment period to then roll solutions out confidently in subsequent periods.

We will trial our in-house developed alternative solutions such as algal treatment of wastewater and alternative lower carbon supply routes for chemicals, such as working with other industrial wastewater streams as an alternative source of coagulants for water treatment. And we will collaborate with other water companies through innovation projects to understand and develop technological solutions.

By 2030-35 we will be fully informed and, in a position, to trial higher-risk abatement technologies and implement proven abatement technologies at scale. Over the long term we will also need to consider the alternative to biogas-to-grid technologies, as the gas network may move from methane to hydrogen supply.

From 2035-50 we will continue this process of implementing new solutions when we are confident, they deliver best value for customers and the environment, including across capital delivery.

Ultimately, delivering net zero emissions is about doing things differently, not doing different things. We will consequently need to change how we operate in all aspects of our business. Sometimes changes will be small - like optimising journeys to reduce travel or using more efficient pumps to reduce energy consumption. But sometimes more fundamental changes will be needed – like switching to low carbon building materials or researching and developing new low-carbon treatment processes that can completely replace existing high carbon ones. Ofwat commissioned a [‘Net Zero Technology Review’](#) by Jacobs in August 2022 to identify

potential technologies that could support a transition to low carbon. We review the potential and extent to which we already employ these technologies in [Annex 5: Review of Net Zero technologies](#) (NES_LTDS1).

While we have identified net zero enhancement costs separately in this Long-term strategy, for the most part these costs will not materialise as standalone net zero investments. Instead, what we expect to see is an increase in costs for all our activities – both areas of enhancement identified in this strategy and existing activities funded from base costs. These costs will not be distributed evenly as some interventions will save money, while decarbonising some activities will be proportionally more expensive (and may be inefficient to decarbonise at a national level). What we have tried to quantify here is a high-level view of what the transition to net zero emissions may cost us over the coming decades.

Replacing lead

Our lead service pipe strategy (March 2023) set out our approach to managing lead pipes and reduce customers' exposure to lead, up to 2030 in line with current guidance from the Drinking Water Inspectorate (DWI)⁵. We have a clear vision to work towards the Water UK long-term ambition to be 'lead free' by 2050. This ambition is stretching and will require us to significantly increase our investment beyond.

The current method for eliminating the harm of lead, phosphate dosing at water treatment works (WTWs), is very effective as a control measure to mitigate the risk of lead from lead pipes owned both by the water company (communication pipe) and customer (supply pipes). However, a recent study suggested that if a tighter lead standard was introduced, it would be a challenge to the efficacy of phosphate dosing. Furthermore, orthophosphate is derived from mineral resources and so is not sustainable either as an environmental commodity or financially due to highly volatile costs dependent on resource availability.

The only sustainable solution to ensure customers are protected from lead exposure whilst meeting the future, tighter lead standard is to accelerate our lead replacement through prioritised schemes replacing both the communication pipe and the customer supply pipe. Our current direction is to replace lead rather than use lining technologies. We have examined these alternative technologies, but we consider replacement to be a better long-term option as it eliminates the need to monitor lining health and have a management and replacement plan for these. Replacing pipes fixes the problem in a more permanent way, with lower risks and with potentially lower lifetime costs.

⁵ See: '[Guidance Note: Long term planning for the quality of drinking water supplies](#)', September 2022, DWI.

Our multi-track approach is designed to achieve the most benefit for consumers. Having optimised phosphate dosing installed for plumbosolvency control provides risk mitigation for the full community. Recognising that this is not a sustainable approach, we are prioritising those most at risk, either by their demographic profile – such as vulnerable groups – or geographical location, through full service-pipe replacement. A further step to address our reliance on phosphate dosing is full pipe replacement in specific areas to negate the need for dosing at the supplying WTWs. We aim to clear lead from discrete rural areas fed by one works without multiple water sources so that we can turn off the phosphate dosing. We will need to risk assess this process and work with the DWI to address any outstanding lead issues.

The final part of our approach relates to engagement and awareness, providing a framework to encourage stakeholders to work in collaboration and informing customers of the protection measures available to them, which may include support for supply pipe replacement when that opportunity is presented.

Interlinkages

We explore these five investment areas separately, but of course the interlinkages between them are incredibly important.

In many cases, delivering improvements in one area will aid delivery in another. For example, restoring and enhancing the local environment through renaturalisation of rivers and peat bog restoration can improve flood resilience and make water resources more secure.

Targeting lead replacement in geographic areas to enable phosphate dosing to be stopped will reduce the risk from lead at the same time as lowering our wastewater treatment costs and environmental impact.

If we are successful in avoiding the worst impacts of climate change – by making our contribution to delivering net zero – we could help maintain water supplies, reduce climate related resilience risks and reduce habitat loss and so support biodiversity.

But conversely, some areas of investment will have detrimental impacts on other objectives. If we are required to invest in end-of-pipe wastewater treatment that requires significant infrastructure investment and future energy and chemicals use, this will make delivering net zero much more difficult. Similarly, if we are required to avoid putting biosolids to land as fertiliser, and instead need to incinerate it, this will add significantly to our greenhouse gas emissions.

The public value based approach to planning and investment we have adopted in line with Ofwat's '[Final Public Value Principles](#)', March 2022, will enable us to continue to balance these objectives against each other and ensure that we deliver in the most effective way. We have implemented a decision support tool called Copperleaf that enables us to assess costs and benefits to optimise the investments we make both.

3.8. KEY ENABLERS FOR OUR INVESTMENT

The investment areas in the core pathway are built on a foundation of partnership working, innovation and productivity improvement. This approach benefits customers through on-going improvements in service, for example, sustainable solutions to problems and cost-efficiency.

Partnership working, innovation and productivity growth are also important in our long-term planning. For example, using innovative approaches may reduce the likelihood of needing to make expensive investments at decision points which may arise in the plausible future scenarios.

We provide examples of how partnership working, innovation and productivity improvement contribute to our long-term ambitions in the coming paragraphs.

Partnership working

Looking to the future working effectively with partner organisations will become increasingly important. We can deliver more by working with others toward mutually beneficial goals and so ensure that money is spent more effectively across organisations. Doing so can also reduce costs for our customers.

Partnership working enables us to bring together different funding streams and work with partners who can make non-financial contributions, such as granting access to land for the development of flood defence and drainage solutions.

Bringing together diverse groups can challenge established thinking and ways of working and encourage innovation. It also helps establish new ways of working with nature to continue to deliver the essential services our customers rely on, but in much more sustainable ways. For example, engaging with customers and communities early in the planning process at a local level and co-creating solutions can be more efficient as we can minimise the need to redesign solutions.

Partnerships can support both planning and delivery. The partnerships with other water companies and stakeholders are central to the development of our WRMPs. We are core members of the Water Resources East (WRE) regional group that has shaped the development of our WRMP for Essex and Suffolk, and the

Water Resources North (WReN) regional group that has similarly influenced our WRMP for our northern region. These groups have explored water resource resilience at a national, regional and water company level and considered water transfers within and between different regions including Water Resources South East (WRSE). We have worked closely with these groups, for example having weekly WRE alignment meetings and by participating in national reconciliation workshops throughout 2021 and 2022.

We have both new and long-established award-winning partnerships for delivery already in place.

Box 2: Partnership working to revolutionise flood resilience and water management

In a bid to manage the challenges of flooding, we initiated a new approach in 2012 to work with stakeholders to better understand our drainage network.

The Northumbria Integrated Drainage Partnership (NIDP) is an award-winning innovative approach to reduce flood risk and promote sustainable drainage. The partnership brings us together with 14 North East Lead Local Flood Authorities and the Environment Agency to deliver schemes that reduce flood risk from sewers, rivers and surface water runoff in communities across the North East.

Since its inception, 59 drainage areas have been studied, leading to delivery of multi-award-winning projects in Tyneside in the North East, reducing flood risk to around 5,000 homes to the value of around £33m.

The NIDP promotes active collaboration and engagement among various stakeholders. It encourages open communication, sharing of expertise, and joint decision-making to ensure a holistic approach to drainage management. By managing flood risk from all sources and across all partners, including preventing rain water from entering our network, the NIDP approach can also deliver wider benefits including habitat creation and water quality improvements.

Recognised nationally as an exemplar of partnership working in industry guidance and government reports, the successful collaboration leverages data-driven decision-making and implements sustainable drainage practices to achieve significant improvements in flood resilience, water quality, and community engagement.

The partnership stands as a testament to the positive outcomes that can be achieved when diverse organisations work together towards a common sustainability goal.

The NIDP has now developed an ambitious 10-year programme that will carry out integrated studies in 38 more areas to 2028.

More than £25m has been invested so far through the NIDP partnership, with more than £15m of that coming from us. We estimate the NIDP will deliver £160m of investment up to 31 March 2030, with our contribution being £73m.

Our new partnership with the Rivers Trust to deliver our plan for environmental investment for 2025-30 is providing invaluable insight and helping us to develop new and different solutions that enhance the natural environment. The catchment solutions that this partnership has developed will make sure that the environmental improvements that our regulators and Government want to see are delivered, but in a more sustainable way with lower carbon emissions and significant cost savings to customers in their bills.

We expect to have even more scope for partnership working in the future. For example, the National Farmers Union (NFU) support our partnership working approach as the agricultural sector is increasingly being asked to deliver the same wider outcomes such as biodiversity net gain and healthy rivers through nutrient reduction as us and hope to deliver these more efficiently and effectively working together. And we expect the development of Local Nature Recovery Strategies (LNRS) across our regions will identify more areas of common ground for partnership working.

The provision of open data will open further new opportunities to work in partnership with others, including citizen scientists – volunteers who carry out scientific research. Our [Open Data Strategy](#) (NES76), published in July 2023, supported by our Data Strategy (coming in 2024) will help foster these partnerships by ensuring that high quality data is publicly available in a timely manner. By providing greater access to data, we aim to learn more from by working with others it to improve the services we provide.

We will continue to work with other organisations to build effective and long-lasting partnerships to deliver for our customers, society, and the environment. By collaborating with others, we can maximise the benefits – strengthening, rather than displacing, other organisations that are better placed to act. These partnerships also provide us with more resilience by building a network and supply chain that can provide a broader and deeper range of resources and expertise in response to uncertainty.

Innovation and productivity improvement

We are already an efficient company and our regulator Ofwat ranked us in the top quarter of companies across the sector for efficiency at the last price review. We are also fortunate to have a mature approach to innovation

and are regularly introducing new technologies and ways of working into our business to improve service for customers and the environment or reduce costs and keep bills affordable.

Innovation is one of our core values and we have actively built a strong innovation culture by employing innovation experts, building a network of innovation ambassadors across the business, and actively working with partners to develop new ways of doing things. This approach is epitomised by our annual Innovation Festival which has been running for many years. In 2022 we welcomed representatives from 26 water companies from as far afield as Australia to collaborate and share ideas on a range of topics including nature-based solutions, regenerative farming, and network challenges, all with an emphasis on partnership working. Our involvement in Spring (Box 3) is just one example of how we are collaborating with others to innovate.

Box 3: Spring

As part of our broader innovation strategy, we will be leveraging the services that Spring, the water sector innovation centre of excellence, is providing to the sector. We have worked closely with the Spring team in the design and development of their service offerings, to further enable collaborative working, and further accelerate the value our innovation plans are targeting. We have contributed to the development of the Water Innovation Strategy 2050 and remain committed to increasing collaboration to deliver against the ambitions outlined in the strategy, as well as to share our knowledge to accelerate the learning of others in the sector.

Specifically, our intention is to at a minimum, support and utilise the Spring:

- Accelerator, to efficiently and effectively fast-track priority collaborative trials of innovations that solve sector wide Water Innovation Strategy ambitions.
- Knowledge Transfer Service, to accelerate our learning of innovations in the sector (including those funded through the Ofwat innovation and water efficiency funds) and to also share our knowledge and insights from performance enhancing innovation.
- Brokerage tools and services, to join collaborative trials to solve sector wide Water Innovation Strategy ambitions.

Spring has been designed to bring efficiencies and other value to water companies and suppliers, with benefits being passed on to customers. As the organisation matures, we see an opportunity for increased engagement on sector wide innovations and we will be working with Spring through 2025-30 to share our ambitions to further develop and scale the service offering to support us and the sector.

Many of the step-changes in improvement we highlighted in figure 16 have been driven in part by the changes that we regularly bring through our innovation pipeline. We are proud to be the most regular winner of bids

through the innovation fund that Ofwat introduced at the last price review. While the festival provides the seed for ideas, it is the dedication of our staff and partners that brings these ideas to life, through trialling practical solutions such as wetlands, Mowbis used to provide short-term supply for customers (see box 4), ammonia recovery and experimental algal treatment of wastewater.

Box 4: Innovating to provide unrivalled customer experience

The Mowbi is our answer to providing an alternative water supply for customers when their water supply would otherwise be interrupted. The Mowbi gives us another option instead of traditional backup supply methods such as over land supplies using hoses or Arlington tanks.

Mowbis use a pressure vessel much like a hot water tank in which a balloon in the vessel is filled with water. The resulting air pressure is used to discharge the water and so provide pressurised water without power. A Mowbi can provide 120 litres of water, and they can be used together to provide even greater volumes.

This is an innovative solution that showcases the innovation culture we foster across our whole organisation. The spark of an idea of using a pressure vessel in this way became a practical solution when the team had the idea of putting the pressure vessel into a wheelie bin – becoming Mowbi version 1. This proved the concept, but to make Mowbi more practical we brought in a manufacturer to design and build a plastic shell for the pressure vessel. Mowbi version 2 was born. This has panels that allow the user to access the controls more easily. Further iterations have made the Mowbi successively more robust and portable.

Being able to provide a significant amount of emergency water without power and the ability to transport them anywhere (or at least anywhere a wheelie bin can go) has made them an invaluable solution to restoring supplies. They proved successful in the hot summer months of 2022 when temperatures hit 40 degrees, water mains were bursting, and supply was short.

Plans are in the pipeline for an even bigger version of the Mowbi that can supply over 2,500 litres and is portable in a different way – the Towbi.

In the face of our future investment pressures, we need to go much further and faster to maximise the opportunities we can leverage from innovation. We explore here the challenges where innovation – both technological and operational – is needed to help us deliver in the long term and the opportunities for innovation that together could provide the solutions to these challenges. With all such innovations it is vital to recognise that the interactions between innovations is almost as important as the innovations themselves. For

example, metering and robotic monitoring can generate more data. But sharing that as open data will provide the information needed for AI to learn and thus enable us to use it to deliver service improvements.

FIGURE 16: CHALLENGES AND OPPORTUNITIES FOR INNOVATION

Innovation	
Challenges: Priority areas where innovation is needed	Opportunities: Priority areas of innovation focus
Power	Systems thinking and partnership working
Labour	Nature-based solutions
Chemicals	AI
Storm overflows	Open data
Asset health	Robotics
Nutrient neutrality	Smart networks
Process emissions	Metering
	Material technologies

Challenges: Priority areas where innovation is needed

Power

Power is one of our major operational costs. We use 100% renewable power and have increased our energy efficiency significantly. But we can go further – using less and generating more renewable power is always better – it will save our customers money and help support decarbonisation of the UK’s electricity supplies.

Labour

We will need to dramatically increase the scale of our activities and to deliver the increased investment required to meet our statutory obligations. Our workforce and supply chain will need to grow accordingly – innovations to increase the efficiency of our people will help us deliver and keep costs down for customers.

Chemicals

Population growth will increase the volume of wastewater that needs treating, and environmental legislation will tighten the standards to which we treat it. Both of these factors will increase our chemical use. The supply chain of some chemicals, such as ferric sulphate, is also limited as they are by-products of other sectors. Innovation is needed to limit our chemical use by refining existing approaches and finding more sustainable sources for example through our work as part of the Royal Society of Chemistry's [Sustainable Polymers in Liquid Formulation](#) taskforce.

Storm overflows

Eliminating the harm from storm overflows will be one of our major areas of investment for the next 25 years. Innovative solutions could help reduce costs and deliver benefits faster. For example, increased monitoring and active control could increase the working capacity of our sewerage network and avoid the need for more costly interventions.

Asset health

We need to continue to evolve and improve our understanding of the health of our assets. Innovation can help us further monitor and examine the health of our assets and make maintenance and replacement work more efficient.

Nutrient neutrality

Excess phosphorous and nitrogen in the natural environment causes major ecological harm. Innovation that enables us to remove nutrients more efficiently, either through technological solutions at our works or innovation in permitting and partnership working that enables more effective management of nutrients at a catchment level would help deliver nutrient reductions quicker and at lower cost, unlocking the potential for additional housing developments.

Process emissions

One of the most significant and currently most difficult areas of greenhouse gas emissions to eliminate are emissions from our treatment processes, which form part of our scope 1 emissions. Innovations in the types of processes we use, and in the capture and removal of fugitive emissions would help us to combat these emissions directly. Without this, we will need to find offsetting emission reductions outside of our operations to achieve Net Zero.

Potential solutions: Priority areas of innovation focus

Systems thinking and partnership working

By adopting a cross-sectoral systems thinking approach we can deliver more for less across society. Innovation in our existing successful partnerships, such as the NIDP, could deliver even greater benefits. For example, the Environment Agency would like the remit of the NIDP to expand beyond flooding and include highways departments and landowners to create greater benefits.

Innovation will also enable us to improve our approach to strategic planning. This Long-term strategy has been developed by bringing together the findings from all our long-term planning frameworks into an adaptive planning and scenario-based approach. In future we aim to further build on this by developing our strategic simulations capability as discussed in our upcoming data strategy.

Nature-based solutions

We already use nature-based solutions such as [reedbeds](#) and they form an important part of our 2025-30 business plan. Using a nature-based approach to reducing nutrient load in the Tees will save customers £280m. But more innovation could enable nature-based solutions to be found for a wider range of problems. And innovation in the way that actions are coordinated across catchments may enable greater use of nature-based solutions.

AI

The maturing and mainstreaming of AI could support service improvements and efficiency across our business. AI is already helping us deliver more effective customer journeys (see for example our work with [Aiimi](#)) and improve customer self-service in support of our customer service teams. AI could also help us learn more from our data – on demand, water quality monitoring and customer expectations – and enable us to manage our network more actively, chemical and energy usage.

Open data

By opening access to our data, citizen scientists and others can use it to unlock value for our customers and the regions we serve. Our [Open Data Strategy](#) (NES76), published in July 2023, sets out our vision, approach, and commitment to making this happen. This will be supported by our forthcoming Data Strategy (due 2024) that will help us further improve the quality and organisation of our data.

Robotics

Robotics is not a new technology as it is applied in the water sector today for tasks such as process automation and asset health assessment. But we can continue to explore new uses of robots. For example, we are carrying out a study into how [Unmanned Aerial Vehicles \(UAVs\)](#) could improve our water quality monitoring capability. In the future, for robots to become game changing the costs need to be reduced so we can apply them in even more areas of our business.

Smart networks

We have been working with [StormHarvester](#) to trial smart network management since 2018. We are now implementing this system to reduce our storm overflow discharges. In future we expect greater monitoring and remote network controls to enable us to make greater use of our existing assets and further improve our environmental performance.

Metering

Innovations in meter design could reduce the environmental impact of meters and their costs – for example self-powering meters could eliminate the need for batteries. And advances in data analytics could enable us use metering data better to identify leaks and high or unusual usage patterns where we could help customers reduce their demand.

Material technologies

To achieve net zero we will need to innovate in materials and construction techniques. We already make use of low carbon concrete in non-water-retaining structures and offsite prefabrication. Innovation including 3D structure printing and design improvements could reduce emissions and costs further. And materials technology can help avoid the need for asset replacement entirely, for example the [no dig](#) mains repair technique.

Our people

Our people are key to our success. Without them we would not be able to deliver the services we provide. To function effectively we need to make sure that we continue to make Northumbrian Water Group a great place to work. We also need to ensure the wider sector becomes increasingly attractive so that our supply chain can continue to meet our growing needs. Over the long-term what this means in practice will change as society and the nature of work changes – as has been demonstrated by the impact of Covid-19.

