

Anglian Water's Climate Change Adaptation Report 2020

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Foreword

“ As we look ahead, we do so in the certain knowledge that there is a huge task ahead of us, but with optimism that delivering on it will help us fulfil our purpose. ”

We became the first organisation in the UK to share our progress and plans in this third round of the Adaptation Reporting Power when we published our draft Plan for consultation in March 2020. Our thanks go to all the organisations and individuals who responded to it. We were heartened to hear that the vast majority of respondents felt we were on the right path; however, we were also grateful to receive constructive feedback on elements where some felt we could or should take a different approach. We have summarised feedback we received in [a separate Consultation document](#) and made some changes to the report to reflect it. Most importantly, of course, we will act upon it, and have set out how in our responses.

Together with rapid population growth in our region, climate change constitutes Anglian Water’s most acute challenge. Mitigating its impact, and adapting to it, both to ensure resilient supplies for the people we serve, and to protect and enhance our environment, has been central to the way we do business for many years. We have led the water industry by enshrining our social and environmental purpose into our company constitution; in 2019 we took the bold step of changing our Articles of Association to ensure, for the long term, that our directors will always consider the impact of their decisions on our communities and the environment.

We also recognise the ‘resilience deficit’ identified by the Climate Change Committee and the process of producing this report has highlighted that there is more we too must do to address it. And despite the challenges of the ongoing Covid-19 pandemic, it is clear there is no time to lose. In the face of ever more frequent extremes of weather, we cannot assume that our collective efforts to mitigate the impacts of climate change will limit global temperature rises to 1.5-2°C. Our next steps, therefore, will include updating all our plans to use the latest climate science and using scenario planning to prepare for a less optimistic scenario of a potential 4° rise in global temperatures - what we describe as getting #FitforFour.

To become #FitforFour will require unprecedented levels of collaboration, both within our sector and beyond it. I am pleased to be co-sponsoring the water industry’s ground-breaking collective commitment to reach net zero carbon by 2030 with my counterparts at Northumbrian Water and Yorkshire Water; this year I also took on the role of co-Chair of the Prince of Wales’s Corporate Leaders Group, which is driving action on climate change

among UK business leaders. Many positive steps are being taken through these and other channels, and there is widespread recognition of the power in working together.

So as we look ahead, we do so in the certain knowledge that there is a huge task ahead of us, but with optimism that delivering on it will help us fulfil our purpose: to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop.



Peter Simpson
CEO, Anglian Water



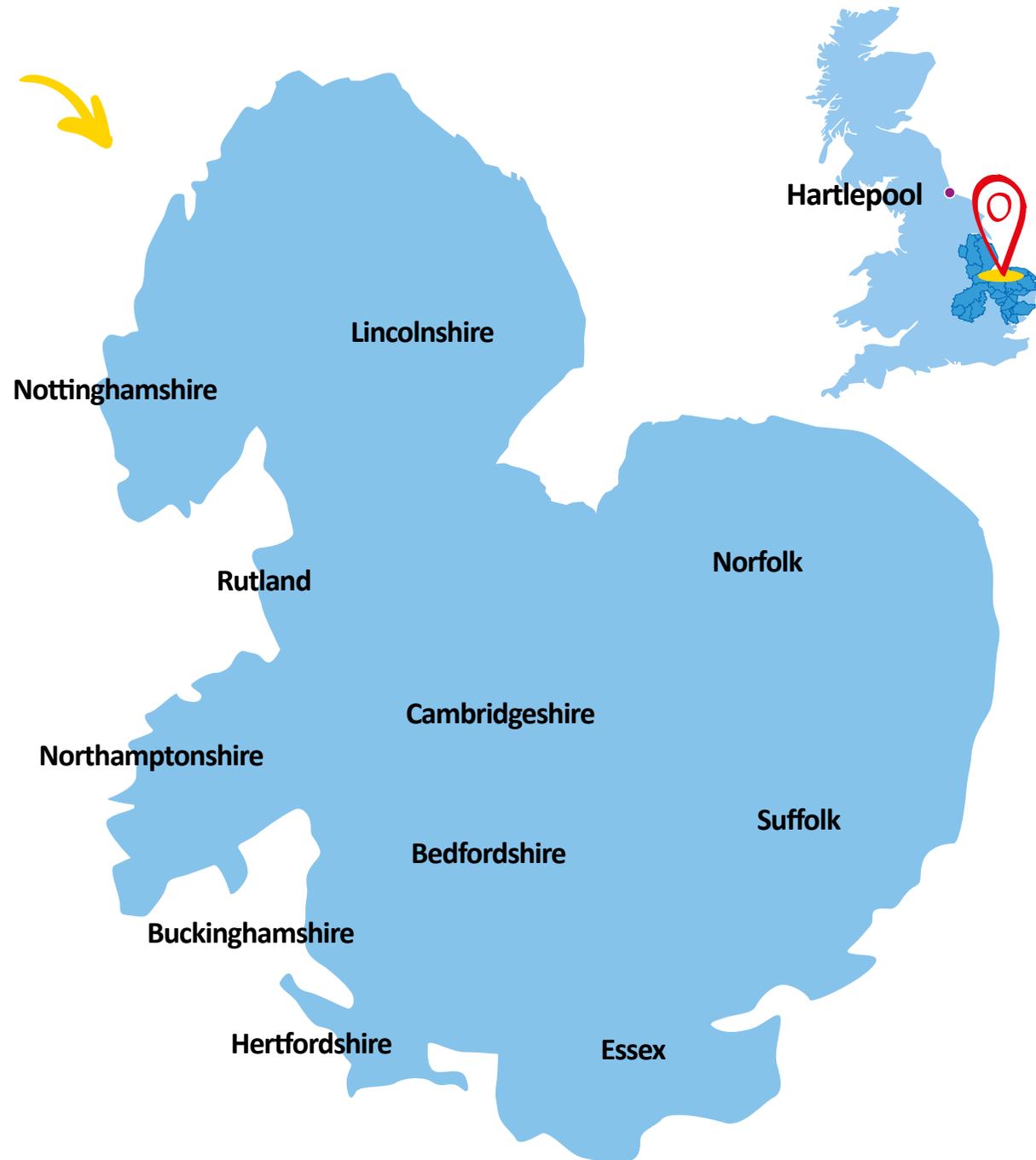
Executive summary

Our region

Our region – low lying, with a long coastline and low rainfall – is particularly susceptible to climate change. Water resources are already scarce, and rising temperatures will reduce them further, with the threat of more frequent droughts. Yet at the same time, rising sea levels and more intense rainfall will also lead to more flooding.

These challenges would be significant even with a static population, but our region is one of the fastest growing outside London, with 175,000 new homes expected to be built by 2025 (without factoring in the proposed Oxford-Cambridge Arc) and population growth of up to a million people likely by 2040. With growth most likely in the areas where supply is most stretched, the risk of flooding is greatest, and the environment most under pressure, the need to adapt to new climate realities is acute.

- **Demand for water** will rise but available water won't
- **Population** is expected to rise – around **1 million** homes to be built in the next 25 years
- Our region is the **driest** in the UK – but warm weather leads to heavy downpours
- **28%** of our region is below sea level
- Our region has **1,200km** of coastline
- **25%** of the nation's cereal crop is grown here in East Anglia, and **75%** of the nation's shellfish industry is located on the East Coast
- As a **low-lying region**, lots of energy is needed to pump water around



Our strategy

The challenges we face are described in our Strategic Direction Statement, which was refreshed in 2017. In it we set four long-term ambitions to help guide our planning - all of which relate to climate change.

However, our recognition of these challenges goes back much further than 2017. We have been taking action to manage our key risks from climate change since the 1990s. The timeline overleaf lists some of the key milestones in our journey to embed climate change across our business.

Looking to the future, we have effective 25-year plans in place for both water resources and water recycling, and we are embedding climate change into everything we do. We recognise that despite the many actions we have taken to date, set out below and in our previous Adaptation Reports (published in 2011 and 2015), there is much more to do to make the East of England resilient to climate change.

A particular challenge in managing climate change is the inherent uncertainty. Our response is to make increasing use of a range of climate scenarios and adaptive pathways combined with the best available science.

Our long term ambitions

-  **Make the East of England resilient to the risks of drought and flooding.**
-  **Enable sustainable economic and housing growth.**
-  **Work with others to achieve significant improvement in ecological quality across our catchments.**
-  **Be a net zero carbon business by 2030.**



Anglian Water climate change timeline

1993

Climate change first considered in our assessment of water resources

2005

Our first company-wide climate change risk assessment

2005

Founding member of the Prince of Wales's Corporate Leaders Group focusing on climate change

2006

Climate Change Advisor appointed

2007

First Strategic Direction Statement published. Climate change recognised as one of two fundamental challenges to Anglian Water, alongside population growth

2007

Contributed to the Stern review on the economics of climate change

2009

Water Resources Management Plan 2009 published. Impact of climate change on supply and demand informed by UKCP02 climate projections

2010 

Love Every Drop, our fully integrated corporate and sustainability strategy, launched

2010

Formation of Climate Change Steering group

2011

First Adaptation Report published

2014

Led the development of multi-sector partnership Water Resources East

2014

Water Resources Management Plan 2014 published

2015

Second Adaptation Report published

2016

Anglian Water became the first organisation in the world to be verified against PAS 2080, a new standard for carbon management in infrastructure

2016

'Water Resources Long Term Planning' published by Water UK, breaking new ground in water resources planning by looking 50 years ahead across the whole of England and Wales. Project chaired by Anglian Water's Jean Spencer

2017

First European utility company to issue a sterling Green Bond

2017

Signed up as a supporter of Taskforce for Climate-Related Financial Disclosures (TCFD)

2017

Second Strategic Direction Statement. 'Make the region resilient to drought and flooding' is one of the goals, together with a commitment to become a carbon neutral business

2018

First TCFD disclosure made

2018

Water Recycling Long Term Plan published. First long-term plan for managing the supply of water recycling services to meet future demands, equivalent to the Water Resources Management Plan

2019

Water Resources Management Plan 2019 published. The impacts of climate change on water supply and demand were modelled using UKCP09 climate projections

2019

Net zero carbon by 2030 commitment made with others in the water sector

2019

Company Articles of Association amended to enshrine consideration for society and the environment into decision making for the long term

2020

Our CEO, Peter Simpson, is nominated as co-chair of the Prince of Wales's Corporate Leaders Group in the UK

2020

Anglian Water secures A-list status from global disclosures organisation CDP for its response to climate change

Risk assessment

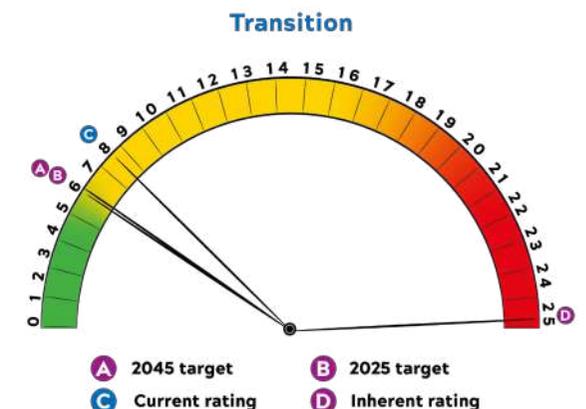
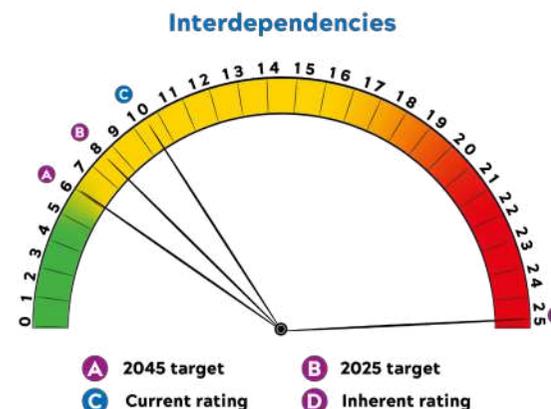
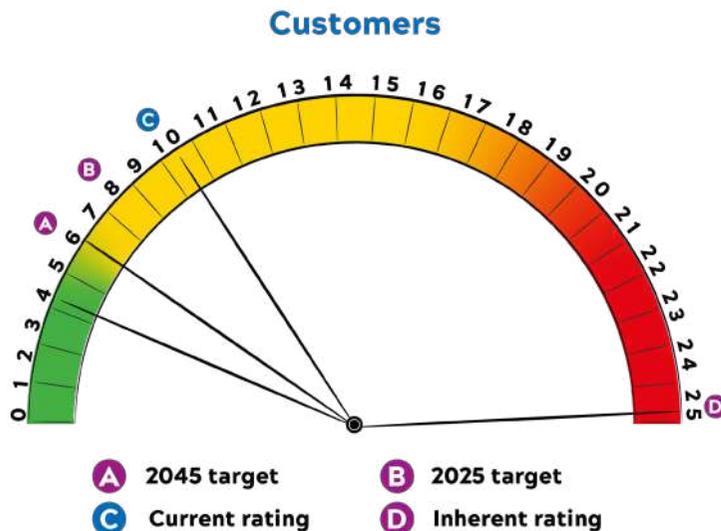
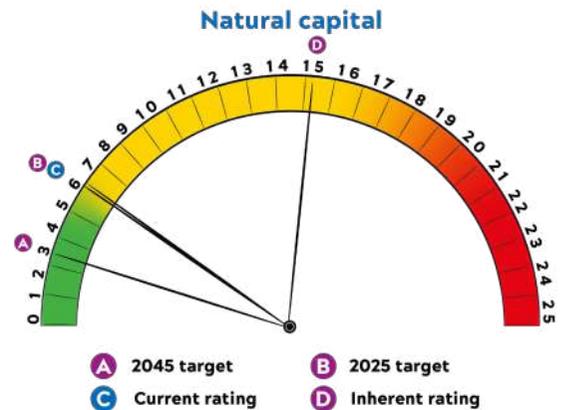
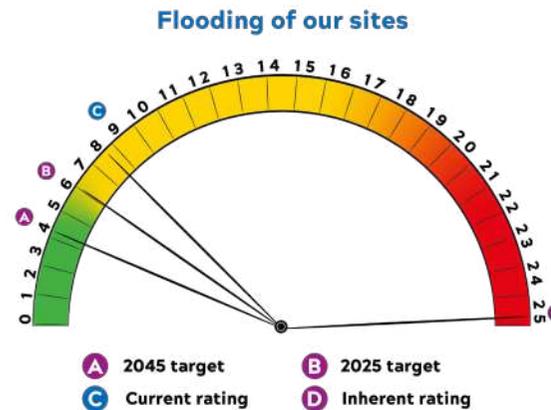
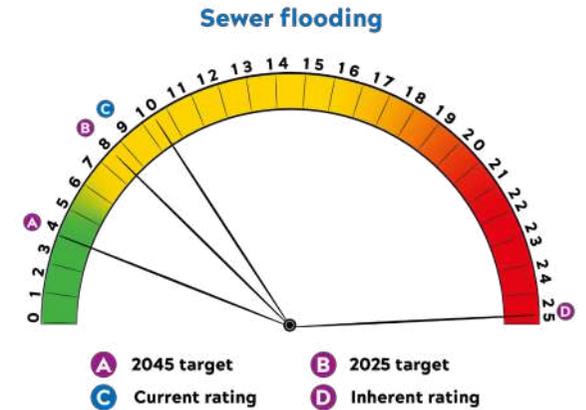
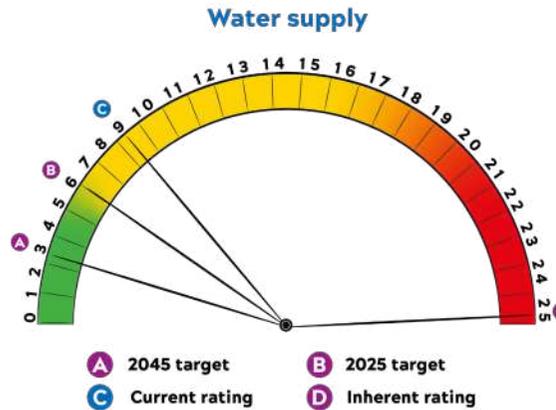
We have carried out a renewed and detailed risk assessment for this report.

The progress we have made in managing our most significant risks is summarised in the infographics below and described more fully in the rest of the report.

The first four chapters cover our most significant physical risks: water supply, sewer flooding, flooding of our sites and natural capital.

Chapter five addresses the financial risk of transitioning to a low carbon economy.

Chapters six and seven are important cross-cutting chapters addressing the risks associated with interdependencies and customers.



What we've done...

Water supply

Updated our **long-term Water Resource Management Plan** and **Drought Plan**

Maintained the **lowest leakage** in the industry

Become **industry leaders** for metering coverage

Changed our service level for emergency drought orders from **1 in 100** years to **1 in 200**

Invested in resilience, reducing the number of customers with a single source of water from **47 per cent** to **25 per cent**

Trialled **smart meters** and **water consumption behaviour change** campaigns in our Newmarket Innovation Shop Window project

Flooding

Published the industry's first **Water Recycling Long Term Plan** in 2018

Assessed flood risk (from all sources) for all our sites and put **permanent defences** and/or **Flood Emergency Response Plans** in place. We also maintain a dedicated **East Coast Flood Plan**

Invested in schemes at **36 sites** between 2015 and 2020 to **improve their resilience** to flooding from multiple sources

Contributed **£7.5 million** through our Partnership Funding programme towards **49 flood protection schemes** that help protect customers and our assets

Other climate-related actions

Delivered the **best overall water company** performance in AMP6 according to Ofwat, including No.1 for customer service

Established **Water Resources East** as an independent company to lead multi-sector water management planning

Ensured that **99% of our Sites of Special Scientific Interest** (SSSI) are in favourable condition

Delivered **reductions in both operational and capital carbon**

Delivered **six successful Sterling Green Bond** issues to fund our investment programme

What we plan to do...

Build **500km of interconnecting pipeline by 2025** to move surplus water from the north to the south of our region

Reduce our leakage by a further **22 per cent by 2025** (versus 2017/18), and **halve it by 2050**

Increase the coverage of customers with a meter towards **95 per cent**, with **all meters to be smart meters**.

