
CLIMATE ADAPTATION REPORT

2024

NORTHUMBRIAN
WATER *living water*

ESSEX & SUFFOLK
WATER *living water*



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1. EXECUTIVE SUMMARY

Climate change presents one of the most pressing challenges of our time, with far-reaching impacts on temperatures, rainfall, sea levels, and extreme weather events.

As a provider of essential water and wastewater services, we are on the front line of these changes. This report outlines our approach for climate change adaptation, not only as a response to regulatory obligations but also to protect our communities and the environment.

Our Purpose as an essential service provider is at the heart of everything we do. We aim to deliver reliable and sustainable water and wastewater services while restoring and regenerating the environment we depend on. This Purpose guides our decisions, ensuring we address both the needs of our customers and the challenges of climate change.

Our climate adaptation efforts are embedded in our core business strategies, such as our **Long-term Strategy** and our **Environment Strategy**, which set out what we want to achieve by 2050. Adaptation is also a key component of our long-term plans, including our **Water Resource Management Plans (WRMPs)** and **Drainage and Wastewater Management Plans (DWMP)**.



This adaptation is then delivered through our Business Plans. We are coming to an end of our current **Business Plan (2020 – 2025)** and preparing to finalise and deliver our next **Business Plan (2025-2030)**. To inform this plan, we carried out an industry-leading analysis of climate risk and understanding of the vulnerabilities across our asset base.

Through the WRMPs, we are not only ensuring resilience but also working to reduce water consumption. We do this through smart metering, which will help us monitor and manage water usage more effectively, and by proactively engaging with customers to reduce their water use. In Essex and Suffolk, we face additional challenges: we will need to explore new water supplies and enhance the resilience of our infrastructure to leave more water in the environment, addressing both customer needs and environmental sustainability.

In our DWMP, we recognise the enormous investment required to meet the requirements of the **Government's Storm Overflow Discharge Reduction Plan**, particularly as changing rainfall patterns increase the pressure on our wastewater systems. This investment is critical to improving our infrastructure's ability to handle extreme weather events and protect our waterways.

In addition to long-term resilience, we are also focused on mitigating immediate risks from extreme weather. Events such as the 2023/24 storm season, which saw a record number of named storms, highlight the growing pressure on our infrastructure. In our Business Plan for 2025-30, we are securing resources to fortify our systems so that they can withstand increasingly frequent and severe weather events, ensuring continuity of service even under extreme conditions.

At the same time, we are committed to transforming our infrastructure for a lower carbon future. Our strategy increasingly emphasises nature-based solutions over traditional engineering approaches, aligning our operations with the UK's climate goals. This transformation supports not only decarbonisation but also enhances biodiversity and public value, helping to regenerate the natural environment alongside delivering core services.

However, the economic conditions facing our customers are challenging. Rising costs mean many households are struggling to pay their bills. In light of this, we face a difficult decision: whether to delay some near-term investments to relieve affordability pressures in the 2025-2030 period. Balancing the need for long-term resilience with short-term affordability is one of the most important decisions we must make.

While these decisions involve significant financial costs, we remain focused on keeping customer bills as manageable as possible while still investing in the future resilience of our services.

To achieve these goals, we have put in place robust governance structures and risk management frameworks. These ensure accountability, guide our investments, and incorporate feedback from our customers and stakeholders, whose input helps shape our strategies.

Our commitment to climate change adaptation is an ongoing journey. We will continue to invest in research and innovation, strengthen partnerships, and monitor emerging climate risks to ensure that our services, infrastructure, and the communities we serve are sustainable for generations to come.

This detailed report highlights our progress and sets the foundation for the future, as we strive to lead the way in addressing climate challenges.

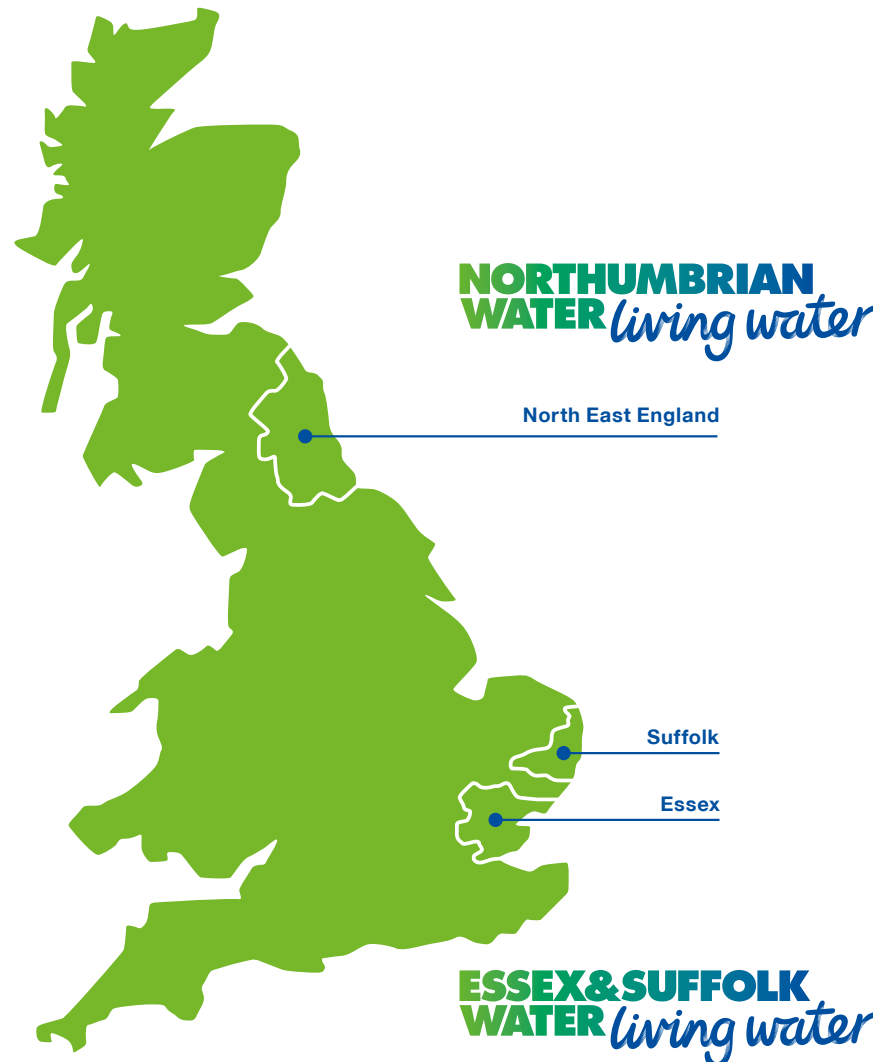
**A shorter, summary
version of this report
can be found here.**



The Cheviots, Northumberland

2. WHO WE ARE

We are privileged to operate across distinct regions of the country. Northumbrian Water provides both water and wastewater services (except for Hartlepool where we provide wastewater services only), while Essex & Suffolk Water provides water services only.



We serve a very diverse and large community across an equally diverse geographical area, from remote rural uplands to the fast-growing margins of urban areas. Climate risks are different across the UK, so we carried out research in 2022 to forecast how specific risks might affect different places.

This showed that wind storms and flooding are particularly high risks in the North East, and drought and temperature increases are particularly risks in Essex and Suffolk. The following sections illustrate this further.

It is important to recognise these differences between our operating areas, and the underlying resilience of our communities, landscapes, and the services we depend on. This helps us make sure that our activities to adapt to climate change are targeted, specific to the risks we are most likely to face, and as efficient as possible.

2.1. NORTHUMBRIAN WATER

Northumbrian Water operates in the North East of England. The major population centres we serve include Tyneside, Wearside, and Teesside, and we also serve large rural areas, such as Northumberland and County Durham. The North East is valued as the poorest of England's nine regions in terms of gross value added (GVA), meaning that supporting vulnerable customers and communities is particularly vital here.

This area of England is made up of diverse landscapes including the Northumberland coast and the hilly area of the Pennines, which rise over 600m and have a maximum altitude of 893m.

The climate in this region is classified as temperate maritime, characterised by mild summers and cool winters. The varied altitude produces diverse rainfall patterns; there is significant rainfall in the Pennines, with the average annual rainfall exceeding 1500mm in higher regions, while the east coast is one of the driest parts of the UK with less than 600mm of rainfall annually.

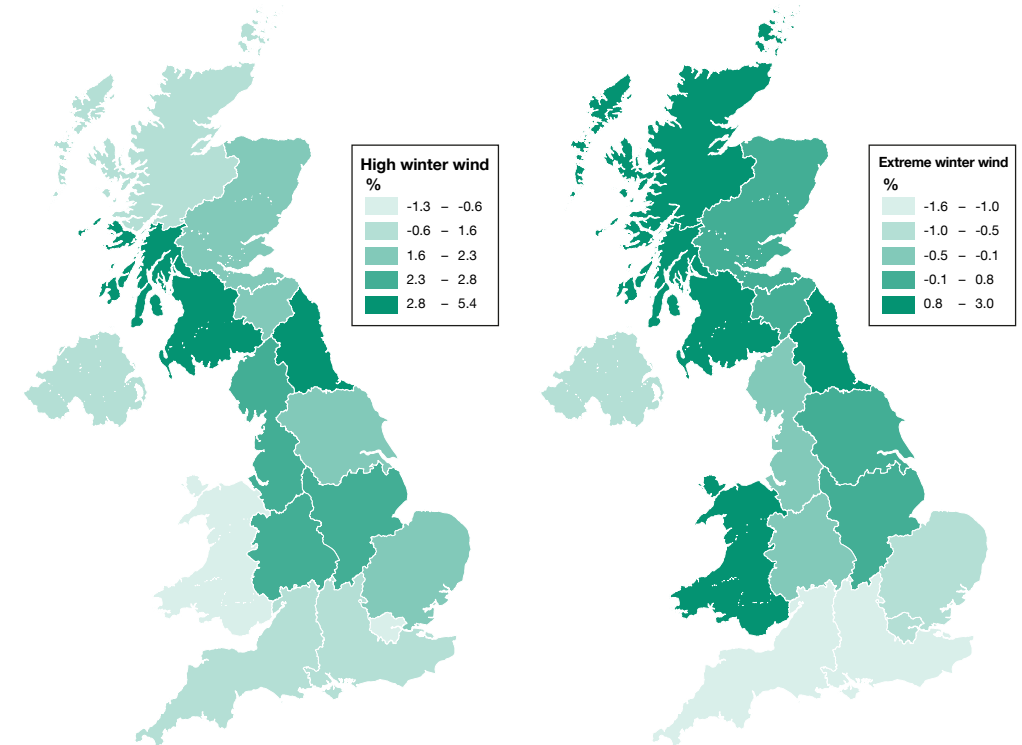
Rainfall in this region displays seasonal variation with most rain in autumn due to greater Atlantic depressions. The region's population is consistently increasing year-on-year, though at a lower rate than the England and Wales average.

