Climate Change Adaptation Report 2024

Affinity Water

Contents

Foreword

I am pleased to share our fourth Climate Change Adaptation Report.

This report follows on closely from our last major update published in 2021 and takes account of a number of changes to our strategic plans including our PR24 business plan, our Water Resource Management Plan, Drought Management Plan and our long-term delivery strategy.

In addition to business updates, we have also experienced major weather events that have impacted on our operations including, the heatwave of Summer 2022, the freeze thaw event of December 2022 and a number of flooding events in 2024.

As the UK's largest water supply only company we recognise the important role we play, not only in providing an essential service but, also as stewards of the environment. Our supply area is home to globally rare chalk streams and a mosaic of important habitats from the home counties of Buckinghamshire and Hertfordshire to the coastal communities of Kent and Essex. This includes the Chilterns, Surrey Hills, Dedham Vale and Kent Downs Areas of Outstanding Natural Beauty. The whole of our supply area is at risk from the effects of climate change and this report sets out what we are doing to address these risks as a company.

As a water company we have a duty to adapt to climate change and reduce our own carbon emissions and have outlined these commitments in our Environment Policy. Our Water Resources Management Plan sets out how we will meet the challenges of supplying water to a growing population, taking into account the impacts of climate change. Our PR24 business plan outlines how we will continue to improve our resilience to these impacts over the next AMP.

We have been working with stakeholders and regulators for more than 20 years to protect and enhance chalk streams in our supply area, making significant reductions to groundwater abstraction, undertaking river restoration and working with landowners and farmers to address water quality pressures. But we recognise that we have more to do, and this is why we have made a commitment to end unsustainable abstraction.

We are pleased to report that with our continuing interventions throughout AMP7 we are on track to meet or exceed the targets we set out in our 2021 report. During this round of reporting we have set ambitious targets for 2050 which reflect our planned actions to continue our work on climate adaptation and mitigate and manage the identified risks.

We have identified six key adaptation risks that, without intervention, pose a threat to Affinity Water. Changing demand patterns; reduced water availability; changes to raw water quality; more frequent flooding; higher import costs and higher risks to our assets all have the potential to impact our core business activities. With our planned interventions throughout the remainder of AMP7, into AMP8 and beyond, these risks become manageable and any potential impacts reduced and managed. We have set out a series of case studies to illustrate how we are adapting to and mitigating these risks.

During our PR24 Business Plan preparation we asked our customers what they think about climate change and what action they expect us to take in response to the key risk areas. Our customers have told us that they recognise climate change to be a serious problem and want us to deliver our service in a sustainable manner. They look to us to lead the way by taking proactive action to protect both the environment and customer supplies. We have collaborated with our customers and regulators through the PR24 process which has enhanced our understanding of our performance metrics that fully recognise the risks posed by climate change and how we need to continue adapting.

Keith Haslett
Chief Executive Officer

Glossary

AMP	Asset Management Period – 5 year investment period used for planning purposes.
ARP	Climate Change Adaptation Reporting Power
CapEx	Capital Expenditure
CCRA	Climate change risk assessment- National Climate Change Risk Assessment for the UK
CO_2e	Carbon Dioxide Equivalent; standard measurement of the most common Greenhouse Gas (GHG) emissions in terms of the most common GHG, Carbon Dioxide (CO_2)
Connect 2050	Connect 2050 will mitigate the risks associated with moving the water from SRO's across our Central region.
DD	Draft Determination
DWI	Drinking Water Inspectorate is a section of the Department for Environment, Food and Rural Affairs (DEFRA) set up to regulate public water supply companies in England and Wales.
Interdependencies	Interactions between interconnected human and physical systems that alters the nature and magnitude of the risk. May also be termed cascading risks, or cross-cutting risks.
l/p/d	Litres per person per day
LTDS	Our 2025-2050 Long Term Delivery Strategy, which sets out our ambitions and has helped shape our business plan.
Ml	Megalitre (1,000,000 litres)
MWp	Megawatt Peak
Ofwat	The economic regulator of the water sector in England and Wales.
OpEx	Operating Expenses
PAS 2080	A globally applicable standard for managing carbon in buildings and infrastructure.
PFAS	Per- and polyfluoroalkyl substances. These are 'forever chemicals' used widely in consumer products and can contaminate drinking water sources and pose health risks to humans.
Physical risk	Risks related to the physical impacts of climate change.
PR19 Business Plan	Our 2020-2025 business plan for price review 2019 (PR19).
PR24 Business Plan	Our 2025-2030 business plan for price review 2024 (PR24).
RAPID	Regulatory Alliance for Progressing Infrastructure Development
Raw water	Untreated and unfiltered water found in rivers, lakes and groundwater
RCP	Representative Concentration Pathways - climate change scenarios to represent future greenhouse gas concentrations. RCP4.5 is equivalent to +2°C warming by 2100, with RCP8.5 equivalent to +4°C warming by 2100 relative to preindustrial levels.
SRO	Our WRMP considers a number of strategic solutions that could significantly increase future supply. The potential solutions are known as our Strategic Resource Options.
TCFD	Task Force on Climate-Related Financial Disclosures
TotEx	Total cost of Expenditures
Transition risk	Risks related to the transition to a lower carbon or Net-Zero economy.
UKCP18	United Kingdom Climate Projections 2018.
UKWIR	UK Water Industry Research
WRMP	Water Resource Management Plan – 50 year plan which water companies use to plan ahead and manage their water resources.
WINEP	Water industry national environment programme (WINEP) is a programme of actions we need to take to meet our statutory environmental obligations and non-statutory environmental requirements.

Chapter 1

Introduction

Purpose of the Report

As the UK's largest water supply-only company we recognise the important role we play, not only in providing an essential and resilient service but also as stewards of the environment, creating value for our local communities and ensuring affordability for our customers.

We have therefore undertaken a risk-based review of the challenges posed by climate change to our business, both now and in the future to inform our fourth adaptation report as part of the Adaptation Reporting Power round four (ARP4). This follows submissions in 2021 and 2015 (Affinity Water) and 2011 (Veolia Water East, Veolia Water Southeast and Veolia Water Central).

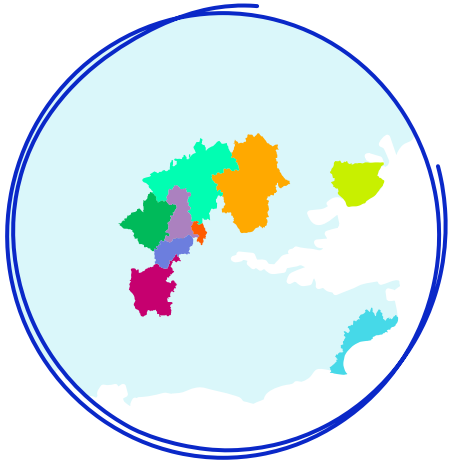
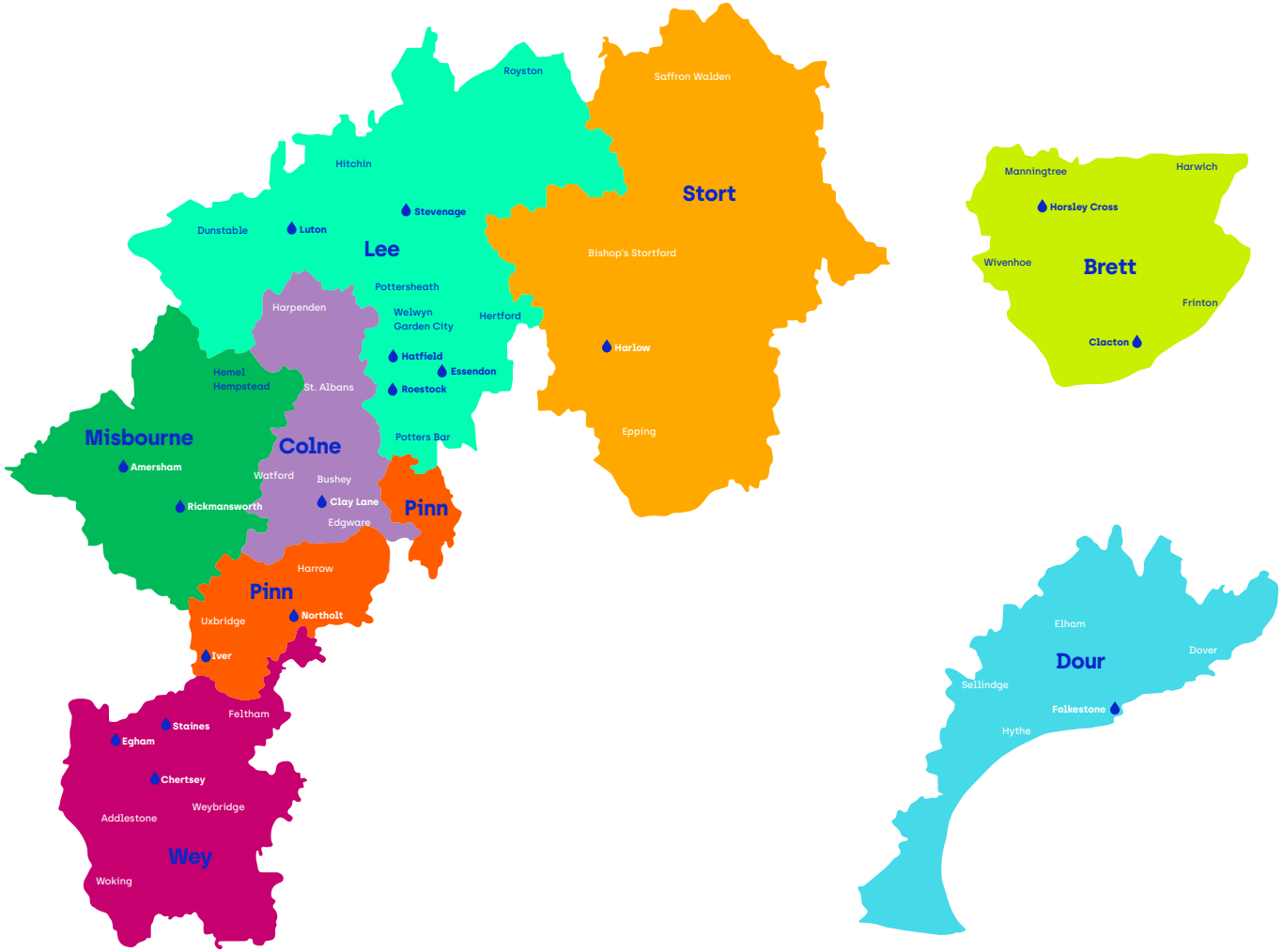


Figure 1-1 – Our water resource regions



Our reporting aligns with the Department for Environment, Food and Rural Affairs (Defra) objectives for this round, which are:

- supporting climate change risk management integration into our organisation;
- building understanding of our level of preparedness to climate change.

As our fourth round of reporting, we have also focused on demonstrating our adaptation progress through measurable performance indicators as part of our robust adaptation monitoring plan. For this round of reporting, we also include risks from transitioning to a climate resilient, Net-Zero economy. Our transition risks exhibit strong interdependencies with our physical risks, and vitally demonstrate the need for cross-sectoral collaboration, together with regulator and government support. The insights from this report will support government understanding of the climate risks and adaptation actions being taken in important infrastructure, and will contribute to the UK's Climate Change Risk Assessment (CCRA) and the National Adaptation Programme (NAP).

Affinity Water Overview

Our water resource region

We are a water supply company situated in the South East of England, supplying parts of Bedfordshire, Berkshire, Buckinghamshire, Essex, Hertfordshire, Surrey, and North West London. We also supply water to the Tendring peninsula in Essex and the Folkestone and Dover areas of Kent. We provide on average 937 million litres of drinking water to approximately 3.9 million people every day. Our supply area also includes 72,000 commercial customers. The communities we serve are shown in Figure 1-1.

We currently abstract approximately 65% of water from groundwater sources and the remainder is from surface water, principally from the River Thames. We also receive water from and provide water to neighbouring water companies, known as 'bulk supplies'. Our region is designated by the Environment Agency (EA) as under serious water stress and is highly vulnerable to climate change. Meanwhile, our region is one of the most densely populated and economically active regions in the UK, with a fast-growing population, which together with housing growth is set to increase the demand for water in our region by 10% by 2050. Our region also hosts 10% of the world's rare, environmentally vulnerable chalk streams. Therefore, we need to reduce abstraction to restore sustainable river flows and achieve our environmental ambition.

Our approach to climate change risk assessment, adaptation planning and resilience

Our approach to climate change risks is embedded in our strategic thinking as a business and integrated in our daily activities and our company purpose. Our strategy (Table 1-1) sets out to deliver resilience, whilst balancing our environmental destination with affordability for customers and the needs of our communities.

> Our purpose is to provide high-quality drinking water for our customers and take care of the environment, for our diverse communities now and in the future.

Owing to this, our fourth climate change adaptation report draws from and builds upon a number of existing plans that address our resilience to climate change. Primarily, we have a statutory obligation to prepare and maintain a Water Resources Management Plan (WRMP2024), which sets out how we will ensure that we have sufficient water resources to meet the current and future demands of our customers for the next fifty years. Furthermore, we prepare a Drought Management Plan which sets out actions we will take before, during and after a drought event to safeguard supplies for our customers and protect the environment. Our 2025-2050 Long Term Delivery Strategy (LTDS) addresses company and sector challenges in the short and

long term and helped shape our PR24 Business Plan. Following Ofwat's Draft Determination round in 2024, we have updated our performance commitments and have released our PR24 Draft Determination Representation which sets out how we will invest £2.32 billion between 2025 and 2030. This represents a 35% increase from 2020 to 2025, reflecting our increasing ambition for meeting our performance commitments, particularly reducing unsustainable abstraction and increasing our resilience. Further, we are taking steps to enhance our Task Force for Climate-related Financial Disclosure (TCFD) reporting, including considering transition risks and their impacts on our business and assessing our resilience under different climate futures as a result of the transition to a Net-Zero climate resilient economy. We have also taken steps to integrate climate adaptation risks into the corporate risk process. We have already mapped climate adaptation risks to corporate risks to ensure that they receive the same governance and risk management processes.

Our approach to ARP4

In the remainder of this report, for six physical and six transition headline risks we present: a summary setting out the risk; its relationship to the CCRA3 risks; and an assessment of our current and future position in relation to the management of this risk. For each headline risk, we have shown the findings of our risk scoring exercise using a graduated bar graphic. This risk assessment reviews our register from ARP3, considering any substantive change arising from: 1) insights gained from recent extreme weather events; 2) changes arising from advancements in our climate risk governance and management; and 3) progress in our understanding of future risk from UKCP18 projections and our strategic and operational plans (such as WRMP24) and 4) changes from adaptation progress. To support our reporting, we have collated evidence from our recent plans, and held workshops and targeted interviews with internal stakeholders/subject matter experts. To improve our understanding of future risk, likelihood and magnitude, we have undertaken additional climate projections analysis as part of APR4, involving development of bespoke metrics tailored to our physical headline risks.

We have scored each risk based on its likelihood of occurrence and the impact if it does occur. Below we outline our methods for this round, including:

- Scenarios and horizons for physical risks
- Scenarios and horizons for transition risks
- Our risk scoring matrix and guidance
- Our action setting and monitoring

We have employed different scenarios and horizons for physical and transition risks, outlined in the sections below. This is due to lower certainty associated with socio-economic and political drivers and subsequent shorter planning terms for transition risks. Our transition horizons also align with our TCFD reporting.

Our strategy

Environment

To leave the environment in a sustainable and measurably improved state.

Resilience

To be prepared for change, and resilient to shocks and stresses.

Customers

To deliver what our customers need, ensuring affordability for all.

Communities

To work with our communities to create value for the local economy and society.

Climate change scenarios and horizons – physical risks

We have updated our risk scoring methodology in accordance with Defra's ARP4 guidance to include additional scenarios and horizons in order to explore uncertainty in our future climate and take a longer term view. In the previous ARP, risks were scored three times: 1) the risk in 2050 if we take no further action; 2) the risk in 2050 taking into account actions we committed to deliver in AMP7(2020-2025); 3) a target risk score which we would like to achieve. In this report, we score each physical risk five times:

01 The present-day (2025) risk score.

02 The risk score in 2050 under a central (+2°C) warming scenario, if we take no further action.

03 The risk score in 2075 under a central (+2°C) warming scenario, if we take no further action.

04 The risk score in 2075 under a high (+4°C) warming scenario, if we take no further action.

05 The target risk score in 2050, considering our planned actions and commitments within our 2025-2030 PR24 Business Plan, our 2025-2050 LTDS and our 2025-2075 WRMP2024.

We have selected horizons of 2050 and 2075 to reflect mid-century risk, and near end-of-century risk to align with our existing plans (LTDS, WRMP2024 and TCFD for physical risks), and Water Resource South East (WRSE's) regional plan, given that climate change analyses are readily built into our plans for these horizons. This gives us higher confidence in our assessment of our resilience in the future based on our commitments and proposed resilience schemes and enhancements.

Similarly, we have utilised climate scenarios aligned with climate projection analyses and modelling included in these plans (Table 1-2).

Table 1-2 – Climate scenarios used within our risk assessment.
*(2080-2099 relative to 1981-2000)

Scenario (by 2100, relative to pre-industrial levels)	+2°C	+4°C
RCP	RCP4.5	RCP8.5
Climate Projections Product	UKCP18 Probabilistic Projections	UKCP18 Probabilistic Projections
Percentile	Median	Median
Average warming in South East England*	+2.6°C	+4.5°C
Average annual precipitation change in South East England*	+0.5%	+0.1%
Average summer precipitation change in South East England (Jun-Aug)*	-29.3%	-42.7%
Average winter precipitation change in South East England (Nov-Jan)*	+17.7%	+28.5%

Climate change scenarios and horizons – transition risks

As the global community strives to meet the goals of the 2015 Paris Agreement and significantly reduce greenhouse gas emissions to limit global warming, businesses and infrastructure services continue to divest from high-carbon emitting assets and supply chains. Transitioning to a low-carbon, climate resilient economy may entail extensive policy, legal, technology, and market changes. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organisations.