We are reviewing our People Strategy and will publish our updated strategy in early 2024. This is driven by our Purpose and how we make that real for all colleagues. It will build on our Workforce 2025 strategy (published in 2018) that set out how we would develop and evolve our highly skilled team so that we can deliver the outcomes our customers want. Our strategy will be focused on three strategic deliverables:

- Attracting and developing the right people and the right skills.
- Creating the right culture for all.
- An enabled, performing and thriving workforce.

Our ongoing delivery of this strategy involves not just hiring and developing our people now, but ensuring we lay the groundwork for a long-term sustainable workforce in the light of the expected future requirements.

We are part of the Energy & Utilities Skills Partnership, working to tackle future skills shortages. We work with schools, partners, and other organisations to deliver apprenticeships and other routes into the sector. At our Innovation Festival, we support activities which are specifically aimed at inspiring young people to consider careers related to science, technology, engineering, maths (STEM).

In 2021, 2022 and 2023 we had national recognition as a top employer by securing a spot on the Great Place to Work Best Workplaces list in the super-large category, with particular recognition for wellbeing and for being amongst the UK's best workplaces for women.

We know that diversity is our strength: we are a signatory to the Social Mobility pledge; we are a Disability Confident employer and a Stonewall Diversity Champion; and we are proud members of the Women in Science and Engineering (WISE) Campaign.

We are also conscious that as a major employer in our regions, we can play a part in delivering the social change we want to see. We are committed to being an inclusive, diverse, and equal company for both our

employees and for our customers – both because it is the right thing to do, but also because it will help us deliver more effectively.

Our Together for Inclusion, Diversity and Equity (TIDE) strategy sets out our ambition across these areas and how we will deliver against it. Our short-term TIDE targets to the end of 2025 are:

Inclusion

- Achieve 75%+ self-disclosure around protected characteristics.
- 0% bullying, harassment, discrimination, or victimisation across characteristics following investigation.

Diversity

- More than 35% of colleagues are female.
- More than 4.3% of colleagues are non-white.
- More than 6% of colleagues with a reported disability.

Equity

- Gender Pay Gap is less than 7%.

In the longer-term we expect our employees' views on what a great place to work is will change. And our understanding of what we need to deliver to be an inclusive, diverse, and equal organisation will mature and adapt. We continually monitor how our people feel about us through the great place to work survey.

As a company that provides services through hard engineering, we need to always keep the safety of our employees at the forefront of our minds and our culture. We do this through a range of initiatives including rigorous training and apprenticeships, a robust lessons-learnt process when incidents occur and regular internal comms to share that learning and support our '60 second checks' process. We recognise that perfection is hard to achieve, but the health and safety of every one of our employees matters and so we must target zero accidents.

Supply chain

Our supply chain also needs to be able to expand and recruit to be able to meet the future needs of the sector. This will be no mean feat – one of our construction partners told us that by 2030 they will need an extra 4,000 people nationally – that's more than our entire workforce.

Customer perceptions of the water sector are an important part of making the water sector an attractive career prospect for current and future generations – as CCW’s report ‘[Customer Centric Culture](#)’ notes, customer confidence impacts employees, as it’s proven to affect recruitment and engagement.

Both customer and employee perceptions of Northumbrian Water and Essex & Suffolk Water are positive – we ranked first for C-MeX in 2022/23 and we have been consistently in the top 50 UK’s Best Workplaces in the [Great Place to Work](#) super-large companies category. We need to continue to play to this strength and use our brand to help foster interest in the water sector. We can do this for example through the work we do with schools and supporting people in STEM careers, particularly women.

We are also actively working to attract new suppliers into the water sector to help expand our supply chain. In the tender for our Capital Delivery Construction and Engineering Frameworks to 2030 we carved out £500m of civil engineering framework contracts for firms with no prior water sector experience to provide an entry point to the sector. We will need to continue this forward-thinking approach to ensure we build the supply chain we need.

3.9. DECISION AND TRIGGER POINTS

Decision points and trigger points are important aspects to our adaptive planning approach and provide a framework for assessing the optimal timing for material investments between 2025 and 2050.

The plausible future scenarios contribute to our long-term strategy by helping us learn how our plans might need to change, depending on risks and opportunities in the future.

We have identified a set of trigger and decision points in line with adaptive planning principles. There are different types of decision points:

Prioritisation decision — this is where we will need to implement one of two interventions, and the decision is about which one to prioritise (#1, 11).

Timing decision — this is where we will need to implement an intervention, and the decision is about when to do so (#s 7, 13, 14).

Intervention decision — this is where it is not certain at present whether we will need to implement an intervention at all, or be able to, and the decision is about whether to do so or not (#s 2, 3, 4, 6, and 8).

Scale of investment decision — this is where it is not certain at present what the scale of investment, if any, is required, and includes decisions to adapt plans to changes in technology and better information, for example, on asset health (#s 5, 7, 9, 10, 12).

The state of the future depicted under the plausible future scenarios affects our decisions. As such, some decisions are more likely under some future scenarios. For example, in a future where there is climate failure, demand Per Capita Consumption (PCC) increases and so we are more likely to invest in additional water supplies.

We have identified a set of decision points that are a subset of all possible investment decisions we may take between 2025 and 2050. These are decisions which are likely to have a material impact on customers' bills and our trajectory towards our long-term goals.

Our decisions will be informed by several factors, including relevant research and feasibility studies, customer and stakeholder views, and greater visibility on the type of future that is unfolding over time.

Over the next few pages, we discuss the decisions we will or may need to take, including the rationale for how and when to do so. The alternative choices are set out for each decision, with the 'A' option designating the core pathway, and alternatives designated B, C etc.

We had expected the solutions required for nutrient neutrality to be determined before the submission of our PR24 Business Plan. However, there is still some uncertainty in this area. We expect this to be resolved before the final determinations for the 2025-30 period and so have not included an adaptive pathway for this investment in this Long-term strategy.

1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir

Our modelling for Essex and Suffolk suggests there is an urgent need for new water supplies by 2032 and the single factor that affects the supply and demand for water the most is the need to reduce in abstraction from rivers and groundwater to more sustainable levels in the future. Current pressures on water supplies mean that we already have a moratorium on new business demand. From 2030, the amount of water the Environment Agency permits us to abstract will reduce. To address this need for new water supplies we are completing further detailed designs to decide whether to prioritise building a 'water reuse' plant at Lowestoft or a winter storage reservoir in North Suffolk. Both will eventually be needed to deliver Environmental Destination, and the decisions relates to which one to build first.

Our current view is that the water reuse plant could be built more quickly than the storage reservoir and provide enough water until the reservoir comes online subsequently. It is our preferred option under our draft [WRMPs](#). However, building a reservoir first would have greater environmental benefits in the near-term, including biodiversity and lower greenhouse gas emissions. This is because less electricity is required to pump water as Suffolk is relatively flat and pumping is needed over relatively short distances. The reservoir also creates natural habitats for wildlife. There are two potential options for the North Suffolk winter storage reservoir, which would differ in the storage capacity and the potential Ml/d that they could supply.

We will need to review in 2024 following the outcomes of EA Habitats regulation investigations and decide by 2027 once we have completed detailed designs of the options.

An important factor will be whether the detailed designs determine whether the North Suffolk reservoir can be built more quickly than our current view so as not to extend the moratorium on new non-domestic supplies in our Hartismere water resource zone and to realise environmental and carbon benefits sooner. Under our current view, the water reuse scheme at Lowestoft could be ready by 2030/31 and the North Suffolk reservoir could be ready by 2033/34.

This decision whether to prioritise the water reuse plant or winter storage reservoir is relevant under all plausible scenarios as it is a decision over the timing of an investment.

While we still need to prioritise the new supply schemes, since consulting on our ESW draft WRMP24, the Environment Agency has informed us that we need to allow for further abstraction licence sustainability reductions by 2027 and this is likely to mean we need to develop both Lowestoft Reuse and either the North Suffolk reservoir or Caister Reuse schemes starting in 2025-30. These options have been identified, assessed, and selected through the WRMP process.

- Option 1A: Neither Lowestoft water reuse nor North Suffolk reservoir built.
- Option 1B: Lowestoft water reuse built.
- Option 1C: North Suffolk winter storage (3500) reservoir built.
- Option 1D: Lowestoft water reuse and North Suffolk winter storage (3500) built.
- Option 1E: Lowestoft water reuse and North Suffolk winter storage (7500) built.

2. The need for Southend water re-use plant

Under the core pathway, we will continue to ensure sustainable water supplies by reducing leakage by a further 40% in Essex and Suffolk, aiming for compulsory smart metering by 2035 and focusing on water

efficiency initiatives. Our plans will also be augmented by the Lowestoft water re-use plant and North Suffolk reservoir.

In the unlikely event that PCC is higher than the 'high PCC scenario' in our draft [WRMP](#), there may be a need to build a water reuse plant at Southend in addition to building a water reuse plant at Lowestoft and a storage reservoir in North Suffolk. There are two potential options as, in line with adaptive planning principles, a modular approach has been developed. The options could provide 20.5 MI/d or 40.5 MI/d. An alternative to building the Southend Reuse scheme is to defer providing 1 in 500-year drought resilience until 2035 which is when a 20MI/d raw water transfer agreement with Thames Water comes to an end.

A decision is needed in 2027 after we have finished more detailed designs, assessed the performance of demand reductions and considered the trajectory of the climate failure scenario. If we decide to build a water reuse plant in 2027, investment will begin at that point, but these dates could change with the next iteration of our WRMP. These options have been identified, assessed, and selected through the WRMP process:

- Option 2A: Southend water reuse not built.
- Option 2B: Southend water reuse phase A built.
- Option 2C: Southend water reuse complete project built.

3. The need for Canvey Island de-salination plant

There could be further requirements still to reduce abstraction from rivers by 2040 by the Environment Agency. This will be confirmed following once Environmental Destination WINEP investigations have concluded in 2026. If further requirements transpire, we have identified building a desalination plant at Canvey Island as the best option within our draft [WRMP](#).

The Environment Agency is most likely to impose further requirements where there is strong demand growth and climate change is more severe than anticipated as these factors place pressure on water supplies. As such, the decision to build a desalination plant in Canvey Island is more likely under the climate failure and regional growth scenarios.

The decision whether to build the desalination plant would need to be made around 2030 as part of the 2029 iteration of the WRMP. These options have been identified, assessed, and selected through the WRMP process:

- Option 3A: Canvey Island de-salination plant not built.
- Option 3B: Canvey Island de-salination plant built.

4. The need for other water supply, transfer, and demand-side options

The exact mix of other water supply options that is needed in different scenarios will depend on local constraints and demand impacts. We have modelled these impacts in our [WRMPs](#). These include:

- Langford WTW UV treatment.
- Langham WTW nitrate removal.
- Langford WTW nitrate removal.
- Langford clarifier and Abberton raw water pumping station upgrade.
- New Linford water treatment works and Borehole(s).
- Corton desalination infiltration gallery and transfer.
- Corton desalination beach well and transfer.
- California Caister desalination infiltration gallery and transfer to Caister Tower.
- Caister water reuse and Ormesby transfer.

For all water resource options, including Lowestoft water reuse, North Suffolk winter storage reservoir, Southend water reuse, Canvey Island desalination and the investments listed above, we will explore whether they can be delivered through direct procurement for customers (DPC) to maximise efficiency and minimise the impact on our financeability. These options have been identified, assessed, and selected for each scenario through the WRMP process.

We note that our analysis concludes that the Caister reuse plant would be needed under our 'habitats regulations' scenario in the WRMP in response to higher sustainability reductions for abstraction. We have modelled this as requiring investment from 2030. However, the Environment Agency should decide on sustainability reductions in April 2024. If they confirm that the new sustainability reductions are larger than currently anticipated, then we would need to revisit our analysis to determine what the new investment profile would be. This may result in additional investment requirements in 2025-30 period. This should be known ahead of the PR24 final determinations, and so should be included in our price controls. If it is not, alternative arrangements to ensure this investment is funded, such as a notified item, would be necessary.

- Options: specified in [Annex 2: Plausible future scenario analysis and Annex 3: Common reference scenario analysis](#) (NES_LTDS1).

5. The impact of new demand on Teesside

Our current water resource management plans should be sufficient to balance supply and demand in the North East. Substantial new demand is forecast in the Teesside region with significant new industry including new investment in hydrogen and battery plants for electric vehicles for example.

We engaged with industrial and commercial customers, the local authority, and other stakeholders in developing our demand forecasts. We have also reflected additional work undertaken by the Environment Agency and the Department for Business, Energy & Industrial Strategy (BEIS). These forecasts suggest that our plans should be sufficient to meet the new demand requirements.

If demand on Teesside does grow considerably, this has the potential to reduce the amount of water that is available for a transfer from Kielder reservoir for export to other water companies. The impact of demand growth on Teesside has been assessed through the WRMP process and does not result in additional expenditure requirements, but we note it has not been included as an adaptive pathway in our WRMP as our analysis does not show that any new investment is required as a result. We include it here to demonstrate that we have considered the potential impact.

- Option 5A: Demand on Teesside grows in line with other regional non-household demand.
- Option 5B: Demand on Teesside grows faster than other regional non-household demand.

6. A potential trade of raw water from Kielder reservoir

Kielder Water is the largest reservoir in the UK by capacity and holds around 200 billion litres of water. It was built in the 1960s to satisfy growing industrial demand but changes in the mix of industry in the region have created a surplus of water that exceeds demand.

The capacity available at Kielder creates an opportunity to export a proportion of the surplus capacity either through our system to the south to Yorkshire Water, referred to as the Tees to York Pipeline (140 MI/d) or through a transfer over the Pennines to United Utilities in the North West, called the Kielder Reservoir to UU Transfer (100MI/d). The need for these transfers has been examined through both the plans of those individual companies but also through the regional water resource groups including Water Resources North and Water Resources West.

Our latest assessments conclude that the capacity available in the Kielder reservoir is sufficient to provide one but not both transfers.

Yorkshire Water has considered the Tees to York Transfer as an option to make up for the loss of deployable output, following sustainability reductions, from its River Derwent source. Subsequently, its Best Value assessment selected the Tees to York Transfer (140MI/d) for delivery by 2040. Consequently, with no other water company plans selecting a Kielder transfer, we jointly agreed with Yorkshire Water to include it in our respective preferred final plans. To enable this transfer, Yorkshire Water would need to invest in a new pump in a currently empty NWL pumping station bay, a raw water strategic pipeline and an upgrade of the Riding Mill Pumping Station including an additional pump and electricity supply.

Further WINEP investigations will be undertaken over the following three years to confirm the size of sustainability reductions that should be applied to Yorkshire Water's River Derwent abstraction licence. It is possible that confirmed reductions are smaller than currently forecast. We will continue to work with Yorkshire Water who intend to undertake further detailed design of the Tees to York Transfer, taking account of WINEP Investigation outcomes, possibly as a Strategic Resource Options (SRO) via the RAPID gated process.

Since consulting on our draft WRMP24, we have re-confirmed with United Utilities its position on importing raw water from us. United Utilities has confirmed that it now considers its headroom position to be more resilient and so the Kielder Reservoir to UU Transfer (100MI/d) is not included in either its preferred final plan or any adaptive pathways. However, we note the Regulators' Alliance for Progressing Infrastructure Development (RAPID) would like us to continue to investigate the Kielder reservoir to UU transfer and so we will continue to work with Yorkshire Water, United Utilities, water Resources West and Water Resources North after our respective revised draft WRMPs have been submitted. Funding will be required to further investigate the export options and, if needed, to progress as a Strategic Resource Option (SRO). This has been allowed for in our Business Plan tables.

We therefore consider that there is a need to have an annual review process of the Kielder trading opportunity until either the opportunity is clearly not required because SRO schemes fall away or because it becomes necessary as the most efficient and effective option for meeting water needs in other regions.

Our core pathway does not include a transfer. The alternative pathways we consider are firstly that Yorkshire Water confirms that it will require the transfer. We assume that this decision would be made in 2029, so that the transfer was online by 2040 as currently required in Yorkshire Water's preferred WRMP. If Yorkshire Water do not need the transfer, then United Utilities would then be able to take a transfer instead. As United Utilities currently do not include the transfer in their preferred plan or adaptive pathways, we assume that any such transfer would not be needed until later in the period. For indicative purposes we therefore assume that United Utilities may decide by 2044 for supply to commence by 2055.

In either case, the investment would provide water to another water company and therefore the cost would not be borne by our customers. We therefore do not include investment costs in our plan for this alternative.

These assumptions simplify the potential range of options, as Water Resources North (WRnN) may conclude that United Utilities needs the transfer earlier and in preference to Yorkshire Water, if collectively this was the most efficient course of action. But we consider these options provide sufficient information to understand the trade-offs in this Long-term strategy. These options have been identified, assessed, and selected through the WRMP process, although we note they are considered as scenarios rather than full adaptive pathways in the WRMP:

- Option 6A: No new strategic water trade.
- Option 6B: 140 Ml/d Tees to York transfer from 2040.
- Option 6C: 100 Ml/d Kielder reservoir to UU transfer from 2055.

7. Speed of delivering storm overflow programme and scale of surface water separation

As part of our long-term strategy, we need to consider how quickly we should deliver reductions in storm overflows required under the government's storm overflows discharge reduction plan which requires us to make improvements to storm overflows by 2050.

We could accelerate the storm overflows programme, which would mean it could be complete by 2040, before government's deadline. Or we could delay elements of it, so that we still meet the interim targets, but deliver bathing water improvements later.

As this Long-term strategy forms part of our consideration for the PR24 business planning process for 2025-30, we have decided on what we consider the best proposal for investment in this period is. However, a decision could be made through the price review process to move to our DWMP adaptive pathway 1 – accelerating investment – or pathway 2 – delaying investment ahead of 2025.

This decision requires balancing of customer priorities between environmental outcomes and affordability while meeting the statutory deadlines. Accelerating investment may be preferable if climate change, technology and demand are benign, which is the case under a sustainable future. Political pressure, potentially driven by media focus may also accelerate investment. Investment could also be delayed if society deprioritised environmental protection, as we assume is the case in the climate failure scenario.

These options have been identified, assessed, and selected through the DWMP process. Under our preferred DWMP pathway we increase the benefits of investing in storm overflow discharge reductions by making

greater use of surface water separation and sustainable drainage solutions to reduce the risk of sewer. This will cost less in scenarios with lower climate change impacts, as modelled under DWMP adaptive pathway 3. (As our core pathway for DWMP includes an allowance for adverse climate change, there is no additional cost for an RCP8.5 scenario, as per the DWMP adaptive pathway 4.)

- Option 7A: DWMP preferred pathway – storm overflows addressed by 2050, bathing water sites prioritised.
- Option 7B: DWMP alternative pathway 1 – accelerated storm overflows pathway – addressed by 2040.
- Option 7C: DWMP alternative pathway 2 – delayed storm overflows pathway – addressed by 2050, but bathing water improvements delivered later.
- Option 7Xi: As options 7A – C above, with higher climate change impacts (RCP8.5) – (DWMP adaptive pathway 3).
- Option 7Xii: As options 7A – C above, with lower costs to deliver sewer flooding reductions through surface water separation due to lower outturn climate change impacts (RCP2.6) – (DWMP adaptive pathway 4).

8. Future environmental challenges

We expect environmental challenges around anti-microbial resistance, persistent organic pollutants and microplastics in the future. There is political pressure for water companies to address these issues and legislation may be introduced requiring water companies to reduce or eliminate microplastics in the water system.

The investment that is needed will depend on the results of current and future investigations into the environmental impacts of these pollutants, and whether alternative solutions can be implemented, such as banning certain chemical products or making behavioural or other product changes to avoid pollutants entering wastewater.

We expect the cost of eliminating micro-pollutants from the water system could be material, especially if legislation is introduced before a cost-efficient solution is found. Our current cost estimates are high as we have not identified a solution yet. We consider the robustness of our cost estimates will improve over time as we refine our approach and if technology improves in this area.

The costs of eliminating micro-pollutants from the water system may be lower than our current estimates as behavioural solutions such as customers putting microplastic filters on washing machines can reduce the amount of the micro-pollutants entering the water system.