Eliminate the risk of severe water restrictions in a 1:200 drought for **all our customers by 2025**

Reduce the proportion of customers supplied by a single source of water to **14 per cent by 2025**

Reduce per capita consumption to **120 litres per day by 2045**

Evolve our **WRLTP** into a **Drainage and Wastewater Management Plan** (DWMP), the new industry standard for long-term planning

50 per cent Increase in partnership funding to **£12 million between 2020 and 2025**

Reduce internal sewer flooding incidents for customers by **24 per cent between 2020-2025**

Deliver our **Make Rain Happy** programme, aimed at better managing surface water

Reduce serious pollution incidents to **zero by 2025**, with a **25 per cent reduction in non-serious incidents**

Invest **£1.4 billion** overall in water resources and the environment in AMP7

Reduce household bills in real terms by 2025, to around £1.15 per day

Deliver a **net zero carbon water sector by 2030**

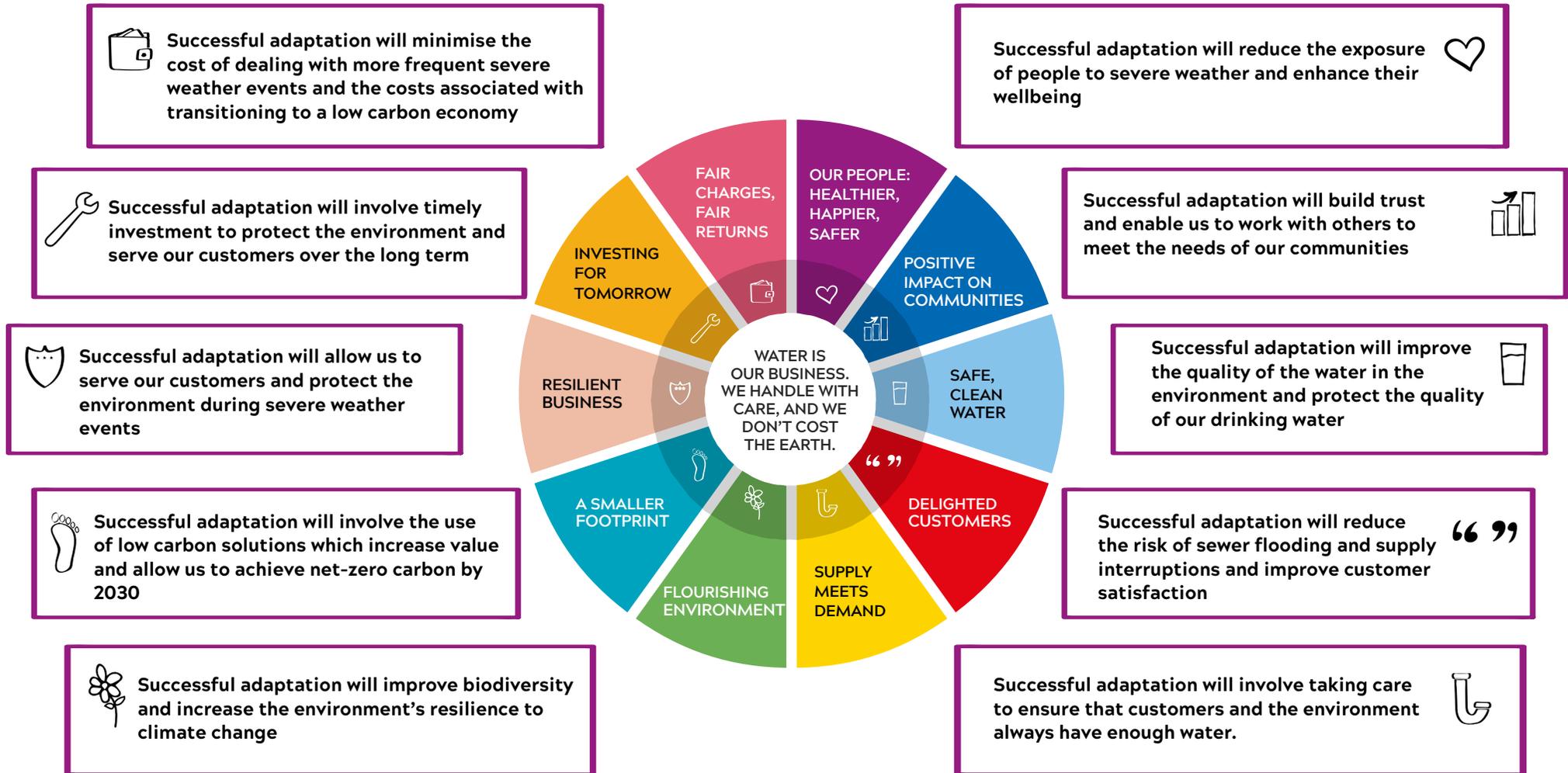
Voluntarily **apply biodiversity net gain** to our projects from April 2020, helping the region's wildlife to become **more resilient to climate change**

Start work on **34 new low carbon treatment wetland schemes by 2025**

Collaborate to protect our region through establishing **Natural Capital East**

Ambitious customer outcomes

And whilst climate change is our biggest challenge, **it's also an opportunity** to do things differently and increase value to our customers and the environment.



Introduction

The purpose of this report is two-fold:

1. To describe how we are embedding adaptation across our business.
2. To contribute to government understanding of our level of preparedness to climate change, and feed into the Committee on Climate Change's reports to Parliament.

Our strategy

Our purpose as an organisation is to bring environmental and social prosperity to the region we serve through our commitment to love every drop.

Our business model is structured to create long-term value for customers, employees, investors, business partners and the wider community, and to safeguard and enhance our environment, as summarised in our Business Model overleaf.

Climate change is formally recognised as one of the pressures we face: we must balance the needs of our customers and the environment in one of the driest, lowest-lying and fastest growing regions of the UK.

In consultation with our customers, we developed ten outcomes in 2013 to describe the future we are working towards, refreshing them in 2017 to stretch ourselves even further. These outcomes have been identified based on the need to address specific challenges in our region; but have also been aligned to national and global drivers of change, such as the United Nations Sustainable Development Goals. The outcomes are linked to the longer-term goals defined in our Strategic Direction Statement, which is our vision for the future we want to achieve, looking ahead to 2045. Without adaptation, climate change will undermine our ability to deliver these outcomes and longer-term goals.

The business model diagram includes a feedback loop to highlight the monitoring, evaluation and learning that is built into the organisation's processes. This happens in numerous formal and informal ways, for example during monthly and annual performance reporting, through the preparation of five-year business plans and through regular updating of the risk registers. Monitoring, evaluation and reporting is also built into the process for delivering major investments: the projects team present the climate-related risks and interventions at each stage of the project to Anglian Water's climate change specialist to review.



In 2019 we became the first water company – and, we believe, the first UK utility – to formally enshrine commitment to society and the environment into our company constitution for the long term.

With the support of our shareholders, we made fundamental changes to our Articles of Association, the legally binding document which governs how the business will be run. Anglian Water's directors are legally required to consider the impact their decisions will have on society and the environment, as well as making fair returns for shareholders.

To support this, we have committed to use a six capitals approach to decision making so that we always consider our wider impacts, balancing financial objectives with social and environmental priorities. Carbon and climate resilience measures are included within our six capitals framework.

Our customers share this view and recognise that additional investment is needed to adapt to climate change. We received very strong levels of support for the investments in our next five-year business plan that will deliver protection from drought and flooding and other climate-related risks.

Our business model



Our approach to reporting

This is the third submission we have made to the Department for the Environment, Food and Rural Affairs (Defra) under the Adaptation Reporting Power (ARP) of the UK Climate Change Act (2008). In ARP1, published in 2011, we undertook a quantitative risk assessment, focusing on the physical risks from climate change to our assets. In ARP2, published in 2015, we reviewed these key risks with stakeholders across the business and concluded that there was little change. In the 10 years since undertaking the ARP1 assessment, our understanding of risks has improved and we have invested heavily in managing them.

In ARP3 we have applied our corporate approach to risk assessment to quantitatively assess risks from climate change. This ensures that climate risks are assessed consistently with other types of risk and they can be easily incorporated into our corporate risk register and resilience framework. This is an important step in embedding adaptation into everything we do: assessing climate-related risk is not a standalone activity for us, it is part of the way we assess and respond to risk to improve resilience in the round.

More information on our approach to becoming a truly resilient water company is available in our publicly available documents, including “A Framework for Resilience: PR19 and Beyond”.

Our approach to this risk assessment

- We have identified risks from climate change by considering potential climate futures and consulting across the business.
- We have scored each risk in terms of the likelihood of it occurring and the consequence if it did occur (using definitions from our corporate risk assessment process) for different time horizons:
 - **Inherent risk** – the level of risk if we took no action.
 - **Current risk** – the current level of risk, taking account of actions we have already taken/are taking.
 - **Target risk** – the level of risk that we are targeting after we implement our planned actions (assessed at 2020 and again at 2045).

The outcome of this risk assessment is a quantitative assessment of more than 40 material risks.

In the chapters that follow, we summarise:

- ✓ Our understanding of the seven most significant climate-related risks
- ✓ The progress we have made in adapting to them since 2015
- ✓ Our plan for reducing them further.



In each chapter we have included a risk profile for each of the risks and metrics for measuring progress. The risks described represent a selection, and in some cases an aggregation, of some of the 40+ risks we identified. As such, in each chapter we have explained how we have defined each of these seven risks. They have been scored in a way that is consistent with the company’s established risk assessment methodology. The risk assessments assume that we will deliver a reduction in risk as per our 2020-2025 Business Plan.

The first four chapters describe our most significant physical risks: water supply, sewer flooding, flooding of our sites and natural capital. Chapter five addresses the risk of transitioning to a low carbon economy. The last two chapters are important cross-cutting chapters addressing the risks associated with interdependencies and customers.

A summary of the risks we have been asked to report on in an industry-standard template can be found in the Appendix.

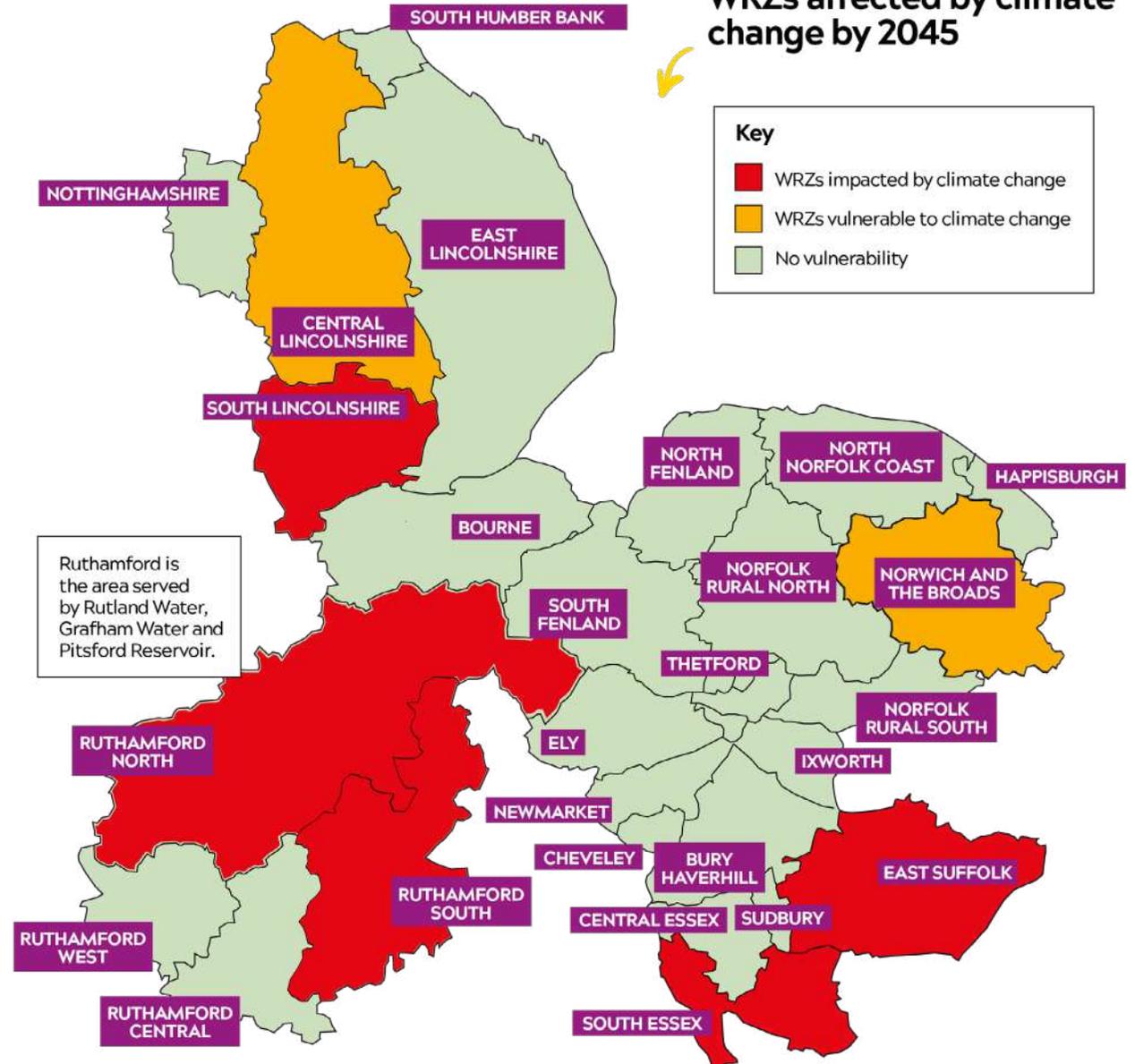
Chapter 1: Risk to public water supply (drought)

1.1 Understanding the risk

Climate change in our region will lead to less rainfall in summer and more in winter. Drier summers and a limited capacity to store an increase in winter rainfall means that there will be less water available through the year. Climate change is also likely to increase the demand for water among both household and non-household customers in a drier, warmer climate. Left unmanaged, this combination of reducing supply and increasing demand results in one of our most significant climate-related risks.

We have been assessing the impact of climate change on water resources since the 1990s. The primary way in which we manage this risk is through the statutory Water Resource Management Plan (WRMP) and Drought Plan. Since the second round of reporting under the Adaptation Reporting Power (ARP2), we have implemented the supply and demand actions set out in WRMP14 and have published our next plan, WRMP19. In preparing WRMP19 we have accounted for uncertainty in the future climate by modelling the impact of a range of climate change scenarios on the supply-demand balance.

Climate change is currently causing a reduction of 38 million litres per day (ML/day) in the amount of water available to meet demand in our region (the supply-demand balance); this could go up to 58ML/day by the end of the 25-year planning period. Our climate change impact assessment confirms that our most vulnerable sources are our winter storage reservoirs and direct abstraction river intakes.



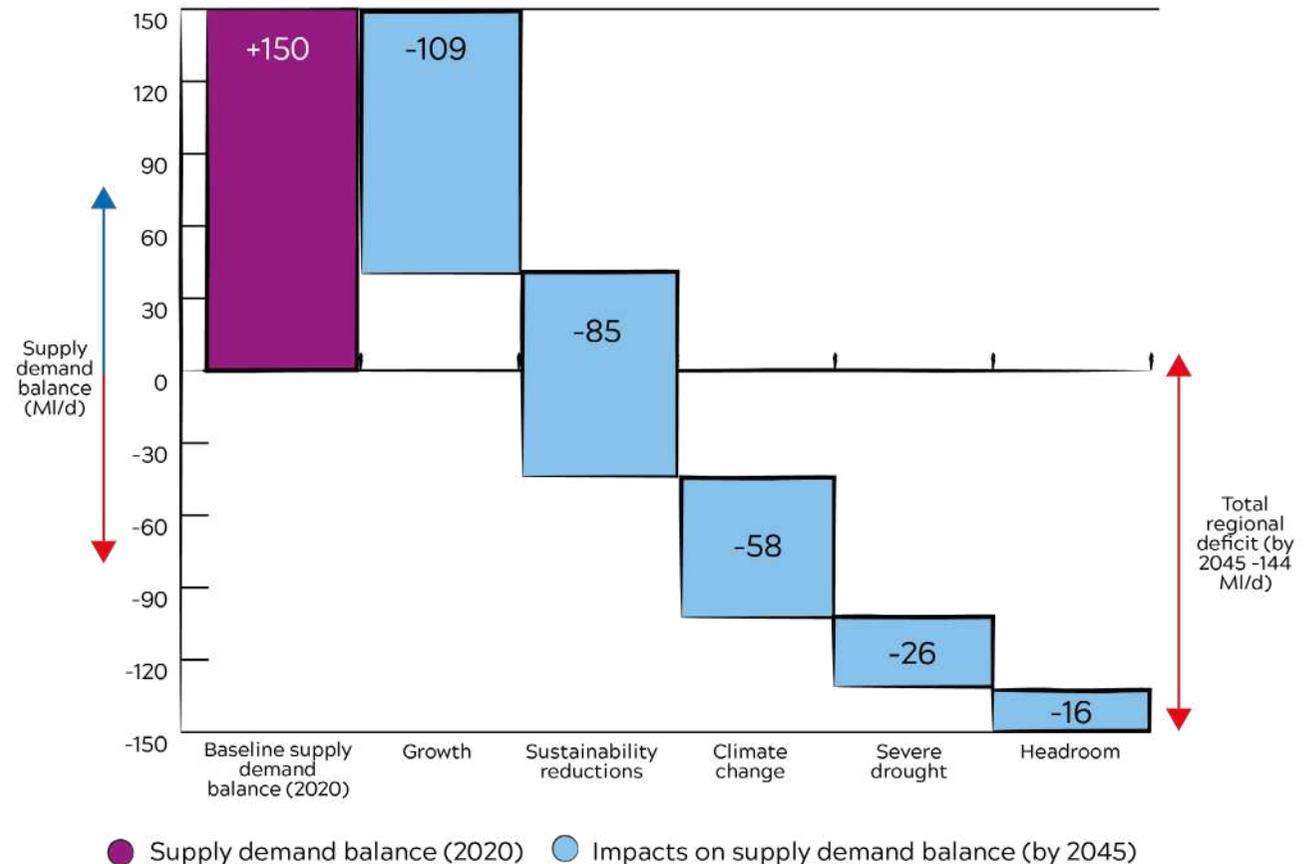
Modelling indicates that climate change will have a significant impact in at least five Water Resource Zones (WRZs). In these zones there will be a material reduction in the volume of water that each water treatment works can put into supply. Two other zones are particularly vulnerable but the impact is unlikely to be material. The map on the previous page and the modelling initially assumes no adaptation.

Climate change is not the only pressure on the supply-demand balance: the graphic on the right shows how climate change and other pressures contribute to an overall projected regional deficit of 144MI/day by 2045. This is our version of the 'jaws of death' chart mentioned by Environment Agency Chief Executive Sir James Bevan in his widely reported and influential speech at the 2019 Waterwise annual conference.¹ To be clear, to address the regional deficit it is essential that we manage demand in all of the WRZs and not just those identified as having a localised deficit.

As well as improving the way we model climate change impacts on water resources, we have improved our understanding of drought risk since ARP2. We have identified Water Resource Zones (WRZs) where a 1-in-200-year drought (i.e. with a 0.5% chance of occurring in any year) could mean that we need to apply severe demand restrictions on customers (such as rota cuts). This risk exists at present in five of our 28 Water Resource Zones.

¹ <https://www.gov.uk/government/speeches/escaping-the-jaws-of-death-ensuring-enough-water-in-2050>

Supply-demand balance



1.2 Actions taken to address the risk

Based on our WRMP 2014, since we last reported we have invested heavily in a “twin-track” approach to both manage demand and develop new sources of supply.

