



Thames Water's progress in planning for climate change

Climate Change Adaptation
Reporting Power

January 2016



1. Chief Executive's foreword

Martin Baggs - CEO, Thames Water

I am pleased to provide this update to the Secretary of State on the progress we've made in making our business more resilient to the impacts of climate change since our first Adaptation Reporting Power report in January 2011.

The basis of our business is providing tap water for 9 million customers and sewerage services for 15 million customers 24 hours a day, 365 days a year. We serve approximately a quarter of the UK's population, across London and the Thames Valley region.

The projected impacts of climate change in south-east England will compound a difficult situation where water resources are already stressed and the population is increasing more rapidly than forecast. We need to find ways of responding to this dual challenge in a positive and equitable way, ensuring that our responses deliver for our customers and contribute to our wider aspiration of becoming a more sustainable business.

Since our first report in 2011 we've experienced a prolonged period of drought. We've also had the wettest summer since 1912 and the wettest winter in 250 years, leading to an extended and widespread period of flooding in the south of England. Each of these extreme weather events made delivering the service our customers expect very challenging. And very recently the intense flooding in the north of England has provided yet another reminder of the potentially devastating consequences of extreme weather.

Although it is not possible to attribute these weather events to man-made climate change, they represent the type of weather we expect to see more regularly in the future. We have therefore incorporated learning from these events into our long-term planning to better understand future risk, to increase the longer-term resilience of our services and to ensure that customer bills are no higher than they need to be.

It is widely accepted that climate change is a real issue and a major challenge to society. However, it's almost impossible to predict the extent and timing of its impact. This makes planning for issues like flooding resilience extremely difficult as we do not want to invest inefficiently - in the wrong areas, or at the wrong time. Nevertheless, our customers, regulators and stakeholders expect us to plan appropriately to accommodate the impacts of climate change within our plans, ensuring that we remain resilient and able to deliver the essential service our customers expect both today and in the future. This report outlines our progress on that journey.

2. A change in the weather

Changes in natural climate variability and weather extremes present risks and opportunities for our water infrastructure, with decisions made now often shaping our long-term capacity to respond to these changes (our 'resilience'). So we recognise these changes and are carrying out a range of activities to adapt to the risks.

Transforming for the future

The coming regulatory period heralds a myriad of changes in our environment driven by new laws and environmental regulations, technological advances and changes in customers' expectations as well as the opening of the non-household market to competition from 2017.

To capitalise fully on the upcoming opportunities, we implemented our Business Transformation Programme which, upon completion, will generate greater flexibility in decision-making and greater agility to respond to ongoing events and changing circumstances.

A changing climate

Climate change is an increasingly important consideration in the operation and planning of our water and wastewater infrastructure assets, in response to:

- Increasing temperatures
- Increased incidence of flooding
- Strains on water resources and water quality
- Less stable ground conditions

In recent years we have experienced a number of extreme weather events that have demonstrated the climate resilience challenges we face:

- From 2010 to 2012 much of central, eastern and southern England and Wales experienced a prolonged period of drought
- In April 2012 the weather abruptly changed and the United Kingdom experienced persistent extreme rainfall with summer rainfall being the wettest since 1912

- In the winter of 2013/14 the UK was severely impacted by a succession of extreme winter storms which caused widespread flooding. The clustering and persistence of these storms was highly unusual and this was the wettest December and January period in our area since 1910

These extreme weather events affected our assets and our customer service in different ways. Although many assets were affected by the 2013/14 flooding episode, we maintained water supplies to customers throughout this period. On the other hand, the droughts of 2012 did cause some loss of service to our customers and forced us to introduce water restrictions. Given the increase in frequency and severity of such events expected in future, these events highlighted the importance of our ability to adapt to the various impacts of climate change.

In this report we set out the progress we have made since our last report to Defra under the Climate Change 'Adaptation Reporting Power' (ARP) in 2011. This initiative is also combined with work to reduce our greenhouse gas emissions, as part of our Twin-Track Approach (outlined in Section 3).

3. Twin track approach

As set out in our long-term strategy, we are taking a twin-track approach to manage the unavoidable impacts of climate change on our business combined with a reduction in greenhouse gas emissions.

Our commitment is reflected in our long-term strategy as well as our climate change policy, which both identify climate change as a central theme in our approach to becoming a more sustainable organisation. Our long-term strategy¹ identifies the potential climate change issues for our business – alongside others such as changing customer expectations, population growth and affordability – and the actions we need to take to ensure effective mitigation and adaptation. In this report we are focusing on our progress and plans on adaptation.

We are working to a set of principles

To respond effectively to the unavoidable impacts of a changing climate and reduce our contribution to its causes, our climate change policy² sets out the following principles (Table 3-1):

Table 3-1 Our climate change principles

- Incorporate the latest climate change assessments and understanding into our business planning processes
- Continue to assess how climate change affects our operations and operational sites and develop appropriate responses
- Work with eight₂O, our business partners, contractors and supply chain to increase resilience to the impacts of climate change
- Implement our statutory Water Resource Management Plan to safeguard water supplies from the impact of climate change, with particular focus on leakage control, metering and water efficiency and the development of new water resources
- Engage with and seek support from our customers for our resilience/adaptation and mitigation responses
- Review and improve the resilience of our sites to flooding

We are working with our suppliers

In order to deliver essential water and sewerage services we rely on goods and services provided by our contractors and suppliers. We want our supply chain to:

- Understand the potential impacts of weather and climate change on its business resilience and put in place plans to respond.
- Understand its carbon footprint and put in place plans which reduce the carbon intensity of the goods and services it provides

We developed and provided leaflets to our top 200 suppliers by volume, to help explain what climate change mitigation and adaptation means to Thames Water. **‘Reducing greenhouse gas emissions in our supply chain’**³ provides advice on how our suppliers can reduce the greenhouse gas emissions associated with the goods and services they provide us with; and **‘Improving resilience to weather and climate change for our customers’**⁴ explains how suppliers can improve their resilience. Both leaflets describe the potential benefits associated with these climate change actions.