We are more likely to invest in eliminating micro-pollutants under a sustainable future, regional growth, and environmental challenges. Under a sustainable future there is appetite to make investments in the environment

given climate change, technology and demand are benign. Under regional growth, technological growth may increase the likelihood of finding a solution and economic prosperity increases the appetite to pay for the solution. Under the environmental challenges scenario, it is assumed environmental legislation that we expect between 2025 and 2050 is enacted.

We are less likely to invest in addressing micro-pollutants under climate failure where it is assumed there is little technological progress and there may not be solutions to eliminate micro-pollutants. We also delay investing in addressing micro-pollutants under the affordability scenario to support affordable bills in the short term.

We will make our decision in 2027 and begin investing in 2031, initially in further investigations, before ramping up investment from 2035. These options have been developed from high level views from subject matter experts. Given the actual costs under either option will depend on government guidance, scientific evidence from investigations and political priority of environmental issues, we have not been able to develop a more robust evidence base for these costs, and so we have lower confidence in these cost estimates.

- Option 8A: WINEP spend (excluding costs associated with the SODRP) from 2030/31 falls to 40% of 2025-30 average.
- Option 8B: As 8A, but with an additional investment from 2031 to address anti-microbial resistance and persistent organic pollutants. (Note: microplastics addressed either outside of the water sector through technological solutions, or through incineration of sewage sludge.)

9. Potential for a technology step change

When looking to the future there is significant scope for technological change that could create a step change in costs. We account for a general reduction in costs due to technological progress across all scenarios – though this could be more or less rapid. However, when we consulted on our draft Long-term strategy, several stakeholders considered that this did not capture the potential impact for game-changing technological progress.

This technological step change could arise from the development and application of AI, for example that enables increased dynamic management of our networks. Alternatively, the development and maturation of lower cost treatment or construction processes, which could be achieved through the application of robotics may achieve a similar shift in our costs.

To enable us to consider the potential for a technological step change we therefore include this indicative trigger point. Development in these areas is progressing rapidly now, but for a material impact on costs to

occur technologies that are currently new would need to mature to the point of being able to be rolled out successfully across our business. We therefore model this as a technological shift in 2035 that reduces costs from then on. We include this as a step change on the wastewater business only, as we consider there is greater scope for a significant change in our operations either due to changes in treatment costs, or dynamic network management in the context of the wastewater business.

These options have been developed from high level views from subject matter experts. Given the actual cost savings will depend on technological progress that is yet to happen, we have not been able to develop more robust cost estimates. We consider these estimates are a reasonable proxy for how costs may evolve.

- Option 9A: No adoption of new technology significant enough to create a step change in costs.
- Option 9B: Technological step change in wastewater (5% reduction in wastewater protecting the local environment costs from 2040) and water (resilience) reducing costs, but alongside an increased requirement for investment in cyber security.

10. Reduction in storm overflow costs from monitoring data

Increased Event Duration Monitoring (EDM), near-real time reporting and continuous water quality monitoring will help us understand the root causes of storm overflow discharges. This may help us to identify ways of reducing discharges at lower cost, for example by making better use of our existing network and so avoiding the need for additional storage solutions.

The impact of the information we gather from additional monitoring is uncertain and will be geographically specific. As we gather more data and learn from it, the interventions we can make as a result will evolve. We expect that in some cases we will be able to respond rapidly to the data, but in other cases we will need to evaluate the results over a longer period to establish better alternative solutions. Additional monitors will be installed before 2030.

To reflect the potential for learning from monitoring, we assume that if these expected benefits are realised, there will be a reduction in the costs of the storm overflow discharge reduction programme from 2030 beyond what is already assumed in our preferred DWMP plan. We assume that this could only deliver up to a 10% further reduction in costs, as use of monitoring data is already considered in our DWMP. This is a simplifying assumption for the purposes of modelling the impact for this Long-term strategy. Our strategic and tactical planning teams will be monitoring this data as it becomes available and will be able to respond more quickly – with investment plans being updated on at least an annual basis.

These options have been developed from high level views from subject matter experts. Given the actual cost savings will depend on the findings from monitoring data we are only now starting to collect, we have not been able to develop more robust cost estimates. We consider these estimates are a reasonable proxy for how costs may evolve.

- Option 10A: DWMP assumptions for reduction in costs from improved storm overflow monitoring data.
- Option 10B: Additional reduction in costs from improved storm overflow monitoring data – starting from 2030/31 rising to 10% reduction in costs from 2034/35.

11. The need for investment in sludge incineration

There is uncertainty on how future regulations might change the way we dispose our wastewater sludge, whilst climate change and emerging themes will also contribute to the likelihood of a diminishing landbank. We consider that it is very likely that there will be some changes and under our core pathway we will gradually adapt to likely future restrictions. We will build a strategically located storage barn to provide resilience to not being able to spread biosolids to land in Autumn months with additional investment in technology that will reduce the volume of biosolids that is deployed to agriculture land. However, there is uncertainty whether we will be required to transition to alternative disposal routes in future – currently the best alternative solution to the landbank closing is incineration.

The decision whether to incinerate sludge is relevant to the environmental challenges as it reflects a future where expected environmental legislative requirements occur between 2025 and 2050 that would limit or stop us from spreading biosolids to land in parallel with landbank accessibility associated with climate change. Whether this is required depends on future learning and understanding of material within our sludge impacts upon the environment associated with emerging themes, such as microplastics, or whether alternative solutions are implemented, such as banning the use of certain products and requiring microplastic filters to be fitted to commercial and domestic appliances such as washing machines.

If sludge incineration is not required, we expect to need additional strategic storage and further treatment through drying and pelletising to reduce cake bulk and so further extend our storage capacity. This is because we anticipate tighter permits on soils associated with nutrients, the progressive impact of climate change limiting land accessibility and emerging themes such as microplastics starting to influence landbank deployment. This investment would be adaptive, as such processes would facilitate incineration if necessary.

If incineration is the optimal solution depends on the reliable development at scale of alternatives, and the environmental impact of increased greenhouse gas emissions and other air pollution incineration will create. If

we do need to develop incineration, we will also need to build additional storage capacity in the interim to provide resilience while we go through the process of planning and building an incinerator, including applying for planning permission.

We consider a key strategic decision will be required in 2028 to trigger design in 2030 to commence the initial design and environmental impact assessments of delivering an incinerator to ensure it is operational early 2035 when the possible closure of the landbank may occur. These costs have been developed in response to evolving guidance through the WINEP process.

- Option 11A: Invest in bioresources cake storage barn in 2025-30 and high-quality dewatering.
- Option 11B: As 11A with additional 50% cake storage capacity in 2030-35 and drying and pelletisation capacity at Howdon and Bran Sands.
- Option 11C: As 11A with additional 50% cake storage capacity in 2030-35, incinerator constructed by 2040 (with 10-year lead time) and alternative solutions implemented from 2045.

12. Level of sustainable long-term capital maintenance expenditure

We deliver essential services to our customers through a highly complex and varied asset base, with many of our assets required to operate for a very long time. It is critical that those assets are healthy and can operate effectively. There is growing evidence of increasing risk in the asset base; we have been able to manage these risks through operational interventions to date but sooner or later this will need to be stabilised through additional investment. Addressing future challenges, such as climate change and service improvement are also likely to require more material replacement of the existing asset base. Doing so will however also deliver additional benefits, such as reducing the number of interruptions to supply and providing opportunities to remove customer-side lead pipes at lower cost.

For 2025-30, we want to understand more about this long-term issue and start to address the highest risk areas. We looked at three areas for our PR24 Business Plan where there were likely to be risks: mechanical, electrical and instrumentation (or MEICA) assets; below ground assets (pipes); and civil assets (mostly concrete structures). We have proposed specific increases in expenditure in these areas as explained in our business case for increasing asset health expenditure ([A3-21 Base uplift case - asset health](#), NES35).

Beyond 2030 we consider that capital maintenance expenditure will need to increase further as explored in '[Regulating for the long-term: resilient essential services require healthy assets](#)', NWL, July 2022. We do not yet know what the long-term sustainable level of capital maintenance expenditure is. For our core pathway, we have used an estimate of a 40% increase in investment from 2020-25 levels starting in 2030. This has been

determined as half of the equivalent uplift allowed by WICS to Scottish Water in its latest [Strategic Review of Charges SR21](#). We consider this conservative view represents a minimum no regrets increase.

However, the required level of investment could be significantly higher. We consider two further point estimates for increases in our scenarios – a 80% and a 123% increase based on the low and high WICS estimates as discussed in [A3-21 Base uplift case - asset health](#), (NES35).

For the purposes of this long-term strategy, we have set a decision point of 2028 and a trigger point of 2030 for determining this uplift. However, we would expect our understanding of assets to mature over time, and so we would expect further evidence to be generated, and further decisions to be made at each subsequent price review to determine the most appropriate level of capital maintenance expenditure.

These options have been developed with subject matter experts; for more information, see [A3-21 Base uplift case - asset health](#) (NES35).

- Option 12A: Increase of 40% in capital maintenance from 2030 relative to 2020-25 levels.
- Option 12B: Increase of 80% in capital maintenance from 2030 relative to 2020-25 levels.
- Option 12C: Increase of 123% in capital maintenance from 2030 relative to 2020-25 levels.

13. Timing of net zero investment

Our core scenario assumes a broadly straight-line trajectory for reaching net zero between now and 2050. But the path that we take will depend on customers' willingness to pay to decarbonise, the actions of other sectors and on legislation. We have therefore considered alternative investment pathways that speed up or slow down the progress towards net zero.

Pulling emissions reductions forward would have environmental benefits – as global warming depends on the stock of greenhouse gases in the atmosphere – but would increase costs to customers in the near-term, and likely overall as abatement technologies will likely reduce the costs of emission reductions in future. We assume this would happen in scenarios where there is concerted support from customers and politicians to decarbonise.

Pushing decarbonisation backwards would increase the deliverability challenge towards 2050 and put an undue burden on future customers. This may nevertheless happen where the societal and political will to decarbonise does not materialise.

We assume a decision about the speed of progress towards net zero would be made in 2028 to take effect from 2030. As with capital maintenance, this will not be a one-off decision, and we would expect changes to

attitudes and legislation to happen over time. This simplifying assumption however enables us to show the potential impact of one such iteration of the decision.

We have identified, assessed, and selected these options through an interventions-based modelling approach developed internally by subject matter experts.

- Option 13A: Central case decarbonisation delivering net zero by 2050.
- Option 13B: Accelerated decarbonisation delivering net zero before 2050.
- Option 13C: Delayed decarbonisation delivering net zero after 2050.

14. Timing of lead replacement

Since we published our draft Long-term strategy, we have significantly revised upwards our estimate for the cost of replacing customer-side lead pipes. Because of these, the importance of when we reach our lead-free ambition for customers has increased. We are still committed to delivering this objective but recognise that it may be the case that customers are not willing or able to fund this replacement by 2050. We therefore consider the impact of alternative timeline under which full lead replacement is achieved in 2075, effectively doubling the length of time to reach our goal.

In our 2025-30 Business Plan we set out our planned expenditure to 2035. We consider we will need to increase expenditure further beyond this to deliver by 2050. Under our 2075 alternative we instead consider a decision point in 2033 about whether to aim for 2050 or 2075, that results in a change in expenditure from 2035 onwards. These options have been developed based on the Water UK ambition to replace lead and a unit cost analysis using APR data. Alternative investments such as using liners instead of pipe replacement have been considered but discounted based on risk of future failures.

- Option 14A: All lead replaced by 2050.
- Option 14B: All lead replaced by 2075.

Summary of decision and trigger points

We set out above what we consider to be the key decision points up to 2050 that we are currently aware of. We specify in Table 4 when these decisions need to be made.

And these dates are important; our adaptive pathways have already started. Of the decision points we set out in '[Shaping our future: developing our long-term strategy 2025-2050](#)' (NES_LTDS3), we have already need to draw a conclusion on two as part our 2025-30 Business Plan – whether to delay investment to support

affordability or whether to accelerate storm overflow investment. We have for the most part not delayed investment, although there are some specific areas of investment through the WINEP that we have proposed to be phased into 2030-35 as discussed in [section 4.6: Investment identified for PR24](#). We have decided not to delay storm overflow investment – although we retain this as an option for our regulators to consider in line with our DWMP.

TABLE 4: SUMMARY OF DECISION AND TRIGGER POINTS

Decision	Decision point	Trigger point
1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir	2027	2028
2. The need for Southend water re-use plant	2027	2028
3. The need for Canvey Island de-salination plant	2027	2028
4. The need for other water supply, transfer and demand-side options	2024-46	2027-46
5. The impact of new demand on Teesside	Annually	Annually
6. A potential trade of raw water from Kielder reservoir	2028, 2044	2040, 2055
7. Speed of delivering storm overflow programme and scale of surface water separation	2024, 2028	2026, 2030
8. Future environmental challenges	2027	2031
9. Potential for a technology step change	2033	2035
10. Reduction in storm overflow discharge reduction costs from monitoring data	2030	2030
11. The need for investment in sludge incineration	2026	2030
12. Level of sustainable long-term capital maintenance expenditure	2028	2030
13. Timing of Net Zero investment	2028	2030
14. Timing of lead replacement	2033	2035

The decision point for sewage sludge incineration is set for 2026, as this is the earliest point, we consider we may have a regulatory decision on this investment; the trigger point for investing will come later, as funding will need to be agreed through the next price review.

The next set of decisions are in 2027 where we will need decide whether to build new water supplies and whether to invest in eliminating micro-pollutants. Building new water supplies (because of planning) and investigating approaches to eliminate micro-pollutants (because of the time needed to gather scientific data) both take time to deliver, which is why a decision is needed in 2025-30. A decision in 2027 would enable a robust planning and costing approach for the next price review.

The decisions on the sustainable level of capital maintenance and timing of net zero delivery can be taken later than those for water resource investments and micro-pollutants as these decisions relate to the speed with which we ramp up investment in what will be a large number of smaller investments. It will therefore be possible to make these decisions closer to the next price review while allowing sufficient time to develop an evidence base to support the funding requirement.

The decisions in 2029 and 2044 about whether to commence planning and construction to facilitate water transfers to Yorkshire Water or United Utilities respectively are a long time ahead of their trigger points as the time will be needed to design, consult on, and build the necessary infrastructure. The 2029 date is more important as Yorkshire Water would require a trade earlier, and currently consider that they would need this transfer in their preferred plan. The 2044 date is indicative only.

The final dates – for 2030 and 2035 – relate to decisions to implement new technologies. These are not firm dates for predicting when technological progress will occur but rather indicative of when they may occur and useful in an adaptive plan as a check point to ensure we investigate alternative opportunities appropriately.

Most of the decision points we have identified are closer to 2025 than 2050 because we have more certainty around the nature of decisions and their impacts in the near term.

In contrast, there is much less certainty over decisions we will need to take closer to 2050 and it is difficult to estimate the potential impacts of those decisions in a robust way. We will continue to update our adaptive planning approach over time, and we are likely to identify future decisions points from the mid-2030s onwards. For example, we will continue to monitor the development of ecosystem markets and update our long-term strategy accordingly.

3.10. ALTERNATIVE PATHWAYS

The decisions we take will lead us down alternative pathways of investment.

To examine the impact of making different decisions at each of these decision points, we have constructed our plausible future scenarios and Ofwat’s common reference scenarios as alternative pathways, which combine a decision for each of the decision points in Table 4. These are summarised in Table 5 and Table 6.

TABLE 5: PLAUSIBLE FUTURES ALTERNATIVE PATHWAYS DECISIONS

	Sustainable future	Climate failure	Regional growth	Environmental challenges	Technological advance
Decision point	2024	2027	2024	2024	2027
Trigger point	2025	2030	2025	2025	2030
1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir	1C	1B	1E	1D	1B
2. The need for Southend water re-use plant	2A	2B	2A	2A	2C
3. The need for Canvey Island de-salination plant	3A	3A	3A	3A	3B
4. The need for other water supply, transfer and demand-side options	See Annex 2: Plausible futures scenario analysis – Table 6: Water resource investments under plausible futures scenarios (NES_LTDS1)				
5. The impact of new demand on Teesside	5A	5A	5B	5A	5B
6. A potential trade of raw water from Kielder reservoir	6B	6B	6C	6B	6B
7. Speed of delivering storm overflow programme and scale of surface water separation	7Bii	7A	7C	7Bi	7A
8. Future environmental challenges	8B	8A	8A	8B	8A
9. Potential for a technology step change	9A	9A	9A	9A	9B
10. Reduction in storm overflow discharge reduction costs from monitoring data	10A	10A	10A	10A	10B
11. The need for investment in sludge incineration	11C	11B	11B	11C	11B
12. Level of sustainable long-term capital maintenance expenditure	12B	12A	12B	12C	12A
13. Timing of net zero investment	13B	13C	13A	13A	13B
14. Timing of lead replacement	14A	14B	14A	14A	14A

TABLE 6: OFWAT COMMON REFERENCE SCENARIO ALTERNATIVE PATHWAYS DECISIONS

	Climate change		Technology		Demand		Abstraction reductions	
	High	Low	Low (slow)	High (fast)	High	Low	High	Low
Decision point	2027	2027	2027	2027	2027	2027	2027	2027
Trigger point	2030	2030	2030	2030	2030	2030	2030	2030
1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir	1B	1B	1B	1A	1B	1A	1B	1B
2. The need for Southend water re-use plant	2B	2A	2B	2A	2B	2A	2C	2A
3. The need for Canvey Island de-salination plant	3A	3A	3A	3A	3A	3A	3B	3A
4. The need for other water supply, transfer and demand-side options	See Annex 3: Common reference scenario analysis - Table 13: Water resource investments under common reference scenarios (NES_LTDS1)							
5. The impact of new demand on Teesside	5A	5A	5A	5A	5A	5A	5A	5A
6. A potential trade of raw water from Kielder reservoir	6B	6B	6B	6B	6B	6B	6B	6B
7. Speed of delivering storm overflow programme and scale of surface water separation	7Ai	7Aii	7A	7A	7A	7A	7A	7A
8. Future environmental challenges	8A	8A	8A	8A	8A	8A	8A	8A
9. Potential for a technology step change	9A	9A	9A	9B	9A	9A	9A	9A
10. Reduction in storm overflow discharge reduction costs from monitoring data	10A	10A	10A	10B	10A	10A	10A	10A
11. The need for investment in sludge incineration	11B	11B	11B	11B	11B	11B	11B	11B
12. Level of sustainable long-term capital maintenance expenditure	12A	12A	12A	12A	12A	12A	12A	12A
13. Timing of net zero investment	13A	13A	13C	13B	13A	13A	13A	13A
14. Timing of lead replacement	14A	14A	14A	14A	14A	14A	14A	14A

Decision 4 – where this relates to sustainability reductions requiring the Caister water reuse plant – and decision 7 on the speed of the storm overflow discharge reduction programme will be made before the final determinations for 2025-30 are made. If these decisions are made after final determinations and require investment in 2025-30, a notified item or other uncertainty mechanism may be required. For all other decisions, we do not expect extra funding would be required before PR29, provided the transition expenditure process that exists for PR24 is used again in PR29.

3.11. MONITORING PROGRESS AGAINST THE LONG-TERM STRATEGY

We will monitor and report our progress against our long-term regularly so that we can be held accountable for our performance.

Following our adaptive planning principles, we need to continuously monitor our performance, to ensure we know if we are on track to deliver against our long-term plan and when we are not, so we can take corrective action. We also need to identify and keep track of information that will be needed to decide whether to follow alternative investment pathways, and to embed monitoring this information into our governance.

Long-term target metrics

Continuously monitoring our performance will enable us to make sure we remain on track to deliver our long-term targets. Table 7 sets out the metrics that will be monitored, how these will be calculated and the sources of data for the calculations.

The metrics will be monitored and calculated on an annual basis. We will publish our metrics in our APR, which we will share with our regulators. For metrics that have associated performance commitments, we will report our progress against the trajectories for these performance commitments set out in our business plan for 2025-30 in table LS1 (see our business plan tables NES_BPT_01). For metrics without associated performance commitments, we will report on progress towards the long-term targets set in Table 28.

If we are not on track to meet our long-term targets or the performance commitment levels, we will review the evidence and circumstances to understand and explain why this is the case and set out an action plan to get us back on target.

