love every drop
anglianwater

Revised Draft WRMP24
Main Document

Our Water Resources Management Plan 2024

August 2023

WRMP24 main report

Business in the Community Awards **Winner 2017**

Financial Times **Climate Leaders 2022**

The Queen's Awards for Enterprise: **Sustainable Development 2020**

Utility Week Awards 2021 Winner **Utility of the Year**

1 Executive summary

1.0.1 Our revised draft Water Resources Management Plan 2024 (WRMP24), taking into account feedback received from the public consultation of the draft WRMP24, sets out how we will maintain a sustainable and secure supply of drinking water for our customers over the period of 2025 to 2050.

1.0.2 This long-term plan, which we call our best value plan, considers the challenges our region faces, allowing us to implement an affordable, sustainable pathway that can provide benefit to our customers, society, and the environment.

1.1 Determining the challenges

1.1.1 The WRMP24 process has identified significant challenges for the East of England between 2025 and 2050; some of which were not present for WRMP19.

1.1.2 By 2050, we will have 38% less water to supply our customers. This stark reduction is driven by:

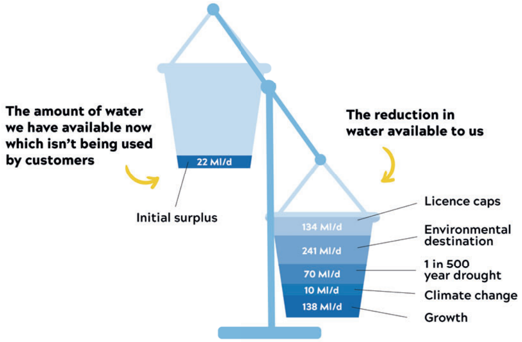
- The implementation of further abstraction **licence capping** across our region.
- Moving beyond our statutory licence cap obligations, further reducing the amount of water we take from sensitive environments. This long-term vision is known as our **environmental destination.**
- Achieving **enhanced resilience to drought**, building on our previous investments to become robust to an extreme 1 in 500 year drought.
- Adapting to **climate change,** and the impacts of the hotter, drier summers and warmer, wetter winters on our water resources.

1.1.3 We also expect an increased demand for water by 2050 with our region's population expecting to grow by 18% by 2050; that's an additional 911,000 people that will need water supplies. Non-household demand growth has also exceeded historical trends and if higher levels of non-household demand are sustained then further capacity will be required. We are in discussion with Government and regulators regarding how best to manage future non-household demand.

1.2 Establishing the need

1.2.1 Figure 1[1] shows the scale of our region's new water needs by 2050. Without any action, we will experience a **shortfall of 593 megalitres of water a day by 2050**. That's equivalent to approximately half the amount of water we put into our network currently.

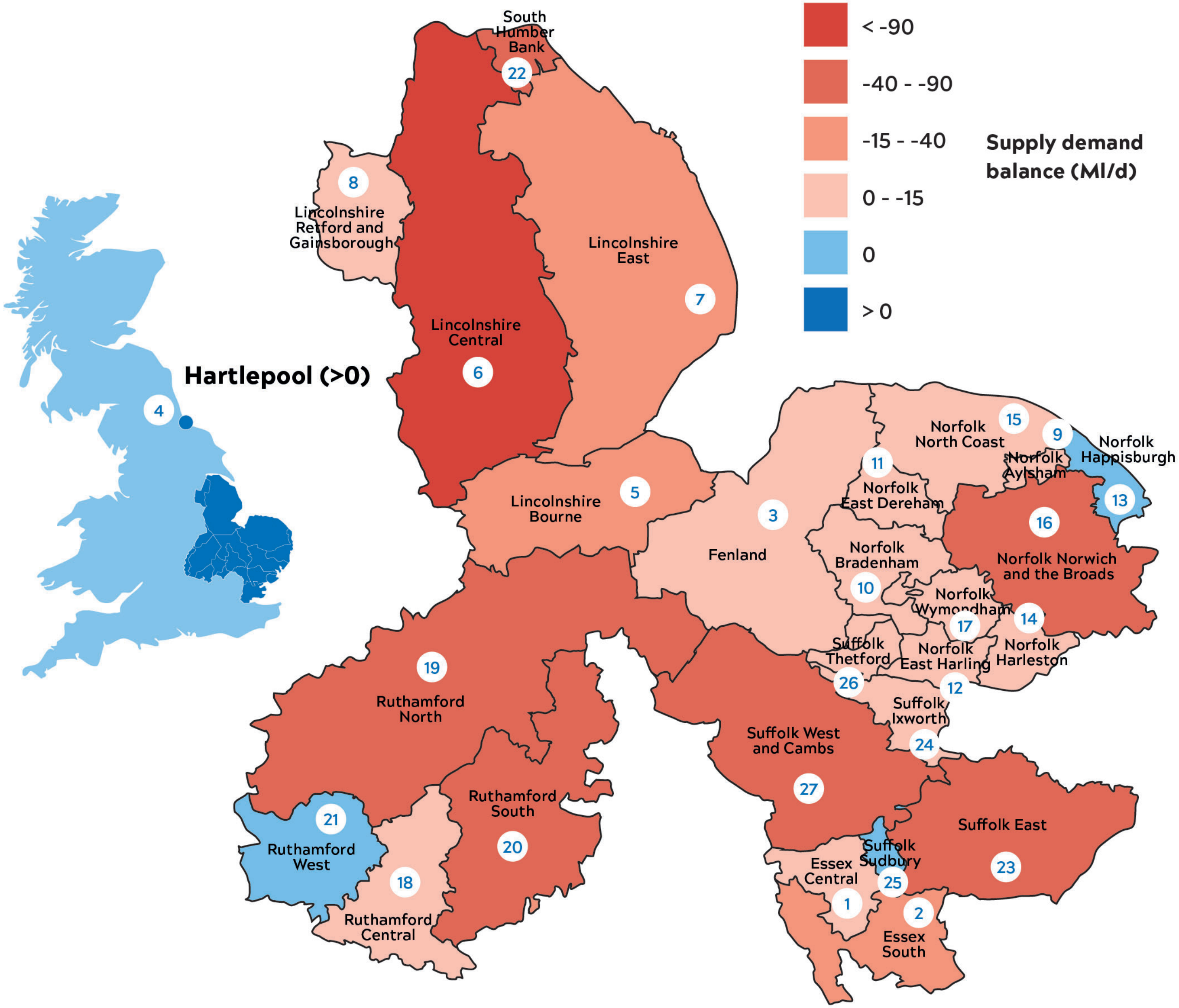
Figure 1 The scale of the challenges for WRMP24



1.2.2 This shortfall of water, along with which challenges has driven it, is shown on our 27 Water Resource Zones (WRZs)[2] on the next page.

1 For the scales in this report we use water available to use (WAFU) rather than deployable output (DO). DO is the amount of water we treat and put into supply before we export to other water companies through our bulk supply agreements. WAFU is a measure of the actual water we can use within a water resource zone to meet demand. This is what is left after we have exported water to other companies.

2 A WRZ represents the largest area in which all resources can be shared effectively. They are usually self contained and defined by their infrastructure connectivity and geographic or physical boundaries. Customers in a WRZ share the same level of resilience.



WRZ		1	2	3	4	5
1	Essex Central	✓			✓	✓
2	Essex South	✓	✓	✓	✓	✓
3	Fenland	✓	✓	✓	✓	✓
4	Hartlepool				✓	✓
5	Lincolnshire Bourne	✓			✓	✓
6	Lincolnshire Central	✓	✓	✓	✓	✓
7	Lincolnshire East	✓			✓	✓
8	Lincolnshire Retford Gainsborough				✓	
9	Norfolk Aylsham	✓			✓	✓
10	Norfolk Bradenham	✓			✓	✓
11	Norfolk East Dereham	✓			✓	✓
12	Norfolk East Harling	✓			✓	✓
13	Norfolk Happisburgh	✓				
14	Norfolk Harleston				✓	✓
15	Norfolk North Coast	✓			✓	✓
16	Norfolk Norwich-Broads	✓			✓	✓
17	Norfolk Wymondham	✓			✓	✓
18	Ruthamford Central	✓				
19	Ruthamford North	✓	✓	✓		
20	Ruthamford South	✓	✓	✓	✓	✓
21	Ruthamford West	✓				
22	SouthHumber Bank	✓				
23	Suffolk East	✓	✓	✓	✓	✓
24	Suffolk Ixworth	✓				✓
25	Suffolk Sudbury	✓			✓	✓
26	Suffolk Thetford	✓			✓	✓
27	Suffolk West Cambs	✓	✓	✓	✓	✓

1 Growth
2 Climate change
3 1 in 500 year drought
4 Licence reductions
5 Environmental destination

(Grey shading) These WRZs do not contain their own water resources so challenges 2-5 are not relevant

1.2.3 We use these WRZs to determine the water needs of our region, and to plan our long-term response. As can be seen from the figure on the previous page, almost all the WRZs are effected by licence reductions and environmental destination. Of the 27 WRZs, 23 of them will have a deficit of water by 2050 if we don't take any action.

1.3 Building a best value plan for our region

1.3.1 With almost no surplus water available to meet the new water needs of our region, WRMP24 has to identify new options for ensuring our customers continue to have a safe, resilient water supply whilst providing best value to our region.

Figure 3 Our best value plan objectives

1.3.2 To us, best value is looking beyond cost, providing a benefit to customers and society, as well as the environment whilst listening and acting on the views of our customers and stakeholders.

1.3.3 This customer and stakeholder engagement helped build our best value framework, shown in Figure 3 . This framework identifies the outcomes that WRMP24 should achieve[3], and the objectives that will help fulfil them.

1.3.4 This best value plan framework has been used as the basis for our decision making as we are confident it drives the right outcomes for society, the environment and our customers.

1.4 Challenges for building a Best Value Plan

1.4.1 To build this best value plan, we conducted a thorough optioneering process for demand management and supply-side options. These options were also environmentally assessed, to ensure that they would not have a detrimental impact on our region's environment.

1.4.2 This optioneering process highlighted the following challenges for developing new supply-side options for our region:

- We have limited surplus water available; where it is available, we have utilised it.
- There are limited new water supplies available to us. We are in the driest region in England, and there are few opportunities to take more water from the environment.
- This lack of traditional resource means that the supply-side options available to us are relatively new to the United Kingdom's water industry.
- There are limited opportunities to trade and share water resource with other water companies and sectors, as abstraction reform and climate change considerations apply across all water resources.
- We are fortunate to live in a region with many environmental designations; any options we build and operate must be designed carefully so we don't cause it harm. This means suitable locations are limited, reducing the amount of feasible supply-side options available to us.

3 These are aligned with our strategic outcomes for customers from our 25 year Strategic Direction Statement.

1.4.3 Meeting the needs of the region through demand management options is also challenging. We have invested significantly in leakage reduction, building on our industry leading performance, and already have a high level of meter penetration across our region. This means that the 'low hanging fruit' discussed in Water UK's Leakage Routemap to 2050[4] are gone; what is left is widespread mains replacement, which would have a significant bill impact to customers. This means we must explore innovative methods for demand management.

1.5 Policy challenges for building a Best Value Plan

1.5.1 As part of the development of the best value plan, we made the following policy decisions:

- We will achieve the following profile for licence capping: time-limited licences will be reduced to recent actual average by 2030; all other licences by 2036.
- Enhanced drought resilience will be achieved by 2039/40, apart from in Ruthamford North and South WRZs where it will be achieved in 2040/41.
- We have planned for an Environmental Destination of BAU+, ensuring consistency with other water companies, regional groups, and guidelines.
- Our environmental destination will be achieved by 2040, earlier than the target of 2050.

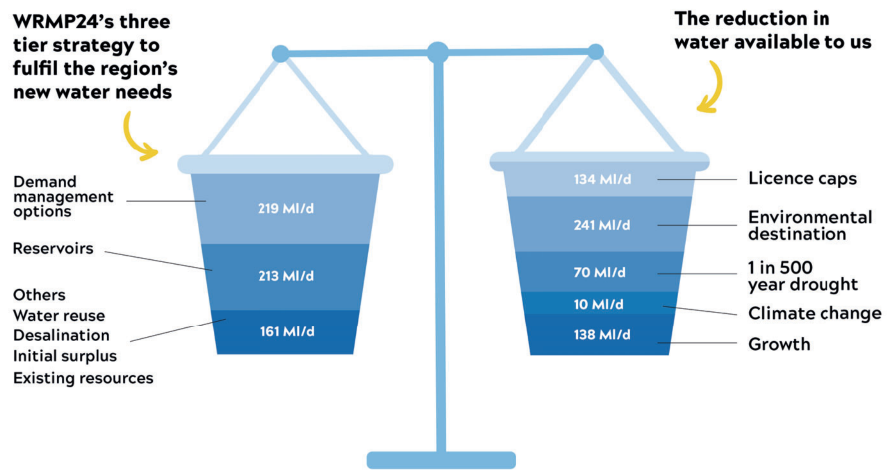
1.6 Three-tiered strategy

1.6.1 Through our decision making processes, guided by the new water needs of our region, the best value plan framework and our customers' and stakeholders' views, we have developed a three-tiered strategy:

1. We will make the best use of our existing resources, building on our industry leading demand management and using any surplus water available.
2. The progression of the strategic resource options (SROs): the Fens and Lincolnshire reservoirs, that will meet 36% of our new water needs, and provide the opportunity for many benefits identified in our best value plan framework.
3. We have planned for adaptive future resources, which allows us to remain flexible to changing circumstances, whilst ensuring we limit bill impacts to our customers by only investing in low regret solutions.

1.6.2 This best value plan will ensure we meet the water needs of our region, whilst improving the environment around us and providing socio-economic and wellbeing benefits to individuals, communities and society.

Figure 4 Meeting our challenges for WRMP24



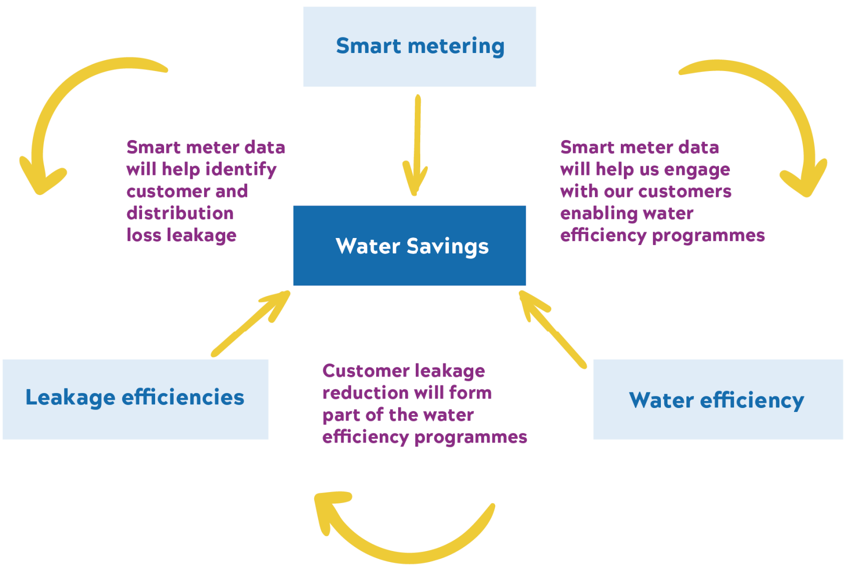
1.6.3 Figure 4 demonstrates how we will use these three approaches to balance the challenges we are experiencing.

4 Water-UK-A-leakage-Routemap-to-2050.pdf

1.7 Making best use of existing resources through demand management

1.7.1 We have always prioritised demand management, ensuring we do the best for the environment and our customers. We continue to build on this achievement for WRMP24 by implementing a three pillar approach for our WRMP24 demand management strategy, as shown in Figure 5. This approach will offset the impacts of growth, managing the risks of deterioration in the waterbodies in our region.

Figure 5 Our three pillars of demand management



1.7.2 We will continue our pivotal smart metering programme, working with customers to improve their water efficiency and reduce leakage, such as leaky loos.

1.7.1 Smart metering

1.7.1.1 Building on our WRMP19 strategy, we will complete our smart meter roll-out by 2030 to achieve maximum feasible meter penetration across our region. This smart meter roll-out is fundamental to our WRMP24 strategy; it will unlock the next step change in demand management, through enhanced customer communication and the identification of leakage.

Enhancing communication with customers

1.7.1.2 The provision of real time consumption data will help customers to understand their consumption, allowing us to work together to promote behavioural change through:

- benchmarking so that our customers can compare their usage with similar households;
- helping customers to understand where they can make changes to their water usage, within the home;
- setting targets so that customers can track their water saving progress, combined with personalised incentives to promote further water efficiency;
- making usage tangible so customers can relate to the amount of money their water efficiency measures are saving.

Customer supply pipe leakage and plumbing losses

1.7.1.3 We estimate that 23%, 40 megalitres per day (Ml/d) of our leakage total is attributable to leaks on customers' supply pipes, and that a proportion of household and non-household consumption is actually due to plumbing losses.

1.7.1.4 Our smart meter roll out will reduce these leakages and losses, as the technology will allow us to alert our customers when we see unusual flows to their property. We expect this to reduce average repair times from 210 days (for a standard meter) to an average of 59 days. We expect that the nature of the repair, for instance a new section of customer supply pipe or a new toilet ball valve, represents a sustainable water saving as these items usually have a long lifespan.

1.7.1.5 It is expected that these initiatives will save 18.1 Ml/d by 2030, allowing us to maintain safe, resilient water supplies whilst we build new supply-side infrastructure. We expect 31.9 Ml/d of benefit by 2050.

1.7.2 Water efficiency

1.7.2.1 Our WRMP19 water efficiency programme is already showing great results, with our lowest Per Capita Consumption (PCC) recorded in 2022 to 2023. We will build on this for WRMP24, helping our customers to reduce their water usage by:

- providing a number of smart devices, such as shower sensors, and investigating their link to sources of information, and other utilities;
- implementing personalised engagement on discretionary and/or seasonal water use;
- continuing to promote behavioural change campaigns that highlight how customers can be water efficient.
- tailoring our communications to the local area, sharing relevant stories and information that our customers will be interested in;
- developing a company-specific innovation fund, reflecting our unique 2030 position with regards to full smart rollout, allowing us to increase our understanding of customer behaviours and potential future water efficiencies.

1.7.2.2 These communications, and working with our customers, will help us achieve a PCC of 118.15 litres per head per day (l/h/d) by 2038, below the 122 l/h/d Environmental Improvement Plan 2023 target. We will achieve 110 l/h/d PCC by 2050.

1.7.2.3 We will need Government-led interventions, such as the implementation of white goods labelling, to help achieve this landmark water efficiency.

1.7.3 Leakage reduction

1.7.3.1 We believe that reducing leakage is the right thing to do, and have invested significantly to achieve this over the last 20 years; we now lose approximately 25% less water through leaks than we did in 1998 despite connecting to over 500,000 new properties.

1.7.3.2 As part of WRMP24, we will continue to have one of the lowest leakage rates in the United Kingdom (UK), aiming for a 38% reduction in leakage from our 2017/18 baseline. This encompasses the maximum leakage reduction that we believe is feasible with current technology. This ambition will see us initiating a major mains replacement programme from AMP9 onwards, replacing over 8,000km of mains; that's just over 20% of our network.

1.7.3.3 This substantial investment of over £4 billion will see our leakage levels reduce to 118.9 Ml/d by 2050, from a baseline of 191.3 Ml/d in 2017/18.

1.7.3.4 We believe this 38% leakage ambition will make a fair and equitable contribution to the National Infrastructure Commission (NIC) target that aims to achieve an overall national leakage reduction of 50%, based on the 2017/18 baseline for England Wales, by 2050. Our analysis shows that achieving 50% leakage will cost over £20 billion to our customers, inflicting huge bill impacts on our customers when supply-side options would provide better value.

1.7.3.5 Our leakage targets will remain adaptive and will be reassessed for every WRMP, so we can quickly respond to new innovative technology.

1.7.4 Compulsory metering

1.7.4.1 We are in an area of serious water stress, so are constantly striving to reduce water demand. As part of this, we need to consider the 16% of our customers who have chosen to stay on an unmeasured charge rather than pay according to the amount of water they use.

1.7.4.2 These unmeasured customers use, on average, 175 l/h/d compared to the 123 l/h/d used by our measured customers. That's equivalent to an extra four and a half buckets of water a day. We believe all of our customers should pay on the basis of what they use. And the majority of our customers agree with this, believing it to be fair.

1.7.4.3 This means we will explore implementing compulsory metering by 2030. By doing this, and our smart metering initiative, we expect 94.8% of our customers to be metered and measured, which is our economic level of meter penetration; where it isn't feasible to install a meter, customers will be billed based on an assessed charge. We will also continue to help our vulnerable customers with the range of tariffs and assistance we have available.

1.7.5 Non-household demand management

1.7.5.1 We recognise that our region is prospering and our non-household demand continues to grow. The efficient use of water in this sector is key to our success so we have developed a package of non-household measures based on the three pillars of our demand management strategy and tailored them according to the size of the business.

1.7.5.2 This non-household strategy will see us work with retailers to deliver smart meter targeted water efficiency packages, scaled according to the size of water consumption, and specialist water efficiency audits with find and fix for larger consumers (those with consumption ranging from 25,000 litres to 500,000 litres per property per day). Retailer incentives will also drive plumbing loss reduction, as well as smart meter identified fixes for plumbing loss and customer supply pipe leakage.

1.7.5.3 We expect this to save 10Ml/d of water by 2029/30 and 50Ml/d by 2049/50.

1.8 Making best use of existing resource through supply-side options

1.8.1 Upgrading treatment works

1.8.1.1 As part of our continuous reviewing of abstractions, we have identified three sites where it is feasible to either retain a licence at reduced levels or move it to another locations. We will continue discussions with the Environment Agency and Natural England to determine what additional investigations are required to finalise these options.

1.8.1.2 Enhancements at our water treatment works, such as the construction of nitrate removal plants, are also part of our strategy, enabling us to utilise existing abstraction licences.

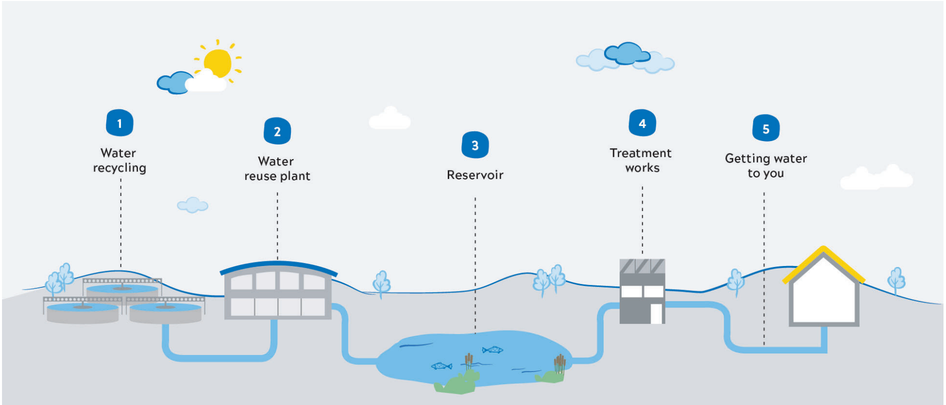
1.8.2 Transfers

1.8.2.1 Our WRMP24 will build on our WRMP19 strategy, adding interconnectivity between our water resource zones. These interconnectors will allow us to use surplus water in our system, ensuring we mitigate any risk of deterioration to waterbodies.

1.8.3 Colchester water reuse

1.8.3.1 We will build a water reuse plant in Colchester.

Figure 6 How we will utilise water reuse



1.8.3.2 Rather than discharge the water from Colchester Water Recycling Centre (WRC) into the estuary, we will treat the cleaned water again using membrane technology, monitoring it against strict water quality standards before discharging and storing it in a raw water storage reservoir where it will mix with river water. An example of this is shown in Figure 6.

1.9 Progressing strategic resource options- the Fens and Lincolnshire reservoirs

1.9.1 Utilising this existing resource isn't enough to satisfy the region's new water needs; we need to develop alternative supplies of water. Possible supply-side options have been considered at both a regional and company level, and tested against differing hydrological and environmental scenarios.

1.9.2 Both regional and company water planning resulted in two SRO being chosen for our region: the Lincolnshire and Fens reservoirs.

1.9.1 The regional need for reservoirs

1.9.1.1 Our regional planning body, Water Resources East, through a multi-objective robust decision making process with stakeholder involvement, concluded that the Fens and Lincolnshire reservoirs, both sized at 55 million cubic metres (MCM), are low regret solutions[5], that are needed to help fulfil the East of England's new water needs.

1.9.2 Promoting reservoirs in WRMP24

1.9.2.1 The WRPG stipulates that we must reflect the choices of the regional plan in WRMP24. The Fens and Lincolnshire reservoirs are in our best value plan but they have been selected in their own right by our WRMP24 modelling and decision making processes.

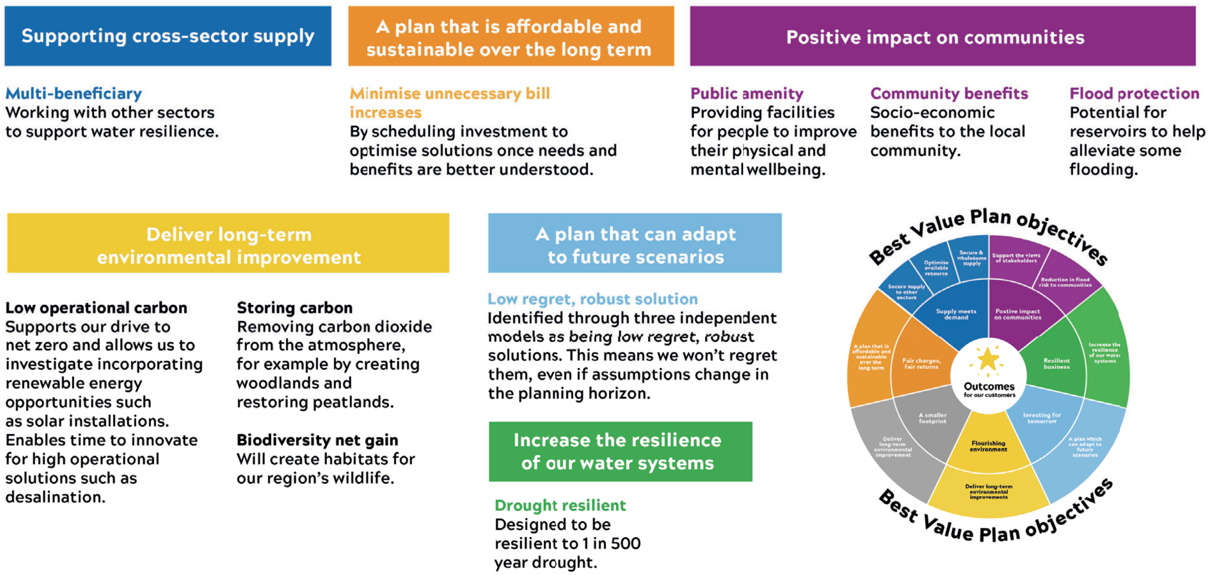
1.9.2.2 The unconstrained selection of both reservoirs highlights the need our region has for them. Their development will provide safe, clean, resilient drinking water supply for future generations and allow us to reduce or cease abstractions to the environment that may be detrimental, as well as enhancing our region's drought resilience.

1.9.3 Why reservoirs?

1.9.3.1 Aside from their essential role in supplying safe, resilient drinking water to our customers, the Fens and Lincolnshire reservoirs will fulfil many of the best value objectives we are seeking to achieve. These are shown in Figure 7.

1.9.3.2 Our decision making process has determined further water reuse and desalination simply do not offer this best value to our region.

Figure 7 The benefits of reservoirs within our best value plan framework



5 Investments that are likely to deliver outcomes efficiently under a wide range of plausible scenarios.

1.10 Planning for adaptive future resources

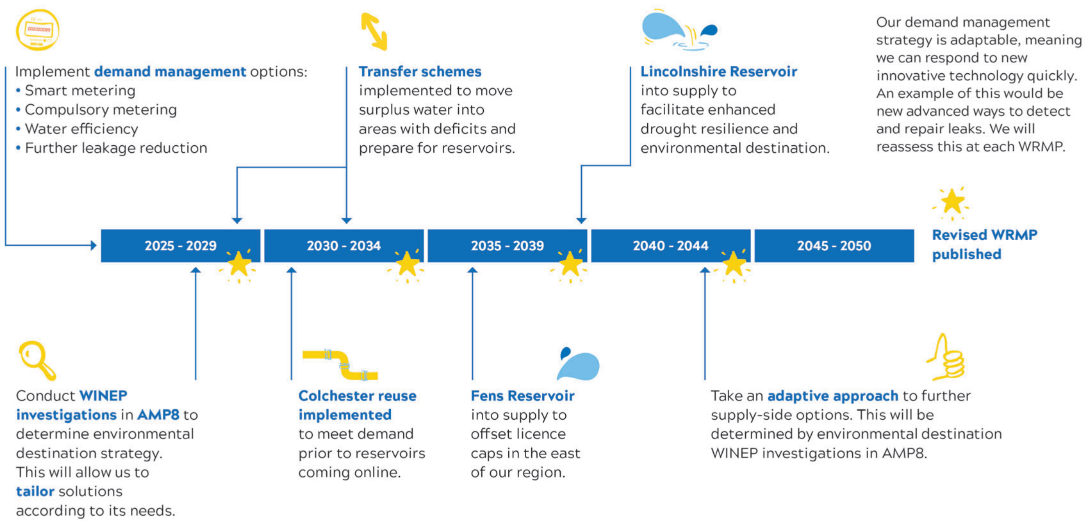
1.10.1 Our decision making has shown that we will need desalination in the long-term future. Whilst we recognise the benefits of desalination, it has a higher operational carbon and bill impacts than reservoirs. That's why its really important that we are sure about the scale of the need they will satisfy.

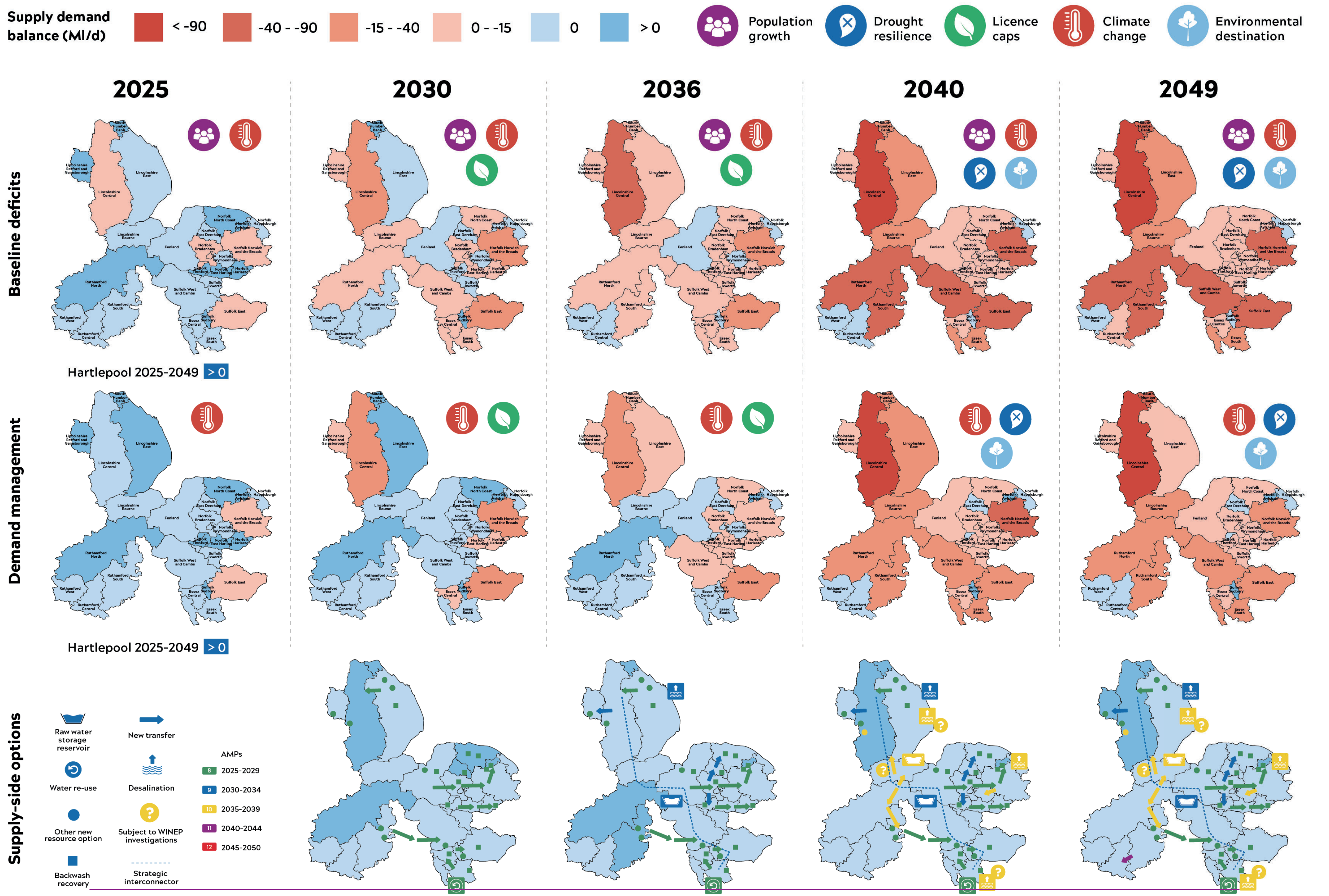
1.10.2 This need, to be considered at WRMP29, will be determined through a series of scientific investigations being conducted between 2025 and 2030, as part of the Water Industry National Environment Programme (WINEP). These will look to define our long-term environmental destination strategy, investigating the needs of our region's environments. This will also allow us to tailor our approach so that we provide benefit to the environments that need help the most.

1.11 Our WRMP24 strategy

1.11.1 Figure 8 is our long term vision for our region. It will keep our customers with a safe, resilient supply of water whilst improving the environment for future generations. An infographic on how this demand management and supply-side strategy will fulfil our new water needs is provided on the next page.

Figure 8 Our WRMP24 timeline





Supply demand balance (Ml/d)
< -90
-40 - -90
-15 - -40
0 - -15
0
> 0
Population growth
Drought resilience
Licence caps
Climate change
Environmental destination
2025
2030
2036
2040
2049
Baseline deficits
Hartlepool 2025-2049 > 0
Demand management
Hartlepool 2025-2049 > 0
Supply-side options
Raw water storage reservoir
New transfer
Water re-use
Desalination
Other new resource option
Subject to WINEP investigations
Backwash recovery
Strategic interconnector
AMPs
8 2025-2029
9 2030-2034
10 2035-2039
11 2040-2044
12 2045-2050

1.12 A best value plan for the region

1.12.1 We believe that our WRMP24 achieves our best value plan objectives, as shown in Figure 9. Over and above ensuring that supplies are sufficient to meet demands, this is mainly driven by the benefits that the Fens and Lincolnshire reservoirs will provide to our customers, society and the environment.

Figure 9 A best value plan for the region

Supply meets demand

Providing water 24/7
We will keep water flowing through taps, adapting to climate change and drought, whilst taking less water from the environment.

Fair charges, fair returns

Using science to inform investment
Between 2025 and 2030, we will carry out investigations so we know what the environments in our area need. This will allow us to tailor our investments to ensure we invest where we need to, meaning best value for our customers.

Positive impact on communities

Wellbeing
Our plan will give people the ability to enjoy nature through activities such as fishing, walking and cycling at our new reservoirs.

Community benefits
Our new reservoirs will provide socio-economic benefits to the local community, such as new jobs and tourism.

Helping vulnerable customers
We will support our customers rectify leaking pipes, identified through smart meters.

Flourishing environment

Leaving water in the environment
We will leave more water in our rivers and watercourses, benefiting habitats, wildlife and precious chalk streams.

New habitats
Our reservoirs will establish new habitats for our region's wildlife.

Biodiversity net gain
We will promote biodiversity by developing new habitats when we build new supply-side options.

Investing for Tomorrow

No regrets investment
Our reservoirs will be needed whatever the future may hold.

Investing for the future
We will explore innovative ways of managing demand.

Able to respond quickly
Our plan is highly adaptive, allowing it to respond to future challenges.

Resilient Business

Drought resilient
Our customers will have a safe, secure supply of water whenever they turn on the tap, even during an extreme drought.

Understanding water usage
Our smart meters will help us understand where our leaks are in our network and help our customers reduce their water usage.

2 Introduction

In this section we will:

- Provide an introduction to Anglian Water, what a Water Resource Management Plan (WRMP) is and how it is developed.
- Discuss what best value planning is and our framework for it.
- Detail links with other plans, such as the Drought Plan and its Levels of Service.
- Give an overview of regional planning, strategic regional options and how they interact with the WRMP.
- Provide a summary of our net zero strategy.
- Summarise the customer and stakeholder engagement we have undertaken.

2.1 About our company

2.1.1 Anglian Water is the largest water and wastewater company in England and Wales- geographically covering 20% of the land area.

2.1.2 We operate in the the East of England, the driest region in the UK, receiving two-thirds of the national average rainfall each year; that's approximately 600mm.

2.1.3 Our region has over 3,300km of rivers and is home to the UK's only wetland national park- the Norfolk Broads.

2.1.4 Between 2011 and 2021, our region experienced the highest population increase in England. Despite this, we are still putting less water into our network than we did in 1989.

2.2 Planning for the Long Term

2.2.1 Our company Purpose is "to bring environmental and social prosperity to the region we serve through our commitment to Love Every Drop". This purpose is at the heart of our business, having been enshrined in our Articles of Association in 2019.

2.2.2 Central to delivering this purpose is planning for the long term. We have an excellent track record in long term planning, first setting out our 25 year ambitions in 2007 through our Strategic Direction Statement (SDS). In this, we set out four ambitions, shown in Figure 10[6], that still remain our priorities today, 16 years on. These ambitions are shaped to deliver our purpose, and we are constantly striving to improve how we perform against them.

Figure 10 Our Strategic Direction Statement ambitions

2.2.3 These SDS ambitions are underpinned by our Long Term Delivery Strategy (LTDS) which will formalise what we have done so well for years: building on our purpose, redefining our ambitions as a company for the next 25 years and, crucially, setting out our core pathway to achieve these.