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¹ <http://www.thameswater.co.uk/about-us/5372.htm>

² <http://www.thameswater.co.uk/tw/common/downloads/aboutus/policy-climate-change.pdf>

³ https://www.thameswater.co.uk/tw/common/downloads/about%20us%20-%20corporate%20responsibility/Climate_Change_Mitigation_A5_ver8.pdf

⁴ https://www.thameswater.co.uk/tw/common/downloads/about%20us%20-%20corporate%20responsibility/12196_-_Adaptation_A5_ver8.pdf

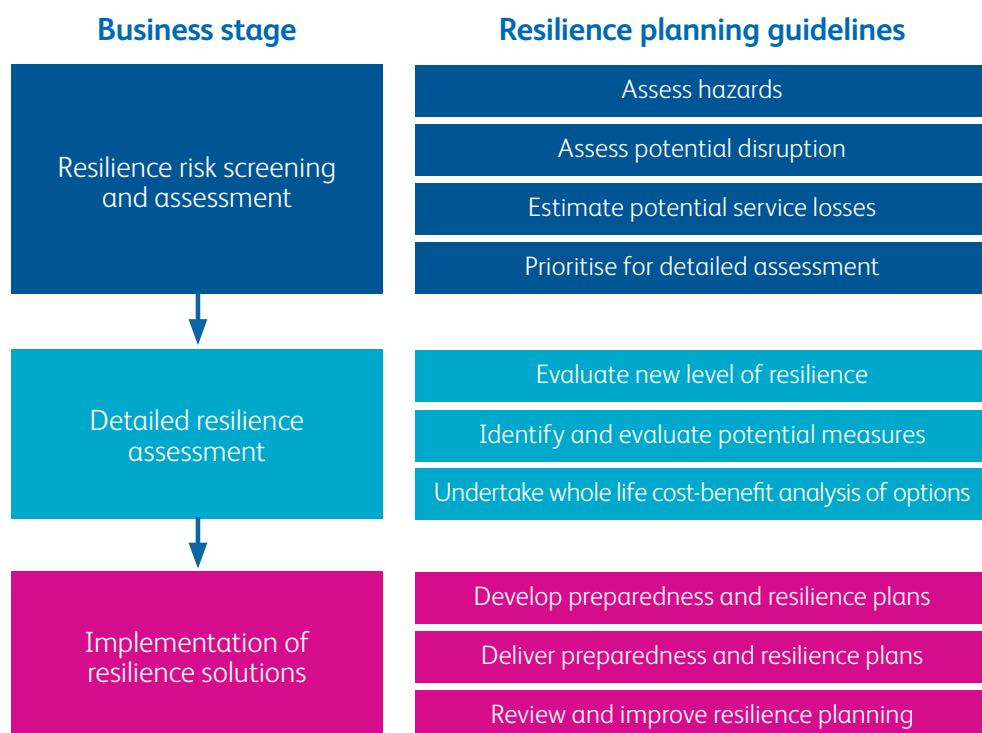
4. A different approach

At Thames Water, we appreciate the significant impact climate change may have on our ability to provide clean, safe water and a reliable wastewater service. We also understand that climate change cannot be considered in isolation and we face many other (non-climatic) risks. With this in mind, we have made considerable efforts to understand the interdependencies, resilience and sensitivity of our systems.

In the last reporting period (2011), we identified that climate change projections alone are not useful for strategic asset and investment planning. Instead, we have been working with leading researchers to understand the climate sensitivity of our systems and develop decision-making threshold points which trigger adaptation responses. This has helped us to make decisions about when to invest in resilience measures. For example:

- We commissioned a project to improve understanding of current and potential future flood risk to our water and wastewater sites. This has helped us to prioritise investment up to 2020 and informed the development of solutions
- In early 2015, we commissioned a study to assess the potential impacts of climate change upon our sites of biodiversity interest. The findings are being used to inform our long-term planning and prioritisation, including pro-active engagement with regulators
- For some of our assets, such as selected treatment works, we are developing and implementing a monitoring programme to assess threshold exceedance

Figure 4-1 Summary of key stages in resilience planning



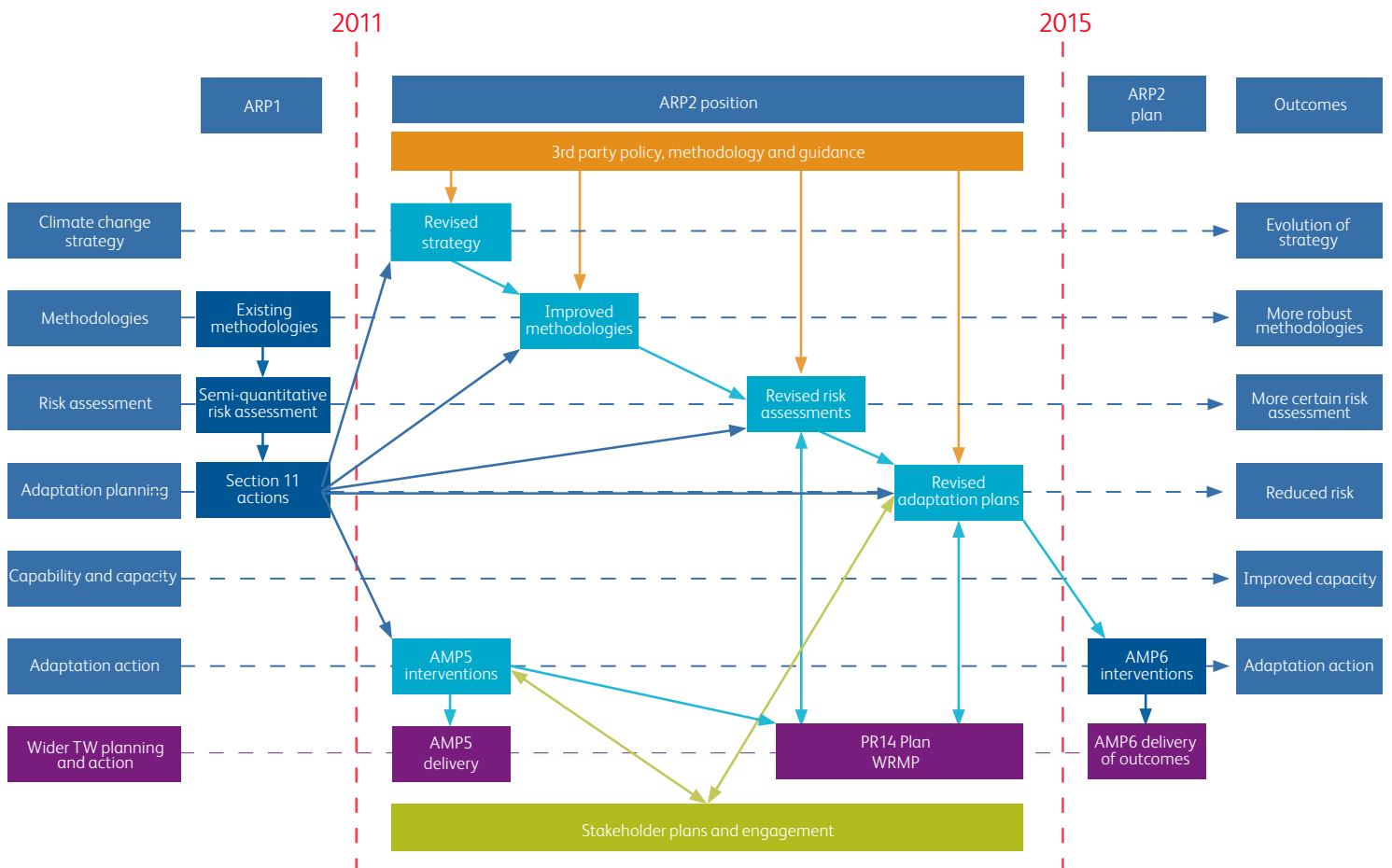
Source: UKWIR 13/RG/06/02 Resilience Planning