TABLE 7: LONG-TERM TARGET METRICS

Long-term targets	Metric	Calculation	Data source
Customer service			
Consistently deliver high quality water – Compliance Risk Index (CRI) of zero.	CRI (water quality compliance) PC Water quality contacts PC	As specified in PR24 final determination	APR
Leading levels of customer service – as defined by current metrics (C-MeX, D-MeX and BR-MeX).	C-MeX PC D-MeX PC BR-MeX PC	As specified in PR24 final determination	APR

Long-term targets	Metric	Calculation	Data source
Reliable water supplies – reduce interruptions to supply greater than 3 hours to less than 2 minutes/customer/year on average by 2050.	Interruptions to supply (3 hours) PC	As specified in PR24 final determination	APR
Eliminate the impact of lead on customers – replace all lead customer supply pipes by 2050.	No PC Number of lead communication pipes	Number of lead communication pipes – number of lead communication pipes replaced	APR
Reduce internal sewer flooding – by 60% (from our 2024/25 performance levels) by 2050.	Internal sewer flooding PC New metric: Percentage reduction in internal sewer flooding from 2024/25 performance level	As specified in PR24 final determination (2024/25 performance minus measurement year performance) divided by 2024/25 performance Measured as internal sewer flooding events per 10,000 connections	APR
Reduce external sewer flooding – by 60% (from our 2024/25 performance levels) by 2050.	External sewer flooding PC New metric: Percentage reduction in external sewer flooding from 2024/25 performance level	As specified in PR24 final determination (2024/25 performance minus measurement year performance) divided by 2024/25 performance Measured as absolute number of external sewer flooding events	APR
Environment			
Reduce household water per capita consumption – to 122 l/p/d by 2038 and 110 l/p/d by 2050.	Per capita consumption PC	As specified in PR24 final determination	APR
Reduce non-household water demand – by 9% by 2038, excluding growth (from 2019/20 levels).	Business demand PC	As specified in PR24 final determination	APR

Long-term targets	Metric	Calculation	Data source
Halve leakage – achieve a 55% reduction in leakage in our North East levels by 2050 (61.1 Ml/d) and a 40% reduction in leakage in our Essex and Suffolk regions by 2050 (40.1 Ml/d), to achieve the national target of 50% companywide (from 2017/18 baseline).	Leakage NW and ESW PCs	As specified in PR24 final determination	APR
Eliminate harm from storm overflow discharges – year on year reductions in number of storm overflows operating more than 10 times a year on average, and none doing so by 2050.	Storm overflows PC	As specified in PR24 final determination	APR
Leading levels of water quality – eliminate the detrimental impacts of our operations and assets on waterbodies as soon as is practical. Work with partners so that, where possible, waterbodies in our regions can achieve good ecological status.	River water quality PC Percentage of water bodies in our regions not achieving good ecological status due to our impact Percentage of water bodies in our regions achieving good ecological status	PC as specified in PR24 final determination Good ecological status data calculated by the Environment Agency	PC: APR GES: Environment Agency assessment
Leading levels of pollution incidents – zero serious pollutions now and always, zero pollutions as a result of our assets and operations and reduce the number of category 1 – 3 pollutions by 50% by 2040 (from 2022 baseline).	Pollutions PC Serious Pollutions PC New metric: Percentage reduction in category 1 – 3 pollution incidents from 2022 baseline	As specified in PR24 final determination (Number of category 1 – 3 pollutions) divided by the total number of category 1 – 3 pollutions in 2022	APR
Enhance biodiversity – all our construction activities, including those that do not require planning permission, will result in a net gain in biodiversity of 10% or the local requirement where higher.	New metric: Percentage of construction projects delivering biodiversity net gain of at least 10% or the local requirement where higher	(Number of construction projects delivering biodiversity net gain of at least 10% or the local requirement where higher) divided by the total number of construction projects	APR
Excellent bathing waters – all bathing waters at good or excellent status by 2030.	Bathing water quality PC Percentage of bathing waters at good or excellent status Percentage of bathing waters at excellent status	As specified in PR24 final determination (Number of bathing waters at good or excellent status) divided by total number of bathing waters.	APR
Protect water environments – target 100% discharge permit compliance and maintain at least 99%.	Discharge permit compliance PC	As specified in PR24 final determination	APR
Affordable and inclusive services			

Long-term targets	Metric	Calculation	Data source
Eliminate Water Poverty – by 2030 no customer will spend more than 5% of their disposable income after housing costs on water and wastewater services and we will maintain this.	No PC Percentage of households in our regions in water poverty	(Number of households spending more than 5% of their disposable income after housing costs on water and wastewater services in our regions) divided by total households in our regions	Internal reporting for Our Purpose report
Sustainability and resilience			
Deliver Net Zero – achieve Net Zero Scope 1, 2 and 3 emissions by 2050.	Operational greenhouse gas emissions PC(s) Total greenhouse gas emissions	Operational emissions as specified in PR24 final determination Total emissions as specified in APR	APR
Halve carbon impact of new assets – reduce embodied carbon by 50% for new assets by 2040 (from 2025/26 baseline).	No PC Scope 3 greenhouse gas emissions from capex (tCO2e) divided by capex (£ 2025/26 FYA CPIH deflated prices)	(Emissions tCO2e/£ capex in 2025/26 minus emissions tCO2e/£ capex in year) divided by Emissions tCO2e/£ capex in 2025/26	APR
Increase renewable generation – 100% of our electricity will come from additional* renewable generation by 2040.	No PC Percentage of our electricity demand that is met by renewable generation that would not exist if we were not buying the power. This includes Power Purchase Agreements (PPA) with new generation that we guarantee the take-off for, and renewable generation behind the meter.	(Our electricity demand that is met by renewable generation that would not have existed if we were not buying the power) divided by our total electricity demand	Total electricity demand: APR. Data on additional generation to be recorded internally
Reduce chemical and energy use – by 20% for all new assets by 2035 (from 2019/20 baseline).	No PC Percentage of new assets in year achieving 20% reduction in chemical and energy use per MI water / wastewater treated for specific asset class compared to 2019/20 grey solution baseline	(Number of new assets achieving 20% reduction in chemical and energy use) divided by total number of new assets	Internal reporting for Our Purpose report
Resilient water supplies – household customers continue to have a sufficient and secure supply of water by planning to be resilient to 1 in 500-year drought.	No PC Drought resilience as specified in the latest WRMP guidance	As specified in latest WRMP guidance	WRMP
Leading asset management practices – achieve AMMA assessment of leading or optimising for all measures of asset management maturity by 2030 and leading by 2035.	Mains repairs PC Unplanned outage PC Sewer Collapses PC AMMA assessment	As specified in PR24 final determination As specified in Ofwat's AMMA assessment methodology	APR AMMA
Efficiency and prudent investment			

Long-term targets	Metric	Calculation	Data source
Leading levels of efficiency – be the most efficient company in the sector in the round by 2030 and maintain that position.	No PC Simple mean ranking against water and wastewater companies in England and Wales for base cost efficiency across all price controls	(Rank water network plus base cost efficiency plus rank water resources base cost efficiency plus rank wastewater network plus base cost efficiency plus rank bioresources base cost efficiency) divided by 4	Efficiency assessment of APR data and other cost assessment data
Leading in innovation – have an innovation pipeline of at least £100m (including Ofwat innovation fund competition) by 2030 and maintain it.	No PC £m investment in our innovation pipeline	£m in our innovation pipeline (comparison to £100m in 2022/23 FYA CPIH deflated prices)	Internal reporting for Our Purpose report
Caring for our communities			
Support our local economies – maintain spending at least 60p in every £ with suppliers in our region.	No PC p in every £ spent with suppliers in our region	£ spent with suppliers in our region divided by £ spent	Internal reporting for Our Purpose report
Give time back to the community – at least 50% of our employees to spend time volunteering every year.	No PC Percentage of employees volunteering through our Just an Hour programme	Number of employees volunteering through our Just an Hour programme divided by total number of employees	Internal reporting for Our Purpose report

Decision and trigger points

In [section 3.9: Decision and trigger points](#), we identified 14 decision points and trigger points at which the alternative investment would be started.

To put the strategy into practice, we need to gather the information needed to make these decisions. The major investment decision points that we have identified each fall under one or more of our existing strategic planning frameworks as shown in Table 8. These planning processes follow five-year cycles and require a continuous process of monitoring, engagement and development and therefore have the governance structures in place to effectively monitor data to inform the decision and trigger points.

All the major investment decisions for both water and wastewater will go through our Asset Management Steering Group (AMSG) for decision. This group therefore is ultimately responsible internally for ensuring that the decision points are monitored and that we follow our adaptive plan.

TABLE 8: DECISION POINTS AND STRATEGIC PLANNING FRAMEWORKS

Decision	Decision point	Decision maker	Strategic framework	planning
1. Prioritising Lowestoft water re-use plant or North Suffolk reservoir	2027	Defra, Northumbrian Water	WRMP	
2. The need for Southend water re-use plant	2027	Defra, Northumbrian Water	WRMP	
3. The need for Canvey Island de-salination plant	2027	Defra, Northumbrian Water	WRMP	
4. The need for other water supply, transfer and demand-side options	2024-46	Defra, Northumbrian Water	WRMP	
5. The impact of new demand on Teesside	Annually	Northumbrian Water	WRMP	
6. A potential trade of raw water from Kielder reservoir	2029, 2044	Defra, Northumbrian Water, Yorkshire Water, United Utilities	Regional water resource management planning	
7. Speed of delivering storm overflow programme and scale of surface water separation	2024	Defra, Northumbrian Water	DWMP	
8. Future environmental challenges	2027	Environment Agency	WISER / WINEP, DWMP, WRMP	
9. Potential for a technology step change	2033	Northumbrian Water	WISER / WINEP, WRMP, DWMP	
10. Reduction in storm overflow discharge reduction costs from monitoring data	2030	Northumbrian Water	DWMP	
11. The need for investment in sludge incineration	2026	Environment Agency	WISER / WINEP	
12. Level of sustainable long-term capital maintenance expenditure	2028	Northumbrian Water, Ofwat	Relevant to all, but lead by none	
13. Timing of Net Zero investment	2028	Defra, Northumbrian Water	Relevant to all, but lead by none	
14. Timing of lead replacement	2033	Northumbrian Water, DWI	Relevant to WRMP, but lead by none	

In addition to sitting under our strategic planning frameworks, some trigger points – in particular 7, 8, 9, 10, 11, 12 and 13 – will depend on technological change. We have a mature approach to innovation that is embedded

across our business, which will support us in identifying opportunities that will inform decision points. Our innovation ambassadors and our annual Innovation Festival in particular help us to identify and implement new technologies and ways of working, as discussed in section [3.8: Key enablers for our investment](#).

The strategic planning frameworks enable us not just to monitor information pertinent to those alternative pathways already identified, but also emerging pathways. These could arise due to changes in technology, legislation, or local factors such as changes to business demand. We consider that the existing strategic planning frameworks and our innovation strategy provide a good basis for identifying upcoming investments across the water resources and restoring and enhancing the local environment investment areas. However, as discussed in [section 7: Next Steps](#), a more joined up and robust approach to identifying the strategic investment needs to deliver resilience and asset health, net zero and lead replacement is needed. We are therefore planning to work with other companies and regulators to develop a framework for further strategic planning in these areas.

4. RATIONALE

4.1. IDENTIFICATION OF CORE AND ALTERNATIVE PATHWAYS

We have built our core pathway around the no and low regret investment we see is needed between 2025-50. Our alternative pathways consider how this investment will need if other investment is needed as circumstances change and new information becomes available.

The identification of the core pathway starts with the exploration of customer expectations and the development of our ambitions, as set out in [section 2: Ambition](#). We explore in [section 3.5](#) the investment areas we consider are necessary. We identify the investments we consider are necessary under the core pathway in sections [3.6: Core pathway](#) and [3.7: Core pathway by investment area](#).

In [section 3.2 Horizon scanning](#), section [3.3 Future challenges and opportunities](#) and section [3.4 plausible future scenarios](#), we consider how the future may be different, and how we can reflect that in our strategy. [Section 3.9: Decision and trigger points](#) and [section 3.10: Alternative pathways](#) consider the choices that we will need to make that may lead us to an alternative investment path from the core.

In the next section we test our strategy against the different scenarios identified and examine their impact.

4.2. SCENARIO TESTING

Considering plausible future scenarios shows the possible impacts on investment and bills over the next 25 years. Decisions and trigger point identified above are inherent within plausible future scenarios and determine the shape of alternative investment paths.

The cost of plausible future pathways and bill impacts are important considerations for customers and inform our 2025-30 Business Plan. We discuss how the costs and bill impacts for each scenario and how they inform our Business Plan below. Further information on the scenarios can be found in [Annex 2: Plausible futures scenario analysis and Annex 3: Common reference scenario analysis](#) (NES_LTDS1). The model used for this analysis is included in our submission as [NES LTDS9](#).

Scenario materiality

We have developed these scenarios to cover the future scenarios we consider are useful to examine either because they are probable, or because they create particular challenges or opportunities that could influence actions we should take in the short term. To ensure that the scenarios we consider are meaningfully different

from the core pathway, we have also applied a materiality test. We consider it is important to consider materiality both in terms of the absolute size of investment required, and the variance in investment over time. We have therefore defined a scenario to be material if either the total investment over 2025-50 is 6% higher or lower than the core scenario, or if the investment in any five-year price review period is 10% higher or lower than the core scenario.⁶ The materiality of the scenarios we have tested is shown in Table 9.

TABLE 9: MATERIALITY OF SCENARIOS

Materiality summary	Test 1: +/-6% variance 2026-50	Test 2: +/-10% variance in any five-year price review period	Overall materiality assessment
Core	N/A	N/A	N/A
Sustainable future	Material	Material	Material
Climate failure	Material	Material	Material
Regional growth	Material	Material	Material
Environmental challenges	Material	Material	Material
Technological advance	Not material	Material	Material
Abstraction reductions - Low	Not material	Not material	Not material
Abstraction reductions - High	Material	Material	Material
Climate change - Low	Not material	Not material	Not material
Climate change - High	Not material	Material	Material
Demand - Low	Not material	Not material	Not material
Demand - High	Not material	Material	Material
Technology - Slow (low)	Material	Material	Material
Technology - High (fast)	Not material	Material	Material
Unused scenario 2	Not material	Not material	Not material
Unused scenario 1	Not material	Not material	Not material

⁶ We use a 6% threshold for the whole period as this is the highest and therefore most demanding materiality threshold used for costs in Ofwat’s PR24 methodology – see [PR24 final methodology Appendix 9 Setting Expenditure Allowances](#), December 2022, Ofwat, p.31. For variations between price review periods, we have adopted the 10% threshold used for [interim determinations](#) of price reviews, although we apply this to enhancement totex only as this is the key variable explored in the scenario analysis.

Totex impacts

Expenditure under sustainable future, environmental challenges and climate failure is relatively high compared to the other scenarios. This is in part because there is investment in more activities in these scenarios.

Sustainable future and environmental challenges see investment in eliminating micro-pollutants which is a significant cost driver. It is important to note that our current estimates of cost for these areas is very high level, as we do not yet understand the technical solutions that will be required to address these issues.

Climate failure has relatively low expenditure earlier in the period due to the limited investment in improving the environment, but the impact of high PCC is felt later on. The regional growth scenario in contrast sees higher investment required in the nearer term than under climate failure, but it drops off over the period, as the focus of customers and government is less on environmental issues in this scenario. The technological advance scenario in contrast sees issues addressed through innovation, which minimises the need for investment – although significant investment is still required throughout the period.

Bill impacts

Between 2024/25 and 2049/50, combined water and wastewater bills in the North East could increase by 71% under the core pathway and by up to 170% under the environmental challenges, sustainable future and regional growth scenarios. In Essex and Suffolk, bills could increase by around 23% under the core pathway and by up to 78% under climate failure, regional growth, and environmental challenges.

The proportionate increase in bills is higher for Northumbrian Water than Essex & Suffolk Water. This is because the majority of investment is needed for wastewater activities, and bills in the North East are for water and wastewater services whereas bills in Essex and Suffolk are for water only. It is also because the plausible future scenarios are more likely to affect investment in wastewater services. Examples include investments in storm overflows and possible legislation requiring sludge to be incinerated. In contrast, the Essex and Suffolk region is affected by the need to build new water supply schemes and under some futures, there is a need to build additional water reuse plants and invest in a desalination plant at Canvey Island.

Compared to our findings in '[Shaping our future: developing our long-term strategy 2025-2050](#)' ([NES LTDS3](#)), we see lower bill impacts for a number of reasons. Firstly, we have looked for opportunities to reduce investment by refining our assumptions. Secondly, we have updated our modelling approach and assumptions around the growth in base (ongoing) expenditure, which has reduced the impact of all scenarios on bills. We have also applied an additional adjustment to our modelling so that only customers in Essex &

Suffolk bear the costs of additional water resource investments in this area, which results in a relative increase in bills for these customers.

It is important to note that for the upcoming price review in 2023/24, our regulator, Ofwat, will set the allowances only for the next price control period, 2025-2030. Even though we are looking at potential investment pathways beyond 2030, to make sure we invest efficiently as needed in the coming years, the levels of investment through customer bills does not get set at this time. We will continue to reassess future investment needs, and innovations and efficiencies will emerge which can help manage our costs. Affordability support will also continue to be extended to even more customers who struggle to pay, as discussed in our Business Plan [appendix A1 – Customer affordability](#) (NES02).

We discuss below the results of each scenario in more detail. Further information can be found in [Annex 2: Plausible futures scenario analysis](#) (NES_LTDS1).

Core pathway

In the core pathway we expect totex and bills to rise between 2026 and 2050. This is because of increasing statutory expectations, including through WINEP and the storm overflows discharge reduction plan, which mean investment levels will need to be higher than what was allowed in previous price reviews. Significant investment will be required across each five-year planning period up to 2050.

Sustainable future scenario

Accelerating storm overflows improvements by 2040, accelerating the delivery of net zero and addressing future environmental challenges are all possible in this future due to benign climate change, lower water demand and improvements in technology. But most importantly customers' willingness to fund higher levels of investment is key to enabling delivery of greater environmental benefits more quickly while not making customers feel they are paying more than they should for water. Changing the conversation around the value of water is fundamental to the success of the sector in this scenario. It will be important to focus on innovation to increase the likelihood of finding cost-efficient solutions; higher productivity improvements help offset some of the cost increase.

Climate failure scenario

In the climate failure future, investment is needed in new water supplies as customers don't decrease consumption and more investment is required to ensure sustainable abstraction. Consumption is so high that we need to invest in the Canvey Island desalination plant, which is built in the 2040s, and is both expensive

and energy intensive to operate, increasing our impact on the environment. There is no appetite to invest in eliminating micro-pollutants due to low technological growth and the absence of a cost-efficient solution. Affordability constraints created by the impact of climate change on other parts of the economy result in a decision to delay investment in lead replacement – meaning the 2050 target is missed and full lead replacement is not delivered until 2075. This scenario teaches us that a failure to address climate change accompanied by low technological growth is likely to mean needing to forgo investment in other important areas. Throughout our planning we will continue to work with other water companies, academics, and other sectors to increase the likelihood of discovering cost efficient solutions that are manageable in the event of climate failure.

Regional growth scenario

Under the regional growth scenario, bills increase from additional investment needed in water supplies to meet increased demand. This scenario teaches us that it is important to keep our investment options open during 2025-30, as regional growth may increase our need to invest in water supplies. We have included feasibility studies for additional water supplies in our 2025-30 Business Plan, which do not commit us to making investments but keep investment options open.

We note that the increases in investment needed in this scenario would be partially offset by increased industrial demand meaning the impact on households is lower, and higher earnings in the region from local economic growth. We have not modelled the impact of the greater share of industrial demand on customer bills.

Environmental challenges scenario

The environmental challenges scenario shows that totex will increase significantly if all expected environmental legislation between 2025 and 2050 results in further investment in the water sector being required. In a future where technology advances are limited, we are unlikely to find cost-efficient solutions. Slow technology growth affects our ability to find alternative solutions that reduce the need for interventions, and so worsens the affordability impact of the required investment. For 2025-30, this scenario teaches us that innovation and finding alternative approaches will play an important role in reducing the likelihood of environmental legislation leading to even higher investment needs. It will also help us find cost-efficient solutions that minimise the potential impact of environmental requirements on customers' bills.