6 https://www.anglianwater.co.uk/siteassets/household/about-us/revised-strategic-direction-statement-2020-2045.pdf

2.2.4 By doing this, our LTDS will bring together our strategic planning frameworks and statutory environment programmes to maximise the potential of what our company delivers. One of these strategic planning frameworks is the Water Resources Management Plan (WRMP), which details how we will ensure resilient water supplies to our customers over the next 25 years.

2.2.5 The LTDS and WRMP both look for no[7] and low regret[8] investments for our region, giving flexibility to adapt to future challenges and opportunities such as technological advances, climate change, demand variations, and abstraction reductions.

2.3 Water Resources Management Plans

2.3.1 We produce a WRMP every five years. It is a statutory document that sets out how a sustainable and secure supply of clean drinking water will be maintained for our customers. Crucially it takes a long-term view over 25 years, allowing us to plan an affordable, sustainable pathway that provides benefit to our customers, society and the environment.

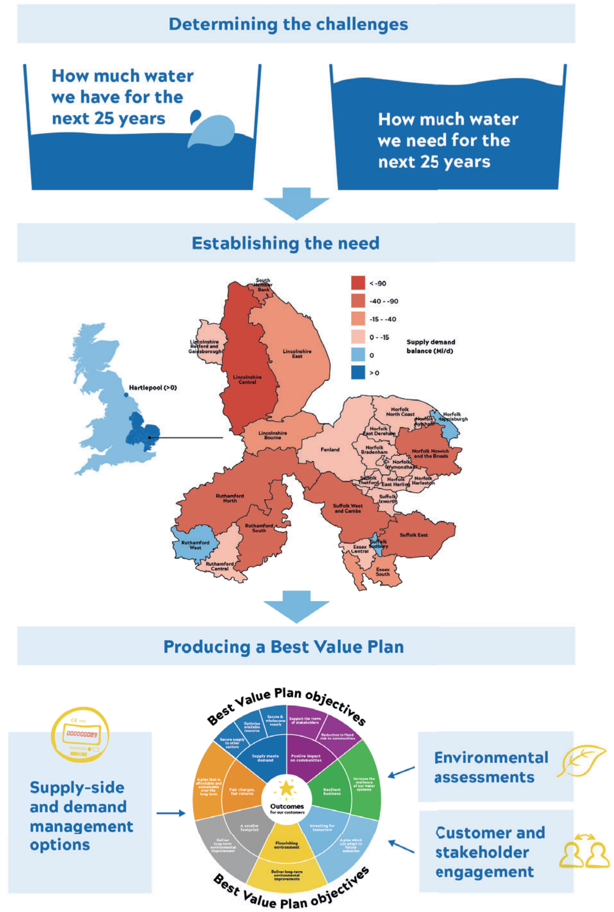
2.3.2 This WRMP focusses on the period 2025 to 2050, and is known as WRMP24. We have developed it by following the Water Resources Planning Guideline (WRPG)[9], as well as other relevant guidance, in order to meet statutory requirements. This has ensured our WRMP24:

- Provides a sustainable and secure supply of clean drinking water for our customers.
- Demonstrates a long-term vision for reducing the amount of water taken from the environment, and shows how we will protect and improve it.
- Is affordable.
- Maintains flexibility by being able to respond to new challenges.
- Complies with its legal duties.
- Incorporates national and regional planning.
- Provides best value for the region and its customers.

2.3.1 Developing our WRMP

2.3.1.1 Our WRMP24 has been progressed following processes detailed in the WRPG, as shown in Figure 11.

Figure 11 A high level overview of the process for producing WRMP24



7 Investments that are likely to deliver outcomes efficiently under all plausible scenarios.
8 Investments that are likely to deliver outcomes efficiently under a wide range of plausible scenarios.
9 https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline

2.3.1.2 We start by determining the extent of the challenges we face between 2025 and 2050. We achieve this by developing forecasts to establish the amount of water available to use (supply forecast) and the amount of water needed (demand forecast) in our region. When these forecasts are combined, a baseline supply-demand balance is created. This tells us whether we have a surplus of water or a deficit, establishing our water needs for the planning period.

2.3.1.3 An appraisal for both demand management options and supply-side options is undertaken, starting with an unconstrained list of possible options which progresses through various assessments until a final constrained list is determined.

2.3.1.4 Demand management options aim to reduce the amount of water being used by our customers and/or lost in our water network. Examples of these options include smart metering and the promotion of water efficiency measures, such as reducing shower times. Supply-side options are also developed; these provide additional water to supply to customers. Examples of these options include new raw water storage reservoirs or water reuse treatment works.

2.3.1.5 We environmentally assess both demand management and supply-side options so we can understand their potential environmental impacts and what could be put in place to mitigate them; in some cases we exclude options from further consideration.

2.3.1.6 The next step is for the water savings associated with the chosen demand management options to be added into our baseline supply-demand balance to determine if our region's water needs are met. If the demand management options savings do not solve the need, supply-side options are added into the modelling process. This is undertaken in our Economics of Balancing Supply and Demand (EBSD) model which conducts numerous modelling runs, creating a range of plans that meet our objectives. These plans are also environmentally assessed.

2.3.1.7 We develop a best value plan from these different model runs[10] and environmental assessments, encompassing the views of our customers and stakeholders who have been consulted throughout the plan's development.

2.3.2 Best value planning

2.3.2.1 To ensure we developed the right solution for our region's water needs, we have focused on 'best value'. To us, best value is looking beyond cost and seeking to deliver a benefit to customers and society, as well as the environment whilst listening and acting on the views of our customers and stakeholders.

Figure 12 Our best value plan objectives

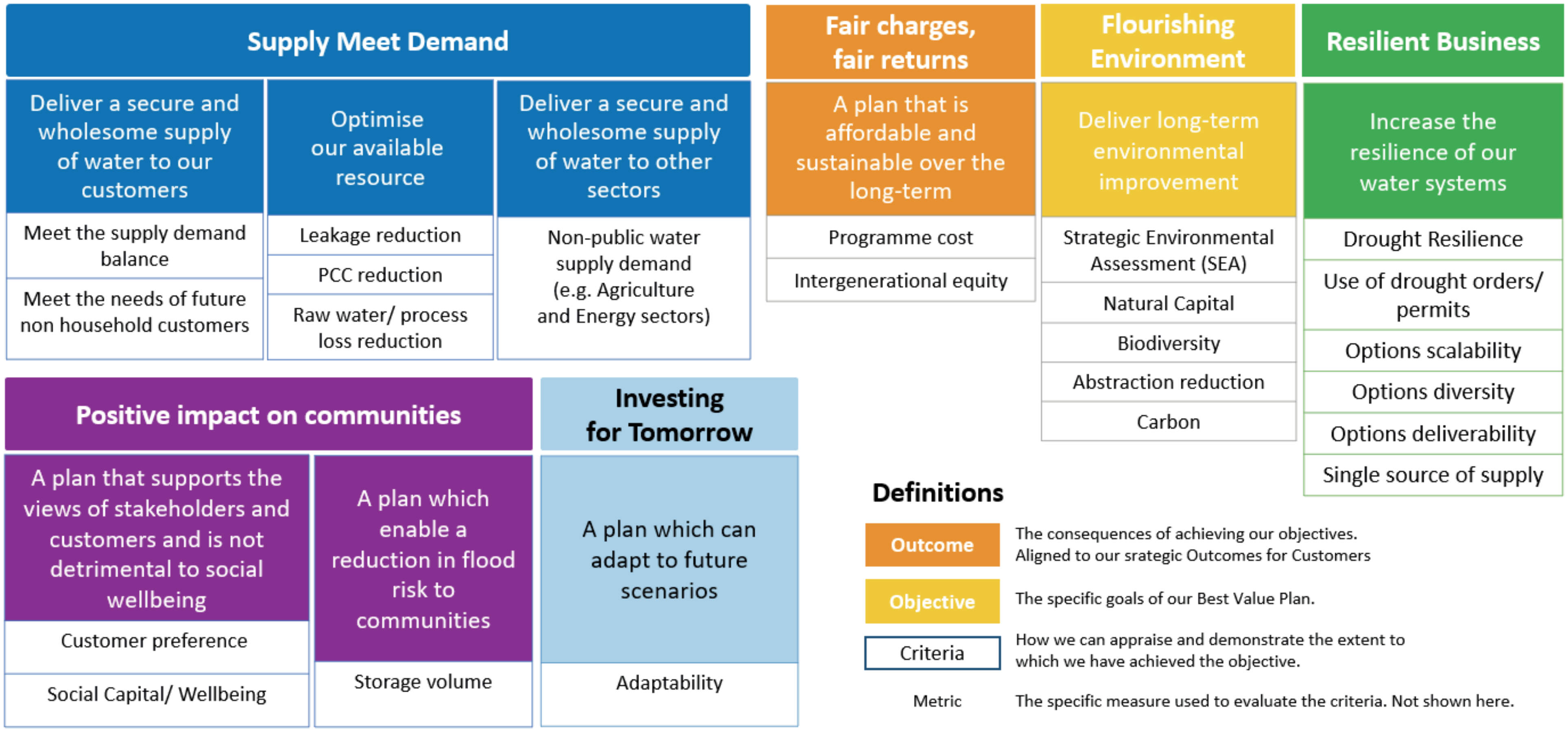
10 A best value plan considers factors alongside cost, achieving an outcome that provides benefit to customers, the wider environment and society as a whole.

2.3.2.2 These views, from our customers and stakeholders, have helped build our best value framework, shown in Figure 12 which has been used as the basis for our decision making.

2.3.2.3 The best value framework identifies the outcomes that WRMP24 should achieve[11]. Below these outcomes sit the objectives for the plan; these are the specific goals we need to accomplish in order to achieve our outcomes. To determine whether we have met these objectives, we use criteria to appraise and demonstrate the extent to which they have been achieved.

2.3.2.4 The criteria, objectives and outcomes in our best value planning framework are shown in Figure 13. We also use a range of metrics (not shown) to evaluate the criteria. These can be quantities, monetised values or qualitive assessments.

Figure 13 Our best value planning framework



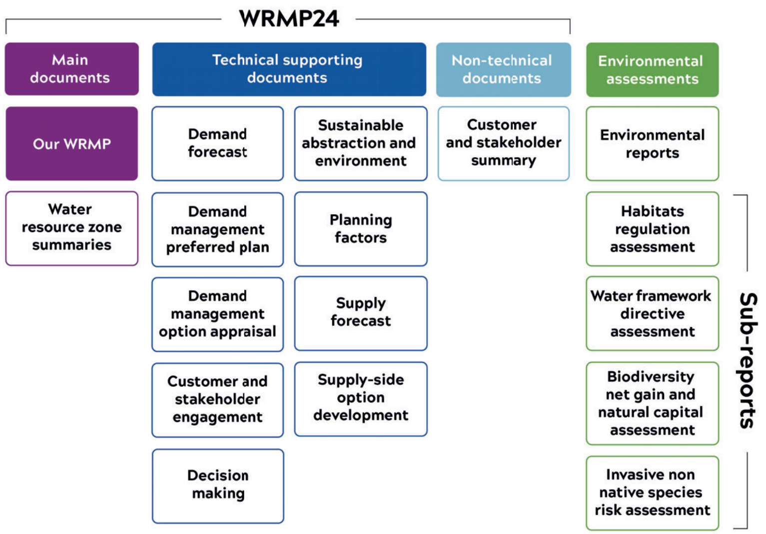
11 These are aligned with our strategic outcomes for customers from our 25 year Strategic Direction Statement.

2.3.2.5 We recognise that it is not possible to maximise all of the criteria in our best value planning framework, so there will be trade-offs between objectives. A best value plan must balance these trade-offs in order to deliver the best outcome to customers, stakeholders and the environment.

2.3.3 Our WRMP24 reports

2.3.3.1 An overview of our best value plan and its development is featured in this WRMP24 Main Report. Further detail can be found in our suite of supporting technical documents which are shown in Figure 14.

Figure 14 Our revised draft WRMP24 reports



2.4 Relevant legislation, plans and strategies

2.4.1 Our WRMP24 is influenced by the following legislation, plans and strategies. A non-exhaustive summary is provided below:

- Local Authority Plans
- River Basin Management plans
- The Conservation of Habitats and Species Regulations 2017
- The Environment Act 2021
- The Environmental Assessment of Plans and Programmes Regulations 2004
- The Environmental Improvement Plan 2023
- The National Framework for Water Resources 2020
- The Plan for Water
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- The Water Industry Act 1991
- The Water Resources Act 1991
- The Water Resources Management Plan Regulations 2007
- The WRMP Direction 2022
- The 25 Year Environment Plan

2.4.2 Our WRMP24 is also central to many of our company's plans and strategies, including:

- Future Fens: Integrated Adaptation[12]
- Our Business Plans for 2020-2025[13] and 2025-2030
- Our Drought Plan 2022[14]
- Our Long Term Delivery Strategy
- Our net zero strategy to 2030[15]
- Our Drainage and Wastewater Management Plan[16]
- The Fens Reservoir and Lincolnshire Reservoir RAPID gate submissions[17]

12 Future Fens: Integrated Adaption (anglianwater.co.uk)
13 Anglian Water (September 2018), 'PR19 Our Plan 2020-2025'
14 https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drought-plan/
15 net-zero-2030-strategy-2021.pdf (anglianwater.co.uk)
16 https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-wastewater-management-plan/
17 Investing in two new reservoirs (anglianwater.co.uk)

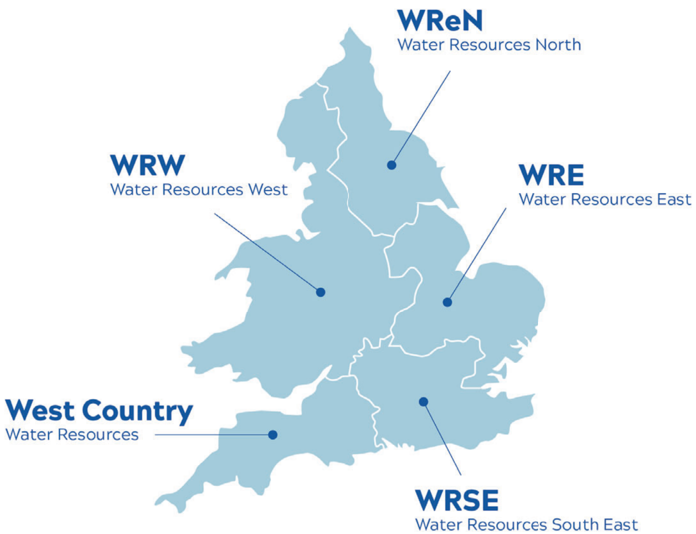
These interactions will be referenced throughout this document and technical supporting documents.

2.5 Links to other plans and processes

2.5.1 Regional planning

2.5.1.1 The National Framework for Water Resources[18] provides a mandate for five regional planning groups, which are shown in Figure 15. These planning groups bring together abstractors, as well as regulators and environmental groups; these stakeholders work together to form a long term strategy for how water will be supplied to households, industry and agriculture across their region.

Figure 15 Regional Planning groups



2.5.1.2 Through the production of regional best value plans, the five regional planning groups work together to ensure a coherent, efficient national water strategy, exploring inter-regional transfers and the sharing of resource[19]. The results of this are particularly important to us, as the WRPG states that we should reflect applicable regional plans in our WRMP.

2.5.1.3 We are active participants in WRE, the regional planning group for the East of England. Representatives for agriculture, energy, councils and environmental groups are key stakeholders, as well as our fellow water companies Essex & Suffolk Water, Cambridge Water and Affinity Water (as part of its Brett Zone).

2.5.1.4 We took a leading role in the development of WRE's draft Regional Plan, evolving the methodologies for the technical process as well as chairing Task and Finish groups charged with their implementation. We also coordinated weekly alignment meetings with our fellow water companies and WRE, ensuring a consistency of approach. This regular engagement means we have been able to liaise extensively with WRE stakeholders, gaining their wider views on our approaches and decision making.

2.5.1.5 WRE is focused on developing low regret[20], robust strategic supply-side options for the region's water users, and adopted a Multi-Objective Robust Decision-Making process, alongside stakeholder participation to achieve this. We have reflected these options in our WRMP24, verified and proven robust by our own modelling and decision making processes, ensuring they truly offer best value to our customers.

2.5.1.6 The regional groups also set an environmental strategy for their region, otherwise known as its environmental destination. This aims to define a long-term 25 year vision for the environment, rather than just focusing on what can be achieved in a five year planning cycle[21]. This environmental destination will inform how the region reduces the potential impact of its abstractions, allowing waterbodies to be restored, protected and enhanced.

18 Environment Agency (March 2020),'Water Resources National Framework Appendix Two: Regional Planning'
19 National_Framework_for_water_resources_summary.pdf (publishing.service.gov.uk)
20 A low regret option is one that we won't regret, even if assumptions change.
21 This five year planning cycle is known as an Asset Management Plan (AMP) period.

2.5.1.7 Our WRMP also includes a WRZ for Hartlepool Water which is part of the Water Resources North (WReN) planning group. Our plan for the Hartlepool WRZ is consistent with WReN's strategy.

2.5.2 RAPID and Strategic Resource Options

2.5.2.1 In WRMP19 we recognised that new supply-side solutions can be complex to deliver, with long planning timescales, making them difficult to implement quickly if a near term challenge occurred. Through WRMP19 modelling and decision making, we identified schemes to develop so they could be 'shovel ready' earlier.

2.5.2.2 Some water companies received funding to investigate and develop options like this through a gated process overseen by Ofwat, the Drinking Water Inspectorate and the Environment Agency. These regulators have formed an alliance called the Regulators' Alliance for Progressing Infrastructure Development, otherwise known as RAPID, which aims to accelerate strategic water infrastructure to meet the long-term needs of the country. These options are called SROs.

2.5.2.3 We have two SROs in the RAPID process: the Fens (known as North Fenland in WRMP19) and Lincolnshire (known as South Lincolnshire in WRMP19) reservoirs which are being developed to meet the new water needs of our region, whilst also allowing us to contribute to our company purpose. The need, suggested size and indicative locations for these surface water reservoirs and associated treatment works were identified in WRMP19

2.5.2.4 As part of the RAPID process, a dedicated project team has refined the WRMP19 option, refining the sources of water, the treatment needed and the preferred location for the reservoirs. Water resources planning processes have determined that both reservoirs should be 55 million cubic metre raw water storage reservoirs, with 50 million cubic metres of usable water. The need for them, and consequently their size, has been determined through regional and company planning processes. A brief overview of this is provided below:

- A multi-objective robust decision making process was undertaken by WRE to ascertain the needs of its region. New supply-side options from all WRE water companies were tested against differing hydrological, demand and environmental scenarios, with stakeholder input shaping the best value metrics to be applied to the portfolios generated. Through this process, the Fens and Lincolnshire reservoirs were determined to be low regret regional options.
- An independent national model, the Water Resources of England and Wales water resources model, identified the need for and value of both the Lincolnshire and Fens reservoirs. This modelling also confirmed that both reservoirs are resilient against uncertainty in supply and demand over the long-term.
- Our WRMP24 modelling confirmed the need for the reservoirs with unconstrained model runs selecting both reservoirs. We also found that the reservoirs satisfied more objectives on our best value planning framework than feasible alternatives, such as desalination or water reuse.

2.5.3 Interactions between WRMP24, Regional Plan and SROs

2.5.3.1 WRMP24, WRE's Regional Plan and the RAPID process are all essential components of water resources planning.

2.5.3.2 The aims and decision making of each stream is shown in Figure 16. We also detail how best value planning is applied in each process.

2.5.3.3 These planning streams have been developed in parallel, requiring an iterative approach to reconcile and refine them. For instance, the WRPG requires that our WRMP24 reflects WRE's Regional Plan, unless there is a clear justification for not doing so. We have reflected this Regional Plan in our WRMP24, but our own modelling processes have independently selected the SROs from an unconstrained supply-side options list, showing that the outputs from the Regional Plan are the best value ones for our own company and region.

Figure 16 Water resources planning decision making framework

	Regional plan	Water Resource Management Plan*	Strategic Regional Options
Decision making complexity	Extremely complex	Very complex	Fairly complex
Principal guidance	National Framework for Water Resources	Water Resource Planning Guideline	Regulators Alliance for Progressing Infrastructure Development
Aims	Produce a resilient, long-term water resource plan for the region	Achieve a secure supply of water for customers and a protected, enhanced environment	Progress strategic infrastructure to meet the long-term needs of the region(s)
What it determines	Environmental destination and ambition for the region Additional inter-regional transfers Strategic supply-side options and timings SRO need and sizing Non-PWS options	Confirm environmental destination and ambition for the company Company supply-side options and their timing Demand management options and their timing 1:500 Drought resilience timing Licence cap timing Confirm SRO need and sizing SRO sizing, location and timing of need	SRO delivery date Multi-sector opportunities Design and progression of scheme
How is best value applied	Reflects multi-sector aims and needs, as well as looking at inter-regional transfer capability Trades off multiple stakeholder objectives through a high-level large set of search and tracked metrics	Reflects company environmental and societal outcomes and aligns with strategic direction and LTDS Integrates stakeholder and customer views	Aligned with regional plan and company WRMPs Decision making criteria for site location Cost and technical elements of concept design, following design principles

*Statutory document

2.5.3.4 Demand management options are determined by WRMP24, as well as the timing of enhanced drought resilience and licence capping. WRMP24 also determines if and when any smaller scale supply-side options are required, as illustrated in Figure 17.

Figure 17 WRMP24 reflecting the Regional Plan

2.5.3.5 The environmental destination set by the region has been placed at the heart of our WRMP24; this will will see us conduct scientific investigations between 2025 and 2030, with the aim of establishing which environments need intervention the most and what that action should be. The results will inform our selected environmental destination in WRMP29.

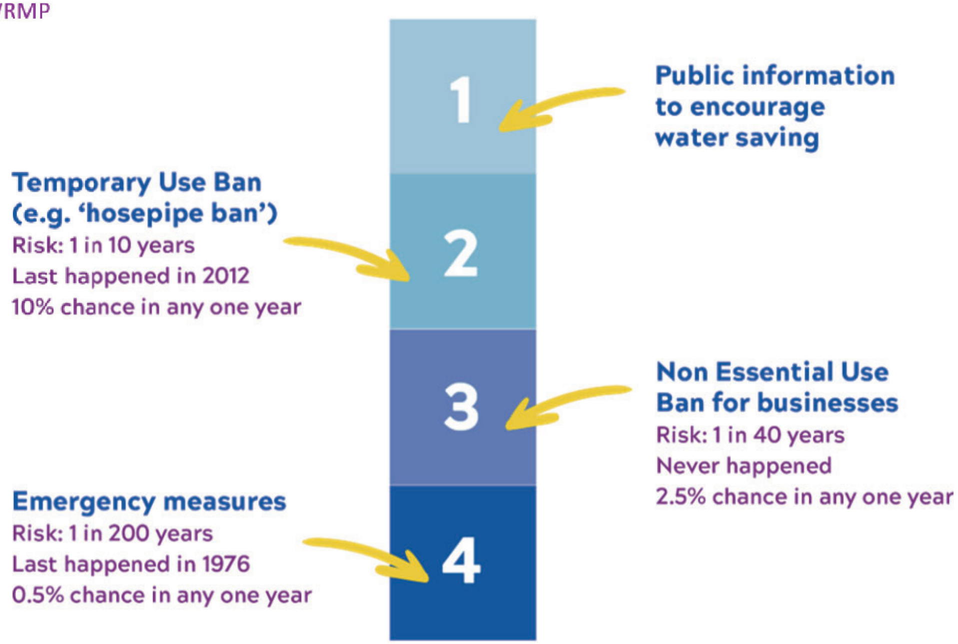
2.5.4 Our Drought Plan and Levels of Service

2.5.4.1 We published our drought plan in April 2022. This sets out how we will protect public water supplies in the event of a drought occurring between 2022 and 2027. This includes the Levels of Service we provide to our customers, as shown in Figure 18.

2.5.4.2 We consulted extensively with our customers on our Levels of Service as part of the formation of our SDS, as well as for previous business plans and WRMPs. For this WRMP24, we again carefully considered these Levels of Service and spoke to our customers to determine if they felt they were still acceptable.

2.5.4.3 Our engagement shows that 72% of our customers feel that a 1 in 10 year risk of temporary use bans is acceptable. This means there is a 10% average annual risk of us implementing a hosepipe ban, during which time customers would not be able to use a hosepipe to water their garden or wash their car.

Figure 18 Our Levels of Service from 2025



2.5.4.4 Seventy-three percent of customers felt the probability of a non-essential use ban is acceptable. A non-essential use ban means that a business could not conduct activities such as filling a non-domestic swimming pool or using a mechanical vehicle washer. Our Level of Service for a non-essential use ban is 1 in 40 years, equivalent to a 2.5% annual average risk.

2.5.4.5 Following customer feedback for WRMP19, we put investment plans in place to become resilient to a 1 in 200 year drought by 2025[22]. This will reduce the chances of customers being subject to emergency measures during a severe drought. Examples of emergency measures include rota cuts where customers experience no or low flow to their taps at certain times of day or have to use standpipes to collect water.

2.5.4.6 We strongly believe this increased resilience is essential to our sector and region as we know being prepared for drought is more cost effective than implementing expensive emergency measures. It also ensures we lessen the chances of our customers having a restricted water supply. This is an approach echoed by the NIC[23]. We were pleased that our historical investment in resilience proved worthwhile during the drought of 2022.

2.5.5 Our net zero strategy

2.5.5.1 We will achieve net zero operational carbon emissions by 2030, reducing the greenhouse gas emissions from our operations as far as possible. Any residual emissions that we cannot avoid or reduce will be counterbalanced from 2030 by an equivalent sequestration of gases. This means that, overall, we will have no impact on greenhouse gases in the atmosphere.

2.5.5.2 We will achieve this by:

- maximising energy efficiency and renewable energy generation and storage
- procuring green electricity
- managing our process emissions
- developing our offsetting strategy
- opting for alternative fuels
- decarbonising our fleet, and
- maximising the value of our biogas

2.5.5.3 We are actively manage the capital carbon impact of our business, setting a target to reduce capital carbon by 65% by 2025 and 70% by 2030 against a 2010 baseline. At the end of 2021/22 we are proud to have achieved a 63.1% capital carbon reduction against our 2010 baseline. This has been achieved by a four step hierarchy:

1. No build
2. Reuse assets
3. Optimise design
4. Change materials to low carbon alternatives

2.5.5.4 We have considered our greenhouse gas emissions as part of WRMP24 by evaluating how our plans perform for both operational and capital carbon. We have also reviewed the phasing of our higher operational options, such as desalination. Further detail on our carbon approach can be reviewed in the revised draft WRMP24 Decision making technical supporting document, Appendix D.

2.5.5.5 Further detail on our current greenhouse gas emissions can be found in our Annual Integrated Report 2023 (available at https://www.anglianwater.co.uk/siteassets/household/about-us/air-2023.pdf).

2.6 Stakeholder and customer engagement

2.6.1 Engagement has been central to shaping, informing and challenging our plan. Through WRE we have made new stakeholder relationships and furthered existing ones. The Fens Water Partnership and Lincolnshire Reservoir Working Partnership have also been instrumental to the development of our water resources strategy.

2.6.2 We continue to maintain close links with our regulators, meeting monthly with the Environment Agency to discuss the development of our WRMP. We have also liaised with Ofwat, the Drinking Water Inspectorate, Natural England, Historic England and the Marine Management Organisation.

22 We are currently 1 in 100 year drought resilient.
23 Preparing for a drier future (nic.org.uk)

2.6.3 Webinars were held for our pre-consultation and consultation, informing stakeholders about our WRMP24 and its challenges. We also continued with one to one stakeholder engagement, using the opportunity to inform of any developments in the plan making process, as well as using the opportunity to ask for opinion and insight.

2.6.4 We have conducted targeted meaningful engagement with our customers, focussing on the key questions in Figure 19, enabling our customers to shape our plan. Further details on our stakeholder and customer engagement can be reviewed in our Stakeholder and Customer Engagement technical supporting document, available at www.anglianwater.co.uk/wrmp; the engagement is also detailed throughout this report.

Figure 19 Key engagement questions for WRMP24

2.7 Errata

2.7.1 Please refer to the Errata on anglianwater.co.uk/wrmp for details of the changes in this document since first issue.

3 WRMP19 and new challenges for WRMP24

In this section we will:

- Provide an overview of our WRMP19 strategy, focussing on leakage reduction, our strategic pipeline, our smart metering programme, and our investment in the environment.
- Discuss the new challenges we are experiencing for WRMP24.
- Show WRZ changes since WRMP19, and subsequent problem characterisation.

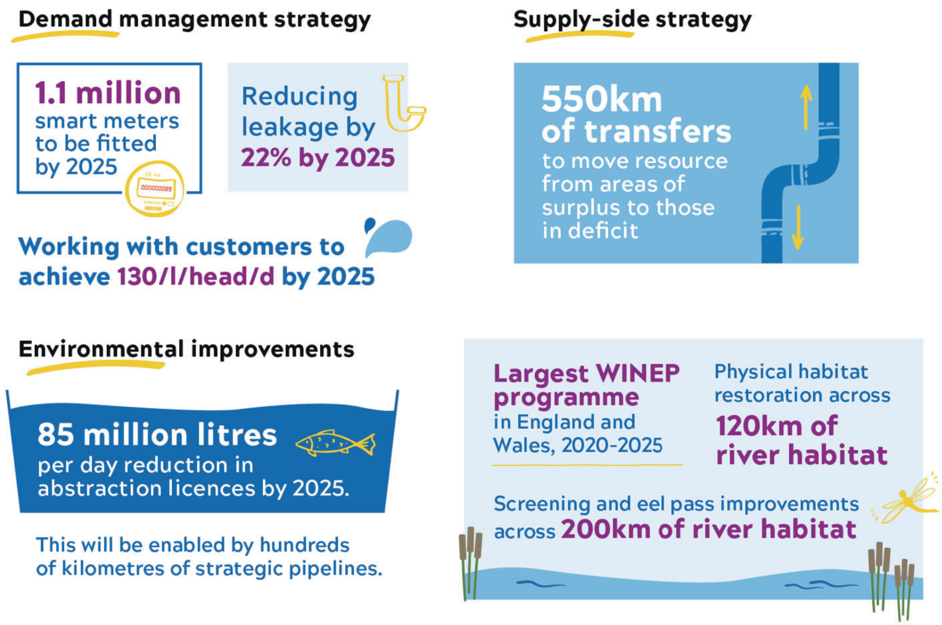
3.0.1 Our current WRMP was published in 2019. WRMP19 promoted a twin track approach, implementing an ambitious demand management programme, building on our already industry leading leakage performance, combined with a significant main laying scheme to take water from areas of surplus to areas of deficit. This approach will allow us to cease or reduce abstraction from certain sensitive environments by 2025.

3.0.2 We will build on this twin track approach for WRMP24, unlocking the potential that our smart meter strategy gives us whilst using the connectivity provided by our new pipeline to reduce abstractions from our most sensitive environments.

3.0.3 Our adaptive planning programme has also been developed, recognising that certain supply-side options take significant amounts of development time. This has allowed us to develop our understanding of water reuse, desalination and aquifer storage and recovery. The Fens Reservoir was also developed as part of this programme, prior to entering the RAPID process at gate one.

3.0.4 An overview of our strategy is shown in Figure 20.

Figure 20 Our WRMP19 strategy



3.0.5 We have experienced significant challenges during the delivery of our WRMP19 strategy, including: Brexit, the Covid-19 pandemic where our PCC increased, the Ukraine war which disrupted our supply of steel for our strategic pipeline, and supply chain issues with items such as computer chips in short supply.

3.0.6 Despite these challenges, we have made great progress delivering our WRMP19 strategy but it has made us even more aware that we need to be resilient and flexible to further challenges that may challenge the deliverability of WRMP24.

3.1 New challenges for WRMP24

3.1.1 Whilst we are responding well to WRMP19's challenges, we have significant new considerations for WRMP24 (shown in Table 1).

Table 1 A comparison of WRMP19 and WRMP24 challenges

Impact		WRMP19	WRMP24
Growth	Baseline growth	✓	✓
	Growth associated with OxCam		✓
	Impact of Covid-19 on demand		✓
Sustainability reductions	Sustainability reductions (AMP7 WINEP)	✓	
	Licence capping for no deterioration to maximum peak volume	✓	
	Sustainability reductions (AMP8 WINEP)		✓
	Licence capping for no deterioration to recent actual average		✓
	Further licence reductions to enhance the environment (environmental destination)		✓
Climate change	Historic climate change	✓	✓
	Future climate change	✓	✓
Extreme drought	Reduced reliance on drought permits		✓
	Increased resilience to 1 in 200 years	✓	
	Increased resilience from 1 in 200 to 1 in 500 years		✓

3.1.2 A brief summary of these challenges is now provided.

3.1.1 Growth

3.1.1.1 The East of England has experienced the highest growth rates in the UK since the 2011 census. We expect this to continue with an additional 911,000 people forecast to live in our region by 2050.

In addition, we are experiencing a significant increase in requests for new non-household demand, including to service net zero related developments. This is discussed further in Section 5.

3.1.2 The Oxford Cambridge Arc

3.1.2.1 The Oxford-Cambridge Strategic Growth Corridor is a potential strategic growth corridor that could increase the amount of water needed in our area. The extent of its growth is currently uncertain; however we have included an element of strategic growth in our WRMP. Please refer to Section 5 of this report or the revised draft WRMP24 Demand forecast technical supporting document, Section 5 for further information.

3.1.3 Covid-19

3.1.3.1 Covid-19 changed our lives and work habits. During the lockdown periods we saw a 10% increase in household demand for water across our region. This demand has now reduced but not to pre-Covid levels. We are currently developing our understanding of what this means for long term demand for water, especially with new hybrid ways of working. Please refer to Section five of this report or the revised draft WRMP24 Demand forecast technical supporting document, Section 12.

3.1.4 Licence capping

3.1.4.1 We want our abstractions to be environmentally sustainable. For WRMP19 we voluntarily committed to maintain all of our groundwater abstractions below maximum peak abstraction rates, ensuring there would be no additional risk of abstraction causing deterioration to the health of a waterbody.

3.1.4.2 Since our commitment in WRMP19, the Environment Agency has signalled that further abstraction licence reductions are required. It is proposed that abstraction licences are restricted to recent actual average abstraction levels rather than maximum peak levels. This will reduce the amount of water we have available, leaving us with a significant short term risk as a large percentage of our licences are time-limited. For further detail, please refer to Section 4 of this report, Section 5 of the revised draft WRMP24 Supply forecast technical supporting document and Section 5 of the WRMP24 Sustainable abstraction and environment technical supporting document.

3.1.5 Environmental destination

3.1.5.1 Environmental destination is a new consideration. We support it wholeheartedly as it promotes a long-term vision to deliver greater environmental improvement to the country, challenging abstractors to consider changes to water abstractions that are above and beyond their statutory obligations.

3.1.5.2 To support these discussions, different environmental destination scenarios were developed from the National Framework by WRE. These scenarios vary in the extent of environmental improvement achieved, their associated abstraction reductions and what infrastructure is needed to facilitate it. Further detail on how environmental destination has shaped our WRMP24 can be found in Section 4 of this report, Section 5 of the revised draft WRMP24 Supply forecast technical supporting document and Section 6 of the WRMP24 Sustainable abstraction and environment technical supporting document.

3.1.6 Climate change

3.1.6.1 Our climate is becoming undoubtedly hotter and weather patterns are changing. We are expecting these extremes to become more frequent in the future and have to plan for this. Further detail can be found in Section 4 of this report and Section 7 of the revised draft WRMP24 Supply forecast technical supporting document.

3.1.7 Drought resilience

3.1.7.1 In WRMP19, we planned to become resilient to a 1 in 200 year drought by 2025[24]. The WRPG states we need to increase our robustness to drought further by becoming resilient to a 1 in 500 year drought[25].

3.1.7.2 This enhanced drought resilience means we will be able to maintain supply to our customers during drier periods, without resorting to emergency measures such as rota cuts or standpipes. The WRPG states this needs to be achieved by 2039, with its timing determined by the water company and/or regional planning group. Further detail can be found in Section 4 of this report and Section 6 of the revised draft WRMP24 Supply forecast technical supporting document.

3.1.8 Drought permits

3.1.8.1 When drought occurs, we may need to apply for a drought permit[26]. We don't include drought permits in our baseline forecasts as the water is not always available in periods of low flow.

3.1.8.2 The WRPG has signalled that water companies should reduce their reliance on drought permits. We support this but recognise it could leave us less resilient to drought whilst we develop new supply-side measures that may have significant lead times.

3.1.9 Availability of supply-side options

3.1.9.1 The amount of water we can take from the environment is decreasing, so there is limited opportunity for building new conventional treatment options. This leads us to look at schemes that need significant infrastructure such as new raw water storage reservoirs, water reuse plants and desalination. None of these options can be delivered quickly as they can include significant planning processes, long construction programmes or new technology. In some cases, all three can be factors. Please refer to Section 8 of this report and Sections 2 to 6 of the revised draft WRMP24 Supply-side option development technical supporting document.