Our climate change assessment in 2022 showed that wind storms are already affecting the North East more than any other part of the country. We have already seen large crisis events such as Storm Desmond (2015) and Storm Arwen (2021) already causing major disruption and power failures across our region. The assessment showed that weather patterns that created these storms are likely to become worse over time due to climate change. Due to the rural nature of the North East and lack of resilience in energy networks it means we need to invest more quickly. The Met Office reports that during the 2023/34 storm season, the UK had its most number of named storms since the system was launched in 2015. We must continue to prepare for extreme wind and increased winter rainfall, both in planning our network capacity and in protecting our sites and assets.

However, the North East is forecast to have less impact from temperature increases over time than areas in the south of England. This means that although we will still need investment in adapting to temperature increases, this might be slower than in other areas of the country. We have already begun protecting important water treatment chemicals (sodium hypochlorite) which deteriorate in particularly high summer temperatures, as we have seen several record high heatwaves in the last few years – and these are expected to continue to become more frequent. However, we do not yet know the impact of increasing temperatures on our local environment.

FIGURE 1:

Projections of average (left) and extreme (right) wind speeds by region, by 2050



Source: Mott MacDonald analysis of UKCP18 projections

2.2. ESSEX & SUFFOLK WATER

Our Essex operating area is part rural and part urban, with the main areas of population being in Chelmsford, Southend, and the London Boroughs of Barking and Dagenham, Havering, and Redbridge. In Suffolk, it's mainly rural with the biggest towns being Great Yarmouth and Lowestoft.

The South East of England is generally low lying, with an altitude of less than 60m for much of the area. It encompasses large regions of downlands, wetlands and stretches of coastline. The region is mostly flat with large-scale farming operations. This increases the volume and speed of water-run off in the area and impacts the quality of ground and surface water.

Suffolk surface water abstractions come from The Broads or Broadland rivers which are below sea level. Their position below sea level means that they are consequently at risk from tidal surges and coastal breaching.

The South East England is one of the driest regions in the UK, with an average rainfall of less than 700mm per year. This makes it particularly susceptible to droughts and water shortages. Across this area we also know that the population is forecast to increase. On average for Essex there is a predicted 22% increase in total population to 2049/50 and 13% increase for Suffolk, with increases also forecast in water demand from new and expanding businesses. These increases will result in an increased demand for water in the coming decades and consequently may put a strain on our operations.

In the last few years, Environment Agency investigations in East Anglia have shown that reductions are now also needed in abstraction from the Broads and other rivers, which means that there will be a severe shortage of water without additional water resources. These reductions allow water to remain in the environment, so that it can be more resilient to climate change – and this could mean more abstraction reductions in the future.

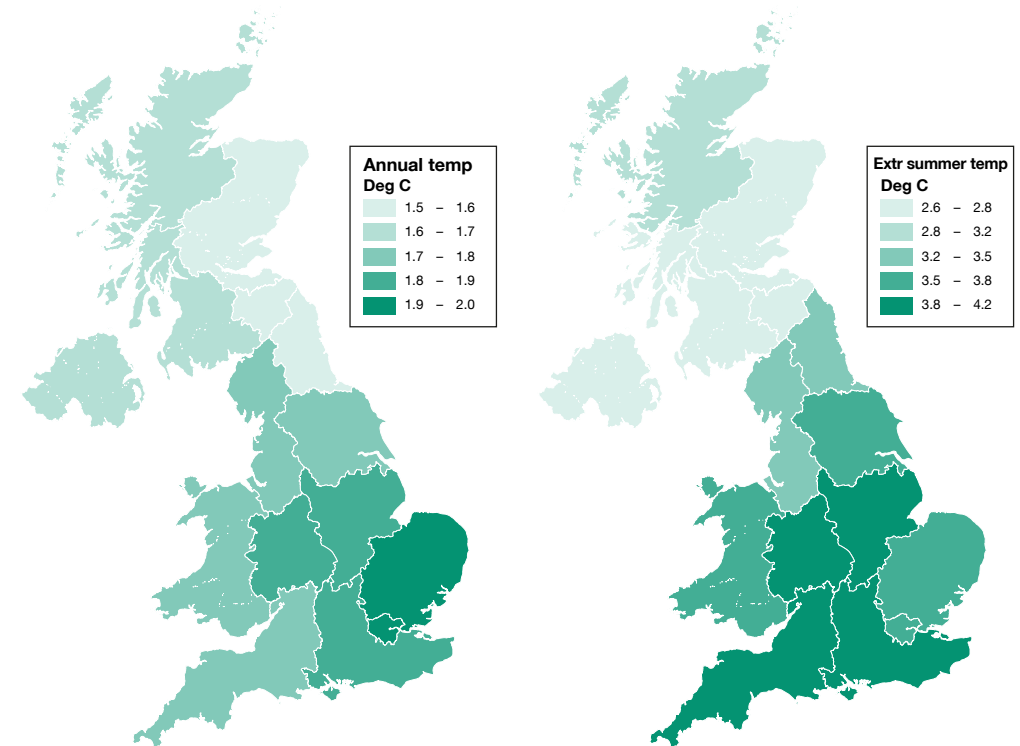
Increasing temperatures also cause other issues. For example, our “slow sand filter” treatment works were designed many years ago and some can no longer cope with increasing water temperatures (which affect their capacity). The level of nitrates in raw water is increasing, and combined with temperature increases this can lead to problems such as algae growth – that can no longer be managed by blending water supplies or reducing treatment capacity. These issues will continue to grow.



Dedham, Essex

FIGURE 2:

Changes in mean (left) and extreme (right) summer temperatures by 2050



Source: Mott MacDonald analysis of UKCP18 projections

Our assessment shows that Essex and Suffolk will have increased autumn rainfall and wind speeds, but this is not as severe as in the North East. Some adaptation is still required to protect key sites, particularly where the consequences of failure are higher (for example, when there are already shortages of water).

We do not provide wastewater services in Essex and Suffolk, and so we do not have any role in managing flooding apart from our own assets.

3. OUR STRATEGIES AND PLANS

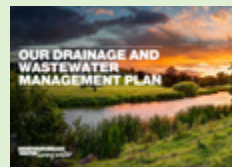
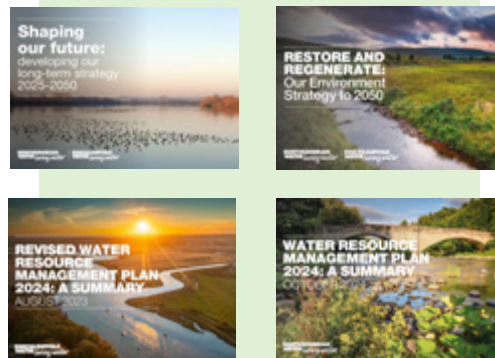
In the face of escalating climate change impacts, effective strategies and plans are crucial for ensuring the resilience of our operations. Since we published our previous [Climate Adaptation Report in 2021](#), we have created and updated a range of integrated business strategies and plans.

Climate adaptation is an integral part all of these and those of relevance are outlined in Figure 3 and discussed below. In the development of these strategies and plans, we have sought out the views of our customers and stakeholders, to seek their opinions on long-term priorities and the level of ambition.

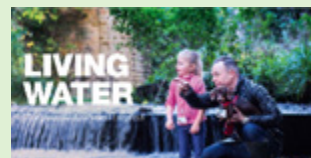
More information on this can be found in Section 4 - Customer Engagement

FIGURE 3: Our Strategies and Plans

Long-term strategies and plans



Medium-term plans



3.1. LONG TERM STRATEGIES

3.1.1. Long-term Strategy

Our business is inherently long-term with some of our assets expected to operate for more than 100 years. As a result, we have an enduring presence in the communities we serve and provide services to generations of our customers.

In 2023, we published our **Long-term Strategy for the 2025-50 period**.

This strategy sets out our long-term goals (Figure 4) and highlights the key choices we must make in the future to make sure we deliver the long-term improvements customer and stakeholders want to see in the most efficient and effective way. Climate adaptation is a key element of these first three goals. We need to ensure we are adapting to climate change to provide a reliable service to our customers, such as ensuring we have sustainable supplies of water to our water treatment works. In caring for the long-term needs of the environment we need to consider how changing rainfall patterns has an impact on our drainage systems to minimise the risk of flooding. The third goal in Figure 4, sustainability and resilience, focuses specifically on climate adaptation and our aim is to be national leader in the provision of sustainable and resilient water and wastewater services in a changing world.

FIGURE 4: Our Long-Term Strategy Goals



Our Long-term Strategy shows that under any future climate scenario, we expect investment requirements to increase steadily for climate change adaptation. We showed how this might vary depending on the pace of climate change, and how this depends on new technologies and behaviours from consumers, Government, and other third parties. We will need to keep our approach under review – but we expect water bills to be more expensive in the future to adapt to new threats. In turn, this will need to attract the financing needed to make these investments.