Technological advance scenario

The technological advance scenario shows that if we can harness the opportunities created by technological development, we may be able to deliver more for customers and the environment while reducing future totex requirements. However even in this optimistic world, we will need to continue investing at levels on a par with the historically higher levels we are proposing for 2025-30. Where technology can help is not just through reducing costs in the water sector, but also by addressing or avoiding problems elsewhere that would otherwise need to be solved in the sector, for example by stopping microplastics entering the water system in the first place.

FIGURE 17: TOTEX IMPACTS – PLAUSIBLE FUTURES SCENARIOS

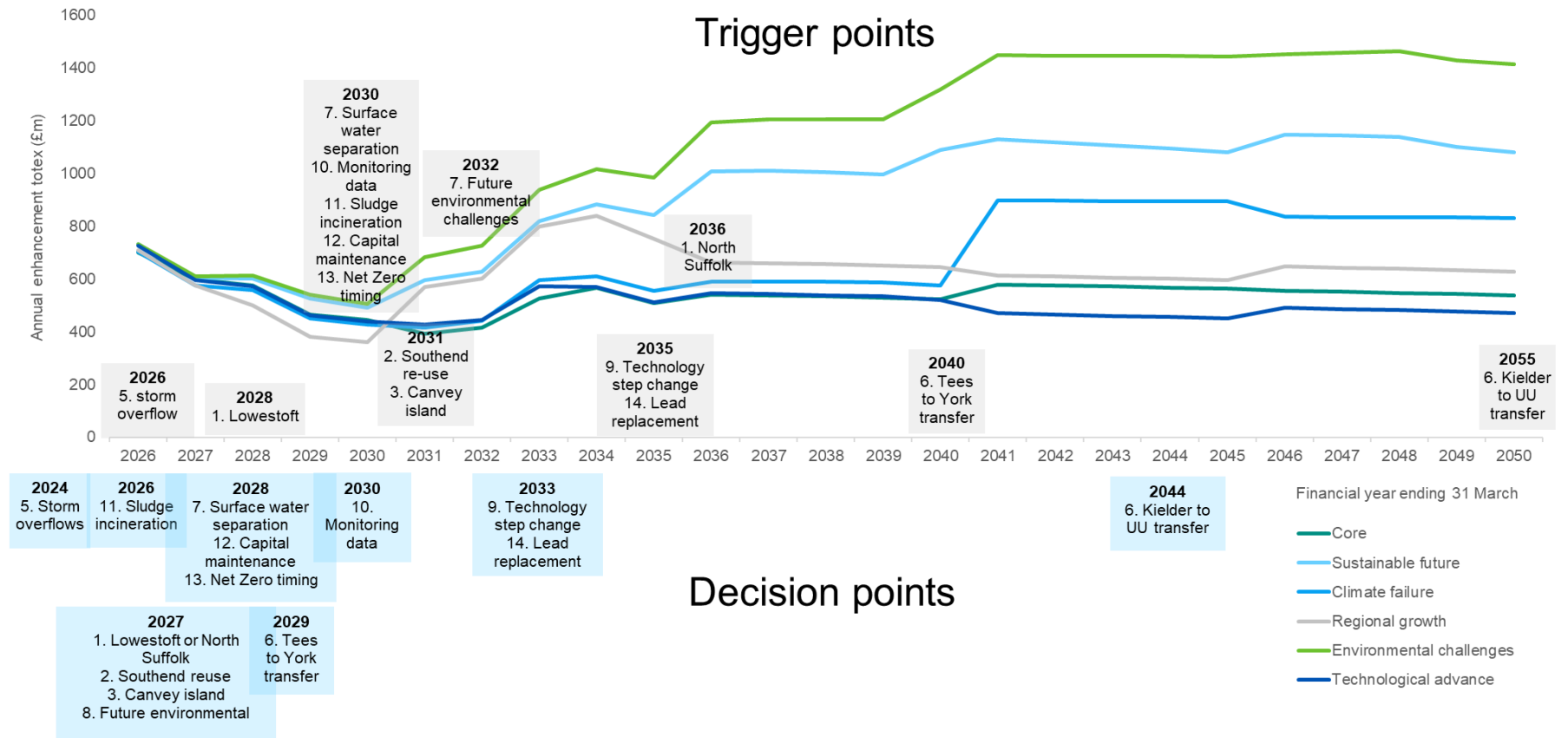


FIGURE 18: AVERAGE TOTAL COMBINED BILL IN THE NORTH EAST 2021-50 (22/23 PRICES)

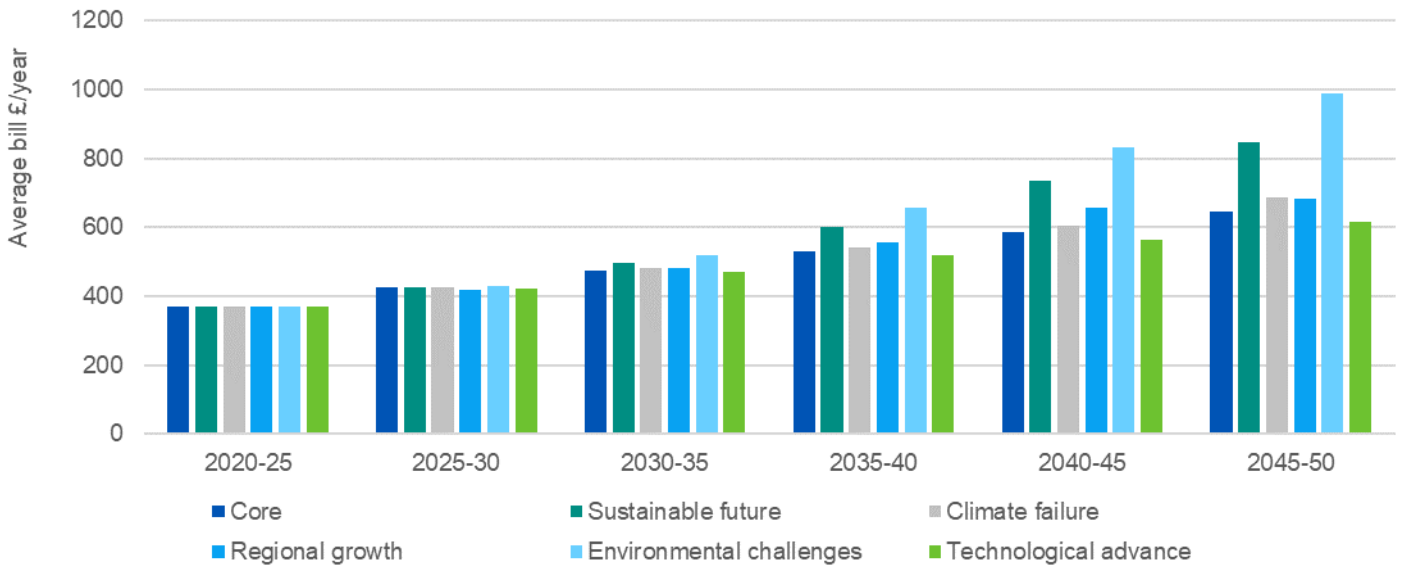
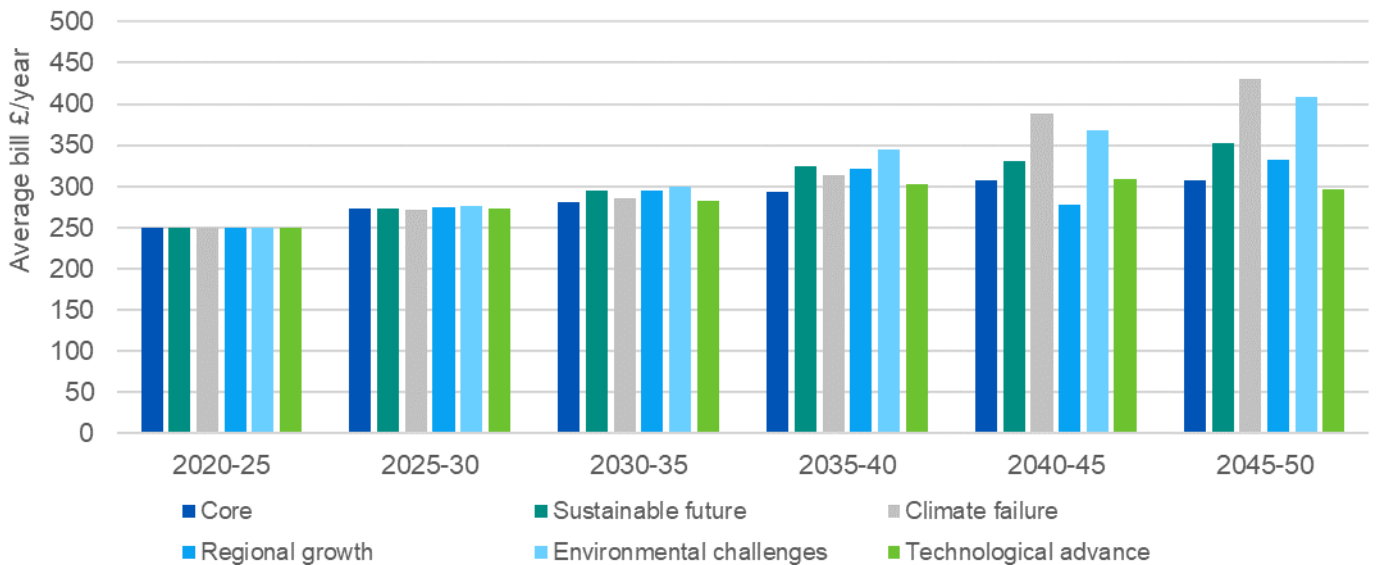


FIGURE 19: AVERAGE TOTAL WATER BILL IN ESSEX & SUFFOLK 2021-50 (22/23 PRICES)



Common reference scenarios

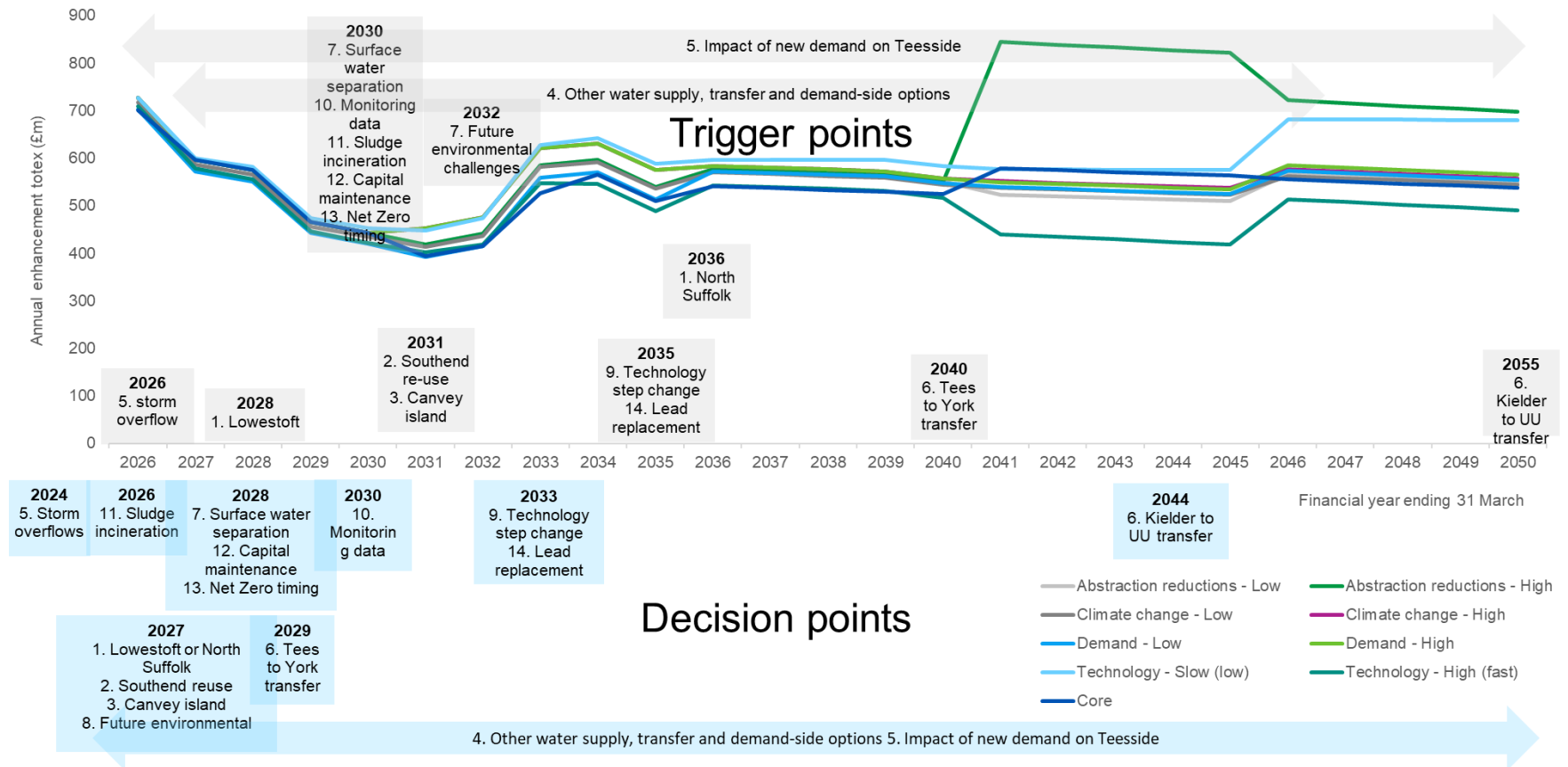
In contrast to our plausible futures scenarios, the common reference scenarios have relatively little variation in totex. This is to be expected as they look at single points of differentiation. The scenarios that result in the biggest changes are the technology scenarios and the extreme high abstraction reduction scenario.

The high abstraction reduction scenario results in the need to invest in significant additional water resources, including the Canvey Island desalination plant. This adds significantly to the investment need in the 2040s.

The technology scenarios show that, while differences in the general rate of productivity improvement will have an impact over time, this is dwarfed by the impact of potential step change in technology. This should emphasise to us the importance of innovation, as we discuss in [section 3.8: Key enablers for our investment](#).

In our draft Long-term strategy consultation, we did not use Ofwat's common reference scenarios directly – instead, we incorporated these into our five plausible futures scenarios. However, we have now assessed these scenarios too and we have included our analysis in [Annex 3: Common reference scenario analysis](#) (NES_LTDS1).

FIGURE 20: TOTEX IMPACTS – OFWAT COMMON REFERENCE SCENARIOS



4.3. BUILDING ON PREVIOUS LONG-TERM STRATEGIES

Our strategy builds on the lessons learnt from developing previous long-term strategies and our existing strategic planning processes.

As discussed in section [1.4: Developing our Long-term strategy](#), we have developed this Long-term strategy by bringing together our strategic thinking from the relevant long-term strategic planning frameworks we participate in:

- Regional water resource management planning.
- Company water resource management planning (WRMPs).
- Drainage and wastewater management planning (DWMP).
- Flood risk management plans (FRMP).
- River basin management plans (RBMPs).
- Shoreline management plans (SMP).
- Water Industry National Environment Programme (WINEP).

The RBMP, FRMP and SMP are taken account of primarily through the WRMPs, DWMP and WINEP. Regional water resource management planning also informs and is informed by our WRMPs, through the WRE and WReN groups. The WINEP is also dependent on the outputs of the DWMP and WRMP processes.

The DWMP process is new for PR24, so looking back to PR19 the key strategic planning frameworks we are building on are the WRMPs and the WINEP.

Our Essex & Suffolk WRMP from five years ago painted a more optimistic picture of long-term supply /demand balance and did not identify a need for significant new water resources. For PR24 this has changed due to changes in the national guidance to reflect a desire to make abstraction more sustainable and because more up to date climate change impacts data has become available. The scientific and engineering picture has evolved and therefore we are moving from a period in which demand-side interventions were sufficient, to one where significant new water resources and transfers are required.

In the North East in contrast we remain well supplied, in large part due to the Kielder reservoir. Even with new climate change data, we can remain in surplus to 2050 and beyond using demand-side interventions only.

The WINEP, in contrast to the WRMP process, at PR19 was very much focused on the five-year period 2020-25. The [WINEP methodology](#) introduced for PR24 has tried to extend the time horizon considered by this strategic planning framework, but it nonetheless remains relatively short term. The main link between the

previous and current WINEPs is that investigations in one period often led to interventions in the following period. In this sense our current WINEP builds on the previous one. We hope that through the development of the DWMP and WRMP processes, this Long-term strategy process and the ongoing development of the WINEP that it will gain a greater focus on long-term outcomes. Experiments such as the Advanced WINEP, which we put forward schemes to participate in, are to be welcomed and supported.

This Long-term strategy also builds on our '[Shaping our future 2018-40](#)' document – referred to by Ofwat as our 'strategic direction statement' – that informed our 2020-25 Business Plan, which was informed by our conversations with customers about their priorities for their business. That strategy in turn was an evolution of our 'Future Horizons' document published in 2014 that informed our plans for 2015-20.

The six strategic themes we set out in '[Shaping our future 2018-40](#)' have stood the test of time. They have evolved slightly as shown in **Error! Reference source not found.**²¹ but have been carried through into this Long-term strategy.

FIGURE 191: EVOLUTION OF OUR STRATEGIC THEMES



Our previous strategy set out these themes and how we intended to deliver against them and assessed trends against the PESTEL (Political, Economic, Social, Technological, Environmental and Legal) framework. This updated strategy builds on this significantly, with a broader horizon scanning exercise, identification of future challenges and opportunities and then building an adaptive plan to deliver against a range of plausible futures and using scenarios to test the strategy.

We have also considered the long-term outcome performance levels developed at PR19 when developing our long-term outcomes for 2025-50. These are discussed in [Annex 4: Delivering our goals – our performance commitments](#) (NES_LTDS1).

4.4. MAINTAINING AFFORDABILITY FOR CUSTOMERS

In the UK we are experiencing the toughest cost-of-living crisis in a generation. The reasons for this are many and varied – the Covid-19 pandemic, the war in Ukraine and the highest levels of inflation

since privatisation. In the long-term the affordability of water bills will be dictated by the interplay between movements in bills on the one hand and trends in real incomes on the other.

Our analysis shows that under all the scenarios that we have considered, bills are going to rise continually between 2025 and 2050. This is driven by the increasing need to invest to meet statutory obligations to address environmental issues and adapt to climate change and population growth to ensure we can provide reliable, resilient, and sustainable water.

Examination of future trends in real wage growth (adjusting inflation) is notoriously difficult. We have looked at trends in median incomes data from the Annual Survey of Hours and Earnings (ASHE) over the period this data is available (1999-2021) regionally for the North East and Essex and Suffolk.

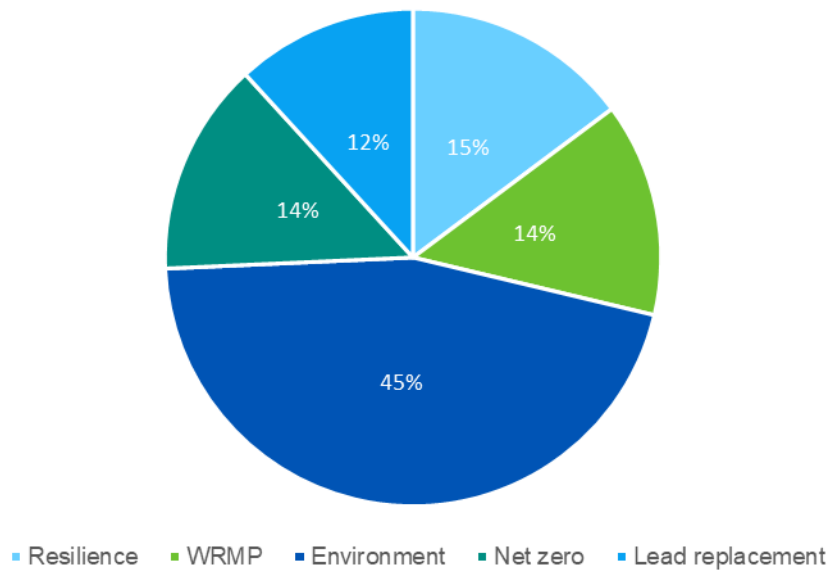
We have considered three possible trends based on the average real wage growth rate, the average for the 50% slowest growth years and the average for the 50% fastest growth years. This allows us to look at the sensitivities of affordability to different real wage growth rates. We then compare these income estimates in 2050 with bills under our scenarios.

