

Meeting our Future Water Needs: a National Framework for Water Resources



Image shows the River Misbourne near Little Missenden



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Forewords



If we don't take action, many areas of England will face water shortages by 2050. We need water to survive; our businesses, industry and farmers need it for their continued prosperity; and our precious natural environment needs it to thrive.

These apparently competing demands are equally important. We know that a healthy environment is fundamental to a healthy population and a healthy economy, yet we cannot have a healthy environment without investment in clean and plentiful water.

An increasing population, demand from agriculture and industry and improving our resilience to drought will all put significant pressures on our water resources. The climate emergency – periods of hotter and drier weather – will only exacerbate these pressures.

This report delivers the step-change in strategic and regional collaboration required to ensure the needs of all water users are brought together to better manage and share resources. It's an opportunity to rethink water and help everyone make decisions on water supplies that can deliver the resilience and environmental enhancement we all want to see.

Whether it is our coastal wetlands, river ecosystems or globally important chalk streams; restoring our environment so we're the first generation to leave it in a better state than we found it, needs the buy-in from all of society and those who depend on water.

This framework is a pathway to achieving this ambition.

Emma Howard Boyd
Chair of the Environment Agency



We have grown used to a constant supply of water to the point where it is difficult to contemplate what it would be like if it was not available. Yet, maintaining reliable water supplies needs careful management and planning and ours face significant pressures over the coming years.

This national framework is the result of collaboration across the water sector bringing together representatives from the water industry through Water UK and regional groups, agriculture, power generation, industry, drainage authorities, navigations, environmental NGOs, regulators and government. It has been developed using the latest science, working closely with leading academics from the Environmental Change Institute at the University of Oxford and the University of Manchester.

The framework provides a strategic direction to long-term water resource planning built on a shared vision to leave the environment in a better state than we found it, improve the nation's resilience to drought, minimise interruptions to water supplies for all users of water and support growth while underpinning a thriving economy.

Over the next twelve months the five regional groups will be working to assess their needs in more detail and identify what is needed to improve the environment and realise a truly sustainable future for water resources. I look forward to continuing to support this sector-wide collaboration.

Jean Spencer
Independent Chair of the Senior Steering Group

Image shows Bewl Water reservoir

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Meeting our Future Water Needs: a National Framework for Water Resources

The National Framework explores England's long-term water needs. It sets out:

- the scale of action needed to ensure resilient water supplies are available to meet the needs of all users in the future
- a greater level of ambition for restoring, protecting and improving the environment that is the source of all our supplies

Every day:



14,000 million litres of water is provided by water companies for public water supply



1,000 million litres of water* is used by other sectors such as industry, power generation and farming – but varies across regions and seasons

*Excluding public water supplies, hydropower and aquaculture and abstraction volumes adjusted for consumptiveness

If no action is taken between 2025 and 2050 around **3,435 million extra litres of water** per day will be needed for public water supply to address future pressures. This includes:

1,150 million litres per day (MI/d) to make water supplies more resilient to drought

1,040 million litres per day to supply the growing population

720 million litres per day to replace unsustainable abstractions and improve the environment

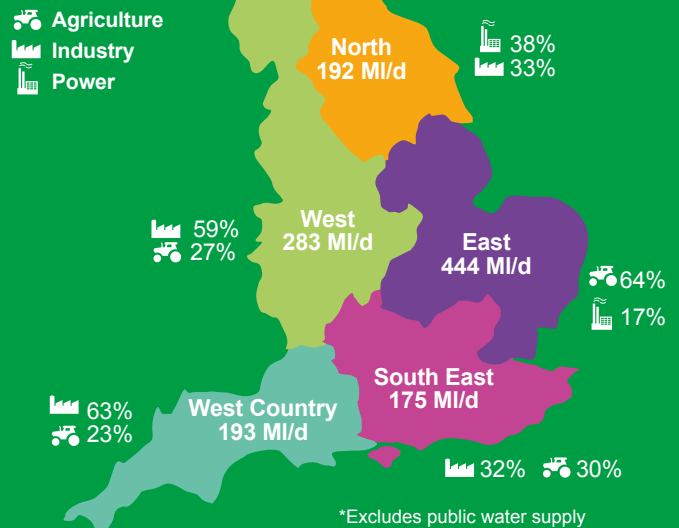
400 million litres per day* to address the impact of climate change on water availability

Around **50%** of the national need is in the South East



*Water companies have included additional impacts from climate change of around 640 MI/d in their plans up to 2025 which is before the start date for this analysis