3.1.10 Cost efficiency of demand management options

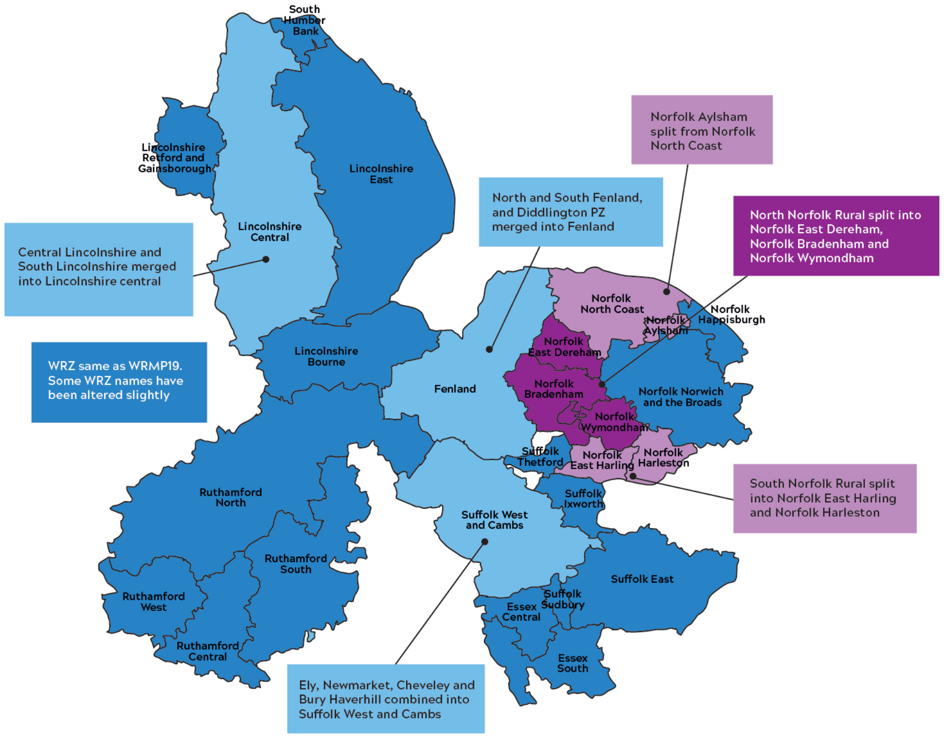
3.1.10.1 We have invested significantly in demand management, with some of our options nearly exhausted until new technology is available. This means that we now have to consider significant mains replacement, which is very expensive. For further information please see Section 7 of this report, and the Demand management options appraisal technical supporting document.

24 This is equivalent to a 0.5% chance of a severe drought occurring in any given year.
25 This is equivalent of a 0.2% chance of a severe drought occurring in any given year.
26 A drought permit secures additional water resources by modifying or suspending conditions on an abstraction licence. An application is reviewed and determined by the Environment Agency.

3.2 Water resource zone changes since WRMP19

3.2.1 When we started developing WRMP24, we assessed the integrity of the 28 WRZs[27] used for WRMP19. WRZs are the principal building blocks used by water companies to develop their supply-demand balance. As a water company, it is our responsibility to divide up our region into WRZs.

Figure 21 Changes to our WRZs for WRMP24



3.2.2 For WRMP24, we needed to confirm if our WRMP19 WRZs were still suitable. Using early supply and demand forecasts, our assessment explored potential scenarios (for instance, environmental destination, growth and licence capping) to test their integrity. When this scenario testing exposed discrete areas of deficit within a large WRZ, the WRZ was divided it into smaller zones to allow the discrete deficit to be included in our WRMP24 modelling.

3.2.3 Our investment for WRMP19 has also allowed us to combine some of our WRMP19 WRZs, as we have new interconnectivity between these zones. The changes are shown in Figure 21.

3.2.4 Our WRZ integrity assessment concluded that 16 of our WRMP19 WRZs would remain unaltered, with the remaining 12 WRZs being either split or combined into 11 new WRZs. This has resulted in a total of 27 WRZs for WRMP24, including Hartlepool.

3.2.5 For further information please refer to Section 4 of the revised draft WRMP24 Decision making technical supporting document.

3.3 WRMP24 problem characterisation

3.3.1 Following on from the development of our new WRMP24 WRZs, we conducted a problem characterisation assessment. This problem characterisation, following the UKWIR Decision Making Process, determines which modelling approach should be undertaken for WRMP24. There are two parts to this assessment:

1. Strategic needs- how big is the problem?
2. Complexity factors- how difficult is it to solve?

3.3.2 These two questions are used to determine the level of concern for each of the seven geographical areas used in the assessment. The problem characterisation is summarised in Figure 22.

3.3.3 Recognising the high level of concern, we have undertaken a complex decision making approach. This has been achieved using WRE's Multi-Objective Decision Making model, and our EBSD model and best value planning framework. This approach has

27 A WRZ represents the largest area in which all resources can be shared effectively. They are usually self contained and defined by their infrastructure connectivity and geographic or physical boundaries. Customers in a WRZ share the same level of resilience.

been used for all of our WRZs apart from Hartlepool[28], reflecting their interconnected nature. This is a change from WRMP19 where we only utilised the EBSD model and best value criteria.

Figure 22 Summary of WRMP24 problem characterisation

Area	Water Resource Zones	Total Needs Score	Total Complexity Score	Level of Concern
1	Lincolnshire WRZs	4	12	H
2	Ruthamford WRZs	6	20	H
3	Fenland WRZ	3	14	M
4	Norfolk WRZs	5	16	H
5	Essex and Suffolk East WRZs	6	17	H
6	Suffolk and West Cambridgeshire WRZs	4	16	H
7	Hartlepool	0	1	L

3.3.4 For further information please refer to Section 4 of the revised draft WRMP24 Decision making technical supporting document.

28 This is modelled separately as it has a low level of concern.

4 Water availability

In this section we will:

- Give an overview of how we developed our supply forecast.
- Discuss what has changed since WRMP19.
- Provide an overview of sustainability reductions and how moving to actual average impacts our supply demand balance.
- Detail what environmental destination is, how it has been developed and how it has impacted WRMP24.
- Show the impact of climate change and moving to 1 in 500 year drought resilience.

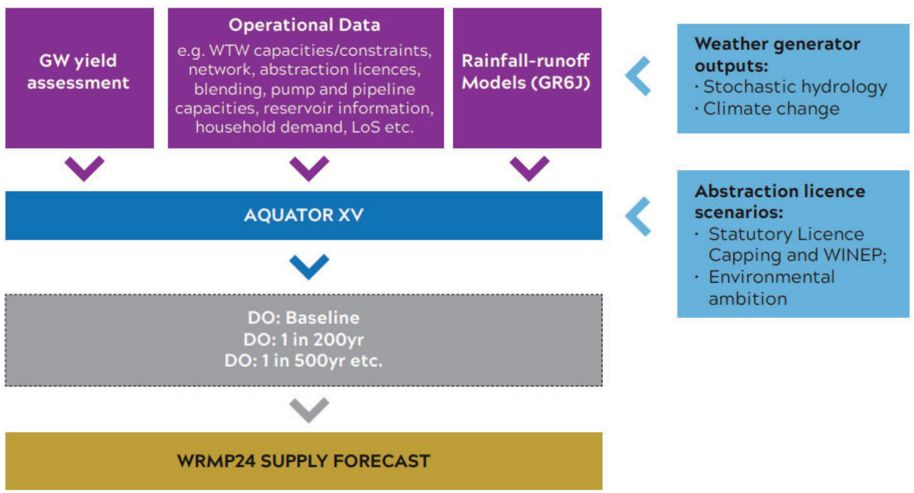
4.0.1 Half of our water supplies come from groundwater sources, with the rest coming from surface water such as reservoirs or rivers. To understand how much water will be available from these sources over the planning period, we produce a supply forecast; this considers the challenges we discussed in Section 3 as well as operational constraints that have occurred since WRMP19.

4.0.2 For detailed information on how the supply forecast was produced, please refer to the Supply Forecast technical supporting document, available at www.anglianwater.co.uk/wrmp.

4.1 Overview of developing the supply forecast

4.1.1 The supply forecast is developed using hydrological models and a water resource simulation model called AQUATOR. This systems based approach provides a more accurate and advanced method for calculating deployable output (DO)[29] compared to the traditional spreadsheet method. Figure 23 shows the main inputs to AQUATOR and the supply forecast process.

Figure 23 The supply forecast process



4.1.2 Further information on AQUATOR and in its inputs is available in Section 4 of the revised draft WRMP24 Supply forecast technical supporting document.

4.2 Changes since WRMP19

4.2.1 There have been a number of changes to DO since WRMP19, as a result of updates to river flows, water treatment works information, pump capacities, groundwater yields and WRZ delineation. Table 2 shows the reported total DO for our region as forecasted in 2025/26.The change in total DO for the same year from WRMP19 to WRMP24 is an increase of 40 Ml/d.

29 This is defined as the annual average output that can be reliably supplied from a commissioned source or group of sources within a WRZ, during a design drought, with current infrastructure.

Table 2 Comparison of WRMP19 and WRMP24 DO numbers for 2025/26

WRMP	Reported total DO in 2025/26 (Ml/d) [30]
WRMP19	1397
WRMP24	1437

4.2.2 The majority of the difference is attributed to the implementation of the WRMP19 interconnectors, taking locked-in resource, which previously couldn't be counted as DO in WRMP19, to other parts of our region where water resources are stretched.

4.2.3 The other large difference comes from Ruthamford, which is largely down to a lower climate change impact. As part of WRMP24, the climate change impact has been recalculated to the base year of 1990, following updated guidance and data, and is assessed with and without severe and extreme droughts. As a result, the marginal impacts of climate change are relatively small in comparison to the other supply reductions; drought resilience, licence capping and environmental destination.

4.2.4 Sources (Habrough, Barton) have also been added within the DO calculation, having been previously discounted due to long-running operational issues. Three sources (Belstead, Hall and Clapham) have also had their DO removed or reduced due to ongoing problems with raw water quality which cannot be resolved based on the current operation of the water treatment works. Further information can be viewed in the Appendix of the Supply Forecast technical supporting document.

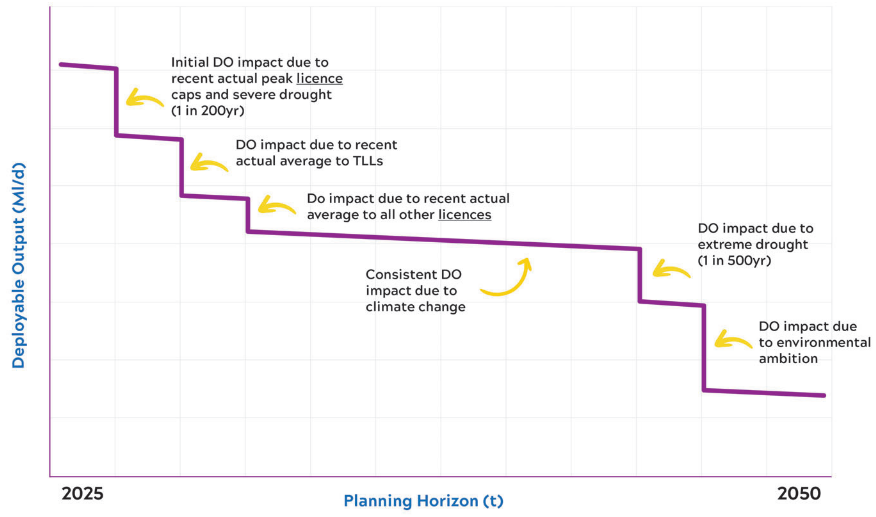
4.2.5 Process losses have also been refined, ensuring that the DO is an accurate reflection of reality, and new models and datasets implemented since WRMP19. Further information can be viewed in the Supply Forecast technical supporting document, Section 4.

4.3 Determining deployable output for WRMP24

4.3.1 To avoid double counting DO impacts at the same sources, an order of impact has been applied. This is demonstrated, using an example WRZ, over the 25 year planning period in Figure 24.

30 Rounded up.

Figure 24 Order of impact for deployable output impacts



4.3.2 This order of impact reflects the baseline starting position in 2025; this includes a 1 in 200 year drought resilience and known licences that have been capped to recent maximum peak volume. From this baseline, the impacts of recent actual average licence caps for time-limited and permanent licences are then assessed.

4.3.3 The DO impact of achieving enhanced drought resilience to 1 in 500 years is then assessed, as well as the climate change impacts for both the 1 in 200 year and 1 in 500 year baselines.

4.3.4 Lastly, environmental destination impacts are then modelled, including under drought conditions.

4.3.5 Further information can be viewed in the Supply Forecast technical supporting document, Section 4. We will now discuss how we approached each of these challenges in the supply forecast, and their impact on the amount of water available in the future.

4.4 Sustainable abstraction

4.4.1 Since 2000, we have proactively assessed the impact of our abstractions on the environment, working closely with the Environment Agency and Natural England to maintain the balance between environmental need and public water supply. This work has been driven and informed by legislation such as the Water Framework Directive (WFD) 2000, the Habitats Directive 1992 and the Wildlife and Countryside Act 1981.

4.4.2 This engagement has seen us reduce our abstractions for WRMP19 to recent peak maximum volume[31], and will see us continue to implement licence caps for WRMP24.

4.4.1 Licence capping for WRMP19

4.4.1.1 At WRMP19, we accelerated environmental improvements across our region, focusing on abstractions that were having, or likely to have, an environmental impact. We also committed to prevent deterioration of the status of all bodies of surface water and groundwater.

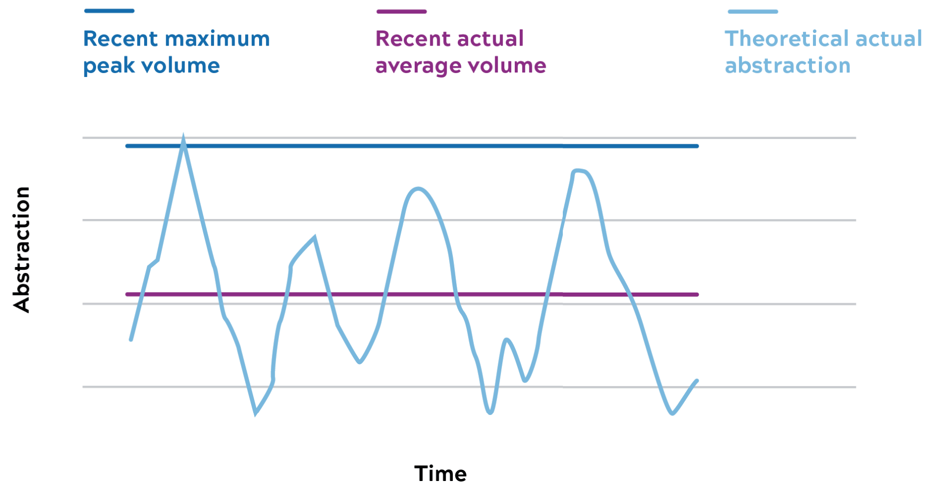
4.4.1.2 This WRMP19 pledge saw us plan to cap all groundwater abstraction licences, where reasonably practicable, to recent maximum peak volumes, to prevent deterioration of waterbodies. We were the only company to chose to complete this by 2025, even though our deployable output reduced by 5.6%, the highest impact seen in the water industry.

4.4.1.3 The schemes needed to facilitate these licence caps will be completed by 2025, resulting in a 85 million litres per day reduction in abstraction licences.

4.4.2 Licence capping for WRMP24

4.4.2.1 For WRMP24, following direction from the Environment Agency, we plan to reduce our abstractions to recent actual average volume[32]. Figure 25 shows how the two different capping scenarios (recent maximum peak volume and recent actual average volume) impact a theoretical abstraction.

Figure 25 A theoretical example of the impacts of different types of licence caps



4.4.2.2 As can be seen from the figure, whilst our abstractions generally operate at recent actual average volumes (by definition), there are periods when we have a need to run at maximum peak volume. Examples of this include hot summers or when we carry out essential maintenance at our treatment works.

4.4.2.3 Moving to recent actual average volume means losing headroom[33] in our network, so there is limited water available to take if there is an emergency.

31 This is the maximum amount of water abstracted from the environment in any one year over a defined historic reference period (typically defined by the Environment Agency as 2005-2015.

32 This is the total volume of water abstracted during the representative recent actual period divided by the number of years in that period.

33 This is an allowance we hold in our supply-demand balance to cater for uncertainties, for instance if we have a water quality issue at one of our water treatment works.

4.4.3 Time-limited and permanent licences

4.4.3.1 The licence caps in WRMP24 will impact both our time-limited[34] and permanent abstraction licences[35].

4.4.3.2 We have a high proportion of time-limited licences compared to other companies; out of our 202 abstraction licences, 124 are time-limited. Of these 124, 76 will expire before WRMP24 is implemented, leaving us no time to develop, design and construct new supply-side options that will offset the impacts of moving to recent actual average volumes.

4.4.3.3 We are working with the Environment Agency to mitigate the impact of moving our time-limited licences to recent actual average. Where we can't implement them without an interruption to our customers' water supply, we submit cases of Overriding Public Interest (OPI) which will demonstrate that the licence caps need to be delayed until we have additional sustainable sources of water to replace our DO losses.

4.4.3.4 For the cases of OPI that are currently being considered, we have adopted an interim annual licence volume for the period from April 2025 to March 2030 within WRMP24. This interim volume reflects the latest OPI discussions that have occurred for abstraction licences with an expiry date in 2022/23. These interim volumes are included within the Supply Forecast and can be viewed in Section 5.

4.4.3.5 Please note that surface water abstractions do not pose a significant deterioration risk due to existing licence constraints such as Hands Off Flow and Minimum Residual Flow conditions, and hence no sustainability changes related to WFD no deterioration are expected.

4.4.4 Assessing the impact of licence caps in WRMP24

4.4.4.1 To ensure we are doing the right thing for our customers and the environment, we have modelled a series of licence capping scenarios to test. These scenarios, shown in Table 3, were developed following consultation with the Environment Agency and internal stakeholders, and allow the phasing of licence capping to be explored, both in terms of residual deficit created and the supply-side options selected to mitigate the impact.

Table 3 Licence capping scenarios and dates of implementation

Licence cap scenario	Capped at peak		Capped at average	
	Time-limited licences	Permanent licences	Time-limited licences	Permanent licences
1	-	-	2022-2024	2025
2	2022-2024	-	2025	2025
3	2022-2024	-	2025	2030
4	2022-2024	2025	2030	2036
5	2022-2024	2025	2036	2036
6	-	-	2022-2024	2030
7	2022-2024	2025	2030	2032
8	2022-2024	2025	2030	2030-2036

4.4.4.2 The results of this scenario testing is detailed in Section 10 of this report and the revised draft WRMP24 Decision Making technical supporting document, Section 4.

4.4.5 Habitats Regulations

4.4.5.1 Whilst a significant portion of our licence caps are attributed to the WFD, we are surrendering a number of licences in the Ant Valley region of Norfolk due to Habitats Regulations. These sources include Ludham (closed in March 2021), East Ruston, and Witton (scheduled for closure in 2024).

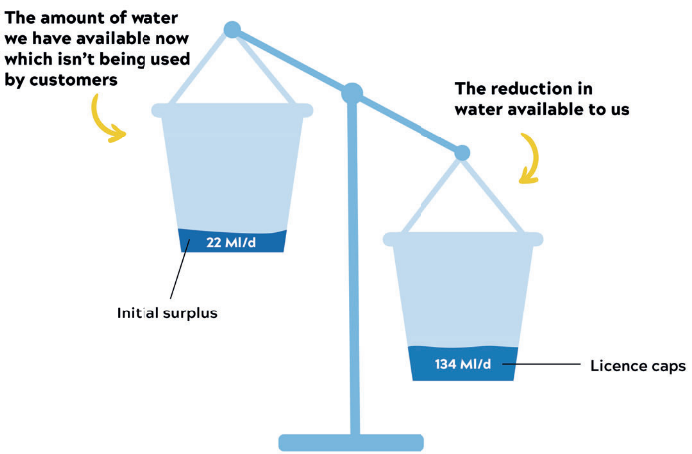
34 A time-limited licence has a specified expiry date. Unsustainable abstraction can be addressed at the point of expiry or renewal of the licence.
35 A permanent licence does not have an expiry date. Unsustainable abstraction can be addressed through statutory processes.

4.4.5.2 As part of the ongoing Ant Valley investigation, other water sources are being investigated. After discussions with the Environment Agency, we have assumed the licences for Kirby Cane and Thorpe St Andrew/Postwick will be revoked by 2030. This assumption has been included within the supply forecast.

4.4.5.3 We are currently working with the Environment Agency to understand if other closures may be required. Where we simply can't implement closures without an interruption to our customers' water supply, we will need to submit cases of Imperative Reasons of Overriding Public Interest (IROPI). These cases will demonstrate that we either need to delay any closures until we have additional sustainable sources of water to replace our DO losses or that we are not able to achieve the closures required (for example, due to disproportionate costs). The principal water resources solution for this area is desalination and this would require evaluation as soon as the outcomes from the Environment Agency's investigations are known.

4.4.6 Total impact of licence capping

Figure 26 The impact of licence capping in WRMP24



4.4.6.1 Figure 26 shows that licence capping will mean we have 134 Ml/d less water available to use.

4.5 Environmental destination

4.5.1 There has been a step-change in the nation's environmental ambition since WRMP19, illustrated by the 25 Year Environment Plan, the Environmental Improvement Plan 2023 and the Plan for Water 2023; all highlighting the Government's commitment to be the first generation to leave the environment in a better state than we found it.

4.5.2 Recognising the need for long-term sustainable abstraction in this ambition, the Environment Agency produced its National Framework for Water Resources in 2020. This framework promotes a vision of regional planning groups exploring multi-sector approaches to water resource planning, focusing on ensuring resilient water supplies and improving the environment by setting an environmental destination.

4.5.3 We have worked with other abstractors (public and non-public) in WRE to develop this destination for the many important environmental and biodiversity sites in our region.

4.5.4 Further information can be found in the revised draft WRMP24 Sustainable abstraction technical supporting document, Section 6.

4.5.1 Developing a Regional Environmental Destination

4.5.1.1 For WRMP24 and this round of Regional Plans, a top-down approach has been undertaken to refine the original environmental destination scenarios established by the Environment Agency. This refinement has created bespoke scenarios for the East of England, shown in Table 4 .

Table 4 Environmental destination scenarios for WRMP24

Business as usual (BAU)	Business as usual plus (BAU+)	Enhanced
Achieves flows to support 'Good Ecological Status' under the Water Framework Directive	Achieves flows to support 'Good Ecological Status' under the Water Framework Directive	Achieves flows to support 'Good Ecological Status' under the Water Framework Directive
Excludes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)	Excludes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)	Includes uneconomic waterbodies (as assessed by the Environment Agency's Abstraction Plan by 2027)
	Further protections for European Protected Sites (riverine and Groundwater Dependent Terrestrial Ecosystems)	Further protections for European Protected Sites (riverine and Groundwater Dependent Terrestrial Ecosystems)
		Further protection for chalk streams, sensitive headwaters and Sites of Specific Scientific Interest

4.5.2 Environmental Destination and WRMP24

4.5.2.1 These regional environmental destination scenarios have informed our WRMP24 supply forecast, with the BAU+ scenario meeting the requirements of the guidance from the Environment Agency regarding the 'most likely' scenario. The BAU and Enhanced scenarios are consistent with the requirements of Ofwat's Common Reference Scenarios for environmental destination so have also been modelled.

4.5.2.2 The projected impacts of these on our abstraction licences are shown below in Table 5, along with projected returns to the environment in an average year[36].

Table 5 Licence impacts of environmental destination scenarios for Anglian Water

	Business as Usual	Business as Usual Plus	Enhanced
Deployable output of licence reductions	180 Ml/d	241 Ml/d	368 Ml/d
Returns to environment in an average year (indicative based on future predicted abstraction)	90 Ml/d	157 Ml/d	287 Ml/d

36 These projected returns are less than the licence changes in an average year due to the system deployable output assessment.

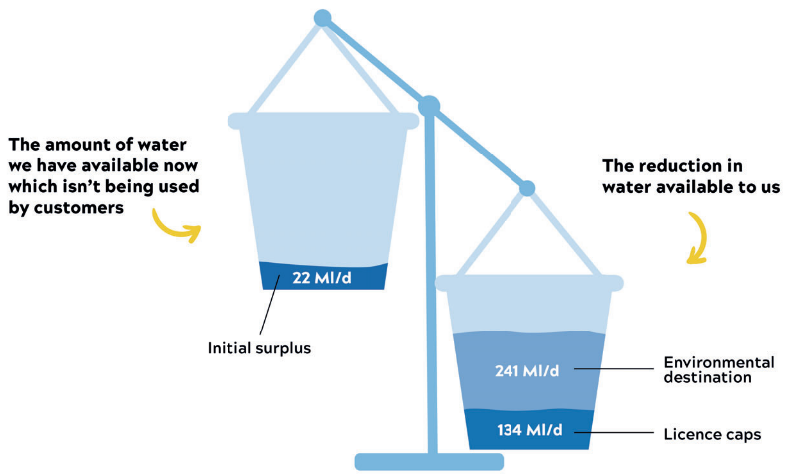
4.5.2.3 Approximately 90% of the environmental destination abstraction reductions impact groundwater sources as they are considered to be the main cause of deterioration to flow in our region, with surface water abstractions already having existing licence constraints such as Hands-Off Flow and Minimum Residual Flow.

4.5.2.4 The key areas identified as part of WRE's revised environmental destination scenarios are in the eastern side of our supply system: the Norfolk catchments, Cam and Ely Ouse, Essex and East Suffolk, as well as some sensitivity in Lincolnshire.

4.5.2.5 Please refer to the revised draft WRMP24 Sustainable abstraction technical supporting document, Section 7.

4.5.3 Total impact of environmental destination

Figure 27 The impact of environmental destination for WRMP24



4.5.3.1 Figure 27 shows that environmental destination, with the BAU+ scenario, means we will have 241 Ml/d less water available to use.

4.5.4 AMP8 WINEP informing our Environmental Destination

4.5.4.1 Although the initial environmental destination scenarios introduced by WRE have enabled abstractors, regulators and stakeholders to understand the types of interventions required to achieve varying degrees of sustainable abstraction, uncertainty persists over what the right solutions are for the region's environment. It is becoming apparent that reducing abstractions may not yield the anticipated positive outcomes.

4.5.4.2 That's why we will conduct a series of scientific investigations in AMP8 to really understand what our environment needs, ensuring we provide maximum environmental benefit whilst delivering low regret investments. This will also allow us to focus our attention on improving the environments that need it the most, rather than just implementing blanket abstraction reductions.

4.5.4.3 We are currently developing the scope of these scientific investigations with WRE, the Environment Agency and Natural England. We are expecting the investigations to include groundwater and surface water modelling, estuarine modelling, hydroecological modelling, and flood risk modelling. Pilot scale catchments will also be identified, allowing collaboration between abstractors and environmental groups.

4.5.4.4 We expect the results of these scientific investigations to determine our environmental destination for WRMP29, enabling us to prioritise our investments so we target the catchments that need the most help. It is anticipated that the investigations may highlight the need for abstraction reduction, river restoration and water quality schemes. Once these needs have been ascertained, WRMP29 will evaluate them, determining the size, location and type of supply-side solutions required to deliver the defined environmental destination.

4.5.4.5 Further detail can be viewed in the revised draft WRMP24 Sustainable abstraction and environment technical supporting document, Section 7.

4.6 1 in 500 years drought resilience

4.6.1 For WRMP19, we planned to be resilient to a 1 in 200 year level of drought by 2025; we are on track to deliver this. As part of WRMP24, in line with the National Framework and the WRPG, we must plan for an enhanced level of drought resilience, 1 in 500 year, to be achieved by 2039.

4.6.2 To determine the impact of achieving this enhanced drought resilience, the Atkins stochastic flow series has been used for estimating drought events, ensuring consistency with WRE and the inter-regional reconciliation process. From this Atkins data series, realistic 1 in 200 year and 1 in 500 year reference droughts have been selected. These selections were made through a ranking process that evaluated the effects of drought on each of the eight raw water reservoirs within our water supply system. Additionally, an analysis was conducted to understand the characteristics of these identified drought events.

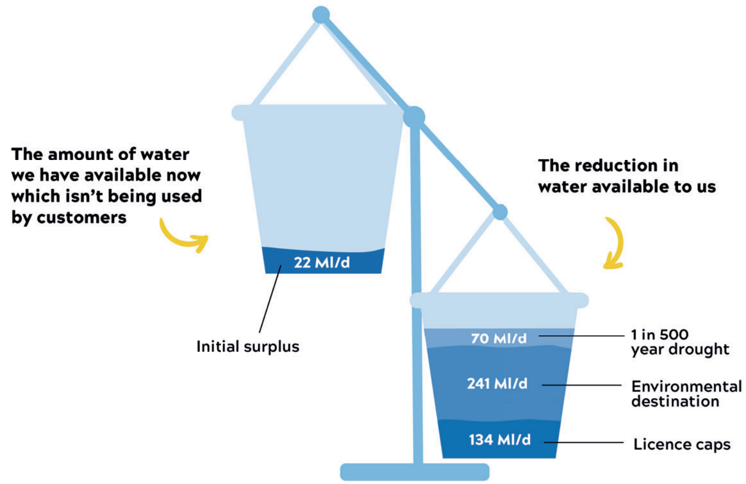
4.6.3 In order to assess the reliability of the selected reference drought scenarios, we collaborated with the MET Office to develop an additional weather generator known as AME, leading to the creation of an alternative set of hydrological data. These new data sets were subjected to analysis using AQUATOR, enabling us to conduct a comparative evaluation of the effects of our chosen reference droughts from the Atkins data series.

4.6.4 From this, we conclude that our adopted reference droughts are a pragmatic selection of regionally coherent, long-duration droughts, which rank amongst the most severe events in the weather generator drought libraries we have created with both Atkins and the Met Office. Sensitivity testing of more and less extreme 1 in 500 year events has also been included within the plan in the assessment of our Target Headroom allowance.

4.6.5 Further detail is available in Section 6 of the revised draft WRMP24 Supply Forecast technical supporting document.

4.6.1 Total impact of 1 in 500 year drought

Figure 28 The impact of 1 in 500 year drought in WRMP24



4.6.1.1 Figure 28 shows that moving to an enhanced drought resilience of 1 in 500 years will mean we have 70 Ml/d less water available to use.

4.7 Climate change impacts

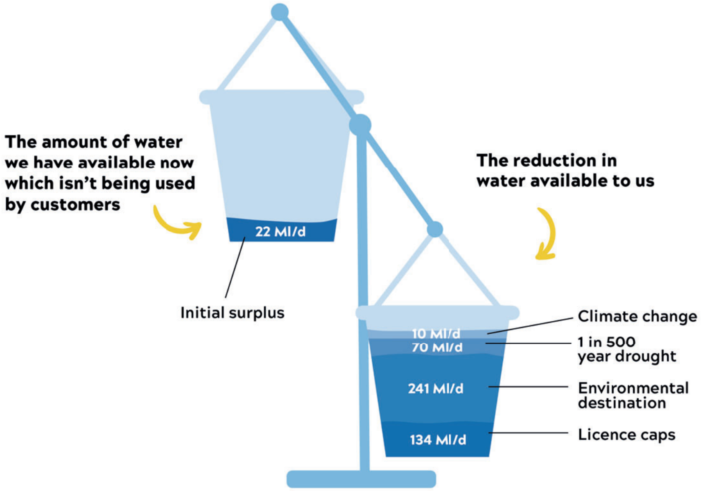
4.7.1 Our region is the driest and lowest lying in the UK, making it more vulnerable to the effects of climate change. To ensure an accurate assessment of these impacts, we conducted the most robust level of climate change assessment (Tier 3 in the WRPG supporting guidance) for our whole system.

4.7.2 For the modelling process, we used climate change projections based on UKCP18 through 12 bias-corrected Regional Climate Model (RCM) factors for RCP8.5. This modelling was carried out for the each WRZ within our system, with the results showing that the impact of climate change is dwarfed by the impact of the impact of licence changes and, to a lesser extent, the 1 in 500 year extreme drought.

4.7.3 For further information please refer to the revised draft WRMP24 Supply forecast technical supporting document, Section 7.

4.7.1 Total impact of climate change

Figure 29 The impact of climate change in WRMP"4



4.7.1.1 Figure 29 shows that climate change will mean we have 10Ml/d less water available to use.

5 The demand for water

In this section we will:

- Introduce the methodology used for the demand forecast.
- Highlight how strategic household and non-household growth could impact our region.
- Look at household trends.
- Provide a summary of the impacts of Covid-19 on demand.
- Show how growth will impact our supply demand balance.
- Give an overview of our baseline leakage and consumption figures.

5.0.1 Data from the Office of National Statistics (ONS) shows that, since the 2011 census, the East of England has experienced a population growth of 8.3%, the highest level in the UK. This is equivalent to an increase of approximately 488,000 additional residents.

5.0.2 In addition to this already significant growth, we are anticipating further demand in our region. This is led by more housing and population growth and despite an ageing population, and a reduction in the average household size. More houses and more people means an increase in the demand for our water and water recycling services.

5.0.3 The National Framework and the NIC have emphasised how important it is to understand the demand for water. We agree with this, which is why we have implemented our smart metering strategy to help us understand our network and customers' usage further.

5.0.4 To also increase our understanding of the demand for water, we have improved our water balance and demand forecast methodology for WRMP24. This has allowed us to integrate consumption forecasts for household and non-household properties, as well as our leakage and demand management options forecasts into a single unified system, as show in Figure 30. It has also helped us consider other impacts on water demand, such as:

- How water use behaviour will change in the future
- The changing design standards of water using devices
- Improvements in technology and practices for leakage detection and repair
- The impact of demand management options
- The effect of climate change and weather patterns
- Potential strategic growth, such as the Oxford Cambridge Arc
- The long-term impacts of Covid-19

Figure 30 The elements of the demand forecast

5.0.5 Full details of how the demand forecast is developed and used are available in the revised draft WRMP24 Demand forecast technical supporting document, Sections 3, 4, 5, 6 and 7. Additional information regarding our ambitious demand management strategy may be found in our revised draft WRMP24 Demand management preferred plan technical supporting document.

5.1 Peaking factors

5.1.1 We have produced our demand forecasts for dry year annual average and for the critical period. Dry year annual average demand is considered to represent a period of low rainfall and unrestricted demand, whilst the critical period forecast highlights short-term weather related variation. We have defined our peak period as any three days which relate to observed demand peaks.

5.1.2 We investigated the potential for using a seven day peaking factor on the basis that we may see longer periods of peak water consumption in the future. We have chosen to continue using a three day peak following discussions with our operational teams as it is more consistent with our peak supply forecast values.

5.2 Household customer forecasting

5.2.1 The WRPG states that forecasted population and property figures should be based, where possible, on local authority plans. As local plans are at different stages of publication, we commissioned a specialist demographic analysis company to engage with local authorities to determine their plans and ascertain projected growth in their respective areas.

5.2.2 This information was collected and household build trajectories produced for all of the 65 Local Authorities in our region. We have used plan based data for property development and plan based derivations of population have been generated for each Local Authority, based upon the revised household projections and trend derived occupancy rates (based on ONS data). As directed, we have also accounted for potential strategic growth in our region.

5.2.3 As local plans forecast to fifteen years in the future, ONS data has then been used to inform the time frame beyond this. This level of growth is lower than forecast by Local Authority Plans.

5.2.4 Further details regarding our housing plan projections can be found in the revised draft WRMP24 Demand forecast technical supporting document, Section 5.

5.3 Non-household forecasting

5.3.1 Non-household consumption accounts for approximately 27% of our overall demand. This demand is difficult to forecast due to lack of visibility of developers' plans as well as the variability of the wider socio-economic environment we operate in, which is in considerable flux.

5.3.2 In our region, non-household demand has been historically relatively stable, allowing us to accommodate new requests using available headroom. However, in 2023 alone there has been a large increase in requests for non-household demand: totalling over 30 megalitres a day of new water needed. This increased demand appears to have been driven by a multitude of factors including: the loss of businesses' own licences due to licence capping, the relocation of production due to factors such as Brexit, and the need for hydrogen and carbon capture, use and storage (CCU) to meet the UK's ambitious net zero goals.

5.3.3 We use a suite of projections for non-household demand for each year up to 2049/50 at the WRZ level. These projections are aligned with the population and property forecasts used for WRMP24, and characterised by geographic area and industrial sector.

5.3.4 Separate regression models have been produced at a WRZ level for each of the sectors, and company averages have been obtained by aggregating the outputs from these models. The calibration of each model has been based upon the appropriate selection of explanatory variables, such as numbers in employment or the level of economic activity, which most appropriately account for historical trends and variations in demand. The recent increase in non-household demand has exceeded historical trends and if higher levels of non-household demand are sustained then further capacity will be required. We are in discussion with Government and regulators regarding how best to manage future non-household demand.

5.3.5 Non-household population projections have been determined for all Local Authorities in our region using WRZ apportioned Census data. This includes estimates for residents in non-household properties such as hospitals, nursing homes and hotels. For WRMP24, we have estimated that it will show a similar growth trend to that shown for household population.

5.4 Strategic growth scenario development

5.4.1 Strategic growth areas are anticipated in our region, most notably with regard to the Oxford Cambridge strategic corridor. To capture and plan for this, strategic growth variants have been generated in alignment with Government expectations. These have also been aligned with participating companies in WRE and Water Resources South East (WRSE). Further details regarding this can be found in the revised draft WRMP24 Demand forecast technical supporting document, Section 5.

5.4.2 A low variant of this strategic growth has been used in our plan, reflecting our current understanding of Local Authority Planning development. We will continue to monitor this and remain adaptive in our future planning to allow for any changes.

5.5 Household trends

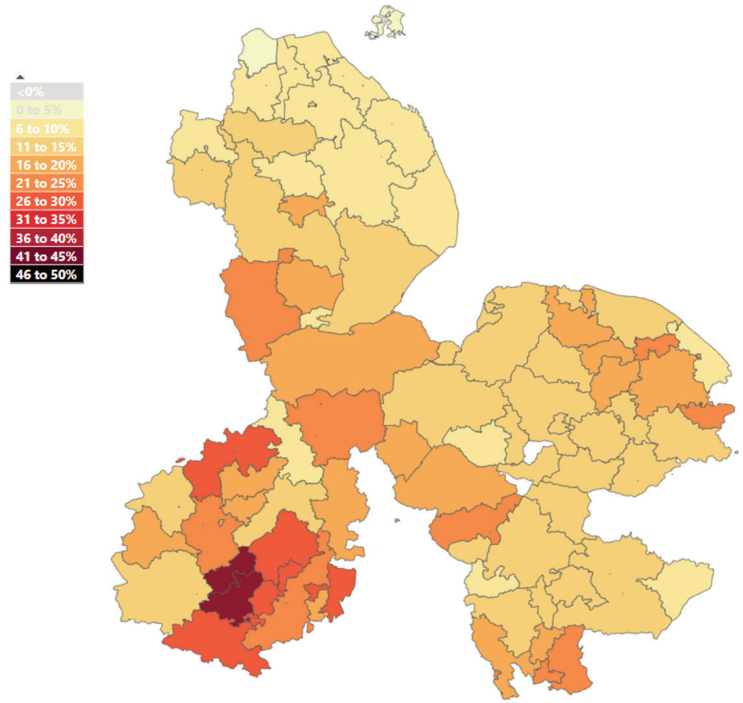
5.5.1 Using local authority plans followed by the ONS data, we are forecasting that our region's population will grow from 4.987 million in 2024/25 to 5.898 million in 2049/50: an increase of 911,000 people.