Demand management

Between 2015 and 2020 we have:

- **Achieved an industry-leading leakage rate.** In 2019/20 we achieved a leakage rate of 182MI/d (three-year average 185MI/d). This is 13 per cent of our total water treatment works output and is half the industry average.
- **Installed 86,000 new water meters and upgraded another 412,000.** We are now industry leaders for metering coverage. Nationally, around 50 per cent of households have a water meter; in the Anglian Water region this is 90 per cent.
- **Continued our behaviour change programmes, working with customers to reduce demand.** Our Smarter Drop campaign in Newmarket led to a drop in demand of 8 per cent (see case study, page 69). Through our Bits and Bobs campaign we have also carried out 180,000 home visits, providing personal water-saving tips, distributing water-saving products and checking for meter leaks.

Supply measures

Between 2015 and 2020 we have invested more than £165 million to implement supply-side measures. Examples of investment to address supply-demand deficit and improve resilience include:

- **Investing £3 million** in relocating one of our intakes on the River Wensum to address a deficit in the Norwich and the Broads resource zone and restore favourable hydro-ecological conditions in the river.
- **Investing £28 million** in a major resilience scheme for Grafham Water Treatment Works, helping us achieve our target to reduce the number of customers with a single source of supply from 46.9 per cent to 24.7 per cent.

“We have invested heavily in a “twin-track” approach to both manage demand and develop new sources of supply.”



Our Smarter Drop campaign in Newmarket

1.3 Planned actions

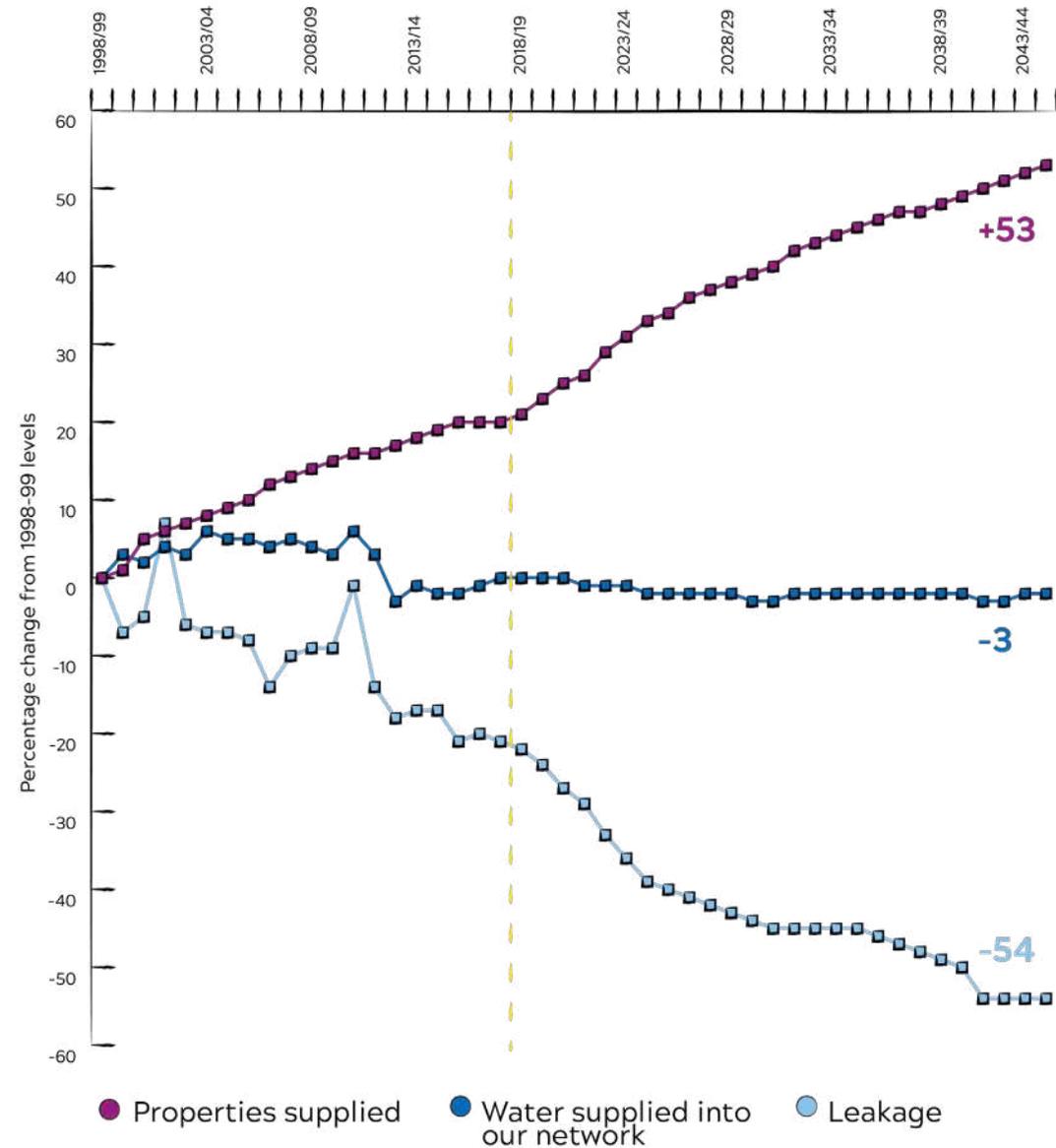
We will continue to manage the risk from climate change to public water supply by implementing the twin-track approach set out in our recently published 2019 WRMP. Our Final Determination from Ofwat allows about £720 million of funding for the period 2020-2025, some of which is to be funded through Direct Procurement.

Demand management

The graph on the right shows what we have achieved in terms of demand management since 1998: the number of properties we supply today is 20 per cent greater than in 1998, while the amount of water required to supply them has remained broadly stable. We have achieved this through reducing leakage and managing demand. We will continue to do this over the next 25 years: our ambition is to supply 54 per cent more properties in 2045 than we did in 1998/99, with slightly less water going into supply.

- **Reducing leakage** – we plan to invest £70 million of the Final Determination funding in reducing leakage over the next five years. This is the first part of our long-term aim (by 2045) of less than 10 per cent of treated water (distribution input) being lost in leakage. We will also work with the other water companies in England to triple the rate of sector-wide leakage reduction by 2030 as part of the water industry's Public Interest Commitment.²
- **Metering and reducing water consumption** – we plan to invest £126 million of the Final Determination funding in rolling out smart meters across our network; increasing coverage of customers with a meter towards 95 per cent, considered the upper feasible limit.

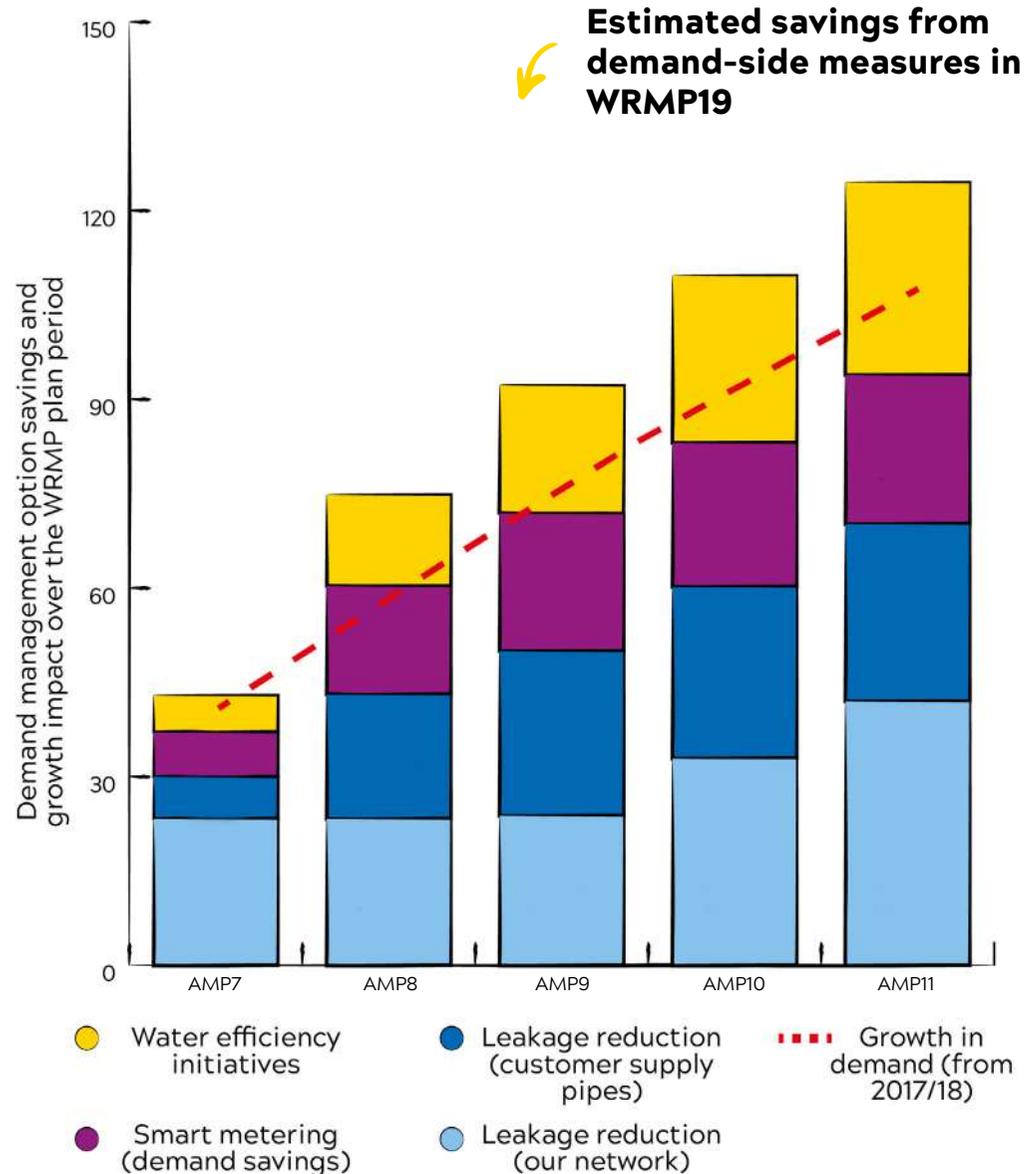
**Demand management :
past actions and future
ambition**



These measures will combine to achieve a saving of just over 120Ml/d by 2045, exceeding the anticipated growth in demand from new housing and a larger population, see the graphic on the right. This means that at the regional level, we will not abstract more water from the environment to accommodate housing growth. In fact, we put less treated water into our network today than we did in 1989, despite serving a much larger population.

² <https://www.water.org.uk/publication/public-interest-commitment/>

“ We will also work with the other water companies in England to triple the rate of sector-wide leakage reduction by 2030 as part of the water industry’s Public Interest Commitment. ”



Supply measures

In our latest 25-year Water Resources Management Plan we proposed a 500km series of interconnecting pipelines running from Lincolnshire, where there is surplus water, to Cambridgeshire, Suffolk and Essex, where water is less readily available. Moving water from areas of surplus in the north to areas in deficit, and adding in new supplies over time where required, is an essential part of our twin-track strategy.

The graphic to the right illustrates the supply-side measures we proposed.

Of the £720 million included in Ofwat's Final Determination, £130 million has been assumed for the treatment and transfer of potable water in the north of our region. This work will be delivered by third party direct procurement. A further £25 million has been allowed for measures to address abstraction licence reductions and £365 million will be used for the strategic supply measures required to address the areas in deficit.

“ Moving water from areas of surplus in the north to areas in deficit is an essential part of our twin-track approach. ”



Proposed supply-side measures

WRMP24

Our planning for managing risks to water resources doesn't stand still. We are already working on our next water resources management plan, WRMP 2024, which will be published for consultation in 2022. This involves updating our modelling of climate change impacts on water resources using UKCP18 (the latest climate projections for the UK), and improving how we account for uncertainty by considering an even greater range of climate change scenarios. WRMP 2024 will also take account of the emerging findings of two academic studies which we are sponsoring, looking at the relationship between climate change and drought.

In the medium to long term, we are likely to need additional sources of supply. This could include winter storage, recirculation of recycled water, inter-regional transfers and desalination. We will continue to work with regional stakeholders and neighbouring water companies over the next two to three years to identify the best options to take forward to WRMP 2024 (see case study on Water Resources East, page 61).

“ We are already working on our next Water Resources Management Plan. ”

Improving our understanding

We are currently working to develop our understanding of the potential risks from climate change to water quality. In 2020 we have begun a major piece of work to identify and assess these risks with the aim that future WRMPs will take into account the impact of changing water quality on resources, and vice versa.

We are also working to improve our understanding of the risk to public water supply (and water recycling services) from operational impacts associated with high temperatures.

The risks identified in our WRMP and Drought Plan are likely to be exacerbated by high temperatures which can cause equipment to overheat, potentially leading to loss of service for our customers.



Working with regional stakeholders at a Water Resources East event

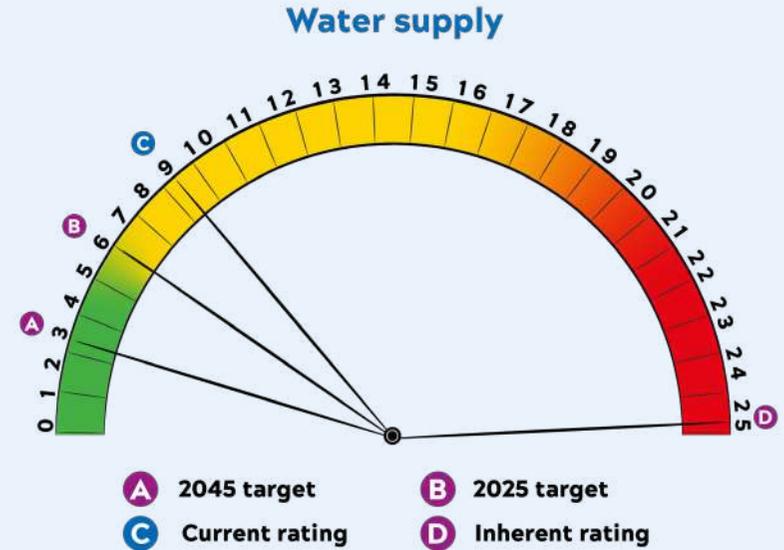




1.4 How have we quantified the risk?

To quantify the risk to public water supply from drought, we have assessed the risk of implementing severe supply restrictions in a 1-in-200-year drought as well as the risk of a loss in supply during a (summer) peak demand period. The assessment assumes we satisfy the supply-demand balance described in our Water Resources Management Plan and operate in accordance with our Drought Plan.

The assessment methodology is consistent with the approach used for our corporate risk register.



1.5 Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
Risk of severe restrictions in a 1-in-200-year drought	% customers at risk	-	-	5.20	0	0
Percentage of population supplied by a single supply system	%	-	46.9	24.1	14.1	0
Service Level Restrictions	Number per 10 years	0	1	1	-	-
Security of Supply Index (100 = secure)	Score out of 100	100	100	99.9	100	100
Unplanned outages	% unplanned outages from production capacity	-	-	1.54	2.34	1.74
Water supply interruptions	Average time in minutes: seconds cost per customer	-	20:06	18:39	05:00	03:00
Per capita consumption (3-year average)	Litres per person per day	147	135	136	131	120
Leakage (3-year average)	Ml per day	210	191	185	156	107
Meter penetration	% of customers on a meter	65	85	91	~93	~95

Customer performance commitments for the period starting in 2020/2021 are indicated in **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

Chapter 2: Risk of sewer flooding

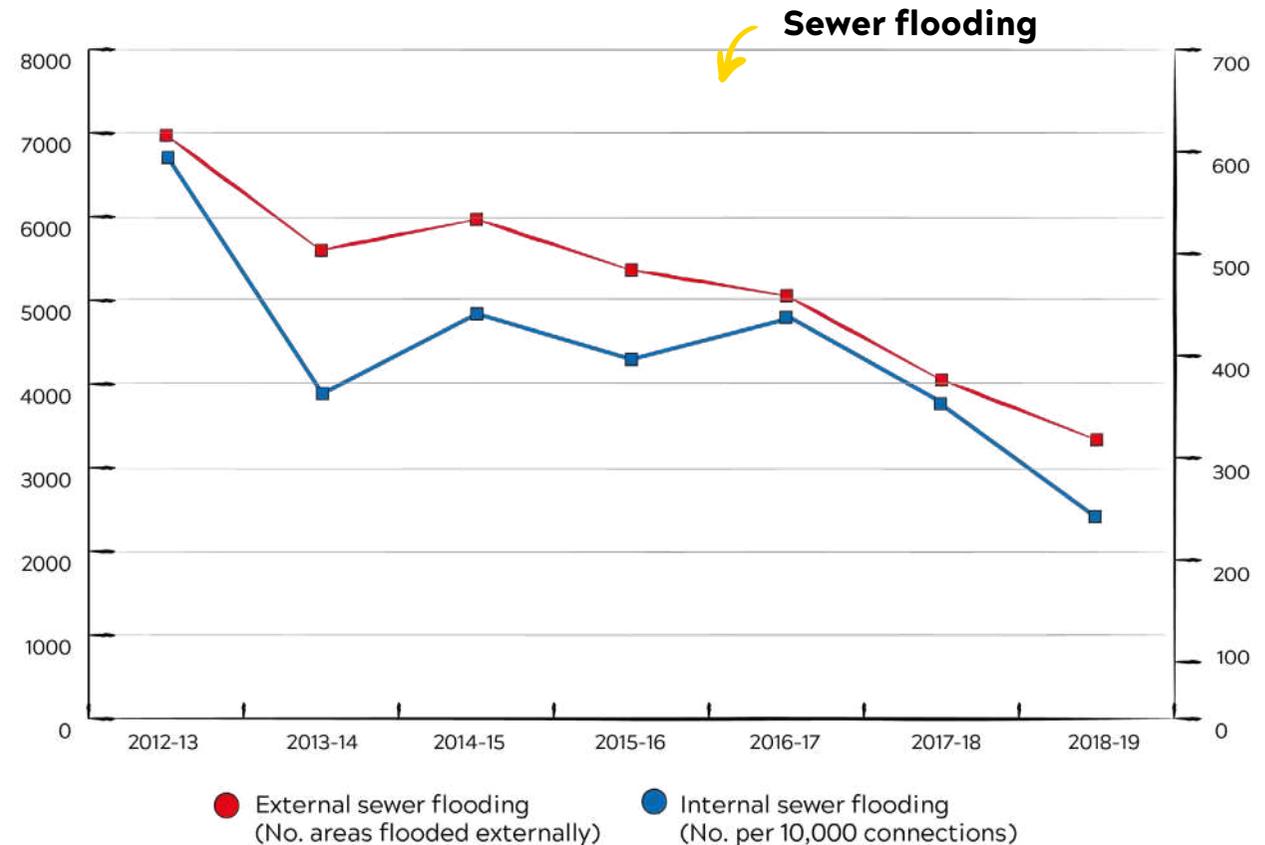
2.1. Understanding the risk

Sewer flooding is caused by hydraulic overload (too much water) or blockages (fat, oil, grease and other ‘unflushable’ items) and can lead to flooding of homes and business and environmental pollution. In our region more than 80 per cent of sewer flooding incidents are due to blockages.