Defra's adaptation reporting round four encourages a robust risk and adaptation assessment for services and functions in addition to evaluation of physical asset vulnerabilities. This is similar to the evaluation of transitional risk we are developing by following guidance from the Department for Energy Security and Net-Zero, based on information from the TCFD recommendation report, and as part of our greater commitment to ensuring our business is sustainable in the long term. Transitional risks and their impacts to Affinity Water have been scored for preliminary assessment. This includes risks related to Affinity Water's services and functions, such as supply chain vulnerabilities, reputational risk and profitability.

As a result, we have included the preliminary evaluation of transitional risks in this adaptation report alongside the physical risk adaptation assessments to record, compare and contrast risk scores and highlight interdependencies between physical and transitional risk. However, unlike physical risks there is a lower certainty in how transitional risks will impact Affinity Water far into the future as the nature of the risks themselves depend not only on the speed with which the UK transitions to a low-carbon economy but also on the wider global transition to a zero-carbon economy.

Therefore this report assesses transition risk by considering three scoring scenarios with a maximum time horizon of 2030, which aligns with the upper end of the time period considered by our PR24 Business Plan. The three risk scoring scenario/categories are:

01 present-day conditions

02 the risk in 2030's, with no further mitigating actions

03 2030's world, with enhanced mitigating actions

Our transitional risks were identified across the four transition risk categories defined by the TCFD: Market, Policy and Regulation, Technology, and Reputation risk. Financial indicators were used to determine the materiality of each transitional risk and therefore indicate the level of impact, including operational expenditure (OpEx) representing costs for day-to-day operations, capital expenditure (CapEx) representing costs for major long-term investments, service costs which related to the cost our customers pay for water, outcome delivery incentives (ODIs) or penalties issued by Ofwat, customer complaints and permit compliance rewards and penalties.

Climate risk scoring matrix

We have maintained a consistent risk scoring process with our third round of reporting, using a five-by-five risk likelihood (remote to almost certain) by risk magnitude (insignificant to critical) matrix (Figure 1-2). This consistency in scoring enables us to review progress in adapting to our risks. Risk likelihood scoring guidance is provided in Table 1-3. For impact scoring, we have used our risk impact scoring guidance aligned with our corporate risk scoring process, which outlines levels of financial, health and safety, interruption, water quality, environmental, legal and regulatory, and customer communications impacts.

Present day likelihood and impact was informed through engagement with internal stakeholders to understand current risk occurrence and impacts, further to evidence from our monitoring and our performance. Future risk likelihood and impacts were informed by our bespoke UKCP18 projections analysis, analysis within our WRMP24, 2023 drought plan and other strategic plans, and consideration of additional drivers, including population growth forecasts, environmental ambition and Net-Zero commitments, in addition to stakeholder engagement which explored how assets, operations and communities would be impacted under future scenarios.

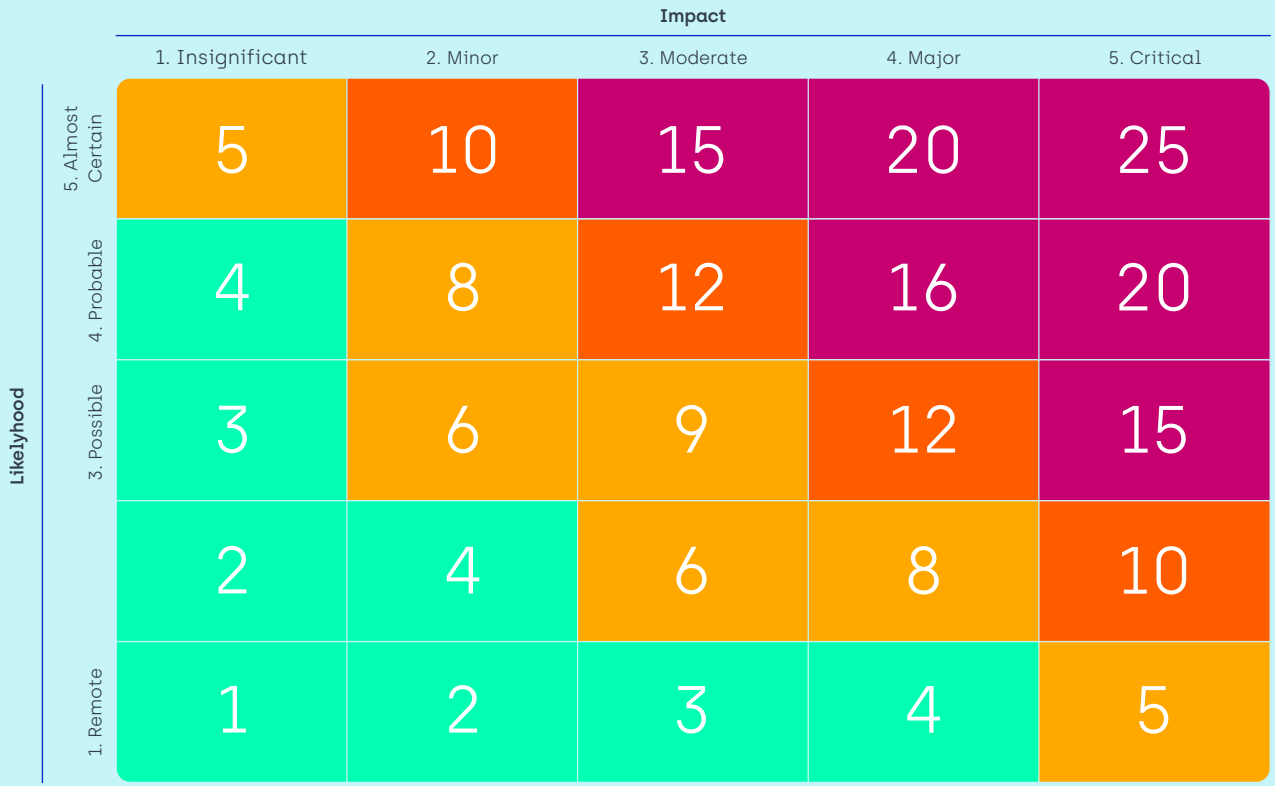
Table 1-3 - Risk likelihood scoring guidance.

Likelihood	Guidance
Remote	No more than once in 10 years
Unlikely	At least once in a 5-year period
Possible	At least once in a 3-year period
Probably	At least once in a 1-year period
Almost certain	At least once in a 180-day period

Action setting, monitoring and performance indicators

For each risk, we have set out our progress adapting to the risk, including progress against actions set out in previous rounds of adaptation reporting, further to any additional delivered or ongoing actions. We then set out our future actions that we are committed to delivering to further manage the risk. Future actions include those defined in our PR24 Business Plan (2025-2030), LTDS, WRMP24. Our performance commitments and risk target scores are founded upon the assumption that sufficient funding is available to deliver all actions proposed therein. As part of our action setting, we include measurable indicators and commitments in order to monitor the performance of our adaptation plan delivery.

Figure 1-2 - Risk scoring matrix (green = low risk; red = very high risk)



Chapter 2

Our headline physical climate risks

Following a review of our round three risk register, our headline risks remain the same as those reported for ARP3. Our risk assessment identified six headline physical risks across three primary climate-related themes: climate risks to water availability and supply, climate risks to asset resilience and climate risks to water quality (**Figure 2-1**). For ARP3, these headline risks were supplemented by 17additional physical risks and seventeen interdependent risks. For this round of reporting, we enrich the narratives of the headline risks, including related drivers and impacts of additional risks, such as interdependencies. The scores for the individual risks in present-day, 2050 under +2°C and 2075 under +2°C 5 and +4°C are presented in **Table 2.1** below.

For all of our headline risks, risk scores increase across each scenario, raising to a score of 25 (almost certain risks with critical impacts) for the unmitigated risk in 2075 under the higher (+4°C) warming scenario for five of our six risks. Despite the forecasted increasing impacts and risk likelihood under unmitigated scenarios, we have set ambitious 2050 target scores that will lower or maintain our current risk scores, reflecting our planned actions to mitigate and adapt against these risks. Moreover, we have met or outperformed our ARP3 target score following the AMP7 interventions for all of our headline risks between 2020-2025, indicating our good progress managing our headline risks. The following sections delve deeper into the identified headline risks, the progress that has already been made to address them and our future commitments to adapt to these risks.

Figure 2-1 - Our six headline risks under the corresponding risk themes of water scarcity, asset resilience and water quality. Arrows indicate interdependencies between the various risks and themes

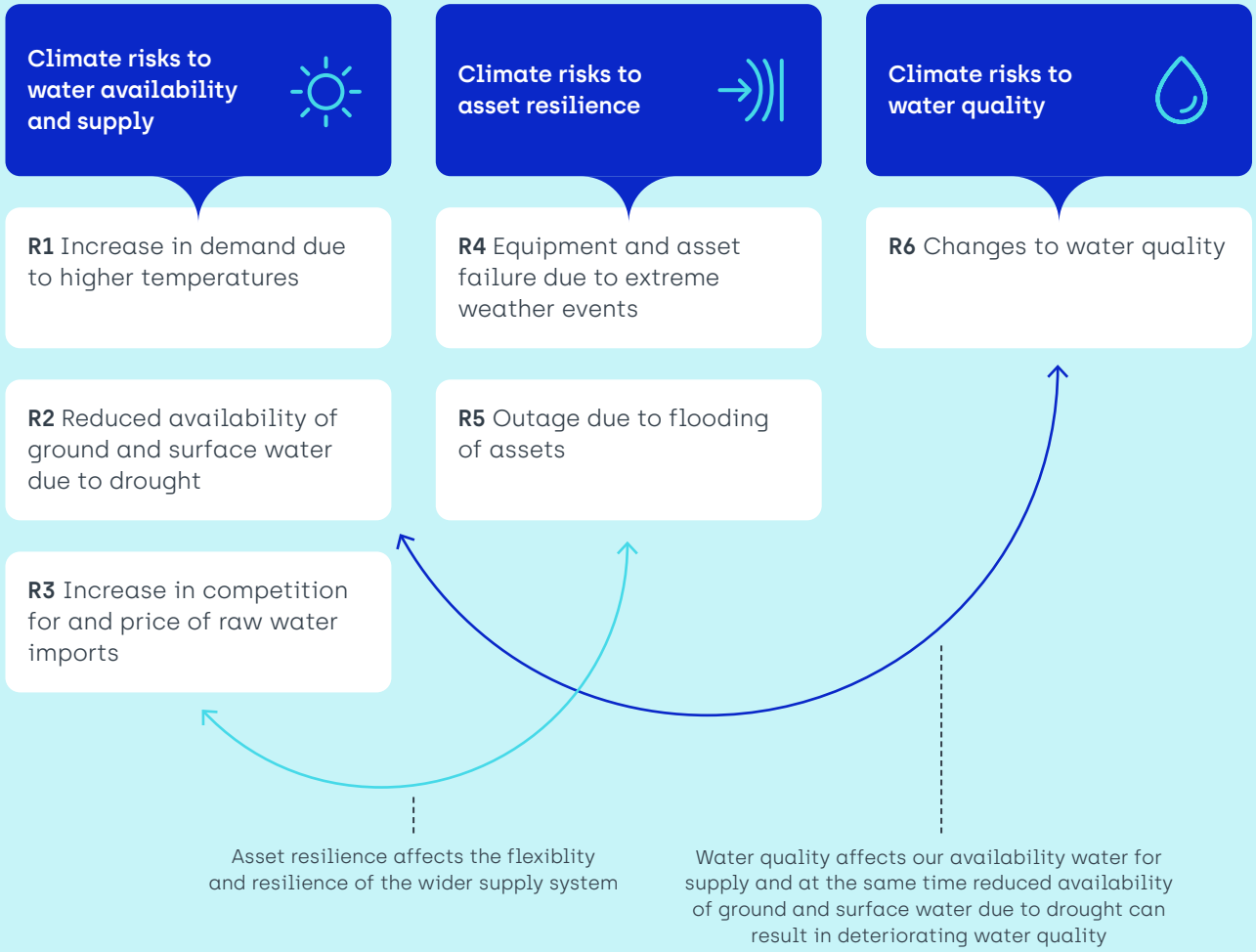


Table 2-1 - Our headline risks and risk scores

Physical Risk	ARP3 scores (assessed in 2021)			ARP4 Scores (assessed in 2024)														
				Present day			2050 +2°C (RCP4.5)			2075 +2°C (RCP4.5)			2075 +4°C (RCP8.5)			2050 Target		
	2050 unmitigated score	Score after AMP7 interventions	2050 target score	Likelihood	Impact	Overall Score	Likelihood	Impact	Overall Score	Likelihood	Impact	Overall Score	Likelihood	Impact	Overall Score	Likelihood	Impact	Target risk post mitigation (score)
R1 Increase in demand due to higher temperature	20	12	6	2	4	8	3	4	12	4	4	16	5	5	25	3	2	6
R2 Reduced availability of ground and surface water due to drought	25	9	4	3	3	9	3	4	12	4	4	16	5	5	25	1	2	2
R3 Increase in competition for and price of raw water imports	16	12	4	2	2	4	2	2	4	3	3	9	4	3	12	2	2	4
R4 Equipment and asset failure due to extreme weather events	16	12	4	3	4	12	3	4	12	4	4	16	5	5	25	3	2	6
R5 Outage due to flooding of assets	16	9	4	2	4	8	3	4	12	4	4	16	5	5	25	3	2	6
R6 Changes to raw water quality	16	9	4	3	3	9	3	4	12	4	4	16	5	5	25	2	3	6

Our performance commitments, current performance and targets to increase our resilience against all six headline physical risks.

Headline Risk	Performance metric	Current 2023/24	2024/25 forecast	2030 target	2050 target	Key actions to realise 2030 target
1, 2, 3, 4	Leakage – % reduction of 3-year average of leakage from 2019-20	18.3%	20%	31%	44.1%	Smart metering, innovation, satellite leakage detection
1, 2, 3	Per capita consumption (PCC) – % reduction of 3-year average PCC from 2019-20 baseline	-1.5%	-0.3%	12.9%	>12.9%	Smart metering, customer visits and education, new tariffs
1, 2, 3	Business demand – % reduction of three-year average PCC from 2019-20 baseline	9.3%	7.7%	11%	7.3%	Smart metering, water audits, partnerships with farmers
1, 2	Average time properties experience low pressure	01:47:09	01:57:54	01:43:43	00:45:00	Planned schemes, smart networks, improving penetration of data loggers.
2, 6	Biodiversity units per 100km^2 of business company land	N/A	N/A	1.73	1.02	WINEP schemes, INNS prevention and removal, partnerships.
1, 2, 3, 4, 5, 6	Water supply interruptions (Hours:Minutes:Seconds per property per year)	00:02:46	00:04:55	00:05:00	00:03:58	Increase investments in resilience now and beyond 2030. Increase storage and treatment capacity and network redundancy. Pressure management. Asset maintenance. Behavioural campaigns to reduce PCC.
1, 2, 3, 4, 5, 6	Unplanned outage (% of peak week production capacity)	1.42%	1.64%	2.14%	1.50%	Maintenance, improve emergency planning, investing in critical spares, improving preparedness among our workforce.
1, 2, 3, 4, 5	Mains repairs (Per 1,000km of main)	98.3	142	132	123	Calming programme, mains maintenance, new technology and software, increase in proactive maintenance.
6	Discharge Permit Compliance	N/A	N/A	100%	N/A	DWI Notices, Raw Water Deterioration programme. Catchment management
6	Number of serious pollution incidents (Category 1 & 2)	0	0	0	0	WINEP schemes to monitor, investigate, model and deliver schemes to improve water quality. Nature based solutions and natural capital evaluations driving investment decisions. Partnerships and data sharing.
6	Customer contacts about quality control	0.58	0.56	0.67	0.67	Mains flushing programme, proactive maintenance.
1, 2, 3, 4, 5, 6	Operational greenhouse gas emissions (Tonnes of CO_2 per Ml)	69905.56	tbc	74,659	N/A	Renewable energy, solar schemes, improve efficiency, electrification, low carbon alternatives, nature-based solutions.
1, 2, 3, 4, 5, 6	Whole life carbon (% reduction of tonnes of CO_2e from baseline)	N/A	N/A	14%	N/A	Improve skills, knowledge and experience.