We are embedding the principles of resilience planning within an integrated approach to ensure our responses are well co-ordinated. A more ‘all-hazards’ approach has also become business-as-usual across many areas with an aim to fully engage the whole company. More specifically, we have made progress across a hierarchy of activities:

- Revising strategy
- Improving methodologies for assessment and planning
- Revising risk assessment and adaptation plans
- Carrying out agreed interventions to improve resilience

Figure 4-2 shows our hierarchy of activities to improve resilience since the last reporting period. Many of these activities have been carried out as an integral part of the investment programme to deliver our fifth Asset Management Plan (AMP5: 2010-15) or the development of our Water Resources Management Plan. Improving resilience is so important that we have also made formal commitments to improve resilience within our suite of performance outcomes for AMP6 (2015-20).

Figure 4-2 Overview of Thames Water’s hierarchy of activities to improve resilience



5. We Said, We Did

In the last Adaptation Reporting Period we made a number of commitments to improve the resilience of our services to customers and the environment.

We committed to:

- Improve our understanding of the sensitivities and thresholds of our water and wastewater systems, investigate potential adaptation options and monitor asset performance
- Adapt our water resources to the increasing risks from drought and temperature rise and incorporate measures into our water resources management plan
- Improve our water efficiency and develop new resources
- Improve modelling and understanding of the impacts of climate change on flows to be treated and undertake a programme of flood alleviation
- Prepared our 2014 Water Resource Management Plan in line with industry guidance, taking account of the latest UK Climate Projections
- Invested in demand reduction, leakage reduction and increased efficiency to decrease the pressure on our supply and wastewater infrastructure. Our investment in demand management helps us to balance the impact of growth and climate change over next 10 years and delay the need for a significant new supply
- Reduced our dependence on energy from the grid and increased our wider resilience through improved energy efficiency and increased self-generation of energy at our wastewater sites
- Reviewed the impact of climate change on water systems and their resilience to historical weather conditions. We have also used a stochastic (random) time series of weather in our burst modelling. Activities like these have contributed to our plans to improve the capacity and reliability of major treatment works presented in our long-term strategy (2015-2040)
- Invested in research projects to improve confidence in our long-term asset development decisions. For example, we have led or participated in seven UK Water Industry Research agency (UKWIR) projects related to climate change

We have made significant progress since the last Adaptation Reporting Period.

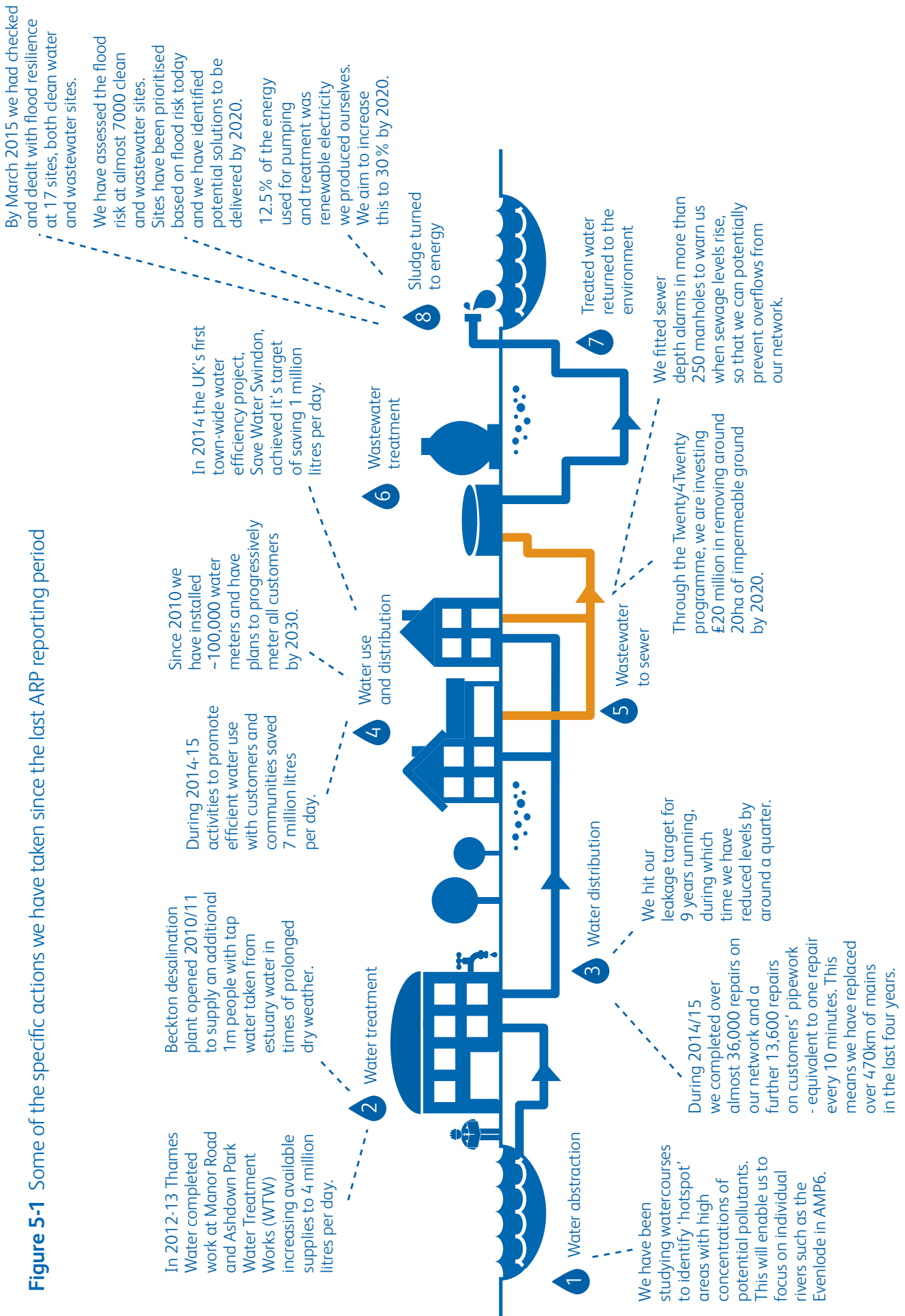
Specifically, we have:

- Improved our understanding of sensitivity and thresholds across our water system. This has been supported by our involvement in numerous interdisciplinary research projects that consider adapting water and wastewater systems to climate change. Further detail of these can be found in Section 8. We have also developed a new water resource at Horton Kirby
- Improved the flood resilience of water and wastewater sites and networks. This includes developing Sustainable Drainage Systems and Catchment Management approaches

We are continuing to build capacity and implement actions that build resilience and adapt to climate change, while accommodating future growth and maintaining customer service. Some of the specific actions we have taken since the last ARP reporting period are shown in Figure 5-1.

To help explain what we have undertaken since ARP1, we have produced a number of case studies.

Figure 5-1 Some of the specific actions we have taken since the last ARP reporting period



6. Customers, stakeholders and materiality

We are actively seeking to engage our customers and stakeholders on climate change, including our supply chain. Since the water industry Price Review in 2009... we have sought our customers' views through a range of engagement activities and built their responses into our resilience planning.

Our engagement activities included:

- Analysis of day-to-day contacts, such as calls and correspondence
- Research on specific issues
- Public consultations on draft strategies and plans
- Direct local engagement with customer and stakeholder groups on specific issues
- A formal Customer Challenge Group, established in line with Ofwat guidance

In 2013, we undertook a gap analysis of our planning processes and level of preparedness, in terms of the Ofwat nine principles of resilience (see Figure 6-1). This had a specific focus on four undesirable outcomes:

- Prolonged water supply interruption
- Contamination of water supply
- Third party damage (leading to, for example, a major sewer flooding incident)
- Major environmental pollution incidents

Resilience for each of the nine principles was assessed on a scale of 0 (principles not addressed) to 1 (principles fully addressed). The analysis resulted in an overall score of 0.66 across the nine principles. This suggests that we are making good progress towards addressing climate resilience issues.

Our aim is to become a more sustainable business. We updated our materiality assessment which provides an overview of our progress towards this goal. This report provides a summary of our performance, across all areas of our business. It focuses on the issues identified by our customers and stakeholders as 'of high importance' demonstrating that we are inclusive, engage with our customers and stakeholders and focus on key material sustainability issues that affect them. We continue to refer to best practice guides, such as the Global Reporting Initiative's Sustainability Reporting Guidelines and AccountAbility Principles Standard (AA1000).

Table 6-1 Ofwat's nine principles of resilience³

- An all-hazards approach to resilience planning
- Proportionate resilience strategies embedded into corporate governance
- Third party engagement
- Resilience planning focused on risk to service outcomes
- Customer preferences and environmental acceptability for different levels of resilience
- Broad consideration of intervention options for resilience
- Using cost benefit analysis to support significant decisions
- Preparedness for response and recovery
- Continuous improvement in resilience planning

Ofwat (2012)

- To develop our Water Resource Management Plan for 2014 we spoke to more than 8,500 people from across our region
- Around 1,200 customers responded to our consultation 'Making the most of the essential service', held in 2012. Climate change is seen to be the second most important challenge we face, behind reducing leakage
- During our engagement it became clear that the importance of water resources was, for many stakeholders, brought into sharp focus by the extreme weather experienced throughout 2012 – both the drought in the first half of the year and the extremely high rainfall in the second. Government policy has set out clear directions that aim to ensure a sustainable future
- Our call centres handle more than 3 million customer queries a year
- In spring 2013 we conducted an eight-week public consultation to seek views on our business plan for the period 2015-2020. As part of this, we hosted 'roadshow' stands at shopping centres and community events at 22 locations across our region. We spoke to more than 5,000 people at these locations to discuss our plans with them and request their feedback
- More than 2,700 people visited our five-year plan website
- In total, we received 1,009 responses from individuals, businesses and stakeholder organisations on our business plan
- Engaged with the Customer Challenge Group, an independent body whose members come from a range of stakeholder groups
- We also held a consultation on our 25-year draft Water Resources Management Plan, to which we received 350 responses.
- During the extreme wet winter weather in 2013/14, we worked in partnership with numerous local organisations through six 'Gold Command' structures (Croydon, Gloucestershire, Surrey, Hampshire, the Thames Valley and London). We liaised closely on local issues with ward and parish councillors and MPs
- Among our activities, we held a drop-in session on sewer flooding at the Houses of Parliament, giving MPs an opportunity to raise individual constituency issues and see first-hand how local sewer networks operate
- We also visited local communities in our 'flood bus' to talk with customers in the worst-affected areas, such as Lambourn, Cirencester and Staines

³ http://www.ofwat.gov.uk/sustainability/climatechange/adapt/rpt_com120503mottmacresil.pdf

7. Risk assessment

Our resilience planning, action and reporting is underpinned by our assessment of the risks from climate change and other related hazards. Since our first Adaptation Reporting Power report, this risk assessment has been reviewed and revised to take account of improvements in information relating to various risks as well as actions we have taken.

The rose diagrams below (Table 1-1) provide a high-level summary of the previous (ARP1) level of climate risk (left-hand column) and current (ARP2) level of climate risk (middle column) to our key service areas and the expected level of residual risk once we have implemented our planned adaptation actions over the next five years (right-hand column). Risks to water resources, treatment and networks are shown in terms of their effects on selected performance indicators – drinking water quality, supply interruptions, security of supply, asset performance, leakage and greenhouse gas emissions. Risks to wastewater networks, treatment and sludge management are shown in terms of their effects on pollution incidents, discharge compliance, sewer flooding, asset performance, sludge disposal and greenhouse gas emissions. For each indicator, the score is an aggregate of the scores of multiple individual risks, each scored from 1 (low) to 9 (high).