We've estimated how much water in total other users in each region will need at 2050 and which sectors will use the most*



Regional groups will each produce **one plan** to:

Understand and address the needs of the environment in a collaborative way to deliver long-term improvements

Set out how the supply of water for people, business and all other major users will be managed across their own region

Increase resilience to drought by reducing the need for rota cuts and standpipes to no more than once every 500 years on average



Identify all the options needed in their region and how the plan will deliver best value and adapt to different futures

Regional plans will inform water company Water Resources Management Plans and will:

- **reduce demand** – to 110 litres of water per person per day by 2050 and drive down water use across all sectors
- **halve leakage rates** by 2050
- **develop new supplies** such as reservoirs, water reuse schemes and desalination plants as well as innovative cross-sector options that bring broader benefits
- **move water to where it's needed** through more transfers of different scales and lengths
- **reduce the use of drought measures** that have an impact on the environment



Image shows a reservoir with two canoeists

The National Framework

The National Framework explores the long-term needs of all sectors that depend on a secure supply of water. This includes public water supplies provided by water companies to customers' homes and businesses; direct abstraction for agriculture, electricity generation and industry; and the water needs of the environment.

The organisations responsible for England's water supplies have come together to understand the strategic water needs for England and its regions – across all sectors – from 2025 to 2050 and beyond¹.

It brings together two of the government's pledges that were set out in its 25-year environment plan, that is:

- to leave the environment in a better state than we found it; and
- to improve the nation's resilience to drought and minimise interruptions to water supplies.

Our findings build on previous reports by Water UK and the National Infrastructure Commission and continue to support the case for water resource investment to increase drought resilience, so the nation's water supplies are fit for the future.

This report marks a shift to strategic regional planning by setting out the principles, expectations and challenges for five regional groups – made up of the 17 English water companies² and other water users. These have been developed and agreed through a collaborative process involving regional groups, other major abstractors, government, our fellow regulators and a wide range of stakeholders. This joined-up approach is needed to address the scale of the challenges we face and realise the opportunities that emerge from water resource planning.

Regional planning is needed because Water Resource Management Plans – the statutory plans which address future water resources developed

by individual water companies for their customers' needs alone – are unlikely to deliver the right strategic solutions for the nation as a whole. By putting aside company boundaries and considering the needs of the whole region – including other water users – and how these needs fit with the national picture, we can deliver the step-change in resilience and environmental protection required.

Regional groups – who's who?

Regional groups bring together the water companies that operate in each of England's regions with key water users and other stakeholders. Water company membership is as follows:

- **Water Resources North:** Northumbrian Water, Hartlepool (Anglian) Water, Yorkshire Water
- **Water Resources West:** Severn Trent Water, United Utilities, South Staffs Water, Dŵr Cymru Welsh Water
- **Water Resources East:** Anglian Water, Essex and Suffolk Water, Cambridge Water, Severn Trent Water, Affinity Water
- **Water Resources South East:** Affinity Water, Portsmouth Water, South East Water, Southern Water, SES Water, Thames Water
- **West Country Water Resources:** Bristol Water, Wessex Water, South West Water.

1. The National Framework is primarily focused on England as this is the Environment Agency's remit. However, Welsh government and Natural Resources Wales have been involved in the work and are represented on the senior steering group.

2. Natural Resources Wales is represented in the Water Resources West group.

The role of regional planning

Regional plans will develop a more detailed picture of the future water resource needs of each region, setting out the type and scale of the challenge to public water supplies and considering the needs of other users.

Each regional group must produce a single plan that builds resilience to a range of uncertainties and future scenarios. It will set out the preferred plan for the region – delivered through a set of options that present the best value to customers, society and the environment, rather than simply least cost. Together, the five regional plans must add up to meet the collective national need.

Through a collaborative process, we have agreed what the regional plans should deliver and how, so they drive a step-change in water resource planning. These step-changes include:

- **increasing resilience to drought** – so that restrictions such as rota cuts and standpipes are needed no more than once every 500 years on average by the 2030s
- **delivering greater environmental improvement** – by considering changes to water abstractions, beyond those already identified in water company plans, that will deliver a sustainable abstraction regime across all sectors
- **long-term reductions in water usage** – through adopting a planning assumption of achieving, on average, 110 litres per person, per day, of water use by 2050 while also reducing non-household demand
- **leakage reduction** – through delivery of the industry's target to reduce leakage by 50% by 2050
- **reducing the use of drought permits and orders** – by understanding the environmental risk of each measure and using them less frequently, particularly at sensitive water sources or habitats
- **increasing supplies** – by exploring a range of options, such as reservoirs, water reuse schemes and desalination plants; considering the potential for developing and sharing supplies with other sectors; and through work to improve water management in catchments
- **moving water to where it's needed** – by fully exploring all opportunities for water transfers, within and between regions, of different scales and lengths.