5.5.2 The highest level of growth between 2025 and 2050 is seen in our Ruthamford region, specifically:

- Milton Keynes (45%)
- Newton Pagnell (44%)
- Clapham (34%)
- Woburn (32%),
- Bedford (31%) and
- Corby (29%).

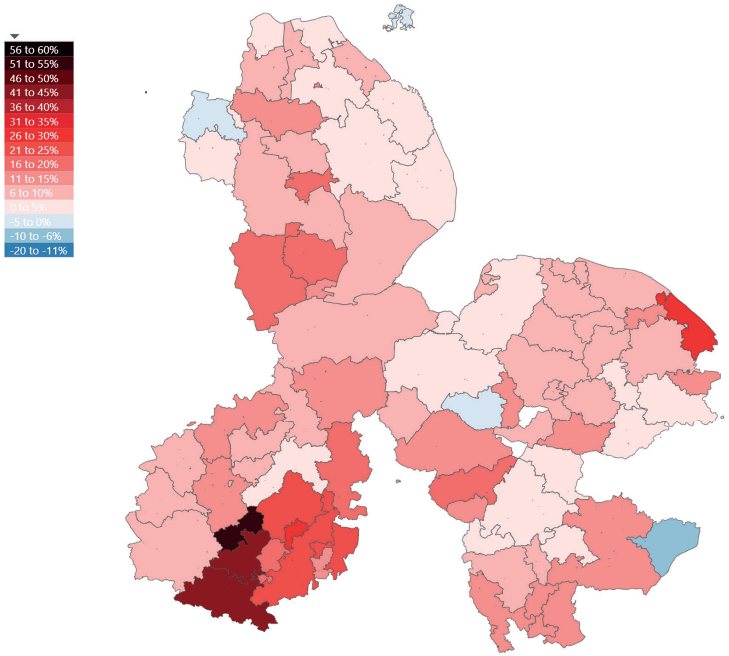
5.5.3 The lowest growth areas are seen in Hartlepool and Scunthorpe. A map of the population growth is shown in Figure 31

Figure 31 Population growth- % change from 2025-2050 (PZ detail)



5.5.4 These levels of growth will have a direct impact on the need for water, with it being anticipated that distribution input will increase from 1177.1 Ml/d in 2025 to 1312.7 Ml/d by 2050. This is highlighted in Figure 32 which shows the percentage change expected in water need, without the implementation of demand management, in the baseline demand forecast for 2050.

Figure 32 Baseline-DYAA- percent change in demand 2025-2050 (PZ level)



5.5.5 The increasing demand into our network also reflects reducing occupancy rates with it being expected that occupancy rates will decrease over the planning period with the lowest occupancy rates being seen in Norfolk Happisburgh, Norfolk Aylsham and the North Norfolk Coast. The highest rates are expected in Ruthamford Central, Essex Central and South Essex.

5.6 Non-household trends

5.6.1 We are forecasting that baseline non-household consumption will rise from approximately 304 Ml/d in 2024/25 to 337 Ml/d by 2049/50, a 11% increase.

5.7 The impacts of the Covid-19 pandemic

5.7.1 As the forecast baseline has been updated to 2021/22, a year in which Covid related habits were still prevalent, we have included a down lift factor as it is assumed that the impacts of the pandemic will subside.

5.7.2 We have not included a factor for non-household consumption as this returned to relatively normal levels through 2021.

5.8 Baseline leakage

5.8.1 To create our demand forecast, we assessed leakage using the methodology set by Ofwat in the reporting guidelines published during the PR19 process. This means that our calculated leakage level has increased compared to what was reported in WRMP19.

5.8.2 We continue to reduce leakage by recruiting additional resources to detect leaks. We also continue with our smart meter installation programme, enabling us to refine night-flow records in our forecasting processes.

5.8.3 We are projecting that our WRMP24 baseline leakage will be 163.8 Ml/d for 2024/25 and that this will reduce to 118.49 Ml/d by 2050. This represents a 38% leakage reduction from the National Framework base year of 2017/18, which was 191.3 Ml/d [37].

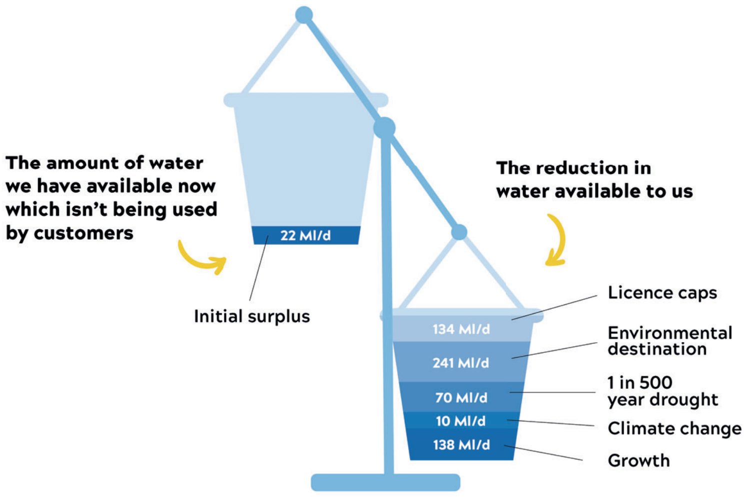
5.9 Baseline consumption

5.9.1 We achieved a household consumption of 658Ml/d in 2021/22. Using this as the base year for the forecast, household consumption is expected to be 657 Ml/d for 2024/25, with levels of household consumption at 768 Ml/d in 2049/50. After the implementation of demand management options, we anticipate that household consumption will be 635 Ml/d by 2049/50. This excludes Government-led interventions.

37 This includes the 15% leakage reduction projected for AMP7.

5.10 Impact of growth

Figure 33 The impact of growth in WRMP24

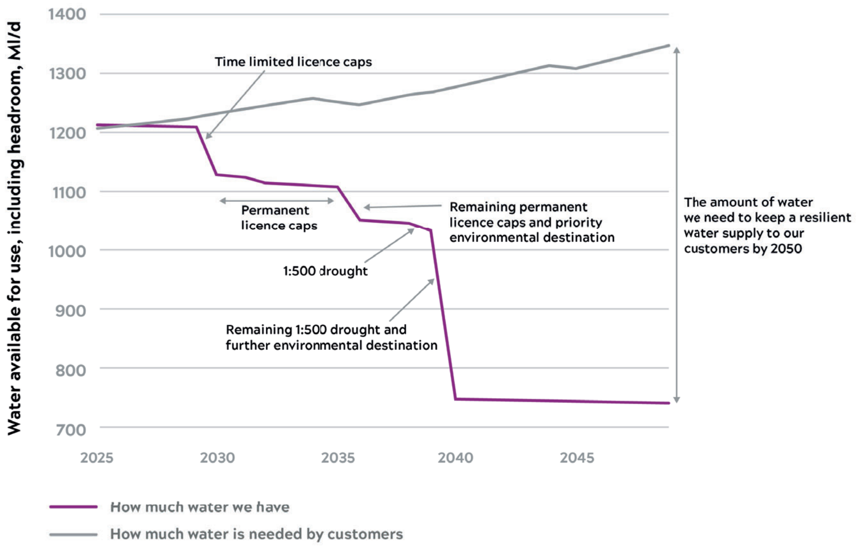


5.10.1 Figure 33 that growth will mean we have 138 Ml/d less water available to use by 2050.

6 Establishing the need for water

6.0.1 Bringing together the water we have available and the water our customers will need in Figure 34, shows the extent of our water needs over the next 25 years.

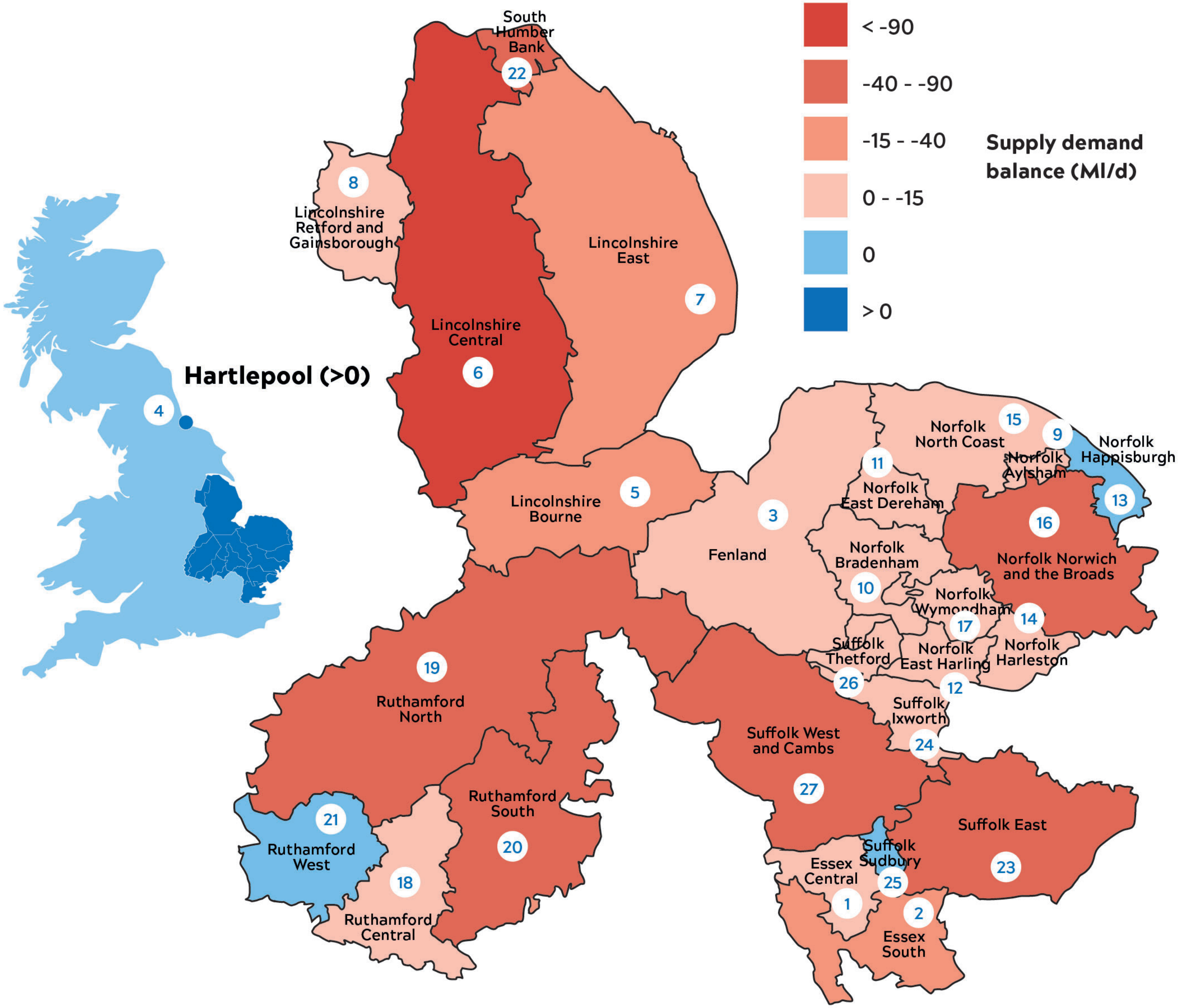
Figure 34 Our region's new water needs for 2025 to 2050



6.0.2 As can be seen, if we take no action, we won't be able to meet our region's water needs. This means our customers will not have a safe, resilient water supply, which is not acceptable. To determine how we could fulfil these needs, whilst achieving a best value plan, we conducted a demand management and supply-side options appraisal process, carrying out environmental assessments in parallel, which fed into our decision making.

6.0.3 How these individual challenges impacts our individual WRZs is shown on the next page. To summarise:

- Licence reductions and environmental destination are the key drivers of need in almost all of the 27 WRZs.
- Most non-impacted WRZs are supplied by surface water reservoirs.
- Almost all WRZs are impacted by growth.



WRZ		1	2	3	4	5
1	Essex Central	✓			✓	✓
2	Essex South	✓	✓	✓	✓	✓
3	Fenland	✓	✓	✓	✓	✓
4	Hartlepool				✓	✓
5	Lincolnshire Bourne	✓			✓	✓
6	Lincolnshire Central	✓	✓	✓	✓	✓
7	Lincolnshire East	✓			✓	✓
8	Lincolnshire Retford Gainsborough				✓	
9	Norfolk Aylsham	✓			✓	✓
10	Norfolk Bradenham	✓			✓	✓
11	Norfolk East Dereham	✓			✓	✓
12	Norfolk East Harling	✓			✓	✓
13	Norfolk Happisburgh	✓				
14	Norfolk Harleston				✓	✓
15	Norfolk North Coast	✓			✓	✓
16	Norfolk Norwich-Broads	✓			✓	✓
17	Norfolk Wymondham	✓			✓	✓
18	Ruthamford Central	✓				
19	Ruthamford North	✓	✓	✓		
20	Ruthamford South	✓	✓	✓	✓	✓
21	Ruthamford West	✓				
22	SouthHumber Bank	✓				
23	Suffolk East	✓	✓	✓	✓	✓
24	Suffolk Ixworth	✓				✓
25	Suffolk Sudbury	✓			✓	✓
26	Suffolk Thetford	✓			✓	✓
27	Suffolk West Cambs	✓	✓	✓	✓	✓

1 Growth
2 Climate change
3 1 in 500 year drought
4 Licence reductions
5 Environmental destination

(Grey shading) These WRZs do not contain their own water resources so challenges 2-5 are not relevant

7 Demand management option appraisal

In this section we will:

- Show how we developed our demand management options.
- Discuss our strategic portfolios, and why we develop these.
- Give an overview of our demand management options.

7.0.1 We have a strong track record of delivering demand management. It has enabled us to keep our demand relatively constant since privatisation in 1989 until the present day. We have achieved this by setting ambitious and demanding targets for reducing leakage in our network, as well as our high levels of metering. This, combined with our other sector leading demand management options such as water efficiency programme and smart meter rollout, has established a robust, integrated and deliverable demand management strategy that has delivered substantial savings.

7.0.2 We plan to continue this strategy for WRMP24, becoming more innovative to achieve further water savings. To achieve this, our plan is focused on unlocking the potential from our smart metering programme, as well as looking at initiatives that are relatively untested in the water industry in the UK.

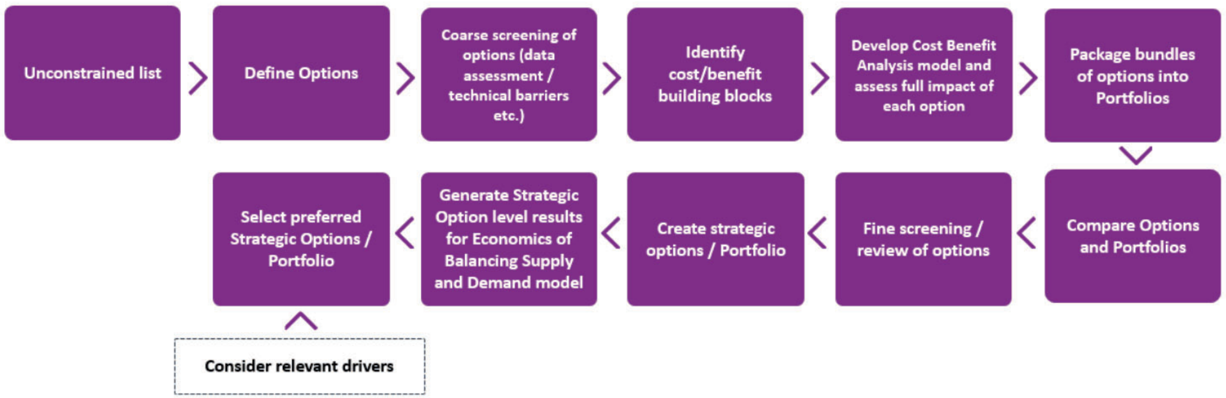
7.0.3 This section will set out how we have appraised these demand management options and how, due to the interconnected nature of demand management, we have built demand management portfolios.

7.0.4 For further information, please refer to the revised draft WRMP24 Demand management preferred plan technical supporting document and revised draft WRMP24 Demand management option appraisal technical supporting document.

7.1 Option development

7.1.1 A detailed option development process has been undertaken for our demand management options. An overview of this process is shown in Figure 36.

Figure 36 Demand management option appraisal process



7.1.2 Initially, an unconstrained list of demand management options was explored. This list drew upon current business practices within the water industry and abroad, other sectors' experiences of encouraging demand management and behaviour change, as well as opportunities provided by technology and innovation.

7.1.3 The unconstrained options were defined by our subject matter experts to determine if they were feasible options, and to assess their associated water saving benefit. From this process it was identified that options such as smart metering, the incentivisation of behaviour change, the use of smart devices, and implementation of leakage reduction should be progressed.

7.1.4 These feasible options were then developed further. For smart metering options, roll-out trajectories were defined, customer interaction and supporting technologies detailed and all associated installation, maintenance and back office costs noted. These findings were developed by our subject matter experts to become quantitative 'building blocks' to be included in a multi-criteria assessment. Examples of a quantified building block include the projected reduction in costs for customers as consumption is lower and the amount of money saved by reducing treatment and pumping costs due to lower distribution input.

7.1.5 As well as quantitative benefits, qualitative benefits were captured. Examples of these include leaving more water in the environment, improving resilience in our systems, and offsetting or mitigating the impacts of climate change.

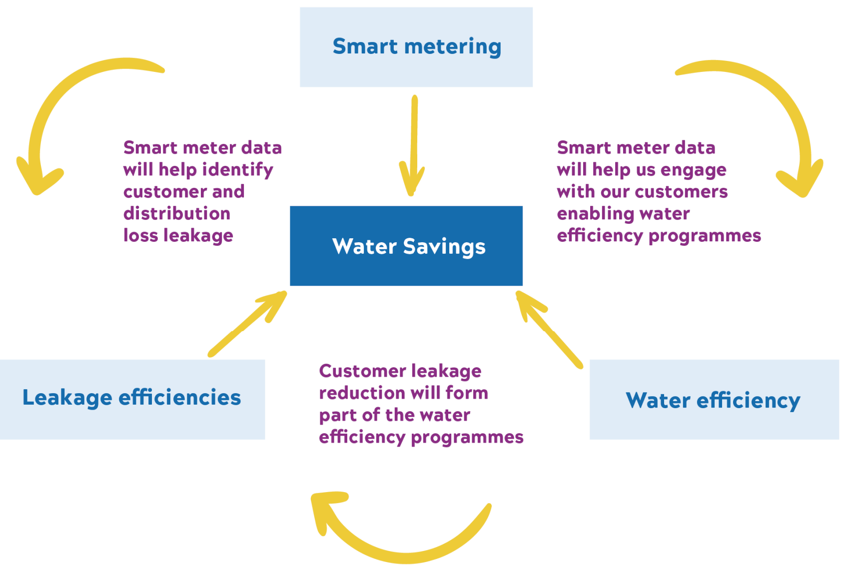
7.1.6 These building blocks were developed using our own data, expertise and experience, as well as published and unpublished information available to us through industry research groups and academic research. They will continue to be refined and reviewed as part of our demand management strategy and as learning progresses.

7.1.7 Cost categories and societal valuation information were also captured for each option. A full list of these can be referred to in the revised draft WRMP24 Demand management option appraisal technical supporting document, Sections 2 to 8.

7.2 Strategic portfolios

7.2.1 The feasible options were grouped into holistic strategic portfolios, consisting of a smart meter rollout, additional leakage reduction and water efficiency sub-options, as shown in Figure 37. These three strategic pillars of demand management complement each other, allowing us to maximise water savings.

Figure 37 The three pillars of our demand management portfolios



7.2.2 The different portfolios, built from the bottom-up at a WRZ geographic level, were then scrutinised, allowing our aspirations for WRMP24 to develop. As part of the iterative process, portfolios were then refined, to establish which of them would be taken forward for cost benefit analysis (CBA) and multi-criteria decision making. This decision making process is detail in Section

9 of this document, with further detail available in the revised draft WRMP24 Demand management option appraisal technical supporting document, Section 2 and 8.

7.3 Our demand management options

7.3.1 We explored a wide array of demand management options to ensure we remain at the forefront of demand management. An overview of the options taken forward into the strategic portfolios is given here, with further detail available in the revised draft WRMP24 Demand Management Option Appraisal technical supporting document.

7.3.1 Smart metering

7.3.1.1 We are well on our way to installing 1.1 million smart meters [38]by 2025. As part of the demand management options appraisal process, it was recognised that continuing the smart meter rollout would underpin our whole demand management strategy, facilitating:

- A 2% long-term consumption reduction, due to behavioural change, compared those on a visual metered/measured property.
- Improved engagement with customers, as they receive more accurate information in a timely manner, allowing them to better understand their water usage.
- More awareness of leakage on customers' supply pipes, as well as plumbing losses within their property. This awareness is achieved by analysing flow data to identify continuous flows and any unusual usage or spikes.
- Efficient meter reading, reducing the amount of vans on the road and carbon emissions.
- Optimisation of our network operations as we gain further understanding of consumption patterns.

7.3.2 Leakage options

7.3.2.1 We are determined to improve on our excellent record of leakage[39] reduction. We know it is a key priority for our customers, and it is for us too. We also know leakage reduction has the benefit of leaving more water in the environment, ensuring that habitats can flourish and be enjoyed by local communities.

7.3.2.2 As we are already industry leading for leakage reduction, the cost of furthering this becomes more significant as leaks become smaller and smaller. Whilst mains replacement is included as a demand management option, we also include state of the art thinking in WRMP24, for example the use of drone technology, so we can reduce our leakage further. We also use our smart meter rollout to promote a step change in detecting customer supply pipe leaks as indicated by continuous flows.

7.3.2.3 Other options considered include:

- New pressure management schemes
- Increased leakage 'find and fix' activity
- The replacement of shared supplies for household properties currently fed via a shared supply

7.3.3 Water efficiency measures

7.3.3.1 Using research conducted by the University of East Anglia on our behalf, we identified a number of options for water efficiency[40] as part of our demand management option appraisal process. These water efficiency measures include:

- the provision of smart water devices/shower sensors
- development of gamification and rewards schemes
- linking smart devices to hubs, developments and communities
- enhancing schemes to assist vulnerable customers with internal leaks
- using smart meters to highlight plumbing losses within the home

38 A smart meter is another name for an Advanced Meter infrastructure meter and its transmission network. These meters transmit data via a radio mast network, allowing hourly readings from the customer meter. Currently data up to the previous day is available for customers to view via our MyAccount website.

39 Leakage is how we describe the water that escapes from our pipes and our customers' pipes. Whilst we can experience significant bursts due to changing weather conditions (such as extreme hot or cold weather causing ground movement), the majority of leaks are difficult to find as they are of small volume.

40 Being water efficient means taking simple steps to reduce water usage, this could involve utilising water saving technologies or promoting behavioural change. Reducing water usage saves both energy and money for us and our customers, as well as retaining more water in the environment, protecting important aquatic flora and fauna.

7.3.4 Compulsory metering

7.3.4.1 As we are in an area of serious water stress, we have an obligation to consider the costs and benefits of compulsory metering[41]. The results from our customer engagement shows that customers are generally supportive of the principle of paying according to the amount of water used.

7.3.4.2 Ninety percent of our customers already have a meter fitted with 84% of customers (in 2022/23) paying measured charges; this means they pay according to what they use. Our current modelling projections indicate, even with our smart meter rollout, that we still have metered and unmeasured customers at the end of the WRMP24 planning period, if there is no further intervention such as compulsory metering. Those unmeasured customers tend to have a higher consumption, 174.77 l/h/d compared to measured customers who use, on average, 123.1 l/h/d.

7.3.4.3 The differences in usage are significant, albeit a small proportion of our customer base. Consequently, the investigation of compulsory metering and the implementation of assessed charges went forward as demand management options[42].

7.3.5 Tariffs

7.3.5.1 We reviewed the potential for applying alternative tariffs and price signals. The majority of household customers pay their water bill based on a simple two part tariff structure: a fixed charge and a uniform unit charge for volumetric usage.

7.3.5.2 In order to assess the feasibility of more complex tariff options to encourage reduced water usage, we commissioned the University of East Anglia Centre for Competition Policy to review the international experience of price and non-price approaches to manage water demand. This research suggested that certain pre-conditions must be met before the implementation of complex tariffs. These conditions include, but are not limited to:

- Customers need to be able to understand their consumption and engage positively in managing their demand, otherwise introducing tariff changes may have, unintended, adverse consequences both to customer bills and to demand.
- Access to near real-time information is key to informing the customer of the relationship between usage and cost, and thus, the impact on bills of particular behaviours.

7.3.5.3 It was also highlighted that tariffs and price differentials would need to be implemented fairly, so that no group of customers would be discriminated against, and there would need to be consideration of particular demographic groups and vulnerable customers in the implementation of any tariff structures.

7.3.5.4 Following on from research, tariffs were considered as demand management options. These options include block tariffs[43] which could be used to balance affordability and water efficiency, by promoting lower charges for those who use less water. This could also emphasise our messaging on water conservation, promoting behavioural change.

7.3.5.5 Seasonal[44] tariffs were also considered as part of the demand management options appraisal. The aim of a seasonal tariff is to target and reduce the higher discretionary use of water that occurs in the summer. Additionally, seasonal tariffs should help to signal the importance of water resource issues.

7.3.6 Non-household demand

7.3.6.1 Non-household consumption accounts for 27% of overall demand in our region, so it is crucial that retailers and wholesalers implement demand management options to improve water efficiency. However, the relationship between wholesalers, retailers and non-household customers is complex.

7.3.6.2 As part of the demand management options appraisal process, we worked with our fellow companies in WRE to engage with regional retailers and non-household customers to determine their appetite for water efficiency and to gain an understanding

41 Where all customers metered or feasibly metered pay on the basis of the amount of water used.
42 This means that remaining customers would be charged based on an assessment of likely water use determined from a survey of the property.
43 Block tariffs are where different unit prices are charged for pre-specified blocks (quantities) of water used by the consumer. An increasing block tariff (IBT) is where the unit price increases with each successive block of consumption.
44 This would see measured households having a lower volumetric cost for water during winter and higher charges during summer.

of what they saw as the barriers to achieving it. We then progressed, over a multi-stage process, to co-create non-household demand management measures. These include:

- Measures to reduce customer supply pipe leaks, based on the provision of smart meter data[45] .
- Measures to reduce leakage from internal plumbing losses, based on the provision of smart meter data will allow retailers to have the data needed to drive this water efficiency, and further potential incentives such as leaky loo 'find and fix'.
- Assistance and incentivisation, conducted through water efficiency audits, with potentially the retrofitting of water efficient devices.
- The provision of information, scheme design and/or consultancy support to introduce water recycling/water reuse (grey/green/black).
- Incentives and rebates for water consumption reduction; these could potentially be linked to other utilities.

7.3.6.3 Further information on these non-household options is available in the revised draft WRMP24 Demand management preferred plan technical supporting document, Section 9 and the revised draft WRMP24 Demand management options appraisal technical supporting document, Section 6.

45 Our smart meter rollout includes non-household customers. The implementation of smart metering will provide retailers necessary to facilitate water efficiency and leakage reduction, in a manner similar to our three pillar household strategy.

8 Supply-side option appraisal

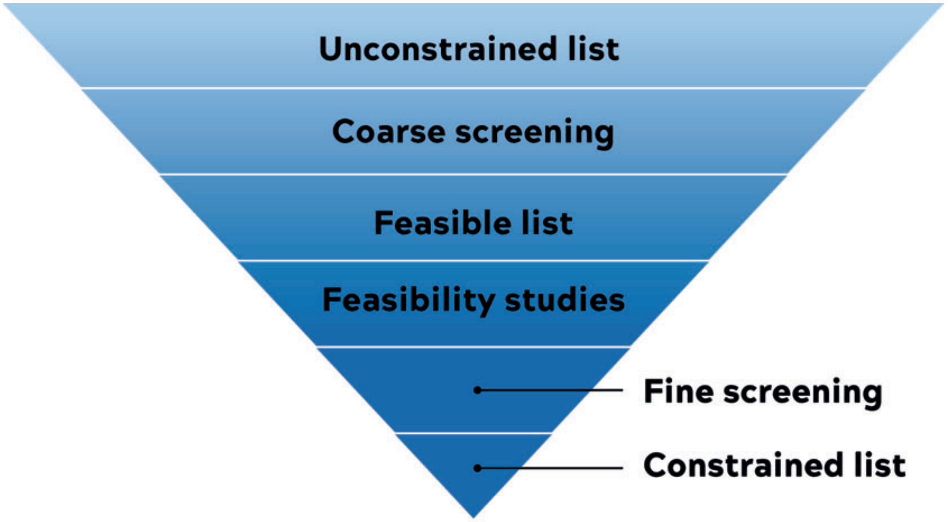
In this section we will:

- Describe the supply-side option development process.
- Discuss our strategic regional options.
- Provide an overview of the supply-side options available to us.

8.1 Supply-side option development process

8.1.1 We completed a rigorous appraisal of available supply-side options. As the amount of water we take from the environment is reducing, we have explored sustainable ways of supplying water, mindful of environmental impacts. The process we use for this is shown below in Figure 38.

Figure 38 The supply-side option development process



8.1.2 Further information is available in the revised draft WRMP24 Supply-side option development technical supporting document, Sections 2 to 6.

8.1.3 The supply-side options have been developed following the framework set out in UKWIR Guidance on decision making processes and the WRPG.

8.1.1 Unconstrained options and coarse screening

8.1.1.1 For the first stage of the process, the unconstrained list, we compiled a list of all possible options that could reasonably be used in our plan. These options could have environmental or planning issues but are technically feasible. Resource sharing with other water companies and third party trading are also present in the unconstrained list. A small number of options were also received through the market information platform.

8.1.1.2 These unconstrained options, after an initial pre-screening, were tested against our coarse screening criteria. This coarse screen also included an initial environmental assessment, designed to identify environmental risks and constraints. The Environment Agency's Catchment Abstraction Management Strategies (CAMS) were considered at this stage, to determine if surplus water was available.

8.1.1.3 The results from the coarse screen identified whether the option needed to be refined (e.g. altering a transfer route), rejected or progressed to the feasible list. Of the 1529 unconstrained options, 307 options[46] progressed to the feasible stage.

8.1.1.4 The number of feasible options has been constrained by abstraction reform. There is little surplus water available, resulting in limited opportunity for licence trading or to develop traditional sources.

46 Please note that some of the options are the same supply-side option but a different size to allow the decision making process to select the optimal solution.

8.1.2 Feasible screening

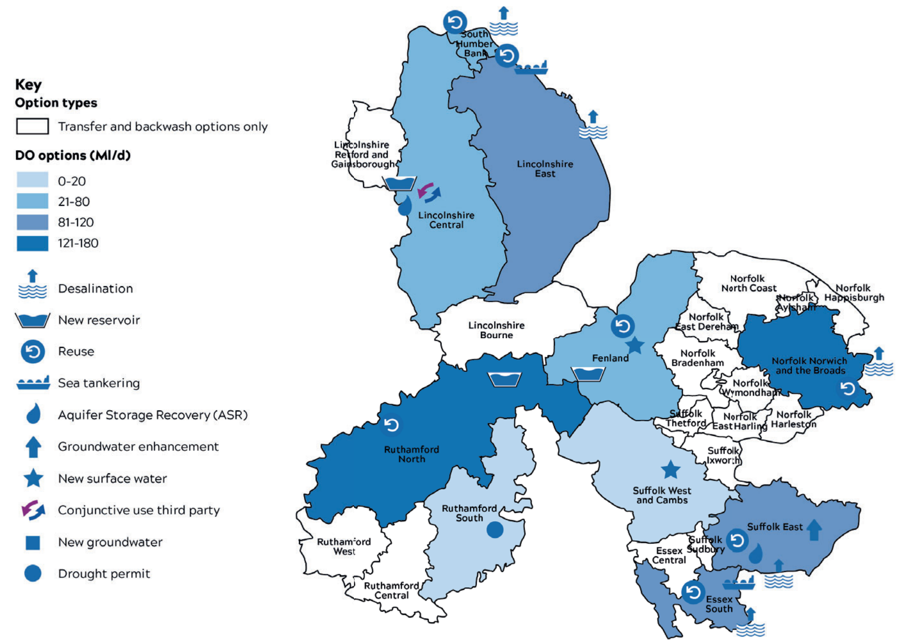
8.1.2.1 Options that progressed past coarse screening were subject to a suite of feasibility studies to ensure their technical feasibility and understand their potential impact to the environment. Stakeholder engagement was also key to this process.

8.1.2.2 Fine screening was then undertaken on this feasible list, producing a constrained list that went forward to modeling. The supply-side option types taken forward to the constrained list included:

- Aquifer storage recovery (ASR)
- Backwash recovery
- Bulk/intra company transfers of treated water
- Conjunctive use- 3rd party
- Desalination
- Drought permit
- Groundwater sources
- New reservoir
- New surface water
- Sea tankering
- Water quality schemes increasing deployable output
- Water reuse

8.1.2.3 The constrained supply-side options. excluding the transfers, are mapped onto the WRZs they are in Figure 39, with an indication of the possible deployable output available. The white depicts WRZs with no supply-side options present in them, indicating they would need to be supplied from transfers from other WRZs.

Figure 39 Amount of DO available from new supply-side options in each WRZ



8.1.2.4 A high level overview of the supply-side options in the constrained list is now provided. For detailed information on this process, and the options on the constrained list, please refer to the WRMP24 Supply-Side Option Development technical supporting document.

8.2 Strategic Resource Options

8.2.1 Two supply-side schemes, the Fens and Lincolnshire reservoirs, have been progressed through the RAPID gated process, recognising the need to plan long term for our region's future water needs. These are raw water storage reservoirs that take surplus water when available in the environment, storing it until needed by customers. These schemes featured prominently in WRMP19.

8.2.2 Both reservoirs are classed as Nationally Significant Infrastructure Projects (NSIP), so will require a Development Consent Order (DCO). We are currently developing construction timelines for these projects, but it is expected that both reservoirs' DCOs will be applied for in 2026.

8.2.3 With the SRO programme running in parallel to the development of the revised draft WRMP, interim data has been used, where appropriate, for the SRO schemes (post Gate 2). This interim data includes a review of the available sources of supply for each reservoir and an update to the assessment of yield, reflecting new hydrological data based on the stochastic droughts we use to forecast 1:200 and 1:500 drought impacts.

8.2.4 Further information on these reservoirs can be found in WRE's Regional Plan[47], the RAPID Gate 2 submissions for Fens and Lincolnshire reservoirs[48], and their websites[49].

8.2.1 Lincolnshire Reservoir

8.2.1.1 The Lincolnshire Reservoir was introduced into the RAPID gated process by both Anglian Water and Affinity Water, with the original solution including a transfer of up to 100 Ml/d of water from the reservoir to the Affinity Water (central) supply area. Through regional modelling and best value assessment at both WRE and WRSE level, it has been concluded that this transfer did not represent best value for customers. Consequently, Affinity Water has pursued other SROs, ceasing to be a project partner on the Lincolnshire Reservoir at Gate 2 of the RAPID process[50].

8.2.1.2 The Lincolnshire Reservoir is a 55 MCM raw water storage reservoir, with a usable volume of 50 MCM. There are three possible sources being assessed for the reservoir; these are the:

- **River Trent** which has significant water availability and provides a highly climate resilient source for the Lincolnshire Reservoir, in support of the Witham source. It is proposed to transfer, either by pipeline or open channel transfer from the Trent to the Witham at times when it is not possible to abstract from the Witham itself.
- **River Witham** catchment serves as an important source in its own right, in addition to its function as a transfer route to bring water from the Trent to the reservoir. A pipeline transfer from the Witham to the reservoir is being assessed, alongside an open channel transfer via the South Forty Foot Drain.
- **South Forty Foot Drain** is being considered as a potential additional source to supply the reservoir given its proximity, and potential function as a transfer route for water from the Witham.

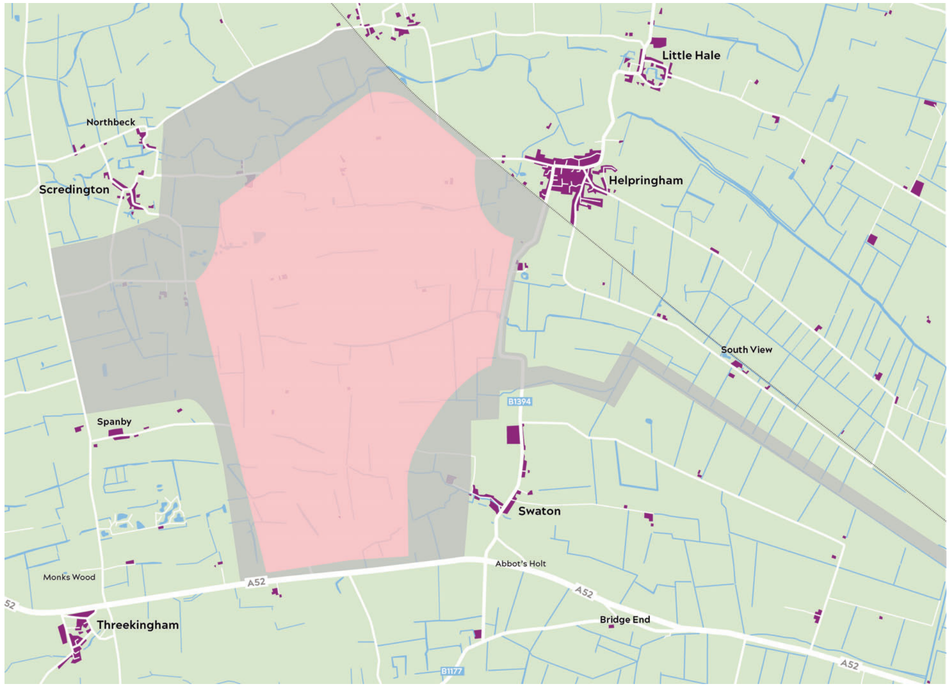
8.2.1.3 Following a comprehensive site selection process, including the application of a sequential, risk-based approach to development and flood risk (as set out in the National Planning Policy Framework)[51], the best performing site location for the reservoir was identified as being approximately seven kilometres southeast of the town of Sleaford, between the settlements of Swaton, Scredington and Helpringham. This area, covering about five square kilometres, is depicted in pink in Figure 40 below, and is

47 https://wre.org.uk/projects/the-regional-plan/
48 https://www.ofwat.gov.uk/regulated-companies/rapid/,
49 https://www.fensreservoir.co.uk/ andhttps://www.lincsreservoir.co.uk/
50 This decision has not impacted the size or design of the Lincolnshire Reservoir, with regional and company decision making showing that the full output of the reservoir is required within the WRE region.
51 The approach is designed to ensure that areas at little or no risk of flooding are developed in preference to areas at higher risk of flooding. Application of the sequential approach in the plan-making process, in particular application of the Sequential Test, steers new developments to be built within Flood Zone 1 (areas with a low probability of river or sea flooding) ahead of Flood Zone 2 (areas of medium probability of river or sea flooding) or as a last option Flood Zone 3 (areas of high probability of river or sea flooding).

dominated by arable farmland and small isolated blocks of woodland. Land use includes a mix of residential properties, businesses and agricultural holdings.