Our Long-term Strategy also sets out our long-term targets. This includes some of our standards for resilience – such as for household customers to have a sufficient and secure supply of water by planning to be resilient to a 1 in 500 year drought. In our strategy, we note that there are no other standards set for climate change resilience across the whole water sector, including the level of protection that should be met – and we encourage the Government to set such standards, as recommended by the National Infrastructure Commission. Our long-term targets also include our work to reduce our climate impact, including delivering net zero and reducing embodied carbon.

3.1.2. Environment Strategy

In 2023, we also published **Our Environment Strategy**. This strategy builds on what was set out in our Long-term strategy and on our past achievements, outlining our path forward for the environment to 2050. The strategy is guided by an **Environmental Ambition**, along with three guiding principles, and contains five **Environmental Priorities** that work together to help deliver this ambition.



FIGURE 5: Our Environment Strategy



Although climate change is part of all the Environmental Priorities, 'Effective climate action' focuses specifically on this topic and includes our commitments both with regards to climate mitigation and climate adaptation.

Our three guiding principles within the strategy set out how we will work to achieve our commitments. These are particularly important in helping create more resilient systems in a changing climate.

- **Systems thinking** - we take a big picture view to create the optimal balance of actions within a catchment to maximise long-term benefits for all.
- **Natural solutions first** - our default is to look to nature for inspiration when making decisions. We consider natural, suitable solutions before engineered ones. This may result in the use of nature-based solutions on their own, or in combination with engineering projects.
- **Partnership mindset** - we work hand-in-hand with our customers, suppliers, and stakeholders to co-create mutually beneficial solutions.

Our Thriving Catchments programme (**Case Study 7**) is a great example of how these guiding principles are being applied.

3.2. LONG TERM PLANS

Our Water Resource Management Plans (WRMPs) and our Drainage and Wastewater Management Plan (DWMP) are key long-term plans for the business that shape our approach for climate change adaptation.

The plans are created using agreed water industry frameworks, with common assumptions and forecasts for how growth and climate change could affect the services we deliver. As we face an uncertain future, these plans take an adaptive planning approach to optimise interventions over time, ensuring that options are kept open until there is sufficient certainty around the best course of action, while ensuring investment decisions are taken when needed. This approach allows us to maintain the right level of adaptivity and flexibility so that we can adjust our course over time.

These plans underpin our more detailed five year business plans and use the same assumptions about climate change as our Long-term strategy and Business Plan. This helps us to design new investments to be resilient to potential climate change scenarios.

3.2.1. Water Resource Management Plan

Since our last Climate Adaptation Report we have published our updated **WRMPs (2025 – 2030)**, which cover both our Northumbrian and Essex & Suffolk operating areas. These plans are known as WRMP24 (Water Resource Management Plan in 2024). For our WRMP24 we, along with other water companies, included some new requirements from our regulators. From 2040 we need to plan for extreme drought that could happen on average once every 500 years (in our previous plan produced in 2019 it was once every 200 years). We also need to make sure there's enough water, even if the Environment Agency (EA) needs to reduce how much water we're allowed to take in the future to make sure our abstractions remain sustainable.

Our plans work towards ensuring the projected implications of climate change are adapted to and mitigated, to provide a lasting water supply to meet demand. The objectives of WRMP24 are:

- Achieve a secure, resilient, and sustainable supply of water for our customers, moving to a 1 in 500 level of resilience by 2050.
- Protect and enhance the environment, ensuring our abstractions are sustainable both in the short and long term.
- Reduce leakage from our network and from customer's homes, contributing to a national target of 50% reduction from 2017/18 levels by 2050.

- Reduce customer demand to 110 litres per head per day by 2050.
- Reduce non-household customer demand by 9% by 2037/38 (excluding growth).
- For all our meters to be smart meters by 2050.

Our WRMP24 also works towards meeting the targets set out in the Government's 25 year Environment Plan:

- Reduce per capita consumption to 122 litres per head per day by 2038 and 110 litres per head per day by 2050.
- Reduce leakage by 16% by 2025, 20% by 2027, 30% by 2032, 37% by 2038, and 50% by 2050.
- Reduce non-household water use by 9% by 2038 and 15% by 2050.
- Reduce the use of public water supply in England per head of population by 9% by 2027, 14% by 2032, and 20% by 2038.

As an organisation, when planning for climate adaptation, we follow the Climate Change Risk Assessment's principle of adapting for two degrees while preparing for four degrees, which is in line with the Paris agreement. Because of this, we have shifted from UKCP09 to UKCP18, which is the most up-to-date projection and represents this principle. UKCP18 moves beyond climate trends, building upon the conclusions of UKCP09.

Our commitment to climate change adaptation is unwavering. All our projected scenarios are based on emission scenarios Representative Cognitive Pathways (RCPs) 8.5 and 6, representing high and medium emissions scenarios. By comparing the outcomes from both scenarios, we can develop adaptive strategies to mitigate risks associated with varying degrees of climate change. These projections are instrumental in planning for future water demand, supply reliability, and infrastructure resilience, all in line with our goal of adapting for two degrees while preparing for four.

In developing our plans, we have accounted for the effects of climate change on forecast supply and demand following the methods set out in the Water Resources Planning Guideline. In many cases, climate change does not have a significant effect on groundwater recharge, and so does not impact the deployable output of our groundwater sources. Despite this, climate change does, however, impact our surface water sources and has an impact across Essex and Suffolk. To address this, we have taken a twin-track approach in our plans, reducing overall demand while also developing new water supplies. Reducing demand benefits the environment as it means we will abstract less water from the environment, particularly during dry weather, leaving more water in rivers, reservoirs, and groundwater aquifers.

By examining the need for adaptive pathways, and considering alternative scenarios, we have confidence our plan will deliver across a broad range of potential futures.

3.2.2. Drainage and Wastewater Management Plan

In 2023, we published our first **DWMP**. This new framework represents a significant step change in how long-term planning for drainage and wastewater is carried out. For the first time, a national framework has been produced, which outlines the steps that should be taken to produce long-term plans, over the period to 2060, to create sustainable and resilient drainage and wastewater systems. They also address our long-term statutory requirements to adapt to climate change, working with the UK National Adaption Programme.

The DWMP framework for our first DWMP was built on the supply and demand approach from WRMP. It focused on *'examining future scenarios within and up to the 25-year planning period'* with the aim of providing *'the basis for more collaborative and integrated long-term planning by organisations that have interests and/or responsibilities relating to drainage, flooding and protection of the environment'*. As part of this approach, the DWMP outlines the investment required over the next 40 years to ensure that drainage and wastewater systems can cope with the coming pressures associated with climate change, population growth and increased impermeable hard standing in urban areas. The plan looks forward at how we will meet our obligations in future, including meeting the challenges from climate change and population growth. The plan also incorporates requirements through the Government's Storm Overflow Discharge Reduction Plan and the 25 Year Environment Plan.

Almost two thirds of the solutions in our DWMP are green or mixed but we know we need to accelerate the use of purely 'green' nature-based options.

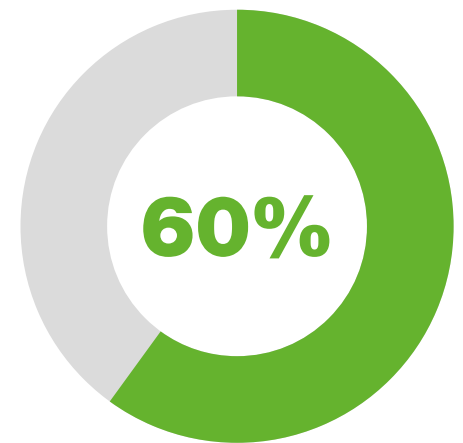
Our DWMP examines the impact of climate change on the wastewater network, including considering the impact of increased flooding at wastewater treatment works, storms causing local and regional power and communications outages, hotter summers causing equipment to fail and rising sea levels. Like with our WRMP, we did this following the Met Office United Kingdom Climate Projections 2018 (UKCP18) representative concentration pathway (RCP) 8.5 and created new rainfall models. This is consistent with the Government's guidance on DWMP and Ofwat's prescribed scenarios for PR24 – and will help to make sure that investments are designed with enough capacity even in higher climate change scenarios.

The sewer network models have been simulated using both design rainfall and time series rainfall (TSR), specifically developed for the Drainage and Wastewater Management Plan (DWMP). For future planning, 2050 and 2080 versions of the 19 TSR datasets were generated, incorporating the impacts of climate change using the UK Water Industry Research (UKWIR) climate perturbation tool, 'RedUP V3'. This makes sure the risks and opportunities identified in the DWMP are as robust as possible, aligning with the latest rainfall generation software and climate change models.

The National Infrastructure Commission's report, 'Reducing the Risk of Surface Water Flooding', emphasised the need for a national approach to tackle flooding and the challenges of mitigating sewer flooding.

Key long-term targets in the final DWMP include reducing both internal and external sewer flooding by 60% by 2050. Additionally, we have aligned partnership opportunities within the DWMP, such as those with the Flood and Coastal Erosion Risk Management (FCERM) strategy. This includes working towards the core ambitions of FCERM; building climate-resilient communities, making sure today's infrastructure is resilient to tomorrow's climate, developing a national strategy for adapting to flooding and coastal change. Our efforts towards enhancing overall resilience, particularly climate resilience, form a key part of our alignment with the FCERM strategy, future proofing our assets.

Our vision for the DWMP is to further strengthen our strategic planning, ensuring resilient drainage and sewerage services over the next 25 years. It provides a solid evidence base for short, medium, and long-term investment needs, identifies collaborative solutions to current and future risks, and integrates into our business planning process. Over time, it will create a comprehensive dataset to further inform our options development and offering valuable insights to customers and stakeholders.



**Reducing sewer flooding
by 60% by 2050**

3.3. BUSINESS PLANNING

Every five years, Ofwat carries out a price review for all water and wastewater companies. As part of this process, we produce a Business Plan that sets out all the things we want to deliver for our customers, such as reductions in flooding, or improvements in customer service. Our long-term strategies and plans help shape our five year business plans, allowing us to effectively plan to address climate-related challenges.