We are already experiencing wetter winters, which is consistent with projections of climate change projections. During the most recent decade from 2009 to 2018, UK winters have been 5 per cent wetter compared to the reference period 1981-2010.³ This trend is forecast to continue and will increase the underlying risk of sewer flooding. However, there has been a downward trend in areas and properties affected by sewer flooding since our first Adaptation Report, which we attribute to the work we do with customers to reduce the risk of blockages, and schemes we have delivered to reduce the risk of hydraulic overload.

One of our performance commitments is to reduce the percentage of customers at risk of sewer flooding in a 1-in-50-year storm (i.e. a 2 per cent chance of happening in any given year). In 2018/19 the percentage of customers at risk was 14.31 per cent. We propose to reduce this to zero in the long term. Without adaptation action, an increase in heavy rainfall due to climate change will make it impossible to meet this commitment.

³. State of the UK Climate 2018



	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Internal sewer flooding (No. per 10,000 connections)	593	380	452	411	427	349	251
External sewer flooding (No. areas flooded externally)	6,974	5,600	5,970	5,364	5,057	4,051	3,337

2.2 Actions taken to address the risk

We have worked hard to reduce the risk of sewer flooding caused by overloading and blockages. 2018/19 was our best year to date, with the fewest internal and external flooding incidents from our sewer network. We were also well ahead of our regulatory (ODI) target to have no more than 298 pollution incidents caused by escapes from our water recycling network by the end of 2019/20.

However, we know that we cannot stand still, and if we do not continue to adapt, climate change will increase the risk of sewer flooding. Since we last reported, we have published our award-winning Water Recycling Long Term Plan (WRLTP) and invested in research to inform the design of new sewers and behaviour change programmes to reduce the risk of flooding from our existing sewers.

Water Recycling Long Term Plan

Our WRLTP is the industry's first long-term plan to manage the supply of water recycling services and is equivalent to the Water Resources Management Plan (WRMP). In developing our WRLTP, we used the UKCP09 climate change projections, population projections, and information on future flood risk to inform sewer capacity and water recycling centre deficit assessments and identify priorities for investment.

Sewer design

Climate change would not have been a consideration when most sewers we own and operate were designed and built. However, we now design all new sewers with climate change in mind. We have carried out our own research to determine what 'leading' looks like and have contributed to a

UK Water Industry Research (UKWIR) project which looked at the impact of rainfall intensity on sewer design. As a result, our standard for internal and external flood management schemes is to design with a 20 per cent uplift for climate change.

Following the publication of UKCP18, and in particular the local 2.2km convective projections⁴, we are involved in the 'Future Drainage' project.⁵ This project aims to produce revised rainfall 'uplifts' and new guidance for urban drainage design and for modelling surface water flooding in urban areas.

⁴. <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-factsheet-local-2.2km.pdf>

⁵. <https://gtr.ukri.org/projects?ref=NE%2FS017348%2F1>

Behaviour change



Keep It Clear campaign

Our Keep It Clear campaign provides customers with advice on how to properly dispose of fats, oils and grease as well as unflushables, so that sewers don't become blocked. In locations where Keep It Clear is running, we've seen blockages reduce by 84 per cent. We also support the Marine Conservation Society's unflushables campaign.

Since our last Adaptation Report we have developed our Make Rain Happy campaign. This brings surface water management to life and communicates it in a way that everyone can understand and engage with. We hope to get our customers, communities and key influencers, such as local authorities, landowners and our own employees, excited about using green infrastructure (such as creating rain gardens and tree planting) to manage surface water runoff.

Sustainable drainage

By using Sustainable Drainage Systems (SuDS) we are reducing and slowing the rainfall entering our sewers. Since 2015 we have delivered 24 schemes using sustainable solutions. This equates to 42 per cent of all the sewerage capacity schemes that we have delivered, well ahead of the 25 per cent target that we set ourselves for the 2015-2020 period.



SuDS installation at a school in Newmarket as part of the Make Rain Happy campaign

Collaboration

We have continued to work closely with government and other Risk Assessment Management Authorities (RMAs). Partnership working is supported by our customers and delivers mutual benefits and cost savings compared with trying to resolve flood problems independently.

Since 2010 we have been involved in 54 Surface Water Management Plans (SWMPs) developed by local authorities in our region. We support the development of SWMPs through the provision of data and hydraulic modelling outputs. Since 2017 we have been working with Lead Local Flood Authorities (LLFAs) to deliver more integrated approaches to modelling, sharing our hydraulic models with partners in locations including Dunstable, Lowestoft, Milton Keynes and Sudbury.

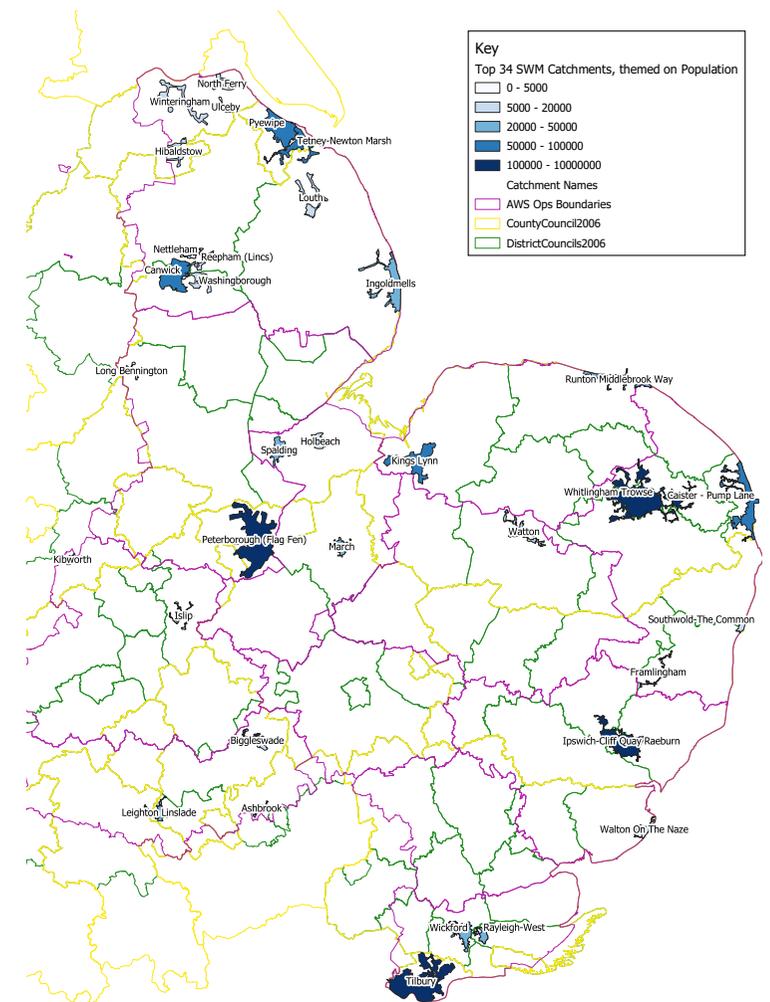
2.3. Planned actions

Investment

Between 2020 and 2025 we plan to invest more than £40 million in a suite of options that promotes the use of sustainable, innovative solutions to local sewer flooding, including:

- Providing storage by upsizing our existing system
- Increasing investment in property-level protection
- Beginning delivery of a multi-AMP Surface Water Management Programme.

Our multi-AMP Surface Water Management Programme takes a catchment-and community-level approach to addressing the root cause of sewer flooding by removing surface water flows from the sewerage network. We have identified 34 catchments which we will invest in between 2020 and 2025 (see below). This will be supported by our ongoing Keep It Clear and Make Rain Happy behavioural change programmes.



The top 34 Surface Water Management Catchments

Drainage and Wastewater Management Plan

Our approach to managing the risk of sewer flooding has been underpinned by our WRLTP. This will shortly be replaced by our first Drainage and Wastewater Management Plan (DWMP) – the new industry-standard way for organisations to work together to improve drainage and environmental water quality. Like our WRLTP, DWMPs provide the basis for more collaborative and integrated long-term planning by water companies, working with other organisations which have responsibilities relating to drainage, flooding and protection of the environment. They will ensure that investment is targeted even more effectively and provide customers and stakeholders with better information about the UK's drainage and wastewater services.

The DWMP will use scenario analysis and the latest climate change projections to develop a long-term investment plan. We will publish our draft Drainage and Wastewater Management Plan using this framework in the summer of 2022, as will other water and sewerage companies in England and Wales, to support our business plans for the 2024 Price Review.

Planning applications

The current position is that water companies are not statutory consultees to the planning application process. We are legally obliged, in accordance with Section 106 of the Water Industry Act 1991, to accept all new connections to the existing sewerage infrastructure, regardless of capacity within the system. Because of this, we will continue to work very closely with local planning authorities, both strategically during the Local Plan process, and locally with regard to individual developments, where necessary asking local councils to place conditions on developments to ensure additional drainage infrastructure is put in place before any connection to our network is made.

We continue to call for the automatic right to connect new development to surface water and combined sewers to be removed, and replaced with a more conditional approach whereby water companies, developers and local authorities work together to assess and approve connections to the sewer network based on a full assessment of the drainage hierarchy and existing sewer capacity.

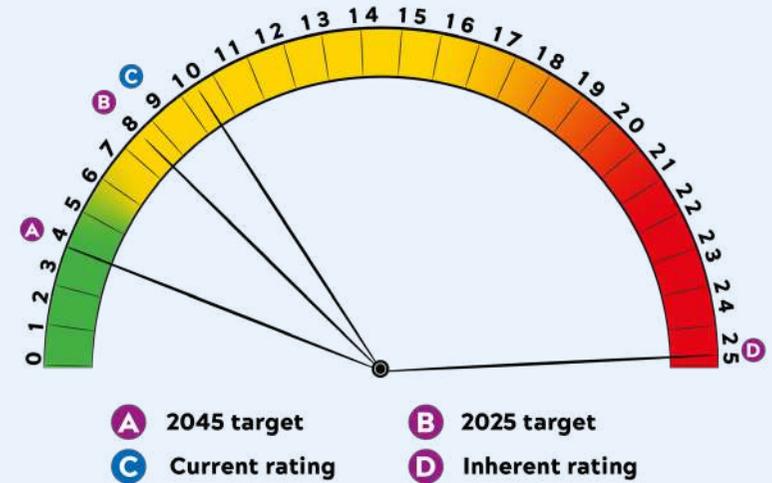
“ We will publish our draft Drainage and Wastewater Management Plan using this framework in the summer of 2022. ”



2.4. How have we quantified the risk?

To produce the risk profile we have assessed the risk of sewer flooding occurring in a 1-in-50-year event (or an event with a 2 per cent chance of occurring in any year). The assessment methodology is consistent with the approach used for our corporate risk register.

Sewer flooding



2.5. Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
Risk of sewer flooding in a storm (1-in-50-year storm)	% customers at risk	-	-	0.51	9.75	~0
Internal sewer flooding	No. per 10,000 connections	-	1.67	1.06	1.34	0.75
External sewer flooding	No. areas flooded externally	-	5,970	2,474	3,991	3,741

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

We also provide annual data returns to the Environment Agency under Section 18 of the Flood and Water Management Act 2010.

The sewer flooding targets are generally higher than the 2019/20 performance. This reflects recent changes in our reporting to align with clarification around the definitions and the relationship to - and variability of - weather.

Chapter 3: Risk to services from flooding

3.1. Understanding the risk

Historically, water and water recycling infrastructure has been built next to or near water, either rivers, streams or the sea, to aid abstraction for potable water supplies, and the return of recycled water back to the environment. While this makes for an efficient water and water recycling system, it brings an element of risk associated with flooding from watercourses and the sea. Our assets are also at risk from surface water and groundwater flooding.

In this section we have combined information on how we are addressing flood risk from a variety of sources, including fluvial, coastal, pluvial and groundwater, as we manage them in a similar way. These risks are captured as separate risks in the water industry standard template i.e. In2, In3, In4, In5, as shown in the Appendix.

More than 5,000 assets, equating to 64 per cent of our total above-ground assets, are currently at risk from a severe flood (a 1-in-1,000-year flood, or a flood with a 0.1 per cent chance in that location). The percentage of assets at risk from different types of flooding is shown above. The change is largely due to improvements in modelling

Flood risk - cause of flooding	% of assets at risk	
	2013	2017
Fluvial flooding – flooding from watercourses	23	19
Coastal flooding – flooding from the sea	1.6	1.5
Pluvial flooding – flooding from rainfall run off	47	43
A combination of two or more of the above risks	10	15*

Assets at risk from different causes of flooding in a 1-in-1,000-year-flood

This assessment of risk is important because it aligns with recommendations from the National Infrastructure Commission. The Commission recommends that government should set out a strategy to deliver a nationwide standard of resilience to flooding with an annual likelihood of 0.5 per cent by 2050, where this is feasible. It also recommends that a higher standard of 0.1 per cent should be provided for densely populated areas, where the costs per household are lower.

“ More than 5,000 assets, equating to 64 per cent of our total above-ground assets, are currently at risk from a severe flood. ”

3.2. Actions taken to address the risk

Investment in flood resilience

Between 2015 and 2020, we implemented schemes at 36 sites to improve their resilience to fluvial, pluvial, coastal and groundwater flooding. This included:

- 13 water sites, with a total investment of more than £600,000.
- 23 water recycling sites, with a total investment of nearly £600,000.



J-Bar flood barrier and gate at Wickford Water Recycling Centre



Flood swinging barrier and stop logs at Bocking Water Treatment Works.



J-Bar flood barrier around critical equipment with swinging barrier at Gosfield Water Recycling Centre

The table below shows how this investment has been made in a way that is consistent with the Cabinet Office's Infrastructure Resilience Components (2011).

Resistance	<p>Measures include permanent flood barriers, such as flood walls around the perimeter of the site, flood walls around individual assets, flood doors, waterproofing buildings and air vent covers.</p> <p>We also have access to 500m of demountable flood barriers, which can be used at sites without permanent flood resilience measures.</p>
Reliability	<p>Measures included raising electrical panels and ensuring communications and telemetry are maintained during an incident.</p>
Redundancy	<p>The ability to rezone water supplies to ensure no loss of service to customers.</p>
Response and recovery	<p>High-risk sites have Flood Emergency Response Plans, which detail the actions to be taken by staff on site including the critical assets to protect and safe access routes.</p> <p>During incidents we have the ability both to provide potable water and to remove foul water using tankers.</p>

Partnership funding

As a Risk Management Authority, we have worked in partnership with others to reduce flood risk. This is an approach our customers have expressed strong support for as it delivers greater value than working independently. Between 2015 and 2020 our Partnership Funding programme contributed £5.4 million to 40 schemes. We worked with 22 Risk Management Authorities to reduce flood and coastal erosion risk. Examples include work in Canvey Island (see case study, page 64), Clacton to manage coastal erosion, and in Grimsby to manage surface water flood risk. In Clacton we worked with partners to protect a significant sewerage asset, saving customers almost £25 million compared with the cost if we had acted alone. In Grimsby we saved customers almost £500,000, while delivering additional schemes with savings made from the project.

Updated flood risk assessment

In 2012 we assessed the risks from fluvial and coastal flooding to all our above-ground assets. In 2017 we improved and updated our methodology based on learning from the 2012 assessment and better asset data. For the first time, we assessed the risk from groundwater flooding and we also assessed the risk of outfalls (where drains and sewers discharge into rivers or the sea), becoming tide-locked, preventing them from discharging. We used the Environment Agency's flood mapping, which includes the impact of climate change, to inform our flood risk assessment, and considered a range of flood risk scenarios, ranging from a 1-in-20-year flood (5 per cent) to a 1-in-1,000-year flood (0.1 per cent).

We started by screening all of our water and water recycling above-ground assets to establish a long list of sites at risk for more detailed assessment – a total of more than 6,600 sites. Using specialist consultants, detailed desktop analysis, asset owner verification and site visits, we established a better understanding of the risk. Investment was only proposed where it was necessary to supplement other measures, such as response and recovery plans. As a result of these assessments we have put permanent defences and/or Flood Emergency Response Plans in place. We also have a dedicated East Coast Flood Plan which draws on the learning we have gained from past flooding events in 2007, 2013 and 2017.

This process met the requirements of the National Flood Resilience Review and our responsibility to assess risks and plan for emergencies as a Category 2 responder under the Civil Contingencies Act 2004.

“ Between 2015 and 2020 our Partnership Funding programme contributed £5.4 million to 40 schemes. ”

“ We are planning a 50% increase in partnership funding to £12 million between 2020 and 2025. ”

3.3. Planned actions

Our updated flood risk assessment identified the need to invest at seven sites. One of these sites was a treated water site and six were water recycling sites. We will invest up to £1.2 million between 2020 and 2025 to better understand and reduce the risk at these sites.

We are planning to increase partnership funding between 2020 and 2025. Our Final Business Plan proposed more than £15 million. Ofwat's Final Determination has reduced this to £12 million. This includes investment in the Thames Estuary, which protect almost 100 of our water recycling assets, both pumping stations and four major water recycling centres.

We will continue to explore how we can work in partnership with others to manage the risk of flooding to our assets. This may include using natural flood management techniques and making room for water during high flow events.

We will continue to ensure we have sufficient resilience arrangements in place at other sites and that we can respond quickly to recover any critical activity that is interrupted. This will be achieved by applying our Business Resilience Management System, which is certificated to the international standard ISO 22301:2012 for business continuity.

Now that UKCP18 data is available, we will use it to inform our next flood risk assessment and investment plan for the period 2025–2030.

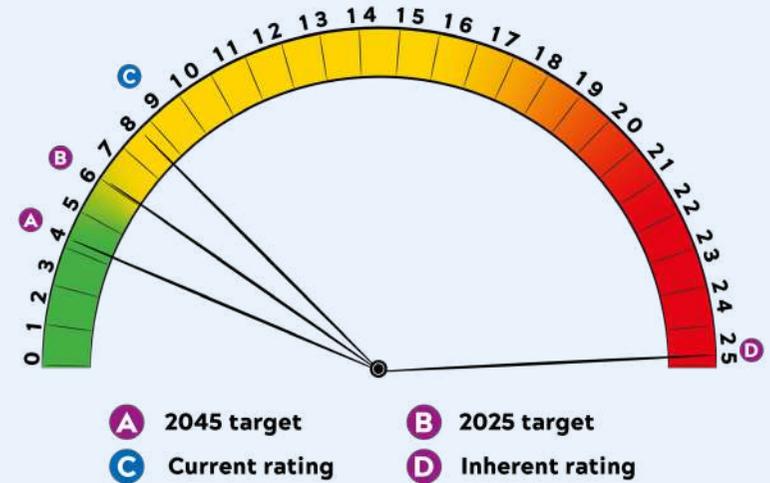
“ We are now planning to invest £1.2 million at seven sites between 2020 and 2025. ”



3.4. How have we quantified the risk?

To produce the risk profile for flooding we have assessed the risk of a loss of supplies and pollution due to a fluvial, pluvial and coastal flooding event. The assessment methodology is consistent with the approach used for our corporate risk register.

Flooding of our sites



3.5. Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
*Water supply interruptions	Average time in minutes: seconds cost per customer	-	20:06	18:39	03:00	03:00
*Unplanned outages	% unplanned outages from production capacity	-	-	1.54	2.34	2.34

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

We also provide annual data returns to the Environment Agency under Section 18 of the Flood and Water Management Act 2010.