8.2.1.4 We anticipate that there will be development associated with the reservoir, such as habitat creation and educational centres; the land that could be used for such development is shown in grey on Figure 40. The detailed plans for this area will be developed in consultation with local communities, homeowners, landowners and other local stakeholders.

Figure 40 The best performing site for Lincolnshire Reservoir



8.2.1.5 Further detail on the site selection process and our proposals are available at www.lincsreservoir.co.uk, as well as the public consultation that occurred between October and December 2022.

8.2.1.6 It is expected that the reservoir's construction will take ten years, including time for commissioning. This timescale is driven by the construction of the reservoir and embankment, which is largely weather dependent as earthworks are most efficiently constructed in dry weather.

8.2.1.7 This means the earliest the Lincolnshire Reservoir will be available to use is 2039. Once in supply, it is expected that the associated water treatment works will supply 169 Ml/d of water to 500,000 customers in Lincolnshire, as well as connecting into our existing network in the south-west of region, through a new transfer from Peterborough to Grafham.

8.2.2 Sizing and yield of Lincolnshire Reservoir

8.2.2.1 As part of the development of Lincolnshire Reservoir, a volumetric sizing exercise was undertaken. This included four different sizes: 25 MCM, 50 MCM, 75 MCM and 100 MCM with 10% dead storage for each (for example the 50MCM reservoir would have an actual volume of 55 MCM). For this exercise, all the reservoir sizes share the same footprint and the change in volume is achieved by adjusting the embankment height and associated borrow pit to achieve a cut and fill balance. Each reservoir size was modelled to determine total yield, as shown in Table 6 below.

Table 6 An overview of the Lincolnshire Reservoir options that progressed to modelling

Reservoir size (MCM)	Total yield (Ml/d)	Estimated earliest year in service	Proportion to Anglian Water
25	105	2038	100%
50	169	2039	100%
75	195	2041	100%
100	214	2046	100%

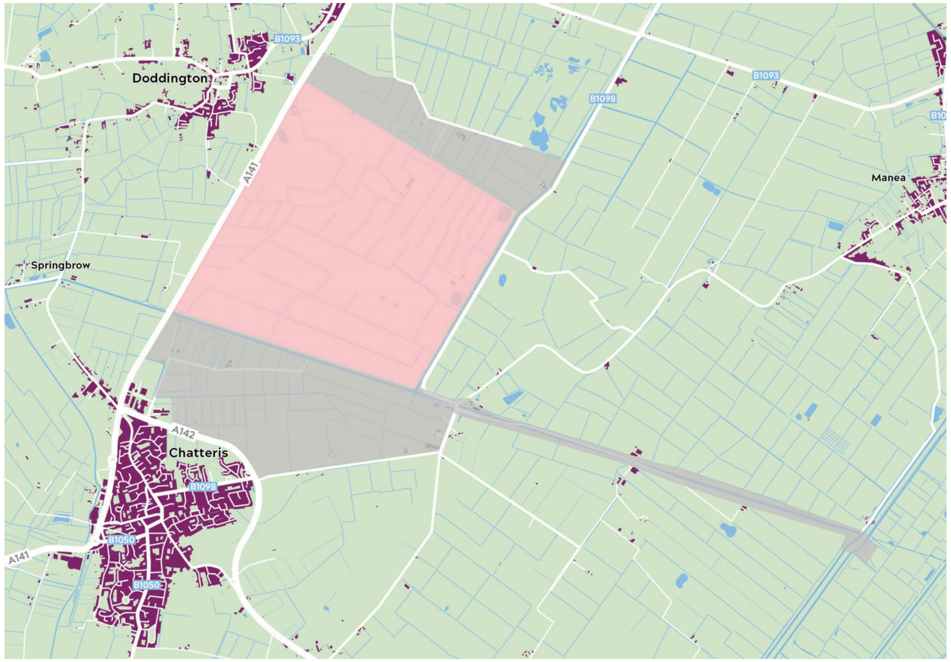
8.2.3 Fens Reservoir

8.2.3.1 Anglian Water and Cambridge Water[52] are working together to progress the Fens Reservoir, a 55 million cubic metres (MCM) raw water reservoir. with a useable volume of 50 MCM. There are five possible sources of supply to fill Fens Reservoir; these are the:

- **Middle Level** which will provide the primary source of water via the Sixteen Foot Drain (or the Forty Foot Drain) adjacent to the reservoir site, when water is available. If required, due to level constraints, water will be transferred to the Middle Level from the other available sources to the reservoir, described below.
- **River Nene (Stanground)** which feeds the Middle Level at Stanground via the King's Dyke throughout the year. It may be proposed to improve the capacity of this transfer and channel, if required, to enable additional transfer from the River Nene, when water is available.
- **River Great Ouse (Earith)** is being assessed as a transfer option involving either a pipeline to the reservoir or a combination of pipeline and open water transfers to the Middle Level system.
- **Counter Drain (Nene) i**s expected to provide a resilient yield to supply the reservoir. The Nene Counter Drain currently discharges to the tidal River Nene, downstream of the Dog-in-a-Doublet. Subject to ongoing assessment of water availability and quality, available water could be discharged into the fluvial Nene and transferred to the reservoir via the connection to the Middle Level.
- **Ouse Washes (River Delph)** is located in close proximity to the reservoir and is regularly flooded with water diverted from the River Great Ouse at Earith. This potential source option involves a proposed transfer from the River Delph at or nearby Welches Dam, and improvements to the Forty Foot Drain to transfer water into the Middle Level system.

8.2.3.2 Following a comprehensive site selection process, including the application of a sequential, risk-based approach to development and flood risk[53] the best performing site location for the reservoir was identified within the Fenland district of Cambridgeshire. The proposed site is between Chatteris and March, near to Doddington, Wimblington and Manea. This area, covering about five square kilometres, is depicted in pink in Figure 41 below, and is dominated by arable fields of varying sizes, interspersed with drainage ditches, with minimal tree cover. Land use includes a mix of residential properties, businesses and agricultural holdings.

Figure 41 The best performing site for Fens Reservoir



52 To reflect this 50:50 partnership, the costs and benefits for Fens reservoir has been modelled on a proportional basis. This has been based on a 50% share for reservoir options with a total yield of less than 100 Ml/d. For options providing more than 100 Ml/d, it has been agreed that Cambridge Water would require 50 Ml/d with Anglian Water utilising the rest of the yield.

53 The approach is designed to ensure that areas at little or no risk of flooding are developed in preference to areas at higher risk of flooding. Application of the sequential approach in the plan-making process, in particular application of the Sequential Test, steers new developments to be built within Flood Zone 1 (areas with a low probability of river or sea flooding) ahead of Flood Zone 2 (areas of medium probability of river or sea flooding) or as a last option Flood Zone 3 (areas of high probability of river or sea flooding).

8.2.3.3 We also anticipate that there will be development associated with the reservoir, such as habitat creation and educational centres; the land that could be used for such development is shown in grey on Figure 41. The detailed plans for this area will be developed in consultation with local communities, homeowners, landowners and other local stakeholders.

8.2.3.4 The construction programme for the reservoir is estimated to be eight years, including time for commissioning. This timescale is driven by the construction of the reservoir and embankment, which is largely weather dependent as earthworks are most efficient in dry weather.

8.2.3.5 This means the earliest the Fens Reservoir will be in supply is 2036. Once in use. it is expected that the associated water treatment works supply up to 44.4 Ml/d of potable water through new mains to over 125,000 Anglian Water customers in Cambridgeshire and Norfolk via a connection into our network at Bexwell. The remaining 44.4 Ml/d will aid Cambridge Water, reducing abstractions from the sensitive environments in their area (yield as shown in Table 8).

8.2.4 Sizing and yield of Fens Reservoir

8.2.4.1 We conducted a volumetric sizing exercise to determine the size of Fens Reservoir, with four different sizes compared: 25 MCM, 50 MCM, 75 MCM and 100 MCM with 10% dead storage for each (for example the 50MCM reservoir would have an actual volume of 55 MCM). For this exercise, all the reservoir sizes share the same footprint and the change in volume is achieved by adjusting the embankment height and associated borrow pit to achieve a cut and fill balance.

8.2.4.2 For the RAPID Gate 2 submission, the yield was based on abstraction from the Ouse Washes (River Delph) and River Great Ouse (Earith). For revised draft WRMP24, the yield from the Gate 2 sources and the Middle Level (the low yield options) were assessed for the different sizes of reservoir. The results of this hydrological modelling are shown in Table 7 below. These were progressed into the EBSD model.

Table 7 An overview of the low yield options according to differing sizes of reservoir

Reservoir size (MCM)	Total yield (Ml/d)	Estimated earliest year in service	Proportion to Anglian Water
25	54.0	2036	50%
50	77.1	2036	50%
75	100.1	2039	50%
100	122.8	2042	59%

8.2.4.3 We also modelled abstraction from the Middle Level, River Nene, Counter Drain (Nene), as well as Earith (the high yield options). These yields, and respective reservoir sizes, are shown in Table 8 below.

Table 8 An overview of the high yield options according to differing sizes of reservoir

Reservoir size (MCM)	Total yield (Ml/d)	Estimated earliest year in service	Proportion to Anglian Water
25	66.1	2036	50%
50	88.8	2036	50%
75	111.1	2039	55%
100	130.5	2042	62%

8.2.4.4 We will continue to assess and optimise the potential abstractions from these sources throughout RAPID Gate 3 and beyond, so have also considered the possibility of having a combination of higher yielding sources; these have been subject to sensitivity testing as detailed in the revised draft WRMP24 Decision making technical supporting document, Section 7.

8.2.5 Benefits of the reservoirs

8.2.5.1 Fens and Lincolnshire reservoirs have the potential to bring great benefit to our region. Aside from fulfilling approximately 40% of our region's new water needs by 2050, the reservoirs will deliver benefits related to biodiversity, recreation, health and wellbeing; all objectives in our best value plan framework. We also believe, subject to funding, discussion and support from working with partners across the region, significant wider benefits could be delivered for the economy, agriculture and industry.

8.2.5.2 Whilst we continue to develop the potential benefits that the reservoirs could bring to the region, an external review has identified a wide range of benefits associated with reservoirs. The review found the benefits are summarised below:

- Reservoirs have the potential for many recreational benefits due to their provision of 'green space' (i.e. walking paths, meadows) and 'blue space' (the reservoir), with these spaces hosting a breath of recreational activities such as sailing, swimming, or walking. The level of recreational benefits will vary according to the current recreational opportunities within the surrounding area of the reservoir.
- Health benefits are associated with reservoirs with public access and recreation facilities as access to the outdoors provides opportunities for activity, improving physical health. These outdoor areas also have the opportunity to improve mental wellbeing, providing people with the opportunity to participate in shared social activities, providing a sense of belonging.
- Access to reservoirs can provide educational benefits for members of the public. This could be in the form of formal educational benefits, such as hosting school trips, public events and classes, or through informal visits which stem from visitors undertaking their own exploration and investigation of surroundings.
- Reservoirs could provide an agricultural benefit, increasing the availability of water for irrigation whilst also mitigating flood risk which could impact nearby agricultural areas.
- Local areas can prosper from reservoirs as visitors are likely to spend money in the local area, whether that be the local pub or visiting another attraction on the way home. Local suppliers and businesses can also benefit from running or providing goods to onsite facilities.

8.2.5.3 We have also estimated, based on initial economic impact assessment, that reservoir development and construction has around 30% greater potential for localised employment opportunities and economic activity compared to desalination. This is because it is expected there would be a lower need to recruit staff and other specialists from elsewhere in the country or abroad.

8.2.5.4 Our current reservoirs provide many benefits including: watersports, cycling, walking, and fishing. There are also opportunities to relax, whether that be at one of the beaches we have created or in a cafe whilst enjoying the nature and wildlife that our reservoirs host; some of them are even designated sites.

8.2.5.5 The reservoirs form a key part of the multi-agency Future Fens: Integrated Adaptation initiative https://www.anglianwater.co.uk/community/wisbech-regeneration/future-fens/. This is sharing knowledge, resources and ambition, to create an integrated approach to water management for the Fens that will deliver resilience and adaptation to the changing climate. It will help unlock economic growth, new housing projects and improved transport links, as well as benefiting nature, tourism and long term food security.

8.3 Water reuse

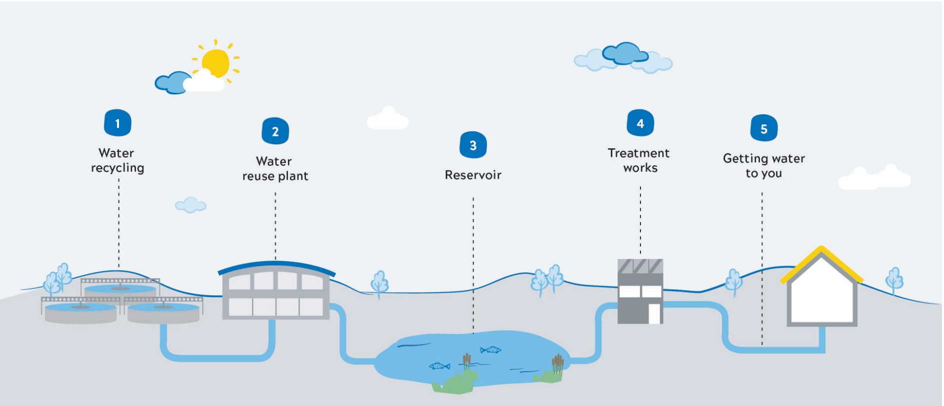
8.3.1 Utilising the resource we already have is important to us so we instigated a study to determine which of our 1000+ WRCs could be suitable for water reuse options. The criteria we used to determine the suitability of a WRC's effluent were:

- It should be able to provide a meaningful output. Due to advanced water reuse treatment, the process losses could be around 30% of the inlet flow rate. All WRCs with a licensed Dry Weather Flow of under 10 Ml/d were rejected on this basis.
- The flow from WRCs can support river flow so we needed to ensure any development of a scheme would not deprive

sensitive rivers of flow. Any sites identified through CAMS as supporting river flows were removed.

8.3.2 When assessed against these criteria the number of viable WRCs reduced significantly. We then explored water reuse options with different process configurations, as well as varying locations for the water reuse discharge to the environment. These discharge locations included both reservoirs and rivers. An example of a discharge to reservoir is shown in Figure 42.

Figure 42 Water reuse via reservoir



8.3.3 Following discussions with the Drinking Water Inspectorate, the Environment Agency and Natural England, we removed options that transferred cleaned water via a river from our modelling and focused on using reservoirs as the receptors for the cleaned water. The water reuse options discharging into rivers were removed because:

- Directing water reuse via river, in some cases, resulted in excessively long pipelines and higher carbon.
- It is difficult to quantify how much water would be lost if water reuse was put into a river, with the aim of abstracting again to reservoir.

8.3.4 Further detail is available in the revised draft WRMP24 Supply-side option development technical supporting document, Section 6 and Appendix B.

8.3.1 Benefits of water reuse

8.3.1.1 A review of the benefits of water reuse, undertaken alongside analysis of the benefits of reservoirs and desalination, found that:

- Water reuse can offer significant environmental benefits, providing a sustainable alternative to conventional water supply options.
- Its treatment processes can be energy intensive. But, whilst higher than reservoir energy demands, they are less than desalination.
- The discharge of water reuse could have positive effects on habitats.
- The implementation of water reuse could reduce dependence on freshwater sources, ensuring resilient water supplies.
- Water reuse could be utilised by other industries for irrigation purposes, or other non-potable use.

8.4 Desalination

8.4.1 We evaluated our coastline and estuaries for feasible desalination locations. From this evaluation, three types of desalination were identified:

- Coastal: an onshore desalination plant with a separate intake and outfall to sea.
- Estuarial (brackish): a desalination plant located at an estuary with a separate intake and outfall to the estuary system. These options typically need a balancing pond to allow for variability in tidal movements.
- Floating: a desalination plant located on a barge in the sea, with the water piped inland.

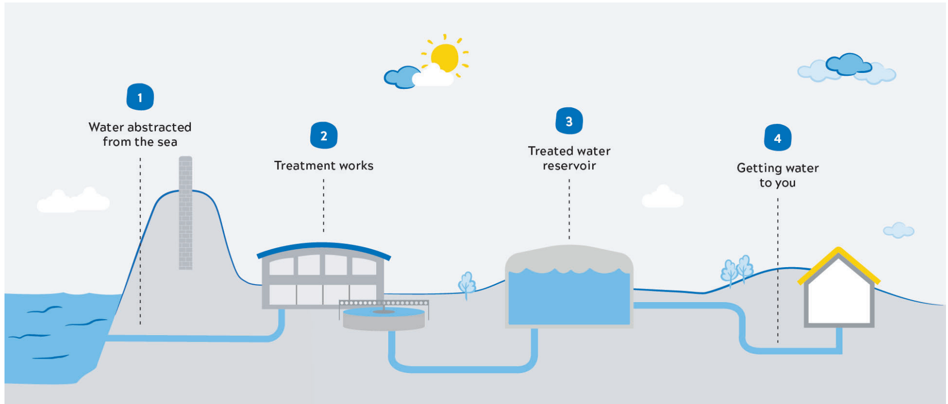
8.4.2 It was identified, as part of the options identification process, that some of these desalination options contain a conjunctive use element, allowing for the possibility of working with another party to share water.

8.4.3 These unconstrained desalination options were subject to further screening, determining water depth and environmental designations. Following on from this further assessment and discussions with regulators and desalination operators, it was identified that seawater desalination was preferable to estuarial (brackish), due to the variable water quality associated with tidal movements.

8.4.4 Floating water desalination was also rejected as we concluded that there were residual risks associated with these options that would be complex to resolve and, whilst this didn't make the options technically unfeasible, they demonstrated no benefit over the onshore equivalent options.

8.4.5 An example of a coastal desalination process is shown below in Figure 43.

Figure 43 Seawater desalination process



8.4.6 Further detail is available in the revised draft WRMP24 Supply-side option development technical supporting document, Section 6 and Appendix A.

8.4.1 Benefits of desalination

8.4.1.1 An independent review of existing desalination plants found the following socio-economic benefits:

- There is the potential for economic opportunities around brine.
- Desalination could be delivered in tandem with renewable energy initiatives. This could negate against some of the negative impacts of its intensive energy use and establish new sustainable industry in places.

8.5 Transfers

8.5.1 An unconstrained list of transfer options was developed from the WRMP19 list, with consideration given to the strategic pipeline currently being constructed.

8.5.2 Additional routes were also identified through internal workshops with operational teams, alignment with the WRE options set and any needs highlighted by the modelling process.

8.5.3 The transfers were then developed using a route optimisation tool which aims to minimise the capital and total expenditure of a transfer route, as well as avoiding key land use and environmental constraints. This is achieved by evaluating topographical data along a route, carrying out hydraulic calculations so the route can be adjusted to minimise pumping costs.

8.6 Other feasible options

8.6.1 Our other constrained supply-side options, on the whole, have less water available. However, these supply-side options are potentially useful in specific circumstances and locations.

8.6.1 Aquifer storage and recovery

8.6.1.1 Aquifer storage and recovery (ASR) is a technique used to replenish and store groundwater in aquifers for subsequent abstraction and supply. We don't currently operate any ASR schemes, and there are only limited operational examples in the UK.

8.6.1.2 For our WRMP19 adaptive planning programme we developed the Sherwood Sandstone ASR, exploring land availability, detailed design and borehole drilling requirements for a pilot project. We also discussed the option with our regulators to ascertain consentability. However, after exploring DO benefit for WRMP24 and ascertaining the costs for drilling, it has been decided not to continue exploring the option.

8.6.2 Sea tankering

8.6.2.1 The process of sea tankering involves importing potable water from outside of the UK into UK ports by sea tanker. The option could be used to provide water resilience at times of high demand in water networks or during drought events.

8.6.2.2 The sea tankering options were developed based on a supplier proposal.

8.6.3 Backwash recovery

8.6.3.1 Backwash recovery involves cleaning filter backwash water and returning it to the head of a water treatment works to be treated again, rather than discharged to the environment or sewer. The amounts associated with such returns are generally small and can have impacts on water treatment processes.

8.6.3.2 However, these supply-side options are essential for resolving local deficits.

8.6.4 Conjunctive use

8.6.4.1 Conjunctive use describes when we share resource between us and other companies. For instance, there could be an instance where a power company possesses a consumptive abstraction licence that is not being fully utilised. In this circumstance, there could be the opportunity to purchase the unused volume of these licences, abstract and treat it, to support our own supply needs.

8.6.4.2 We continue to explore these options but are mindful that, for example, energy markets can be volatile and abstraction licences may become fully utilised by the sector at short notice. At present these options remain technically feasible, but more work is needed to understand the long term risks associated with trading licences.

8.6.4.3 Where a desalination plant is located near to a power plant there is also the option for power sharing. Additionally, there could be the opportunity for brine waste from the desalination plant to be discharged into an existing power plant outfall, providing a significant capital expenditure saving. We will continue to explore these desalination options over the coming years.

8.6.5 Reservoirs

8.6.5.1 A small number of additional reservoirs were carried through to the feasible list. These are limited in size and yield due to the small amount of surface water available for abstraction and are not classed as SROs.

8.6.5.2 All constrained supply-side options are detailed in the revised draft WRMP24 Supply-side option development technical supporting document, Section 6.

8.7 The timing of our supply-side options

8.7.1 As we have limited options for developing conventional treatment options, many of our feasible supply-side options have long delivery times. These delivery times are due to a number of factors, such as planning approval and the use of technologies not historically used in the UK, for instance seawater desalination is commonly used in the Middle East and Australia, not the North Sea.

8.7.2 A summary of the timescales we are planning to and the reasoning behind them is provided below in Table 9. These implementation timeframes are used in our modelling process to determine realistic, deliverable plans.

Table 9 Feasible option implementation periods

Option Type	Time to investigate, plan, design and implement option (years)	Earliest available date	Notes
Desalination	7-10	2032-2035	It has been assumed that design and construction of the treatment process could be completed within 4 years but several years of planning, testing, and stakeholder and customer engagement would be required.
Potable water transfer	3-5	2028-2030	Due to the planning, enabling works, environmental issues, large number of land owners and procurement these transfers have been assumed to be deliverable within 3-5 years depending on the complexity and length of the pipeline.
New reservoir	15+	2036-2046	As most of the reservoir options are >30Mm^3 they are considered as Nationally significant infrastructure projects[54] (NSIPs) and would be subject to the Development Consent Order (DCO) process.
Water reuse for potable water use	7-10	2032-2035	It has been assumed that design and construction of the treatment process could be completed within 4 to 5 years but several years of planning, testing, and stakeholder and customer engagement would be required.
Water reuse for non-potable use	7-10	2032-2035	It has been assumed that design and construction of the treatment process could be completed within 4 to 5 years but several years of planning, testing, and stakeholder and customer engagement would be required.
Conjunctive use with treatment	5	2030	Planning and licence trade negotiations would take 2-3 years followed by 2 years construction and commissioning.
Aquifer recharge	7	2032	Complex planning and permitting issues and includes time to recharge the Aquifer.
Backwash recovery	2-5	2027-2030	These schemes are within our existing sites, often needing only modification to existing assets. As a result, there is minimal planning and short delivery timescales.
Enhancements to existing treatment works	2-5	2027-2030	These schemes can range in scale but planning and delivery is less complex than a new reservoir or desalination plant.

8.7.3 Further detail is available in the revised draft WRMP24 Supply-side option development technical supporting document, Section 5.

54 Planning Act 2008

9 Our demand management strategy

In this section we will:

- Summarise our demand management decision making process.
- Provide details on our preferred demand management portfolio and the impact it will have on our region's water need.
- Introduce our non-household demand management strategy.
- Provide an overview of our expected performance against targets.
- Describe our demand management monitoring framework.

9.0.1 We are firm believers in the value of demand management, a sentiment shared by our customers. This belief has driven decades of significant investment. As a result, we put slightly less water into our network than we did in 1989, despite a notable increase in properties across the region.

9.0.2 We have accomplished this significant achievement by undertaking one of the highest levels of meter penetration in the UK, with the majority of our customers billed on the basis of what they use. Additionally, our pioneering efforts with smart meters are allowing us to understand water usage like never before.

9.0.3 Leakage reduction, which has consistently been at the core of our strategic planning over successive AMP cycles, has enabled us to achieve leakage rates per kilometre of water main that are half the industry average, allowing more water to be kept in the environment.

9.0.4 As a company, we are proud of our demand management achievements and continue to build on them for WRMP24.

9.1 Determining our demand management strategy

9.1.1 As detailed in Section 7 of this report, our demand management option appraisal process produced a number of demand management strategic portfolios, all of which include leakage, smart metering and water efficiency. From these portfolios, three (extended low, extended plus and aspirational) were selected for further evaluation against our baseline scenario. These portfolios are shown in Table 10 below.

Table 10 Summary of our demand management option portfolios

Demand management option	Date savings achieved	Extended Low	Extended Plus	Aspirational
Leakage reduction (combination of leakage and smart metering strategies)	2030	5.4 Ml/d	10.6 Ml/d	10.6 Ml/d
	2050	19.6 Ml/d	32.3 Ml/d	44.9 Ml/d
Smart metering	-	Roll out finished by 2035	Roll out finished by 2030	Roll out finished by 2030
	2030	7.1 Ml/d	18.1 Ml/d	18.1 Ml/d
	2050	33.3 Ml/d	31.9 Ml/d	31.9 Ml/d
Water efficiency strategies	2030	6.4 Ml/d	9.4 Ml/d	9.4 Ml/d
	2050	11.1 Ml/d	14.6 Ml/d	14.6 Ml/d
Non-household water efficiency options	2030	10 Ml/d	10 Ml/d	10 Ml/d
	2050	50 Ml/d	50 Ml/d	50 Ml/d
Total options saving (net)	**2030**	**27.9 Ml/d**	**44.0 Ml/d**	**44.0 Ml/d**
	2050	**114.9 Ml/d**	**121.5 Ml/d**	**134.1 Ml/d**
Cost	**2050**	**£322.11m**	**£1032.61m**	**£4654.47 m**

9.1.2 The portfolios were compared through a series of decision making processes that will be discussed below.

9.1.1 Assessment against best value plan objectives

9.1.1.1 The extended low, extended plus and aspirational portfolios underwent a multi-criteria assessment. This involved evaluating the portfolios against a set of criteria, aligned with our best value planning objectives, on a Red Amber Green (RAG) basis. The results of the assessment are shown in Table 11 to the right of the page.

9.1.1.2 From this analysis, the aspirational scenario was determined to be the most favourable as it allows us to:

- innovate and deliver on our future ambitions for demand management;
- deliver the demand management that customers and stakeholders expect;
- shows our commitment to meeting targets for leakage, per capital consumption and non-household water efficiency; and
- delivers a strong economic case.

9.1.1.3 Alongside this multi-criteria assessment, analysis was undertaken to determine: if the portfolios would support a supply demand balance, how much the implementation of the portfolio would save through deferring supply-side investment, and the combined demand management portfolio and complementary supply-side portfolio costs. A CBA of the different demand management portfolios was also undertaken.

Table 11 Comparison of options against selection criteria

Best Value Planning Objective	Criteria	Extended Low	Extended Plus	Aspirational
Optimise our available resource	Mitigates near term growth			
	Mitigates long term growth			
	Fulfils regulatory obligations			
Affordable and sustainable over the long term	Reasonable cost			
Delivers long-term environmental improvement	Assists near term environmental destination			
	Assists long term environmental destination			
	Meets SEA requirements			
	Aligns with Net Zero ambition			
Increase the resilience of our water systems	Is deliverable/achievable			
A plan that supports the views of stakeholders and customers	Meets customer expectation			
	Aligns with WRE			
		Unlikely to meet criteria		
		May meet criteria		
		Will meet criteria		

9.1.2 Ability to maintain a supply demand balance

9.1.2.1 Using the EBSD process, the three demand management portfolios were modelled to determine, in conjunction with the constrained list of supply-side options, if they could achieve a supply demand balance. A baseline portfolio and a 50% leakage portfolio were also modelled as part of this process; these weren't considered as main portfolios but were included for comparison.

9.1.2.2 The results showed that the baseline and extended low portfolios yielded residual deficits as there were insufficient supply-side options to achieve a supply demand balance. This makes the baseline and extended low portfolios unfeasible for our WRMP24 process, and are discounted from further analysis.

9.1.3 Deferred supply-side investment modelling

9.1.3.1 Each of the portfolios were compared to determine the value of the supply-side investment that could be deferred due to their implementation. The results of this are shown in Table 12 below. This highlights that the value of the deferred supply-side investment increases with the level of leakage ambition, but only marginally.

Table 12 The deferred supply-side investment for the demand management portfolios

Demand management scenario	Deferred supply-side investment (£bn)
Extended plus	-4.9
Aspirational	-5.0
50% leakage	-5.3

9.1.4 Comparison of combined demand and supply-side option costs

9.1.4.1 The total expenditure for the holistic plans (encompassing both a demand management portfolio and the supply-side options required to achieve a supply demand balance), is shown in Table 13 below[55].

Table 13 Total expenditure for both supply-side and demand management options

Demand management portfolio	Total expenditure for both supply-side and demand management options (£bn)
Extended plus	8.8
Aspirational	12.3
50% leakage	28.1

9.1.4.2 As leakage ambition ascends, total expenditure increases with the 50% leakage portfolio showing that an extra 12% of leakage reduction (equivalent to 24 Ml/d of water saving) will cost an additional £15.8 billion over the aspirational portfolio.

9.1.5 Cost Benefit Analysis

9.1.5.1 An integral part of the WRMP24 decision making process is the CBA, which has been undertaken on the extended low, extended plus and aspirational portfolios. This CBA considers the costs and benefits of the demand management options, the value of deferred supply-side capital investment and societal valuation. Further details on this approach can be found in Section 8 of the 'WRMP24 Demand management option appraisal technical supporting report'.

9.1.5.2 The results of the CBA are shown below in Table 14 below.

Table 14 Summary of the cost benefit analysis of the demand management portfolios

Portfolio	Cost (£m)	Benefit (£m)	Net benefit (£m)
Extended low	264.72	634.15	369.42
Extended plus	724.42	737.19	12.77
Aspirational	2797.74	830.45	-1967.29

55 The baseline and extended low demand management portfolios cannot satisfy a supply demand balance as there are not enough supply-side options to bridge the deficit so are excluded from this analysis.

9.1.5.3 The results of the CBA highlights that both the extended low and extended plus are cost beneficial. But aspirational, whilst appearing not cost beneficial over 25 years, embodies our history of demand management and will allow us to contribute significantly to the 50% national leakage target, as well as the other national targets.

9.1.5.4 We have also analysed the options over the near term (5 year AMP8). Between 2025 and 2030, the aspirational portfolio is cost beneficial; giving us time to search for more innovative ways of achieving our ambitious 38% leakage target; the results are shown in Table 15

Table 15 Summary of the near-term cost benefit analysis of the demand management portfolios

Portfolio	Cost (£m)	Benefit (£m)	Net benefit (£m)
Extended low	138.72	127.16	-11.56
Extended plus	160.32	204.79	44.46
Aspirational	160.32	195.82	35.50

9.1.5.5 We also know, through consultation, that our stakeholders and customers think we should have a high leakage ambition; something that our aspirational portfolio achieves.

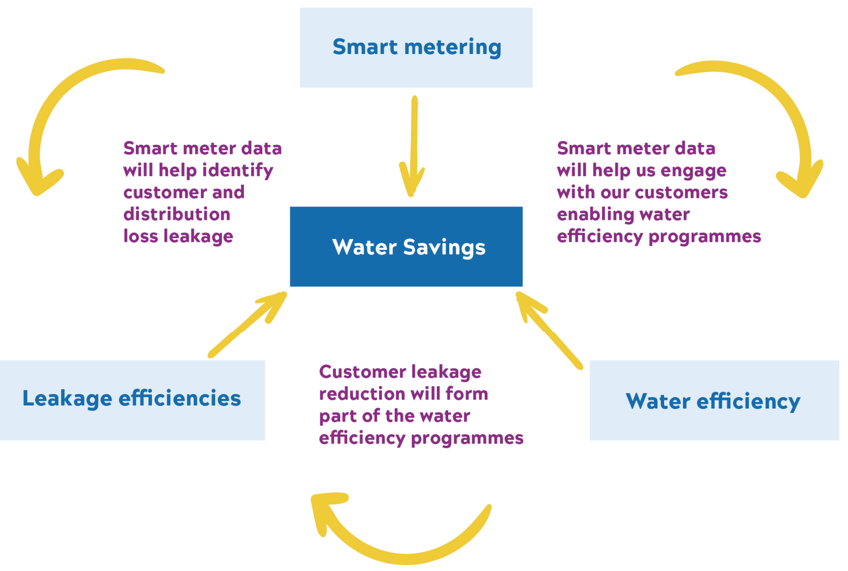
9.2 Our preferred portfolio

9.2.1 From this decision making process, the Aspirational portfolio emerged as the preferred choice. This is because:

- the baseline and Extended Low portfolios do not fulfil a supply demand balance so are unfeasible;
- the 50% Leakage portfolio would have an unreasonable bill impact to our customers, costing an additional £15.8 billion to deliver a water saving of 24 Ml/d.
- It is the best performing against our best value planning objectives;
- it will drive the next step change in demand management;

9.2.2 The aspirational demand management portfolio is our next step in pushing the frontiers of demand management, based on the three pillars of smart metering, leakage reduction and water efficiency, as shown in Figure 44 below. We will now discuss the individual components of the portfolio, and how they will contribute towards resolving our region's water needs.

Figure 44 Our three pillars of demand management



9.3 Smart metering strategy

9.3.1 In WRMP19, we promoted the installation of smart meters across our region with 1.1 million due to be installed by 2025, with an additional 60,000 smart meters being fitted through the Accelerated Infrastructure Delivery programme. For WRMP24, we will continue this investment across our region, reaching maximum feasible meter penetration by 2030.

9.3.2 This continuation of the WRMP19 smart metering strategy will see us achieve significant demand savings of 18.1 Ml/d by 2030, allowing us to maintain a supply-demand balance whilst we build new supply-side infrastructure. 31.9 Ml/d of benefit is expected by 2050.

9.3.3 These savings will be achieved by smart meters facilitating better communication with customers, and by increasing our understanding of the water network so we can pinpoint leakage like never before. We will now discuss these further, recognising they provide both leakage and water efficiency benefits.

9.3.1 Smart meters helping us engage with our customers

9.3.1.1 Our smart meter installation programme is currently driving a fundamental change in our understanding of customer consumption, as well as increasing our ability to communicate with customers. We will continue to improve on this in WRMP24 by continuing to encourage customers to engage with water usage through their individual smart meter data. Tailored messaging will ensure we demonstrate to our customers why this water efficiency is important for their individual circumstances and local area.

9.3.1.2 With customers accessing their water usage through a web portal or mobile application, we will be able to conduct this engagement more effectively, promoting water efficiency by:

- Showing how much water similar homes use, so customers can gauge if their own water usage is high.
- Helping customers to understand how and where they could make changes to their water usage, such as implementing shorter shower times, and then helping them set targets to track their own water saving progress.
- Developing personalised incentives for our customers, so they feel motivated to achieve further water savings.
- Making usage tangible so customers can understand how much water efficiency could save them in monetary rather than volumetric terms.

9.3.2 Smart metering reducing plumbing losses and customer supply pipe leakage

9.3.2.1 Smart meters will help us detect leakage promptly on customers' property; this loss of water could be from customer supply pipe leaks or plumbing losses, such as leaky loos. We will contact the customer within 3 days of identifying this possible leakage; it is expected that the prompt identification and subsequent repair will significantly reduce leakage rates as customer supply pipe leakage currently accounts for 23% of our leakage figures.

9.3.2.2 As part of this initiative, we are working towards achieving an average repair time of 59 days. From our Newmarket and Norwich smart meter trial areas where we found that leakage identified via a smart meter took on average 112 days to be repaired; lower than the average 210 days leakage repair time for visual read meters: a marked improvement.

9.3.2.3 We also continue to investigate enhancing the help we can give to vulnerable customers who may have leaks on their property.

9.4 Compulsory metering

9.4.1 As we are in an area of serious water stress, we have an obligation to consider the costs and benefits of compulsory metering. Whilst we actively try to engage with those who are metered but not billed on their measured value, 9% of customers still choose to remain unmeasured.

9.4.2 As customers are currently only switched to being metered and measured upon request or automatically when moving into a house with a meter, for WRMP24 we will use our innovation programme to understand how we can better engage with our metered and unmeasured customers, and demonstrate the benefits of measured charges more effectively.

9.4.3 Recent customer engagement has shown us that the majority of our customers believe, as do we, that it is fair to pay on the basis of the amount of water used. This has fed into our WRMP24 demand management strategy that will see us continue to investigate a compulsory metering strategy to be implemented by 2030. We will introduce assessed charges for customers without a meter; that means unmeasured customers will start paying more tailored bills based on their household composition and dwelling type.

9.4.4 We recognise that some of our customers and stakeholders have expressed concern for those who may not be able to afford a move to measured charges. We appreciate that such a move may be detrimental to some households, particularly large low-income families and vulnerable customers. Whilst we already have a range of tariffs and support for our vulnerable customers, we will continue to ensure these are appropriate.