The business plans are assessed by Ofwat which determines how much revenue we can collect from customer bills, and what level of service we need to provide to our customers in return. We are monitored against the targets we propose with potential financial incentives/penalties based on how well we meet these targets. The process ensures transparency, accountability, and a focus on delivering value and service improvements for our customers.

Our WRMP and DWMP assessments explore the investment needs for different climate change scenarios. In addition, our Business Plan 2025-30 examines how our current assets and sites may need to adapt to address the impacts of climate change. We discussed this with customers, who told us that as the exact trajectory of climate change was uncertain, they wanted us to invest where the effects were reasonably certain now (that is, would be very likely in the near future under any scenario) and where this would be more efficient to invest now.

We looked at weather patterns and risks over the next 25 years and identified three key risks: increasing wind storms; flooding; and spells of very hot summer weather.

We publish all our customer research **on our website**, and summarised this in our Business Plan (see Section 4).

We assessed how these risks would need to be mitigated before 2030 and developed plans for back-up power supplies to provide power resilience (where energy networks are vulnerable to wind storms and other extreme weather); targeted protection for flooding at treatment works (such as raising doors or protecting vulnerable equipment); and targeted interventions at treatment works to protect from spells of hot weather (reducing the risk of failure). Our customers agreed with these interventions.

We are currently coming towards the end of our current Business Plan (2020 – 2025) and in the process of agreeing our future Business Plan (2025 – 2030) with Ofwat. We have challenged Ofwat to understand how regulators and Government will tackle the issues of cascading failures across infrastructure – in our case, a lack of energy network resilience to storms leading to pollution incidents – and where these responsibilities should fall.

We expect our subsequent Business Plan (2030 to 2035) to require more adaptation across our treatment works and networks, particularly looking at the effect of increasing temperatures on treatment processes and materials. We considered this for the 2025 to 2030 period, but did not include this in our plan because it is not yet clear where and when these will be required.



Howdon Sewage Treatment Works, North Shields

4. CUSTOMER ENGAGEMENT

We care about the essential needs of our communities – and that includes making decisions about climate change adaptation.

Our customers have told us that investing in assets for the future to prepare for severe weather and changing future demand is key. Most of our customers rate climate change as very important, and they recognise that climate change will impact them and their communities in their lifetime (67%) – with severe weather, rising sea levels and water scarcity being key events linked to climate change. Our customers believe that we need to act on climate change immediately (84%) and that this is the responsibility of many; from the individual, to water companies, to the Government.

Although customers continue to think that adapting to climate change is a high priority, there are many competing priorities for investment in the 2025-30 period and beyond – our tracking survey shows that customers consider clean drinking water, reducing bills, and cleaner rivers and beaches all to be a higher priority than adapting for climate change. This doesn't mean that this has become less important or does not need to be done – instead, this reflects increasing concerns about the need for investment and how this should be balanced with affordability.



With this in mind, we asked customers to discuss investments in climate change adaptation in more detail during our PR24 customer engagement programme (between 2021 and 2023). Our customers had mixed views on adaptation to climate change, with younger customers and customers in our Essex & Suffolk area being more supportive of investment in this area. These mixed views continued throughout the development of our Business Plan. Many customers felt that this was important to avoid future issues and protect future generations, Others questioned if investment was really required, or if other investments would do enough to protect water supplies and quality anyway – and how much impact climate change would have in the UK. The majority of respondents in Essex and Suffolk, and around half of respondents in the North East selected the “medium” phasing option that we used in our Business Plan 2025-30.

We developed our plan by looking at where:

1

There was a high likelihood that climate change would have an impact on our services in the short or medium term (under any future climate change scenario).

2

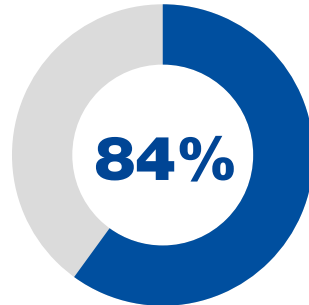
This is likely to have an immediate impact on services – in our customer research, we identified supply interruptions at water treatment works and pollution incidents from sewage pumping stations as two of the key areas.



We set these criteria in line with customer views, as they wanted to be sure that the investment was really needed and that we could be confident that the impact of climate change would mean increased risks to services. We asked our customers about higher investment in 2025-30, to tackle potential future risks – for example, addressing algae growth which can have impacts on water quality, filter performance, and sludge systems at water treatment works. We explained that these were less certain, and that we did not expect that these effects would be seen in the next few years. Some customers did support these investments, but as there were mixed views, we did not include these in our plan.

Exploring these issues with customers helps to set the right balance of investment and affordability, so that we make sure this is balanced in a way that is acceptable to customers. This means discussing difficult topics, and we did this through our new People Panels approach, working with groups of customers over time to build understanding and develop a more detailed and informed approach. We then worked with the independent Water Forum, who discussed and challenged our overall approach to resilience including the details of climate change adaptation, to make sure that we had incorporated customer views, legal obligations, and the wider evidence.

Instead of a large investment programme to tackle increases in heat during 2025-30, we will focus on understanding the uncertain threats to water and wastewater treatment processes and materials – and what potential mitigations will be required. We will share these risks and solutions with customers again in 2025 and 2026 as we understand the specific actions that will be required for future adaptation. Our customers have told us that they prefer sustainable approaches were possible, while reflecting that traditional approaches are still required in some instances. We continue to use this to inform our approach, using the guiding principles in our **Environment Strategy** of systems thinking, natural solutions first, and partnership mindset.



Customers that believe we need to act on climate change immediately



5. DELIVERING CLIMATE CHANGE ADAPTION

Our strategies and plans help us prepare for climate change. In this section we illustrate how we have been delivering this.

It focuses on three key areas – ensuring sustainable water supplies, providing a resilient wastewater service, and delivering net zero. In our last Climate Adaptation Report, we described the actions we needed to complete by 2025 and in the longer term. Since then, we have made progress in each of these areas, some of which we describe here, and an overview is provided in [Appendix 1 and 2](#).

Find out more information in our Appendices here

5.1. ENSURING SUSTAINABLE WATER SUPPLIES

Our WRMPs ensure we can continue to provide water to our customers under any climate change scenario, and our WRMP24 builds on this to further increase the level of resilience to make certain we can continue supplying water up to a 1-in-500-year drought. We have previously focused on increasing resilience, driving down leakage, and launching our smart metering programme – including compulsory metering in Essex and Suffolk. We are now developing new water supplies across Essex and Suffolk, as well as boosting our focus on reducing leakage and improving water efficiency. New sustainable water sources, plus improving efficiency of the sources we already have, will allow us to reduce abstraction at some locations across Essex and Suffolk to minimise the impact on our water environment too.

In Essex and Suffolk, we have the lowest leakage in the UK (11.1%, compared to 19.4% average across England and Wales, as per the Environment Agency's [Water resources 23/24 water analysis](#)) and we have reduced this further since 2020. We will continue to reduce this further by 2030, as well as reducing leakage in our Northumbrian Water area (currently 17.4%).

This reflects the benefits of our smart water metering enhancement programme. Based on hourly smart data, we were able to identify 9,399 household properties with customer side leakage, this was a 353% increase on the number identified in 2022-23 period.

However, while remaining focused on maximising programme delivery targets by March 2025, we continue to mitigate the risk of a shortfall and associated ODI penalties. Like the rest of the water industry, we have not seen the reductions in household consumption that we expected, and our Business Plan 2025-30 has a renewed focus on this, including reducing non-household demand for water. We have successfully influenced the Government to introduce water efficiency standards for new appliances and, from 2025, we will drive a much greater awareness of climate change and the impact on water resources in Essex and Suffolk, accelerating our smart metering programme and increasing our expenditure on water efficiency.

In addition to maintaining water supplies, we have invested to improve drinking water quality where the quality of water in the environment is deteriorating. Typical climate related risks to water quality include increased concentrations of dissolved organic material from areas of peat and increases in the occurrence of algae blooms. Whenever we see a rising trend in environmental based parameters, we plan to carry out investigations to identify the best solutions and then implement appropriate solutions through our next Business Plan. We will also continue our partnership work with others across catchments to improve the quality of river and groundwater, for example by supporting farmers to make improvements to farm infrastructure and agricultural practices where appropriate and supporting other organisations to deliver river restoration schemes to increase river resilience and water quality in the face of climate change pressures.



Case Study 1

New pipelines to future-proof water supplies

More than 200,000 customers across the south of County Durham and into the Tees Valley are benefiting from a £155m investment to upgrade and futureproof our water supply network across the area. The programme – ‘Project Pipeline: County Durham and Tees Valley’ – will involve installing entirely new pipelines and replacing sections of the network that have served the area for over 100 years. This multi-year project will improve resilience and allow us to continue to deliver for the people of the area for generations to come. We’re also making sure Project Pipeline delivers for the environment at the same time as delivering great quality water for our customers. We worked with environmental and ecological experts when planning the project to make sure biodiversity on-site is either enhanced or restored, while protecting the environment during project delivery itself.

£155 million
investment to upgrade and futureproof our water supply network across the North East

In Essex, we are also currently constructing a pipeline to transfer untreated water from Layer-de-la-Haye Water Treatment Works to the existing reservoir at Langford Water Treatment Works, providing enhanced resilience during drought and hot weather periods. This £20m investment will install 19km of new pipeline, linking and balancing the use of water resources in the northern part of Essex with those in the south of the county. The pipeline will add resilience to supplies for more than 370,000 customers and be capable of carrying up to 50 million litres of water a day. As well as supporting customers’ supplies, the investment will protect the environment by enabling even better management of the county’s raw water resources.