Chapter 4: Risk to natural capital

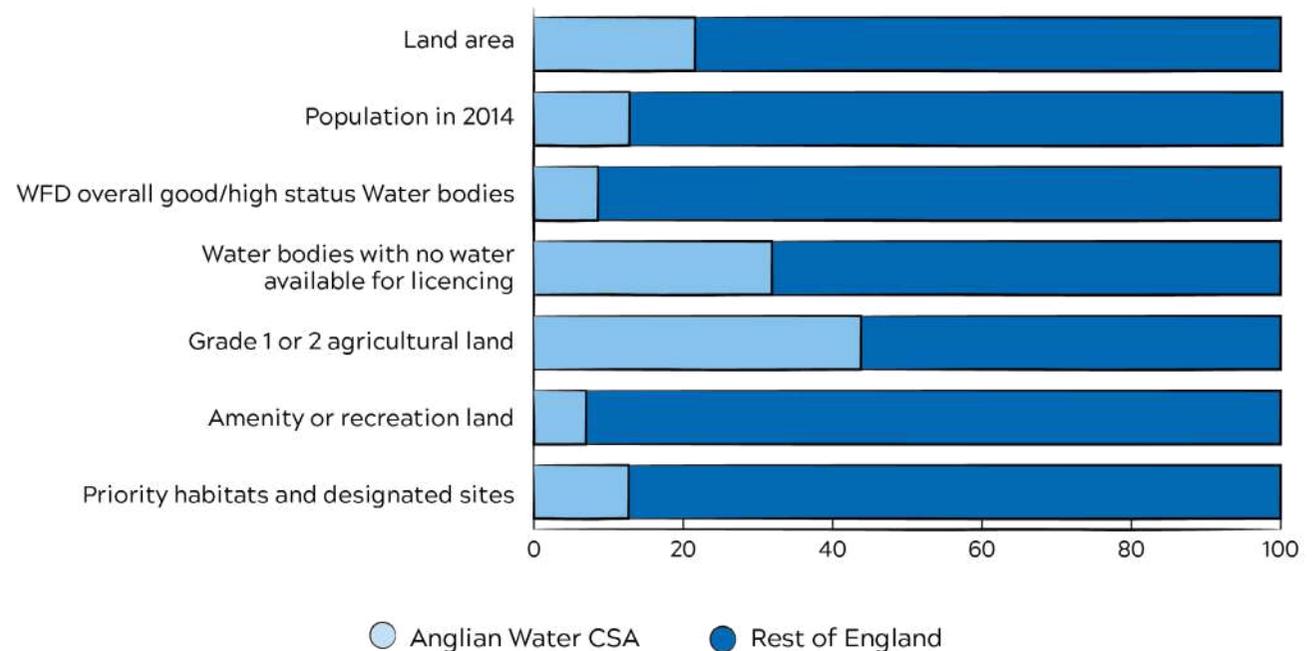
4.1. Understanding the risk

Natural capital refers to natural assets such as water, habitats, soils and biodiversity which we own or which we rely on to deliver for our customers. We depend on natural capital to provide the water we put into supply and we have an impact on natural capital when we return water to the environment and carry out construction activities. The natural assets we own provide benefits in terms of water quality, and opportunities for recreation for the communities we serve. We own 49 Sites of Special Scientific Interest (SSSIs) and more than 150 Local Wildlife Sites. More than 2.5 million people visit our waterparks each year.

While climate change poses a risk to the various forms of natural capital, we also recognise that natural capital offers an opportunity to meet future needs in a way that benefits the other five capitals that we are now explicitly measuring and managing. The development of wetlands is one such example which is referred to in this report.

In 2018 we worked with the University of East Anglia (UEA) to conduct an evaluation of the natural capital in the Anglian Water region, which covers approximately 22 per cent of both the land area and coastline of England. This research found that our region already compares poorly to other regions in terms of biodiversity. The lack of biodiversity, fragmentation of remaining habitat and other pressures such as invasive non-native species, make our region's wildlife especially vulnerable to climate change.

Anglian Water percentage share of England



“The lack of biodiversity, fragmentation of remaining habitat and other pressures such as invasive non-native species, make our region especially vulnerable to climate change.”

Our strategy recognises the many other sites, which can be of equal importance to SSSIs, but which do not have the same level of protection. For example, we commissioned a study to estimate the amount of wildlife habitat on our land and the sensitivity of those habitat types to climate change, the results of which are shown in the table below. Sites that are of most value for wildlife now will continue to be of high value in the future, despite the impacts of climate change, so it is important that they are properly managed. The outcomes of this work will help us manage these risks and improve the resilience of biodiversity to climate change.

Habitat type	Area (ha)	Climate change sensitivity
		1=High, 5=Low
Lowland fens	61	1
Lowland mixed deciduous woodland	821	2
Eutrophic standing waters	2,433	2
Wet lowland meadows	67	2
Dry lowland meadows	9	4
Other neutral grassland	287	5

Anglian Water habitats of most conservation value

We don't have much land that contains peat in our ownership - maybe around 100ha in total (out of about 7,000ha). Most peat sites are designated as either SSSI or Local Wildlife Site (LWS) and much of this is in conservation management.

Examples include Tetney Blow Wells SSSI in Lincolnshire and Whitlingham Fen LWS in Norfolk.

Climate change could affect biodiversity on our sites in the following ways:

- Changing water levels resulting in wetlands drying out and draw-down zones around reservoirs (the land exposed when water levels are low) increasing in extent.
- Increased frequency and severity of eutrophication (an excess of minerals and nutrients in the water which can result in excessive algal growth and a reduction in oxygen levels), with subsequent impacts on flora and fauna.
- Oxidisation of peat soil in fen habitats, reducing habitat extent and quality.
- Phenological changes (that is, changes in the timing of seasonal events) resulting in, for example, reduced survival rates of young birds.
- Warmer winters resulting in increased survival of plant pathogens as well as mammals such as deer or squirrels, resulting in changes in community composition.

Climate change is also expected to increase the risk of algal blooms. In the last two years outbreaks of blue-green algae have led to closure of recreation facilities at some of our sites.

4.2. Actions taken to address the risk

Six capitals accounting

Since publishing our last Adaptation Report in 2015 we have introduced a six capitals approach to accounting to more accurately reflect the costs and benefits to the environment and society of the decisions we take. Natural capital is one of our six capitals, the others being financial, people, intellectual, social and manufactured. Biodiversity is one of the metrics we use to define our impact on natural capital in the region.

Site prioritisation

We undertook an innovative study with the University of East Anglia to select which sites we should prioritise for biodiversity action, taking account of their location in relation to other biodiversity sites across the region. Our assets are now ranked according to these criteria, enabling us to focus our resources on the most important sites. The outcomes of this work will help us manage these risks and improve the resilience of biodiversity to climate change.

Investment to reduce our impact on the environment

Investment driven by an immediate need to enhance natural capital often has the additional benefit of increasing resilience to climate change. Well-functioning ecosystems are likely to be more resilient to shocks and disturbances such as changes in rainfall and temperature and extreme weather events.

The Water Industry Natural Environment Programme (WINEP) is a set of actions that the Environment Agency requires water companies to complete to meet environmental objectives. We have an excellent track record in delivering WINEP schemes: in previous investment periods we have delivered every WINEP scheme on time and often earlier than required. Between 2015 and 2020 we invested £330 million in implementing WINEP. One example is a £6.5 million project to build a new pipeline between our treatment works at Norwich and Ludham – see case study, page 63.



Ingoldisthorpe wetlands

In 2017, we were the first water company in England to build a water treatment wetland, in partnership with the Norfolk Rivers Trust and the Environment Agency. The two-hectare site at Ingoldisthorpe in west Norfolk acts as a natural treatment plant for more than a million litres of water a day.

Catchment management

We employ a team of catchment advisors; many of the activities they undertake help to reduce the risk of climate change to natural capital as well as addressing immediate and short-term risks in our catchments. Such activities include:

- Advising farmers on how best to use, store and dispose of pesticides as well as minimising pesticide use
- Investigating soil health and helping farmers design interventions relevant to their own land
- Advising farmers on how to mitigate risks to watercourses and ground water from livestock
- Installing precision weather stations and providing farmers with a real-time forecast of spraying conditions for the next six days through an app
- Working with farmers to understand, plan and reduce nitrogen losses to air and water from their activities.

4.3. Planned actions

Develop a natural capital strategy and key metrics

One of our performance commitments for the period 2020–2025 is to develop a natural capital strategy and key metrics based around three specific areas we identified in our business plan: carbon; water quality and quantity; and biodiversity. We already have metrics for carbon and water quality and quantity and we will be introducing a biodiversity net gain metric. We have committed to deliver 10 per cent biodiversity net gain on our capital projects, helping the region's wildlife to become more resilient to climate change. In future, our investment plans will be subject to a biodiversity net gain assessment.

Updates to site biodiversity plans

The research that we are undertaking to understand the risk of climate change will help us to improve our site biodiversity plans.

“In 2017, we were the first water company in England to build a water treatment wetland, in partnership with the Norfolk Rivers Trust and the Environment Agency.”

Investment to reduce our impact on the environment

Around 20 per cent of WINEP obligations in the country over the period 2020-2025 fall to us (although we currently represent only 10 per cent of the population) because of the topography, intensive agriculture and slow-moving rivers in our region. Ofwat's Final Determination allows us £688 million between 2020 and 2025 to meet our WINEP obligations. This represents a doubling in the funding as compared to the previous five-year period. This highlights the need to protect the natural capital in our region; increasing its resilience to climate change.

Our water treatment wetland at Ingoldisthorpe demonstrates what can be achieved using natural solutions. We plan to create at least 34 more of these sites, subject to feasibility, between 2020 and 2027.

Natural Capital East

Building on the success of Water Resources East in collaboratively managing water resources, we have led the creation of a new entity: Natural Capital East. Natural Capital East will convene partner organisations to improve natural capital in the region. In August 2019, we announced a joint initiative, along with other English water companies, to plant 11 million trees by 2030. Natural Capital East provides an opportunity to ensure that we deliver on this commitment with support from, and in alignment with, others in our region.

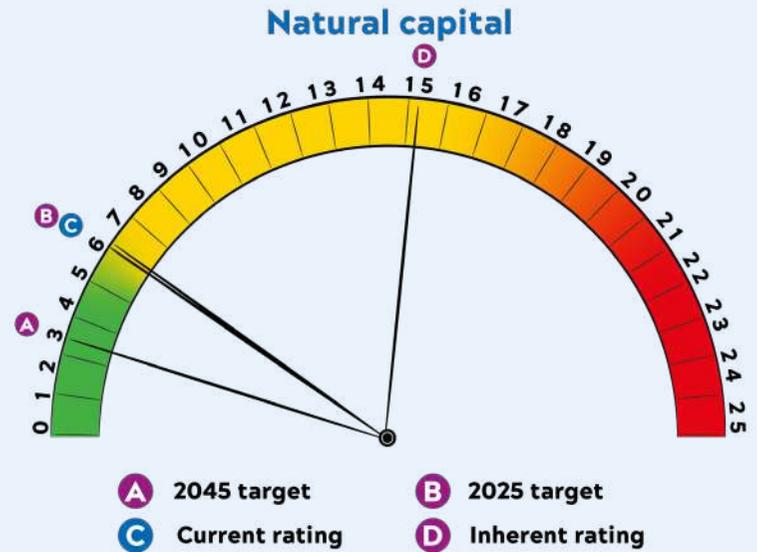


Ingoldisthorpe wetlands



4.4. How have we quantified the risk?

To produce the risk profile for natural capital, we have assessed the risk of our SSSIs going out of Favourable Condition due to climate change. The assessment methodology is consistent with the approach used for our corporate risk register.



4.5. Metrics

Metric	Unit	2009/10	2014/15	2018/19	2024/25 (target)	Long term (target)
*Natural capital	-	-	-	-	Report delivery of strategy & key metrics	
Biodiversity	% net gain	-	-	-	>10	-
*WINEP	No. of obligations	-	-	-	1,856	-

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

Chapter 5: Transition risk and opportunities

5.1 Understanding the risk

The Task Force on Climate-Related Disclosures (TCFD) divides climate-related risks into two major categories:

- Risks related to the physical impacts of climate change
- Risks related to the transition to a lower-carbon economy.

We monitor and manage numerous transition risks. This includes policy, legal, technology, market, and reputational risks. One of the more recent examples is how our legal and carbon management teams monitored and managed the withdrawal of the CRC Energy Efficiency Scheme (formerly known as the “Carbon Reduction Commitment”), and the introduction of the Streamlined Energy and Carbon Reporting (SECR).

This section focuses on two of the most significant risks - and opportunities - associated with transitioning to a lower-carbon economy.

Financing our business

Over the period 2015–2020, we have financed a capital programme of c. £2 billion, and the long-lived capital assets that we build are funded through long-term debt and equity. We currently have gross debt of £7.7 billion, with an associated interest cost of £329.9 million in 2019/20. This is the business’s largest single cost. Increasingly, environmental and social risk management is influencing the debt markets.

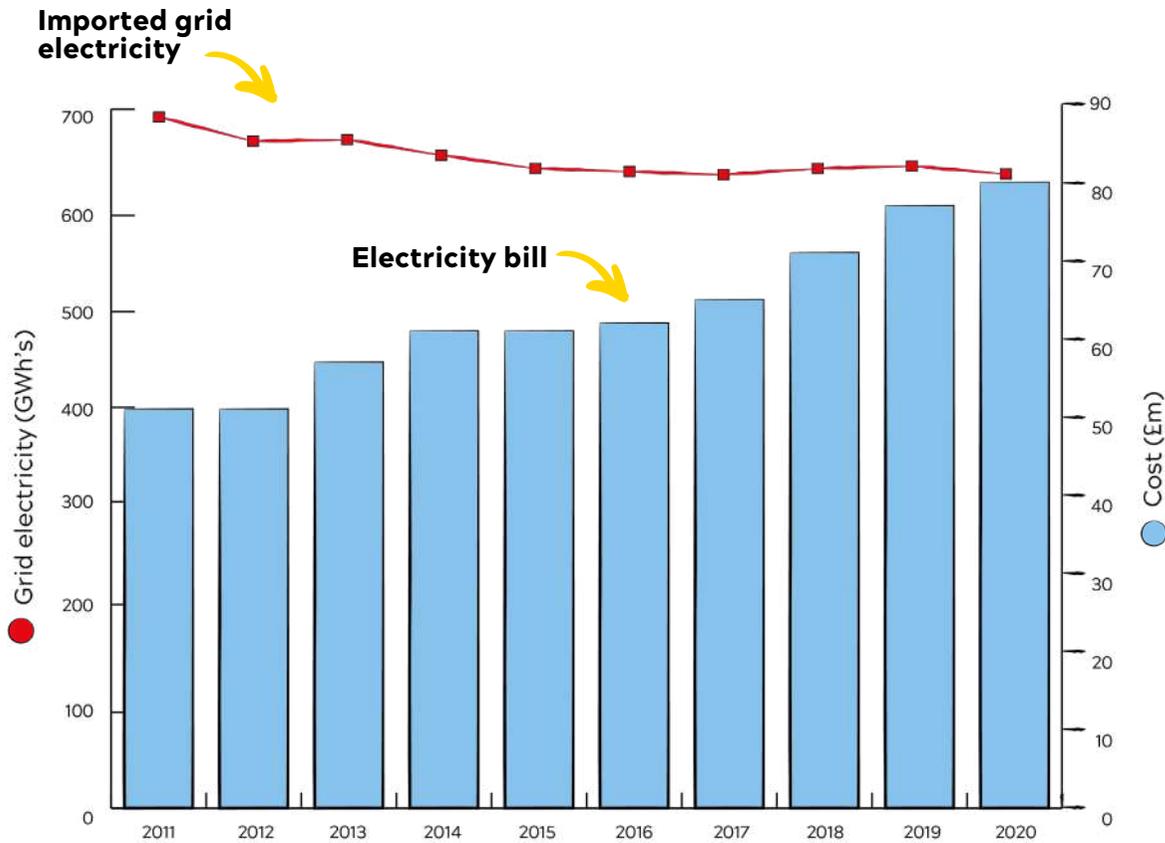


“Increasingly, environmental and social risk management is influencing the debt markets.”

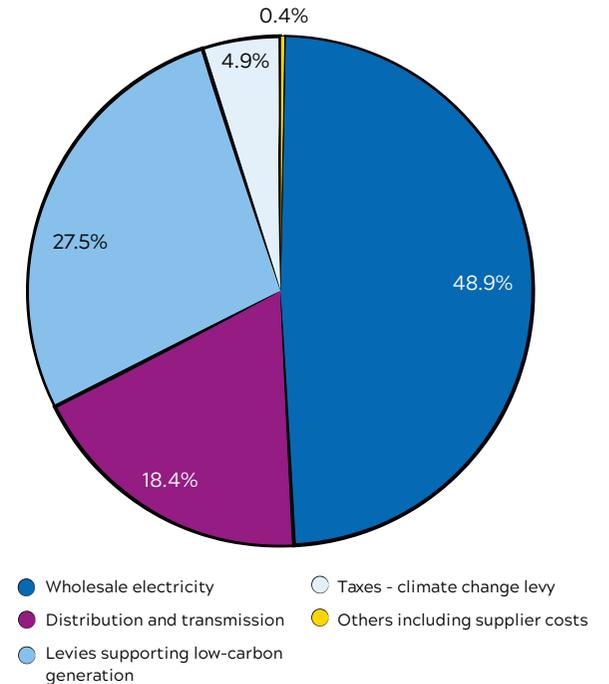
Energy and carbon costs

Treating and pumping water around such a geographically large and flat region requires large amounts of energy. In 2019/20 energy accounted for about 12 per cent of our total operating expenditure. Despite year-on-year reductions in the amount of electricity we purchase from the grid, our electricity bill continues to rise.

Policies to decarbonise the energy sector can increase energy prices and volatility. For example, in 2011, the cost of wholesale power made up 63 per cent of Anglian Water's total power bill.



Breakdown of our energy costs



However, by 2018/19, this had reduced to 49 per cent of the total cost because of an increase in third party costs which include the levies and taxes designed to subsidise low-carbon energy and investment in resilience programmes (see above). This highlights the need for us to continue both to reduce our energy consumption and to reduce our exposure to these transition risks.

5.2 Action taken to address the risk

Since submitting our previous Adaptation Report we have taken steps to reduce the transition risks associated with financing our business and our use of energy. The steps we have taken have delivered significant benefits.

“ In 2017 we became the first European utility company to issue a sterling Green Bond, following up with a second in 2018. ”

Green finance

In 2017 we became the first European utility company to issue a sterling Green Bond, following up with a second in 2018. Our initial £250 million, eight-year bond will mature in August 2025 with a return to investors of 1.625 per cent. We have committed to raise the finance for our capital investment as sustainably as possible, and are proud that all of our capital activity meets the stringent environmental criteria set for Green Bond investment. We have issued a total of c. £880m of debt in accordance with the Green Bond Principles to date, via six Green Bonds. We also use liquidity bank facilities which incentivise or impose penalties for delivering agreed environmental and social goals.