Water Resources

Our main climate change risks to water resources are temperature rise, drought and flooding. We are proactively responding to these risks and are, for example, at the forefront of recent research regarding robust decision-making in the water industry and planning for drought. Other planned adaptation actions in response to these risks include:

- Collaborative water resources management planning (as a member of the Water Resources in the South-East)
- Continued research into the effective use of probabilistic climate change projections
- Continued initiatives to improve water efficiency such as smart metering, customer demand management and leakage reduction

- Engagement in a new '21st Century Initiative' that will consider:
 - A definition of water resources resilience
 - What we should do to ensure resilience
 - What Ofwat should do to ensure resilience

Water Treatment Works and Networks

The primary climate risks to our water treatment works and network are temperature rise, drought, flooding and sea level rise. We have invested heavily in an improved data monitoring and management system. This will help increase our understanding of the sensitivity of our water treatment to these climate risks and other external drivers and enable us to optimise treated water operations. Other planned adaptation actions in response to these risks include:

- Replacing water mains and improving how we target leaks
- Extending a 1-in-200-year standard of flood resilience until the 2040s to priority water treatment works and pumping stations

Wastewater Treatment Works and Networks

Temperature rise, drought, flooding and sea level rise are all key climate change risks to our wastewater assets and sludge management operations. We have invested heavily in efforts to improve the flood resilience of our wastewater networks and treatment and have helped lead UKWIR studies for modelling the impacts of climate change on sewage networks. Other planned adaptation actions in response to these risks include:

- Extending a 1-in-200-year standard of flood resilience until the 2040s to priority sewage treatment works

- Heavy investment in sustainable urban drainage systems (SuDS) to reduce the risk of sewer flooding
- Increasing the amount of renewable energy produced from 170GWh (accredited and non-accredited) to 400GWh by 2020. This will be achieved predominantly through generation of renewable electricity from the treatment of sewage sludge and will help reduce our dependency on the grid and increase resilience

Table 7-1: Previous, current and predicted residual level of climate risk to our key service areas* **

	Previous risk position (ARP1)	Current risk position (ARP2)	Residual risk after planned actions
Water resources			
Water treatment works			
Water networks			
Wastewater treatment works			
Wastewater networks			

*The orange shaded segments relate to sludge management

**Not all segments are applicable to each diagram. For example, it is not applicable to illustrate progress on Sewer Flooding under the Wastewater Treatment Works and Sludge Management discipline as progress on Sewer Flooding has been reported under Wastewater Networks.

8. Research and working in partnership

Since the last reporting period we have engaged with our stakeholders through a wide range of activities both within the company and externally across the sector.

Figure 8.1 illustrates the extent of our engagements with government and regulator policy, industry research and guidance relating to climate change affecting the water sector. This also shows the alignment of our external engagement with Thames Water's own investigations. For example, we have invested significantly in research to improve understanding of the sensitivity of our systems, which is vital to building our adaptive capacity. Table 8.1 shows our collaborations, contributions and approach to considering climate change in AMP 6 planning.

Table 8-1 Collaborations and contributions on climate resilience

Water resources →	<ul style="list-style-type: none">• United Kingdom Water Industry Research (UKWIR) projects to assess the significance of UK Climate Projections 2009 to inform a new Environment Agency Water Resources Planning Guideline• HR Wallingford 'Future Flows' project to test the resilience of our preferred Water Resources Management Plan to future increased intensity and frequency of drought• University of Oxford Environmental Change Institute/ Environment Agency research to develop new approaches for water management decision-making in the face of climate change uncertainty• Paper to provide the Environment Agency with an overview of real options analysis• Environment Agency/UKWIR and University College London/University of Manchester studies in regard to robust long-term water planning and decision-making• Living with Environmental Change and the Engineering and Physical Sciences Research Council research on the water/food/energy nexus• Living With Environmental Change summary of the nature and scale of climate change impacts on the UK's infrastructure• Water Resources Management Plan 2019 Technical Advisory and Steering Group member• Managing the Risks, Impacts and Uncertainties of droughts and water scarcity• Flood risk: building infrastructure resilience through better understanding and management• Energy Research Partnership – Resource Use Strategies• UK Infrastructure Transitions Research Consortium
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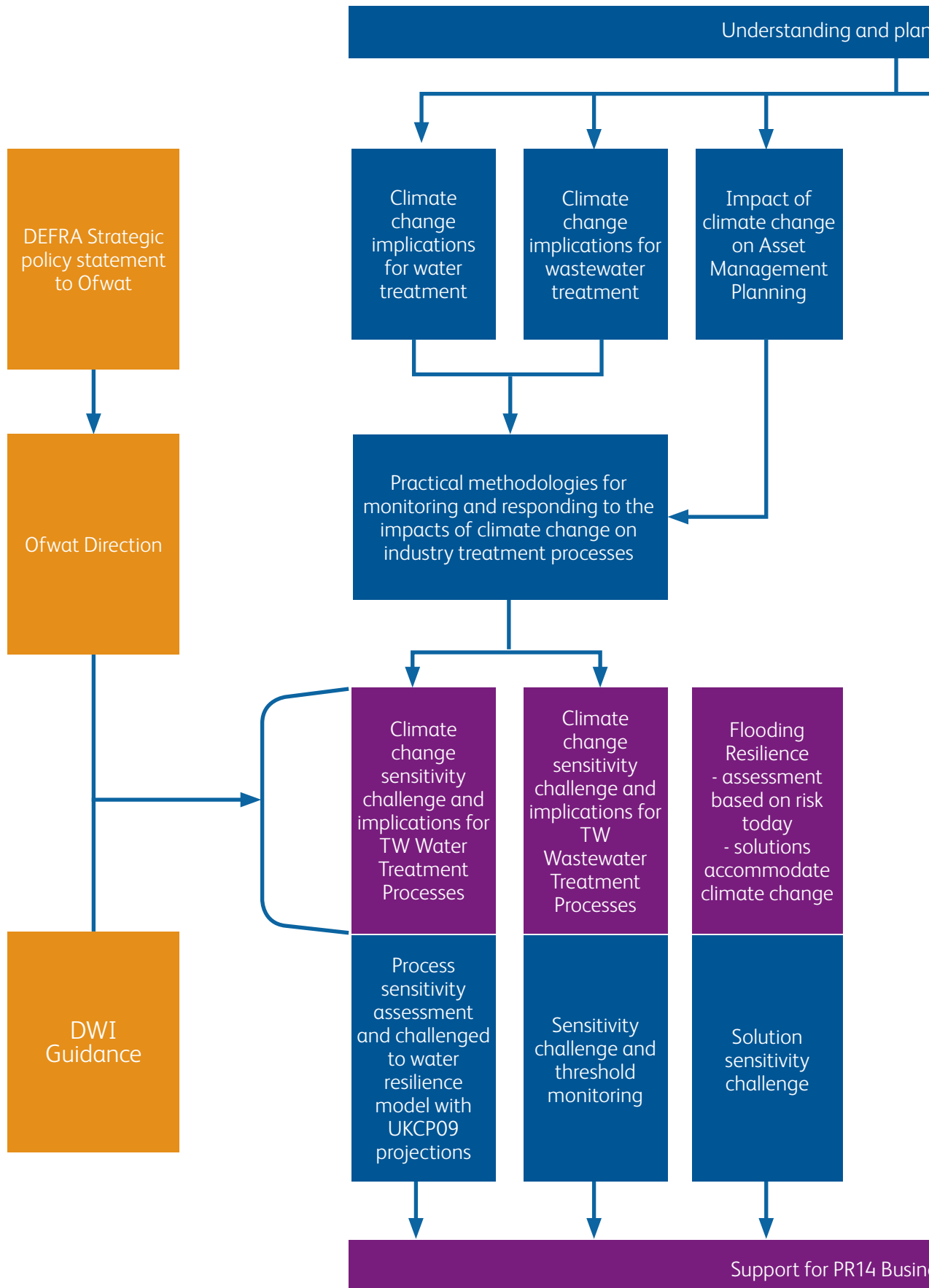
Water treatment