9.5 Household water efficiency

9.5.1 We are good at engaging with our customers, whether that be targeted discussion or day to day interactions, giving us a strong foundation for our aspirational portfolio to build on, with the aim of promoting prolonged behavioural change with our customers.

9.5.2 Some of the initiatives in our aspirational portfolio are continued from AMP7, as well as those being currently developed as part of our smart meter roll out. There are also a significant number of new activities in WRMP24, including incentivisation for customers to replace leaky toilets with more efficient versions, and the installation of smart devices that will promote further engagement with water usage.

9.5.3 A brief summary of these water efficiency solutions is included below, with further detail included in the 'Demand management preferred plan technical supporting document': Section 9.

9.5.1 Smart homes

9.5.1.1 Driving the next step change in demand management will see us harness the full capabilities of technology by introducing additional smart devices into our connected network. These smart devices will allow us to target the most water intensive aspects of consumption, such as showering and bathing, by giving customers even more information about these specific activities.

9.5.1.2 Using showering as an example, we will provide smart devices to our customers so they have more information about their shower volume and duration. As part of this initiative, we will also trial sensors that are capable of being linked to our own smart meter system, providing information to customers through our 'My App' system.

9.5.2 Encouraging behaviour change

9.5.2.1 We know that prolonged behavioural change can be difficult to achieve, and will strive to maintain it through continuous engagement with our customers, allowing us to embed and maintain behavioural change over time.

9.5.2.2 For WRMP24, we intend to build upon our current engagement by using all available communication channels, in addition to our smart meter interface. We envisage that community engagement will play a major part in this day to day strategy, ensuring that we include the digitally disadvantaged and vulnerable customers.

9.5.2.3 We will continue to tailor our communications; this could be through targeted local communications during times of drought and peak summer demand, making customers aware of water scarcity and their ability to make a difference during these periods, or be demographic specific, for example, providing babydams to families to help them reduce the water needed for a baby's bath.

9.5.2.4 Incentivisation will be at the heart of our WRMP24 strategy, with the ability to offer rewards to customers and/or their local communities when certain milestones are achieved. We want our customers to be involved with setting these milestones and their potential level of reward. We are currently reviewing the form that these rewards might take; they may range from a free coffee to some water saving technology. Community rewards may involve contributions to facilities such as a local playground.

9.5.2.5 Developing and maintaining customer engagement will be key to customer satisfaction and achieving the water efficiency goals we have set, so we will ensure that the design and presentation of information will be clear and engaging.

9.5.3 Community action

9.5.3.1 We know our customers care for their local communities and environment. We already conduct hyperlocal engagement through written communications such as Newsplash and community hubs, and will continue this approach for WRMP24. This local communication may include information on local reservoir levels or ongoing investments in that area.

9.5.3.2 The concept of smart cities (such as https://www.mksmart.org/), linking water, energy and carbon efficiency programs in a holistic scheme is also something that excites us and will explore in WRMP24.

9.5.4 The Water Demand Reduction Discovery Fund

9.5.4.1 As part of our WRMP24 demand management strategy we have included an innovation fund, the 'Water Demand Reduction Discovery Fund'. This fund will be utilised to increase our understanding of customer behaviours, recognising the importance of promoting prolonged behavioural change, and to explore future water efficiency initiatives.

9.5.4.2 It is currently envisaged that the Discovery fund will:

- Support research into the long-term effectiveness of demand management interventions.
- Fund rigorously designed trials into the effectiveness of different types of metering, technological and behavioural change interventions over a five-year period.
- Enable the ongoing monitoring of our 'Enabling Water Smart Communities' project, answering important questions about how we might encourage new developments to adopt an integrated water management approach and incorporate measures like localised water reuse.

9.6 Government led interventions

9.6.1 As part of a Water UK and Defra project, Artesia developed a number of demand management scenarios based around the potential impact of Government-led interventions on PCC.

9.6.2 In particular they found that the introduction of water labelling (similar to the energy labelling present on white goods) and the slow change to more efficient white goods, along with a set of Government-led mandatory standards for new-build and retrofit properties, might lead to very significant water savings in the long-term (up to 31 l/h/d by 2050).

9.6.3 Given that the Government has signalled its intent to introduce legislation to bring in water labelling and promote more water efficient white goods, we have included a demand reduction linked to these changes in our aspirational portfolio. This achieves a significant water saving of 14.95 l/h/d by 2049/50, this would equate to a demand reduction of approximately 84.35 Ml/d.

9.6.4 It should be noted that Government-led intervention, and its associated savings, is required to achieve the National Framework target of 110 l/h/d, along with the savings quantified for our smart metering and water efficiency programs.

9.7 Leakage

9.7.1 We continue to believe that minimising the amount of water we lose from our system through leakage is the right thing to do for our customers and the environment. Our 38% leakage reduction target recognises this belief, encompassing the maximum leakage reduction that we believe is feasible with current technology. This ambition will see us initiating a major mains replacement programme from AMP9 onwards, replacing over 8,000km of mains; that's just over 20% of our network. It comes at a significant cost of over £4 billion.

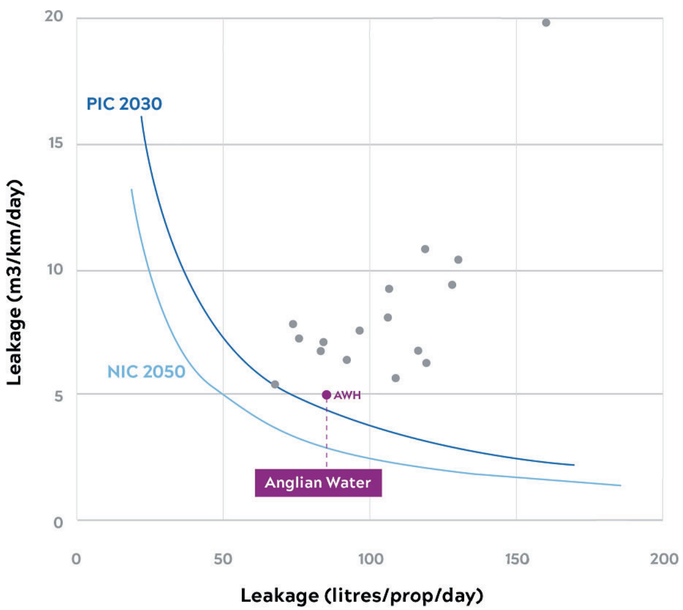
9.7.2 This substantial investment will see our leakage levels reduce to 118.9 Ml/d by 2050, from a baseline of 191.3 Ml/d in 2017/18.

9.7.3 We are conscious that the water industry agreed to a Public Interest Commitment (PIC) of tripling the rate of sector wide leakage by 2030 and there is a NIC target of 50% leakage reduction by 2050. We have reviewed our current leakage position (and that of other water companies) in relation to these targets [56], shown in Figure 45, recognising that the challenges experienced by each company are different. From our analysis,

56 Using the National Leakage Routemap, attainment curves were created by aggregating the individual water company leakage values to a national value, halving this, and then creating a set of equivalent figures for the combined metrics of leakage per kilometre of main and leakage per property. We believe this provides a fairer comparison of company leakage performance.

we believe that a national 50% reduction in leakage will only be achieved by some water companies reducing their leakage values by a much larger amount than forefront companies such as us.

Figure 45 Our company position compared to other companies for NIC and PIC

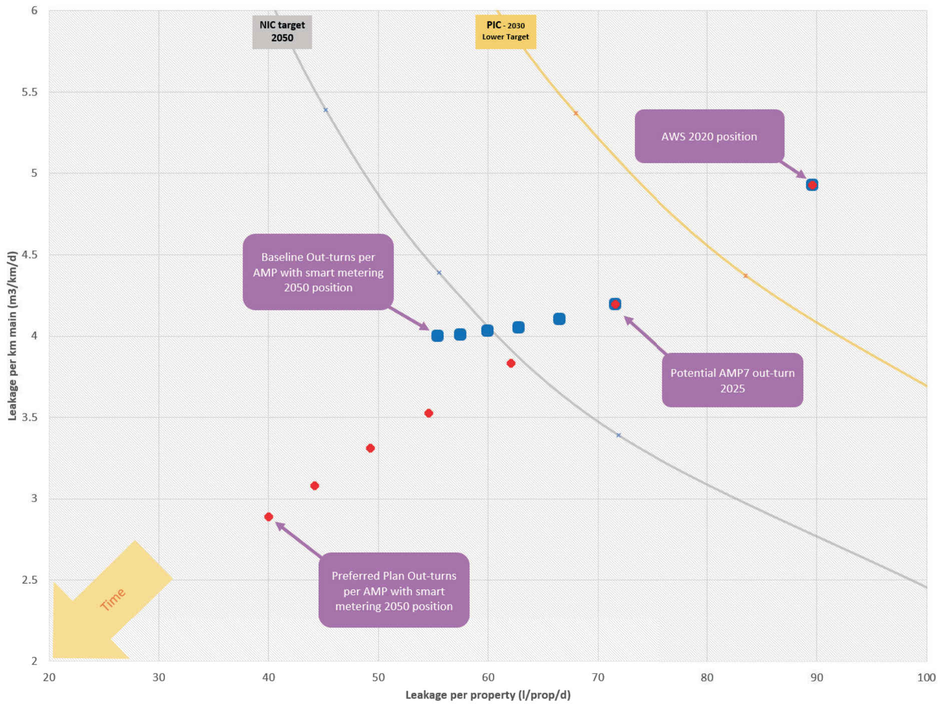


9.7.4 Our analysis shows that achieving a 50% leakage reduction by 2050 from our 2017/18 position is not a reasonable option to us, or our customers. We are unsure if it is even feasible as we have nearly exhausted pressure management and network optimisation; this means the vast majority of leakage reduction would be achieved through mains replacement. This mains replacement programme would be at an estimated cost of over £20 billion, inflicting huge bill impacts on our customers when supply-side options could provide better value.

9.7.5 The impact of digging up approximately 22% of our network will be disruptive to our customers and likely to have negative environmental impacts, as well as requiring diesel, steel and plastic production to accommodate the need.

9.7.6 We have reviewed our 38% leakage target against the National Leakage Routemap attainment curves in Figure 46 below; this review shows that we expect leakage to be below the PIC target by 2025 and the NIC target by 2040.

Figure 46 Baseline and preferred plan leakage forecasts and NIC and PIC attainment curves



9.7.7 We will continue to actively explore how the use of state-of-the-art technology can help us achieve further reductions, remaining adaptive in our approach. We will now give an overview of how we will achieve a 38% leakage reduction through pressure management, fixed acoustic logging, utilising smart metering and water mains replacement.

9.7.1 Pressure management

9.7.1.1 We will have completed the bulk of our pressure management optimisation programme by 2025 but recognise there is scope to implement new, improved or additional pressure reducing valves into our network.

9.7.2 Fixed acoustic logging

9.7.2.1 We will utilise fixed acoustic logging for WRMP24, a technique for pinpointing leakage. This is undertaken by installing permanent sensors along the distribution network that 'listen' for leak noises. These acoustic loggers will help reduce detected leak run-times, leading to overall leakage reduction[57].

9.7.2.2 Fixed acoustic logging offers another advantage. The loudest leaks (i.e. those most detectable using more traditional methods) are not necessarily the biggest leaks, as a pipe under pressure with a small hole in it will make a louder noise than a pipe that is split in two. Acoustic logging is the best way of picking up these secondary, quieter leaks that are likely to be losing more water.

9.7.3 Water main replacement

9.7.3.1 Water mains replacement reduces background water losses; these are a component of total physical losses that cannot be detected, usually as they are small leaks at low flow rates, and reduced using active leakage control.

9.7.3.2 As part of WRMP24 we will replace 8,654km of mains replacement, approximately 22% of our network, from AMP9 onwards; this timing will allow us opportunity to explore new technologies.

9.7.4 Smart metering and customer supply pipe leakage

9.7.4.1 As already discussed, smart meters will achieve significant leakage savings by analysing for continuous flow that could indicate plumbing losses (impacting PCC levels) or customer supply pipe leakage, with a mechanism for alerting the customer. Where leakage is identified on shared customer supply pipes, we will conduct additional investigations to determine where the leak is and the best course of remedial action.

9.7.4.2 As part of WRMP24, we will help our most vulnerable customers with visits and incentives to fix these leaks as fast as possible. Further details on these initiatives can be found in the revised draft WRMP24 Demand management preferred plan technical supporting document, Section 6 and on our website at https://www.anglianwater.co.uk/help-and-advice/water-care/.

9.8 Non-household water efficiency

9.8.1 For WRMP24, we have developed a number of non-household water efficiency options that we will trial prior to full implementation in 2025/2026. As part of the development of these non-household demand management options, we have actively worked with our retail partners. Part of this engagement established there are the following barriers to non-household water efficiency:

- Working within the retailer and wholesaler framework to achieve water efficiency.
- The lack of meaningful data available to retailers and non-household customers.
- The need to understand the different behaviours and water usage of the multiple sectors.
- Business customers may not fully understand the need, and drivers, for water efficiency measures, and they are unsure as to how they can become more water efficient.

9.8.2 We did find an appetite to engage with water efficiency measures, especially if we, the wholesaler, could assist with the process. This appetite assisted us with the co-creation of non-household demand management options through engagement with fellow water companies from WRE, regional retailers and non-household customers. The resulting demand management options were discussed with regulators.

9.8.3 This has led to the non-household demand management options, shown in Table 16 below, being promoted in WRMP24. We expect this portfolio of non-household options to save 10Ml/d of water by 2029/30 and 50Ml/d by 2049/50.

57 A recent UK large-scale trial carried out by Affinity Water on fixed acoustic logging indicated savings in the region of 70% of volume of water lost through a single leak due its quicker detection and repair.

Table 16 Non-household water efficiency options

Type of visit	Size of customer (consumption)	Expected no. Properties impacted per year (based upon our customer base)	Expected saving (per property per day)
Delivery of smart meter targeted water saving efficiency packages, similar to household drop20 campaigns. This will be undertaken on a scaled basis (dependent on the size of water consumption).	Low Consumption	3000	86 litres per water efficiency package
Specialist water efficiency audits, with find and fix for consumers using approximately 25,000 litres per property per day.	Medium Consumption	79	2,127 litres per property
Specialist water efficiency audits with find and fix for larger consumers (approx. 500,000 litres per property per day).	High Consumption	10	43,775 litres per property
Retailer incentives for plumbing loss reduction A £100 incentive to retailers to reduce plumbing losses.	All users	3000	59 litres per property
Smart meter identified plumbing loss fix Non-household plumbing loss repairs for properties identified, through smart metering, to have continuous flow. These visits will be aligned with water efficiency visits.	All users	3000	240 litres per property
Smart meter identified customer supply pipe leakage (cspl) fix. Non-household repairs for properties identified, through smart metering, to have continuous flow. These visits will be aligned with water efficiency visits.	All users	3000	9 litres per property

9.9 Optimising our own operations

9.9.1 As a non-household water user ourselves, we continue to look for ways to use water more efficiently in construction and day to day activities. One example is the Strategic Pipeline Alliance that has trialled low water commissioning methods such as air swab washing and disinfection to reduce its overall water footprint.

9.10 The potential to further our demand management

9.10.1 As part of WRMP24, we continue to review the potential for applying tariffs and price signals. The majority of household customers (84% as of 2022/23) pay their water bill based on a simple two part tariff structure, with a fixed charge (calculated on a per day basis) and a uniform unit charge for volumetric usage.

9.10.2 We believe that potential tariffs could used as a mechanism to reinforce seasonal messaging, promoting behavioural change and water efficiency during periods of peak summer demand. It should be noted that tariffs would be reduced during the winter months, creating a balanced bill.

9.10.3 To develop our understanding of seasonal tariffs, we will implement an initial tariff trial from April 2024. We have worked with the Centre for Competition Policy (CCP) at the University of East Anglia (UEA) to develop a robust methodology.

9.10.4 We continue to collaborate with developers and local authorities to ensure new housing developments are as water-efficient as possible. We are actively supporting the development of Local Plan policies that require higher water efficiency standards, as a means to reduce PCC to 110 litres/head/day, and we track the current level of standards applied across the region.

9.10.5 Further detail can be found in our revised draft WRMP24 Demand management preferred plan technical supporting document, Section 10.

9.11 Achieving targets

9.11.1 The Environmental Targets (Water) (England) Regulations 2023, under the Environment Act 2021, has set environmental targets for priority areas. Regulation 20 states: "*The fourth target in respect of water is that the volume of potable water supplied per day per head of population in England is, by 31st March 2038, at least 20% lower than the baseline.*" [58]. We believe this target includes both household and non-household demand.

9.11.2 Our demand management portfolio is ambitious and reliant on Government intervention in order to achieve our targets. Between 2020 and 2038, we expect our demand will decline from 1172 Ml/d to 1105 Ml/d (a decrease of 5.7%) with an increase in household population from 4.695m to 5.435m (a 15.7% increase) during the same period. This will see us achieve a significant reduction of 18.5% in the volume of potable water supplied per head per day of population.

9.11.3 Whilst we appreciate this does not achieve the 20% target, we believe 18.5% is realistic because of our already significant investment and drive on demand management measures.

9.11.4 We will achieve the 20% target by 2040.

9.11.5 The Environmental Improvement Plan 2023, setting out two interim targets: '*To achieve the statutory water demand target, we plan to reduce household water use to 122 litres per person per day (l/p/d), reduce leakage by 37% and reduce non-household (for example, business) water use by 9% by 31 March 2038. This is part of the trajectory to achieving 110 l/p/d household water use, a 50% reduction in leakage and a 15% reduction in non-household water use by 2050. The interim targets are based on the progressive reductions needed to meet the long-term target and supply-demand challenge*[59].

9.11.6 Our WRMP24 water efficiency strategy is ambitious, fully utilising our smart meter technology to drive PCC improvements. These initiatives will allow us to achieve a PCC of 118.15 l/h/d, below the target of 122 l/h/d, by 2038.

9.11.7 We believe the 9% reduction in non-household water use by 2038 will be a very challenging target as we expect growth in non-household consumption to be aligned with population growth. In total, we expect that our non-household demand management options (which will mainly be delivered by retailers who are independent to us) will help us achieve approximately 8% reduction by 2037/28 and a 15% reduction by 2049/50. These reductions can only be achieved relative to the non-household demand position (including non-household demand growth).

9.11.8 The WRMP Direction 2022 states at Article 3(1)(m) that the water undertaker must include in its WRMP "*a description of... how its intended programme to manage and reduce leakage will contribute to– (i) a reduction in leakage by 50% from 2017/18 levels by 2050.*"

9.11.9 As detailed in Section 9, we have reviewed our leakage performance against our fellow water companies, using attainment curves from the National Leakage Roadmap. This has highlighted that, to achieve a 50% national leakage reduction, some companies need to reduce their leakage values by a much larger amount than forefront companies such as Anglian Water.

58 The baseline to be compared to is the 1st April 2019 to 31st March 2020 Further information can be reviewed at https://www.legislation.gov.uk/uksi/2023/93/part/5/made.
59 Further information is available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf.

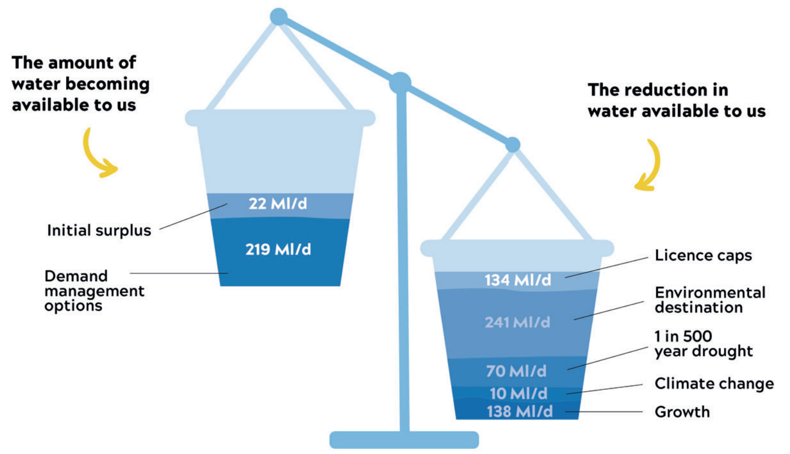
9.11.10 Analysis has shown that the costs of achieving 50% leakage reduction by 2050 are high as we have already implemented the 'low lying fruit' discussed in the National Leakage Routemap. To move from our proposed 38% leakage strategy to a 50% leakage reduction from baseline, would save an additional 25 Ml/d at an additional cost of £16 billion.

9.11.11 We consider our 38% leakage reduction to be a fair and equitable contribution to the overall national leakage target of a 50% reduction in leakage from the 2017/18 baseline for England and Wales. A 38% leakage reduction will see us below the NIC target by 2030, reaching the exceptionally low levels of 2.9m3 per km of main/day or 40l/prop/day respectively, by 2050, compared to 4.2m3 per km of main/day or 71.6l/prop/day in 2025. These levels will be unprecedented across the industry.

9.12 The impact of our WRMP24 demand management strategy

9.12.1 Our demand management strategy will have a significant impact on our future water needs; the savings it achieves will offset growth in our region, managing the risk of deterioration in our existing waterbodies.

Figure 47 The impact of demand management options in WRMP24



9.12.2 However, demand management does not fulfil all of our future water needs, as shown in Figure 47. For that, we must turn to supply-side options.

10 Supply-side decision making

In this section we will:

- Discuss the modelling approaches undertaken for the WRE Regional Plan and our WRMP24.
- Articulate the policy decisions we have made.
- Show how we developed least cost plans to use as a benchmark for comparing plans.
- Highlight the process for developing alternative plans and the ones taken forward to the best value framework assessment.
- Provide an overview of the sensitivity and stress testing undertaken.
- Show how the plans performed against the best value plan framework and detail what our best value plan is.
- Discuss adaptive plans and pathways.

10.0.1 After the aspirational demand management portfolio has been applied to our supply demand balance, there is still a significant need for water in our region. As we cannot apply any further demand management savings that are feasible and cost beneficial, we must turn to supply-side options to ensure that the water needs of our customers are met.

10.0.2 The determination of the correct supply-side options is a complex process, and involves an iterative approach, working closely with WRE and the RAPID process, to ensure that a best value plan is achieved for the region and our customers.

10.0.3 This section will provide an overview of how these supply-side options were chosen, focussing on the best value plan framework. For further information please refer to the Decision Making technical supporting document, available at www.anglianwater.co.uk/wrmp.

10.1 Modelling approach for Regional Plan and WRMP24

10.1.1 Using the problem characterisation detailed in Section 3, it was determined that more complex decisions would be assessed at a regional level. As such, WRE's multi-objective robust decision making process was used to determine the need and sizing of the SROs. A regional EBSD model was used to support this decision making, and to determine the timing of the need.

10.1.2 WRMP modelling was used to independently verify the outputs from the regional modelling, and ensure that the SROs are low regret for Anglian Water. In addition WRMP modelling was used to determine small resource and transfer options within our area. Stress and sensitivity testing was also conducted to ensure our preferred plan is robust to uncertainty.

10.2 The Regional Plan low regret outputs

10.2.1 The WRE simulator is multi-sector, capturing the demands of public water supply, as well as agricultural and energy demands. The simulator represents surface water, and a simplified version of the groundwater system, in the WRE region. The simulator also includes the current supply infrastructure and possible future supply-side options that could be built before 2050.

10.2.2 The public water supply demand is aggregated to the WRZ level. This demand is fed by surface water and groundwater abstractions, as well as the current and possible future supply-side options.

10.2.3 Agricultural demand is aggregated to the CAMS level and is supplied by both surface and groundwater abstractions. Agricultural abstractions are limited by annual licences whilst public water abstractions are limited by daily and annual licences. Hand-off-flow conditions limit both public water supply and agricultural abstractions.

10.2.4 Energy abstractions occur on the Ouse and on the Trent, the latter represented by an aggregation of Lower Trent Fluvial energy abstraction licences.

10.2.5 The simulator is run over a 48-year time-horizon at a weekly time step. A total of 400 hydrological weather traces are available to run over 11 climate change scenarios for the medium emissions scenario representing possible conditions in the year 2050. In addition 70 possible demand scenarios can be modelled representing different levels of growth and geographic distribution including the proposed Ox-Cam Arc.

10.3 Using the EBSD model for WRMP24

10.3.1 Using the EBSD-MGA model for our WRMP24 modelling approach, we developed least cost plans within the constraints of the input data. To align with our best value plan objectives, the input data (i.e. forecast and options data) was adjusted. For example, to improve our environmental best value objectives, we would reduce our supply forecast and then let the EBSD-MGA model choose the least cost combination of supply-side options to achieve a supply demand balance.

10.3.2 By using the EBSD-MGA model in this way, we can optimise against individual criteria. This means we can clearly understand the impact of that change by comparing the criteria against a baseline run. This demonstrates the impact of any changes to assumptions, providing transparency to our regulators and customers.

10.3.3 Whilst this modelling approach provides the method for exploring real differences in objectives and for the provision of best value metric data, a method for analysis and comparing the modelling outputs is required to build a best value plan that resolves our water needs. This decision making approach is discussed next.

10.4 Our decision making approach

10.4.1 For the WRMP decision making process, we have based our approach on the UKWIR *Deriving a best value water resources management plan* guidance. This report recognises that there are a variety of methods and approaches that may equally arrive at a best value plan but recommends multi-criteria decision analysis (MCDA) as one of the appropriate tools[60]. The emphasis from the UKWIR guidance is that clear justification must be provided for every decision taken in the development of the plan.

10.4.2 Building on the MCDA approach detailed in the UKWIR guidance[61], our decision making was conducted using the following nine steps:

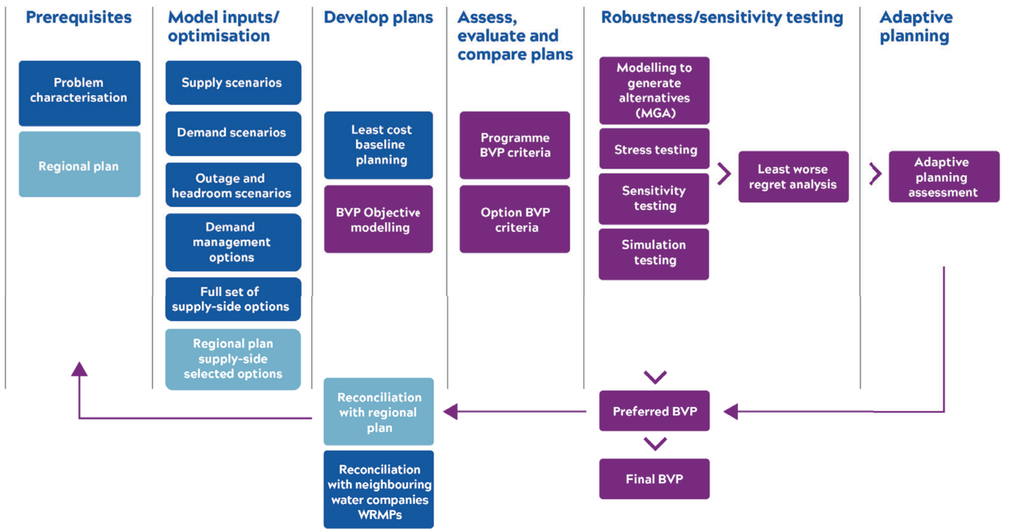
- **Step 1: Structuring the Problem** by using our problem characterisation, and supply and demand forecasts to establish the scale of the water resource need. This is detailed in Sections 3, 4 and 5 of this main report.
- **Step 2: Defining best value,** and how would we measure it. This is discussed in the revised draft WRMP24 Decision making technical supporting document, Sections 2 and 3.
- **Step 3: Undertaking effective engagement to shape alternative plans** with our customers, stakeholders and regulators throughout the development of the plan, with the engagement being used to inform the decisions we make to shape the best value plan. This is discussed in the WRMP24 Customer and Stakeholder Customer Engagement technical supporting document.
- **Step 4: Modelling to develop alternative plans** including a least cost plan to benchmark against. This is discussed in this section and in further detail in the revised draft WRMP24 Decision making technical supporting document, Section 6 and Appendix B.

60 UKWIR (2020) Deriving a Best Value Water Resources Management Plan.
61 Please note that the UKWIR guidance and WRPG requires our decision making approach to be transparent in its methods, data, assumption and decisions. Consequently we chose not to include step 4 (using scores and weights to evaluate plans) of the UKWIR decision making approach. Instead, we use our customer and stakeholder engagement to prioritise and shape our plan, which we feel is more transparent and accessible than scores and weights to form the basis of our approach.

- **Step 5: Testing plans to future uncertainty,** so we know and understand how they are impacted by our assumptions changing. This is discussed later in this section and in the revised draft WRMP24 Decision making technical supporting document, Section 7.
- **Step 6: Applying the best value planning framework to evaluate and compare plans,** including our least cost plan and the Best for the Environment (abstraction) plan. This is discussed in this section and in the revised draft WRMP24 Decision making technical supporting document, Section 8.
- **Step 7: Selecting our best value plan** by using the outputs from steps four to six to identify the plan that will provide best value to customers, the environment and society whilst being efficient and affordable to deliver. This is discussed in this section and in the revised draft WRMP24 Decision making technical supporting document, Section 9.
- **Step 8: Adaptive planning assessment** so we understand how easily we can adapt the preferred plan if the future differs from our original assumptions. This is discussed in Section 11 of this report and in the revised draft WRMP24 Decision making technical supporting document, Section 10.
- **Step 9: Final alignment with regional plans and other water company plans** to ensure the best value plans at regional and water company level remain aligned[62]. This is discussed in the revised draft WRMP24 Decision making technical supporting document, Section 11.

10.4.3 This iterative process is set out in Figure 48, with some stages repeated and refined as the plan is developed.

Figure 48 Our supply-side decision making process



62 Parallel and iterative engagement has occurred throughout the plan making process.

10.4.4 To initiate step 4, the development of plans, we determined how environmental decision making would be incorporated into our process, as well as the policy decisions that were required.

10.5 Including the environment and society in decision making

10.5.1 We have used our strategic environmental assessment to inform our decision-making process, as we have sought to avoid risks to the environment with our WRMP24 (discussed further in Section 12). The assessments have fed into the decision-making, including:

- Helping to shape our constrained list of supply-side options by applying a high-level environmental screening tool to options being considered for inclusion. This process highlighted where an option included undue direct interaction with sensitive environmental receptors leading to unacceptable environmental risks. The process also helped to provide advice to improve the environmental performance of supply-side options that were carried forward into the constrained list.
- Application of the six environmental assessments to the supply-side options on our constrained list. This provided information on the possible environmental consequences of each option to understand their direct risks and where they could interact with other options being considered for inclusion in the plan. The process also outlined environmental mitigation needed to help avoid or reduce predicted negative environmental effects, allowing us to consider these in option design development, and option costings.
- Application of the SEA on the policy decisions made in the plan, this included: environmental destination (scenario and timing), demand management portfolio, licence capping and drought resilience timing. This has allowed us to compare and understand the potential effects of such decisions.
- The SEA, BNG and NCA via ESS findings enabled the environmental assessment process to contribute environmental performance metrics into the tools and modelling that shaped the preferred plan (Plan B) and its alternatives (Plans A, C and D).
- Application of the SEA on the four alternative plans as a whole. This process has looked at the entirety of each plan, understanding the interactions between different policy decisions and differences in supply-side options to allow a full comparison between the plans.
- Findings from the environmental assessment process have been used to aid discussions with statutory environmental bodies, including the Environment Agency, Natural England and Historic England to help contribute more local knowledge. The outcomes of these discussion combined with environmental assessment findings was also used to support decisions regarding appropriate combinations of options that helped define our WRMP.
- More can be read about how the SEA has influenced the plan in Section 5 of the revised draft WRMP24 Environmental Report.

10.6 Policy choices

10.6.1 To start our modelling process, we determine the key policy decisions from the WRPG's requirements of a best value plan. Some of its requirements are not fixed in the guidance and can be optimised through the decision making process. These choices are captured in the five key policy decisions below:

1. The **level of demand management** to be undertaken and how should it be rolled out.
2. The **timing of licence capping.**
3. The timing of **1 in 500 year drought resilience,** so that it meets the requirements of the 2039 deadline.
4. The **level of environmental destination** that should be undertaken.
5. The **timing of our environmental ambition**, which we have to achieve by 2050.

10.6.2 The variations of the policy decisions assessed are shown in Figure 49. The variations came from different sources:

- **Level of demand management variations** were determined by the decision making undertaken to determine the strategic portfolios.

- **Licence capping variations** were compiled through company decision making and liaison with the Environment Agency[63].
- The **timing of drought resilience** was developed through WRE and company decision making.
- We worked with WRE to determine the scenarios for **environmental destination** and **environmental ambition**.

Figure 49 Variations of policy decisions to include our initial most likely scenario

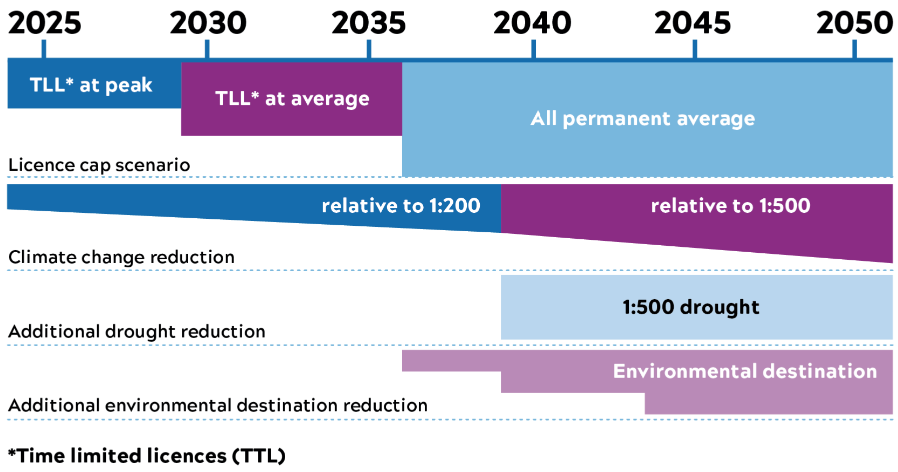
	Policy Decisions							Decision used in other scenarios
1. Level of demand management	Baseline	Extended low	Extended plus	Aspirational	50% leakage			Aspirational
2. Licence Capping	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 4
3. Timing of drought resilience	2025	2030	2035	2039	2045	2049		2039
4. Environmental Destination	None	BAU	BAU+	Enhance				BAU+
5. Environmental Ambition	2030	2036	2040	2045				2040

10.7 Structuring the problem to define our initial most likely scenario

10.7.1 To start the modelling process, we need to use the key policy decisions to determine the initial most likely scenario, which we compare all other variations against. To help us determine this scenario, we separated each of the supply impacts. This allows us to understand the relative impact of each impact; an example of this is shown in Figure 50 below.

10.7.2 By separating the supply impacts, we can compile different scenarios and ensure we are not double counting impacts. We use scenario 6, as determined by the Environment Agency, as the baseline to compare the other scenarios against.

Figure 50 Layering supply impacts to create scenarios



10.7.1 Aspirational demand management portfolio

10.7.1.1 This policy choice has already been discussed in Section 7 of this report, and is summarised below.

10.7.1.2 We considered three different portfolios for our level of demand management: extended low, extended plus, and aspirational. We included 50% leakage and a baseline portfolio as a comparison. These portfolios are summarised in Table 17 below.

63 It was agreed to use scenario 6 with the Environment Agency after scenario 4 had been selected as the decision used in other scenarios.

Table 17 Components of demand management portfolios

Demand management portfolio	Government interventions	Leakage	Smart metering	Water efficiency	NHH DMOs
Baseline	Not included	AMP7	AMP7	AMP7	None
Extended low	Included	24%	3 AMP roll out	Low	Medium
Extended plus	Included	31%	2 AMP roll out	High	Medium
Aspirational	Included	38%	2 AMP roll out	High	Medium
50% leakage	Included	50%	2 AMP roll out	High	Medium

10.7.1.3 Our analysis of these portfolios determined:

- Only the extended plus, aspirational and 50% leakage portfolios are feasible for fulfilling the new water needs of the region with the supply-side options available to us.
- The best value metrics show that increasing the amount of demand management savings only marginally reduces the investment in supply-side options (£5.3 billion for 50% leakage compared to £5.0 billion for aspirational), but comes with a significant increase in cost (£26.8 billion for 50% leakage and £7.1 billion for the aspirational portfolio).
- There is little difference in the environmental metrics between the portfolios.

10.7.1.4 Consequently, we chose the **aspirational portfolio** to include in our initial most likely scenario. This is more ambitious than Extended plus and includes a higher percentage of leakage reduction that will contribute to the national target of 50% leakage reduction. This option does carry significant cost but the vast bulk of this will be incurred in AMP9 and beyond, and will be revisited as part of our WRMP29/PR29 planning process.

10.7.2 Licence capping

10.7.2.1 We included five initial licence capping scenarios for WRMP24, with the driver of ensuring no deterioration. An additional two were added through consultation with the Environment Agency. These scenarios explore variations on the timing of licence capping, with all scenarios applying the same licence capping quantity from 2036 onwards.

Table 18 Licence capping scenarios

Licence Cap Scenario	Capped at Peak	Capped at Average	
	Time-Limited Licences	Time-Limited Licences	All other Licences
1	-	2022-2024	2025
2	2022-2024	2025	2025
3	2022-2024	2025	2030
4	2022-2024	2030	2036
5	2022-2024	2036	2036
6	-	2022-2024	2030
7	2022-2024	2030	2032

10.7.2.2 The Environment Agency consider scenario 6[64] as the baseline to compare the other scenarios against. To conduct this comparison, the EBSD model used the aspirational demand management portfolio and an unconstrained supply-side options set. Environmental destination was forecasted to start in 2040 and 1 in 500 year drought resilience in 2039.

64 It is not accepted that the changes in the amount of water that can be abstracted between scenario 6 and the other feasible scenarios necessarily causes deterioration or presents a risk of that nor that the use of scenarios other than 6 automatically gives rise to the need for OPI. However even if OPI is required in order to amend or alter licences our policy decision modelling shows that OPI would be satisfied.

10.7.2.3 The initial modelling found that the change from maximum peak to recent actual average volume (for both time-limited licences and permanent licences) created a deficit in all the scenarios if there was no supply-side intervention. For some scenarios, including the baseline, deficits were witnessed at the start of the planning period.