Chapter 3

Climate risks to water availability and supply

Risk 1:
Increase in demand due to higher temperatures

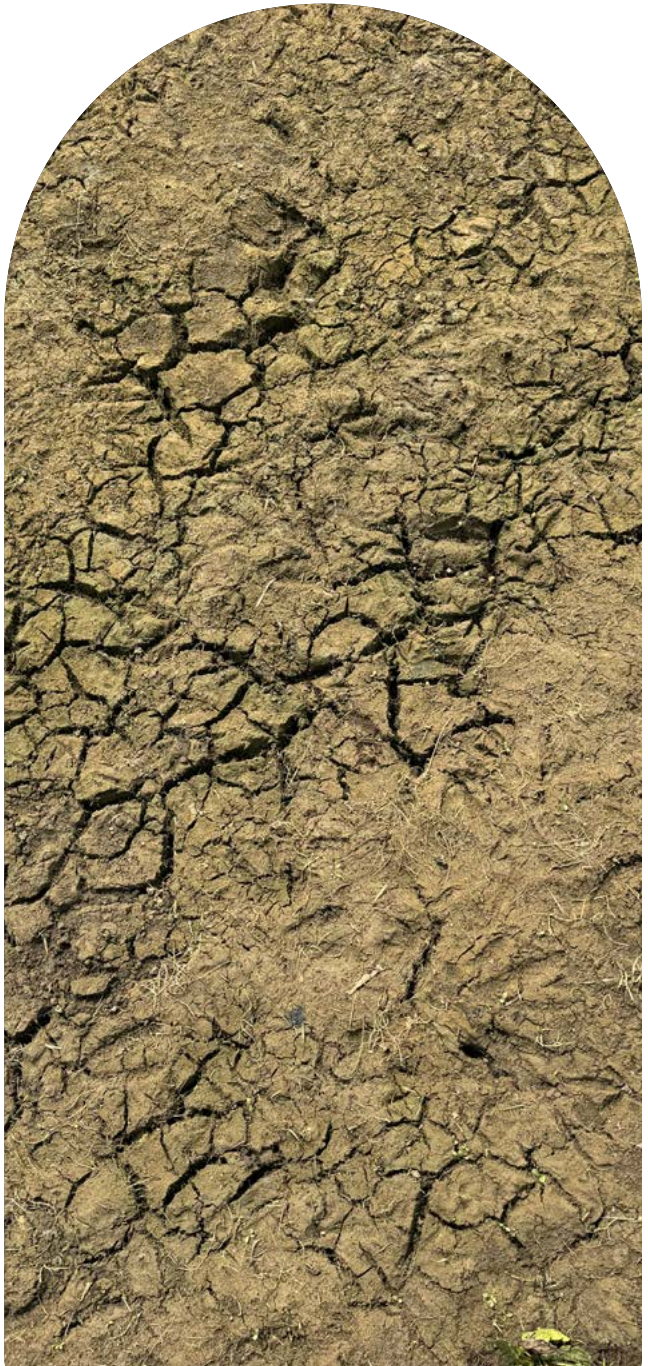
Risk 2:
Reduced availability of ground and surface water due to drought

Risk 3:
Increase in competition for and price of raw water imports

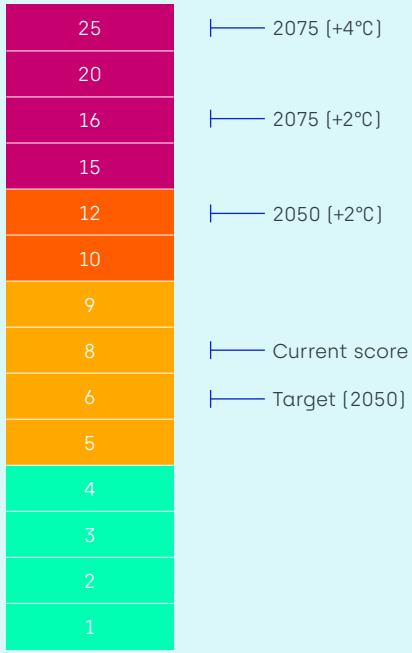
The identified headline physical risks relating to water availability and supply are Risk 1: Increase in demand due to higher temperatures, Risk 2: Reduced availability of ground and surface water due to drought and Risk 3: Increase in competition for and price of raw water imports.

Risk 1 examines the implications that higher temperatures can have on the demand for our resources and the pressure this can put on our wider network and infrastructure, especially at times of peak demand. Risk 2 which focuses on the impacts of the reduced availability of ground and surface water across our network due to prolonged period of low or no rainfall, and the impact that this can have not only on water availability but also water quality. Both of these risks have been identified to result in relevant additional and interdependent risks including the potential loss of chalk groundwater sources due to drought, increased volume of bursts as a result of rising demand, as well as changes in agricultural, water efficient goods, and buildings policies. Lastly, Risk 3 investigates the risk of increase in competition for and price of raw water imports as water availability and supply become an increased concern not only within our region but also on a national level.

Met Office future climate projections highlight more frequent, and hotter summers and general significant increase in likelihood and duration of events under +4°C scenarios. According to our climate modelling, all of our regions are going to experience significantly longer duration hot spells, lasting up to 16-21 days, and becoming up to four times more frequent.



R1



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (20), and in line with our projected score after AMP7 (2020-2025) interventions. Our target score is the same as set in ARP3.

Related CCRA3 Risks
I8: Risk to public water supplies from reduced water availability
H10: Risks to water quality and household water supplies.
H12: Risks to health and social care delivery.

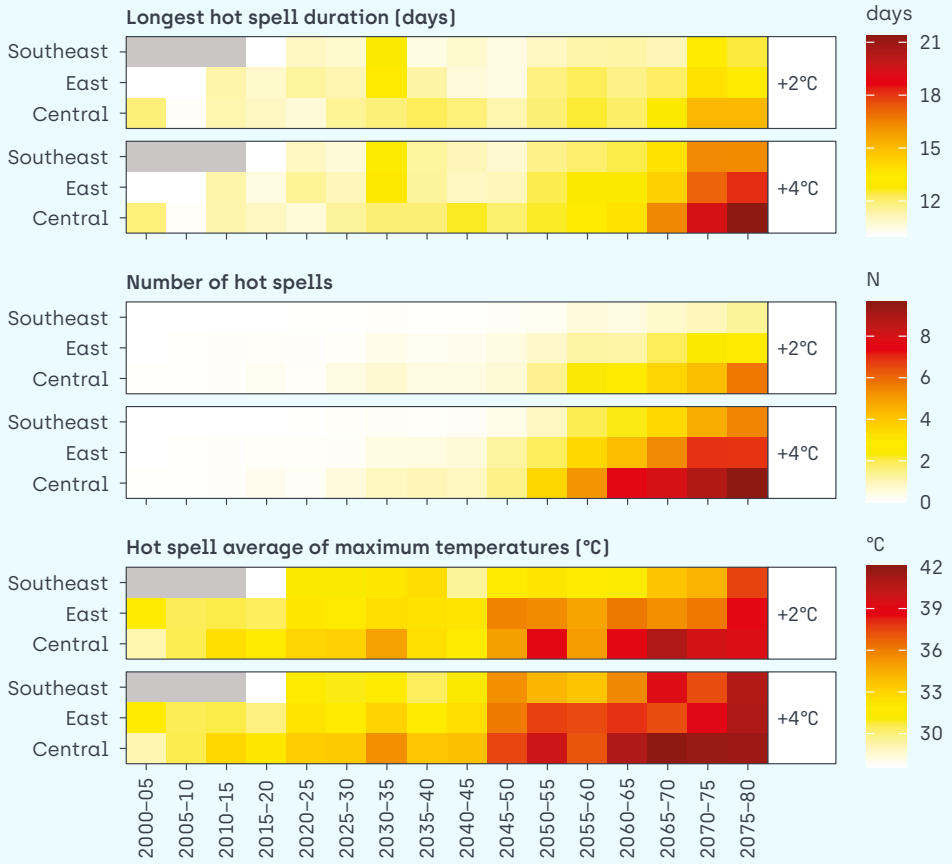
Risk 1: Increase in demand due to higher temperatures

What is the risk?

Climate change will lead to higher average temperatures throughout the year and particularly during the summer. We will also experience more frequent, longer and hotter heatwaves (Figure 3-1). By 2075, hot spells could be on average 10 days longer (+4°C, compared with 2025), with a high chance of at least one hot spell every year. These impacts are expected to be especially pronounced in our Central region. For Affinity Water, this means an increase in demand for water, particularly in regard to the extent and duration of peak demand in summer. We are already experiencing an increase in demand for water in summer months, in part due to warmer weather but also due to a combination of other factors, including net population growth in our regions, and a temporary rise in population associated with tourism in parts of our East and Southeast supply regions. Non-public sector demand including data centres put further pressure on our resources during period of higher temperatures. It is also possible that cheaper commodities such as hot tubs and paddling pools combined with a greater desire to invest in gardens will further increase summer peak demand. In addition, aging infrastructure, network resilience challenges, regulatory frameworks and license restrictions are compounding factors that can exacerbate the impacts of higher demand for our resources in a warmer world.

This risk highlights the interdependencies between different areas within our organisation. Increased leakage and pipe burst, deteriorating water quality, overall network resilience and our network's supply and demand balance are all intricately linked and need to be considered holistically when planning towards our future adaptation actions. The impacts of an increase in demand due to higher temperatures on our network can potentially be significant, as times where demand exceeds supplies can lead to challenges for our network capacity to redistribute water and result in interruptions to supply, increase in customer contacts and provide additional operational challenge due to License compliance limits. At the same time, increasing storage capacity may result in water quality issues during periods of low demand, presenting a delicate challenge of balancing optimal capacity and quality. Higher temperatures can also directly affect our network by overheating and damaging equipment, highlighting the need to take the necessary adaptation actions to increase our network's resilience to future climate change.

Figure 3-1 – Projections of hot spells
(average temperatures greater than 26°C for 10 days or longer).



*Grey values = no threshold exceedance event

Considering the effect that climate change will have on extreme temperatures in all our regions, we expect that under both +2°C and +4°C the impact that these temperatures will have on the demand and pressure across our system will increase. Without taking the necessary actions, the likelihood that future heatwaves will have major impacts on our network is almost certain, with interruptions to supply and legal or regulatory implications presenting a threat to our reputation and customer satisfaction.

By completing the actions and commitments outlined below we will increase our network's capacity and achieve an overall lower demand across our customer base, therefore minimising the impact that these events will have on our network in the future. Increasing our network's redundancy, developing additional emergency measures and investing in improving our existing infrastructure we aim to limit the impact that these higher temperatures will have on our assets and ensuring therefore a more resilient water supply.

What progress has been made in adapting to the risk?

In 2020, we set ourselves a target to reduce per capita consumption (PCC) (the amount of water used by each person, usually measured in litres per person per day) by 12.5% (from a 2019/20 baseline) over the period 2020 – 2025. However, in 2020/21 we saw a rise in demand, with PCC increasing by 14.3 litres per person per day (l/p/d) to 169.3 l/p/d for the year ending March 2021. This resulted from unprecedented demand due to more people staying at home within our supply area because of the COVID-19 pandemic, which coincided with a period of hot weather between April and August 2020. We have responded by investing significantly in an extensive Demand Management programme and we continue to seek new ways to engage with our customers to communicate the importance of conserving water alongside exploring innovative approaches to charging and tariffs. As a result, our PCC has reduced to 151.7 l/h/d, a decrease of 1.5% from our 2019/20 3-year average baseline.

We are also currently taking a number of actions to address this risk and we are delivering an ambitious programme of 21 demand management projects. These include:

In-home water efficiency – We visit **22,000** customer properties per year to carry out water efficiency audits and install water-saving devices such as cistern bags and eco shower heads. We also visit an additional 1,000 customers per year through leak referrals.

Automation – we are investing to provide customers with metered data relating to water use in their locality. Automatic meter reading means that we can increase the accuracy and frequency of meter readings, allowing us to communicate better with customers about water use and improving water efficiency.

Non-per-capita consumption measures – as part of our Demand Management programme, we are working with external partners to drive down consumption, such as the Water Smart Holiday Parks project.

Behaviour change – incentivising customers to reduce their water demand through comparing their water use to others when they receive their bills.

Education and engagement – Save Our Streams (SOS) is a multi-disciplinary campaign that sees us appear on billboards, in newspapers, on the radio, on social media, in local town centres and in many other places (Box 3.1). We are also planning on rolling out a new phase

Save Our Streams Campaign

In 2023, we launched the next phase of our award-winning behaviour change programme - Save Our Streams (SOS), which aims to help customers use water wisely, save money, and support the local environment. SOS aims to help our customers understand the link between local rivers, streams, and their own water use. We used humour to help our customers understand why reducing their water wastage is important and give them practical advice on how to do so.

Over 320,000 customers have engaged in SOS, and hundreds of thousands more households who have seen the campaign have started their water-saving journey. The measured impact of this campaign to date is a saving of the equivalent of two Olympic sized swimming pools of water per day. The program will continue this year and focus on water usage behaviours that are easiest for customers to change in day-to-day life.

In addition to our demand management projects, we have also made significant leaps in a number of other areas since the third round of reporting, which have been crucial in increasing our network's resilience against extreme temperatures. These include:

Developing a more resilient water network – With the primary aim of reducing leakages, we are exploring and investing in innovation and efficiencies in our distribution network leakage control and customer supply pipe leakage reduction. **In the first year of AMP7 (2020/21) we replaced 22.4km of pipes**, while also achieving our leakage reduction targets for 2022/23. As also outlined in our Business Plan for 2024, we are also working towards delivering pressure reduction schemes, and offering free repairs of customer side leaks. We have also started utilising innovative methods to reduce leakages throughout our coverage area and we are currently deploying satellite technology for leakage detection.

Strategic Reservoir Options (SROs) – In our WRMP24 we have set out a number of priority SROs which are now being developed under AMP8 (2025-2030). These include the South-East Strategic Reservoir Option (SESRO), the Grand Union Canal (GUC) and the Thames to Affinity Transfer (T2AT).

Bulk Transfers – In our efforts to mitigate against situations when demand exceeds our supply limits, we are looking into setting up further arrangements including bulk supply agreements or similar contracts with neighbouring companies for bulk water imports. (Also see Risk 2 for Connect 2050 scheme).

New Drought Management Plan 2023 – Through changes in our network pressure we are able to reduce the amount of water that we need to move around our network in severe drought situations.

What else will be done to further adapt to the risk?

Since the third round of reporting power, we have set ambitious targets to **further reduce PCC** through concerted action on water efficiency and smart metering. This 'concerted action' is focused around developing wider collaboration to achieve a more challenging goal. As part of our Draft Determination (DD) Representation, by 2030 we aim to reduce PCC by 12.9% compared to our 2019-20 baseline. These targets require strict implementation and monitoring and the establishment of specific teams to start the metering programme. Our ambitious metering programme for 2025-2030 includes a £131m package of enhancement investment and the installation of 377,165 household smart meters and 20,000 non-household smart meters.

We also have ambitious targets to reduce leakage by 44% before 2050. Through increasing the intensity of leakage activities, innovation, efficiency and reducing customer side leakage, we are on track to deliver our leakage target for 2025, which represents a 15% reduction from our 2020 position. As part of our LTDS for 2025-2030 we also aim to reduce supply interruptions to under three hours by 2050 and reach target leakage reductions of 31% from our 2019-20 baseline by 2030. Through our LTDS we also have planned a 'Calming Programme', aiming to reduce leakages while also reducing the need and cost of investing in replacing pipes. This work is primarily focused on enhancing pressure management activities . In addition, we are currently also in the process of researching new innovative methods to reduce leaks, including looking into fibre option alternatives.

We continue to campaign to increase the involvement of water companies in planning applications involving large scale developments. We want to **increase our influence within the planning system** to ensure that new developments are as water efficient as possible. This is vitally important in our region where significant new development is planned against a backdrop of existing water stress. Through proactive engagement and adherence to regulatory guidelines, we aim to lead in delivering water neutrality and safeguarding water resources for future generations (Box 3.2).

Water Neutrality and Bidwell Development

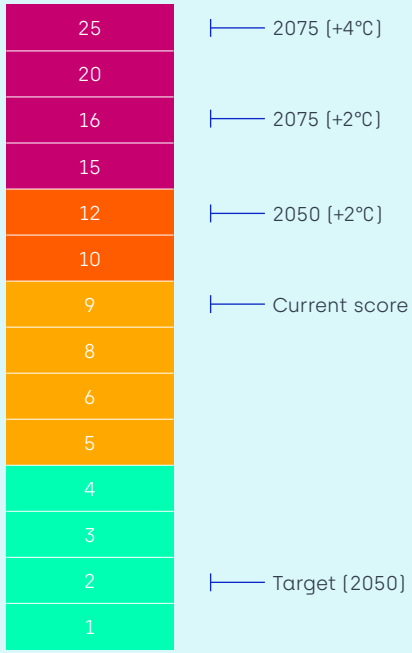
Bidwell Water Savers was a trial to test the impact of a behaviour change campaign only (no technological interventions) on water use in the Bidwell West, 908-home new development in Houghton Regis, Bedfordshire.

A multi-channel marketing campaign asked residents to take one water-saving pledge that they felt they could manage. 382 residents (42%) took a pledge, and 55% of those showed an average of 32.9 litres a day savings vs. expected use post-campaign.

As of March 2024, the site became the world's first water-positive NAV (new appointees and variations) site, with the water reductions from the behaviour change campaign and the off-setting savings cancelling out the total water use of the site.

To facilitate our ambition to end unsustainable abstraction from chalk aquifers and to improve the resilience of our supply to customers, our WRMP24 identifies existing transfers and **bulk transfer agreements** into our network to ensure our resilience against a 1 in 200-year drought event. This will help alleviate the pressures of increased demand for water.

R2



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (25), and in line with our projected score after AMP7 (2020-2025) interventions. Our target score is lower than set in ARP3 (4).

Related CCRA3 Risks
I8: Risk to public water supplies from reduced water availability
H10: Risks to water quality and household water supplies.
H12: Risks to health and social care delivery.

Risk 2: Reduced availability of ground and surface water due to drought

What is the risk?

On average we supply around 937Ml of water a day. We depend greatly on groundwater sources, which currently make up 65% of our total supply, and are at risk from lower annual rainfall levels. Prolonged periods of low rainfall over the summer months also put our surface water sources at risk. Despite projected increases in winter rainfall, changing rainfall patterns with increasing rainfall intensity pose a risk to groundwater recharge as it increases runoff and reduces infiltration – this would work to exacerbate drawdown of aquifers due to drought. More extreme heavy precipitation events put both our groundwater and surface water sources at risk. Our operational response to drought is managed through our Drought Management Plan.