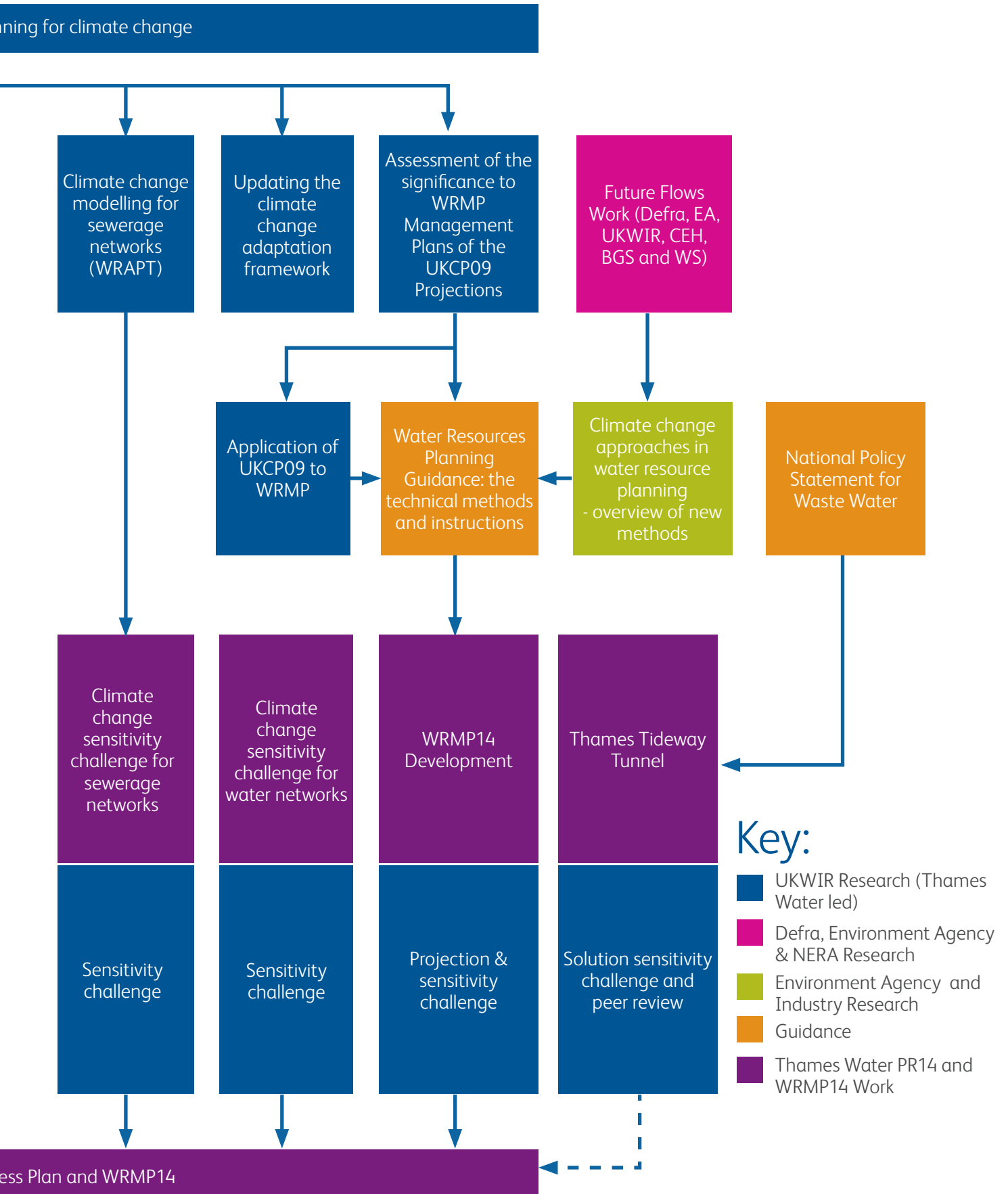
- Key role in an UKWIR project to identify design and operational thresholds, tipping points and potential adaptation requirements in managing water treatment assets
- Collaboration with Imperial College to investigate how various species of algae are affected by climate

Wastewater

- UKWIR industry best practice projects:
 - The use of stochastic (random) UK climate projections 2009 weather generator data in wastewater modelling
 - Risk-based approach to wastewater planning
 - The importance of understanding climate sensitivity thresholds
 - Tiered modelling approach which is fit for purpose, i.e. level of detail modelling adopted is proportionate to the level of risk
 - Monitoring to improve understanding and avoid inappropriate capital expenditure
- UKWIR study investigating the implications of high-resolution modelling which resolves convective storms (CONVEX)
- Assessment and peer review of Thames Tideway Tunnel sensitivity to climate change

Figure 8-1 Alignments between government/agency policy, industry research and guidance and Thames Water’s Climate Change investigation





9. Our plans and targets for the next five years

We are committed to managing the unavoidable impacts of climate change on our business. This commitment is reflected in our climate change policy⁴ which identifies climate change as a central theme in its approach to helping us become a more sustainable organisation. Accordingly, we have been embedding measures to address climate change in our plans for the next five years and the longer term.