10.7.2.4 After supply-side options are made available to fulfil a supply demand balance, it was found that scenarios 1, 2, 3 and the baseline, scenario 6, resulted in residual supply demand deficits. These deficits occur because these scenarios include earlier licence caps, and there are insufficient supply-side options available early in the planning period 2022-2032.

10.7.2.5 By 2032 the deficit is resolved for all scenarios, as this is the timescale when larger and more complex supply options, such as desalination and water reuse, become available within the model. As any potential WRMP24 plan must maintain the supply demand balance, licence capping scenarios 1, 2, 3 and 6 are considered unfeasible.

10.7.2.6 Further analysis of scenarios 4, 5 and 7 found:

- Scenario 7 delivers benefits the earliest but comes with an increased operational carbon, cost and bill impact. It also obligates us to developing supply-side solutions, including desalination, at the start of the planning period; this approach could result in abortive investment as we would be committing to environmental destination reductions before the outcome of the AMP8 WINEP investigations.
- We cannot utilise the surplus in our system, locked into our Ruthamford North WRZ, to fulfil licence cap reductions until 2030 as new interconnectors need to be built to utilise it. Therefore, we cannot carry out licence capping earlier than 2030.

10.7.2.7 In conclusion, we determined that licence capping **scenario 4** is the most suitable for our initial most likely scenario; it demonstrates greater ambition than scenario 5 whilst being more cost effective and flexible than scenario 7.

10.7.3 1 in 500 year drought resilience

10.7.3.1 Our WRMP24 must deliver resilience to a 1 in 500 year drought event by 2039, reducing the use of drought permits and emergency drought orders except in extreme events. To determine the initial most likely scenario for enhanced drought resilience, we investigated the optimum timing for enhanced drought resilience. This was achieved by considering the costs and benefits of five alternative dates, shown in Table 19.

Table 19 Alternative dates for meeting drought resilience to 1 in 500 years

Year 1 in 500 year drought resilience achieved	Years of additional resilience compared to the baseline
2025	14
2030	9
2035	4
2039	N/A
2045	-6
2049	-10

10.7.3.2 Analysis of the modelling results showed that:

- Delivering drought resilience early in the forecast (2025 and 2030) results in residual supply demand deficits. These deficits occur because there are insufficient supply-side options available that early in the planning period. These supply demand deficits are resolved by 2032 in all scenarios, as this is when larger and more complex supply-side options, such as desalination and water reuse, become available. As our WRMP24 must maintain a supply demand balance without any final planning deficits, the scenarios for delivering drought resilience by 2025 and 2030 are excluded from further analysis as they do not meet this requirement.

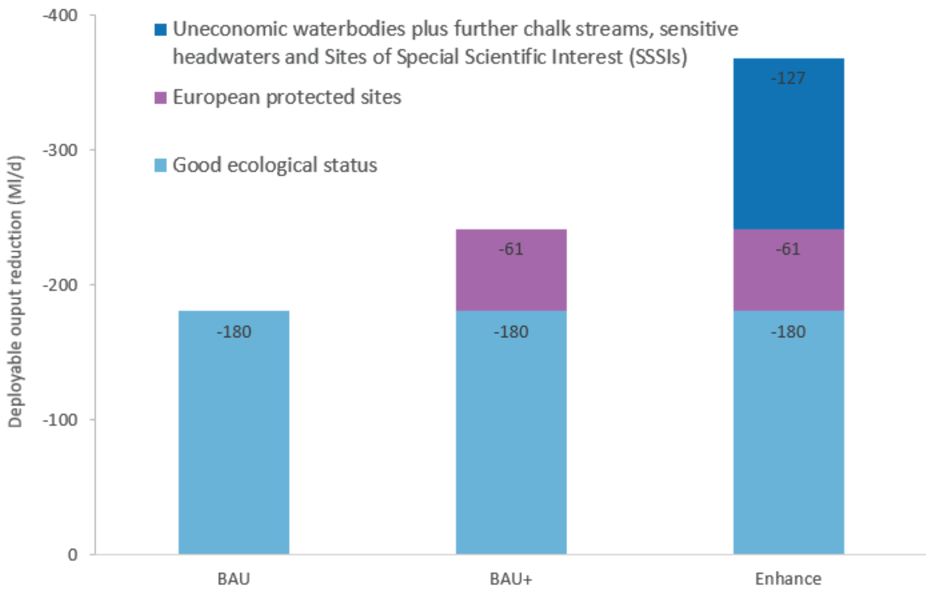
- Comparison against our best value metrics shows that delivering drought resilience earlier than 2039 results in large cost, carbon and SEA impacts as we would need to commit to desalination and water reuse supply-side options.
- Delaying enhanced drought resilience to later than 2039 results in a similar portfolio of options, with minimal variability in capital and operational cost.
- An independent CBA has been conducted; this found that the later the enhanced drought resilience is achieved, the lower the overall net cost. However, the CBA did not include all of the potential economic costs of an extreme drought.
- The inclusion of drought permits does not provide significant cost savings, as they do not enable options to be delayed.
- Our customers have told us that the 2039 date feels right.

10.7.3.3 Having considered this evidence, we included **enhanced drought resilience in 2039** in our initial most likely scenario. We did not include the benefits of drought permits but they will be considered as potential interventions as part of our adaptive planning programme.

10.7.4 BAU+ environmental destination

10.7.4.1 We modelled three levels of environmental destination with varying start dates and profile. All of these scenarios achieved the full environmental destination scope by 2050, our required delivery date. The components of each environmental destination scenario, and their associated quantities, are shown in Figure 51 below.

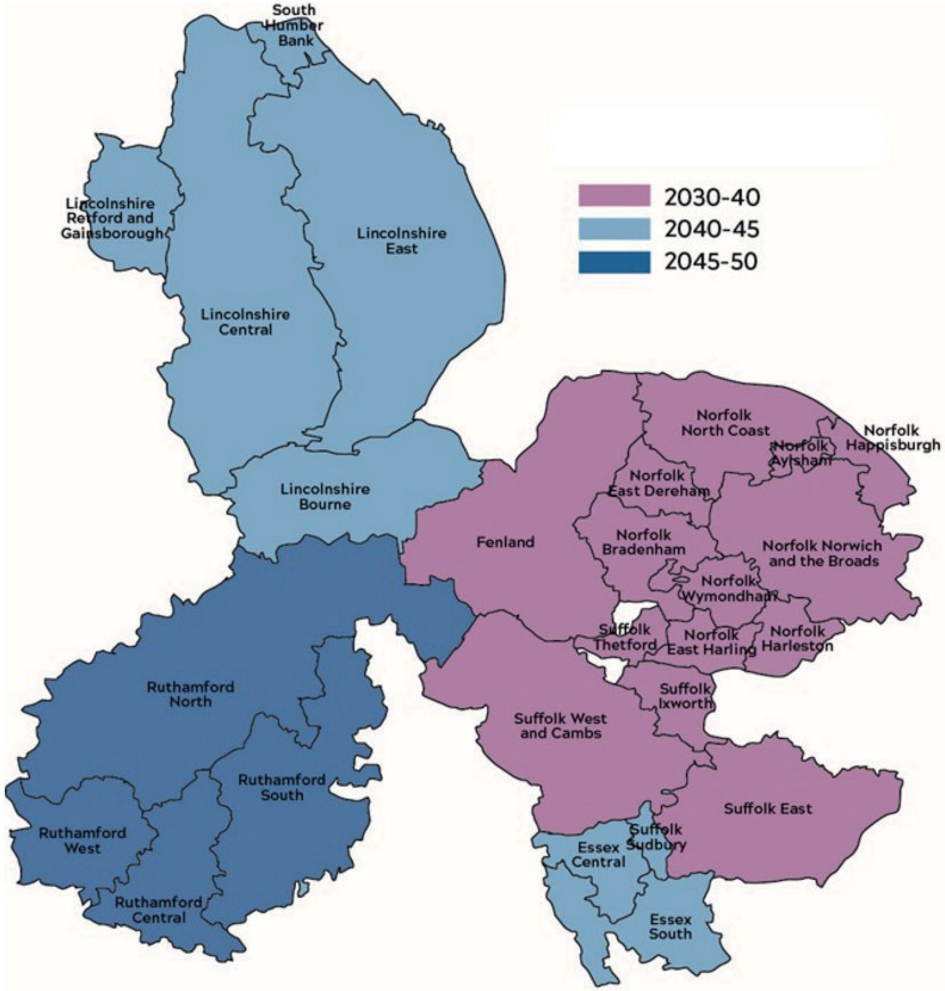
Figure 51 Components of each environmental destination scenario



10.7.4.2 For the profiled scenarios we prioritised WRZs that contain sources which have the greatest potential to improve the environment if their abstractions are reduced. This prioritisation is shown in Figure 52.

10.7.4.3 Please see the Sustainable Abstraction and Environment technical supporting document for further information.

Figure 52 Prioritisation of WRZs for environmental destination reductions for profiled scenarios



10.7.4.4 The three environmental destination scenarios were combined with five environmental ambition scenarios, plus a baseline of no environmental destination to create 16 scenarios. These are shown in Table 20 below.

Table 20 Environmental destination scenarios modelled

Environmental destination scenario	Environmental ambition scenario	
	Applied as	Year
None	Not applicable	Not applicable
BAU 30	Step change	2030
BAU 36	Step change	2036
BAU 40	Step change	2040
BAU 45	Step change	2045
BAU P	Profiled	Starting in 2036
BAU+ 30	Step change	2030
BAU+ 36	Step change	2036
BAU+ 40	Step change	2040
BAU+ 45	Step change	2045
BAU+ P	Profiled	Starting in 2036
Enhance 30	Step change	2030
Enhance 36	Step change	2036
Enhance 40	Step change	2040
Enhance 45	Step change	2045
Enhance P	Profiled	Starting in 2036

10.7.4.5 Our modelling of these scenarios shows:

- We cannot deliver environmental ambition before 2036 as it results in unresolved deficits.
- Delivering environmental destination in 2036 requires the highest level of investment. For the scenarios starting in 2040, 2045 and phased from 2036, we experience similar capital costs but operational costs vary according to the timing of the supply-side options.

- Phasing the priority catchments provides the greatest average annual abstraction reduction over 25 years for each level of environmental destination.
- The costs for delivering BAU in 2040 is £2.27 billion, BAU+ will cost £3.68 billion, and Enhanced will need £5.45 billion worth of investment.
- Using a benefits appraisal tool developed by the Environment Agency, based on the outcomes of the National Water Environment Benefits Survey (NWEBS), we found that, proportionally, the benefit of going beyond BAU to BAU+ is similar to the cost. However, moving to the Enhanced scenario suggests that the costs are significantly higher than the benefits; this is reflective of the inclusion of the non-economic water bodies within this scenario.

10.7.4.6 Our analysis of this information highlights that the trade-off for greater abstraction reduction is higher expenditure, as we need to build more new supply-side options to replace those lost. This means the lowest cost scenario in terms of total expenditure is BAU, with a later implementation date (from 2040 onwards) as this requires the lowest capital cost to replace the lost abstraction and has fewer years of operational costs included in the total expenditure.

10.7.4.7 Through the regional planning process it has been agreed to use BAU+ as the environmental destination scenario in the regional plans [65]. Our analysis supports this decision to include **BAU+ in our initial most likely scenario**. However the plan includes developing adaptive pathways to demonstrate how we could achieve BAU or Enhance in the future.

10.7.4.8 The assessment shows that the **ambition profile where higher-priority water resource zones have abstraction reduced in 2036 and then lower priority ones in 2040 and 2045 is suitable to use for the initial most likely scenario.** This bespoke scenario allows for early reductions where they are needed the most, whilst delaying the negative environmental impacts of investments in less sensitive zones.

10.7.4.9 This scenario is based on profiling impacts for whole water resource zones in specific areas of our supply system rather than individual sources within a zone. This approach is suitable for the initial most likely scenario but more detailed assessment would be required to confirm locations of where to prioritise abstraction reductions.

10.7.5 Initial most likely scenario

10.7.5.1 Following on from this policy decision making, it was decided that the initial most likely scenario would include:

- The aspirational demand management portfolio
- Licence cap scenario 4 with all licences capped at peak maximum volume by 2025, time-limited licences capped at actual average volumes by 2030 and all other licences capped at actual average volumes by 2036.
- Enhanced drought resilience to be achieved by 2039.
- Environmental destination is BAU+. with a profiled phasing from 2036.

10.8 Developing a least cost plan for the initial most likely scenario

10.8.1 Using this initial most likely scenario as our starting point, we developed a series of least cost plans [66] that explored the impacts to option selection when the regional no and low-regret options were included as 'must dos' or modelled as unconstrained [67]. These least cost plans are shown in Table 21.

10.8.2 Through ongoing liaison with the Environment Agency, we had originally agreed to use the 'regional plan low regret options plan' (second row of Table 21) as our benchmark; these low regret options are the SROs: Fens and Lincolnshire reservoirs. However,

65 Meeting our future water needs, the next steps with environment destination scenarios and sustainability changes within water resources planning. Environment Agency 3rd May 2022.

66 A least cost plan is one that only optimises based on cost. It does not consider best value metrics, or our objectives for WRMP24, just the cheapest way of meeting the supply demand scenario. The least cost plan provides a benchmark for all other plans to be compared against and form the starting point for the development of the best value plan.

67 This modelling includes the aspirational demand management portfolio and a 25 year planning period.

our revised draft WRMP24 least cost modelling highlighted that these SROs were selected in the same years for all least cost plans. Therefore, we used the Supply options least cost plan (first row in Table 21) as our benchmark; this reflects the regional plan but does not constrain the scale or timing of the SROs. This least cost plan became **Plan A.**

Table 21 Least cost plans modelled

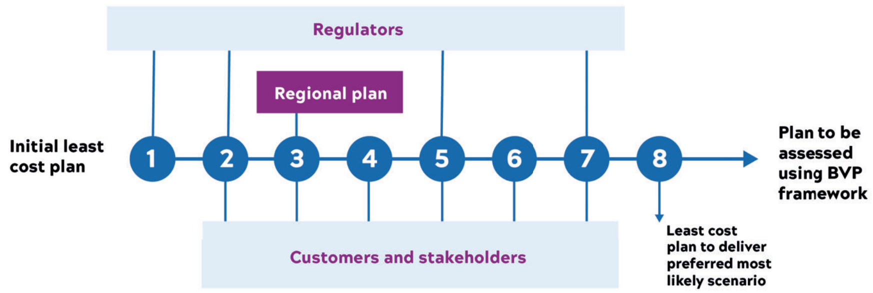
Least cost plan	Assumptions in model	Purpose of plan
Supply options least cost plan	The preferred demand management strategy is set in the model. Supply options are unconstrained (apart from delivery timescale, option costs and deployable output benefit).	This shows the least cost combination of supply options to meet the needs of Anglian Water customers only. The plan includes our preferred demand management strategy but it does not automatically reflect the outputs from the regional plan.
Regional plan low regret (i.e. strategic resource) options	The SROs from the regional plan are set in the model, but the model is free to optimise when these options are required.	The model determines when the regional plan strategic resource options are needed to be delivered by to meet the needs of Anglian Water. It also selects the least cost combination of other supply options required to meet local deficits.
Regional plan low regret (i.e. strategic resource options) and timings	The SROs from the regional plan are set in the model including the delivery dates set by the regional planning needs.	The model selects the least cost combination of supply side options to meet local needs.

10.9 Developing an alternative plan for a preferred most likely scenario

10.9.1 After we produced the least cost plan for the initial most likely scenario **(Plan A)**, we then developed an alternative. This aimed to reflect the draft regional plan, align with neighbouring water companies, and use the feedback from internal and external stakeholders, customers and regulators.

10.9.2 These factors were sequentially applied in each individual model run, making it explicit how each change has shaped the plan. This process is shown in Figure 53; it allows us to adjust the initial most likely scenario to maximise our best value planning objectives. This refined scenario is referred to as our preferred most likely scenario (iteration 7), with the final iteration (8) providing a least-cost optimisation against the preferred most likely supply scenario; this is used for comparison with the alternative plan.

Figure 53 The process of developing an alternative plan for a preferred most likely scenario



10.10 Best value planning iterations

10.10.1 The iterations used to form this preferred most likely scenario are detailed below. We indicate at each iteration what factor drove the refinement.

1. **Develop a bespoke licence cap scenario (feedback from regulators)**

   In response to stakeholder feedback, a bespoke scenario was developed; this brought forward permanent licence caps with the aim of ensuring full utilisation of all available resource. To create this bespoke scenario 8[68], we prioritised, where possible, abstractions that interact with European protected sites. Our analysis shows that scenario 8 is similar to scenario 4 but provides more water back to the environment faster; the trade-off to this is that there is an increase in operational cost and carbon due to the additional utilisation of the supply-side options.

   Conclusion of iteration: scenario 8 included.

2. **Maximise low regret investment (feedback from customers, regulators, the wider business and consultation)**

   It is recognised that there is some uncertainty associated with our initial most likely scenario, mainly due to the location and scale of environmental destination. This uncertainty will be reduced for WRMP29 as we will soon commence a series of scientific investigations. The results of these AMP8 WINEP investigations will provide a better understanding of what the long-term sustainable abstraction requirements are for the region, and what solutions are required to deliver it.

   To recognise this uncertainty, and to maximise low regret investment, we moved the delivery of environmental ambition to 2040. This allows us time to wait for the results of our AMP8 WINEP investigations; this means we can tailor our solutions to match the environment's needs. By doing this, Caister desalination and Fens Reservoir are required in 2040 and 2039, respectively.

   Conclusion of iteration: the delivery of environmental destination was moved to 2040, to try and avoid the deployment of desalination before the results of the AMP8 WINEP investigations are known.

3. **Maximising benefits for customers, the region and the environment (feedback from customers and stakeholders)**

   Iteration two resulted in the Fens Reservoir being selected in 2039, leaving Mablethorpe desalination to meet the deficits required by licence capping. As we have a requirement to make sure we meet our region's water needs in an efficient, sustainable and resilient manner whilst protecting the environment, we compared the performance of Fens Reservoir against Mablethorpe desalination. An overview of this analysis is provided below.

   - Fens reservoir performed better than Mablethorpe desalination for operational costs, carbon and the SEA environmental best value metrics.
   - For Habitat units requiring restoration, the reservoir and desalination perform similarly in terms of their impact on biodiversity. However, when the requirement for 10% net gain is considered, the reservoir provides a significant improvement compared to the desalination option.
   - Our experience of operating reservoirs shows that reservoirs give the opportunity to provide outdoor spaces and recreation opportunities, something desalination (and water reuse) does not. This has been verified using by an independent study which used a range of methodologies and economic impact modelling[69].
   - Desalination is more scalable than reservoirs and can be sized to provide the exact capacity needed. This makes it preferable to build Fens Reservoir earlier and add

68 This is an additional scenario to those presented in Figure 45. It is not accepted that the use of scenario 8 rather than scenario 6 will cause deterioration or present a risk of it, nor necessarily require OPI as part of this licence capping policy. However, we have considered how we would manage the risk of deterioration under WFD. This analysis found that our aspirational demand management portfolio prevents the risk of deterioration, offsetting the increase in demand, and therefore abstraction, due to growth. This continues our historical performance of not increasing overall abstraction despite significant growth.

69 The review found that the key socio-economic benefits delivered by reservoirs stemmed from recreational activities and public access to green space. These benefits include mental and physical health, education, tourism and wider economic benefits due to increased visitors to surrounding areas. Desalination and water reuse present more limited opportunities to create these benefits.

desalination plants later in the plan, once the need and scale of our environmental destination has been determined by the AMP8 WINEP investigations. Deferring the desalination plants also provides greater opportunity for technological developments that may increase the efficiency of the plants, and reduce energy requirements.

- Liaison with WRE and fellow water companies (notably Cambridge Water) also ascertained that Fens Reservoir is required earlier than 2039 to meet the region's water needs.

After evaluating this evidence, we concluded that Fens Reservoir meets our water needs better as it meets more of our best value plan objectives than desalination. Desalination is better phased towards the end of the plan as it is scalable, making it more flexible to the results of our AMP8 WINEP investigations. Phasing desalination later in the process also allows us to explore newer technologies that could make desalination less carbon intensive.

Conclusion of iteration: Fens Reservoir is brought forward to 2036 whilst Mablethorpe desalination moved back to 2039.

4. **Maximise utilisation of surplus resource (feedback from customers and stakeholders)**

The construction of new resource options can provide an initial surplus until full utilisation is achieved. Following feedback from customer and stakeholders in our consultation that we should utilise all surplus resource and look for opportunities to accelerate supply reductions, we explored how this could be achieved. Our modelling found, by delaying enhanced drought resilience in Ruthamford North and South to 2040/41, we created a consistent surplus of 15 Ml/d that could be utilised between 2036 and 2040.

Conclusion: enhanced drought resilience delayed in Ruthamford North and South to 2040/41 from 2039, creating a consistent surplus of 15 Ml/d in order to benefit the environment.

5. **Deliver environmental destination earlier in preference to drought (feedback from customers)**

Our engagement with customers has shown that they choose delivery of environmental improvement in preference to enhanced drought resilience. This led us to use the surplus generated by iteration 4 to reduce abstractions principally in Norfolk and Suffolk; these are areas known for environmental sensitivity, are likely to be priority catchments in terms of environmental destination, and may be subject to further licence changes as part of the Environment Agency's current investigations into the Broads SAC.

Conclusion: the surplus generated by iteration 4 is used to reduce sensitive abstractions in Norfolk and Suffolk.

6. **Future opportunities for regional benefit (feedback from customers, regulators, and stakeholders)**

In line with our company purpose and work within WRE, iteration 6 saw us explore how WRMP24 could provide future opportunities for regional benefit.

As part of this iteration we identified that we had two desalination plant options on the Norfolk coast, located at Caister and Bacton. Both options include a transfer to connect into the same location within our existing network; the main difference between the options is that Bacton is further away and requires a longer pipeline, reflected by its slightly higher cost.

However, locating the desalination plant at Bacton could provide opportunities to work with other industries, in particular the energy sector. This may provide benefits of shared assets such as intakes and outfalls which could reduce costs and provide efficiencies. This stretch of coast also benefits from greater certainty that the shoreline will continue to be protected into the future. We also believe there are water quality benefits for locating the plant at Bacton compared to Caister, as the seawater is less turbid so it would be easier and cheaper to treat.

Conclusion of iteration: Bacton is selected as our preferred location for a desalination plant in Norfolk.

7. **Maximise existing resource and improve resilience (feedback from customers, regulators, and the wider business)**

We have developed a number of backwash recovery schemes at groundwater treatment works. These schemes take process water (which otherwise would have been discharged from the works into the environment or sewer) and return it back to the start of the treatment process. Though these options only provide a small increase in deployable output they allow us to more fully utilise the water which we have abstracted.

As the backwash recovery options only provide a small increase in deployable output at each of the works, a secondary new supply-side option is also required in most WRZs. However, in Norfolk Aylsham WRZ the inclusion of both backwash recovery options is adequate to satisfy the deficit. But, this WRZ is one of our most environmentally sensitive zones with a risk of future abstraction reductions due to Habitats Regulations with the Environment Agency indicating that the River Bure catchment, which passes through the Aylsham WRZ, will be subject to further assessment as part of the Broads Sustainable Abstraction Plan between now and 2024. Therefore we have included a transfer from our Norfolk Norwich and the Broads water resource zone to Aylsham to provide a robust resilience supply that can be supported by the more strategic resources of Fens Reservoir and Bacton desalination.

This concludes the development of the preferred most likely scenario which includes:

- Scenario 8 sustainability reductions to abstraction licences (time-limited licences reduced to average recent actual by 2030, all licences by 2030-2036).
- Medium climate change (with high and low climate change included in headroom).
- Environmental destination scenario is BAU+, starting in 2040 for everywhere apart from the priority WRZs.
- Drought resilience to 1 in 500 by 2039/40 for everywhere apart from Ruthamford North and South WRZs, which is 2040/2041.

Conclusion of iteration: this plan becomes **Plan B** before moving onto iteration 8.

8. **What is the least cost plan to deliver the preferred most likely scenario**

Through the iterations to develop an alternative plan we have altered the initial most likely scenario, this becomes the preferred most likely scenario. As this has evolved from our initial most likely scenario, it is useful to understand what the least cost plan is for the preferred most likely scenario. To determine this, we use the unconstrained supply-side options set to develop a least cost plan for the preferred most likely scenario.

Conclusion of iteration: this least cost plan is the benchmark for comparing other plans against: this becomes **Plan C.**

10.11 Best for the Environment plan (abstraction)

10.11.1 In line with the WRPG and our company purpose, we wanted to develop a plan that emphasises our environmental objective to 'deliver long-term environmental improvement'. Following the modelling process detailed in the revised draft WRMP24 Decision Making technical supporting document, Section 6, we developed a best for the environment (abstraction) scenario focussed on achieving the highest level of abstraction reductions, delivered at the earliest feasible date. This scenario was based on:

- Using the highest environmental destination scenario, Enhance, by 2036.
- Capping abstraction licences as of scenario 8: time-limited licences reduced to average recent actual by 2030, all licences by 2030-2036.
- Medium climate change scenario (with high and low climate change included in headroom).
- Enhanced drought resilience to 1 in 500 years by 2039.

10.11.2 Using the full options set, we ran the model to produce a least cost set of supply-side options that would meet this best for the environment (abstraction) scenario. This created **Plan D.**

10.12 Plans taken forward to further testing and best value assessment

10.12.1 The four plans taken forward to further assessment are shown below:

- Plan A: Initial least cost plan based on the initial most likely scenario (as detailed in Section 10.8).

This is based on achieving BAU+ environmental destination starting in 2036 and profiled over time by prioritising the most sensitive areas of our region. However, by delivering large reductions early, opportunities for the plan to be adapted based on the outcome of WINEP investigations are limited. In this scenario we achieve 1 in 500 year drought resilience by 2039.

- Plan B: Alternative plan based on preferred most likely scenario (as detailed in Section 10.10, stage 8).

Based on BAU+ this scenario profiles the reductions to allow the later part of the plan to be informed by the WINEP investigations. It maximises opportunities to utilise early surplus within the plan to deliver environmental destination reductions in the most sensitive areas. To enable these earlier reductions, we must delay drought resilience to 1 in 500 by one year to 2040. This scenario has been shaped by our customer and stakeholder engagement.

- Plan C: Least cost plan based on preferred most likely scenario (detailed in Section 10.10, stage 9).

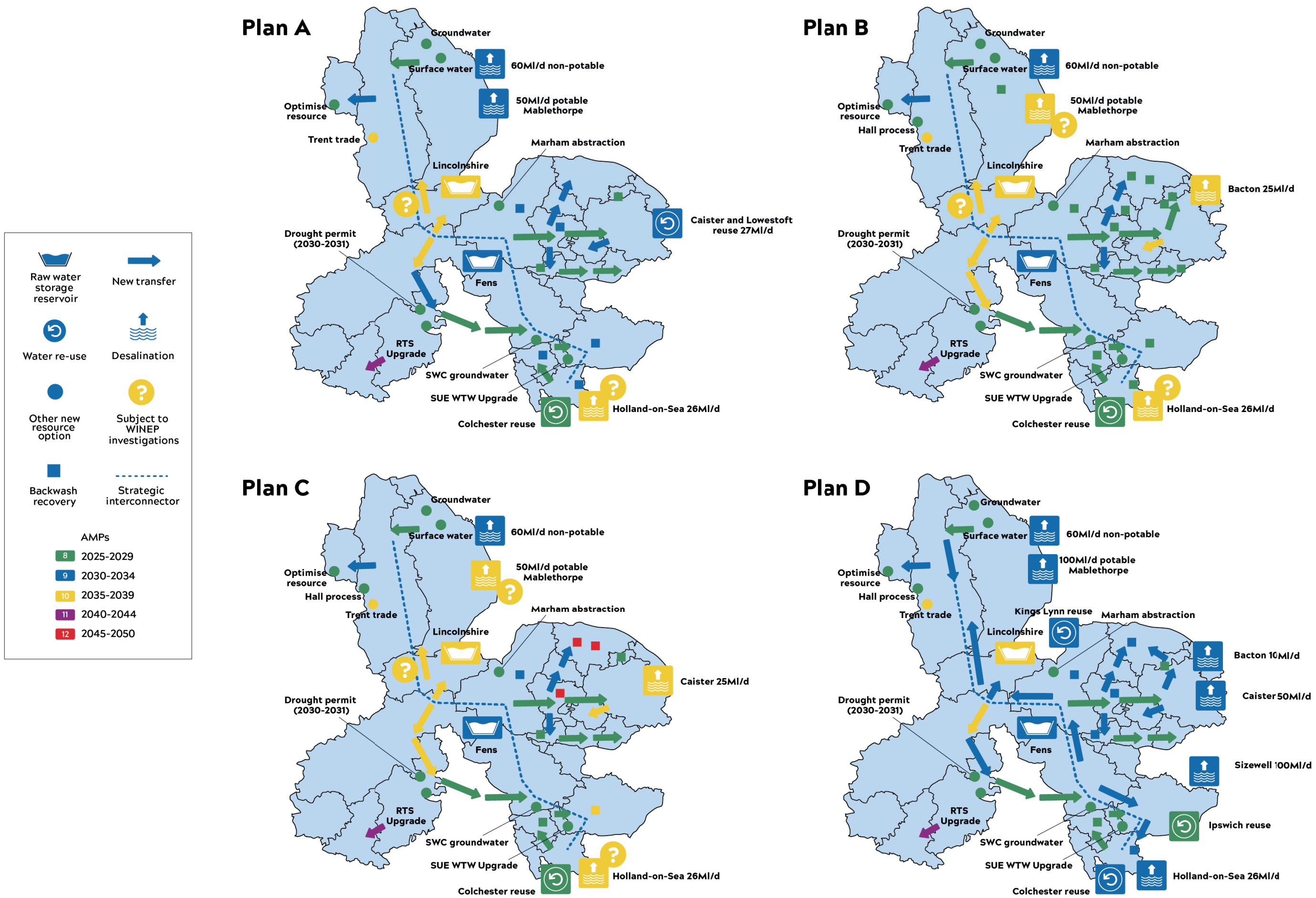
Based on BAU+ this scenario profiles the reductions to allow the later part of the plan to be informed by the WINEP investigations. It maximises opportunities to utilise early surplus within the plan to deliver environmental destination reductions in the most sensitive areas. To enable these earlier reductions, we must delay drought resilience to 1 in 500 by one year to 2040. This scenario has been shaped by our customer and stakeholder engagement.

- Plan D: Least cost plan based on best for environment (abstraction) scenario (detailed in Section 10.11).
- The largest level of environmental destination reductions based on the Enhance scenario are met as early as possible within the planning period. This prevents the ability for the plan to be adjusted to suit the outcomes from WINEP investigations. Drought resilience to 1 in 500 years is achieved in 2039.

10.12.2 These plans were put through sensitivity and stress testing, as well as least worst regrets analysis, to test for future uncertainty. They were also compared against our best value plan framework.

10.12.1 The supply-side plans

Figure 54 Four plans taken forward to best value framework assessment



10.13 Testing plans to future uncertainty

10.13.1 It is important to understand how our plans respond to future uncertainty, as we do not want wasted investment or stranded assets. To achieve this, we conduct thorough sensitivity testing, stress testing and least worst regrets analysis. We also conduct modelling to generate alternatives (MGA)[70] to add further robustness.

10.14 Stress testing

10.14.1 Stress testing establishes how stable plans are or if an adaptive approach is more suitable. We use this stage to understand the implications of future changes on the early investment in a plan, and whether it can adapt accordingly. In our stress testing, the model runs the core pathway as set within our baseline; it is is then free to choose the options later in the plan to meet the various scenarios.

10.14.2 We used the eight Ofwat common reference scenarios to stress test, plus others we have developed to test particular areas of plans. This can be referred to in the revised draft WRMP24 Decision making technical supporting document, Section 7.

10.15 Sensitivity testing

10.15.1 For sensitivity testing we explore what happens if the assumptions put into our model change, based on the preferred most likely scenario[71]. These model changes relate to the following components: the supply forecast, demand forecast, supply-side options, demand management options, and planning factors. We only change one element of the preferred most likely scenario in each run as this ensures we can understand the impact of that change in assumption.

10.15.2 We structured the sensitivity testing around a series of questions; some examples are shown below:

- If the Ofwat common reference scenarios were used instead of our preferred most likely scenario, how does this impact option selection
- Changes to the options, both supply and demand
- Variations to the planning factors
- How options from other regional groups could impact the plan

10.16 Least worst regret

10.16.1 Least worst regret analysis is a tool used to minimise regret across all scenarios analysed. This regret can be considered as the difference between a decision and the optimal decision.

10.16.2 We use this method to assess the consequence of committing to options early in a plan, and then the future changes. We determine the impact by how much additional investment would be required to meet the changed future need. We then identify the plan with the minimum additional spend (the optimal decision) and compare against the other plans. The plan with the least regret is the version that requires the lowest additional spend compared to the other plans.

10.17 Conclusions

10.17.1 This testing enabled us to analyse how the future could impact our choice of plans. Further detail is provided in the revised draft WRMP24 Decision making technical supporting document, Section 7 of the results of the testing, with a summary provided below.

- Varying the climate change scenario does not significantly impact the plan. WRMP19 included the large step change of historical climate change.
- All plans need an element of desalination capacity. When we excluded desalination there were insufficient alternative options to meet the need. The reservoirs options could be replaced with desalination but at considerably higher operational costs.
- Desalination is scalable so can be sized to meet the need.

70 The modelling to generate alternatives (MGA) shows that all but one of the options needed early in each of the four plans considered are consistent across plans. The exception was Colchester water reuse, which was not selected in Plan D (best for the environment).

71 We use Plan C which is the least cost version of this scenario.

- Exclusion of either reservoir impacts the ability to supply Cambridge Water; therefore these scenarios are considered unfeasible as these plans do not meet regional needs.
- Extending the length of the planning period from 25 years to 50 years shows:
  - The greatest impact is seen in the least cost plans, Plan A and Plan C. When optimised over the longer duration, larger desalination options are developed earlier in the plan.
  - Plan B is mainly stable when we extend the horizon, although it does build an additional 25 Ml/d of desalination capacity in 2040. The reservoir options are developed at the same time, with the other new resource options and the interconnector network remaining the same prior to 2036. Post 2055 an additional two water reuse schemes (29 Ml/d) and further desalination (25 Ml/d) is required.
  - Plan D remains almost identical over the longer planning horizon as all the need is met by 2039, with only additional transfer options needed in 2055.
- If we found, in subsequent rounds of planning, that imports from other regions were available, the plan would reduce the desalination capacity in 2040 if the imports were deemed better value. Additional imports would not impact the capacity of the reservoirs.
- If a neighbouring region needs an export from us in the future we would need to build additional desalination capacity sized to the export volume.

10.17.2 The largest variations in the plans are due to environmental destination. This uncertainty is mitigated by the development of our preferred most likely scenario which has been developed to be adaptive to the level and location of environmental destination. This is achieved by delaying most of the reductions to allow the WINEP investigations to inform the plan.

10.17.3 All the plans include the strategic resource options, which through the regional plan have been identified as the most robust and low regret options. However:

- Plans A and D require desalination capacity to meet the earlier supply reductions which makes the Lincolnshire Reservoir an additional or 'top up' option to meet the needs of environmental destination.
- For Plan A, most of the low or benign scenarios, such as low climate change or growth, fall within the reservoir capacity and therefore there is a risk that if these scenarios were to occur, we may have excess resource.
- Plan D is more severe where the Lincolnshire Reservoir capacity is only required to meet the most extreme scenario of Enhance environmental destination.
- Plans B and C are both based on the preferred most likely scenario which shifts the preference to deliver reservoirs earlier to meet the more certain need and builds desalination later in 2040. The scale and location of desalination can be adjusted to meet the need once confirmed through the WINEP investigations. This is also reflected in the least worse regret analysis which shows Plans B and C having the least regret.

10.17.4 Plan B was the best performing in the least worst regrets analysis, with the least worst regret of £0.99 billion. Plan D had the greatest overall regret at £5.93 billion.

10.18 Reservoir sizing

10.18.1 We have modelled the Fens and Lincolnshire reservoirs as unconstrained where appropriate, this ensures the full range of reservoir sizes and yields can be considered by the model. Through the sensitivity and stress testing this has demonstrated that for both reservoirs the 50MCM is the most robust sized reservoir.

10.18.2 The Lincolnshire Reservoir is consistently selected at 50 MCM across all sensitivity and stress test portfolios.

10.18.3 The Fens Reservoir is selected at 50 MCM across the majority of stress test, but does show more variability, with larger and smaller options selected in specific scenarios. For the sensitivity tests we did not constrain any of the options including the regional no-low regret ones and only included the proportion of the Fens Reservoir allocated to Anglian Water for the costs and the benefits. When the needs of Cambridge Water are included the Fens Reservoir is always selected at 50 MCM.

10.18.4 Modelling the relevant proportion of Fens Reservoir as unconstrained is useful to understand how it impacts options selection in our plan but it does not reflect the needs of Cambridge Water and the WRE region.

10.19 Applying the best value plan framework

10.19.1 After carrying out our testing for an uncertain future, we then applied the best value framework to the four alternative plans, allowing us to choose our best value plan. The performance against our best value plan objectives is summarised below. Further detail is available in the WRMP24 Decision Making technical supporting document.

10.20 The Best Value Plan

10.20.1 An overview of Plans A, B, C and D's performance against our best value plan outcomes is provided below. Further comparison against our best value plan objectives is provided in the revised draft WRMP24 Decision making technical supporting document, Section 9.

10.20.2 Our WRMP24 must ensure **supply meets demand** without any final planning deficits. All four of the plans achieved a supply demand balance and they all meet the demand criteria equally as they are all based on the same demand forecast, the aspirational demand management portfolio. Plan B optimises our available resource more than the other plans as it includes all of our backwash options.

10.20.3 All four plans deliver a secure and wholesome supply of water to other sectors, ensuring **supply meets demand,** by including 60 Ml/d of non-household demand on the South Humber Bank.