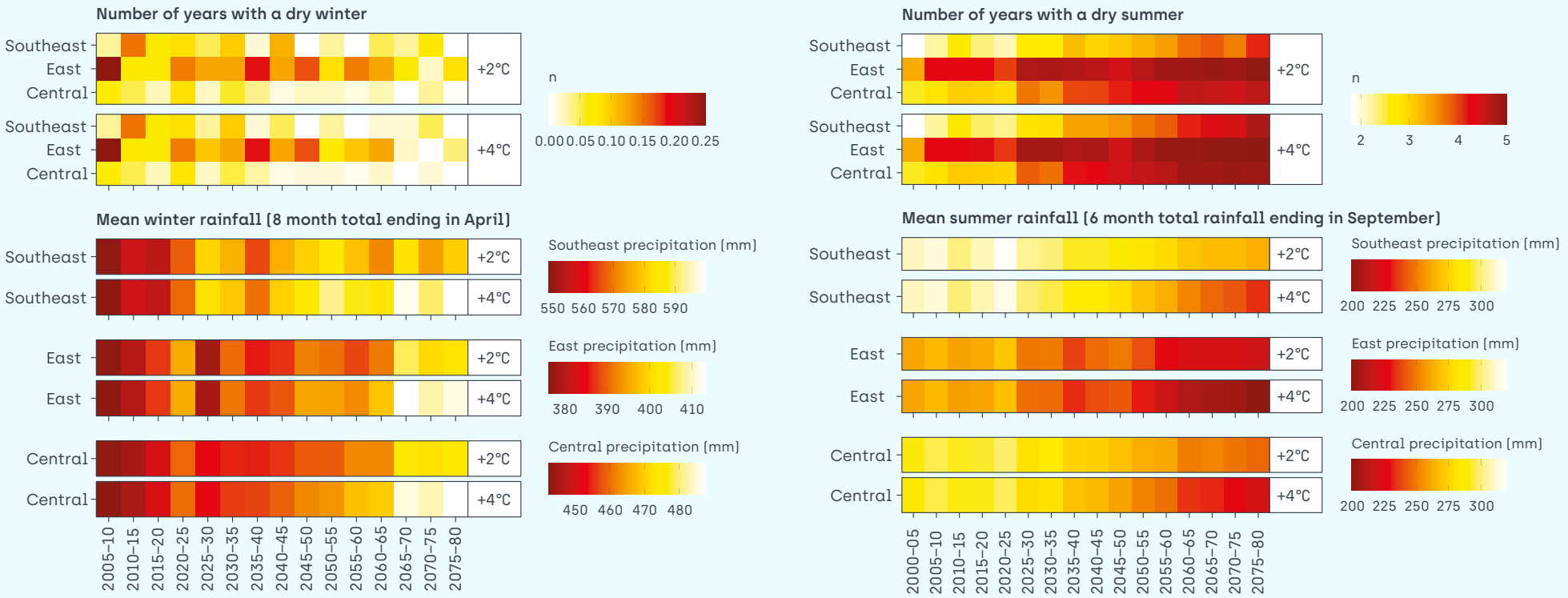
Future climate change projections show that winters across all our regions will become wetter under both +2°C and +4°C, especially in our Central area (Figure 3-2). With average monthly precipitation over the months of September-April projected to also increase by AMP18 (2075-2080), we expect the conditions to favour groundwater recharge over the winter months.

In contrast, summers are expected to become significantly drier, with a dry summer potentially occurring every year by 2075. This will have significant impacts on surface and groundwater sources as reduced river flows associated with drought and changes in rainfall patterns will not only lead to the drying of surface waters but can also affect how much groundwater we are able to abstract due to constraints on certain abstraction licences which are triggered by low river flows. With licence restrictions also preventing us from making best use of our groundwater sources at all times, we recognise the significance of a continuous and resilient ground and surface water network.

Drought also poses an indirect risk to water supply where we abstract water directly from surface water sources, such as the River Thames. Although our river intakes are drought resilient (due to our preferential status in the legal and commercial agreements), lower river flows could impact other abstractors and their ability to supply our import requirements. Lower water levels due to prolonged periods of low or no rainfall also have the potential to adversely affect water quality across our network by resulting in algal blooms, higher pollutant concentrations and saline intrusion in some of our sites, leading to knock-on effects on our supply chain and potentially negative customer reputation due to deteriorating water quality standards and interruptions to water supply.

The risk is exacerbated by external factors such as a general increase in water demand due to net population growth and land-use changes which might impact water quality and availability in our sites. Non-public sector demand including for hydrogen production and data centres is also in recent

Figure 3-2 - Projections of dry winter and summer precipitation patterns under +2°C and +4°C for our three regions.



years putting increased pressure on water demand across our regions and needs to be considered when assessing our network's future drought risk.

Considering the effect that climate change will have on extreme temperatures in all of our regions, we expect that under both +2°C and +4°C the impact that the changing precipitation patterns will have on our surface and groundwater assets will be significant and will have a noticeable effect on our ability to satisfy our customers' needs. Without taking the necessary actions, the likelihood that drier summers and more unpredictable rainfall events will have major impacts on our network is almost certain, with interruptions to supply and legal or regulatory implications presenting a threat to our reputation and customer satisfaction.

Our commitments outlined below pave the way towards reducing both the likelihood and frequency with which these events will have a significant impact on our network while also reducing the extent of disruption.

What progress has been made in adapting to the risk?

We are seeking to mitigate this risk by reducing our reliance on sensitive groundwater and surface water sources, restoring sustainable abstraction through reductions in abstraction from our existing sources, and through managing abstraction during periods of drought.

Management Plans and Bulk Transfers

Our WRMP19 modelled the impacts of climate change on water resources, including related changes to ground and surface water source availability. The outputs of the climate change assessment were factored into our supply-demand balance calculations, and the associated risks are being managed through our investment programmes, including our Connect 2050 programme of strategic network development that aims to incorporate new sources of water into the existing water network through transfers from areas of surplus to areas where there is a deficit. Our new Drought Management Plan assessed the drought vulnerability of our groundwater sources for WRMP19 by modelling the impact of 'worst historic', severe droughts (1 in 200-year event) and extreme droughts (1 in 500-year event). We are currently taking steps to ensure that we will be resilient to a greater than a 1 in >200-year return period drought event without the need for drought permits beyond 2024, with the ambition to increase this to 1 in > 500-year return period drought events by 2040. Through changes in network pressure, we also plan to reduce the amount of water that needs to be moved around the network at times of peak demand.

Catchment Management

As well as updating our plans and investing in infrastructure schemes to address climate change risks to water supply, we have invested significantly in catchment management to improve water retention for crop growth during droughts (Section 5.1). Our Catchment Team works with farmers and other land managers to improve catchments to benefit water quality, water resources and the wider environment. We do this in partnership with various groups including Catchment Sensitive Farming, the Wildlife Trusts, other water companies and the agricultural industries.

What else will be done to further adapt to the risk?

We recognise that maintaining a sustainable year-round high-water balance within our catchment regions is the most effective strategy of ensuring a continuous and resilient water supply. We have therefore set ambitious plans to reduce our abstractions, improve our catchment management processes, increase our storage potential and improve our emergency planning. These actions include:

Abstraction Reductions – We are in the process of, and will continue to, review our abstraction in light of sustainability reductions and the Environment Agency's abstraction licensing strategy. We aim to reduce our reliance on Chalk groundwater by 21.9 Ml/day by 2030. This will leave more water in the environment in sensitive catchments, making them more resilient during dry periods. One of the aims of the review is to increase the degree of flexibility we have over the management of water resources within environmental limits. By grouping licences at a catchment level or by investigating the introduction of five-year rolling licences, we hope to be able to leave more water in the environment when it is most needed. This aligns with our company objectives whilst also meeting the ambitions of the National Water Resources framework and Environmental Destination.

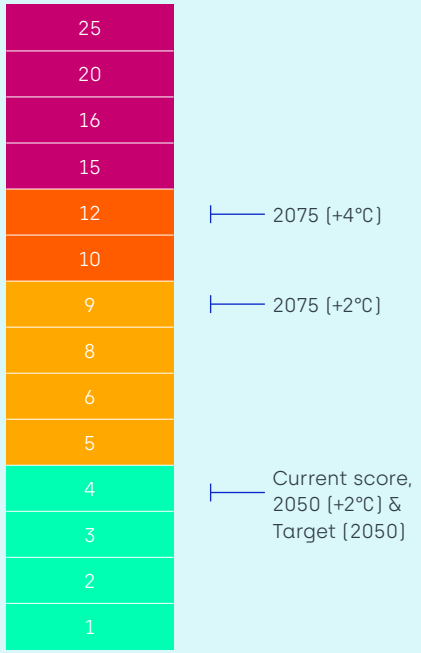
Improved Catchment Management – We recognise our catchments as our primary asset and will plan to invest in additional catchment management interventions and targeting implementation in the most appropriate locations within catchments to improve soil health and water resources. This will also help protect our sources from water quality deterioration during all periods. We are also continuing our Water Industry National Environment Programme (WINEP) investigations and ensuring that all SROs have integrated Drinking Water Safety Plans to assess water quality risks.

Increase Storage Capacity – In line with our targets in ARP3, we are also looking into increasing our storage capacity and have identified one of the Thames Water reservoirs as a reliable emergency storage for existing strategic works. Throughout the next AMP (2025-2030) we will be improving our supply resilience by constructing a 10Ml service reservoir in Hertfordshire, and a 10Ml service reservoir in Folkestone. We will also be investing £31.3m in inspections, maintenance, as well as asset improvement and replacement between 2025-30, while also carrying out systematic inspection of storage assets on a risk-based frequency of seven to nine years for internal inspections and three to five years for external inspections. These actions will build on the resilience of our network and provide further contingency in times of reduced water levels in our network.

Asset Maintenance – In addition, we have also set targets for proactive maintenance of strategic assets, by investing in the continuous improvement of our sites and setting high standards to increase the overall resilience of our network.

Emergency Planning – Under our PR24 we also aim to build on our emergency planning by procuring 4 tankers to maintain supplies during extreme weather events by 2030, with the ambition to increase the number of tankers to 16 by 2040-45. We are also in the commissioning phase of the Sundon conditioning plant, which will allow us to maximise usage of the existing Grafham transfer and the Stage 1 Egham to Iver transfer scheme, giving us increased resilience against future drought events. Our draft WRMP24 assumes that the new treatment plant will be in operation by the first year of our planning period (2025/26).

Risk 3: Increase in competition for and price of raw water imports



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (16), and lower than our projected score after AMP7 (2020-2025) interventions (12). Our target score is the same as set in ARP3 (4).

Related CCRA3 Risks
I1: Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures

What is the risk?

We are not alone in facing risks from climate change to water supply. These risks associated with heatwave peaking demand (Risk 1, Section 3.1), drought (Risk 2, Section 3.2) and changing water quality (Risk 6, Section 5.1) will also affect neighbouring water companies with whom we trade both raw (untreated) and potable (treated) water every day. This physical risk is also interdependent with our transition risks (see Section 6), which will also affect neighbouring water companies. Currently we import and export water from other companies through bulk transfer agreements and emergency connections. There is little consistency to the commercial and legal arrangements between companies which means that pricing policies differ, and the basis of the supply can vary from a "right to take" to a "best endeavours" basis that may be suspended in times of drought or emergency.

As part of our WRMP24, at a company level we currently have an average import capability of 109.84 megalitres of water per day (rising to 146.77 Ml/d during peak demand conditions), approximately 11.5% of our daily distribution input (under average groundwater level conditions). This ability to transfer and trade water across company boundaries is an important part of our water resources management strategy and increases resilience whilst minimising environmental impact. Our reliance on inter-company transfers will increase significantly in the medium term. To facilitate our ambition to end unsustainable abstraction from chalk aquifers and to improve the resilience of our supply to customers, our WRMP19 identified the need for a major strategic import to the Affinity Water supply area in the mid to late 2030s. Our WRMP24 has now prioritised three SRO schemes that provide a combination of treated and raw water transfer from other companies and are currently being developed under AMP8 (2025-2030). The SRO schemes make Affinity Water more resilient, but also come with associated risks.

With the expected increase in the frequency and length of drought conditions (see Section 3.2), as well as changes to water quality (Section 5.1) because of changing temperature and rainfall patterns across southeast England, there is potential for greater competition for raw water imports in the future as well as lower headroom in the wider region. The price we pay for water imports will likely increase, alongside the requirement for companies to consider higher cost and higher carbon solutions. Whilst importing water is an important part of our current strategy, this approach to water resources management is likely to become more uncertain as the climate changes. However, we have to balance this risk against risks to the environment locally and importing water from areas where there is surplus water plays an important role in reducing the

impact of unsustainable abstraction. We are therefore working to reduce water use by all customers and increase the resilience of our network (Risk 1, Section 3.1, Risk 2, Section 3.2), lessening the need to import water and help us to reduce groundwater abstraction locally.

Considering the effect of climate change combined with sustainable reductions and population growth, we expect that under both +2°C and +4°C competition for and price of raw water imports will increase. Without taking the necessary actions, there will be a moderate risk to our water pricing, further to high reliance on water transfers to meet demand, with the likelihood of this increasing further into the future under a +4°C scenario.

By completing the actions and commitments outlined below we aim to increase our network's flexibility in water management to move water from surplus areas to those in deficit, further to actions to address water supply and demand risks (Section 3) to reduce our reliance on water transfers.

What progress has been made in adapting to the risk?

Through WRMP24, we have modelled the impact of climate change, population growth and environmental ambition on the supply demand balance and have set out a range of supply and demand measures for addressing the deficit.

Through our two regional planning groups Water Resources East (WRE) and Water Resources South East (WRSE) and the Regulatory Alliance for Progressing Infrastructure Development (RAPID) programme, we have been joint promoters on RAPID's assessment of six SROs: (Minworth; GUC; SESRO; T2AT; South Lincolnshire Reservoir (SLR); and Anglian to Affinity Transfer (A2AT) during the period 2020 – 2025. These schemes include imports, reservoirs, pipeline transfers, canal transfers and wastewater reuse schemes, which will allow us to reach our target 1 in 500-year drought resilience target by 2040.

We have now prioritised three SROs as part of our preferred plan: initial development of the 100Ml/d GUC transfer, followed by the development of SESRO supported 50Ml/d T2AT. There is potential to extend to an additional 50Ml/d transfer capacity if we face one of the two most adverse future situations included in our adaptive plan modelling. To assess how to incorporate new sources of water into the existing local water network and solve the areas of remaining deficit we have updated our Supply 2040 project from WRMP19 and developed a new holistic strategy which we refer to as Connect 2050 (see Box 3.2).

To specifically address the risk of price of imports, RAPID have set up a water transfer pricing sub-group alongside the option development work (that the companies attend), to ensure that appropriate bulk supply contracts principles are agreed. The principle of fairness in pricing is part of that sub-group work.

Box 3.2.

Connect 2050.

"We must make these interventions in AMP8 to guarantee clean and safe water to our customers from 2030 and be able to progress with our sustainability reduction programme in AMP8 and beyond."

While some of our broader supply-demand will improve the deficit position that will arise from sustainability reductions on abstractions (including leakage improvement, metering deployment, etc.), the Connect 2050 programme is necessary to move water from new resource options to areas where it can address the remaining deficit.

The Connect 2050 programme effectively balances cost and benefit through a comprehensive solution development and optioneering process, accounting for the changes in the strategic supply network required to facilitate abstraction reductions and new supply-side resources.

What else will be done to further adapt to the risk?

Through our planning process Minworth and the GUC Transfer have been selected as the first strategic schemes to be delivered with planned completion by 2032. We are now in the process of Gate 3 assessment of the SROs. The GUC transfer is one of our most innovative Strategic Resource Options (SROs; Box 3.3). It utilises existing infrastructure to transfer water from the Midlands, down to our Affinity Water supply area.

Further to our SROs, we will continue to increase the degree of flexibility we have over the management of water resources within environmental limits through our Connect 2050 programme, and actions stated under water scarcity and water quality risks that increase our overall supply, reduce our demand and increase resilience of our supply network.

Box 3.3.

GUC Transfer Strategic Resource Option.

This project is key to delivering sustainable and reliable water supply for the future and reducing our reliance on water from other sources, including unique chalk stream habitats. The GUC Transfer is a strategic water resources option that we identified as part of our plans for water resources in the future. We are working alongside Severn Trent and the Canal & River Trust to complete this scheme and secure an additional 50Ml/d by 2032/33. In accordance to this plan we will be able to secure an additional 100Ml/d following the completion of the scheme.

Starting at a water recycling centre in Birmingham, additional water treatment infrastructure will treat water. Water will then be transferred reusing existing equipment along the canals, as well as installing some new pumps and pipes. The water will then be channelled into a new water treatment works near Milton Keynes, with associated open water storage, before being transferred as clean drinking water into our supply area.

As well as creating this essential water resources infrastructure, the project will explore ways to unlock benefits for canal users and owners, the local community and the environment.

Chapter 4

Climate risks to asset resilience

Risk 4:
Equipment and asset failure due to extreme weather events.

Risk 5:
Outage due to flooding of assets.

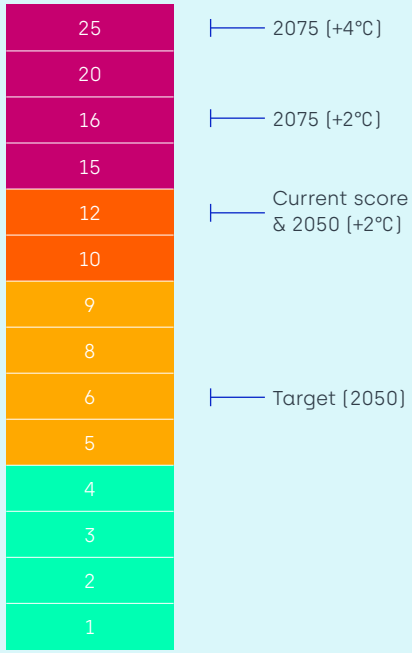
The identified headline physical risks relating to our asset resilience are Risk 4: Equipment and asset failure due to extreme weather events and Risk 5: Outage due to flooding of assets.

Risk 4 examines the physical risks that our wider network is exposed to, which includes extreme temperatures and heatwaves, heavy rainfall, flash floods, and extreme winds, while Risk 5 looks specifically at our risk of our network experiencing outages due to flooding of assets. With our coverage regions and assets being spread across various parts of the country, including coastal and inland areas, we are exposed to flooding originating not only from extreme rainfall events but also from the sea, as a result of storms surges and sea level rise.

We recognise that the resilience of our assets also faces a number of indirect and interrelated risks relating to extreme weather events and flooding. These include disruptions to the national road network, mobile phone and internet services, electric vehicle infrastructure, as well as disruptions to shipping and road transport of supplies to our operation sites, all of which can hinder our response to emergency situations and exacerbate the direct impacts brought about by these extreme events.

Climate change projections show that under both +2°C and +4°C all three of our regions will experience more frequent high intensity precipitation events, higher 5-day precipitation maximums as well as more prolonged periods with temperatures higher than 26°C, all of which are expected to put pressure on the resilience of our assets and infrastructure.

R4



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (16), and in line with our projected score after AMP7 (2020-2025) interventions. Our target score is higher than set in ARP3 (4).

Related CCRA3 Risks
I3: Risks to infrastructure services from coastal flooding and erosion.

B2: Risks to businesses and infrastructure from coastal change from erosion, flooding and extreme weather events.

Risk 4: Equipment and asset failure due to extreme weather events

What is the risk?