Anglian Water opens the London Stock Exchange on 31 July 2017 to coincide with the issue of the first UK utility Green Bond

Energy and carbon management

Even before the submission of our first Adaptation Report in 2011 we recognised the financial risk of failing to manage the transition to a lower-carbon economy. In 2006 we made a fundamental change, launching our Energy Initiative and committing to measuring, managing and reducing carbon in everything we do. The progress we have made since then demonstrates the opportunities that are available in transitioning to a lower-carbon business. We have clear evidence that, as well as being the right action to take, reducing carbon, reduces costs. We are committed to reaching net zero carbon by 2030, and in collaboration with others in the water sector and leading consultants we have developed a routemap to net zero which was published in November 2020.

Reducing carbon is embedded within Anglian Water's strategy, our targets and our communication activities. This can be illustrated with reference to our Energy Initiative and our Renewable Energy Strategy.

Our Energy Initiative is both a 'hearts and minds' and an investment programme. It has been led by a dedicated carbon and energy team and it makes use of 'champions' in operational teams to promote carbon and energy reduction. It has delivered year-on-year reductions in our consumption of grid electricity and our carbon emissions. In 2019/20 it reduced our energy bill by more than £1.8 million.

Currently, the vast majority of our renewable energy is generated by our biogas Combined Heat and Power (CHP) engines. The biogas is produced at our water recycling centres through anaerobic digestion of sewage sludge. The renewable energy output from our fleet of CHPs has continued to grow thanks to ongoing investment and operational optimisation. 2019/20 was a record-breaking year for renewables. 131 GWhs were generated, up 8 per cent from the previous year. Since then we have commissioned our largest ever solar array. The 43,000 solar modules installed at Grafham will mean that at certain times yet another of our largest sites will be fully self-sufficient with renewable energy. Since submitting our first Adaptation Report in 2011 we have also installed three large wind turbines and, more recently, installed solar panels on 11 sites.

For more than 10 years the management of operational carbon has been certified by CEMARS to ISO 14064-1 and in 2016 we became the first organisation in the world to be verified against PAS 2080, a new carbon management in infrastructure standard. These certifications demonstrate our leadership in energy and carbon management and have been critical to demonstrating compliance with Green Bonds criteria.

5.3 Planned actions

The total capital investment allowed in our Final Determination is over 30 per cent higher than the expenditure in the previous five-year period.

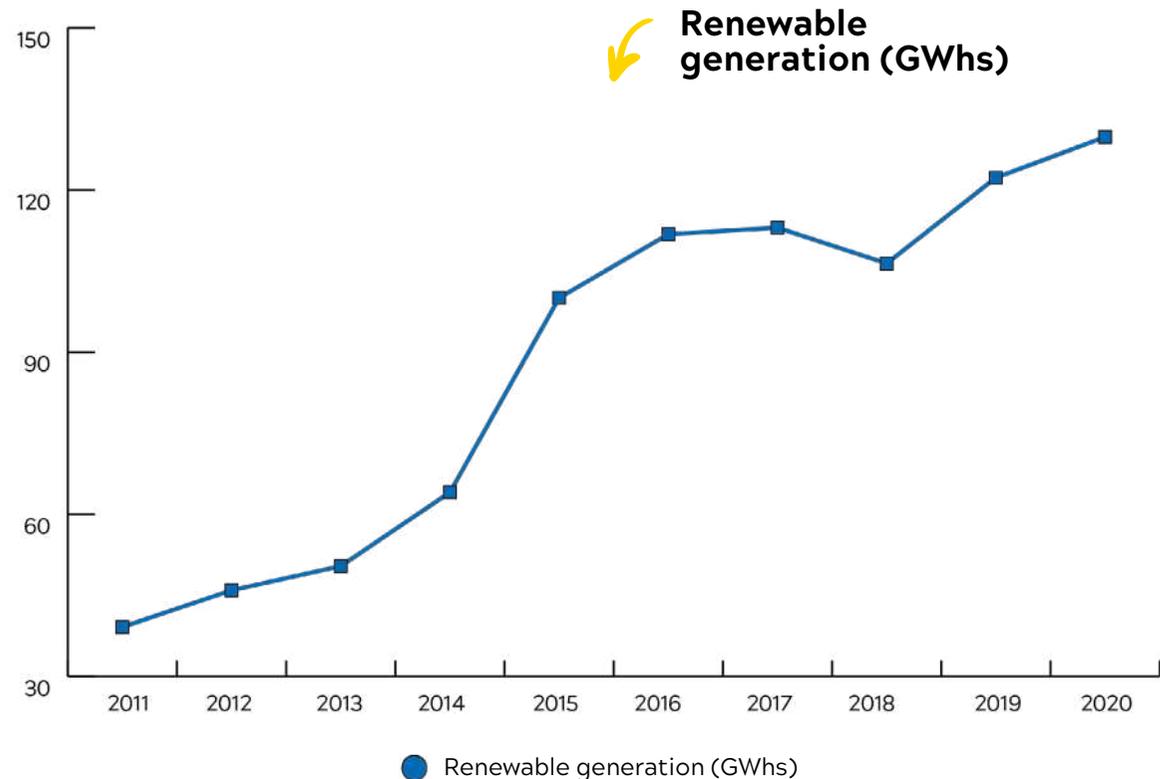
We will continue to measure and design carbon out of the projects funded by this investment.

We will also improve how we assess the impact of the changing climate on these projects. This will be done within the framework we are developing for natural capital and the five other capitals (financial, people, intellectual, social, manufactured).

As we move into our next five-year plan, we are planning to link the vast majority of our financing to our environmental, social and governance (ESG) objectives.

We are using the water industry's net zero routemap to develop a detailed action plan around its three distinct pathways: reducing demand, technology-led solutions and nature-led solutions. We will also need to consider insetting and offsetting opportunities, but our first priority is to maximise the potential of our energy efficiency and renewable programmes. There is the potential for climate change to increase the output from solar energy installations as a result of increased sunshine hours. We are planning to roll out even more solar to create one of the UK's largest privately funded solar networks. This will help us reduce our energy costs, manage price volatility and improve our resilience.

“ We are committed to reaching net zero carbon by 2030. ”



The expectations on organisations to improve how they manage and report on climate-related risks are increasing. It is essential that we continue to improve our climate-related disclosures to retain the confidence of our customers, our regulators and our investors. We will continue to collaborate with government, policy-makers and others to support these improvements.

For example, we have already produced two reports in line with the Task Force on Climate-Related Financial Disclosures and we will continue to support its rollout as members of the Prince of Wales Accounting for Sustainability (A4S) Project. In particular, we will improve how we use scenario analysis to quantify climate-related risks across the whole business.



5.4 How have we quantified the risk?

To produce the profile for transition risk, we have assessed the risk of increasing costs due to changes in UK climate-related policies and investor sentiment. The assessment methodology is consistent with the approach used for our corporate risk register.



5.5 Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
Operational carbon	5-year average (tCO ₂ e)	480,172	465,245	365,022	-	Net zero by 2030
Capital carbon	% reduction from 2010 baseline	-	54%	61%	65%	
Climate-related disclosure	We will continue to issue improved climate-related disclosures on an annual basis					
Financing	Our strategy is developing from launching our first Green Bonds in 2017 to all financing linked to our ESG objectives					
Financial Determination	The key measure of our success in managing the transition risk is that we continue to deliver against the financial determination set by our regulator.					

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

Chapter 6: Interdependencies

6.1. Our interdependencies

The key partners and interdependencies associated with the risks described in the previous chapters are summarised below:

Risk	Key partners	Interdependencies
Risk to public water supply	Government, Environment Agency, Natural England, Ofwat, Regulators' Alliance for Progressing Infrastructure Development (RAPID), Drinking Water Inspectorate (DWI), District and Borough Councils, water companies, Water Resources East	<p>The Department for Environment, Food and Rural Affairs (Defra) is the policy lead for water resources management in England and sets the WRMP Directions. The Environment Agency sets technical criteria for water resources and drought planning and is the primary environmental regulator. As the economic regulator, Ofwat determines company business plans.</p> <p>There are interdependencies with other water companies (e.g. relating to trading), with local authorities (in relation to growth) and with Water Resources East with respect to multi-sector regional planning.</p>
Risk of sewer flooding	Government, Environment Agency, Lead Local Flood Authorities, district and borough councils, coast protection authorities, water and sewerage companies, Internal Drainage Boards, highways authorities.	<p>The Department for Environment, Food and Rural Affairs (Defra) is the policy lead for flood and coastal erosion risk management in England.</p>
Risk to services from flooding		<p>National policies are delivered by Risk Assessment Management Authorities (RMAs).</p> <p>Under the Flood and Water Management Act 2010 RMAs are required to:</p> <ul style="list-style-type: none"> • co-operate with each other • act in a manner that is consistent with the National Flood and Coastal Erosion Risk Management Strategy for England and the local flood risk management strategies developed by Lead Local Flood Authorities • exchange information.
Risks to natural capital	Natural England, Environment Agency, farmers and their supply chains, environmental non-governmental organisations (NGOs), policymakers	<p>The Environment Agency's regulatory approach influences the degree to which we can rely on nature-based solutions like treatment wetlands. Natural England assesses the condition of our SSSIs and influences our management approaches, as well as taking a wider interest in our activities, such as general land management and abstraction. Farming influences water quality and the extent and condition of wildlife on their land, both of which impact our operations and our own wildlife sites. Environmental NGOs help to manage land on our behalf.</p>
Transition risks	Government, policymakers and the energy and financial sectors.	<p>Policies to decarbonise the energy sector can increase cost – particularly energy price/volatility – and the management of climate-related risk is increasingly influencing the debt markets.</p>

We depend on the infrastructure and services of many other organisations to deliver water and water recycling services to our customers. Climate change will exacerbate risks that already exist due to complex interdependencies between infrastructure and built and natural systems, as well as creating new ones. The key dependencies we have identified for our business are energy, IT and communications, and local authority partners.

Energy

We have more than 7,000 sites connected to the electricity grid. Grid electricity accounts for nearly 60 per cent of our total energy consumption and we experience more than 1,000 power failures per year. Natural gas, which is used for office and process heating, accounts for less than 2 per cent of our consumption. After grid electricity, our next most critical sources of energy are the fuels that we rely on for transport and back-up generators.

IT and telecommunications

We operate the biggest telemetry system in Europe to help monitor and manage our operations effectively, and respond to problems quickly as they arise. We also rely on telecoms services to maintain contact with our customers and our employees across the region

Local authority partners

During emergencies, collaborative working with local authority partners helps us to respond quickly and effectively and continue to deliver services to our customers.

6.2. Action taken to address the risk

Previous chapters describe how we have continued to work with stakeholders to manage our physical and transition risks. Highlights include the production of our first Water Recycling Long Term Plan (WRLTP) and an update of our Water Resources Management Plan (WRMP) in consultation with others. As a Risk Management Authority, we have worked in partnership with 22 Risk Management Authorities to reduce flood and coastal erosion risk. Through Water Resources East we have worked with others to manage the risk of drought and flooding (see case study on Water Resources East) and we recently established Natural Capital East (NCE) to convene partner organisations to improve natural capital in the East of England.

Energy

To manage the risk of power failures we are designing resilience into our sites and networks, maintaining our fleet of back-up generators and working closely with the distribution network operators. For sites without fixed back-up generators we have facilities and contracts in place to secure mobile generators. We have also increased fuel stocks held at our operational sites to ensure we can continue to run our generators in the event of a fuel shortage, and worked with suppliers to ensure emergency arrangements for access to fuel are robust. The Grafham water and energy resilience case study on page 68 is an example of the investment we have made since our last Adaptation Report.

IT and telecommunications

Since our last Adaptation Report we have reviewed the IT, telecoms and power resilience of our offices around the region to improve our preparedness for disruptive incidents. We have also worked with national and local bodies to strengthen our incident response arrangements.

“ We have built strong relationships with local authority partners through the Local Resilience Forums, and the Multi Agency Support Group. ”

Local authority partners

We have built strong relationships with local authority partners through the Local Resilience Forums, and the Multi Agency Support Group which is open to agencies across our region. Through these groups we have regularly met with agencies to develop and enhance multi-agency response arrangements and test our plans to ensure that arrangements are fit for purpose and effective during incidents and emergencies. Over the last year, examples of this work include planning for disruptions from severe weather, a multi-agency cyber security exercise and planning for the risks

associated with Brexit. We have also established a regular Lead Local Flood Authority (LLFA) officer forum for our region, with Environment Agency representation, chaired by Anglian Water's Regional Flood Risk Manager.

“ Since our last Adaptation Report we have continued to work with government, policymakers and other national organisations. ”

National collaboration

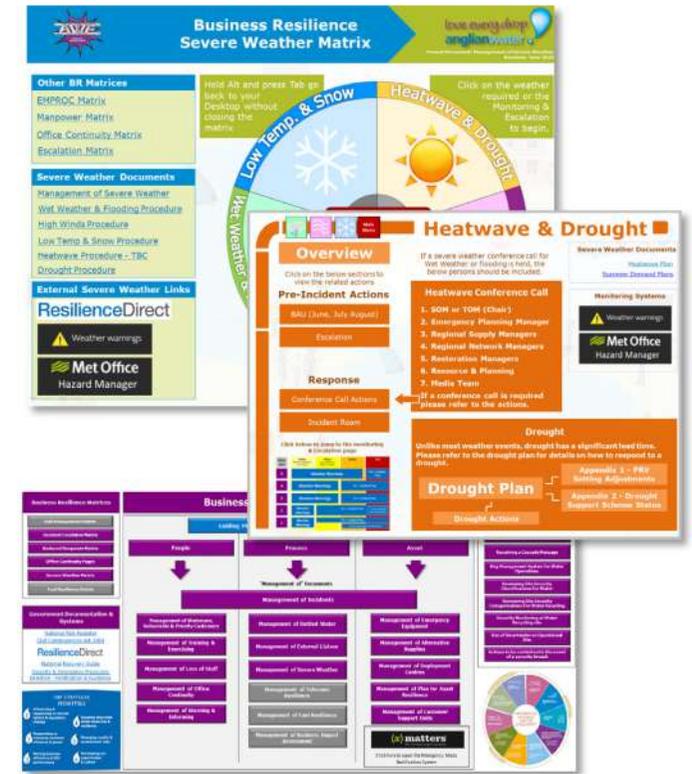
Since our last Adaptation Report we have continued to work with government, policymakers and other national organisations to improve our combined understanding of - and response to - interacting risks. As part of our risk management process, we have assessed risks associated with our key dependencies, taking into account information from the National Risk Assessment. We have responded to consultations from organisations including the National Infrastructure Commission and given evidence to the Environment Audit Committee's inquiry into higher temperatures and heatwaves, and the Environment, Food and Rural Affairs Committee's inquiry on water resources infrastructure.

Our support to the Committee on Climate Change includes our participation in its interacting risks project for the third UK's Climate Change Risk Assessment (CCRA3).

Integrated management systems

We have maintained our certification to ISO22301, the international standard for business continuity. As part of this business resilience management system we continue to assess activities critical to the delivery of our key products and services and the dependencies in terms of people, systems, stakeholders, information and other resources to allow us to continue to operate effectively. Included within our integrated management system is EMPROC, a collection of structured 'Emergency Management Procedures' which ensure we are sufficiently prepared to respond and recover from any level of impact, event or incident.

“ We have maintained our certification to ISO22301, the international standard for business continuity. ”



(Top) Our severe weather matrix for management. (bottom) our EMPROC Matrix

Integrated supply chain

The creation of large-scale ‘alliances’ has been a key part of our integrated supply chain strategy. These are innovative and collaborative organisations of consultants and contractors with whom we work to deliver the priorities we have agreed with our customers and regulators. One of the many benefits of this way of working is that we can respond more effectively to severe weather events than we could if working in isolation. For example, during the ‘Beast from the East’ in 2018 we were able to call on a wider pool of resources in locations across the region so that our customers were not adversely affected as a result of widespread snow and ice.

More than 75 per cent of our supply chain spend is now covered by a “framework agreement”. One of the benefits of framework agreements is that their development gives both parties the chance to better understand their respective priorities, risks and issues before entering into a contract. As part of this process Anglian Water carries out a Supplier Resilience Risk Assessment and also challenges the supplier’s approach to carbon management.

6.3. Planned actions

We will continue to improve our understanding and management of climate-related interdependencies using the collaborative approaches described above, as this has proved effective in reducing risks and delivering new opportunities. Other planned actions which require the support of others include:

Research and innovation

Our three-day innovation event Innovate East (see case study, page 70) provides an example of how we collaborate with partners to overcome challenges, and is a model we intend to repeat. We will also continue to build on the excellent relationships we have with many other experts to better understand and adapt to climate change. Since our last Adaptation Report we have worked with the University of East Anglia, the Tyndall Centre for Climate Change Research, the Met Office, HR Wallingford, JBA Consulting, Arup, WSP and many, many more research and innovation partners. For example, last year we committed to support the new Centre for Climate Change and Social Transformations (CAST). This new £5m research centre is a collaboration between Cardiff, Manchester, York, East Anglia and Utrecht Universities, and the charity Climate Outreach. The Centre aims to be a global hub for understanding the profound changes required to address climate change.

Innovative insurance products

The only directly climate-related risk we currently insure against is flooding of our assets; however, we are reviewing the viability of different types of insurance products, including Parametric Insurance. These products operate in a different way from normal insurance policies in that the trigger is a weather event or series of events that breaches a pre-set level, triggering the release of a predetermined sum of money without a claim assessment process. This type of product could be used to offset increased costs of working in periods of extreme weather such as drought or high temperatures or, conversely snow, ice and very low temperatures for extended periods.

Policy development

Anglian Water’s public policy team has led our response to more than 50 government consultations, select committee inquiries and other relevant policy development exercises in the last 18 months. We also support several other forums such as Waterwise’s Water Efficiency Strategy Steering Group (chaired by our Head of Public Affairs), the Westminster Sustainable Business Forum, and the Broadway Initiative: set up to help build cross-sector consensus on an ambitious Environment Bill. We are making the case for the following actions to be taken to help us and others accelerate the pace of adaptation:

- The Environment Bill should introduce mandatory water efficiency labelling on water-using appliances, fixtures and fittings, and product standards that remove the most water-wasteful products from the market over time.