Whittle Dene, Northumberland



Our Project Pipeline

Case Study 2

We have continued to adapt and innovate our approach to water efficiency including:

- Establishing a comprehensive Per Capita Consumption (PCC) Tactical Plan to adapt and innovate our approach to water efficiency to provide direct benefit to our customers
- Being proactive in understanding the impact of Covid-19 on PCC, ensuring our services and operational sites continued to run to making sure water continued to flow for all our customers.
- Substantially pivoting our water efficiency strategy to including targeting water efficiency visits at highest users with enhanced focus on personalised behaviour change and longer term follow up, via our **Water's Worth Saving programme**.
- Upscaling our leaky loo and home retrofit programmes as part of our water saving initiatives. Leaking toilets are the single biggest waste of water in the home, equivalent to an extra two people's water use and occur in 5-8% of homes. During 2020-25 we focused on repairing leaky toilets at no cost to the customer and focused retrofit programme on our top 5% highest water users.
- Leveraging our smart meter installation programme to allow us to evaluate the effectiveness of various water saving interventions – and achieve maximum future uptake. We are working towards ensuring all water meters are smart throughout the Essex and Suffolk supply regions by 2035.

IS YOUR LOO COSTING YOU?

A leaking toilet can increase your water bill by up to £200 but they are not always easy to see.

Visit: nwl.co.uk/leakyloo
or eswater.co.uk/leakyloo

HIDDEN TRICKLING FLOWING



NORTHUMBRIAN
WATER *living water*

ESSEX & SUFFOLK
WATER *living water*

WATER'S
WORTH SAVING



Case Study 3

Accelerated water resilience investment in Essex and Suffolk

We have received accelerated funding of £48m to bring forward the start of vital works to boost the resilience of our water network in Essex and Suffolk. These four projects will help maintain secure supplies of water to 1.8m people across the area and the investment includes:

- £12.74m on a new water treatment works and borehole in Linford, Essex, which will add an extra seven million litres of capacity into the local water network.
- Detailed engineering designs for the £12.49m Suffolk strategic network and storage enhancement schemes. This work will lead to the construction of two new strategic pipelines in Suffolk, which will allow surplus water to be transferred more easily around the county to the areas that need it.
- Detailed design of the £15.08m North Suffolk winter storage reservoir, which would further add resilience to Suffolk's water supplies.
- Detailed design of the £7.79m Lowestoft Reuse scheme.

The storage reservoir and reuse schemes have the potential to work alongside the Suffolk strategic network and storage enhancement schemes to add further resilience to supplies for customers in Suffolk.

Accelerated funding of
£48 million
 to bring forward the start
 of vital works.



River Deben, Suffolk



North Suffolk

5.2. RESTORING AND ENHANCING THE LOCAL ENVIRONMENT

We have delivered 100% of our commitments made through the Water Industry National Environment Programme (WINEP) and will continue to do so. As one of the leading performers in the sector on environmental measures for the last few years, we remain committed to our ambition to have the best rivers and beaches in the country. We have reduced phosphorus in our treated wastewater more than any other company, and we have outperformed our target (by more than a factor of four) for delivering improvements to the water environment through our Bluespaces funding scheme.

We achieved a good 3 star rating in the Environment Agency's latest annual Environmental Performance Assessment 2023, and achieved 4 stars in 2020 and 2021. We missed our target for treatment works discharge compliance. We also received an "amber" score on pollution incidents, where unreliable power supplies at our sites are causing problems; we have already developed a plan to improve this, including increased backup power supplies at our sites.

We have explored the risks and opportunities associated with nature-based solutions, and we have greatly increased the number of nature-based solutions in our plans. We have also started to introduce smart networks to maximise the capacity of our existing wastewater networks, as well as investing in improvements in the future.

Our Business Plan 2025-30 is more ambitious on the environment than ever before, investing more than £1.7bn – more than ten times the current level. This includes a £1bn investment in tackling storm overflows to reduce sewage spills. The plan also includes investments to reduce nutrient pollution across our catchments (from all sources, not just our own); improving biodiversity and water environments more than ever before; and monitoring rivers to understand how these need to be improved further in future. This focuses on nature-based solutions and developing partnerships with others to restore and enhance the environment.

£1 billion
investment
in tackling storm overflows
to reduce sewage



Dawn fishing, Kielder

Case Study 4

Smart Sewer Networks

In our Northumbrian Water operating area, we have begun a ground-breaking £20m project which is set to significantly reduce spills from storm overflows across Tyneside.

The project, which is set to be the first of its kind in the UK, will see a combination of new technology, sensors and AI analytics used to lower the risk of overflows happening and is based upon research and proven techniques used in the United States.

In South Bend, Indiana, the smart sewer technology – sensors, AI analytics, control measures – were installed in a section of wastewater network with the aim of reducing the number of spills from storm overflows. Over a ten year period, they saw an 80% reduction in the amount of spills with a combination of smart controls and targeted investment.

Storm overflows act as a relief valve on the wastewater network and operate during times of heavy rainfall to prevent sewer flooding from taking place in customers' homes. They are used with Environment Agency consent to protect homes from the devastation that can be caused by internal flooding.

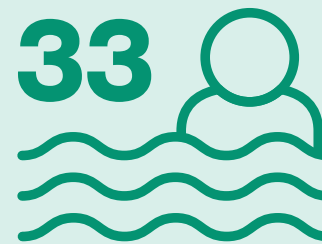
The 'smart sewer' project is revolutionary in that it will allow us to make changes to the flow and direction of wastewater (which contains a dilute mix of sewage, rainwater, run-off from roads and fields, and water from sinks, showers and appliances) moving it around the sewer network, and making spills less likely to happen. This will make our system more resilient to the more frequent and heavy rainfall events we are experiencing due to climate change.

Using a mix of AI technology and hundreds of smart sensors placed along sewer pipes, it will predict when and where rain is about to hit in the region and when and where the sewer networks are more likely to reach capacity and spill.

It will then automatically balance the flows of the network, diverting this wastewater to the emptier parts of the network, managing capacity and reducing the likelihood of spills taking place. The technology will also identify areas where additional capacity is needed, allowing further targeted investments to be made to build alternative storage for rainwater where it is needed most.

This real-time decision support system will be powered by a digital twin – a digital version of the physical sewer network that runs ahead of time and gives us more control over the system and the chance to make changes before spills happen.

The "smart sewer" will be carried out in partnership with HydroDigital and will help reduce the impact of storm overflows on the region's rivers and keep the high standards of the region's bathing waters – with 33 of the region's 35 bathing water currently meeting Defra's top two standards of Excellent and Good. There are active investigatory works underway on the two 'poor' waters to work towards improving their classification ratings.



of the region's **35** bathing waters reaching the highest of Defra's classification standards of **Excellent and Good**.



Howdon treatment works

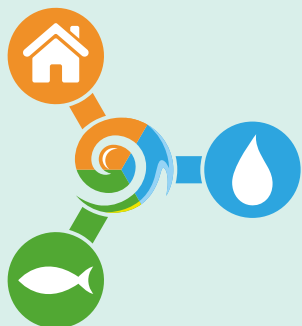
Case Study 5

Northumbria Integrated Drainage Partnership

We are an integral part of the Northumbrian Integrated Drainage Partnership (NIDP), an award winning, multi-agency approach to developing flood risk reduction schemes across the region.

The NIDP brings together stakeholders to collaboratively manage flooding from sewers, rivers, and surface water, and aims to promote wider benefits including habitat creation and water quality improvements. It is frequently cited as a leading approach.

Working with the local flood authorities we have been developing a suite of studies in readiness to deliver once we start our next Business Plan in April 2025. Some of our successes to date include reducing flood risk around Brunton Park, and Killingworth and Longbenton.



Northumbria Integrated Drainage Partnership



Brunton Park

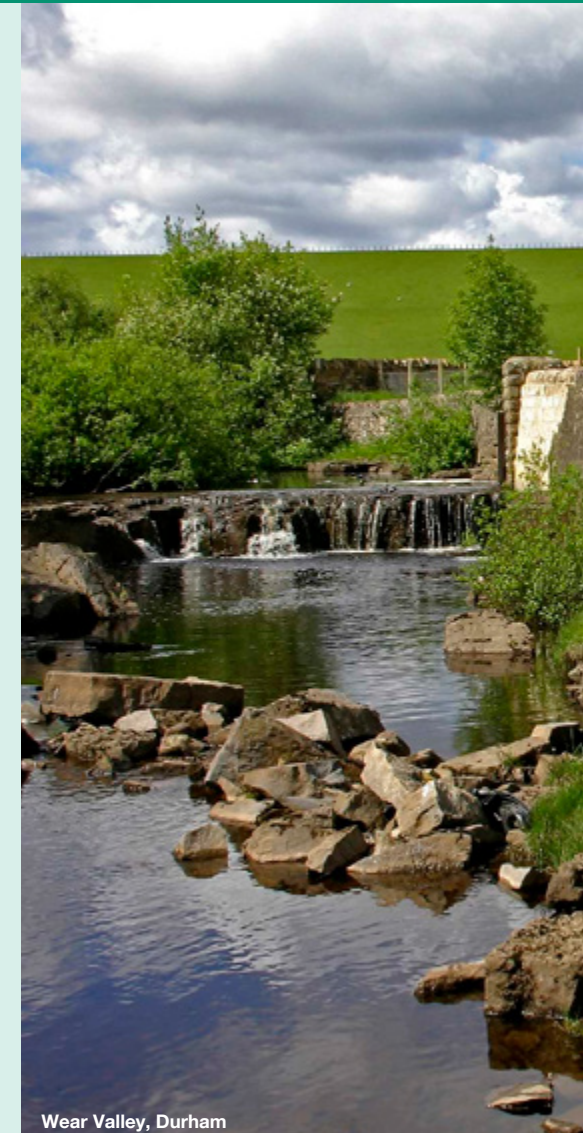
Case Study 6

Thriving Catchments

The Thriving Catchments Partnership is a collaborative initiative we launched with The Rivers Trust and partners across the North East of England. It supports long-term investment and collaborative approaches to improve water quality and river health, benefitting communities and the wider environment. Its focus on partnership delivery for catchment and nature based solutions makes this the first of its kind in the UK.