Climate change will lead to more frequent and more intense extreme weather events, including extreme rainfall events, heatwaves and storms. The assets and equipment that underpin the service we deliver to customers are exposed to a range of direct risks associated with these extreme weather events, including:

- Overheating of mechanical and electrical equipment during heatwaves.
- Peak demand during heatwave periods increases the risk of asset failure.
- Inundation of assets and equipment by floodwater (because of surface, fluvial, groundwater and coastal flooding) leading to damage or contamination.
- Pipe bursts as result of shrink-swell events (as well as sporadic freeze-thaw events), leading to increased leakage.
- Damage to pipes crossing major rivers because of higher flows and increased scour. We have 343 pipe crossings of large rivers, of which 103 are trunk diameter pipes.
- Higher and more prolonged peak demand can place additional pressures on assets, increasing the risk of failure.

Further to this, many of our assets are interdependent with other infrastructure systems, such as energy and communications, as well as supply chains for inputs such as chemicals, which are themselves exposed to risks from climate change. For example, our assets and equipment are at risk of failure during power outages which could be caused by extreme weather events such as flooding, heatwaves or high wind. Restricted site access for staff as a result of flooded roads or other network disruptions would also hinder our emergency response efforts, especially at times when multiple sites are affected. The knock-on effect is the potential for loss of service, disruption to their water supply, deterioration of their water quality and increased leakage.

Our network's preparedness to withstand and respond to these risks is also paramount in minimising the impact on our system. Ensuring that our infrastructure is properly maintained, our emergency response systems regularly tested and improved, and our infrastructure planned and built to the highest industry standards will be vital in reinforcing our assets' resilience against future extreme weather events.

As our climate becomes more unpredictable and extreme weather events become more common, we expect that the consequences that these events will have on our assets and infrastructure will become more severe. We estimate that with no further actions, we will experience critical destructions to our equipment and extensive asset failure at least twice a year under +4°C, with this having significant repercussions on our ability to sustain a resilient water supply. Without taking the necessary actions, we expect to see significant consequences on our water supply

as well as more critical legal or regulatory implications which would present a threat to our reputation and customer satisfaction.

By incorporating future climate change scenarios into our asset planning and development and ensuring a resilient energy supply at times of extreme weather events we aim to limit the potential impacts that these extreme events will have on our assets and infrastructure. At the same time, improving our emergency planning and monitoring will ensure a lower likelihood of our network being severely disrupted by these events.

What progress has been made in adapting to the risk?

Following our findings through the implementation of our PR19 we have designed and rolled out Affinity's Resilience Tool, developed to measure the resilience of our assets and systems (Box 4.1).

As part of our increased efforts to improve the resilience of our assets against extreme weather events, we have also developed exhaustive **emergency response procedures** to deal with any outages and network disruptions we might experience. Our Emergency and Crisis Management Plans describe the structure and define the roles and responsibilities that form the basis for our emergency response. Our plans have been written to align with emergency response best practice (Joint Emergency Services Interoperability Principles (JESIP)) and have been designed to be generic so that they can be applied to any incident, including an extreme drought. This flexibility in our approach allows us to adapt and apply the same response structure whatever the situation.

Box 4.1.

Case Study: Affinity's Resilience Tool

The Affinity Resilience Tool (ART) evaluates the operational resilience of our assets and systems at both the Asset/Site level and the System/Network level and determines the nature and extent to which these may impact service outcomes. It assesses resilience against various hazards that may arise in different scenarios. By providing a standardised framework, the tool enables us to measure and compare resilience across all assets and regions consistently, leading to better informed decision-making.

We now have a standardised understanding of the level of resilience at each key asset and site, which customers rely on the sites, and where we have system redundancy to protect services. The tool can also model the effects of specific interventions or mitigations and quantify the effect on resilience. This provides us with a clear line of sight between risks to resilience, planned mitigations and package of outcomes we aim to deliver for our customers.

The Affinity Resilience Tool has been instrumental in comprehending the need for resilience-focused investment for the PR24 business plan beyond the fundamental building blocks of asset health and WRMP, such as Single Points of Failure (SPoF) and Flooding Protection schemes.

One of the key risks from climate change to our assets and equipment is **loss of external power** as a result of extreme events such as flooding, storms and heatwaves. This risk is increasing as we experience more intense and more frequent extreme weather events. We depend on third parties to supply most of our power, and therefore to address this risk, we have installed back up power (diesel generators) at critical sites and are currently investing in a solar power programme to decrease our dependency on external suppliers. Achieving this will not only increase our network's resilience to the risk of power outages associated with extreme weather events but also contribute to our Net-Zero strategy and reduce energy consumption costs.

Climate change is likely to also lead to an increase in the risk of leakage due to damage to pipes from more shrink-swell events, making it more challenging to meet our leakage targets without further investment. Pipe damage due to freeze-thaw events may become less frequent under climate change but will remain a risk. While we met our 15% leakage reduction target for 2015-20 (the water industry's largest percentage leakage reduction target for AMP6 (2015-2020)), we are continuing to explore and invest into finding more ways of further reducing leakage across our system, as discussed Section 3.1.

Complementing our targets and ambitions outlined in this section, we have also taken the following steps and invested in measures which improve the resilience of our assets and equipment to the flood risks, as also described in Section 4.2:

- In AMP5 (2010-2015), actions were taken to protect the security of supply of 800,000 people against a 1 in 100-year flood event, including an allowance for the risks posed by climate change, exceeding our legal obligation. We also currently have plans to invest in further flood protection measures in our next AMP cycle (2025-2030).
- In 2016 we invested £300k in temporary flood defences which included flood gates and removable barriers, to reduce the risk of inundation to critical equipment by flood water.
- We installed sump pumps to drain surface water ingress at critical sites.
- We are also investigating the role that nature-based solutions can play in reducing flood risk. In addition to mitigating the risks posed by climate change, these interventions increase the overall resilience of our pumping stations and distribution network.

We have also invested in our first solar plants, which have been generating electricity since March 2022.

Lastly, we our continuing to work closely with our suppliers and other water companies to improve our resilience to supply chain risks. For example, even though we maintain our own chemical supplies, we also have agreements in place with our suppliers to hold additional supplies, providing additional contingency in case of emergencies.

What else will be done to further adapt to the risk?

Our 25-years ambition is to enhance our resilience against river, surface and groundwater flooding. Our flooding LTDS aligns with government flood resilience expectations and adapts to climate change, population growth, and abstraction reduction scenarios. Our Core Flood Mitigation Pathway is designed to mitigate against 1 in 100-year fluvial or pluvial event, allowing for climate change and 300 additional millimetres. To achieve this, we aim to improve our understanding of flood risk at all our sites, enhance site resilience, and cooperate with local authorities. We also plan to invest in 142 flood-prone sites over the LTDS period, with a platform providing emergency data for specific sites being developed at the moment.

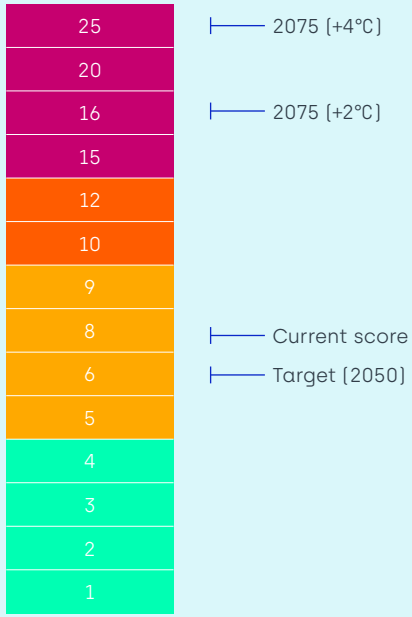
Building on our existing **emergency procedures**, a new emergency plan will be published in draft form by the end of this year, which will be updated with processes and procedures as those evolve over time. In addition, we will also be carrying out training and competency tests for crisis management that will align with our plans and chains of command (bronze, silver and gold). We have already been working to improve our relationships with the seven Local Resilience Forums that our supply area covers. We will also be ensuring our plans align with multiagency response processes.

To achieve our ambitious targets on the backdrop of increased risk of **leakage** due to changes in ground conditions, we will continue to invest to reduce leakage rates, as discussed in Section 3.1. We are also planning to continue updating the data on our resilience tool to measure the benefits of our protective measures and help guide decisions for further investments.

Our solar programme will continue throughout AMP7 (2020-2025) with a total installed capacity of 4MWp. The original business case for our second phase of solar that includes a further 28 sites are under review for the next phase of delivery. This is targeted at sites where we both own the land and have high energy consumption, which together justify the installation of solar panels. We will continue to look for solar and other renewable energy opportunities as well as alternative fuels like Hydrotreated Vegetable Oil (HVO), with a view to increasing our capability in future years. We are also looking into higher energy sites and will be reviewing our generator strategy, while also expanding our emergency planning to potentially consider tankers as discussed in Section 3.2. In the long term, we are also looking at on site battery storage as a resilience measure, preserving power quality and offsetting cost at peak tariff times of day.

Risk 5: Outage due to flooding of assets

R5



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (16), and lower than our projected score after AMP7 (2020-2025) interventions (9). Our target score is higher than set in ARP3 (4).

Related CCRA3 Risks
I2: Risks to infrastructure services from river, surface water and groundwater flooding; **I4:** Risks to bridges and pipelines from flooding and erosion; **B1:** Risks to business sites from flooding; **H3:** Risks to people, communities and buildings from flooding; **H10:** Risks to water quality and household water supplies; **H12:** Risks to health and social care delivery.

What is the risk?

Our ability to supply our customers with high-quality drinking water and take care of the environment, for our diverse communities now and in the future relies on a network of sites and assets. This includes water treatment works, pumping stations, booster stations and depots. Several of our sites are already at risk of flooding from a range of sources – rivers, the sea, groundwater and surface water. Changing rainfall patterns, more extreme rainfall events and sea level rise as a result of climate change will exacerbate these risks, as well as potentially putting more sites at risk of flooding.

Surface water flood events present a particular challenge for us as they happen quickly and lead times for reacting operationally are short. An increase in the magnitude of heavy rainfall events means that surface water flooding is likely to happen more frequently, representing a significant risk to our operations. Our Southeast and East regions are projected to experience the greatest increase in the frequency of these events under both +2°C and +4°C while all three regions are expected to experience events with 24-hour precipitation totals exceeding 90mm as early as AMP12 (2045-2050) (Figure 4-1a). At the same time, under +2°C and +4°C our Central and East regions in particular are projected to experience an overall increase in prolonged heavy rainfall periods, with significant variability between AMPs (Figure 4-1b). This is expected to increase the likelihood of both surface and groundwater flooding across our network and at critical sites.

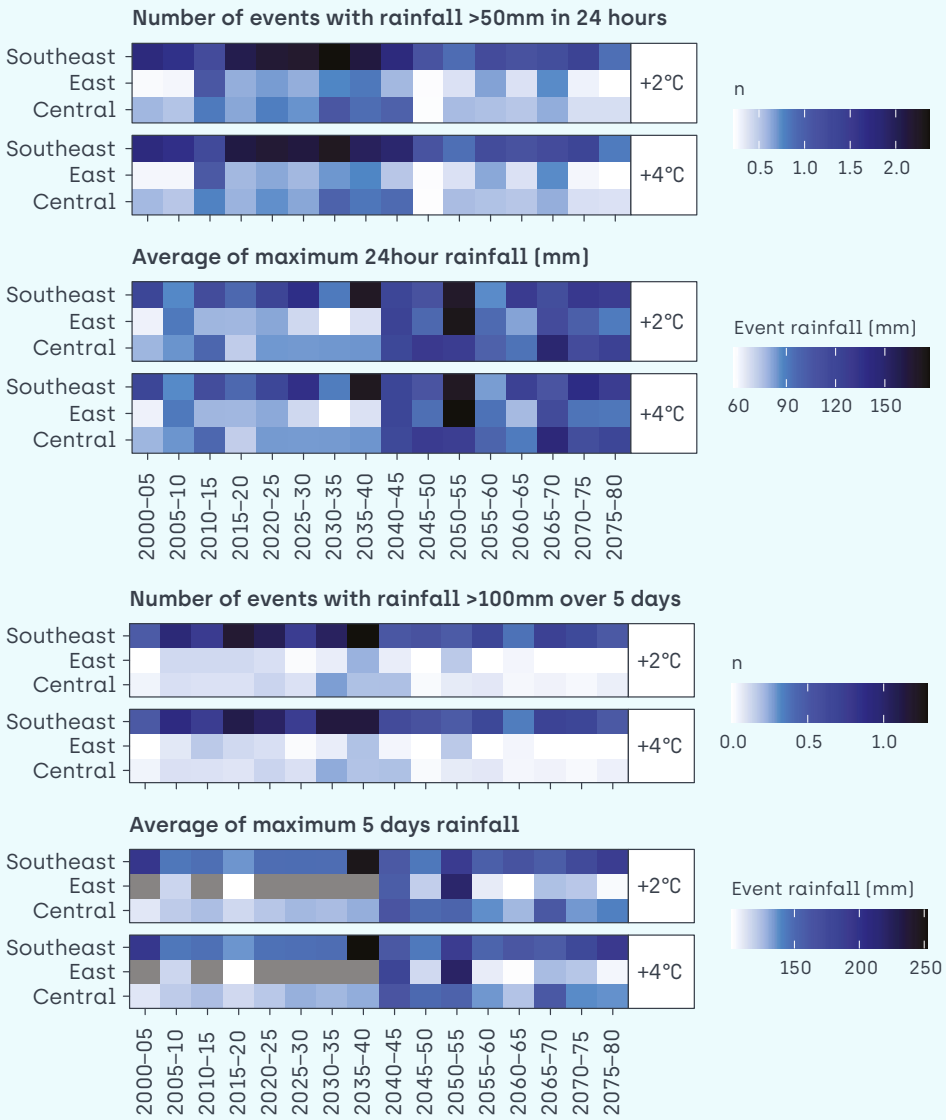
For our coastal sites in Essex and Kent, flooding as a result of storm surges and sea level rise presents and additional risk. Other potential risks associated with sea level rise include saline intrusion into groundwater sources, leading to increased treatment requirements or loss of sources. Our environmental monitoring will provide an early warning of saline intrusion.

Flooding can cause damage directly to equipment and assets at our sites, such as scour damage to pipes due to high flows, but it can also prevent staff from accessing sites. This can affect our ability to put in place emergency responses or make emergency repairs, potentially increasing the length of disruption to services. Flooding of our sites also has the potential to cause operational outages, which could interrupt supply to customers.

One of the ways this can happen is if the floodwater impacts raw water quality (discussed in Section 5.1). If several sites are impacted concurrently, our ability to mitigate supply risks by redistributing water in our network is reduced. Such an event would result in transition to our emergency plan, as described in Section 4.1. The increased risk of flooding at our sites because of climate change therefore poses a risk to a number of our performance commitments.

To take the appropriate adaptation actions it is important to recognise that flood risk in all our sites is also dependent on external factors. Inadequate infrastructure and flood defences upstream in areas outside of our management, as well as land use changes in the surrounding region can significantly affect the risk faced by our assets

Figure 4-1 - Projected changes in the frequency and magnitude of a) 1-day and b) 5-day precipitation totals under +2°C and +4°C for our three regions.



and equipment. In turn, flooding can have secondary impacts on our service areas, causing interruptions to supply due to the network's interdependencies with energy and communication systems. Storms and high winds accompanying heavy rainfall events are also associated with infrastructure failure which can put increased pressure on our network at times of flooding. Lastly, flooding can potentially increase sinkhole occurrences, as well as increase the risk of leakage and pipe burst, putting our water resources under increased threat.

As rainfall patterns across our regions and the wider country become more unpredictable and more extreme, we expect that flooding events will have an increasingly important impact on our assets. We estimate that with no further actions, we will experience network outages due to flooding at least twice a year under +4°C and at least once a year under +2°C, with this having significant repercussions on our ability to sustain a resilient water supply. Without taking the necessary actions, we expect to see significant consequences on our water supply as well as more critical legal or regulatory implications which would present a threat to our reputation and customer satisfaction.

By incorporating future climate change scenarios into our emergency planning and asset maintenance, as well as by establishing contingency plans and investing improved flood protection infrastructure we aim to limit the potential outages resulting from the flooding of our assets. Improving our emergency planning and monitoring will also ensure a lower likelihood of our network being severely disrupted by these events.

What progress has been made in adapting to the risk?

Our last region-wide Flood Risk Assessment (FRA), conducted in 2014, focussed investment on flood defences at critical sites assessed as being most at risk of flooding. This protected the security of supply of 800,000 people against a 1 in >100-year flood event, including an allowance of the risks posed by climate change, equating to a 20% uplift on peak flow level. Where suitable, additional mitigation consideration was given to the risks posed by wave action. Since then, we have taken a number of additional measures to adapt to the increased risk of flooding across all our sites. It is also worth noting that in addition to mitigating the risks posed by climate change, the following interventions also increase

the overall resilience of our pumping stations and distribution network and prevent pollution incidents.

Flood Protection – Between 2015-2020 we implemented flood mitigation measures for our 35 high-priority sites. This included investments in flood defences, including flood barriers, temporary flood gates and demountable barriers which can be deployed to reduce the risk of flood water ingress and damage to assets.
Key to successful deployment of these temporary flood defences is receipt of accurate and timely flood warnings. We receive flood warnings in relation to fluvial flooding from the Environment Agency, but rainfall warnings and pluvial flood warnings are highly variable. We are working to understand our catchments better, particularly in terms of understanding surface water flooding. Since the third round of reporting power, we have carried out a pluvial risk assessment for all our sites, which was used to shape our PR24.

Nature-Based Solutions – Since the submission of our ARP3 we have also explored opportunities for natural flood management through the use of Nature-based Solutions (NbS) and using sustainable land management adopting the principles of regenerative farming as a reservoir for upstream retention of water and mitigating the impacts of flood peaks. As part of this we are engaging with local stakeholders and are working with farmers and landowners to explore potential opportunities for future investments. Lastly, to ensure that our infrastructure responds effectively to future extreme precipitation events we have taken measures to improve our asset maintenance and enhance the effectiveness of drains and culverts throughout our network.

Flood Management Plans – We have site-based flood management plans and will update these following the update to our regional FRA, including additional recovery measures if necessary.

What else will be done to further adapt to the risk?

We know that flooding is a significant risk to our business and customers, and we have several actions planned to improve our resilience further.