- Part G of Building Regulations should require all new homes to be fitted with appliances, fixtures and fittings that meet a minimum water efficiency standard, based on the labelling scheme above. Minimum standards should tighten over time, so that new homes from 2022 use 100 litres per person per day (l/p/d) or less, falling to 85 l/p/d or less by 2030.
- Significant new developments in areas of severe water stress should also be 'water neutral', whereby the additional consumption of treated water is offset by water efficiency schemes in nearby housing developments, schools, hospitals and care homes. This policy should be applied via local plans, or for schemes such as the Oxford-Cambridge Arc, via a National Policy Statement or Statutory Spatial Plan. This measure would help promote community-scale rainwater harvesting, and green and grey water recycling, to reduce a development's consumption of water abstracted from the environment.
- Local plans or other statutory planning documents should also require all new development to be 'nutrient neutral', so that the environment isn't harmed by heavier nutrient loads from effluent and increased runoff. This means additional nutrient loading would need to be minimised, and any residual increase offset by catchment management approaches in partnership with local landowners.
- Planning authorities should have a duty to act consistently with local Nature Recovery Strategies proposed under the Environment Bill, to make sure development decisions do not undermine these new environmental spatial plans.
- A 'public money for public goods' approach should be taken to subsidising land management in England. Land area-based subsidies should be withdrawn and be replaced with payments for achieving defined natural capital benefits that have been identified as strategically important within the local Nature Recovery Strategy.
- The automatic right to connect new development to surface water and combined sewers should be removed. Instead, water companies, developers and local authorities should work together to assess and approve connections to the sewer network based on a full assessment of the drainage hierarchy and existing sewer capacity. This would fulfil, in a different way, Schedule 3 of the Flood and Water Management Act, which was set to give SuDS approval powers to local authorities but never put into practice. It would also support the new water industry Design and Construction Guidance (DCG) for sewers that promote the design, adoption and maintenance of multi-functional SuDS in new developments.
- The Environment Bill should include wet wipes within the scope of Extended Producer Responsibility. Almost all toilet, baby, cleaning, make-up and other single-use moist wipes contain plastic or other synthetic fibres. These cause sewer 'fatberg' blockages, sewer flooding and severe damage to the environment.

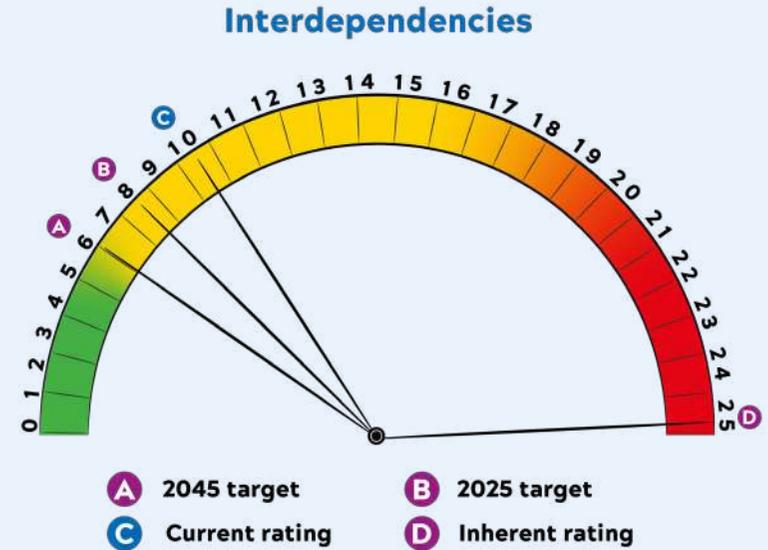
“ **Planning authorities should have a duty to act consistently with local Nature Recovery Strategies** ”

“ **The Environment Bill should introduce mandatory water efficiency labelling** ”



6.4. How have we quantified the risk?

To produce the risk profile for interdependencies, we have assessed the risk of a loss of energy, the loss of IT and telecommunications and the impact of highways drainage on sewer flooding. The assessment methodology is consistent with the approach used for our corporate risk register.



6.5. Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
Risk of severe restrictions in a 1-in-200-year drought	% customers at risk	-	-	5.20	0	0
Percentage of population supplied by a single supply system	%	-	46.9	24.1	14.1	0
Risk of sewer flooding in a storm (1-in-50-year storm)	% customers at risk	-	-	0.51	9.75	~0
Per capita consumption (3-year average)	Litres per person per day	147	135	136	131	120

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

2024/25 sewer flood target is higher than the 2019/20 performance. This reflects recent changes in our reporting to align with clarification around the definitions and the relationship to - and variability of - weather.

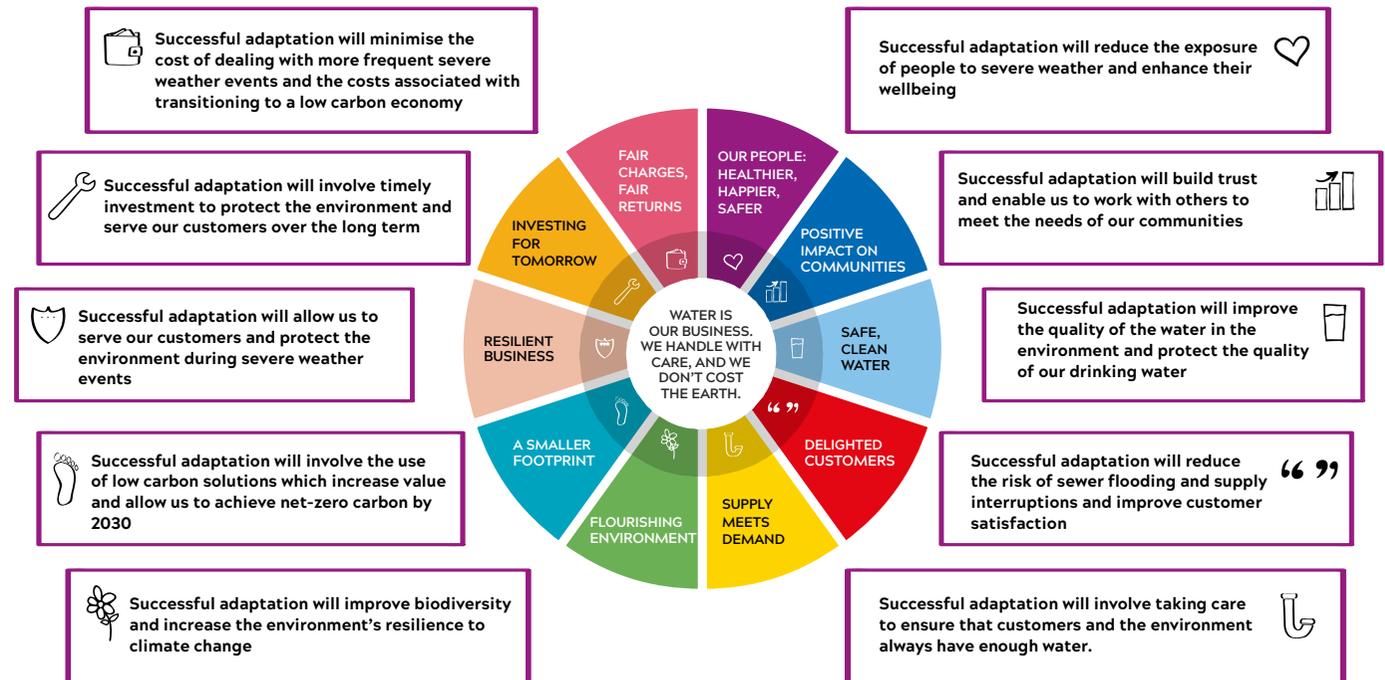
Chapter 7: Customers

7.1 Customer outcomes

Failure to manage the risks described in this report would lead to increases in interruptions to supply, more severe drought restrictions, more incidents of sewer flooding and greater damage to the environment. All of this would lead to poor outcomes for customers and the environment and ultimately undermine our legitimacy as a provider of essential public services.

Ten outcomes have been developed in consultation with our customers for the next AMP period (2020–2025). Under each of these outcomes we have agreed, again with our customers, a number of performance commitments (see the Appendix). In preparing our Adaptation Report we have mapped how climate-related risks and our actions in response can have an impact on these outcomes and the associated performance commitments. Clearly, if we fail to adapt we will fail to deliver against our agreed outcomes and performance commitments. The diagram to the right illustrates that all of our outcomes have the potential to be impacted by one or more of the physical and transition risks we have identified.

This report demonstrates how we will continue to deliver an outstanding level of service to our customers. This is possible because we recognise climate change as one of our biggest challenges and have embedded how we manage it into our long-term strategy as well as our shorter-term plans. To ensure we continue to protect our customers, we will deliver the actions identified in the report and monitor ourselves using the performance commitments we have agreed with them.



7.2 Customer service

We are recognised leaders in customer service. In 2019 our regulator, Ofwat, confirmed that we had achieved the number one position in our industry for customer service. We were also named the best for customer service across the whole of AMP6 (2015–2020). In addition, the Consumer Council for Water, the statutory consumer body for the water industry in England and Wales, highlighted us as the best in the industry for resolving customer issues quickly, and for receiving fewer written complaints than other water companies.

“ We are recognised leaders in customer service. ”

Our leading position in our industry for customer service from 2015 to 2020 reflects our management of numerous severe weather events.

The preparedness developed through our Business Resilience Management System and previous investment in resilience has been an important factor in the successful management of these events.

Wet weather event

August 2014

Heavy rainfall overnight on 9 August led to high volumes of internal flooding, pollutions and alarms in some areas. All incoming work across all areas was prioritised and tankers were used to reduce the impacts in the worst affected areas.

Hot weather event

July 2015

Ongoing hot weather and a lack of rain resulted in falling levels in our treated water storage points. An incident team was coordinated to monitor storage levels throughout the region. Network rezones were planned to ensure no areas were off water and treated water tankers were used to help fill high risk storage points.

Flood event

July 2015

Properties in Lowestoft in Suffolk suffered from internal flooding due to heavy rainfall increasing river levels. Anglian Water coordinated with local authorities to manage the impact of the flooding and to help mitigate future flooding events.

Wet weather event

June 2016

Ongoing wet weather throughout June resulted in high levels of flooding and pollutions, with more rain predicted to fall. During this period Essex received 116.3mm of rain, nearly two-and-a-half times (245 per cent) the normal June amount. To manage this, internal flooding and pollution jobs were prioritised and extra resource was secured through our supply chain.

East Coast flooding

January 2017

A combination of high tides and strong winds left us at risk of coastal flooding. Our incident team was mobilised to monitor and manage any operational impacts and gather additional operational and office resources to support. Asset checks were undertaken by local operational resources. The event passed with minimal impact on our assets.

Summer demand

June 2017

Hot weather and high demand over the summer left us with low treated water storage levels. Our incident response team was mobilised to continually monitor storage levels and manage field resource to respond to issues.

The 'Beast from the East'

February 2018

In February and March 2018 temperatures dropped to -5°C and there was heavy snow across the country. The intense cold was followed by rapid warming, causing pipes to burst. Due to our long-term investment in tackling leakage, our planning for this type of event, our rapid response and effective communication, more than 99.6 per cent of customers experienced no impact at all. In our customer contact centre we successfully responded to a 36 per cent increase in call volume.

Summer heatwave

July 2018

The 'Beast from the East' was followed by England's hottest summer on record. Our incident team was convened to monitor storage levels with our region. Due to our meticulous planning and rapid operational response, customers saw no interruptions to supply from the prolonged dry weather. Our customer contact centre successfully responded to a 90% higher call volume than the comparable week the previous year.

Lincolnshire flooding

June 2019

Nearly two months' worth of rain fell in two days in June 2019. Wainfleet was particularly badly affected, with nearly 600 homes evacuated due to the River Steeping bursting its banks into the town. The breach in the river bank inundated our water recycling centre and network. Our service was affected and this was communicated to our customers. We were part of the Local Resilience Forum and Lincolnshire County Emergency Centre multi-agency response. The fire service and Environment Agency carried out extensive pumping out of the town and an RAF Chinook repaired the breach in the river bank with dropped ballast bags. Despite the extreme nature of the flooding in Wainfleet, our assets continued to function once access and power was restored.

Hottest temperature on record

July 2019

Met Office confirmed 38.7°C recording taken at the Cambridge Botanical Gardens 25 July 2019 as the highest ever temperature officially recorded in the UK. Services to customers were maintained during this peak summer period.

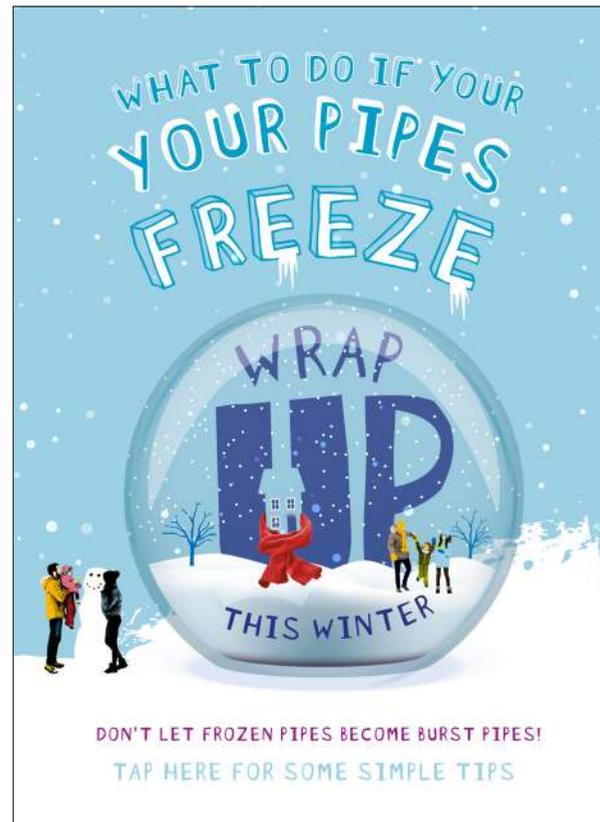
7.3 Customer engagement

We have co-created our business plan for the period 2020–2025 with our customers through more than 500,000 interactions across 38 channels, a ten-fold step up in engagement compared to that for the previous five-year period. These conversations have demonstrated strong customer support for investment to protect our region from drought and flooding. For example, when consulting on our latest Water Resources Management Plan, we proposed £300 million of investment for climate change and highlighted the impact on customer bills. More than 70 per cent of customers who responded supported “future proofing” against growth, climate change, drought and uncertainty.

We have established plans for managing severe weather events which allow for enhanced communication with customers through a variety of channels. For example, ahead of the 2018 ‘Beast from the East’ we proactively communicated to customers the importance of lagging water pipes through our Keep Your Pipes Cosy campaign. In its review of the event, Ofwat noted this campaign as a highlight of the water industry’s response to the extreme weather, saying that “it demonstrated good awareness of social media channels”. We also anticipated and managed a 36 per cent surge in incoming customer calls by redeploying resources in advance of the impact of the severe weather and holding conference calls with our retail customers which were well received.

Customers play an important role in helping us manage climate-related risk. For example, we actively engage with them to save water, keep sewers clear and reduce and slow the rainwater entering our sewers.

The work we do through our Smarter Drop, Keep It Clear and Make Rain Happy campaigns is described elsewhere in this report.



Keep Your Pipes Cosy Campaign

“Customers play an important role in helping us manage climate-related risk.”



7.4 How have we quantified the risk?

The risk to customers is very closely related to all the other risks described in this report. Therefore, to produce the risk profile we have used the highest score from each of the other risks. This is consistent with the approach used for our corporate risk register.



7.5 Metrics

Metric	Unit	2009/10	2014/15	2019/20	2024/25 (target)	Long term (target)
Service Incentive Mechanism	Scored out of 100	-	85	82	Industry leading	
Water supply interruptions	Average time in minutes: seconds cost per customer	-	20:06	18:39	05:00	05:00
Meter penetration	% of customers with a meter	65	85	90	~93	~95
Internal sewer flooding	No. per 10,000 connections	-	1.67	1.06	1.34	0.75
Non-household retailer satisfaction	Retailer Service Index	-	-	-	79.1	86

Customer performance commitments for the period starting in 2020/2021 are indicated **bold**. For these performance commitments the 2024/25 target is from [Ofwat's Final Determination](#), issued in December 2019, and the long term target is from [Anglian Water's Plan for 2020 to 2025 \(PR19\)](#) submitted to the water regulator, Ofwat, in September 2018.

Service Incentive Mechanism score for 2019/20 is a proxy measure, as the methodology changed in preparation for a new customer measure of experience (C-Mex) measure.

The sewer flooding target is higher than the 2019/20 performance. This reflects recent changes in our reporting to align with clarification around the definitions and the relationship to - and variability of - weather.

Case studies

Water Resources East

What is Water Resources East (WRE)?

Water Resources East is a unique collaboration of organisations working in partnership to develop a long-term, multi-sector regional water management plan for the East of England. The vision is for an integrated, best value plan which secures future resilience for all water users, facilitates economic growth and enhances the environment in the region, while contributing to the national water resources challenge.

WRE is:

- **Collaborative** – encouraging multi-sector planning for investment and shared ownership of challenges and solutions.
- **Driving efficiency** – whole system planning enables more efficient multi-sector solutions within catchments across the region.
- **Innovatively sustainable** – focusing on alternative land management approaches, nature-based solutions and increased natural capital through delivery of increased storage of water within the landscape, habitat restoration, aquifer recharge and green infrastructure.

What is our role in WRE?

Anglian Water established WRE in 2014 and provided sole funding for the first five years. In 2019, WRE became a separate legal entity, with multi-sector co-funding and governance. Anglian Water remains a significant contributor; our Chief Executive is a Board member and a number of senior staff are currently seconded into WRE.

What is the benefit of WRE in terms of adapting to climate change?

WRE will continue to play a crucial role in the delivery of our strategic goal to make the East of England more resilient to flooding and drought. Our region is facing a supply-demand deficit, exacerbated by climate change, and the delivery of innovative multi-sector investment approaches to water management, focused on demand reduction and the development of new supply-side options, is pivotal to increasing our resilience. Working in partnership with others, we understand our responsibility to make sure these investments are delivered as efficiently as possible, while enhancing the environment in our region. The WRE options appraisal has helped to inform our extremely ambitious WRMP19, and the regional plan which WRE is now developing will feed directly into our WRMP24.



Future Fenland

Anglian Water has worked for many years to help regenerate the Fenland town of Wisbech in NE Cambridgeshire, in partnership with Fenland District Council and other organisations like Business in the Community. Our joint work has focused on addressing social challenges such as skills and opportunities, much-needed housing, better transport connectivity, and addressing high levels of flood risk in an area where much of the land is below sea level.

The ambitious Future Fenland initiative, a new cross-sector partnership involving Anglian Water, Water Resources East, the Environment Agency, Royal Haskoning DHV and many regional partners, builds on this successful approach and takes it to a new level. It offers the opportunity to manage land and water across the Fens in a new and integrated way to deliver sustainable growth, nature restoration and climate change adaptation.