Thriving Catchments is built on the knowledge that no single organisation can tackle these complex environmental challenges alone. By bringing together over 30 experts and ten delivery organisations we are sharing skills, expertise, data and investment opportunities, joining up plans and creating a ripple effect that helps transform the health and resilience of rivers and their catchments.

The work is initially focusing on reducing phosphorus concentrations in our rivers, a key reason for poor river health. It will be using catchment and nature based solutions, as opposed to traditional engineered solutions, which provides greater resilience within the catchment to our changing climate and achieves multiple benefits for the environment and local communities.



Wear Valley, Durham

5.3. ADAPTING OUR ASSETS TO BE RESILIENT TO CLIMATE CHANGE RISKS

We have already adapted some of our assets to protect from flooding and provided some power resilience (through mobile generators) to protect from storms. We have worked with Water UK and contributed to discussions with the National Infrastructure Commission on climate resilience standards in the water sector. We have sought to influence regulators to understand the need for climate change adaptation and the barriers to this – and what they could do to address cross-sector cascading risks for customers. We carried out an industry-leading analysis of climate risk and understanding of the vulnerabilities across our asset base and used this to inform our Business Plan 2025-30.

This has meant we have been able to provide much better evidence about the specific impacts of climate change in our areas and on our assets. We discussed these risks and the right actions for 2025-30 with our customers in detail when we developed our plan, to make sure this was the right balance of investment and affordability (see Section 4).

In the North East in particular, there are risks from cascading infrastructure failures – that is, if energy supply networks lose power during storms, this can lead to power failures across treatment works and pumping stations. We can install backup power supplies at these sites. We have made this case to ofwat in our Business Plan for 2025-30, but in its final determination for our price limits, Ofwat has not allowed all of the funding we requested to improve our power resilience, and so we will have to implement a reduced programme of investment.

However, this is not necessarily the right solution to this problem. A systems-based approach should look at the resilience of the power system, how the risks of power failures are allocated, and the impacts of failures. Regulators should work together with the Government, water companies and energy companies to decide where these risks should be addressed, rather than simply allocating these costs to water customers or accepting a higher level of pollution incidents. We have engaged with regulators and others to try to drive these discussions – and so better outcomes for customers.

Similarly, we have raised concerns about the historic level of asset maintenance allowed through price controls and have demonstrated that a higher level of investment is needed. This is not because of climate change directly, but delaying this investment will increase the likelihood of assets failing in extreme weather, leading to potential cascading failures of our own. Regulators and Government should consider setting resilience standards, as recommended by the National Infrastructure Commission.

Throughout 2025-30 we will be investing around £4.5bn in the North East and £1.5bn in Essex and Suffolk, creating 3,000 jobs a year across our business and adding £5.7bn to the North East local economy and £1.7bn in Essex and Suffolk through employment and using local suppliers.

We are more than doubling the supply chain capacity we have and adding over 30 new supply chain partners to provide capacity to deliver over £700m of work a year compared to around £300m currently. We are also expanding our own capacity and capability by scaling up our recruitment.

Our focus will be on establishing new training academies and apprenticeship programs to develop the current and future workforce needed to deliver on our ambitious commitments.

£700 million
of work a year delivered,
compared to around
£300m currently.



Puffin, Farne Islands

5.4. DELIVERING NET ZERO

In our Business Plan for 2020-2025 we set our ambitious goal of net zero operational emissions (scope 1 and 2) by 2027. We are on track to deliver the absolute reduction in operational emissions on a market basis that we envisaged when we set this goal. In 2019/20 our emissions were 69kTCO₂e, in our most recent reporting year we have reduced these emissions to 19kTCO₂e – a 72% reduction.

However, the science and approach used to calculate emissions continues to improve and evolve. Our understanding of wastewater process emissions has progressed significantly since this time, and these are materially higher than originally estimated. Additionally, we have expanded our areas of emissions management to include our entire upstream supply chain. Taking these two areas into account, we no longer consider that net zero operational emissions by 2027 is the correct target and have set ourselves a long-term target of reaching net zero for all emissions (scope 1, 2 and 3) by 2050. We will continue to reduce our operating emissions by at least the amount that we had estimated when we set the initial 2027 target.

In line with our previous call to action of adapting to the Climate Change Risk Assessment's principles of adapting to two degrees and preparing for four degrees, we are working towards validating our long-term goals with the Science Based Targets initiative (SBTi) whereby our greenhouse gas (GHG) emission reductions will be aligned with the Paris Agreement (limiting global warming to 1.5°C above pre-industrial levels.

To support our progress since the last report, we are exploring additional options for energy management and efficiency performance across the business and will align our energy management system with ISO50001 compliance. A gap analysis has been carried out to make sure we focus on areas that will strengthen our energy management processes and opportunities. Additionally, our energy savings opportunity scheme action plan will set out the energy related improvements that we plan to make over the next 5 years. This plan will be published in March 2025.

Ultimately, delivering net zero emissions is about doing things differently, not doing different things. We will 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 have since assessed these technologies, with many already in use or under development.

The extent to which these and other technologies are deployed depends on their efficacy, reliability and value for money – it is important that we and other water companies deploy technologies at the right time. Our focus on innovation ensures that we are keeping base with Net Zero technology.

We recognise that some of the biggest and most deliverable net zero opportunities are energy related both within our operations and within our supply chain. We, along with the wider economy, need to transition away from our reliance on fossil fuels as quickly as possible – it is this change that can deliver environmental benefits while reducing customer bills. That is why we have committed to 100% of our electricity being supplied by additional low-carbon generation. We also recognise that the energy transition can have major benefits not just for our customers, but for the environment, our communities and our local economy. We will expand our partnership working and systems thinking to create more local energy economies, and we will ensure our energy activity includes environmental betterment. We are targeting at least two community energy projects by 2030 and will ensure all new renewable generation delivers biodiversity net gain.

One example of our efforts to decarbonise our operations is in our response to Ofwat's draft determination, we provided evidence on our plans to invest in charging infrastructure to enable us to electrify our fleet of light commercial vehicles. By 2030 we plan to electrify 283 of our 1005 light commercial vehicles, supported by targeted investment in charging infrastructure.*

We will continue to engage with stakeholders across the sector and other utilities to embrace the opportunities to collaborate and work as a collective towards the common goal of being net zero by 2050.



Derwent Reservoir

*See '**NES80C – Fleet electrification analysis**', NWL, August 2024 and '**NES80D – Ennoviga Solar Limited EV study results**', ESL, August 2024.

Case Study 7

Green energy expansion

A high-tech test facility that uses heat to capture ammonia from sewage, ready to turn into green fuels, has been trialled in the North East, at our existing Howdon Sewage Treatment Works in North Tyneside. This involved installing a purpose-built advanced ammonia stripper and recovery system – a small-scale treatment plant, on the site.

The project, in partnership with environmental technology company, Organics Group, uses thermal energy to strip and recover the ammonia from wastewater – the first time in the world that a water company has ever recovered ammonia using a thermal technique in this way. The recovered ammonia product can then be used to generate fertiliser products and green fuels that may be used in the emerging hydrogen economy.

Removing ammonia will also have several benefits for our wastewater treatment process, making it more efficient by reducing overall energy demand, reducing greenhouse gas emissions and ultimately helping to keep customer bills as low as possible. By minimising emissions from the biological treatment process, it will also help to accelerate our ambitious net zero goals.

The idea to develop a thermal ammonia stripper plant at Howdon first won a £225,000 funding bid from water regulators, Ofwat, back in 2021.



Howdon Sewage Treatment Works

Case Study 8

The green machine for sustainable water treatment

The Algae project at our Bran Sands Advanced Anaerobic Digestion (AAD) facility represents an innovation approach that aims to revolutionise wastewater treatment by using microalgae.

Bran Sands is a large sludge treatment centre, industrial effluent treatment site and gas to grid facility. Currently, the treatment process generates a challenging effluent that is costly to treat and contributes around 30% of the 15,000 tonnes of CO₂ emitted by the Bran Sands gas to grid plant every year.

Off the shelf treatment options all involve breaking down ammonium to nitrogen oxides (NOx) which are released as greenhouse gases. This places a huge challenge on our net zero ambitions but also presented an unexpected opportunity when we discovered a unique microalgae growing in an out of service treatment cell. Through the implementation of an 8% scale microalgae plant, we can harness the remedial properties of microalgae meaning we will be able to reduce treatment costs by £170,000 a year, enhance biogas production, and significantly reduce our carbon footprint. We have already tested the treatment concept at smaller volumes and trialled different approaches and are now seeking to scale up the arrangements.

The project will provide full treatment of our digested sludge liquor which is around 5,500 tonnes a year.



Algal treatment

5.5. INNOVATION

As we must adapt to climate change to continue to provide a resilient service, we also need to adapt how we are delivering that service by embedding research and innovation in our business.

Innovation is central to how we work and being 'innovative' is one of our core values that we uphold. An example of this is our annual Innovation Festival. This commenced in 2017 and is now an established and highly anticipated event both nationally and globally. The novel format of the festival enables us to attract a diverse audience which is a critical part of design sprints.

Since our first Festival we have taken over 250 ideas back into the business, with the value from the projects contributing £100M to the local economy annually - demonstrating our convening power to bring others into our regions. The festival output projects cover many aspects of the business, including climate change resilience. For example, the Ofwat funded project River Deep Mountain AI was awarded >£6M to create models that will help to restore water body health using artificial intelligence and machine learning tools not yet used in the water sector.



The impact of this innovation can be seen across our Business Plan 2025-30. We have included new and innovative nature-based solutions for tackling nutrients in our rivers, using projects such as restoring sea grass, native oysters and mussels as an alternative to using traditional engineered and chemical treatment solutions – and we will lead the sector by showing the impact that this can have, driving more of this in future.

We have improved our geospatial data and launched new mapping tools including real time information. We are improving our geospatial capabilities further and will produce open data to explain our plans and explore partnership opportunities across river catchments in the North East.