Our last region-wide FRA was completed in 2014 but since then, updated climate change projections for the UK (UK Climate Projections 2018, or UKCP18) have been published, along with updated climate change flood allowances published by the Environment Agency. We will update our regional FRA with the latest information, to better understand how climate change will affect flood risk for our sites. In accordance with the updated FRA, our existing flood protection measures will be examined and adapted if necessary to manage the combined risks of climate change impacts, population growth, as well as abstraction reduction risks.

Additionally, our previous FRA focused on fluvial flood risk, but we know that it is important that any update to our FRA considers risk from all sources of flooding – rivers, the sea, pluvial and groundwater. In line with this, over the next 25 years, our core plan will focus on enhancing 17 fluvial, 71 pluvial, and 5 groundwater flood-prone sites, along with modernising flood risk assessments and regional strategies, to achieve resilience to a 1 in 100-year fluvial and pluvial flooding events as well as 1 in 30-year groundwater flooding events.. This will also involve exploring options to further our flood defences in Sacombe by carrying out localised flood modelling.

An updated FRA will help us prioritise where we need to invest further in permanent and temporary flood defences, including natural flood management methods, as well as improving our understanding of how best to use the equipment we have. This will involve updating our site-based emergency plans and protocols for sites at greatest risk of flooding, as outlined in Section 4.1. It is important that the appropriate training on deployment of the temporary flood defences is correctly rolled out, and that maintenance of our existing defences is kept to a high standard to ensure efficient performance at times of emergency.

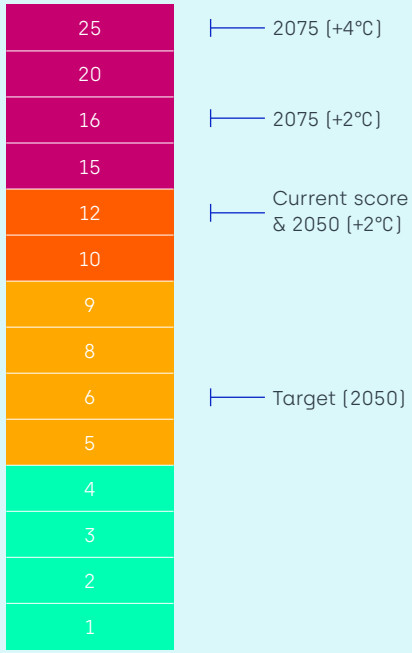
Chapter 5

Climate risks to water quality

Risk 6: Changes to raw water quality

Changes to water quality as a result of climate change impacts are increasing due to the higher frequency and intensity of droughts, extreme high temperatures, and intense one-off precipitation events. Our sources closer to the coast are also at risk from sea level rise and storm surges which increase the risk of saline intrusion. Additional drivers, including agricultural development in sensitive zones, increased concentrations of nutrients and pollutants and sewer overflows exacerbate the risk of our water sources getting contaminated. Water quality is closely interlinked to water scarcity as poor water quality compounds water scarcity risks and loss of source and lower groundwater levels worsen water quality risks by intensifying groundwater contamination. We have identified one overarching water quality risk to our company, encompassing the risks posed to raw water quality across our network.

R6



Comparison with ARP3 Scores
Our 2050 risk is lower than in ARP3 (16), and in line with our projected score after AMP7 (2020-2025) interventions. Our target score is higher than set in ARP3 (4).

Related CCRA3 Risks
I3: Risks to infrastructure services from coastal flooding and erosion.

B2: Risks to businesses and infrastructure from coastal change from erosion, flooding and extreme weather events.

Risk 6: Changes to raw water quality

What is the risk?

We take raw water from the environment and treat it to meet drinking water quality standards, before supplying our customers. Our company purpose centres around delivering high quality drinking water, and we will always take actions to ensure the water we supply is compliant. However, the treatment requirements for our sources are influenced by the quality of the raw water we abstract, which could deteriorate under future climate scenarios and therefore require additional treatment.

Changes in rainfall and temperature patterns could affect raw water quality of both groundwater and surface water sources in different ways at different times of the year, meaning that it can be difficult to determine the overall impact of climate change on our water quality. Nevertheless, the potential impacts we have identified include:

- Wetter winters and flood events leading to increased nutrient, pesticide and microbiological contaminants impacting our surface waters sources and an increase in leaching of nutrients and other contaminants impacting our groundwater sources. At the same time, these events also result in greater leaching of contaminants into groundwater, and can increase the rate of dilution of historic contaminants already in the aquifers.
- Wetter winters leading to increased urban runoff which introduces metals and fuel contaminants into watercourses and increases Combined Sewage Overflows (CSO) that in turn affect the quality of surface water sources.
- Extreme rainfall following a period of long, dry weather results in a 'first flush' effect with high concentrations of nutrients and pollutants entering surface and groundwater sources.
- Intense rainfall events cause higher nutrient runoff from land into waterbodies, resulting in an increase in algal blooms and deterioration of surface water sources due increased eutrophication.
- Sea level rise potentially leading to saline intrusion at coastal sources.
- Shift from groundwater sources to surface water due to sustainable reductions, resulting in higher need for chlorination and additional treatment.
- Extended period of drought and reduction in groundwater levels will increase the need to draw in water from other areas which might potentially increase contamination within our network. Reversely, intense precipitation events that result in sudden increases in groundwater levels can bring in contaminants from neighbouring catchments, disturbing the water quality in our sites.

We are already seeing some of these risks occurring across our region. For example, in the water we abstract from the River Thames we have observed higher levels of suspended solids and pollutants from land in the catchment and have also noticed the effects of saline intrusion on our coastal sources in our Southeast region. We have also witnessed increased erosion, nutrients and road runoff which is leading to further pollution of rivers and in particular our precious chalk streams.

Climate change will impact existing risks to raw water quality including those associated with changes in groundwater levels but will also affect our water treatment processes as hotter weather can lead to challenges relating to the use and storage of chemicals used for our chlorination processes.

Drought and extreme weather phenomena including higher temperatures and heavy rainfall events are expected to become more common. Without taking the necessary actions, we believe there is a significant increase in risk with regards to the quality of our drinking water supplies, with more critical legal or regulatory implications which would present a threat to our reputation and customer satisfaction. Through upscaling our catchment management scheme roll-out, improving our existing schemes and by committing to sustainable abstraction and delivering on our WINEP investigations programme we aim to lower the likelihood of our network being impacted by significant changes in water quality. By increasing our treatment and storage capacity we also look to adapt against short-lived changes in raw water quality as a result of extreme weather events and ensure we are able to meet our customer demands.

What progress has been made in adapting to the risk?

Catchment Management and River Improvement Schemes

We know that climate change (and other factors) will change our raw water quality and we are taking a holistic approach to addressing the challenge through catchment management initiatives as well as treatment solutions. Many of our catchments are dominated by agricultural land, predominantly used for arable crop production. Working with farmers to address water quality challenges is at the forefront of our catchment management programme. Our Catchment Team, working alongside other organisations such as Catchment Sensitive Farming, the Wildlife Trusts, other water companies and the agricultural supply chain, works with farmers and other land managers to promote good land management practices that benefits water quality, water resources and the wider environment, including chalk streams. Our catchment management measures are targeted at high-risk land to address drinking water quality challenges such as pesticide and nutrient pollution. We recognise these measures can provide wider ecosystem services benefits and climate change resilience, so these schemes also seek to identify landscape-scale catchment and nature-based solutions working with natural processes improve biodiversity, implement natural flood risk management and help address climate change. We are also working with local authorities, planners, developers and landowners to encourage appropriate management of climate change impacts to limit further contamination through current and future development (Box 5.1).

In addition, our LTDS builds upon our ambitions as set out in our Strategic Direction Statement and

Box 5.1.

WINEP Catchment Management and Sustainable Farming

The catchment management team works with farmers across our supply area to protect water supplies and the environment and to do this, our schemes provide funding to farmers to help improve soil health across catchments. Healthy soils buffer extreme weather events, as water that falls onto soils rich in organic matter is filtered as it drains into rivers and chalk streams and infiltrates down into the chalk aquifer. Soil and water are intrinsically linked and well-functioning soils across catchments, are the most sustainable form of water treatment there is.

Since 2020, Affinity Water's catchment team have provided funding to farmers through multiple channels including in-house schemes and the Landscape Enterprise Network (LENS) for East of England which merges public and private sector funding of nature-based solutions. In total, we have funded over 11,000 hectares of cover and companion crops across target catchments in Hertfordshire and Kent to protect groundwater sources from nitrate losses and safeguard sources impacted by pesticides. Through LENS, we also fund many regenerative farming practices such as intercropping, species rich grassland and support the adoption of no till farming.

includes a multi-AMP programme of measures informed by the WRMP24 and WINEP investigations, ceasing abstraction and No Deterioration abstraction licence capping of chalk groundwater sources, alongside associated investments in our infrastructure, delivered in partnership with the Environment Agency through the Restoring Sustainable Abstraction programme.

To understand the wider environmental and climate change benefits of our schemes, in 2022, we commissioned Atkins to carry out a Natural Capital Assessment for Affinity Water's completed projects in the River Beane catchment in Hertfordshire. This included five River Improvement Works (RIW) projects, catchment management measures funded to farmers and our abstraction reduction in the catchment, to quantify and value the ecosystem services benefits of these schemes completed in AMP6 (2015-2020) and AMP7 (2020-2025). The purpose of the evaluation was to inform and support the development of future catchment and nature-based solutions schemes with evidence from projects that have already been implemented on the ground. In addition, We are using a natural capital accounting and ecosystem services assessment to establish a biodiversity baseline for our entire estates, with the of increasing biodiversity units to 2.7 per 100km2 across our company-owned land by 2030.

Investigations and risk assessments

As part of our strategy to minimise water quality deterioration across our network, we have been carrying out detailed investigations under WINEP to ensure that our groundwater sources, and the wider environment, are not at increased risk of pollution as a result of our sustainable abstraction reduction targets. We are also carrying out investigations to determine the best use of interception pumping to protect our downstream sources from further water quality deterioration due to upstream influences. We are also working toward ensuring that all SROs have Drinking Water Safety Plans to assess water quality risks, in addition to each groundwater and surface water source in our region.

Capital investment to increase resilience

We are already in the process of expanding our storage capacity and have set ambitious targets to continue these efforts to increase our overall resilience to the deteriorating water quality as a result of increased pollution at the River Thames. We are also continuing to enhance our risk-based programme of water storage inspections and maintenance, investing in computational fluid dynamics to understand how water moves with our storage assets. This includes:

- Delivering our Drinking Water Inspectorate (DWI) Notices at Egham and Iver to install new treatment processes
- Delivering our Raw Water Deterioration programme delivering improvement to sources affected by Nitrates, PFAS and Turbidity
- Investing in the continuous improvement of our sites, setting ourselves high standards for our assets and operations.
- Proactive maintenance of our strategic and distribution assets.

What else will be done to further adapt to the risk?

We recognise that catchments are our primary assets. Building on the success of our cover crop programme, we will identify additional catchment management interventions for investment, looking to target interventions more precisely within catchments. We also recognise that nature-based solutions play a critical role in reducing the risks that climate change is posing on our water quality and we will be investigating a wider range of measures such as arable reversion, chalk grassland

restoration, year-long cover crops, building of carbon into soils and companion cropping. In combination with our SROs and future abstraction activities we will also reevaluate the benefits of these activities upon the future quality of our water sources and the wider environment.

At the same time, we are also improving our understanding of how climate change will affect water quality and the knock-on effect of changing water quality on water resources. Our Drinking Water Safety Plan references climate change risks but we are reviewing this with the aim of improving our understanding of climate change risks to water quality at a site level. This will enable us to prioritise interventions and investment at sites and sources most at risk of changes in water quality.

In parallel, we are continuously investing to increase our network's capacity in an effort to improve our overall resilience to climate change impacts. These investments will be directed towards new treatment works for the GUC, increasing our raw water storage to improve our resilience against pollution from the River Thames and also towards enhancing our treatment capability. More specifically, we aim to increase our treatment capability at 10 sites to address raw water contamination risks. This also includes improvements in the ways we store treatment chemicals to prevent impacts from increased temperatures. By 2050 we aim to enhance treatment at 14 sites, integrating in our approach adaptive pathways that will address the greater contamination risk brought about by climate change.

Catchment management

Our ambition is to enhance Drinking Water Protected Areas (DrWPAs) through a 25-year Catchment and Nature-based Solutions (C&NbS) programme. This initiative aims to reduce pollution risks e.g., pesticides and nitrates in the DrWPA of our River Thames abstractions, while fostering biodiversity and Net-Zero benefits alongside wider benefits like soil health.

We will deliver C&NbS measures in our DrWPA catchments in partnership with neighbouring water companies, creating more sustainable and resilient catchments in the Thames River Basin District. C&NbS measures will mitigate pollution risks through identification of sources, improving water quality and soil health, increasing drought and flood resilience, enhancing biodiversity, capturing carbon, and enhancing water resources in chalk stream catchments.

Box 5.2.

Resilient Chalk Catchments Programme

Delivered in combination with the Revitalising Chalk Rivers (RCR) programme, Resilient Chalk Catchments (RCC) is our land management focused programme of C&NbS. This programme will work in partnership with landowners, farmers, businesses, environmental NGO's, regulators, Beane Catchment Partnership, and the River Beane Restoration Association (RBRA) to target C&NbS spatially and temporally at the catchment scale to achieve among other outcomes, enhanced infiltration and aquifer discharge, prevent deterioration of groundwater quality and protect chalk streams from land management pressures.

Building on our work in the River Beane, between 2025 and 2030, we are expanding this catchment management initiative to an ambitious flagship chalk stream catchment restoration scheme which will shape our future work on chalk streams (Box 5.2).

Investigations and risk assessments

We have also set ourselves ambitious targets to continue and improve our monitoring, investigation and evaluation procedures to mitigate and adapt to the impacts that climate change will have on our ground and surface water sources. We will continue our on-site pesticide monitoring, including our WINEP Pesticides scheme, carry out regular PFAS investigations across all our sites, and intensify our saline intrusion monitoring in light on the increased saline intrusion risk in our Southeast region. Lastly, we are also looking into innovative methods of tracking water quality risks, including the use of satellite imagery and remote sensing to track land use change as we have identified strong correlations between land use changes and pollution sources.

Chapter 6

Our headline climate transition risks

A summary of our key transition risks is shown in Table 6-1. We have included transition risks as part of our round four ARP due to the strong interdependencies that exist between our physical and transition risks, and potentially significant impacts that we could face as we transition to a climate resilient, Net-Zero economy. As our sustainability reporting matures, we will increasingly align with requirements for climate-related financial disclosures, improve our knowledge and quantification of impacts and enhance our resilience through robust, evidence-based adaptation planning. For example, by the next adaptation reporting round we will have completed a detailed assessment of transitional risks and aim to gain a greater understanding of our transitional risk and therefore potentially better adapt and mitigate against them.

The following sections in this report detail the nature of each transitional risk, impact indicators used, and interdependencies with other transitional and physical risks.

Table 6-1 - Summary of preliminary assessment of transition risks and risk scoring

Transition Risk Category	Risk ID	Risk	Risk Scoring Scenario		
			2025 (current)	2030 (unmitigated)	2030 (targeted)
Market	T1	Increased costs of energy and materials due to climate change and the Net-Zero transition	12	20	9
Policy and regulation	T2	Regulatory system not enabling sufficient investment for Net-Zero transition and climate adaptation	20	20	12
	T3	Changes in the policy and regulatory requirements for water companies related to climate change, Net-Zero, and more stringent environmental regulations	12	20	12
Technology	T4	Capacity and readiness of technology, Affinity Water's people, resources, and supply chain to deliver Net-Zero and climate adaptation	15	15	9
Reputation	T5	Negative public / stakeholder perception of Affinity Water due to underperformance in management of the environment and/or Net-Zero	12	15	6
	T6	Customer affordability and fairness concerns due to costs to decarbonise and adapt to climate change	9	12	6

Market Risks

T1

Impact and performance indicators
The indicators we are currently using to measure these impacts are CapEx, OpEx, and service costs.

Related Affinity Water Risks
This risk is strongly related to physical risk R3 and transitional risks T4, T5 and T6.

Market risk is inherent risk associated with movements in stock prices, interest rates, exchange rates, and commodity prices. Market risks are greatly affected by climate change through shifts in supply and demand rates for energy and materials, and by extreme weather disrupting the exchange of commodities.

T1 Increased costs of energy and materials due to climate change and the Net-Zero transition

What is the risk?

As the UK transitions to a Net-Zero economy there will be an increase in demand for supply of renewable energy and increased competition for low carbon materials and technology. As demand is currently greater than the supply, the cost of these commodities is higher. It is increasingly challenging to invest the higher amounts required for renewable energy and low carbon technologies.

Recent high energy prices have been a significant contributor to our £80m overspend on our forecast in our PR19. Although inflation and the conflict in Ukraine are key drivers of recent rises, the energy transition is likely to continue to impact electricity prices. The cost of electricity to treat and distribute water across our network represents a significant proportion of our TotEx (14%) and OpEx (22%) for 2025-2030, highlighting the need to increase our resilience to energy prices. While our energy strategy has mitigated some of the shock from energy prices, such as the development of solar generation and intelligent purchasing of electricity, rising energy costs have still had an effect on our business.

In our preliminary assessment of this risk, we are likely to be more acutely affected in 2030 as competition for low carbon resources increases in the drive towards a Net-Zero economy. Specifically, our customers and our operations could be affected by increasing cost of schemes for resilience and Net-Zero which may result in delays in programme, causing negative reputational impacts. Increased costs may impact our research and development initiatives and curtail our use of innovative technology. Our resilience schemes, such as the use of the GUC to help provide a sustainable water supply and replace sustainable reductions are driving increased emissions, which is impacting our Net-Zero transition targets.

What will be done to manage the risk?

To reduce the impact from the wholesale price of energy on our cost base, we have developed an ambitious energy strategy across three pillars: 1. Reduce consumption through efficiency 2. Develop self-generation capacity 3. Manage residual risk via intelligent purchasing.

We have developed a programme of delivering energy efficiency through site and system optimisation, asset replacement, and improvements to offices. Our PR24 business plan has over 80 named schemes due for delivery totalling over £2m per year in energy savings.