Our long-term plans⁵ include measures to improve the resilience of water resources to climate change and extreme weather over the next five years (2015 – 2020), categorised as:

Proactive management

- Continued initiatives to increase supply capacity and reduce demand (through initiatives such as smart metering, customer demand management and leakage reduction)
- Continued investment to improve flood resilience
- Working with our partners and stakeholders on climate change, including supply chains, to provide confidence that we can deliver essential services to our customers. For example, we provided leaflets to our top 200 suppliers (by volume) on how they can reduce greenhouse gas emissions and improve their resilience
- Monitoring and refinement of thresholds that describe the sensitivity of our systems to climate, and development of tools to analyse changes, to inform investment decision-making
- Investing £20 million to remove 20ha of impermeable surfaces by 2020, helping to reduce the risk of sewer flooding and pollution following heavy rainfall whilst improving biodiversity and local amenity

Collaborative responses:

- Collaborative water resources management planning (as a member of the Water Resources in the South-East)
- Contributions to industry best practice guidance through UKWIR
- Feeding into Environment Agency guidance development for 2019-2024 and beyond
- Engagement in a new '21st Century Initiative' that will define water resource resilience and what should be done to ensure water resource resilience

⁴ <http://www.thameswater.co.uk/about-us/5372.htm>

⁵ <http://www.thameswater.co.uk/tw/common/downloads/aboutus/policy-climate-change.pdf>

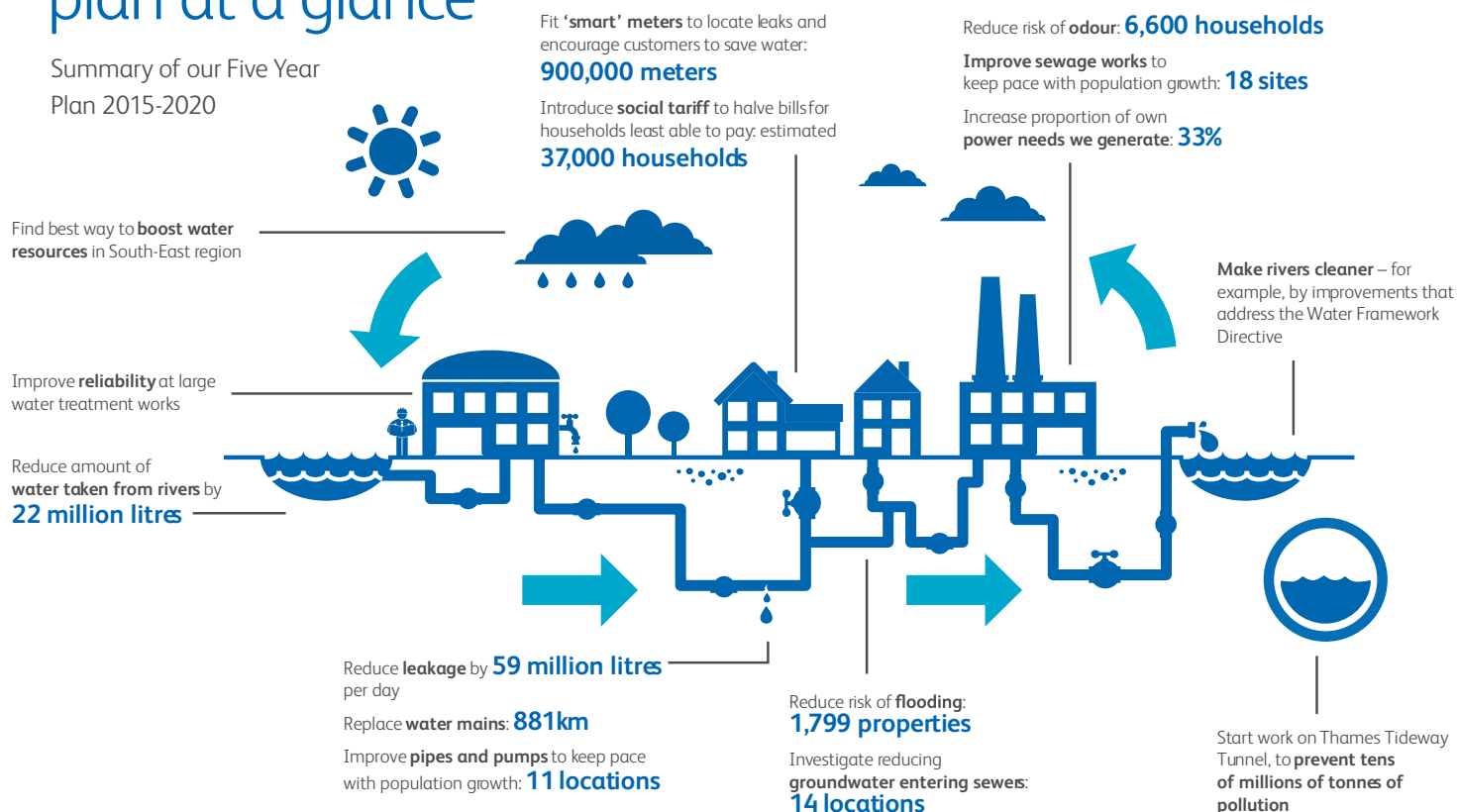
Forefront of research:

- Research into drought management planning in partnership with Oxford University
- Research into methods to achieve more robust decision-making for new investment
- Continued research into the effective use of probabilistic climate change projections
- Research led by ‘Living with Environmental Change’ and the Engineering and Physical Sciences Research Council on the water/food/energy nexus

These plans are combined with steps to reduce our contribution to greenhouse gas emissions as part of our twin-track approach.