£100 million
value added to the local
economy annually



*See 'NES80C – Fleet electrification analysis', NWL, August 2024 and 'NES80D – Ennoviga Solar Limited EV study results', ESL, August 2024.

6. GOVERNANCE MANAGEMENT

6.1. RISK MANAGEMENT (RISK REGISTERS)

The Board has overall responsibility for risk management which includes the management of climate-related risks and opportunities.

The Board is supported by its committees which allows for strong governance, assurance, and risk management arrangements. We conduct environmental risk assessments to evaluate the potential effects on our operations, financial performance, and reputation. Adaptation measures are reviewed to address these risks effectively. Identified climate-related risks are incorporated in plans such as the DWMP and WRMPs to ensure we have plans in place to deliver a sustainable service. Since our last report, we have made progress in implementing the actions we committed to taking to mitigate key sector-wide adaptation risks, outlined in **Appendix 1**.

We have improved our approach to risk and how we understand and mitigate climate change risks.

We have engaged with stakeholders to identify and outline a variety of key challenges and risks, incorporating climate risk, which can be reflected in our **Long-term strategy** (page 45 to 46) and in our latest **Annual Report and Financial statements** (page 23 to 26).

Our risk registers capture the levels of these risks and potential adaptation and mitigation interventions. They support us to keep track and monitor progress on addressing these risks. Our risk appetite is reviewed annually, or more frequently if there are any significant changes to the risk environment. We are transitioning to a resilience-based risk approach and to improve the connection between the business's bottom-up, tactical risk management processes and its horizon-scanning and strategic risk management processes.

6.2. BOARD ASSURANCE

Our adaptive approach means that our governance arrangements will allow us to respond to changes in needs through our strategic and tactical planning process.

Our PR24 Board sub-group looked in detail at our plans for WRMP, DWMP, our Long-term strategy and our Business Plan 2025-30, particularly reviewing our approach in relation to identifying, mitigating, and managing long-term risks – especially in relation to climate change. As part of our existing governance and assurance framework, as reflected in our **Annual Performance Report for the year ended 2024** (page 116), these risks are considered and managed appropriately in order to inform and steer business decisions. For example, key 'trigger points' are explicitly revisited in our governance structures to ensure that the choices we make are the best for the long-term and always take account of all the best information available.



Bran Sands

6.3. MONITORING AND REPORTING

In our Business Plans we set our 'Performance Commitments', targets we work to deliver over the five year period.

We report progress on these commitments to our regulators, with reputational and sometimes financial penalties if we fail to meet them. Our **Annual Performance Reports** give an overview of our performance towards our commitments and how we are continually striving to improve the services we deliver to our customers and our business outcomes. Our Annual Report and Financial Statements provides our stakeholders with easily accessible information on our performance and governance.

Our company scorecard, which includes our Performance Commitments and other Key Performance Indicators allows us to assess our performance throughout the year. This information is shared with our board, who are updated on a quarterly basis on our performance and targets.

We understand what makes our services, networks, and assets vulnerable to climate change, we do this following the ISO 14090:2019 approach:

- The hazard
- The exposure of the system to a hazard
- The sensitivity of the system to the hazard
- The climate change impact
- The risk with adaptation in the future

Our Integrated Management System accredited by the International Organisation for Standardisation (ISO) feeds into our adaptation strategies. We are always seeking to improve our management systems and embed best practice; we do this through a risk management system, which allows us to record findings, determine root causes and identify and implement corrective actions, monitor progress, and escalate to where required. This is primarily reflected by the continuous improvement initiatives delivered in our Asset (ISO55000) and Environmental (ISO14001) Management improvements initiatives which mitigate the climate adaptation challenges we face.



6.4. RISK INTERDEPENDENCIES

Understanding interdependencies is key to our approach to climate resilience as it supports our analysis of climate impacts and allows us to understand cascading risks. There are several types of interdependencies to consider:

- **Functional:** when systems are connected and rely on each other to operate.
- **Physical:** when systems interact through physical processes.
- **Geographical:** when geographical properties, like proximity, impact systems.
- **Economic and financial:** when systems may be impacted by market results or budgetary constraints.
- **Institutional and policy:** when agencies control systems through policy, legal, or regulatory means.
- **Social:** when individuals and organisations interact with systems.

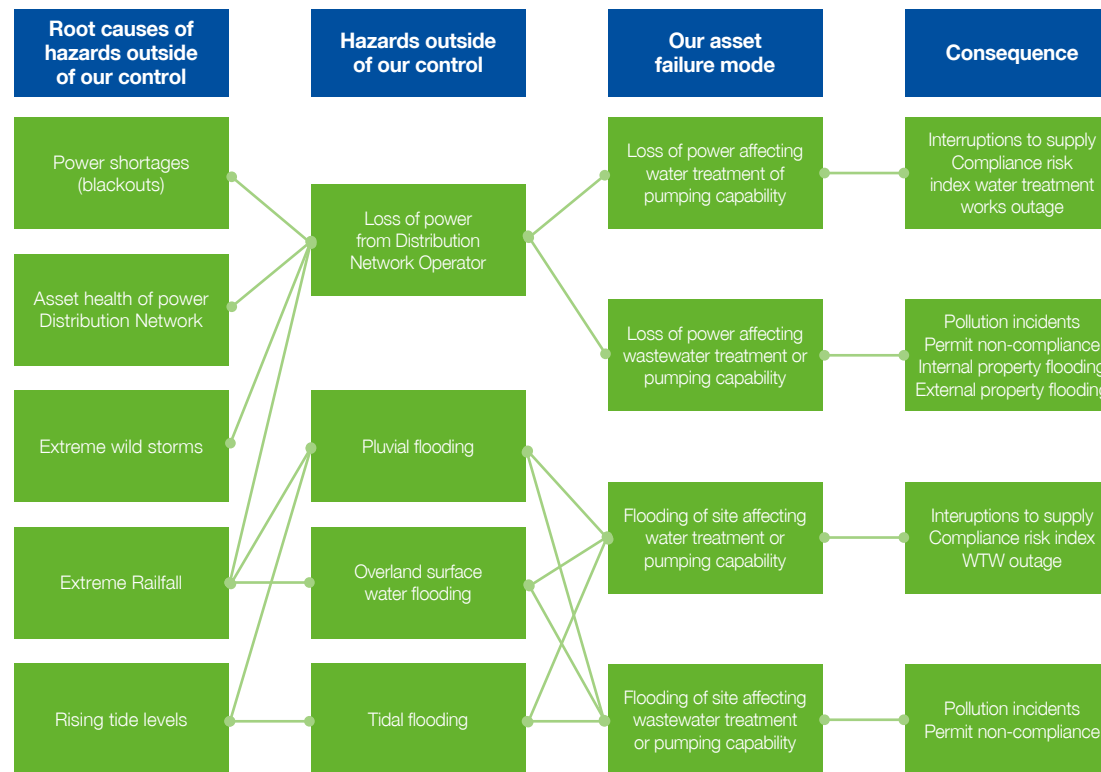
The water infrastructure network represents a significant part of the interconnected energy transport and technology network. If any failures occur in these systems, we have emergency response and recovery plans in place to ensure business continuity.

Since our last Climate Adaptation Report, we have formulated enhancement cases to identify and address hazards, outside of our control, identify their root cause, and understand how they affect the services we deliver to customers (Figure 6).

Such enhancements could provide an immediate reduction in risk to service levels. Customers told us that they were cautious about spending money before it is necessary (as the future is uncertain), and that bills need to be kept affordable – but on the other hand, this can prevent costs and problems escalating in future years and a safe, clean, reliable supply of water is a high priority.

Using our learning from our current Business Plan 2020 – 2025, we have created a much stronger process for understanding of our key interdependency risks, specifically related to power and flooding, designed appropriate solutions, and challenged ourselves on costs.

FIGURE 6: Risk interdependencies



7. FORWARD LOOK

Our Business Plan for 2025-30 sets out our next steps on climate change adaptation – with investments in new water supplies; added storage capacity in our wastewater network; and changes to our water and wastewater treatment works to protect them against power failure, flooding, and extreme temperatures.

It will create significant opportunities for local economic growth and community development. Throughout 2025-30 we will invest 60p in every £1 in our operating areas to support local jobs and communities.

We will invest more in environmental improvements than ever before, including improvements to water environments through our Bluespaces funding programme and a range of nature-based solutions to tackle nutrient pollution. We will continue to work with farmers and other stakeholders to improve biodiversity and catchment management in our areas, and through partnerships such as the Northumbrian Integrated Drainage Partnership to tackle flooding from all causes.

These investments will mean improved resilience against climate change – but this work is continuing. We have already started our next long-term planning cycle (through our next DWMP), and we are modelling the impacts of revised climate change assessments to assess the need for wastewater capacity. We expect the results of further investigations into abstraction in Essex and Suffolk later this year, and this will lead to more decisions about the right adaptive plan for water resources in this area by 2027.

We will launch our trials for behaviour change for households about how to reduce water entering sewers in the North East in the first place, and we will continue to improve our understanding of climate change and its impact on our systems and processes.

We remain committed to our principles: we must adapt to a changing future, however that might look. As always, we will look for opportunities to deliver research and innovation to support the implementation of this in the longer term. Working in partnership to deliver our work remains key and we continue to look for opportunities to deepen our collaboration with others. We want to do this using natural, sustainable solutions that consider the best balance of actions within the whole catchment, maximising long-term benefits for everyone – and where we can't, we will look for the most efficient solutions that are needed now. We will do all of this in discussion with our customers, balancing these needs with affordability.

In our last Climate adaptation report, we said that we could not adapt alone. We called for our regulators to work collaboratively to identify key opportunities to invest in our climate resilience in the long-term – and this has become more pressing, with standards for climate change resilience and a regulatory framework for cross-sector cascading failures now urgently needed. We call on regulators and the Government to consider this again, as without this framework and support it will become impossible to finance and deliver the climate change adaptation that is required.