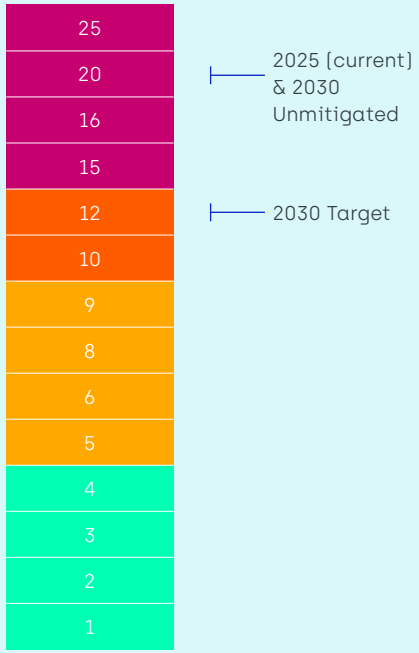
In developing our self-generation capacity, we have an ongoing **solar programme** which will continue throughout AMP7 (2020-2025), with our second phase of solar that includes a further 28 sites also being

under review for the next phase of delivery. In future, we are also considering alternative renewable energy sources and widening our current solar scheme to further adapt to this risk. Although at present we have chosen not to procure solely renewable energy due to the high costs, we are supporting a solar scheme which will upscale our procurement of renewable energy to stabilise our rising energy costs. We plan to include these costs in our risk register so that they can be actively reviewed by our board of directors.

We are considering several adaptations to our procurement strategies to mitigate this risk, including diversifying suppliers, increasing supply resilience, and developing a procurement code of ethics. In this code our carbon commitments and expectations of our supply chain will be clearly stated, and whole life/cradle to cradle methods of carbon accounting will be considered to reduce our footprint. We have a commitment to implement PAS 2080 to reduce embodied carbon and are considering using tools to understand our embodied carbon costs as part of our smart metering program, as well as considering ways to increase our operating efficiency to reduce material usage overall.

Policy and Regulation Risks

T1



Impact and performance indicators
We are exploring impact indicators for this risk. We could develop performance monitoring metrics and targets linked to our OpEx and CapEx spend in responding to a changing climate as part of future TCFD assessments.

Related Affinity Water Risks
This risk is strongly related transitional risks T5 and T6.

The policy and regulatory landscape are constantly evolving as business and government adjust to the challenges of changing to a Net-Zero economy, increasing environmental ambition, and increasing resilience to climate change. Therefore, there is a risk that new policy or regulation brought forward may impact Affinity Water or result in misalignment with current policy and ongoing activities.

T2 Regulatory system not enabling sufficient investment for Net-Zero transition and climate adaptation

What is the risk?

We risk not being able to deliver our 2030 Net-Zero target if there are insufficient expenditure allowances required to substantially reduce the carbon footprint of our key business assets and operations. In addition, expenditure allowances through the price review process may not keep pace with investment needed to proactively adapt to climate change or conform to increasingly ambitious environmental legislation and the increasing costs of materials (see Risk **T1**). Exacerbating this risk is the increasing public awareness of environmental regulatory requirements and expectations, at a time when weather extremes are becoming increasingly commonplace.

Specifically, our customers and operations have been impacted by increased expenditure to mitigate risks, respond to impacts of climate change, and transition our company to Net-Zero. As a result, we may experience ODI penalties or a reduction in regulatory allowances which put our Net-Zero programme targets at risk due to delay. We may also have to increase our bills to customers and ultimately suffer negative reputational impacts if the target levels of resilience cannot be delivered due to insufficient expenditure allowances needed to adapt to climate change. Our preliminary evaluation of this risk, given the current and planned adaptations we have summarised in this report, is described below.

What will be done to manage the risk?

We have sought to make the case for investment in Net-Zero and adaptation through the PR24 Business Plan and other long term planning to provide the evidence to regulators of the required efficient costs to deliver a resilient transition. We are continuing our engagement with regulators, customers and stakeholders to raise awareness of how policy changes must be supported by sufficient investment to be achievable, and actively horizon scanning for opportunities to achieve Net-Zero goals under available existing regulatory mechanisms.

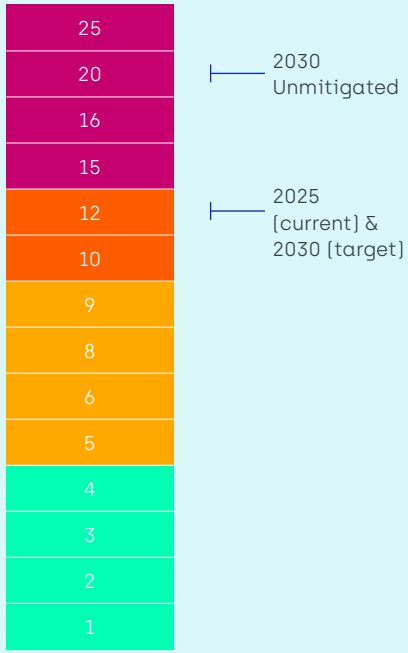
We will continue integrating carbon and multi-capitals into our decision-making frameworks to help make the case for investment in low-carbon and best value solutions. We will also continue the development and use of the 6 Capitals approach in investment planning tools such as CopperLeaf, in addition to integrating climate change impacts and considerations into all our business cases.

We are exploring insurance options by building a model for parametric insurance for cases of future extreme freeze-thaw events, investigating specific thresholds and triggers. Parametric insurance could lead to a faster payout time

if Affinity Water suffered damage from extreme weather in the future, and therefore quickly counter any extra operational expenditure on responding to extreme weather.

In the future we are exploring third party funding options as well as Power Purchasing Agreements (PPAs) for renewable energy and may need to review our own ambitious targets regarding transitioning to Net-Zero and investing in climate adaptation if funding is forecasted to be insufficient. As part of PR24, we have carried out research to understand the expectations of our customers as regards to our targets and ambitions and used these findings to to inform the development of our bespoke performance commitments and associated incentive rates, ensuring we are delivering on our customers' priorities and challenging ourselves to do more to meet and exceed their expectations.

T3



Impact and performance indicators
The indicators we are currently using to measure the impact of this risk are CapEx, OpEx, service costs, penalty and reward values and operational and embodied carbon emissions

Related Affinity Water Risks
This risk is related transitional risks T5 and T6.

T3 Changes in the policy and regulatory requirements for water companies related to climate change, Net-Zero, and more stringent environmental regulations

What is the risk?

We have many initiatives to ensure our business is sustainable in the long-term, as set out in our business plan 2025-2030. They include meeting our environmental ambitions and targets for reducing carbon emissions, increasing our resilience to climate change, and complying with water sector regulations. We could face challenges when balancing and prioritizing these multiple initiatives as we execute our long-term delivery strategy, especially due to the dynamic and evolving nature of regulations across these objectives.

We are committed to mitigating this risk, however it may not be possible to prioritise all our initiatives at the same time. The pace of change of some regulation can compound challenges, for example by driving the requirement for higher-carbon solutions over other options which we may have preferred. Additionally, regionally or nationally set environmental targets do not consider local impacts, and short-term regulatory

objectives may compromise long term goals. For example, abstraction licenses are being reduced to achieve environmental ambition, but we may incur penalties if we have to enforce a temporary use ban as water resources may not be sufficiently resilient to drought conditions. To restore our supply, we need to replace groundwater sources with surface water sources, requiring construction of our SROs, such as the use of the Grand Union Canal, further to additional water treatment requirements for these additional surface water sources. Similarly, to manage emerging water quality risks related to PFAS in line with the DWI requirements, we will need to use higher energy and higher carbon water treatment processes. Subsequently, increased environmental regulation is driving increased emissions, which is impacting our Net-Zero transition targets.

We could be impacted by increased expenditure to meet enhanced regulations. An example of this is the Environment Agency permit scheme which aims to reduce discharges to wells and groundwater to avoid ground source heating causing pollution. However, this permit scheme does not take into account the chalk aquifer management we have in place. It is an example of how we have increased our carbon

footprint through increased energy and material used to meet enhanced regulations as it has forced us to invest in new assets to further mitigate this risk beyond our current measures. Further impacts include; increased ODI penalties and reduced performance rewards, increasing customer costs, reputational impacts and a potential delay and risk to our Net-Zero Programme.

The UK Government generally give notice (1-3 years) when significant policy change is coming into place. For example, requirements related to climate disclosures were announced in the Green Finance Strategy of 2019, 3 years before becoming mandatory. In addition, Ofwat policy change is now unlikely given that the PR24 process is due to complete by December 2024. Therefore, we are satisfied that this reduces the risk likelihood.

What will be done to manage the risk?

We will continue horizon scanning to keep sight of any emerging regulations and explore the Ofwat innovation fund to provide additional investment to support our ambitions. We will continue engagement with our customers, stakeholders and regulators and encourage strong discussion with clear resolutions on any policy which misaligns with ongoing business strategy. Our engagement with Water UK continues to highlight the need for local solutions to environmental policies, and we aim to submit any potential future regulatory conflicts and best approach solutions to the RAPID. In the future we will complete public value assessments as part of decision-making to balance trade-offs of different agendas in the regulatory framework. We will also enhance our regulatory and policy understanding with further monitoring and reporting of climate related risks, following guidance from ongoing TCFD assessments.

We already have in place a whole life carbon performance commitment and we set out our Net-Zero Strategy in 2023. We have used an adaptive planning approach within WRMP24 and LTDS scenarios to manage uncertainty by testing a range of potential future scenarios and holistic approaches to achieving our long-term sustainable business goals. We aim to invest in innovation and in enhancements to resilience to key climate risks, including nature-based solutions, to achieve a holistic response which best meets all agendas over the long-term. Key to this investment is monitoring to better understand how climate change and changes in policy might affect our supply and impact our environmental ambitions.

Technology Risks

T4

Impact and performance indicators
The indicators we are currently using to measure these impacts are CapEx, OpEx, and service costs.

Related Affinity Water Risks
This risk is strongly related to physical risk R3 and transitional risks T4, T5 and T6.

Technological improvements or innovations that support the transition to a lower-carbon, energy efficient economy can have a significant impact on organisations. The timing and capacity for technology deployment, however, is a key uncertainty presenting risks.

T4 Capacity and readiness of technology, our people, resources, and supply chain to deliver Net-Zero and climate adaptation

What is the risk?

There is a risk that skills, technology, resources and infrastructure are not available or ready to enable our transition to Net-Zero operational emissions by 2030. Additional drivers of this risk include lack of capacity in our supply chain to procure and design low carbon solutions. Further, certain materials used for the treatment and distribution of drinking water require the official approval by the DWI. This oftentimes leads to delays in the adoption of new products as low-carbon alternatives. In addition, it may be challenging to attract and retain expertise in operating new technologies. There may be a lack of investment and regulatory change needed to drive innovation to produce more low-carbon solutions and infrastructure before 2030. Conversely, there may be costs associated with investing in low carbon technology that is quickly superseded, and therefore there is a risk of not recovering those costs through the regulatory system. The potential lead times to realising some nature-based solutions (NbS) and some uncertainty in their performance is also a source of uncertainty and driver of risk. Overall, there will be increased competition and demand for low-carbon technology and infrastructure, ultimately increasing the risk that there will be insufficient resources available to meet the 2030 target and adapt to a changing climate.

Our customers and operations could be impacted by increased expenditure focused on building capacity across company and supply chains and we could suffer costs on investing in technology that may not to be fit for purpose. We are facing increased costs to access the renewable technologies skills market, as well as increased cost of wholesale materials. As a result, we may need to consider increasing costs for customers which will negatively impact Affinity Water's reputation.

What will be done to manage the risk?

We have developed a procurement code of ethics, as discussed in T1, where collaboration across the supply chain will be encouraged and increase availability and capacity of resources and new technologies. This has been supported by the increased understanding we now have of the challenges faced by New Appointments and Variations (NAV) partners through our innovative New Developments project. We are engaging with Water UK, UKWIR and Energy & Utility Skills network to raise awareness of potential skills shortfalls.

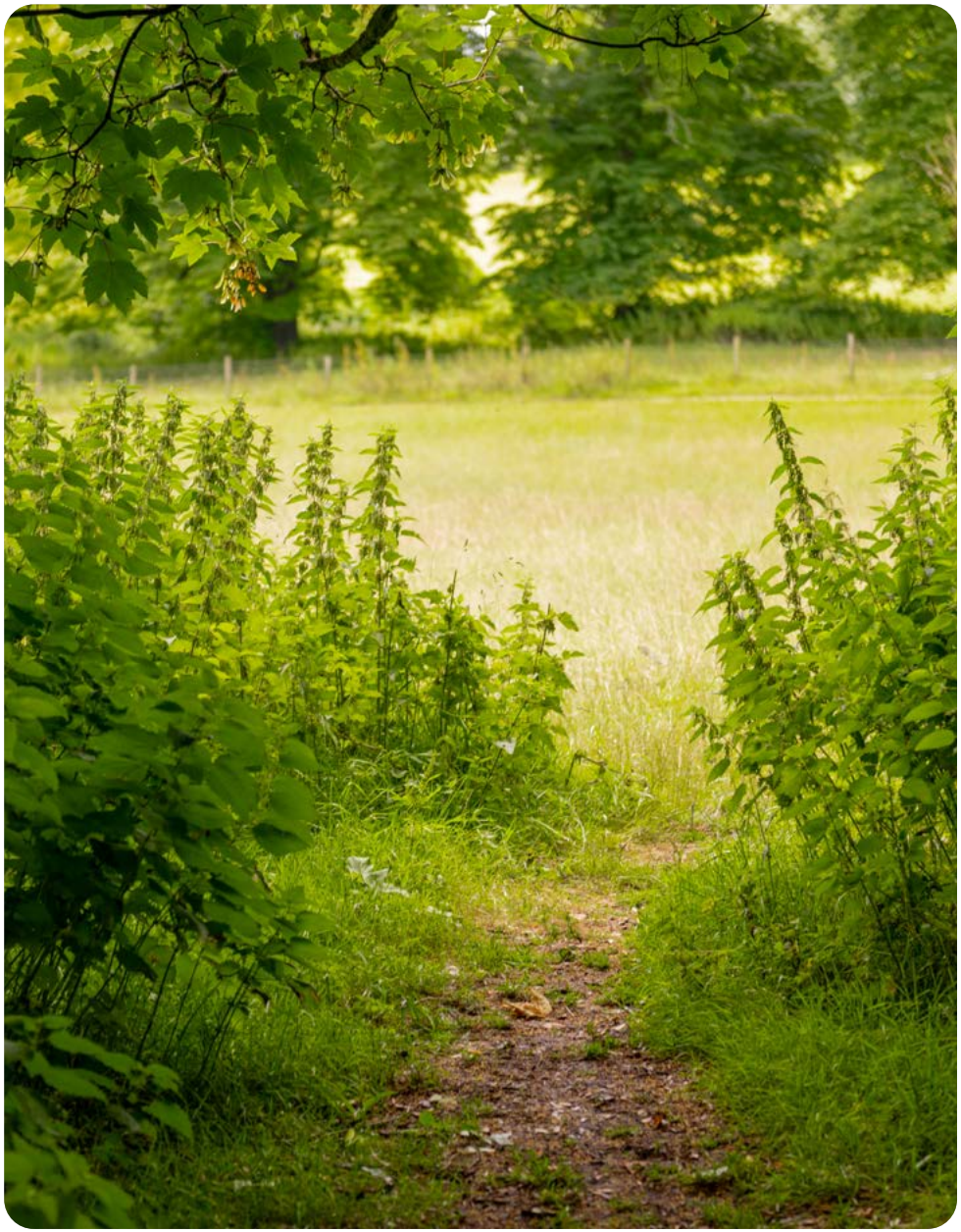
As part of our WRMP we used an adaptive pathways approach to assess our adaptation options, prioritising low-regret solutions such as NbS. We have begun to assess a range of NbS via natural capital evaluations to capture their benefits over a number of ecosystems in comparison to their

cost. Part of our Net-Zero policy in our LTDS includes commitments to fund research into understanding the carbon benefit and optioneering of NbS, which may include sponsorship of tertiary study on this topic, and enhance our capacity to determine adaptation options. In addition, we plan to invest in our graduate training programme and in-house training schemes, with the aim to build our internal capacity to deliver more elements of large schemes, and therefore reduce reliance on suppliers.

We have several environmental innovation projects linked directly to our internal public interest commitment. Through these we test new methodologies and approaches linked to different environmental themes and water use behaviours so we can develop a deeper understanding of the communities in our region and scale up sustainable solutions that can be replicated in the next regulatory period (AMP8 (2025-2030)). These may become commonplace by 2030 in the drive to deliver Net-Zero, and mitigate the risk of insufficient capacity of skills, technology, or resources for the transition. In addition, we are participating in the Ofwat innovation neutrality programme, further expanding on our capacity and knowledge of Net-Zero technologies.

Overall, supporting these innovation activities positions us to quickly mainstream any developed methods that are shown to robustly reduce our carbon footprint and be in alignment with our long-term delivery strategy.

Future actions we are considering include a more diverse portfolio of NbS, identifying more piloting options of new technologies and horizon scanning to identify further investment opportunities to innovate. In addition, we are considering integrating considerations of technology and expertise into our capital asset framework for carbon mitigation.



T5

Impact and performance indicators
The indicators we are currently using to measure the impact of this risk are OpEx and customer complaints with this risk as a theme.

Related Affinity Water Risks
This risk is related to transitional risks T2, T3 and T6.

Reputation Risks

Climate change is a potential source of reputational risk tied to changing customer or community perceptions of an organisation's contribution to or detraction from the transition to a lower-carbon economy.

T5 Negative public / stakeholder perception of Affinity Water due to underperformance in management of the environment and/or Net-Zero

What is the risk?

There are high expectations of the water industry to transition to Net-Zero, after setting a plan to deliver Net-Zero water supply for customers by 2030 in what Water UK reported was the world's first sector-wide commitment of its kind. There is also increasing environmental ambition and legislation to complete the Net-Zero transition in a timely manner and without negatively impacting biodiversity. Therefore, not meeting targets or being perceived to not meet them is a key risk for our company, as not meeting customer expectations or underperforming in the management of the environment or Net-Zero transition will lead to negative reputational impacts. In turn, this could drive increased customer dissatisfaction and result to negative reputational impacts.