The results show that under the core pathway combined water and wastewater bills in the North East could rise from 1.2% of the median income in 2024/25 to 1.8% with average income growth by 2049/50, with a range of 1.3% to 2.7% of income under the low and high wage growth assumption. Under the scenario with the highest bill (environmental challenges) this could rise to 2.9% of the median income by 2049/50, with a range of 2.0% to 4.3%.

In the core pathway, Essex and Suffolk water only bills grow broadly in line with wages and remain at around 0.7% of the median income over the period under the average wage growth assumption. If wage growth diverges from the average, then bills could be between 0.4% and 1.1% of median incomes in 2049/2050. Under the scenario with the highest bill (climate failure) bills could rise to 1.0% of median incomes, with a range of 0.6% to 1.6% of median incomes under the low and high wage growth assumptions.

The affordability challenge is greater in the North East because we expect to need to invest more on wastewater services, which we only provide in the North East, and because incomes have historically been lower and risen slower in the North East compared to in Essex and Suffolk.

FIGURE 202: CORE PATHWAY INVESTMENTS 2025 TO 2050 (INVESTMENT % OF TOTAL)



Potential solutions

This sort of long-term persistent increase in pressures on customers’ needs a multipronged approach to reduce the pressure of bills for the majority and provide focussed support for those still left in an untenable position.

Across these various investment areas, the vast majority are investments to meet statutory obligations that the business is being required to deliver including significant investment to reduce SO spills and improve the environment, to achieve net zero by 2050 and to ensure sustainable water supplies. We therefore do not consider there is much scope to remove the investments we have identified and as explored in the scenarios analysis, indeed there are other additional needs that may need further investment.

1. Minimise future investment requirements and increase efficiency

The first question is whether the investments that we have included in our analysis can be reduced, and so their impact on bills limited. Under our core pathway most of the investments relate to areas that we have little or no discretion over as they are driven by legislation.

Instead of removing issues from the list of problems we need to find solutions to save money, can we instead change the way we deliver the solutions? We have already included some aggressive assumptions about productivity improvement in our forecasting, but one way of potentially reducing these costs is to further

innovate and find alternative, cheaper solutions, or solutions that can be co-delivered with partners that can contribute financially. Box 5 gives one example of how we are doing this - through the development of the National Underground Asset Register.

Box 5: Revolutionary register unveiled: transforming infrastructure management and keeping our workers safe

We were the first company to sign a national data-sharing agreement that sees existing data on underground pipes and cables brought together in one single, digital map. NUAR (the National Underground Asset Register) displays where electricity and phone cables, and water and gas pipes are buried, helping to keep utility workers safe and saving the UK economy billions of pounds.

Developed at our 2017 Innovation Festival, the comprehensive database serves as a centralised information system that provides accurate data about the location, type, and condition of underground assets. This information is crucial for effective infrastructure planning, maintenance, and avoiding accidental damages during construction or excavation projects and is now being delivered on a national scale after being adopted by the UK Government.

In 2018 alone, we spent over £1M repairing pipes that had been damaged by third parties, and it's estimated that the cost to the UK's economy of accidental strikes on underground assets is £2.4bn a year. NUAR has been live in our North East operational area since April 2023.

Once fully operational across England, Wales and Northern Ireland, it will help improve efficiencies in construction and development, reduce disruption to the public and businesses from extended road closures and congestion, and is envisaged to deliver at least £350 million economic growth per year.

The register is one of our best examples of what can happen when we become more open with data, providing us with a consistent, interactive digital map of buried asset data, which will be refreshed and kept up to date.

For more information on NUAR, [click here](#).

One key area of investment is on reducing the harm caused by storm overflows. Alongside our own activities there are actions that others could take to address existing issues or reduce future pressure on the drainage system.

Enabling flood defence schemes to work in partnership with water companies so that we can address flooding and storm overflows together – and so more efficiently – can also help. We are at the forefront of this

collaborative approach and have an instrumental role in the Northumbrian Integrated Drainage Partnership, which aims to do just that.

We will continue to seek further opportunities in this space to reduce costs, but we do not consider that this alone will solve the growing affordability issue given the scale of the investment required.

2. Maximise offsetting income

An additional solution to reducing costs is to increase the income that we receive from other sources that can be used to offset rising costs. We already generate income where we can from byproducts of our business. We were the first and still the only water company to use 100% of our sewage sludge to generate biogas, which we maximise value from by injecting the biogas onto the national gas grid. We are exploring the possibility of importing bioresources from neighbouring wastewater companies to make most efficient use of our assets and so reduce costs and increase income.

As markets develop for ecosystem services such as biodiversity and nutrient reductions, we can create opportunities to reduce our costs by purchasing credits to meet our obligations where it is more efficient to do so and generate income that can be used to offset our costs where possible.

We have not yet included increased income from alternative sources in our scenario analysis as this is difficult to scale but this may help bring long-term bills down.

3. Social tariffs and affordability support

Social tariffs and affordability support can help to reduce affordability issues for the worst off in society even if overall bills are rising. Our analysis shows that even in low-cost scenarios, bills could be equivalent to over 5% of the median income by 2050.

We already operate a successful social tariff that seeks to support those on low incomes through a wide range of initiatives and partnerships. However, as social tariffs are paid for by our customers, we need customer support to extend these further.

We would welcome the introduction of a national social tariff as has previously been debated at the 5% income level.

If we are to ensure bills remain affordable then maximising the role for social tariffs and affordability support will be even more important. As more of our customers move on to metered tariffs, how we incentivise the right behaviours while protecting for adversely affected groups will become more important.

Affordability support could additionally be provided through incentives for customers to change their behaviour in a way that helps them to reduce their bills and at the same time helps us. This could include incentives to instal water butts and remove impermeable paving, or innovative tariffs that encourage lower usage when water is scarcer.

While directly reducing the burden on bills is the most obvious way we can help, as pressure on affordability increases it will become even more important for us to continue to provide a complete package of support. We already offer a range of services, including helping customers access advice on debt and how to maximise their income for example from benefits. And we can help as individuals too – as one response to our draft Long-term strategy from a housing association noted, the demand for volunteer services such as foodbanks increases as affordability worsens, so continuing to support volunteering, as we do through our ‘just an hour’ initiative, can help those most in need.

4. Change the conversation about the value water

For the worst of in society, more targeted affordability support will be needed as bills rise to address the pressures on the environment of providing water and wastewater services. But it is not realistic for most customers to receive affordability support. Over the long-term as bills rise for everyone, including those on middle incomes, we will need to change the conversation about how water is valued.

When we spoke to customers about our Long-term strategy some expressed the view that ‘maybe water is too cheap’. The Environment Agency noted in their feedback that it is important for the sector to think about how we get a cultural shift to value water and the water environment in its entirety differently.

We can see now that the cost of providing fully sustainable water and wastewater services will be higher than customers are currently paying. Because of this more customers will get closer to spending 5% of their income on water and wastewater bills. We therefore need to work together with stakeholders across the sector to ensure that customers understand why and to change the conversation about the value of societal and environmental benefits. By doing so, we can garner customer support to invest where we need to and still provide help to those struggling most in society, so that no one is left behind.

A more affordable future

In summary the affordability challenge we see developing over the next 25 years is too great for one silver-bullet solution. We will need to take a multifaceted approach to bring down costs, generate offsetting income, support the most in need and deliver solutions in and beyond the water sector.

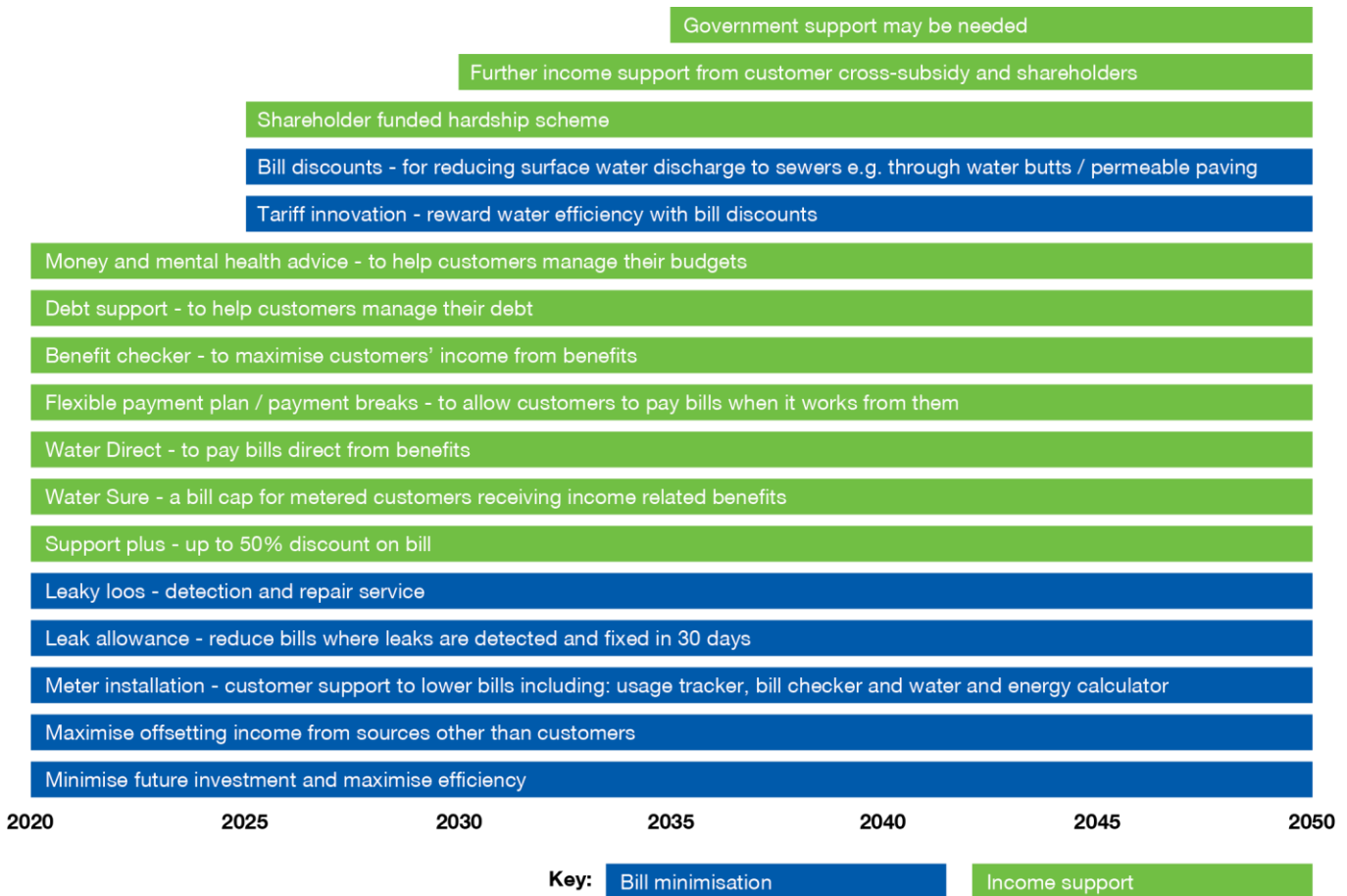
As shown in figure 22, we already offer a wide range of support to customers to minimise their bills, maximise their incomes and offer financial support to make their bills affordable. We are introducing additional financial support in 2025-30, as described in our Business Plan [Appendix A1: Customer Affordability](#) (NES02), which will see us expand our support for all customers with affordability challenges from c.£40m in the current period to c.£170m – a more than four-fold increase. We will also explore introducing bill discounts and tariff innovations to reward customers for reducing water consumption and the amount of surface water entering our sewers. We will implement these win-win changes where they can both lower bills and reduce our costs.

For the 2025-35 period we consider that we should be able to maintain affordability and eliminate water poverty at the 5% level with funding from customer cross subsidies and shareholder contributions supporting metering, social tariffs, and water efficiency / tariff innovation.

However, due to the level of investment we expect to need to make, from 2035 financial support from the government may be needed to keep our customers out of water poverty under CCW's 5% definition. There is precedence for this – South West Water's customers have received a £50 per year reduction in their bill paid for by the government since April 2013⁷ as they have faced higher bills than in other parts of England and Wales.

⁷ See: [South West Water customers to receive £50 off their water bills - GOV.UK \(www.gov.uk\)](#) and [The £50 reduction \(southwestwater.co.uk\)](#)

FIGURE 213: EVOLUTION OF AFFORDABILITY SUPPORT TO 2050



Affordability for non-household customers

Since the opening of the business retail water market, non-household customers have been billed by their water retailer, with licensed retailers buying wholesale water services from us. Although we no longer have a direct billing relationship with non-household customers, we recognise that the increase in investment needed over the long-term will impact on affordability for these customers as well. In the near term, our plans for PR24 will support affordability for these customers by expanding our smart metering and water efficiency programmes as discussed in our Business Plan [Appendix A1: Customer affordability](#) (NES02).

Over the long-term progress towards delivering our long-term target to reduce non-household demand by 9% by 2038 through the provision of water efficiency advice and support will help these customers manage upward pressure on their bills. Larger customers may have more flexibility to respond to increasing prices by reducing their consumption and so affordability is a lower concern for these customers. Smaller customers that potentially have less flexibility to significantly reduce their demand, for example small independent retailers,

may face greater affordability challenges in future. We will work with non-household retailers to understand the impact of rising bills and provide appropriate support.

4.5. FINANCING DELIVERY OF THE STRATEGY

Both the core pathway and all the alternatives we have developed show a significant step up in the investment from what the sector has made in the past. This is largely driven by new statutory requirements.

Significant new capital will need to be raised from both equity and debt investors. Historically most of the new investment requirements in the sector and for us have been financed by new debt borrowings – this has been possible because the levels of investment have generally been much lower than our forecasts suggest will be required in the future and we have been able to raise that finance whilst maintaining a resilient financing structure with a good credit rating and gearing at or below 70% (which is close to the average for the sector).

Since the publication of ‘[Shaping our future: developing our long-term strategy 2025-2050](#)’ (NES_LTDS3), recognising the scale of the investment and affordability challenge, we have worked to reduce the investment needed under the core pathway.

If this significant step up in the investment requirements is seen in the future, then investment will be needed from both equity and debt financing on a much greater level as it will not be matched by such a significant step up in revenues from bills.

TABLE 10: CORE PATHWAY HISTORICAL AND FUTURE CAPEX FORECASTS FROM 2010-15 TO 2045-2050⁸

£m, 22/23p	2010-15	2015-20	2020-25	2025-30	2030-35	2035-40	2040-45	2045-50
Enhancements	520	252	429	2,616	2,265	2,503	2,683	2,568
Base	1,050	1,065	1,186	985	960	983	1,008	1,035
Total capex	1,570	1,317	1,615	3,600	3,225	3,486	3,692	3,603

⁸ Increases in asset maintenance expenditure are included in enhancements in our Long-term strategy and in these figures.

The sector has a long-track record of raising debt finance successfully. Provided there is a stable policy environment, predictable and sensible regulation, and a fair return for investors – who often have global choices – we don’t envisage any problems raising more debt finance under the proposed model.

Table 111 provides some indicative analysis of the level of equity financing required to deliver such a significant step up in investment whilst retaining a resilient financial structure with gearing levels remaining around 70% (their current levels). We start with the capital investment that emerges from the totex scenario modelling we have used in this long-term delivery strategy (A) this is subtracted from the depreciation revenue that we would receive from customers in their bills (B) to arrive at a funding gap (C). To retain a gearing level of 70% we assume that 30% of that gap would need to be funded by new equity (D) with the remainder financed through new debt. We assume a base dividend yield of 4% consistent with Ofwat’s expectations from the last regulatory price determination, this is slightly higher than current distributions of around 3% and at the bottom end of returns when compared to other regulated infrastructure sectors. The final row provides a net position of equity cash out versus cash in where ‘negative’ highlights that during that period the net investment made by investors is less than the returns earned and ‘positive’ implies that returns are greater than equity invested.

TABLE 11: INDICATIVE ANALYSIS OF LONG-TERM FINANCING REQUIREMENTS

£m, 22/23p	Formula	2025-30	2030-35	2035-40	2040-45	2045-50
Capex	A	3,600	3,225	3,486	3,692	3,603
Depreciation Revenue	B	1,235	1,680	2,001	2,306	2,575
Funding gap (Capex less Depcn)	C = A – B	2,365	1,545	1,486	1,385	1,028
30% Equity funding injection	D = 30% * C	710	464	446	416	308
RCV at end of AMP	E = (E-1) + C	7,524	9,069	10,555	11,940	12,969
Equity cash out less cash in		Negative	Positive	Positive	Positive	Positive

As we can see:

- The investment requirements are so large that significant new equity is required every five years for the whole of the 25-year period.

- Given the long lives of the assets being invested in it can take more than five years for the investor to make a return on their investment – and the return in the second five years is minimal.
- The table also shows the significant growth in the value of the underlying business which we measure using the Regulatory Capital Value (RCV), which is part of the return that equity investors get for their investment.

The analysis also implies a change to the nature of the returns investors could earn for their investment, and the balance between dividend yields and RCV growth. All these points raise questions about how this future investment programme could be financed.

There are several ways that these financing challenges could be addressed:

- In the first instance there may be opportunities to constrain the size of the investment programme, either by altering the ambition or finding more efficient ways of delivering our long-term targets.
- It may be possible to bring new equity investment in either into the current ownership of the company or through new financing models and competition for large and discrete investments. We will investigate whether these schemes, in particular for water resources, can be delivered through DPC wherever possible, as explored in supporting document [A6-01 'Assessment of projects for DPC eligibility at PR24'](#) (NES38).
- If the pay-back period is not investable then we could consider adjusting the period over which the investment is returned by accelerating revenues sooner, this would allow equity investors to receive a return on their investment faster making the opportunity more attractive but would raise customer bills and further exacerbate the significant affordability pressures we see. This would not involve customers paying any more money in their bills, but it would involve an intergenerational transfer between customer groups with current bill payers generally paying more than those in the future.
- We could soften the level of financial resilience that we think would be needed. We wouldn't advocate this, but it is an approach that could be taken.

We have explored three different scenarios. In the first future investment requirements under the core scenario are reduced by 25% either through efficiency or through delivering the investments through other parties. In the second we adjust the pay-back period to deliver the investment over 20 years rather than the life of the assets and under the final scenario we relax the gearing position from 70% to 80% allowing more of the investment to be delivered from debt finance.

Across these three financing scenarios we observe:

- Scaling back the capex by 25% reduces the overall equity requirement and increases the equity cash positivity in the second five year period. Total Equity injection falls by £0.7bn.
- Accelerating depreciation to 20 years reduces the overall equity requirement and increases the equity cash positivity in the second five year period. Total Equity injection falls by £0.7bn.
- Assuming higher gearing of 80% reduces the overall equity requirement but reduces equity cash positivity in the second five year period. Total Equity injection falls by £0.8bn.

Additional debt will need to be raised, although there are limits on how much investment can be funded in this way due to the restraint on gearing. Higher interest rates will also increase the cost of debt.

If all three scenarios are used in combination, then this not only reduces the equity requirement significantly but also lowers the equity cash negativity in the first five years.

Our Board places a strong focus on maintaining long-term financial resilience, and we maintain a detailed five-year plan that is updated regularly and formally reviewed by the Board annually. This is underpinned by a commitment to maintaining an investment grade credit rating, as assessed by independent credit rating agencies Moody's and Standard & Poor's. We also stress test our plans against our most significant risks and uncertainties, currently for a period of eight years (to the end of March 2030).