We said that we wanted to engage with our customers and communities directly on climate adaptation. We have done so, involving our customers in planning and developing schemes to improve local water environments and reduce flooding (with much more investment secured for community projects in 2025-30) – but there is much more still to do. We said that we wanted to look for opportunities with stakeholders to co-create and co-deliver climate adaptation projects – and this needs to increase much more in the next few years, as it becomes more and more needed.

Please contact us at haveyoursay@nwl.co.uk if you would like to discuss specific opportunities.



River Blyth, Suffolk

8. APPENDIX

APPENDIX 1 – PROGRESS AGAINST OUR 2021 FIVE KEY AREAS OF ADAPTATION ACTIVITIES

Key area for activity	What did we say in 2021?	What have we done?
Engineering and nature-based solutions	<ul style="list-style-type: none"> • Develop a catchment approach to sustainable urban drainage. • Align our approaches to modelling climate change across the business. • Review company design standards to make sure they incorporate climate resilience. • Zonal strategic studies. • Continue to develop the resilience of the Broads. • Use innovation to reduce the impact of climate change on our assets. • Key projects to improve the resilience of our systems. • Best practice asset management. • Research to apply the circular economy approach within our business. • Continue our work in close collaboration with others. • Better understand the risks and opportunities associated with nature-based solutions to we can increase this for 2025-30. • Develop our approach to whole life asset management for nature-based solutions. 	<p>We developed a catchment approach to sustainable urban drainage, and we are using this alongside other tools (such as surface water separation) in our 2025-30 plans.</p> <p>We aligned our modelling for climate change across WRMP, DWMP, and other areas – and we adopted climate resilience standards in our designs for 2025-30.</p> <p>We delivered most of our resilience projects for AMP7, with some still due to complete. We scored the maximum on Ofwat's measure of best practice asset management, with substantial improvements in many areas.</p> <p>We carried out more work to understand how we could use more nature-based solutions (and continue to manage these over the whole life) and included many more of these for 2025-30.</p> <p>We completed our zonal strategic studies and included this in our investment plans for 2025-30.</p> <p>We carried out a more detailed assessment of climate risks and the impacts on our systems, to support more efficient and effective investment.</p>
Data, R&D and emerging technologies	<ul style="list-style-type: none"> • Test and develop more effective and sustainable water and energy solutions for homes. • Review our approach to geospatial data. • Continue with PhD funding through partnerships with universities, focusing on groundwater resilience under climate change. • Develop evidence base of asset performance across different temperature profiles. • Continuing research on interdependencies and risk associated with supply chains. • Develop app to help us understand individual asset risk and resilience. 	<p>We have improved our geospatial data and launched new mapping tools including real time information. We have continued to fund research through partnerships with Exeter and Newcastle Universities to look at the resilience of groundwater resources under different scenarios of climate change.</p> <p>We have looked at asset performance across different temperature profiles and proposed investment to address the immediate risks in our 2025-30 plan.</p>

Behavioural	<ul style="list-style-type: none"> ● Use our platform to leverage wider change in water use habits and water stewardship among our customers. ● Deliver campaigns and support others. ● Community investment strategy, working to collaborate and co-deliver solutions with multiple stakeholders. ● Work with Water UK, Government and others to promote water stewardship and responsible water use. ● Engage with our customers on climate change. ● Include climate change in our water efficiency engagement. ● Use innovative techniques to carry out strategic customer research. 	<p>We have driven the Water UK national campaign to reduce sewer blockages (Bin the Wipe) and have successfully influenced the Government to introduce water efficiency standards for new devices.</p> <p>From 2025, we will drive a much greater awareness of climate change and the impact on water resources in Essex and Suffolk, accelerating our smart metering programme and increasing our expenditure on water efficiency and extending this to business customers.</p> <p>We have engaged much more with customers on climate change, using innovative People Panels to address these strategic issues about timing and balancing investment against affordability.</p>
Institutional	<ul style="list-style-type: none"> ● Contribute to UKWIR project for common framework for climate adaptation. ● Continue to develop and improve our risk approach. ● Improve our asset resilience – systems analysis of risk and understanding vulnerabilities across our asset base. ● Explore participatory sustainable urban drainage and water use. ● Develop sector wide thinking on investing in climate adaptation by working with regulators. ● Engaging with academia and industry to understand how we can use the best tools and approaches to embed adaptation decision making. 	<p>We have improved our approach to risk and how we understand and mitigate climate change risks.</p> <p>We will launch our trials for behaviour change for households about how to reduce water entering sewers in the North East and will continue working with farmers to reduce the nutrients entering the environment in the first place.</p> <p>We carried out an analysis of climate risk and understanding of the vulnerabilities across our asset base and used this to inform our 2025-30 business plan. We will continue to advocate for standards and support the development of regulatory frameworks to assess climate change adaptation in a clearer way that incorporates customer views and climate evidence – and leads to the right outcomes for customers and the environment.</p>
Financial	<ul style="list-style-type: none"> ● Develop our approach to using sustainable finance instruments. ● Reporting our climate risks for NWL and NWL's pension fund. 	<p>We developed the approach in our Sustainable Finance Framework which aligns our sustainability strategy and business plan commitments to our financing ambitions.</p> <p>We published the TCFD report for the Northumbrian Water Pension Scheme year ending 31 December 2023 which focuses on climate-related risks.</p>

APPENDIX 2 – SUMMARY OF PROGRESS ON KEY SECTOR WIDE RISKS SINCE 2021 REPORT

Key sector wide risks	How do our actions work to address these risks?	Our progress
<p>1. Risk to our assts from river, surface, groundwater and coastal flooding</p>	<p>We aim to develop a catchment approach to sustainable urban drainage.</p> <p>We will continue to feed into developing the resilience of the Broads.</p>	<p>We continue to work in partnership with the Environment Agency (EA) and all Lead Local Flood Authorities in our region as part of the Northumbria Integrated Partnership (NIDP). NIDP schemes aim to deliver flood risk reduction from all sources, as well as other catchment benefits such as reduced storm overflow spills, surface water removal and new habitat and improved biodiversity.</p> <p>In our Business Plan for 2025-30, we have included more than £60m of investment to further support the delivery of future schemes across our region.</p> <p>Flood risk assessments for the Broads were refreshed for 2025-30 with no change in risk. We will continue to work with the EA and Broads Authority on the future flood risk management strategy for the Norfolk Broads and Broadland rivers. We are working with the EA to understand the final requirements for abstraction reduction from the Broads and Broadland rivers.</p>
<p>2. Risks to our systems and networks from subsidence</p>	<p>We aim carry out a review of company design standards for different asset types to ensure that they incorporate climate resilience.</p> <p>We will develop an evidence base of asset performance across different temperature profiles, and we are developing an app to help us to understand individual asset risk and resilience.</p>	<p>Work in these areas is ongoing and forms part of our business as usual activities.</p> <p>We assessed the key risks to our networks from temperature by 2030 and included some investments in our Business Plan 2025-30 (to protect key chemicals from heatwaves, and to accommodate higher water temperatures).</p>
<p>3. Reduced water availability, risking public water supplies</p>	<p>We will implement key projects to improve our supply resilience with a new connection to Abberton reservoir.</p> <p>We have been awarded funding from the Ofwat Innovation Fund which aims to test and develop more effective and sustainable water and energy solutions for people's homes</p> <p>We carry out a number of different customer engagement campaigns with a focus on water saving, such as Every Drop Counts and Rainwise. These support our customers to reduce water use, supporting climate adaptation and resilience.</p>	<p>The Abberton reservoir to Langford WTW Pipeline will be complete by 31 March 2025. New demand management and supply schemes, as detailed in our now approved Water Resources Management Plan 2024 (WRMP24), are being progressed. These include new strategic pipelines, a Water Reuse Scheme and a winter storage reservoir in Suffolk and a new water treatment works in South Essex.</p> <p>The project is ongoing, we have recruited nearly 70 households and are currently installing high frequency water consumption monitors and upgrading meters to make them smart. Our partners have also been conducting baseline surveys with customers and designing a programme of interventions ready for roll out and evaluation.</p> <p>We have continued to deliver successful campaigns across our regions.</p>

Key sector wide risks	How do our actions work to address these risks?	Our progress
4. Risks of poor water quality and supply interruptions	<p>We aim to build on existing critical asset assessments. We will continue our work on zonal strategic studies to help understand strategic, system-level pinch-points in the water system and extend this to new systems.</p> <p>New innovations to reduce algal loading.</p>	<p>We completed our zonal strategic studies and used this to develop our 2025-30 plans. This work is on-going as we will now build on this.</p> <p>We continue to look for new technology to reduce algal loading, and to optimise existing processes.</p>
5. Risk to our network from cascading failures	<p>We aim to improve our asset resilience to ensure that they are climate ready. We aim for this to include a systems analysis of risk and understanding of the vulnerabilities across our asset base.</p> <p>We will continue to align our approaches to modelling climate change across the business to ensure that all our systems are prepared for future climate events.</p> <p>We will continue research on interdependencies and the risk associated with supply chains.</p>	<p>Asset resilience continues to be part of our business planning activities.</p> <p>Climate change scenarios are a core part of our business planning. We aligned our DWMP, WRMP and long-term delivery plan assumptions for climate change, and used the same scenarios for modelling flooding risk to our assets for the first time. We created an assessment of regional climate change and different future risks for the first time.</p> <p>This work is continuing. We worked with Northern Powergrid to understand how cascading infrastructure risks could be addressed.</p>
6. Risks to aquifers from sea level rise and saltwater intrusion	<p>We are developing our updated water resource management plans which focus on improving the resilience of our water supplies in the long term.</p>	<p>Our revised WRMP has now been published (WRMP24).</p> <p>The main risk from saline intrusion is in the River Waveney. The EA has set new conditions that will prevent the saline wedge from moving upstream. This will result in less natural river water being available for Essex & Suffolk Water abstraction. However, any shortfalls will be made up by the schemes in our WRMP24.</p>