If we do not effectively communicate our existing positive actions to mitigate negative reputational impacts, we could miss the opportunity to enhance our reputation and customer satisfaction. If we are penalised by Ofwat for not meeting our carbon and environmental performance commitments or we are scored poorly by the Environment Agency in an upcoming Environment Performance Assessment (EPA) then our reputational damage may also increase.

Specifically, our reputation could be impacted by stakeholder and customer dissatisfaction with the speed or pathway for our transition to Net-Zero, and by interruptions to our supply which may be perceived as a lack of climate resilience by our customers. As a result, we have increased expenditure and activity to manage stakeholder relations and public perception, mitigating reputational impacts.

What will be done to manage the risk?

As part of PR24, we have undertaken the largest programme of customer research and engagement in Affinity Water's history to develop our plan. We have commissioned our own, innovative new research to deeply understand our customers' views and values, as well as collaborating with regional partners and national groups to understand our customers in wider contexts.

We have public relations campaigns currently underway which highlight our affirmative environmental action, such as Save our Streams and proactive catchment management to reduce potential flooding. We have published our natural capital and biodiversity net gain assessment and continue to support community outreach and educational outreach focusing on the Save our Streams campaign.

We are engaging with local authorities to feed into their Local Nature Recovery Strategies, and engaging more with our customers on our business plan strategies to ensure we invest where our customer's most desire.

We plan to enhance our sustainability policies and practices. We have transitioned to Environmental, Social, and Governance (ESG) Board Committee to ensure strategic focus and direction is given to the ESG matters across the business and to monitor and minimise ESG risks and maximise opportunities to add social and environmental value from our activities. We are also planning to share externally how Affinity Water adds public value from ESG initiatives.

T6

Impact and performance indicators
The indicators we are currently using to measure the impact of this risk are OpEx and customer complaints with this risk as a theme and the potential value of penalties.

Related Affinity Water Risks
This risk is related to transitional risks T3 and T5.

T6 Customer affordability and fairness concerns due to costs to decarbonise and adapt to climate change

What is the risk?

Our domestic customers consider affordability is amongst their top priorities. Affordability for customers and questions around fairness become very challenging, especially in today's global economic climate and extraordinary UK cost-of-living pressures. There are uncertainties relating to the cost of climate change and large investment is needed to adapt to climate change and complete the transition to Net-Zero. It is likely that customers and stakeholders will heavily scrutinise any increase in service cost or change to investment strategy that is related to this adaptation and transition, so we must ensure a just transition and fair water pricing considerations are employed.

There is pressure on the water industry to decarbonise and subsequent changes in policy and availability of regulatory funding. However, there may be disproportionate climate adaptation needs between our service regions which may lead to negative reputational impacts if the policy and funding available is not also scaled to the needs of our service regions.

Specifically, we have increased expenditure and activity to communicate how our affordability and fairness has been maintained, to minimise impact to our reputation. Our reputation may be negatively impacted if customers are dissatisfied with service affordability, and there is the potential that penalties may be imposed if we fail to adequately support our most vulnerable customers.

What will be done to adapt to the risk?

Delivering what our customers need, ensuring affordability for all is a key pillar of our strategy. We have engaged with our customers to understand that their priorities for affordability are for fair bills and for us to provide help for customers struggling to pay. Moreover, we have followed Ofwat's methodology for the affordability and acceptability testing of our plan and worked collaboratively with other water companies to deliver the research. Subsequently, we have a multilayer affordability strategy, taking action ourselves to ensure bills are as low as they can be, before asking our customers to take action.

We have outreach and educational programmes on the innovations at Affinity Water – such as Save our Streams. We have also addressed affordability and fairness to customers in our business plan

We are also piloting a Watersave tariff which applies different prices depending on if the water is supplied for essential use (free for the first 30,000 litres used) or if it is supplied for additional use, such as filling paddling pools. To ensure affordability for all, we will provide a broad package of support for customers struggling to pay; provide a water assistance voucher scheme and debt support scheme; introduce payment plans and payment breaks and provide free repairs of customer supply pipes for vulnerable customers.

In the future we are looking to increase efficiency across our company to reduce impacts on customer bills and continue to champion innovative programmes which reduce the price of water paid by customers and increase water carbon footprint neutrality.

We plan to use catchment management strategies and NbS to keep more water in the catchment, reducing loss of vital nutrients in soil and reducing water treatments needs. We also plan to further develop how our customers can reach out for support with their water bill, to ensure affordable water is accessed by all.

Chapter 7

Concluding remarks

We have already made good progress against our climate adaptation actions set out in our third round of adaptation reporting, which has seen our current physical risk scores decrease, in line with our previous targets following AMP7 (2020-2025). However, without our continued actions to increase our resilience, and without further investment to mitigate the impacts of climate change, our risks will increase significantly in both likelihood and impact.

Without further action, five of our headline physical risks spanning water supply, water quality and asset resilience are set to become almost certain, with critical impacts on our assets and operations by 2075 under a high warming scenario. However, we are confident that with sufficient investment to deliver our AMP8 (2025-2030) plans, and our long-term plans within our LTDS and WRMP24, our interventions can deliver target risk scores lower than what we are currently experiencing.

Overall, our transition risks have scored higher when considering the current scenario in comparison to physical risks. This is largely because physical risks have been considered in the past (PR19) therefore mitigation and adaptation action have already taken place, while transitional risks have only been preliminarily evaluated. As risk assessments err on the side of caution we have decided to score our transitional risks higher to capture their greater uncertainty and the impact they have to our business. We plan to complete a more detailed assessment of transitional risk as part of our ongoing TCFD activities, where we plan to explore more granular performance monitoring metrics and targets for these risks. While our risk assessment indicates higher impacts associated with transition risks in the short term, our physical risks pose much greater impacts to the services we deliver if left unchecked.

When considering the target scenarios, our transitional risks score more highly than physical risk. This is not due to our lack of ambition regarding adaptation to transitional risk, but rather the greater uncertainty surrounding potential adaptation to transitional risk as those adaptations are dependent on national and global factors that are outside Affinity Water's control.

Increasing our resilience to our climate risks will not only require action from us, but cross-sectoral collaboration, further to engagement and cooperation with land owners, local planning, regulators, and our customers. We are committed to working with others to ensure we can deliver on our performance commitments for our customers, our environment, and our resilience. Currently, some of our greatest challenges are from balancing our environmental ambition with our Net-Zero target and our resilience to climate change. We must ensure that our decisions are well informed by research and monitoring, founded upon holistic long-term solutions, while ensuring efficient and affordable services in both the short and long term.

Table 7 -1 – Overview of our physical and transition risk scores. *Future risk scores are given for +4°C for 2075 for physical climate risks (R1-6), and for 2030 for transition risks (T1-6).

Risk Category	Risk Ref	Risk name	Current risk score	Future* Risk score	Target Risk Score	Related Risks
Physical risk: Climate risks to water availability and supply	R1	Increase in demand due to higher temperatures	8	25	6	R2, R3, T2, T6
	R2	Reduce availability of ground and surface water due to drought	9	25	2	R1, R3, R6, T2, T3, T5, T6
	R3	Increase in competition for and price of raw water imports	4	9	4	R1, R2, T2, T6
Physical risk: Climate risks to asset resilience	R4	Equipment and asset failure due to extreme weather events	12	25	6	R5, T6
	R5	Outages due to flooding of assets	8	25	6	R3, T6
Physical risk: Climate risk to water quality	R6	Changes to raw water quality	9	25	6	R2, T4, T5, T6
Transition risk: Market risks	T1	Increased costs of energy and materials due to the transition to decarbonise	12	20	9	R3, T4, T5, T6
Transition risk: olicy and regulation risks	T2	Regulatory system not enabling sufficient investment for Net-Zero transition and climate adaptation	20	20	12	T5, T6
	T3	Changes in the policy and regulatory requirements for water companies related to climate change, Net-Zero, and more stringent environmental regulations	12	20	12	T5, T6
Transition risk: Technology risks	T4	Capacity and readiness of technology, Affinity's people, resources, and supply chain to deliver Net-Zero and climate adaptation	15	15	9	T1, T6
Transition risk: Reputation risks	T5	Negative public / stakeholder perception of Affinity Water due to underperformance in management of the environment and/or Net-Zero	12	15	6	T2, T3, T6
	T6	Customer affordability and fairness concerns due to costs to achieve Net-Zero and adapt to climate change	9	12	6	T3, T5

Appendix A. Defra risk assessment and action plan template

*Category of action key:
1- scoping, monitoring and identifying impacts / risks
2 - consideration of impacts, risks and likely actions with stakeholders
3 - implementation of actions to address impacts / risks and maintain delivery of the organisation's functions
4 - monitoring actions, evaluation against original plans, reassessment of risks, management system audit (against adaptation best practice)

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions (planned, current or completed)
		Services/ Assets				
R1 & R4	Temperature, Heatwaves, Extreme weather events	Services, Assets	Resilient water network - Leakage reduction	Explore and invest in innovation and efficiencies in distribution network leakage control and customer supply pipe leakage reduction	3	Current
				Research into fibre option	1	Planned
				'Calming Programme' which includes Critical valve & smart valve ops programme Watchkeeper programme Enhanced pressure management	3, 4	Planned
				Replace pipes	3	Planned
				Free repair of customer side leaks	3	Current
				Satellite leakage detection	1, 4	Current
				Network MOTs	3	Planned
R1, R2, R3	Temperature, Heatwaves, Extreme weather events, Drought	Assets	SROs to Increase DO	WRMP major schemes - SESRO, GUG and A1AT prioritised and now being developed under AMP 8 (2025-2030)	3	Current

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions [planned, current or completed]
R1, R2, R3	Temperature, Heatwaves, Drought	Services	Bulk Transfers and more efficient distribution networks	Set up arrangements including bulk supply agreements or similar contracts with neighbouring companies for bulk water imports	2, 3	Completed
				Supply 2040	3	Completed
				Connect 2050	3	Current
R1 & R2	Drought risk to supply-demand balance and increased demand due to high temperatures	Services	New Drought Plan	Reduction in the amount of water that we need to move around the network at time of peak demand, through changes in network pressure	3, 4	Current
R2				Emergency measures	3	Current
R1 & R2	Drought risk to supply-demand balance and increased demand due to high temperatures	Services	Metering and in-home efficiency	Improved communications with customers, My Account online portal, personal water use to drive behavioural change.	3, 4	Current
				£63.7m of enhancement investment in smart metering between 2025-30	3, 4	Planned
				Install 377,000 household smart meters and 20,000 non-household smart meters	3, 4	Planned
				Customer visits to carry out water efficiency audits and install water-saving devices such as cistern bags and eco-shower bags	3	Current
R1 & R2	Drought risk to supply-demand balance and increased demand due to high temperatures		Education and engagement / Behaviour change	Campaigns like "Save our Streams" which engaged 320,000 customers.	2, 3, 4	Current
R1, R2, R3	Drought risk to supply-demand balance and increased demand due to high temperatures	Assets	Asset maintenance and increasing storage capacity	Proactive maintenance of strategic and distribution network assets. Investing in the continuous improvement of sites, setting high standards for assets and operations	3	Current
R2				Identified Wraysbury Reservoir as a reliable emergency storage for existing strategic works	3	Completed
R2 & R3				£31.3m to be invested in the renewal of reservoirs. Continual inspection of storage assets on a risk-based frequency between seven to nine years.	3	Current

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions (planned, current or completed)
R2	Drought risk to supply-demand balance	Services	Commitments: Increase resilience against extreme drought events	Take steps to ensure we will be resilient to greater than a 1 in >200-year return period drought event without the need for drought permits beyond 2024.	3	Current
				1 in 500-year events to be considered after 2040 (WRMP24)	3	Planned
				Increase our deployable output by 0 Ml/d and interconnector capacity by 43 Ml/d by 2030	3	Current
				Reduce our reliance on ground water abstraction by 21.19 Ml/d by 2030	3	Current
R2 & R6	Drought risk to supply-demand balance and impacts on water quality	Services, Assets	River improvement schemes	Resilient Chalk Catchments (RCC) programme - enhancing infiltration/aquifer recharge and to prevent deterioration of groundwater quality	3,4	Current
R2 & R6				WFD status - River restoration, river improvement works and habitat enhancements	1, 2, 3, 4	Current
R2	Drought risk to supply-demand balance			Sustainability reductions - Restoring Sustainable Abstraction programme.	3, 4	Current
R2, R3, R6	Drought, higher temperatures, heavy rainfall (first flush), sea level rise	Services, Assets	Capital investment to increase capacity	Increase raw water storage - to increase resilience to River Thames pollution risk (SESRO)	3	Current
R3 & R6	Drought, higher temperatures, heavy rainfall (first flush), sea level rise			Delivering DWI Notices at Egham and Iver to install new treatment processes	2, 3	Current
				Delivering a Raw Water Deterioration programme to deliver improvement to sources affected by Nitrates, PFAS and Turbidity	3, 4	Current
				Enhancing treatment capability at 10 sites to address raw water contamination risks; improve ways of storing treatment chemicals to prevent impacts from increases in temperature	3	Planned
				By 2050 enhance treatments at 14 sites, with adaptive pathways to address greater contamination risk	3	Planned
				New treatment works for GUC and for taking water from River Thames	3	Planned

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions [planned, current or completed]
R4	Storm surge, heavy rainfall, intense wind, extreme temperatures (heatwaves), flash floods	Services, Assets	Resilient energy supply	Solar programme to continue throughout AMP7 (2020-2025), aiming to provide 10% of Affinity's total energy requirement by 2024	3	Current
				Review generator strategy. Looking at higher energy sites and alternative fuels to switch from diesel to HVO	3, 4	Planned
				Potential on-site battery storage as a resilience measure	3	Planned
R4 & R2	Storm surge, heavy rainfall, intense wind, extreme temperatures (heatwaves), flash floods, droughts	Assets		Emergency planning - Procure 4 tankers (under PR24) to maintain supplies during extreme weather events by 2030. aim to have 16 by 2040-45	3, 4	Planned
R4 & R5	Extreme weather events, extreme rainfall	Services	Emergency Plans	Update site-based emergency plans and protocols for sites at greater risk of flooding. Platform for providing specific emergency data is being developed at the moment.	4	Planned
R4 & R5				Generic emergency plan will be out in draft form by the end of the summer 2024 and will be updated with processes and procedures as they change	4	Current
R4 & R5				Training and competency for crisis management and making sure training aligns with plans and that plans are updated, bronze, silver and gold chain of command (triggers).	3	Planned
R4 & R5				Aligning with 7 local resilience forums and improving relationship and cooperation.	2	Planned
R4 & R5	Extreme weather events, extreme rainfall	Services	Investigations/ research/ modelling	Update site-based emergency plans and protocols for sites at greater risk of flooding. Platform for providing specific emergency data is being developed at the moment.	1	Planned
R4 & R5				Generic emergency plan will be out in draft form by the end of the summer 2024 and will be updated with processes and procedures as they change	1, 4	Planned
R5	Flooding and sea level rise	Services	Flood Risk Assessment	Pluvial flood risk assessment was carried out	1	Completed
				Update Flood Risk Assessment with UKCP18 projections and review of investment in flood defences at critical sites and develop contingency plans	1	Planned

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions (planned, current or completed)
R5	Flooding and sea level rise	Assets	Flood Defences	Investment in flood defences - Enhancement of 17 fluvial, 71 pluvial and 5 GW sites - Investments 2030-2050 (alleviating 95%) physical works to mitigate water supply risks over 25 years	3	Completed
				Install flood barriers, portable flood barriers	3	Planned
				Maintenance and ensuring efficient performance of existing defences	3	Current
R5	Flooding and sea level rise	Assets	Natural Flood Management	Natural flood management with NbS and stakeholder engagement - Using sustainable land management as a reservoir for upstream retention, working with farmers and landowners	2, 3	Current
				Asset maintenance (drains, culverts)	3	Current
				Flood modelling to explore options for Sacombe	1	Planned
R6	Drought, higher temperatures, heavy rainfall (first flush), sea level rise	Services, Assets	Catchment Management	Flagship Chalk Stream Restoration Strategy and Implementation Plan - River Beane	3	Planned
				WINEP - DrWPAs - C&NBS Enhance Drinking Water Protected Areas (DrWPAs) through a 25-year catchment and nature-based solutions (C&NBS) programme (Lower Thames)	1, 2, 3, 4	Current
				Karstic Groundwater Improvements & Dour & Little Stour (DrWPA)	3	Current
				DWpz - engage with planners and landowners, encourage developers to manage impacts appropriately. Improve engagement with planning authorities. contamination or runoff, turbidity. manage impacts better.	2	Ongoing
				WINEP - biodiversity INNS management, enhance biodiversity on own land, and work with key stakeholders for enhancements on 3rd party land, eel and fish screens and options appraisals. Protection enhancement of designated sites.	1, 2, 3, 4	Ongoing
				Better ESG reporting	4	Planned
				Natural Capital approach - "catchment first" approach to protecting, restoring and enhancing biodiversity (see A5)	1,4	Planned

Risk Code	Climate Variable	Function	Action Theme	Actions to address risks (including ARP 1-3 actions)	Category of Actions*	Status of actions [planned, current or completed]
R6	Drought, higher temperatures, heavy rainfall (first flush), sea level rise	Services	Investigations and risk assessments	WINEP investigations		Ongoing
				Sustainability reductions - investigations to ensure no increased risk of groundwater quality as a result of the abstraction reduction.	3, 4	Ongoing
				Interception pumping to protect downstream sources	4	Current
				WINEP Pesticides	3	Current
				PFAS investigations	1	Current
				Saline intrusion Monitoring	1	Planned
				Discussing drinking water undetectable concentrations with DWI	1	Planned
				Remote sensing for habitat assessments and identifying INNS	1	Ongoing
				Increase the use of satellite imagery/remote sensing to track land use change which may present a pollution risk to water supplies.	1	Planned
R6 & R2	Drought, higher temperatures, heavy rainfall (first flush), sea level rise	Services		Ensuring all SROs and all water sources have Drinking Water Safety Plans to assess WQ risks	1	Current

Affinity Water