Our financial resilience has been tested and delivered as intended through recent world events and uncertainty. For example, we have been able to manage the impacts both of Covid-19 and the significant increases in power and chemical costs during 2022 resulting from the war in Ukraine.

4.6. INVESTMENT IDENTIFIED FOR PR24

Our Business Plan for 2025-30 delivers the first five years of our Long-term strategy and is aligned with our core pathway. We are implementing the strategy through the period by embedding adaptive planning into the way we operate.

Ensuring investment aligns with the core pathway

We have tested each of our business cases for enhancement expenditure for 2025-30 to make sure they are all necessary parts of delivering our Long-term strategy. As we set out in our Business Plan appendix [A3: Costs](#) (NES04), each business case for enhancement expenditure must satisfy a set of criteria to be deemed either as low or no regrets or enabling investment. These criteria are derived from Ofwat's guidance: '[PR24 and beyond: Final guidance on long term delivery strategies](#)', April 2022.

To qualify as low or no regrets, the investment must be needed:

- To meet statutory requirements in the short term.
- Under both the benign and adverse Ofwat common reference scenarios for one or more of climate change, water demand, technology or abstraction reduction.
- To meet Ofwat's high common reference scenario for water demand.
- Only under the adverse Ofwat common reference scenario for climate change, water demand, technology and/or abstraction reduction but construction must start during 2025-30 for it to be completed in time and there is no efficient option to keep alternative future options open instead.
- Or across a wide range of plausible scenarios considered in our LTS.

To qualify as enabling, the investment must be needed:

- To keep options needed to meet more adverse future scenarios open.
- Or to ensure future options do not become significantly more expensive.

In addition, where we are not legally obliged to deliver investment by 2030, the phasing of the investment needs to support deliverability and affordability over the long term for us to consider it to be consistent with our Long-term strategy.

Adaptive planning

We have developed our own adaptive planning principles and are embedding them across our strategic and tactical planning teams (see Box 1: Adaptive planning approach). By doing so, the decision points identified in our adaptive planning approach are being built into our operational plans. This will facilitate the right people

and teams gathering the information they need to monitor issues continuously and make decisions at the time that they are needed to enact our adaptive plans.

Phasing of investment in 2025-30

The current economic conditions are very tough, and we recognise that customers feel the effects of rising costs and some struggle to pay their bills. This is why we have challenged ourselves to identify what investment could be delayed helping with affordability pressures.

Our affordability focus scenario in '[Shaping our future: developing our long-term strategy 2025-2050](#)' (NES_LTDS3) considered delaying investments in asset health, climate adaptation, net zero, lead and storm overflows to achieve bill reductions.

We will in future need to catch up on any investments that have been delayed; they cannot be avoided. As such, delaying investments provides temporary bill relief but will result in bill increases in the future. It may also be more difficult to procure new water supply schemes in the future due to more competition for infrastructure projects. This may lead to further bill increases.

We are not proposing to delay or accelerate investment in storm overflow discharge reductions relative to our core scenario in our Business Plan for 2025-30.

Our customers have however told us that they did not support the enhancement investment we proposed for net zero in 2025-30. We have therefore not included enhancement expenditure for 2025-30 in our Business Plan. We have instead adjusted our investment pathways for delivering net zero, but remain on the central, core pathway to deliver net zero by 2050 in our Business Plan.

As requested by Defra, we have proposed phasing for the following investments from 2025-30 into 2030-35 to the Environment Agency:

- Monitoring of emergency overflow operation on network sewage pumping stations.
- Septic tank secondary treatment.

The phasing of this investment is discussed in the relevant business cases in our 2025-30 Business Plan: [A3-16 Enhancement case WWN - WINEP monitoring](#) (NES30) and [A3-17 Enhancement case WWN - WINEP septic tanks](#) (NES31).

5. FOUNDATIONS

5.1. ASSUMPTIONS AND UNCERTAINTIES

We have built our Long-term strategy on a solid foundation of robust assumptions and an assessment of future uncertainties that allow us to plan for and adapt to a range of possible futures.

In this section we set out the key areas where we consider there to be uncertainty and the assumptions we have made. Further details for each scenario can be found in [Annex 2: Plausible futures scenario analysis](#), [Annex 3: Common reference scenario analysis](#) (NES_LTDS1) and the [Long-term strategy model](#) (NES_LTDS9).

Economic determinants

We are currently experiencing a period of inflation higher than we have seen in 30 years, against a backdrop of heightened geopolitical uncertainty. How national and global economic conditions evolve, and how this impacts our strategy is a key area of uncertainty.

Under our core pathway, we assume that key economic indicators including inflation and economic growth in the UK follow the Office of Budget Responsibility's (OBR) forecasts.

TABLE 12: OBR LONG-TERM ECONOMIC DETERMINANTS

AVERAGE	2025-30	2030-35	2035-40	2040-45	2045-50
Real GDP growth	1.98	1.82	1.8	1.66	1.54
Nominal GDP growth	3.7	4.14	4.14	4	3.86
Real GDP per capita growth	1.64	1.52	1.56	1.44	1.3
Average earnings growth	2.68	3.7	3.78	3.8	3.8
CPI	1.3	2	2	2	2
RPI*	2.44	2	2	2	2
RPIX*	2.36	2	2	2	2

*The ONS announced that RPI will in effect be discontinued in 2030 when the methodology will be aligned precisely with CPIH. While the OBR develop their CPIH forecast, as an interim assumption RPI and RPIX are both assumed to grow in line with CPI at 2 per cent from 2030-31 and for simplicity the change is assumed to occur at the start of the fiscal year. Source: [Supplementary forecast information release: Long-term economic determinants – March 2023](#)

Deviations from these assumptions are an important aspect of future variation we explore in our scenario analysis. Rather than making specific assumptions about how economic growth or inflation may vary from the core pathway, we define these aspects of our scenarios in a qualitative way and then quantify the impact on our strategy in terms of changes in the investments we need to make and the cost of those investments.

We have adopted this approach as it avoids the need to make detailed quantitative assumptions, for example about how economic growth would impact the relative cost of green versus grey infrastructure. These assumptions would likely be spurious and potentially internally inconsistent with, for example, the assumptions that have been made by local authorities about population growth, which is used to inform our demand assumptions.

We have conducted all our analysis for the Long-term strategy in real terms – that is with the effects of inflation stripped out. This makes comparison of data over time more straightforward and allows direct comparison with our business plan, which is presented on the same basis – in CPIH financial year average 2022/23 prices. However, there are two areas where the impact of inflation is accounted for.

The first is that, in line with our PR24 Business Plan, we have included an adjustment for the real price effects of labour costs. Over the long-term, labour costs tend to increase relative to other costs, and so the share of costs that labour accounts for increase. We have made an adjustment to base costs in our modelling to account for this. As identified in [Appendix A3: Costs](#) (NES04), for power, chemicals and plant and materials we have not identified a long-term trend in a difference between inflation and these prices, however significant variance is observed. We have therefore not included an adjustment for these in the Long-term strategy but note that this is an area of uncertainty that without appropriate true-ups creates an additional risk for us. We have not modelled how this risk would vary over different scenarios.

The second area inflation can have a significant impact is in relation to affordability, as inflation erodes real wage growth. It is therefore important that we consider a range of real (inflation adjusted) wage growth scenarios. For consistency, we have used the OBR's forecasts of average earnings growth to calculate the adjustment for real price effects for labour. However, as discussed in section [4.4: Maintaining affordability for customers](#), we have used historical ASHE data to develop real wage profile scenarios. This analysis also enables us to consider the impact of regional wage growth and provides an empirical basis for developing a range for future real wages. These are presented for comparison in Table 13.

TABLE 13: REAL WAGE ASSUMPTIONS

SCENARIO	ASSUMED AVERAGE REAL WAGE GROWTH RATE 2025-50		
	UK	NORTH EAST	SOUTH EAST
OBR forecasts	1.69%	N/A	N/A
ASHE – average 1999 -2021	0.7%	0.5%	0.7%
High: ASHE – average highest 50% of years 1999 - 2021	2.2%	1.8%	2.3%
Low: ASHE – average lowest 50% of years 1999 - 2021	-0.8%	-0.8%	-0.9%

Source: [Supplementary forecast information release: Long-term economic determinants – March 2023, Annual Survey of Hours and Earnings time series of selected estimates - Office for National Statistics](#), June 2022.

Long-term finance

We have used our view of the 2025-30 cost of capital in our modelling. We evidence why we think this weighted average cost of capital (WACC) is required in Business Plan appendix [A5: Risk and return](#) (NES06).

We have made the simplifying assumption that this rate applies to all future years to 2050. We would expect the cost of capital to fluctuate over the long term to reflect changes in financial markets. However, we consider assessing this variability is beyond the scope of this iteration of our Long-term strategy.

As discussed in [section 4.5: Financing delivery of the strategy](#), we are exploring the impact of future capital investment requirements on our ability to finance our business. There will remain uncertainty around the availability of capital in future financial markets, and the regulated rate of return available to investors.

We have assumed that Ofwat continues to set a 1% net margin for household retail price controls.

Customer priorities and behaviour

Environmental issues and affordability are significantly more important to customers now than they have been in previous price reviews. And our work to understand future customers' preferences shows the environment may be even more important to them – they identified net zero and renewable energy as the most important target against a range of other priorities (see [NES LTDS8](#), p.4). This demonstrates the importance not just of

these current preferences, but also of continually monitoring preferences and the uncertainty around what future preferences will be.

As discussed in section [2.4: Aiming high](#) we have conducted a significant amount of research to understand current customer preferences, and have used this to inform the development of our scenarios for the Long-term strategy to understand potential trajectories of customer preferences – see [People Panels #2: Personas and scenarios \(April 2022\)](#) (NES_LTDS4) for more information on how we did this.

Our core scenario assumes that current customer preferences continue in the future. As a key uncertainty, we set out the most important aspects of customer preferences in each scenario where this differs from the core pathway.

Government and regulatory policy

We assume that the environmental and drinking water quality regulatory regimes remain broadly in their current forms. Our core pathway assumes that current legislation continues to be applied as set out in section [2.4: Aiming high](#).

We do not assume that legislation for the water sector changes between different scenarios, but the impact of it in terms of the investment does. For example, in the Sustainable future and Environmental challenges scenarios, we need to make significant investments to eliminate harm identified from persistent organic pollutants and anti-microbial resistance. In the Technological progress scenario, we instead assume that less potential harm from these issues is identified, and solutions are found that avoid the need for investment in the water sector, such as changes in product regulations that remove persistent organic pollutants from the market.

The economic regulatory regime is assumed to remain broadly in its current form as per Ofwat's guidance, with price reviews conducted by Ofwat every five years.

Partnership working and impact of other sectors

We describe in section [3.8: Key enablers for our investment](#) our well-established approach to working with partners to deliver. We assume in all scenarios that we will continue to apply and evolve our approach to deliver more for less for customers and the environment by working with partners.

As we scale up our investment programme to deliver against our future challenges, we will need to ensure our supply chain grows accordingly – which will require us to work with other sectors to develop the companies

that we depend on. We consider in our scenarios whether particular aspects of the scenario could make cooperation more or less difficult. We also consider whether we can assist other water companies by providing additional water supplies from the Kielder Reservoir.

Natural environment

The primary uncertainty around the natural environment we need to consider is the extent and impact of climate change. We account for this through our scenario analysis, backed up by modelling for both our WRMP for Essex & Suffolk and our Northern region, and in our DWMP.

The impact of climate change on our strategy is most obvious in three aspects. Firstly, more severe climate change will increase the pressure on our water resources, and so necessitate additional supply sources in our Essex & Suffolk region, as explored through our WRMP.

Secondly, more extreme weather will increase the pressure on our wastewater system, and so will require additional investment to deliver the same standards of service, in particular relating to flooding, as explored in our DWMP.

Thirdly, increases in climate change related extreme weather necessitate investment in the near term to improve resilience in particular in relation to power and flooding as demonstrated in [A3-18 Enhancement case WN and WWN - flooding and power resilience](#) (NES32).

We state for each scenario our assumptions around the extent of climate change and any other pertinent environmental assumptions.

Affordability and vulnerability

Affordability and vulnerability will be important across all scenarios. In our [draft Long-term strategy](#) (NES_LTDS3) we examined a scenario in which affordability was the main focus. For this revised strategy, we have removed this scenario and instead considered how we can ensure affordability across all scenarios, in section [4: Maintaining affordability for customers](#). Our affordability and inclusivity strategy builds on this to discuss our approach to affordability and inclusivity.

As affordability will depend on both the level of bills and the level of real incomes, we examine the impact of bills in all scenarios by stress testing against high- and low-income pathways in the detailed assessment for each scenario.

We have taken a top-down approach to estimating costs and bills. However, as consumption patterns change and in particular PCC and non-household demand fall, the impact on the individual customer will differ from that on the average customer. We will need to consider the balance between fixed and variable charges, and the role of tariff innovation. We have not modelled these impacts in this Long-term strategy. We will explore the best approach to minimise the impact on customers through our future work on tariff innovation.

Technology

We explore the impact on technology through Ofwat common reference scenarios, covered in [Annex 3: Common reference scenario analysis](#) (NES_LTDS1), and through specific assumptions for our scenarios covered in [Annex 2: Plausible futures scenario analysis](#) (NES_LTDS1). We have endeavoured to capture both a general impact of technology, through productivity growth – discussed below – and through specific technological shifts relevant to each scenario.

We cannot capture all the potential impacts of technology and interactions between technology and other scenario effects. For example, we will only understand the impact of climate change on different nature-based – and traditional solutions – through experience. So, although our scenarios capture a significant variance in technology, there will be aspects of change which we will not have captured here.

Supply chain

The ability of the supply chain to meet our needs will depend on several factors outside the scope of this strategy to examine – the size and type of investment requirements relative to other water companies and other sectors, the availability of labour and materials in the wider economy and the regulatory certainty that the scale and type of investment required, and so type of skills and expertise, will be maintained.

In section [3.8: Key enablers of our investment](#) we discuss the challenges that our supply chain will face and the actions we are already taking to grow the capability of our supply chain. We assume that under the core pathway the actions we describe will be sufficient to deliver our investment requirements. We qualitatively assess where supply chain challenges may be greater in the descriptions of our scenarios in [Annex 2: Plausible futures scenario analysis and Annex 3: Common reference scenario analysis](#) (NES_LTDS1).

Skills availability

The availability of the skills needed in the sector will be key, not just to deliver growing investment, but also to ensure the resilience of the sector to changing attitudes to work, which was explored in [ARUP's Scenarios & strategies Arup report](#) (NES_LTDS2). We assume in all scenarios that we can continue to attract and

develop the people and skills we need and set out in section [3.8: Key enablers of our investment](#) how we intend to do this.

Asset health and resilience

We explore the Level of sustainable long-term capital maintenance expenditure in section [3.9: Decision and trigger points](#), and our business case for increasing asset health expenditure ([A3-21 Base uplift case - asset health](#), NES35). The business case sets out the additional investment we consider is necessary in 2025-30.

Between the draft and final long term delivery strategies we have lowered the assumed increase in capital maintenance required in the core pathway to reflect a more conservative view, and instead explore the impact of higher requirements in alternative scenarios.

In our core pathway, we assume an increase in investment of 40% is needed relative to our modelled base costs for capital maintenance for 2029/30. In our alternative pathways we consider an increase of 80% or 123%. These are based on 50% of the low estimate, the low estimate and the high estimate of increases needed from WICS' assessment for its latest [Strategic Review of Charges SR21](#) for Scottish Water, as discussed in [A3-21 Base uplift case - asset health](#), (NES35).

Innovation

The scope and scale of the challenges identified in this strategy mean that we will only be able to deliver in the long term if we can innovate successfully. Section [3.8: Key enablers for our investment](#) discusses our mature approach to innovation. We consider the impact of realising or not opportunities to innovate through our scenario assumptions, for example considering whether alternative solutions to dealing with microplastics can be found to avoid the need to incinerate sludge.

Cost efficiency

There is inherent uncertainty around the level of productivity improvements we can deliver in future. We commissioned Economic Insight to provide a report on '[Productivity and Frontier Shift at PR24](#)'. (NES73) so we could better understand the likely scale of ongoing efficiency improvements.

FIGURE 22: SUMMARY OF ECONOMIC INSIGHT ONGOING EFFICIENCY ESTIMATES

	Plausible range		PR24 focused range		Sensitivity analysis range	
	Low	High	Low	High	Low	High
Frontier shift estimate	0.3%	0.8%	0.3%	0.7%	0.1%	1.1%
Time period	2010-2019	1970-2007	2010-2019	Weighted average of: 1970-2007; and 1995-2019	2010-2019	1970-2007
Comparators	Preferred set	Preferred set	Preferred set	Preferred set	Sensitivity 1 ⁷	Sensitivity 3 ⁸

Source: Economic Insight analysis of EU KLEMS data

Considering this report, and regulatory precedent – discussed in [Appendix A3 - Costs](#) (NES04) – we have set our ambition of delivering an annual efficiency improvement of 0.8% in 2025-30. We assume that we can continue to deliver this level of improvement over the next 25 years in our core pathway.

As there is uncertainty around delivery of this level of efficiency improvement, we consider the low value from Economic Insight’s plausible range (0.3%) and, as we are already setting our ambition at the value of the plausible range, we use the high value from the sensitivity range (1.1%) as the upper bound. We specify for each scenario whether we vary the assumption from the core pathway level of productivity improvement.

Delivering Net Zero

One of the five key areas of investment we consider in this strategy is that needed to deliver Net Zero. The pace of delivery, and the cost of delivery is an area of considerable uncertainty. As we discussed in [‘Regulating for the long term: completing Emission Possible’](#), July 2022, there remains uncertainty around the scale of scope 3 emissions in particular.

Our near-term strategy to deliver net zero is to focus on reducing operational emissions that we have a high degree of certainty around and to increase the robustness of the measurement of those emissions we currently have a low degree of certainty around. We have also considered the technologies Jacobs identified in its [‘Net](#)

[Zero Technology Review](#), August 2022. This is discussed in [Annex 5: Review of Net Zero technologies](#) (NES_LTDS1).

There are many variables around which uncertainty exists for net zero. For the purposes of our scenario analysis, we have considered varying the speed at which we decarbonise, and tried to account for the differences in technological progress Ofwat has specified in its technology scenarios. We have carried out a detailed assessment of possible interventions to arrive at the costs of decarbonising the core pathway under these alternative assumptions. We have then used these costs to estimate a proxy additional cost of decarbonising further enhancement expenditure under alternative pathways.

The costs, and emissions reductions delivered for our core pathway, accelerated, and delayed decarbonisation pathways are presented in Table 14. The accelerated pathway captures the assumptions under Ofwat’s benign technology scenario, and the delayed pathway covers the adverse technology scenario.

TABLE 14: INVESTMENT TO DELIVER NET ZERO

TOTAL INVESTMENT TO DELIVER NET ZERO		TOTAL (£M)	TOTAL EMISSIONS AVOIDED (TCO2E)	RATE
			2025-50	(£/TCO2E)
Accelerated	Water	798	2,644,595	302
	Wastewater	1193	4,917,227	243
Core	Water	779	2,683,255	290
	Wastewater	1284	5,226,791	246
Delayed	Water	709	2,529,661	280
	Wastewater	1197	4,854,187	247

The total avoided emissions are highest in the core pathway. In this pathway, capital has not been decarbonised, and so our interventions contribute to a greater reduction in emissions in this pathway.

In the accelerated pathway in contrast, the assumed equalisation of costs between traditional and zero carbon construction techniques from 2035/36 specified by the Ofwat scenario means that we do not need to intervene to reduce capital emissions to the same extent, so the emissions avoided by our actions are lower.

In the delayed pathway, we simply decarbonise slower and therefore avoided emissions are less over the period.

There are several other areas of uncertainty that are worthy of further investigation in relation to net zero, including:

- The level of scope 3 emissions that need to be reduced.
- The role of emissions reduction markets.
- The extent technology will enable process emissions to be eliminated.

In the near term, we consider that a strategic planning framework is needed to establish in more detail the steps required to deliver net zero in the water sector. We discuss this further in [Section 7: Next Steps](#).