10.20.4 We must be a **resilient business**, taking into consideration drought and diversity of plan. All four plans deliver enhanced drought resilience, with Plan A delivering it marginally sooner. The plans are quite similar in terms of options diversity with both SRO reservoirs being selected in each plan, although there is a large variation between the number and capacity of desalination options. As desalination is the best option in terms of scalability to match the needs of our AMP8 WINEP investigations, Plans B and C perform best for this outcome as they are based on the preferred most likely scenario which phases desalination towards the end of the plan, allowing us to scale it according to need.

10.20.5 To be a **resilient business,** we consider delivery risk for the plans. This is determined by examining the number of options required on the earliest available date they could be delivered by. Plan B and C both perform similarly for this metric compared to plans A and D. The main difference between Plan B and C is the selection of Caister desalination in Plan C instead of Bacton desalination in Plan B. Our assessment has shown that Bacton desalination is likely to be more favourable in terms of deliverability due to opportunities for shared assets with the energy sector and better water quality, meaning that overall Plan B has the lowest delivery risk.

10.20.6 All the plans include the SRO reservoirs which provide the greatest potential for **net beneficial opportunities for local communities.** These reservoirs, as shown by an independent socio-economic review, have more potential to provide benefits to communities. We have also taken into account our stakeholders and customers' preferences in Plan B, reflecting their preference for environmental improvement over drought, reservoirs over desalination, and the desire to balance costs, environmental and carbon impacts.

10.20.7 We consider how adaptive the plans are for the **investing for tomorrow** objective. All the plans include the SROs, which through the regional plan and our own WRMP24 modelling have been identified as the most robust and low regret options. Plans B and C are both based on the preferred most likely scenario which delivers reservoirs first to meet the more certain need and builds the more scalable desalination later in 2040. Plans B and C are based on the preferred most likely scenario, waiting for the results of the AMP8 WINEP investigations, and therefore perform best.

10.20.8 As a company, we want a **flourishing environment.** Whilst Plan D offers the greatest abstraction reduction, it has a higher cost to the environment in terms of construction and operational impacts, habitats lost and natural capital. Using the SEA, the positive benefits for both construction and operational are similar for all plans. The biggest difference is the negative impacts where Plan D performs worst; this is due to the amount of desalination required to offset the larger abstraction reductions.

10.20.9 Plan D performs worst for the amount of habitat units requiring restoration; this is due to the amount of desalination needed to offset abstraction reductions. All plans also score negatively on our natural capital approach, as supply-side options are typically built on agricultural land. The SROs, present in all the plans, are working towards a **flourishing environment** through engagement with local stakeholders.

10.20.10 We also want a **smaller footprint** as a business, with a commitment to be net zero in terms of operational carbon by 2030. Our analysis shows that Plans B and C have slightly more operational carbon profile at the start of the plan compared to Plan A due to the additional licence caps addressed in those plans. Plan C would require more energy from renewables up to 2040. Plans A and D require capital carbon impacts to be incurred earlier in the time horizon, as they have earlier infrastructure construction commitments. Plans B and C delay more capital carbon impacts later in the planning horizon, which enables more time for additional low-carbon construction techniques to be enabled.

10.20.11 All plans align with the concept of **intergenerational equity**, in that their financial costs correspond to the timings where benefits such as reductions in unsustainable abstractions, 1 in 500 year drought resilience and recreation and amenity benefits are enabled. Plans B and C are best for intergenerational equity, as they reduce the possibility of customers paying for assets with less certain benefits. For example, desalination options which might not be required depending on the outcome of AMP8 WINEP investigations.

10.20.12 Based on the evidence of this best value planning assessment, Plans B and C meet all the objectives similarly; the only differences between the plans are:

- Plan B includes a transfer to Aylsham WRZ, a small mainly isolated zone with high summer demand and a 14% increase in distribution input over the 25 years. Whilst household growth is expected to be offset by demand management, there is potential for further non-household demand and licence reductions due to Habitats Regulations. This new transfer provides **a resilient, secure and wholesome supply of water to our customers** in Aylsham WRZ.

As one of our most sensitive zones because of the proximity of our abstractions to the River Bure chalk stream, we have prioritised licence caps and environmental destination within this zone. These needs can be met using surplus created by new supply-side options to **deliver long-term environmental improvement.**

The zone is at risk of future licence reductions due to Habitats Regulations so the transfer provides an opportunity to **adapt to future scenarios.**

The transfer provides a robust resilient supply to this zone, supported by the more strategic resources of Fens reservoir and Bacton desalination **increasing resilience.**

- Plan B includes Bacton desalination, rather than Caister desalination. Bacton provides more potential for conjunctive use with the energy sector, supporting a **secure and wholesome supply of water to other sectors**. It is also a more robust location in terms of shore line protection, ensuring a **plan that can adapt to future scenarios** whilst being **affordable** and **sustainable over the long term**.
- All of the backwash options are included in Plan B, aligning with our objective to **optimise our available resource** by maximising all opportunities to use water efficiently.

10.20.13 Based on the evidence of our best value planning assessment, and the advantages over Plan C as described above, Plan B offers best value for our customers and stakeholders whilst providing benefits to society and protection to the environment.

10.21 Why is Plan B our Best Value Plan?

10.21.1 A summary of why we believe Plan B is our best value plan is provided below.

Table 22 How Plan B meets the best planning objectives

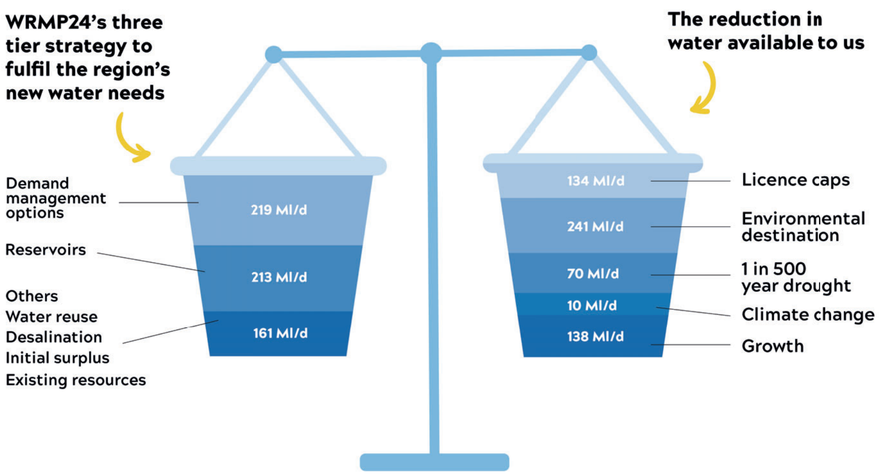
Outcome	Objective	How Plan B meets the objectives
Supply meets demand	Deliver a secure and wholesome supply of water to our customers	Our WRMP24 must maintain the supply demand balance without any final planning deficits. Plan B meets this.
	Optimise our available resource	Plan B includes our preferred demand management options. Plan B contains all the backwash recovery options which maximises our use of available resources.
	Deliver a secure and wholesome supply of water to other sectors	Plan B includes 60Ml/d of forecast non-potable demand for future hydrogen production and carbon capture industrial development in the South Humber Bank WRZ. This demand is directly linked to the South Humber Bank desalination option and does not influence the rest of the supply system. Other multi-sector needs form part of the development of the regional plan. We have not included any future demand for agriculture, however there is ongoing work as part of the development of the SRO reservoir options to evaluate potential benefits for agriculture.
Fair charges, fair returns	A plan that is affordable and sustainable over the long term	These objectives are key trade-offs as the scale and timing of environmental destination adversely affects the costs, carbon and environmental metrics. Plan B meets the expectation to achieve BAU+ scenario. The timing of environmental destination for Plan B allows the WINEP investigations to inform the strategy ensuring efficient costs, carbon and environmental metrics later in the plan where there is the greatest uncertainty. Plan B performs well in terms of cost, carbon and environmental metrics to Plan C, and avoids the potential adverse effects of earlier commitment to desalination. Plan B includes a transfer to Aylsham water resource zone, an environmentally sensitive zone. This enables improved adaptation to future sustainability reductions.
Flourishing Environment	Deliver long-term environmental improvement	
A smaller footprint	Deliver long-term environmental improvement	
Resilient Business	Increase the resilience of our water systems	Plan B meets drought resilience to 1:500 in 2039 but delays some areas to 2040 in order to prioritise environmental needs reflecting the preference from our customers. Plan B include both SRO reservoirs, supported with desalination options which provide scalability to match the need. In Plan B there is adequate time for the WINEP investigations to inform the scale of the need before we commit to constructing new assets. Plan B includes a transfer to Aylsham water resource zone, which is an isolated zone. This enables enhanced resilience. Plan B includes Bacton desalination option, which has better potential for conjunctive use with the energy sector, and adaptability to future climate change than the alternative Norfolk desalination option.

Outcome	Objective	How Plan B meets the objectives
Positive impact on communities	A plan that supports the views of regional stakeholders and water companies' customers and is not detrimental to social wellbeing	Plan B includes the SRO reservoirs which provide the greatest potential for net beneficial opportunities for local communities. Plan B is shaped by our customer engagement and reflects their preferences for delivering environmental improvements ahead of drought resilience, developing water reuse as their preferred option type whilst balancing costs, environmental and carbon impacts.
Investing for tomorrow	A plan which can adapt to future scenarios	Plan B is based on delivering environmental destination at a time that enables the plan to be informed by the outcomes of the WINEP investigations. This allows the plan to adapt to the greatest level of uncertainty in our forecasts.

10.22 The impact of Plan B

10.22.1 Plan B's supply-side option selection, and associated key policy decisions, satisfy the region's new water needs as shown in Figure 55. As can be seen, reservoirs satisfy nearly half of this.

Figure 55 Fulfilling our new water needs in WRMP24



10.22.2 In conclusion, we have developed a balanced option portfolio split between demand management (37%), reservoirs (36%) and other supply (27%) to meet the challenges of the planning period.

11 Adaptive planning and monitoring

11.0.1 The WRPG states that we should consider if an adaptive plan is more appropriate than a 'conventional' WRMP24, where there is a single preferred plan. An adaptive plan [72] contains a core pathway [73] and a series of adaptive pathways[74].

11.1 The core pathway

11.1.1 Using the outputs from the testing uncertainty stage, we determined which parts of the preferred plan (Plan B) are core and which are adaptive. The core pathway is shown below:

- The transfers needed in AMP8 to connect WRZs to the WRMP19 interconnectors.
- Options where we make upgrades to maximise output from existing resources.
- A water reuse scheme required in AMP9 with development started in AMP8 as part of the Accelerated Infrastructure Development programme.
- The two SROs: Fens and Lincolnshire reservoirs.
- Our aspirational demand management strategy.

11.1.2 The other schemes within Plan B are the adaptive pathway; these either have shorter delivery periods and can be delivered within an AMP, or are required later in the plan.

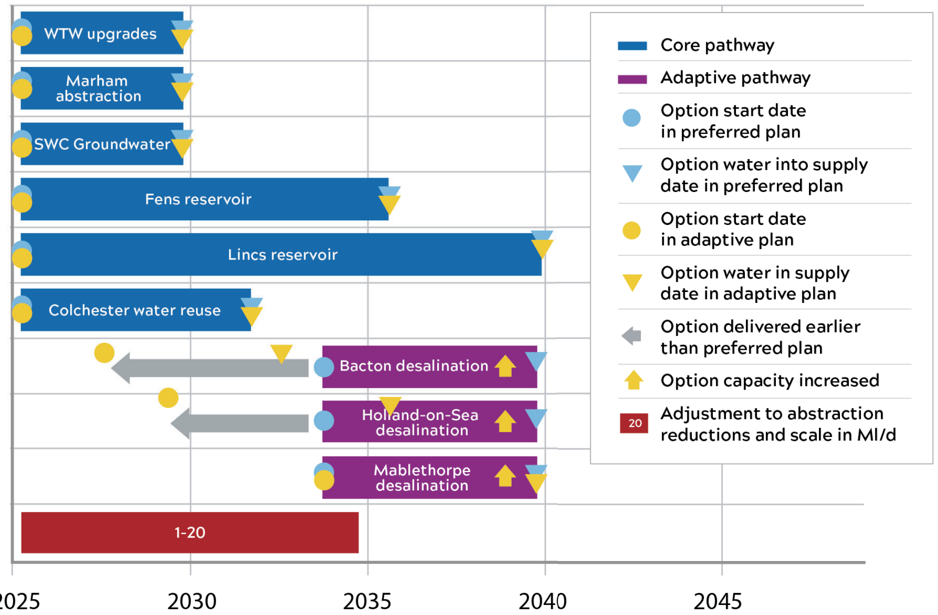
11.2 Pathways

11.2.1 Our testing for uncertainty identified scenarios that could trigger an alternative adaptive pathway[75] to Plan B, these are related to the following risks: later delivery of key schemes, the options do not provide the expected benefits or the forecast assumptions change.

11.2.2 This analysis has driven us to develop ten alternative pathways with decision points[76] and trigger points[77].

11.2.3 Figure 56 illustrates the consequences if demand management was less effective than expected.

Figure 56 Adaptive pathway for demand management being less effective than planned



72 A package of investments over time. Long-term delivery strategies will contain a core adaptive pathway and a number of alternative adaptive pathways.
73 A package of no- and low-regret investments, including investment required to keep future options open.
74 A package of planned investments over time. Long-term delivery strategies will contain a core pathway and a number of alternative adaptive pathways.
75 A package of investments that should be undertaken only for under certain circumstances.
76 The point in time when a decision would need to be taken about whether an alternative adaptive pathway is to be triggered. This is either set at the same point in time as the trigger point, or in advance.
77 The point by which an alternative adaptive pathway would need to be followed in order to cope with the changed circumstances.

11.2.4 In this situation we would bring forward the development of the Bacton desalination option to start in AMP8, rather than starting AMP9 as in the preferred plan. This would require us to initiate design and develop the Bacton scheme in AMP8 to a stage where we can switch to actual construction and delivery earlier than the preferred plan through AMP9 transition funding if appropriate.

11.2.5 The Holland on Sea desalination plant would need to be brought forward to commence at the end of AMP8, to tie in with WRMP29 and Price Review 2029 (PR29). All desalination plants would require an increase in capacity, with Bacton increasing to 45 Ml/d, Holland on Sea increasing to 32Ml/d and Mablethorpe from 50 Ml/d to 65 Ml/d.

11.2.6 Demand management is a pivotal component of our preferred plan, especially early in the planning period when we have limited feasible supply-side options. If the benefits from the demand management options were lower than anticipated, we would have residual deficits. We would look to investigate the feasibility of increasing the leakage component of our demand management strategy if this occurred, but are mindful that this would need to be cost effective and that it would not be adequate to meet the full shortfall. This shortfall would need to be met through an adjustment to licence caps.

11.2.7 For some of the adaptive pathways it is not possible to satisfy all deficits, due to the time needed to deliver options. The adjustment to abstraction reductions, in these pathways, is the difference in the supply demand balance that is needed to ensure customers can receive a secure supply of water, ahead of new sources being commissioned. It is not accepted that these adjustments necessarily causes deterioration or present a risk of that nor that this automatically gives rise to the need for OPI. However even if OPI is required in order to amend or alter licences our decision making modelling shows that OPI would be satisfied.

11.2.8 The nine other adaptive pathways can be reviewed in detail in the revised draft WRMP24 Decision Making technical supporting document, section 10, with a summary provided in the next sub-section of this report.

11.3 Summary of adaptive pathways

Table 23

Adaptive pathway name	Why is it a risk?	What are we doing to address the risk?	When will we know that the risk is likely to occur?	Decision point	Trigger point
Preferred best value plan	The scale and location of environmental destination not confirmed.	AMP8 WINEP investigations will further our understanding of the scale of deficits required to deliver the environmental destination and therefore could influence our plan from 2040.	2027 to inform WRMP29.	2029	2040
Fens Reservoir delivered late	Large complex scheme. The Environmental Impact Assessment (EIA) may flag previously unknown risks that could cause delays to delivery.	Stakeholder engagement through RAPID, allowing exposure to project early warnings. Monitoring as part of EIA. Monitor any potential delays during the construction phase.	2026 to inform Gate 5 Revise triggers as part of WRMP29 informed by knowledge of construction phase Revise triggers as part of WRMP29 informed by knowledge of construction phase.	2029	2029

Adaptive pathway name	Why is it a risk?	What are we doing to address the risk?	When will we know that the risk is likely to occur?	Decision point	Trigger point
Lincolnshire Reservoir delivered late	Large complex scheme. The Environmental Impact Assessment (EIA) may flag previously unknown risks that could cause delays to delivery.	Stakeholder engagement through RAPID, allowing exposure to project early warnings. Monitoring as part of EIA. Monitor any potential delays during the construction phase.	2026 to inform Gate 5 Revise triggers as part of WRMP29 informed by knowledge of construction phase	N/A as not changing plan	2040
Ruthamford South to Suffolk West and Cambs (via Cambridge Water) interconnector is late	Large complex scheme	Early engagement with delivery route to look at planning. Monitor any potential delays during the construction phase.	2025/25 Revise triggers as part of WRMP29 informed by knowledge of construction phase	2025	2025
The interconnectors to Norfolk are late	Large complex scheme	Early engagement with delivery route to look at planning. Monitor any potential delays during the construction phase.	2025/25 Revise triggers as part of WRMP29 informed by knowledge of construction phase	2025	2025
Marham abstraction is deemed unfeasibe	Potential for the relocation of the abstraction point for our water treatment works could cause deterioration. Licence conditions imposed from Environment Agency/Natural England could restrict deployable output benefit from option	Working with the Environment Agency to understand operation of their assets. Programme of water quality to understand the treatability of the raw water to progress detailed design.	2024/25	2025	2025
Suffolk West and Cambs groundwater is deemed unfeasible.	The licence isn't agreed or no certainty on how long it would be retained.	Hydrological modelling and possible monitoring. Discussions with the EA.	2024/25.	2025	2025
Demand management is less effective than planned	We have based our demand forecast on the savings in AMP7, behavioural change in AMP8 could be different. We have also included water savings for Government-led interventions which are beyond our control.	Demand management monitoring programme. Update every forecasts every 5 years as part of WRMP planning cycle.	2028 to inform WRMP29	2029	2029

Adaptive pathway name	Why is it a risk?	What are we doing to address the risk?	When will we know that the risk is likely to occur?	Decision point	Trigger point
Meet BAU scenario	The scale and location of environmental destination is not confirmed.	AMP8 WINEP investigations will further our understanding of the scale of deficits required to deliver environmental destination and therefore could influence our plan from 2040	2028 to inform WRMP29	2029	2040
Meet Enhance	The scale and location of environmental destination is not confirmed.	AMP8 WINEP investigations will further our understanding of the scale of deficits required to deliver environmental destination and therefore could influence our plan from 2040	2028 to inform WRMP29	2029	2040

11.4 Monitoring plan

11.4.1 Our monitoring plan, using some of the metrics developed through the best value planning framework, provides us with the information we need to make decisions on which future pathway we need to follow. It also allows us the time to make decisions.

11.4.2 Though our plan is adaptive to future uncertainty it is relatively simple in terms of decision and trigger points. The decision points will form part of the five year cycle of water resource planning and feature in WRMP29 and WRMP34. This process will include updates to forecasts for external influences such as population growth, non-household demand and climate change. We also recognise the WINEP investigations in AMP8 will provide the clarity on the scale and location of environmental destination. The output from these will be captured in WRMP29.

11.4.3 We will continue to monitor and assess the effectiveness of demand management strategy throughout AMP8. This will be achieved through the Demand Management Monitoring Framework discussed in the next sub-section. The finding of this monitoring will be reflected in our WRMP29 update to the plan.

11.5 Demand management monitoring framework

11.5.1 Demand management will play a critical role in achieving our WRMP24 outcomes, and we know we must rigorously monitor the effectiveness of our strategy. By continuously monitoring we will allow the timely implementation of adaptive plans if demand management options are less successful than initially expected.

11.5.2 The 'Demand Management Monitoring Framework' will allow us to:

- Investigate and understand our customers' consumption patterns and attitudes to water consumption, allowing us to model our baseline population and understand how demographic change will modify forecasts over time.
- Scientifically analyse the demand management portfolio to ensure our water efficiency teams are concentrating on the most effective options and targeting them at customers who will benefit the most.
- Model and test demand management options, so they can be realistically included in our future forecasts for WRMP29 and beyond.

11.5.3 For further details on the Demand Management Monitoring Framework, please refer to the revised draft WRMP24 'Demand management preferred plan technical supporting document, Section 13.4. For more information on the adaptive pathway for demand management, please refer to the revised draft WRMP24 Decision making technical supporting document, section 10.

12 Environmental assessments

12.0.1 We need to be mindful that our future policy decisions, demand management options and supply-side options, whether alone or combined across the plan (and other plans and programmes), have the potential to cause unintended environmental consequences. There is also opportunity to deliver wider enhancement.

12.0.2 We have undertaken a suite of assessments to help inform the development of our plan. These provide information on the likely environmental consequences, both positive and negative, from risks associated with potential new options evaluated in the WRMP.

12.0.3 This approach to our plan-making process is in line with the WRPG. The environmental assessments undertaken alongside the development of our WRMP24 are:

- Strategic Environmental Assessment (SEA)
- Habitats Regulation Assessment (HRA)
- Water Framework Directive (WFD) assessment
- Invasive Non-Native Species (INNS) assessment
- Biodiversity Net Gain (BNG) assessment
- Natural Capital Approach via Ecosystem Services Assessment (NCA via ESS)

12.0.4 The suite of assessments, undertaken by an independent consultant, and general methodological approach taken to this work aligns with the approach that has been applied by WRE in the process they have termed as Integrated Environmental Assessment (IEA). Further detail on the methodology of our environmental assessments can be found in Chapter 4 of the Revised draft WRMP24 Environmental Report.

12.0.5 The four alternative plans (A, B, C and D) were all assessed to the same level. This looked at assessing the plan as a whole; the combination of policy decisions, supply-side options, demand management options, WINEP options, and their cumulative effects. Findings, whether as metrics or advice, have then been included in the decision making process.

12.0.6 A concise version of the approach to and findings of our environmental assessment process is set out in our Environmental Report Non-Technical Summary, alongside this document. Beyond this is a full suite of detailed reports, the primary document being the Revised draft Environmental Report, with sub-reports related to the HRA, WFD, INNS, BNG and NCA via ESS findings.

12.0.7 These reports, and their appendices, can be accessed at: anglianwater.co.uk/wrmp

12.1 Findings

12.1.1 Our Strategic Direction Statement[78] details our aim to achieve significant improvement in ecological quality across our catchments. As such we are committed to minimising the risks that our WRMP24 may pose to the environment, whether this be biodiversity, water, air, soil or the historic environment. We will also seek to maximise the benefits of our plan, and its implementation, to the environment and communities.

12.1.2 The WRMP must also maintain a supply-demand balance to 2050 and, as discussed in Section 9, demand management, although crucial, only forms part of the answer. Alongside those actions new supply-side infrastructure will be needed.

12.1.3 In any plan that is required to propose substantial new infrastructure, in our case water supply installations and transfer pipelines, it is not possible to avoid all risks to the environment from their construction and operation. As such, the environmental assessment findings identify where risk can be avoided or reduced for each new supply-side option we have considered and whether additional risks are likely to emerge when an option is combined with others.

78 https://www.anglianwater.co.uk/siteassets/household/about-us/revised-strategic-direction-statement-2020-2045.pdf

12.1.4 The results of our assessments show that the WRMP24 is likely to deliver reliable and sustainable water supplies that are flexible to cope with future changing growth and demand.

12.1.5 Within our plan, we have balanced the benefits of reducing abstraction to improve the environment and adapting to climate change, against the negative effects of developing alternative supplies. Our SEA reflects this balance, presenting several potential positive effects of demand management, drought resilience, environmental destination and licence capping with the potential negative effects of the supply-side options. We have summarised the operational and construction findings from the SEA below, to read more about this please visit the Revised draft WRMP24 Environmental Report.

12.1.6 Our preferred plan (Plan B) performs well across the operational findings of the SEA, which by their nature tend to be longer term, either permanent, or for the lifespan of the Plan, or the assets delivered. Plan B has significant positive effects across 13 of the 21 SEA Objectives, covering the topics: Biodiversity, Population and Human Health, Water, Climatic Factors and Landscape. Of these 13 significant positive effects the majority (nine) are found to be major beneficial long-term effects. It must be recognised that Plan B also has significant adverse effects during operation across Biodiversity and Climatic Factors, all of which are evaluated to be moderate negative effects.

12.1.7 For the SEA, in terms of construction effects, no significant positive effects are found to result from Plan B; however, a couple of SEA Objectives are found to result in significant negative effects. This is not a surprising result for a WRMP, as the plan is required to deliver a supply demand balance and thus often contain a programme of new infrastructure building over the 25-year plan period. In our WRMP24 we include new infrastructure needed to address over 500 Ml/d of supply demand balancing, even after the plan's demand management options are taken into account. While not always the case, it should also be recognised that environmental and social effects from construction will occur for a shorter period than those associated with the operational stage of an asset, or implementation of the BAU+ environmental destination.

12.1.8 This assessment has also been completed to the same level for the three alternative plans (Plans A, C and D); more can be read about their findings within Section 7 of the Revised draft Environmental Report.

12.1.9 The SEA also took into account the potential implications of adaptive pathways of our plan. The 10 adaptive pathways underwent the SEA at a high-level; the findings for the different adaptive pathways can be found in Section 7 of the Revised draft Environmental Report.

12.1.10 It should be noted that the environmental assessments completed for the WRMP take a plan-level approach, further assessment will be required when individual options are progressed at a project level.

12.1.1 Biodiversity net gain

12.1.1.1 The overall effect of the Revised draft WRMP24 is predicted to generate biodiversity net gain by increasing the habitat units across the region compared to the current baseline situation. This is mainly driven by the proposed benefits of the Lincolnshire Reservoir.

12.1.1.2 Other supply-side options included in the revised draft WRMP lead to localised losses but, in line with legislation and our commitment to improve the environment, we will deliver a 10% biodiversity net gain from all options included in the WRMP when development is predicted to lead to an initial loss of habitat units.

12.1.1.3 The need for such habitat replacement and net gain will not occur until individual schemes move forward to construction. At each design phase, each option will seek to avoid and reduce any such losses and maximise gains. Where biodiversity gain is still required we will seek to deliver this locally and integrate it with developing Local Nature Recovery Strategies to further enhance the overall biodiversity gains associated with the plan.

12.1.1.4 Within our Revised draft WRMP24 BNG and NCA sub-report, there are details on the BNG roadmap for our preferred plan. This highlights the opportunities our preferred plan will offer through contribution to strategic conservation priorities and wider environmental benefits such as, carbon sequestration and climate resilience.

Figure 57 A family of Osprey at Rutland Water

12.1.2 Habitats Regulations Assessment and Water Framework Directive

12.1.2.1 The HRA concluded that the elements of our plan, at this stage, do not give rise to an effect on integrity. More can be read about this in the Revised draft HRA sub-report.

12.1.2.2 The WFD assessment concluded that, at the plan level, the options in our best value plan are considered to be compliant with WFD objectives. For further information, please refer to the Revised draft WFD Sub-report.

12.1.2.3 We recognise that the supply-side options included in our WRMP are at a strategic stage of their design, especially compared to the level of detail that would be required to enable a project to seek development consent, such as planning permission from a local authority. Therefore, the depth and detail of this environmental assessment work will be revisited when options are fully developed at a project level.

12.1.2.4 In addition, we have an adaptive planning programme which is running in parallel to the WRMP process. We recognize that large-scale infrastructure options, such as desalination and water reuse, take significant time to develop. This planning programme allows us to start investigations to further our understanding of the potential risks, opportunities, and identify appropriate mitigation measures.

12.1.3 Cumulative effect assessment

12.1.3.1 We recognise that there is the potential for options selected in other water company draft WRMP24s and other planning applications that could affect identified waterbodies within our plan's WFD assessment and European Protected Sites within our plan's HRA assessment. Therefore, our consultants conducted a cumulative effect assessment to understand the interactions further.

12.1.3.2 The WFD cumulative assessment concluded that 17 waterbodies have some potential for an increased WFD compliance risk due to the interaction of an option in our preferred plan and another plan or project. However, at this plan level, it is anticipated that design adaptation and mitigation measures undertaken by us and/or those responsible for other strategic projects and programmes would be capable of avoiding or mitigating any deterioration risk that might arise from cumulative effects.

12.1.3.3 For the HRA cumulative effect assessments, options that conclude likely significant effects would be included in this assessment. As our plan concluded no effect on integrity, no options were progressed to this assessment. However, as options are developed at a project-level, further assessment on HRA cumulative effects will be required.

12.1.3.4 In addition to the above, within the SEA, a cumulative impact assessment was completed at a strategic level to understand potential interactions of our plan with other plans or projects. This assessment identified potential positive cumulative impacts between our WRMP, Drought Plan and Drainage and Wastewater Management Plan. As well, potential cumulative impacts were highlighted between our plan and other programmes and strategic projects in relation to the SEA objectives. More can be read about this within Chapter 8 of the Revised draft Environmental Report.

12.1.3.5 Where such cumulative risks exist, we will work with the relevant parties and environmental stakeholders, including the Environment Agency and Natural England, to define the scope and requirements to undertake what are likely to be more complex investigations.

Figure 58 The River Trent, one of the surface waters we abstract from

12.1.4 Environment Agency, Natural England and Historic England engagement

12.1.4.1 We have engaged with Natural England and the Environment Agency to exclude the selection of option types that were considered to have the most substantial risk of unresolvable likely significant effects to the National Site Network of protected habitats. This resulted in brackish desalination options being removed from the selection process for the BVP, as there are concerns in such confined locations it would prove more difficult to resolve any risks related to the potential impact of operational brine discharge.

12.1.4.2 We have also received feedback and met with Historic England to discuss our plan and the importance of the historic environment in terms of the WRMP. Within the scoping consultation for the SEA, Historic England provided useful feedback which helped refine the historic environment SEA objective. This has allowed us to assess the potential effects of our plan on conserving and protecting the historic environment. Historic England has also provided substantial feedback to our draft WRMP24 which has aided us in improving the robustness of the cumulative effects assessment in terms of the historic environment. They have also shared information on the next steps as individual options begin to be progressed at a project level.

12.1.4.3 We will continue to engage closely with these bodies, as well as other local groups, to work through the results of the environmental assessments.

12.1.5 Further information

12.1.5.1 Further information can be found in our Revised draft Environmental Report, and its related sub-reports, covering other positive and negative effects predicted to occur in relation to the proposals set out in our Revised draft WRMP24. These reports also set out proposals for mitigation measures related to environmental impacts, which we are committed to delivering and have taken account of within our cost modelling in relation to the plan.

12.1.5.2 The findings of the environmental assessment are also available in a non-technical summary of the Environmental Report, designed to provide a more accessible version of this detailed component of our plan-making process.

13 Our best value plan

Supply meets demand

Providing water 24/7
We will keep water flowing through taps, adapting to climate change and drought, whilst taking less water from the environment.

Fair charges, fair returns

Using science to inform investment
Between 2025 and 2030, we will carry out investigations so we know what the environments in our area need. This will allow us to tailor our investments to ensure we invest where we need to, meaning best value for our customers.

Positive impact on communities

Wellbeing
Our plan will give people the ability to enjoy nature through activities such as fishing, walking and cycling at our new reservoirs.

Community benefits
Our new reservoirs will provide socio-economic benefits to the local community, such as new jobs and tourism.

Helping vulnerable customers
We will support our customers rectify leaking pipes, identified through smart meters.

Flourishing environment

Leaving water in the environment
We will leave more water in our rivers and watercourses, benefitting habitats, wildlife and precious chalk streams.

New habitats
Our reservoirs will establish new habitats for our region's wildlife.

Biodiversity net gain
We will promote biodiversity by developing new habitats when we build new supply-side options.

Investing for Tomorrow

No regrets investment
Our reservoirs will be needed whatever the future may hold.

Investing for the future
We will explore innovative ways of managing demand.

Able to respond quickly
Our plan is highly adaptive, allowing it to respond to future challenges.

Resilient Business

Drought resilient
Our customers will have a safe, secure supply of water whenever they turn on the tap, even during an extreme drought.

Understanding water usage
Our smart meters will help us understand where our leaks are in our network and help our customers reduce their water usage.

14 Lessons from 2022 Drought

14.0.1 In this section we provide an overview of our experiences of the 2022 drought. We start with a general reflection of how we feel we performed during the prolonged dry period, before discussing how our learning will drive improvements to our Drought Plan and our future drought response.

14.1 How were we affected by drought in 2022?

14.1.1 Our continued investment in resilience and industry leading demand management measures meant that we were prepared for a scenario like the 2022 drought. Despite the prolonged lack of rainfall and the record breaking temperatures, we kept our water resource situation secure and did not need to implement any customers restrictions, nor did we have to apply for drought permits. We are especially proud of the latter, as it means we did not put additional pressure on an already stressed environment.

14.1.2 We maintained a good collaborative relationship with the Environment Agency and our other regulators during this time, and were able to support the environment and fellow abstractors by:

- Sacrificing 1,132Ml of water from our Wansford abstraction point; this enabled abstractors in the Middle Level to continue irrigation, as well as supporting the environment.
- Giving up part of our protected rights on the River Wensum so that abstractors upstream could operate at a lower Hands off Flow during periods of low flow.
- Putting 1,653Ml of water into environmentally sensitive river systems across our region, supporting times of low flow
- Working with the EA and local agriculture users to identify if there was water being discharged locally that could be used for irrigation (e.g. borehole maintenance)

14.1.3 We also drove the establishment of the new WRE Drought Group, ensuring a multi-sector response to drought in the East of England. We were also an active member of the WRSE Dry Weather Monitoring Group.

14.2 Updates to our Drought Plan 2022

14.2.1 Overall, we were happy with how our Drought Plan 2022 (DP22) performed during 2022, and we believe the monitoring, triggers and actions set out in the plan helped us to manage the challenges effectively. However, given this is the first event where the plan has been deployed, there are also some changes that we would like to make.

14.2.2 As parts of our region are still classified to be in drought status at time of writing, the suggested updates or improvements listed further in this section may be amended or added to as the situation progresses.

14.2.3 As well as participating in the Drought Lessons Learned workshops in 2023, we have incorporated the recommendations shared from these workshops within the review of our drought response. We will also carry out feedback sessions with the EA local teams as well as setup a yearly situation update meeting with the teams to discuss potential actions and any improvements that can be made ahead of summer periods.

14.3 Drought Response Improvement

14.3.1 We have been working hard since last summer on improvements to our drought response, some of which are listed below.

14.3.1 Asset Improvements

14.3.1.1 Despite not experiencing an impact on DO or on the supply of water to our customers during the 2022 drought, we invested significantly during this time to continue to improve our resilience; this investment includes, but is not limited to:

- The recommissioning of dormant sources and drought resilient mains.
- Improving telemetry and increasing monitoring at our drought vulnerable sources.
- Proactive pump replacement at drought vulnerable sources.
- Investigating new borehole drilling opportunities.

- Improving water quality monitoring.
- Improving operation and efficiency of abstraction assets to maximise site outputs e.g. high voltage resilience and pump control regimes.

14.3.2 Situation Monitoring

14.3.2.1 We also worked hard to improve our situation modelling; this included:

- Reviewing our operational groundwater trigger points e.g. Deepest Advisable Pumped Water Levels (DAPWLs)
- Correlating the levels we see in the observation groundwater sources more closely with our public water supply boreholes
- Increasing the amount of groundwater observation sources that we monitor
- Utilising the updated telemetry systems to allow the water resources situation to be tracked "live"
- Improving our modelling capability with the use of additional models and forecasts
- Creating a new way of reporting our current status and producing Prospects Report using four "sub-regional" areas to take into account the scale and complexities of our region

14.3.3 Drought Permit Readiness

14.3.3.1 We collaborated with the Environment Agency and Natural England to ensure our drought permits were as application ready as possible. This built on the significant work and consultation carried out for the final DP22 by increasing the scale of environmental monitoring and the updating of the mitigation plans that would be needed for drought permits. We reviewed the drought application triggers to ensure they provided us with enough time to apply for and implement a drought permit.

14.3.4 Management of Drought

14.3.4.1 In recognition of the seriousness of the 2022 Drought, we updated our Drought Response Team framework to include workstream leads from multiple disciplines across the business to maximise opportunities for collaboration and action progress. We also created a new tactical workstream to prepare for TUBs in case they were required in 2023.

We conducted several drought exercise based workshops; these aimed to explore the extreme actions available to us ahead of 2024 so that we were prepared for a low winter recharge scenario. These workshops covered both supply- and demand-side opportunities ranging from final effluent reuse to community focussed use of smart metering data.

14.3.5 Multi Sector Collaboration

We improved multi-sector working by driving the establishment of the WRE Drought Group, and by collaborating with neighbouring companies and others in a similar position. We also continued to build upon our non-household strategy by investigating innovative ways of sharing water e.g. Water reuse.

14.4 Suggested Drought Plan 2022 updates

14.4.1 Our DP22 states that we determine the end of a drought to be when our water resources have returned to what would be considered 'normal' for the time of year. We use multiple indicators to help us gauge when we have reached this point. Once we have returned to 'normal' we will then produce a lessons learned report within 3-6 months and make any formal changes to our plan. As the Norfolk area is unlikely to return to 'normal' until the end of this summer at the earliest, we don't plan to make any formal changes to the DP22 until at least the winter of 2023/24.

14.4.2 Some of the areas of the DP22 that we would like to formally update, taking into account the learning and improvements above, are listed below:

- We will add in indicative Level 1 and 2 drought management curves to our direct river sources to give a clearer picture on when demand actions may be required
- Our indicative Level 1 and 2 drought management curves will be improved on the observation groundwater sources; this will provide a more accurate representation of the appropriate actions that may be required in the associated supply system
- There will be an update on our drought reporting approach; this will include the "sub-regional" areas that we have used in Prospects and in National Drought Group forums.

- We will reduce the required TUBs consultation time period to allow us to be more flexible when implementing TUBs, if required
- The updated UKWIR CoP TUBs exceptions tables will be incorporated into Appendix 11
- We will provide an update on how our drought management team is now structured
- There will be an update on our drought permit application triggers, if appropriate
- The environmental drought section of the DP22 will be updated to reflect how we support other sectors

14.4.3 We will continue to work with the EA through the lessons learned process and discuss any changes that we plan to make to the DP22.

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THE QUEEN'S AWARDS FOR ENTERPRISE: SUSTAINABLE DEVELOPMENT 2020

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