Our five-year plan at a glance

Summary of our Five Year Plan 2015-2020



[http://www.thameswater.co.uk/tw/common/downloads/five-year-plan-summary-2015-2020\(1\).pdf](http://www.thameswater.co.uk/tw/common/downloads/five-year-plan-summary-2015-2020(1).pdf)

10. Interdependencies

Our services are dependent on other systems, which in turn are also dependent on our services. While interdependencies can help to build resilience, they can also increase vulnerabilities. We are both working to reduce our dependence on other sectors and actively support a number of wider resilience partnerships and forums.

The growing risk, uncertainties and opportunities associated with a changing climate prompt the need for a co-ordinated response to such interdependencies and vulnerabilities. This creates the need for a systems approach rather than a sector approach to building resilience.

Our primary interdependencies relate to **wider infrastructure systems** and our **supply chain**.

Wider infrastructure systems resilience

Our services are dependent on other infrastructure systems, such as energy, communications and transport. These infrastructure systems are also dependent on Thames Water services. If one sector experiences a failure this can trigger a cascade of failures due to the complementary or functional relationship between sectors.

In the context of improving our overall resilience, we have worked to reduce our dependence on energy from the grid through improved energy efficiency and increased self-generation of energy (as shown in Figure 10-1).

In addition, we actively support a number of wider resilience partnerships and forums:

- Local Resilience Forums (Swindon and Wiltshire, Berkshire, Oxford, Buckinghamshire (Thames Valley), Hampshire, Surrey, London, Kent, Essex, Hertfordshire, Bedfordshire). These are multi-agency partnerships made up of representatives from local public services who plan and prepare for localised incidents and catastrophic emergencies
- We have recently reported our response to the Security and Emergency Measures Direction 1998 (SEMD). The SEMD protects consumers from having to go without water entirely and

stipulates that water companies must have plans to ensure that essential water is supplied at all times

Supply chain resilience

In order to deliver essential water and sewerage services we rely on goods and services provided by our suppliers. A disruption in the supply chain is a significant risk to business continuity. The increasing complexity of supply chains is a significant area of vulnerability.

In order to have confidence that we can deliver essential service to our customers, it is vital that all our partners are sufficiently resilient to the current weather and climate and the changes in these over time. We are therefore working with our suppliers to not only improve resilience to the impacts of weather and climate change, but also further reduce the carbon intensity of the services we provide as part of our twin-track approach. For example, we provided leaflets to our top 200 suppliers (by volume) on how they can reduce greenhouse gas emissions and improve their resilience.

Monitoring interdependencies

eight₂O, our capital delivery partner, has also incorporated Thames Water's Performance Commitments on climate change adaptation into its suite of metrics for 2015-2020, together with a number of others relating to resilience more widely (Table 10-1).

Managing the climate risks associated with our interdependencies with wider systems is an on-going process. We will continue and expand the work and not only build our own climate

Figure 10-1 Renewable Energy from Sewage Treatment in London

AMP5 [2010-2015] - Thermal Hydrolytic Process

In summer 2010, Thames Water launched a £675m project to modernise and extend London's five major sewage treatment works to increase the amount of sewage the sites can treat, greatly reducing the need for storm discharges to the river. As well as improving the standard to which Thames Water treats sewage at each of the works (further boosting the quality of the River Thames) and reducing odour, this work increased the amount of renewable energy we are able to generate.

Renewable Energy Generation

The methane produced at the London sewage treatment works is used to generate renewable energy. Almost all of the energy generated is used on site. By generating decentralised renewable

power we reduce our reliance on electricity imports from the grid thereby increasing our energy security. Also, this initiative helps to offset some of the impact of energy price increases and buffers the business, and therefore customer bills, from the volatility of the wholesale market. Other benefits include:

- Pressure taken off local grid by reducing demand
- Carbon emission reductions in absolute terms as there are no transmission losses
- Fewer vehicle movements through London used to move treated sewage sludge
- Reducing our dependence on the electricity grid

Table 10-1 Indicative metrics for assessing resilience to climate change and other hazards

Metric	Target
Additional capacity protected from flooding (water)	1015 megalitres/day
Additional population protected from flooding (waste)	1.7 million population
Improvement in security of supply index	Maintain at 100
Net reduction in grid energy use per year	190 gigawatt hours (GWh)
Area of impermeable paving removed	20ha by 2020

<http://www.itrc.org.uk/governance-interdependencies-between-the-uk-water-and-electricity-sectors/>

<http://www.raeng.org.uk/publications/reports/engineering-the-future>

<https://www.gov.uk/guidance/local-resilience-forums-contact-details>

11. Closing statement

Continue to look forward to become a more sustainable business with greater resilience

Richard Aylard – Director of External Affairs

Ensuring we have a resilient business which can cope with external shocks and challenges is essential in ensuring we can deliver the water and wastewater services our customers expect. Climate change and weather are two such shocks.

Weather is a challenge we deal with on a daily basis, while climate change is a longer-term challenge, closely related to changes in the weather we must expect to accommodate.

Over the past five years we have put a lot of effort into improving our understanding of how climate change could impact our ability to deliver for our customers. Our approach has evolved from mainly focusing on modelled projections of possible futures, such as the UKCP09 projections, to one which:

- Includes an understanding of our activities and their potential impacts on climate change
- Reduces uncertainty, which has previously been a barrier when taking action
- Prioritises the action taken based on current weather risks and solutions that can accommodate a range of possible climate futures, such as flooding
- Challenges our assumptions about climate change impacts by revisiting the risk assessment undertaken in the first round of reporting in 2011
- Outlines our work with a range of partners to undertake collective research to help improve our understanding of climate change impacts

We have made good progress since the first report and have integrated climate change into our business planning process, as described in section 5, and have:

- Reviewed and improved flooding resilience at 17 significant water and wastewater sites
- Commissioned a desalination plant which can produce up to 150 million litres per day of potable water to improve the resilience of water availability at times of drought
- Delivered a range of demand-side measures to reduce water consumption
- Met our leakage target for the last nine years
- Established clear goals to improve our resilience to flooding and water availability and reduce our dependence on energy from the grid [see section 10]
- Developed new methods to understand the sensitivity of our business activities to the impacts of climate change

We appreciate we have more work to do, and know we cannot deliver climate resilience on our own. For example, we want to build better relationships with our supply chain and other partners, based on a shared understanding of the risks associated with their activities and the impact they have on our ability to deliver the essential service to our customers.

Although this five year regulatory period (AMP 6) has only just begun, we're already thinking ahead and planning how best to address climate change impacts in AMP 7 (2020-25).

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