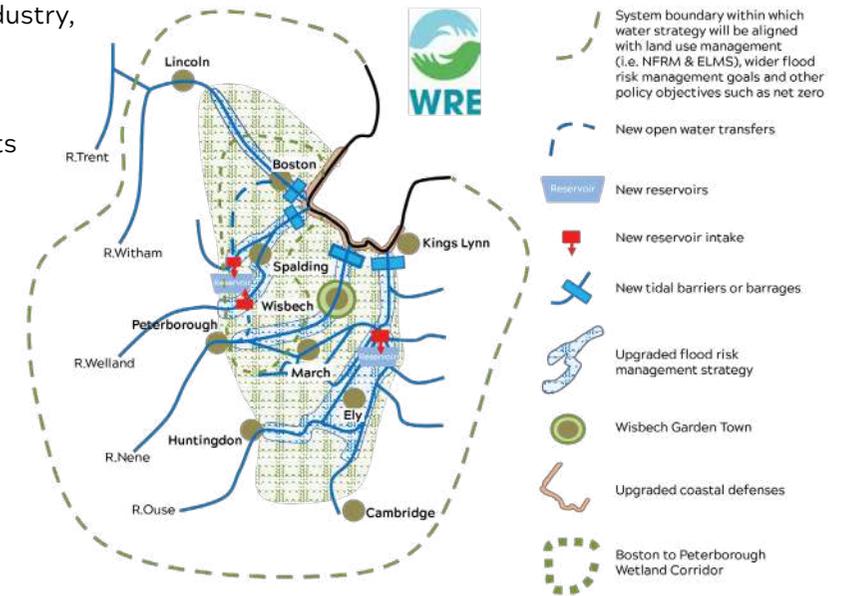
The Future Fenland strategy combines flood risk management, including upgraded coastal defences, barriers and barrages, with new open water transfers and reservoirs serving multiple sectors. Together these investments will unlock economic growth, new housing projects and improved transport links, as well as benefiting nature and tourism.

New multi-sector reservoirs could provide additional water supply resilience for public water supplies, farmers and the food industry, and improve the water environment. Downstream flood barriers or barrages would protect growth areas in the Fens, enabling key local infrastructure projects such as a rail connection from Wisbech to Cambridge and the dualling of the A47 to move forward. Using open channels to move water rather than pipes would benefit nature, tourism and navigation, as well as providing further water storage and flood risk management benefits.

Next steps for the project will see a cross-sector 'Task Force' created, combining public and private sector interests, to develop a detailed scope of works.

Future Fenland is a radical and ambitious approach to tackling the combined challenges of population growth and climate change, delivering not just increased resilience but long-term growth in environmental and social prosperity for the East of England. It is hoped that it will act as a model to inspire others across the UK and beyond, as organisations consider how best to respond to Covid-19 - by investing in low carbon infrastructure that helps prepare for the impacts of climate change.

Fenland futures: integrated adaptation



Norwich to Ludham pipeline

What was the problem?

The main driver for this new pipeline was to improve the quality of the environment. Our role as a water company is to manage our customers' demand for water and the needs of the wider environment. Recently, we've been working with the Environment Agency to review our abstraction licences to ensure we continue to strike that balance.

Water supply in the area came from a nearby borehole but this abstraction was putting pressure on Catfield Fen, a renowned Site of Special Scientific Interest (SSSI) and part of the Norfolk Broads.

The impact of our abstraction on the SSSI was being exacerbated by climate change: in recent years we have seen less than average rainfall and depleted groundwater levels across the region, with particularly dry conditions in Norfolk and Suffolk.

What have we done?

In response to the current and long-term threat from climate change to Catfield Fen SSSI, we are investing £6.5 million in nearly 3km of new pipeline to move water from our water treatment works in Norwich to Ludham. Once the new pipeline is complete in early 2021, we will stop taking water from the groundwater source.

The investment at Ludham is part of a wider programme to reduce the amount of water we take from the environment by 85 million litres a day between 2020 and 2025.

How does this improve resilience to climate change?

The pipeline will improve the resilience of Catfield Fen to climate change by reducing pressure on the water resources on which the site depends. The pipeline will also reduce the risk from climate change to public water supply in the area by improving the resilience of supply to more than 3,000 homes. The project is part of a longer-term proposal to build 500km of large scale interconnecting pipelines running from Lincolnshire to Suffolk and Essex in the south east of our region. This will allow us to move water more freely around the region in stages, from areas of water surplus in north Lincolnshire down to the south and east of the region, where it is less readily available.



Canvey Island partnership working

What was the problem?

In July 2014 a 1-in-300-year (0.3 per cent) storm event hit Canvey Island, which resulted in around 1,000 homes being flooded with surface water. An event of such magnitude stretched the resources of all the authorities involved, but resulted in extensive collaboration and partnership working. This followed a 1-in-100-year (1 per cent) storm event that flooded the island in July 2013.

What have we done?

It quickly became apparent that to deliver long-term recovery and resilience, all partners, including Anglian Water, Castle Point Borough Council, Essex County Council, Essex Highways and the Environment Agency, would have to work very differently. This included:

1. Operational teams sharing resources, including working on each other's assets to restore serviceability to customers.
2. Fixing extensive damage to the surface water network (owned by both Anglian Water and Essex Highways) caused by third party contractors.

3. Taking part in regular response and recovery meetings with all authorities. Undertaking extensive communication with customers, including a dedicated website, newsletters issued to 21,000 homes, frequent social media posts, informative videos, targeted media interviews and media site visits.
4. Developing a six-point plan, a document outlining the unique drainage challenges on Canvey Island and the additional multi-agency funding and activity required to overcome these.

How does this improve resilience to climate change?

Such significant rainfall events are likely to increase with climate change. The work on Canvey Island shows how working in partnership can not only prepare and improve infrastructure to meet the challenges it poses, but also raise local residents' awareness of the risks of the future. Canvey residents were very aware of the risk of coastal flooding, following the historic East Coast flood of 1953 and the construction of huge sea walls. However, until 2013 and 2014, surface water flooding was not part of the collective psyche. Residents are now clear what they can do to protect themselves while partners continue to work together on the island to build resilience.



Managing surface water in Grimsby

What was the problem?

Grimsby, in North East Lincolnshire, is a heavily urbanised catchment, with an average of 68m² of impermeable area per person, and is predominantly drained by a combined sewer system. Since 2015 we have undertaken work to deliver our first long-term surface water management programme. This work has used Grimsby as an exemplar catchment and a learning experience.

What have we done?

Historically, our approach to managing increased flows in our combined sewers has been to increase flow capacity by building bigger sewers or by introducing attenuation tanks. This has delivered benefits including reduced flood risk, improved water quality and better public health, but continuing to build bigger and bigger pipes or more storage becomes unsustainable with climate change.

Instead we have identified opportunities to manage surface water at source in partnership with the local council. This has included restoring a formerly piped watercourse above ground, retrofitting sustainable drainage solutions to a school and its local neighbourhood, looking for opportunities to

disconnect downpipes and plant street trees, and attenuating rural flows that enter the combined system.

How will the catchment approach improve resilience to climate change?

Undertaking this work will help to manage rainfall, reducing both flows and volumes in our sewers during periods of heavy rain. This, in turn, will have a positive impact on the 41 sewerage pumping stations across the Grimsby catchment, as well as the Pyewipe Water Recycling Centre.

Managing surface water in this way helps us to manage the risks of climate change, growth and urban creep. This benefits our customers by reducing the risk of flooding, improving river and bathing water quality through a reduction in pollution, reducing carbon and energy use through reduced pumping and treatment, and providing improved places to live, work and play.



Basildon and Thurrock University Hospital

What was the problem?

SPONGE 2020 (a part-EU-funded project) works with local stakeholders to co-create and implement innovative, place-based climate adaptation solutions in densely built up areas.

Basildon and Thurrock University Hospital is in South Essex, one of the top 10 risk areas nationally for surface water flooding. This project increases resilience against surface water flooding, while simultaneously adapting the communal space for staff, patients and visitors to suit higher summer temperatures.

What have we done?

The courtyards and the adjacent washland area (owned by Anglian Water) at the Cardiothoracic Centre have been renovated with sustainable drainage features.

The courtyards now include permeable paving and planters that either infiltrate or attenuate rainfall. These features reduce the impermeable area at the site by more than half and reduce roof runoff by more than 60 per cent.

The washland area has been completely redesigned and re-landscaped to temporarily store an additional 2,800m³ of water during extreme events, which reduces the risk of flooding to properties and infrastructure downstream. Planting in the washland basin also helps to trap and filter pollutants from urban sources (such as car parks and buildings), improving downstream water quality, while the new planting scheme provides habitats to support local biodiversity and enhance the amenity value for visitors.

How does this improve resilience to climate change?

Surface water flooding is a threat to both new and existing development. Sustainable drainage features, such as those installed at the hospital, aim to manage surface water in a responsible way, by mirroring natural drainage processes. This in turn helps to make existing infrastructure more resilient to extreme weather events. The work to the washland will result in a 12 per cent reduction in peak flows downstream, and the prevention of a potential £4 million of damage to downstream property and sewerage infrastructure.



Wainfleet flooding

What happened?

In June 2019 almost two months of rain fell over the Lincolnshire Wolds in three days, leading to unprecedented river levels in the River Steeping. This resulted in the overtopping, and subsequent breach, of an embankment on the Wainfleet Relief Channel. 139 houses were flooded, while residents of almost 600 were asked to evacuate. Wainfleet water recycling centre was completely submerged, as was the majority of the public sewer system.

Understanding the risk

The Wainfleet Water Recycling Centre was included in the assessment of flood risk undertaken by specialist consultants JBA, both for the 2015 Periodic Review (PR14) and PR19. In both instances, the risk of fluvial flooding is recognised, but considered to be low risk. However, these assessments would not have considered the impact of a breach; rather just the impact of overtopping of existing defences. As the site was considered to be low risk, no investment was planned in either our sixth Asset Management Period (AMP6) or AMP7.

Our response

Anglian Water worked with local responders and the local community to minimise the impact of the flooding on customers through proactive interventions that were focused on Response & Recovery (see 4Rs of Resilience).

As the sewer network became completely inundated, we responded through the provision of portable toilets in the town centre and showering facilities in Skegness. Tankers were deployed to create capacity within the system, helping to maintain some level of service for those customers not evacuated.

In terms of recovery, once it was safe to do so, the water recycling centre was visited, power was restored, and full service was returned to customers across the town. The reliability of our assets meant that despite the extreme nature of the flooding in Wainfleet, our assets continued to function once power was restored.

This example highlights the resilience of our existing asset base, but also highlights their vulnerability and the need to continue to understand the risk of a changing climate, and the benefits of protecting our assets from the increasing risks of climate change.



Grafham water and energy resilience

What was the problem?

In 2014 we made a business case to improve the resilience of our sites to electricity failures. One of the sites included in the business case was Grafham Water Treatment Works. This site supplies 400,000 properties and also provides a bulk supply to another water company. At the time we were preparing the business case, Ofgem was forecasting a significant narrowing of the UK's electricity capacity margins following the closure of coal-fired power stations. We needed to mitigate this transition risk as well as the physical risks associated with severe weather affecting the local electricity distribution network. The business case to improve energy resilience at Grafham was part of a wider investment strategy to improve the resilience of our water supplies to shocks and stresses, including climate change. This project involved the construction of a new 40-mega-litre storage reservoir, a new pumping station, pipelines and inline package booster stations at 15 sites across Cambridgeshire, Northamptonshire and Bedfordshire.

What have we done?

We worked with experts in the energy industry, including National Grid, to quantify the risk and develop a range of options for responding to electricity failures. At Grafham we considered numerous options, including working with UK Power Networks to reinforce its electricity network. We opted to install large back-up generators and to work with our supply chain to ensure a secure supply of fuel in the event of an emergency. The back-up generators were commissioned in 2019. We have now installed solar panels on land we own next to our Grafham site which will meet up to a quarter of the site's energy demands. In 2017 the Grafham water resilience project won the Carbon Reduction Project of the Year Award at the prestigious British Construction Industry Awards.

How has this improved resilience to climate change?

Both the energy and the water resilience projects at Grafham have improved our resilience to climate-related risk. The actions we have taken have significantly reduced our exposure to the risk of electricity failures and cost increases as the electricity grid transitions away from fossil fuels. The installation of solar panels will reduce this transition risk. On 9 August 2019, after we completed these resilience projects, the UK experienced its biggest blackout in a decade following a lightning strike and the failure of generating plant. At Grafham we now use the back-up generators in a precautionary way. Before a storm, the site can be disconnected from the electricity grid and supplied by the new generators. We also intend to make the generators available to the National Grid and UK Power Networks. This will not only help the UK to manage its supply and demand balance, but it will reduce our costs.



Innovation Shop Window

What is the Shop Window?

The Innovation Shop Window, launched in 2017, is the innovation powerhouse behind our 'Love Every Drop' strategy. The programme aims to create the water company of the future today, and reduce water consumption to 80 litres per person per day. Focused on the town of Newmarket in Suffolk, the Shop Window brings the newest, most creative and forward-thinking tools, processes and campaigns to the town first, demonstrating a path for adoption for successful demand management initiatives.

Working with 114 partners, including many start-ups, we have delivered 110 projects in and around Newmarket, including:

- Fitting leak detection equipment that isn't being used anywhere else in the world
- Fitting more than 6,000 smart meters
- Opening a Smarter Drop pop up shop on Newmarket High Street to engage customers on water efficiency
- Running a water efficiency challenge with residents.

The results are impressive:

- Leakage is down 23 per cent, saving almost 350,000 litres of water every day
- Water demand is down by 8 per cent, saving a further 80,000 litres per day
- The drop in demand has been sustained, even through the hot summer of 2018.

Built on the principles of Open Innovation, all challenges are shared. Organisations collaborate on proposed responses, with the outcome and any results also made public.

How does this improve resilience to climate change?

Demand management is central to our twin-track approach to managing the risk to public water supply. Our Shop Window shows what can be achieved in terms of demand management through collaboration and innovation. The initiatives showcased and tested in Newmarket will become part of business as usual for us as we continue to manage water supply and demand in the face of challenges from climate change and growth. For example, between 2020 and 2025, we will be investing in a roll-out of smart meters across the region, in line with our target to achieve a full switch to smart meters by 2030 with an overall penetration of around 95 per cent of households.



Innovate East

What is Innovate East?

In September 2019, Anglian Water and Essex & Suffolk Water presented Innovate East, a three-day innovation festival that tackled some of the most pressing challenges facing our region.

The event brought together some 1,800 people from a wide variety of industries and backgrounds to take part in sprints, hackathons and a STEM workshop. One of the themes of the innovation festival was how, together, we could create carbon neutral and climate-resilient communities.

What happens next?

A fund of £100,000 has been set aside to fully develop the most promising solutions from the festival. A number of groups developed prototype solutions in response to climate change, for example, how to value climate-related interventions and how to work with communities to improve their climate resilience. At the end of the festival the proposal for working with local communities was selected to receive a share of the £100,000. Other climate-related proposals developed at the festival have also been awarded funding.



How does this deliver adaptation?

Collaboration is at the heart of adaptation: it's central to improving the resilience of the East of England to climate change. Collaboration is also essential for addressing interacting risks. The level of interdependency between the water, power, communications, transportation, digital and other sectors means that we cannot address risks from climate change, particularly cascade failures, alone. We need open dialogue and to work in partnership with organisations in these sectors, sharing information and approaches to adaptation. Initiatives such as Innovate East enable us to work together to co-create solutions to shared challenges.



Appendix

Water industry standard template

Climate Change Risk Assessment (CCRA) 2017 Risk	Directly relevant to company?	Likelihood of risk occurring to WaSC	Magnitude of impact on WaSC service	Risk understanding	Actions	Timescales	Metrics / reporting
In1: Risks of cascading failure from interdependent infrastructure networks	Y	M	M	M	<p>Monitoring and risk assessments, e.g. of power and comms failures</p> <p>Investment, e.g. backup power and network resilience</p> <p>Collaboration, e.g. through Multi Agency Support Group, Local Resilience Forums, other Risk Management Authorities and CCC</p> <p>Business Continuity Management System</p>	Investment proposed and carried out within five-year Asset Management Periods (AMPs)	A subset of most of the metrics listed below
In2: Risks to infrastructure services from river, surface water and groundwater flooding	Y	M	M	H	<p>Flood risk assessments</p> <p>Investment in flood protection and network resilience</p> <p>Collaboration, e.g. partnership funding and working with other Risk Management Authorities</p> <p>Business Continuity Management System</p>	<p>25-year long-term plans updated every five years</p> <p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Water supply interruptions</p> <p>Unplanned outages</p> <p>Annual returns made under Section 18 of the Flood and Water Management Act 2010</p>
In3: Risks to infrastructure services from coastal flooding and erosion	Y	M	M	H	<p>Flood risk assessments</p> <p>Investment in flood protection and network resilience</p> <p>Collaboration, e.g. partnership funding and working with other Risk Management Authorities</p> <p>Business Continuity Management System</p>	<p>25-year long-term plans updated every five years</p> <p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Water supply interruptions</p> <p>Unplanned outages</p> <p>Annual returns made under Section 18 of the Flood and Water Management Act 2010</p>

Water industry standard template

Climate Change Risk Assessment (CCRA) 2017 Risk	Directly relevant to company?	Likelihood of risk occurring to WaSC	Magnitude of impact on WaSC service	Risk understanding	Actions	Timescales	Metrics / reporting
In4: Risks of sewer flooding due to heavy rainfall	Y	H	M	H	<p>Long-term plans, e.g. Water Recycling Long Term Plan</p> <p>Investment and behaviour change to separate surface water, maintain capacity and keep sewers clear</p> <p>Collaboration, e.g. partnership funding and working with other Risk Management Authorities</p> <p>Business Continuity Management System</p>	<p>25-year long-term plans updated every five years</p> <p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Risk of sewer flooding in a storm</p> <p>Internal sewer flooding events</p> <p>External sewer flooding events</p> <p>Annual returns made under Section 18 of the Flood and Water Management Act 2010</p>
In5: Risks to bridges and pipelines from high river flows and bank erosion	Y	L	L	L	<p>All hazards approach to investment planning and risk assessments (no formal plans and assessments for In5)</p> <p>Collaboration, e.g. partnership funding and working with other Risk Management Authorities</p> <p>Business Continuity Management System</p>	<p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Failures will be identified through other metrics</p>
In8: Risks to subterranean and surface infrastructure from subsidence	Y	L	L	L	<p>All hazards approach to investment planning and risk assessments (no formal plans and risk assessments for In8)</p> <p>Business Continuity Management System</p>	<p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Failures will be identified through other metrics</p>

Water industry standard template

Climate Change Risk Assessment (CCRA) 2017 Risk	Directly relevant to company?	Likelihood of risk occurring to WaSC	Magnitude of impact on WaSC service	Risk understanding	Actions	Timescales	Metrics / reporting
In9: Risks to public water supplies from drought and low river flows	Y	L	H	H	<p>Long-term plans, e.g. Water Resources Management Plans (WRMP) and Drought Plans</p> <p>Investment in supply capacity and resilience</p> <p>Investment in demand management including leakage, metering and behaviour change</p> <p>Collaboration, e.g. Water Resources East</p> <p>Business Continuity Management System</p>	<p>25-year long-term plans updated every five years</p> <p>Investment proposed and carried out within five-year Asset Management Periods (AMPs)</p>	<p>Risk of restrictions in a drought</p> <p>Percentage of population supplied by a single supply system</p> <p>Service level restrictions</p> <p>Security of Supply Index</p> <p>Unplanned outages</p> <p>Per capita consumption</p> <p>Leakage</p> <p>Meter penetration</p>
In14: Potential benefits to water, transport, digital and energy infrastructure from reduced extreme cold events	Y	M	L	L	Potential for reduced bursts, leakage (freezing and ground movement), process failures (due to insufficient lagging)	N/A	A subset of some of the metrics listed above