5.2. PERFORMANCE IMPROVEMENTS FROM BASE EXPENDITURE

Our base funding allowances are set to enable delivery of our business-as-usual activities. These allowances should therefore enable us to continue to deliver the same level of service in absolute terms⁹, where that level of service has been historically funded through our base cost allowances.¹⁰ For some areas, improvements in service will be possible from base expenditure, while in others further investment will be required.

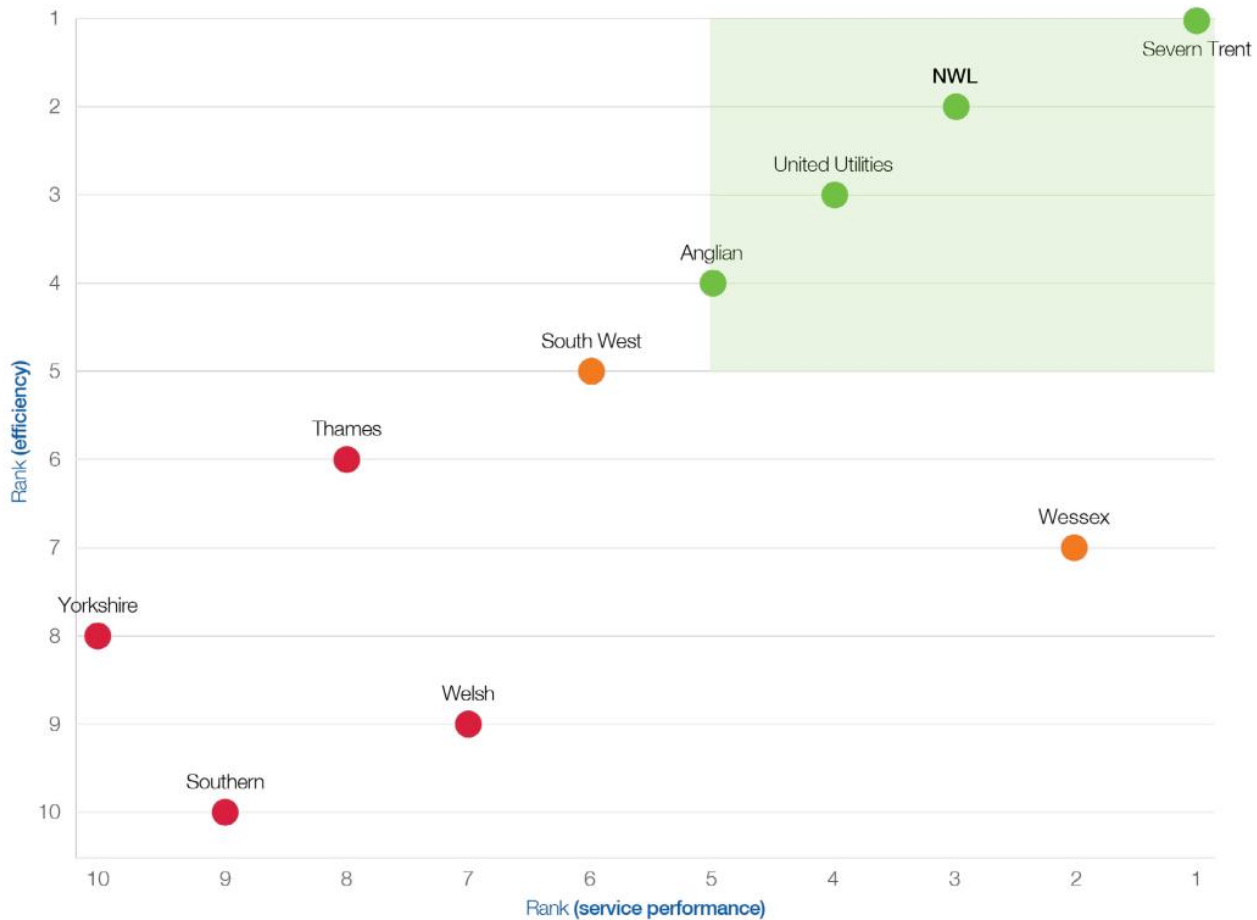
Our vision is to be the national leader in the provision of sustainable water and wastewater services (see [section 2.1](#) Setting our Purpose, Vision, and Values). This means that we would expect to make improvements from base expenditure if others can achieve this through innovation or efficiency. However, base expenditure isn't sufficient for any water company to be in the upper quartile on costs and outcomes for all services – and so sometimes enhancement expenditure is required.

Figure 25 shows that we are among the top companies in the sector for both efficiency and service performance.

⁹ For example, the absolute level of phosphorous load in wastewater returned to the natural environment. Where regulatory requirements change, for example the tightening of environmental permits, additional enhancement funding would be required to maintain permit compliance even though base costs would maintain the absolute level of phosphorous discharged.

¹⁰ Some areas of service, for example our reduction in greenhouse gas emissions are funded through alternative routes, such as through outcome delivery incentives, and so the existing level of service is not fully funded through existing base cost allowances.

FIGURE 23: OUR COST EFFICIENCY AND SERVICE PERFORMANCE PLACES US IN THE TOP 25% OF WATER AND SEWERAGE COMPANIES



Our outcomes fall into three categories:

1. Outcomes we can improve from base costs.
2. Outcomes where some level of service is covered by strategic planning frameworks (particularly WRMP, DWMP and WINEP) and so where enhancement expenditure will be funded through investment identified through these.
3. Outcomes that require additional funding to deliver improvements, but where there are no existing strategic planning frameworks to identify and require funding for enhancement expenditure.

TABLE 15: OUTCOMES WHERE IMPROVEMENTS CAN BE DELIVERED FROM BASE COSTS

OUTCOME CATEGORY	OUTCOMES
Outcomes we can improve from base costs	C-MeX, D-MeX, BR-MeX, CRI, Serious pollution incidents
Outcomes requiring enhancement expenditure covered by strategic planning frameworks	Leakage, PCC, NHH demand, Internal sewer flooding, external sewer flooding, Bathing water quality, River water quality, Storm overflows,
Outcomes requiring enhancement expenditure not covered by strategic planning frameworks	Water supply interruptions, Water quality contacts, biodiversity, greenhouse gas emissions (water and wastewater), Total pollution incidents, Mains repairs, Unplanned outages, Sewer collapses

For the first category, we would expect to deliver improvements, including long-term targets, from base expenditure.

For the second category we identify additional enhancement investment needed to deliver these outcomes in this Long-term strategy. Often this is investment that is specifically to enable delivery of these outcomes. We also identify additional enhancement investment needed to deliver the third category of outcomes in this Long-term strategy. However, these investments will often relate to multiple outcomes, and not be as directed by existing strategic planning frameworks. For example, we would expect our interruptions to supply outcome performance to improve because of increasing asset health investment. But this investment is also for – and not separable from – delivery of resilience and other outcomes.

We set out in [Annex 4: Delivering our goals – our performance commitments](#) (NES_LTDS1) our expected outcome performance from base expenditure under the core pathway.

Delivery of long-term outcomes

Our strategy aims to deliver our outcomes and our long-term targets in the long-term. However, under some scenarios some long-term outcomes may be more at risk or will not be delivered.

We set out our expected performance against our PR24 performance commitments in the core pathway over the long term in [Annex 4: Delivering our goals – our performance commitments](#) (NES_LTDS1). We set out in [Annex 2: Plausible future scenario analysis and Annex 3: Common reference scenario analysis](#) (NES_LTDS1) what we expect the impact of the scenario on delivery of our long-term outcomes and targets would be.

5.3. PROBABILITY ASSESSMENT OF SCENARIOS

Our strategy will enable us to deliver against a range of possible futures by giving us the tools to adapt to whichever possible future comes to pass.

The core pathway is the right course of action for the 2025-30 period. However, it excludes some key investment – notably in water resources – where decisions will need to be made in future about the appropriate investments. We therefore consider it likely we will deviate from the core pathway in future.

The Ofwat common reference scenarios are helpful because they isolate the impact of a single important issue. However, as they only consider one aspect of deviation from the core pathway, we do not consider these are plausible scenarios – and so assume these scenarios have an immaterial probability of occurring.

We developed our plausible futures scenarios to consider a broader range of representative futures. But they will not cover all possible eventualities.

To identify a numerical probability for each of these scenarios as Ofwat has requested, we make the following assumptions:

- Our five plausible futures scenarios collectively represent 75% of all possible futures.
- None of the scenarios we consider has a less than 5% probability of being realised, otherwise they would be excluded from this analysis.
- The scenarios can be ranked in order of probability of occurring,
- Each scenario is 5% more probable than the one ranked below it.

On this basis we ascribe the following probabilities to our plausible futures scenarios:

- Climate failure: 25%
- Environmental challenges: 20%
- Regional growth: 15%
- Technological advance: 10%
- Sustainable future: 5%

We consider climate failure to be the most likely of our scenarios because of the scale of the coordination challenge – and financial challenge – of achieving the global greenhouse gas emissions reductions needed to avoid the worst impacts of climate change. The impact of the failure to do so would result in hard choices being

needed between what services to prioritise as set out in this scenario. Applying the same reasoning to the sustainable future scenario leads us to consider this to be the least likely scenario.

We rank environment challenges as the next most likely scenario as the environmental issues that are identified in this scenario are already known about, the question is the scale of interventions needed both within and beyond the water sector to address the challenges such as anti-microbial resistance, persistent organic pollutants and microplastics.

Both the regional growth and technological advance scenarios offer a more optimistic view of the future. We consider the regional growth scenario to be a more probable outcome due to the existing political rhetoric about supporting the regions, and the Northern Powerhouse in particular. Technological advance in contrast would require a level of technological progress that is beyond what has been achieved in recent years – at least in terms of total factor productivity growth.

We have not attempted to derive probabilities for the likelihood of needing to take any one alternative pathway over another for the 14 decision points. To do so would ascribe a spurious level of accuracy to our ability to predict the future. However, we consider in the general case that all the alternative pathways we have identified are plausible and so consider that each has a probability of at least 5% of occurring. And similarly, we do not consider any of the choices are certain. Therefore it is reasonable to say that each alternative pathway has a probability of 5% - 95% of occurring.

6. BOARD ASSURANCE STATEMENT

The Board has worked with the company throughout the development of the Long-term strategy to provide appropriate challenge and satisfy ourselves that the strategy is the best it can be and that it satisfies the requirements set by Ofwat.

The Board has received external assurance on the Long-term strategy from Martin Hurst – an independent expert. The Water Forum has also provided challenge on some aspects of the Long-term strategy relating to customer engagement and long-term outcomes.

The Board has discussed the Long-term strategy through our ongoing Board engagement process. Our Board formed a dedicated PR24 Board sub-group to provide integrated support to both the Board and management in driving forward and assuring preparation of our PR24 Business Plan. All our independent non-executive directors sit on this group, as do some other Board members and the relevant executive team members. This sub-group met 16 times from July 2021 through to August 2023. The Board sub-group's role was to:

- Make sure that the governance and assurance arrangements underpinning the preparation of the plan are robust and comply fully with Ofwat's requirements for PR24.
- Provide early involvement in the strategic direction on all aspects of PR24.
- Resolve matters escalated from our Price Review Steering Group.
- Review progress against the PR24 project plan.
- Keep the Board fully informed of progress and of any material issues.

The PR24 Board sub-group discussed detailed papers from the company's PR24 team to support them in reviewing and challenging the business plan and the Long-term strategy. The Board sub-group worked closely with our Executive Leadership Team and relevant senior managers, as well as with external assurance providers. The PR24 team provided regular updates on progress to the Board sub-group. Through both the Board sub-group and discussions with subsets of this group with relevant subject matter expertise, the Board has challenged our company's management and concluded that the final Long-term strategy is the best it can be. Table 16 sets out when, on what and how the Board has provided this challenge.

TABLE 16: PR24 BOARD SUB-GROUP DISCUSSIONS ON THE LONG-TERM STRATEGY

Month	What was discussed?
July 2021	BSG paper: PR24 strategy, including considering lessons learned from PR19 and the CMA appeal. BSG discussed future scenarios under the Long-term strategy to make sure we would have an agile plan.
October 2021	BSG paper: Discussion of work on initial development of long-term strategy including work done on issues identification and scenario development by ARUP and KPMG.
September to December 2021	Workshops: A subset of the Board sub-group attended a series of workshops to develop our long-term delivery strategy between September and December.
January 2022	BSG paper: Discussion of progress and proposed changes to the work to adapt to the methodology Ofwat consulted on for long term delivery strategies. The Board sub-group was invited to comment on the long-term targets and scenarios ahead of sign-off for wider consultation.
March 2022	BSG progress update: Progress update including commencement of customer engagement on long-term delivery strategy.
September 2022	BSG progress update: Progress update including innovation workshop to support Long-term strategy development.
January 2023	BSG paper: Final Ofwat methodology update. Paper on development of Long-term strategy to date, ahead of presentation to Ofwat 24 January 2023.
May 2023	BSG paper: Discussion of the draft Long-term strategy (NES_LTDS3) before its publication for consultation in June.
July 2023	BSG paper: Long-term strategy update – covering feedback from stakeholders and customers on our draft Long-term strategy. External assurance on the draft Long-term strategy from Martin Hurst.
August 2023	BSG paper: July plan report from Water Forum – discussed their feedback on our “silver book” – the second draft of the Business Plan, including coverage of Long-term strategy.
September 2023	BSG paper: Final approval of Long-term strategy and alignment between it and the Business Plan.

Table 17 shows how the Board has challenged and satisfied itself that Ofwat’s assurance requirements have been met.

TABLE 17: BOARD ASSURANCE ON THE LONG-TERM STRATEGY

Assurance requirement	Board response
Long-term vision and ambition	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy reflect a long-term vision and ambition that is shared by the Board and company management. The Board has challenged the development of our vision through the creation of Our Purpose. The Board challenged the initial target setting work that was supported by KMPG and ARUP that defines the long-term ambition and agreed the targets for the draft and final Long-term strategy. The Board has satisfied itself that the 2025-30 business plan implements the first five years of the Long-term strategy. This is supported by the Water Forum’s assessment that the 2030 targets show sufficient ambition to allow us to credibly meet our long-term targets as concluded in Martin Silcock’s analysis.</p>
High quality	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy is high quality and represents the best possible strategy to efficiently deliver the long-term goals and targets, given future uncertainties.</p> <p>The Long-term strategy is built on the results of the WRMP, DWMP and WINEP development. These in turn depend on the 25 Year Environment Plan, River Basin Management Plans, Flood Risk Management Plans, Drinking Water Safety Plans, Local Authority plans, Local Nature Recovery Strategies, Environmental Land management schemes and Shoreline Management Plans.</p> <p>The Board received advice from ARUP and KPMG to support the development of the Long-term strategy. The Board challenged the assumptions in the draft Long-term strategy and these were further tested with stakeholders and customers through our consultation. The Board received external assurance on the draft Long-term strategy from Martin Hurst. The Water Forum assessed that our 2030 targets show sufficient ambition to allow the company to credibly meet its long-term targets in Martin Silcock’s analysis to support the Water Forum.</p>
Statutory and licence obligations	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy will enable the company to meet its statutory and licence obligations now and in the future.</p> <p>We test that we are satisfying our statutory and licence obligations annually and provide an assurance statement with our annual performance report. For information on how the Board has assured this area, see Appendix A2: Data, information and assurance section 6.5 (NES03). Section 6.5.1 explains how we have tested our Business Plan and Long-term strategy against our legal obligations. Our Board has considered this at each stage (draft plan, ‘final’ plan, and then for the Board assurance statement). Ofwat must consider how its determination allows it to meet its own duties – and so we have described in section 6.5.2 why we think our plan allows Ofwat to meet its duties. We are also required to consider how we can facilitate the Secretary of States’ strategic priorities for Ofwat, which we explain in section 6.5.3.</p>

Adaptive planning principles	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy is based on adaptive planning principles.</p> <p>The Board sought external assurance of the strategy from Martin Hurst that it met Ofwat’s requirements. In response to this review, the final Long-term strategy includes our own explicit adaptive planning principles that are also included in our final WRMP and are being implemented through our internal governance arrangements.</p>
Customer engagement	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy has been informed by customer engagement.</p> <p>The results of the initial customer research and research carried out on our draft Long-term strategy have been shared with our BSG and Water Forum. The Water Forum has provided challenge to our approach to customer engagement and shared this challenge with the Board. The Board has satisfied itself that appropriate research has been undertaken and been reflected in the final Long-term strategy.</p>
Long-term affordability and fairness between current and future customers	<p>The Board has challenged the company and satisfied itself that the business plan and Long-term strategy secure long-term affordability and fairness between current and future customers.</p> <p>The Board has challenged and satisfied itself that the overall level of expenditure required over the long term is appropriate. The Board has challenged and satisfied itself that phasing of expenditure, including on storm overflows, net zero, nitrogen removal and the advanced WINEP to manage long-term affordability has been considered by the company and tested with customers where appropriate. Pre-acceptability testing included the consideration of the affordability focus pathway from our draft Long-term strategy, which customers did not support. The Board has satisfied itself that the company has reflected the results of this research and discussions with customers on the draft Long-term strategy about it being fair for people to pay for the benefits they get.</p>

We include the [Long-term strategy external assurance letter](#) (NES74) and the [Long-term strategy model assurance letter](#) (NES_LTDS10) as part of our submission.

7. NEXT STEPS

This Long-term strategy is a significant step along our journey to becoming the national leader. But we are not complacent and recognise there is more that we could do to improve our and the sector's strategic planning capability and to deliver our strategy.

The next steps following the publication of this Long-term strategy are threefold:

- Implementation of the first five years of the strategy.
- Monitoring of decision and trigger points and adaptive planning.
- Improving and developing our long-term adaptive planning approach.

Our PR24 Business Plan sets out how we intend to implement the first five years of this Long-term strategy. We will go through the price review process with Ofwat and will update our plans when final decisions are made by Ofwat and other regulators on elements of our plan where uncertainty remains, for example around investments to address nutrient neutrality and storm overflow discharge monitoring.

We describe in [section 3.11: Monitoring progress against the Long-term strategy](#) how we intend to monitor developments that will affect the key decision points identified in this strategy. Monitoring information and further embedding our adaptive planning process into our governance will enable us to deliver best value from the development of this Long-term strategy. And we will provide updates on progress against the long-term targets in our [annual performance report](#) (APR).

Finally, we must look to the future and how we can improve our long-term planning approach in future. We will conduct a lessons learnt review encompassing the development of our PR24 Business Plan, the Long-term strategy, the WRMP and DWMP processes to identify how we can run these even more effectively in future.

One of the key lessons that we have already identified from the development of this strategy is that our long-term strategic thinking is better developed in areas where we already have formal long-term planning approaches in place – the WRMP and DWMP. Our strategic understanding of the future investment needed in the other three major areas we have identified – resilience and asset health, net zero and lead replacement – is at an earlier stage of development.

We therefore consider that ahead of the next round of formally updated long-term delivery strategies for 2030-55 we should develop a sector wide approach to developing adaptive plans for these areas.

We consider that resilience, asset health and lead replacement would sit well together under a common planning framework. Combining these two areas of asset replacement would enable the sector to identify synergies and deliver improvements in the most efficient manner. The planning approach should also consider the potential for collaboration across sectors – by identifying where replacement of underground assets can be combined across utilities further efficiencies could be realised. This could be further supported through innovations such as the National Underground Assets Registry (NUAR) developed from our Innovation Festival.

In the near term, we consider that a strategic planning framework is needed to establish in more detail the steps required to deliver net zero in the water sector. We are already seeing over time an increased understanding and inclusion of greenhouse gas emissions reduction thinking in all our strategic planning frameworks. However, to achieve net zero we need to not only consider what can be done to reduce the impact of new assets on emissions, but also what changes are needed to existing assets, such as water and wastewater treatment works, to enable us to reach net zero.

We have made good progress on reducing operational emissions and already monitor this through our [Emission Possible](#) reporting. But process emissions (scope 1) and embedded emissions (scope 3) require further work at a sector level, and strategic plans at a company level to identify the most efficient way to deliver the required emissions reductions. This strategy too will require coordination with other utility sectors – energy in particular – to ensure that we develop an efficient and adaptive cross sector strategy.