Image shows the River Wensum in Norfolk



Image shows watering a plant with a watering can



Image shows a fly fisherman in the River Wye

Our shared ambition for the environment

Government, regulators and regional groups have a shared goal to improve the environment and address unsustainable abstractions of water from it. So far, our assessment of water needs from current water company plans assumes that around 700 million litres per day of water that comes from unsustainable abstractions will need to be replaced by other means between 2025 and 2050.

This includes all the abstraction changes already in water company plans as well as many more which have been identified and will be investigated over the coming years – including changes to turn around the decline of our unique and highly valued chalk streams.

While the figure included in current water company plans represents a significant change, we recognise the eventual change may need to be greater still. We've started to explore this by modelling a range of future scenarios for climate change and levels of environmental protection. This has shown that an overall reduction in abstraction of between 1,200 million litres per day and 2,200 million litres per day may be needed by 2050.

More detailed investigation is necessary to understand the complex local relationships between abstraction and the environment and refine these estimates. Nevertheless, the National Framework indicates that potentially significant changes are required that are greater than those currently being planned for. This is important to ensure we have time to understand,

and plan for, the alternatives to keep taps and rivers flowing.

We need a shared environmental destination with agreed steps to get there covering short, medium and long term changes. We will work with regional groups, Natural England, Natural Resources Wales and environmental interest groups and organisations to achieve this.

Developing alternative supplies of water takes time and will need significant changes to how water is managed. This cannot be achieved through piecemeal changes in successive, individual water company plans. The Regulators' Alliance for Progressing Infrastructure Development (RAPID) has been established to support the delivery of the strategic schemes that are needed.

Our modeling assumes that around **700 million litres per day** of water that comes from unsustainable abstractions will need to be replaced by other means between **2025 and 2050**.

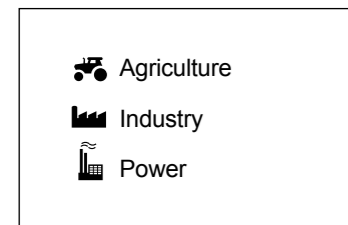
Understanding England's future water needs at 2050

The National Framework provides a picture of England's future water needs across each of the regional groups by 2050.

For public water supply the estimated **additional** water need between 2025 and 2050 is based on:

- increasing resilience to a 1 in 500-year drought
- high population growth
- high environmental improvement through the delivery of the most ambitious abstraction reductions identified in current company plans
- individual water company analysis of climate change impacts*.

We also show our best estimate of how much water will be used in total by the other sectors in each region and the proportion of water used by the different sectors. We have shortened million litres per day to MI/d.



Water Resources West

Additional public water supply needs between 2025 and 2050: 639 MI/d

- drought resilience: **167 MI/d**
- population change: **237 MI/d**
- environmental improvement: **167 MI/d**
- climate change: **68 MI/d**

Estimated total demand from other users: 283 MI/d

- **59%** industry (chemicals, paper and pulp)
- **27%** agriculture (spray irrigation)
- **12%** power generation

West Country Water Resources

Additional public water supply needs between 2025 and 2050: 227 MI/d

- drought resilience: **71 MI/d**
- population change: **86 MI/d**
- environmental improvement: **47 MI/d**
- climate change: **11 MI/d**
- other: **12 MI/d**

Estimated total demand from other users: 193 MI/d

- **63%** industry (manufacturing mineral products)
- **23%** agriculture (livestock and spray irrigation)

Water Resources North

Additional public water supply needs between 2025 and 2050: 233 MI/d

- drought resilience: **41 MI/d**
- population change: **60 MI/d**
- climate change: **132 MI/d**

Estimated total demand from other users: 192 MI/d

- **38%** power generation
- **33%** industry (extracting minerals and materials, navigation, food and drink, paper and pulp)
- **23%** agriculture (spray irrigation)

Water Resources East

Additional public water supply needs between 2025 and 2050: 570 MI/d

- drought resilience: **226 MI/d**
- population change: **193 MI/d**
- environmental improvement: **75 MI/d**
- climate change: **76 MI/d**

Estimated total demand from other users: 444 MI/d

- **64%** agriculture (spray irrigation)
- **17%** power generation
- **14%** industry (food and drink, paper and pulp)

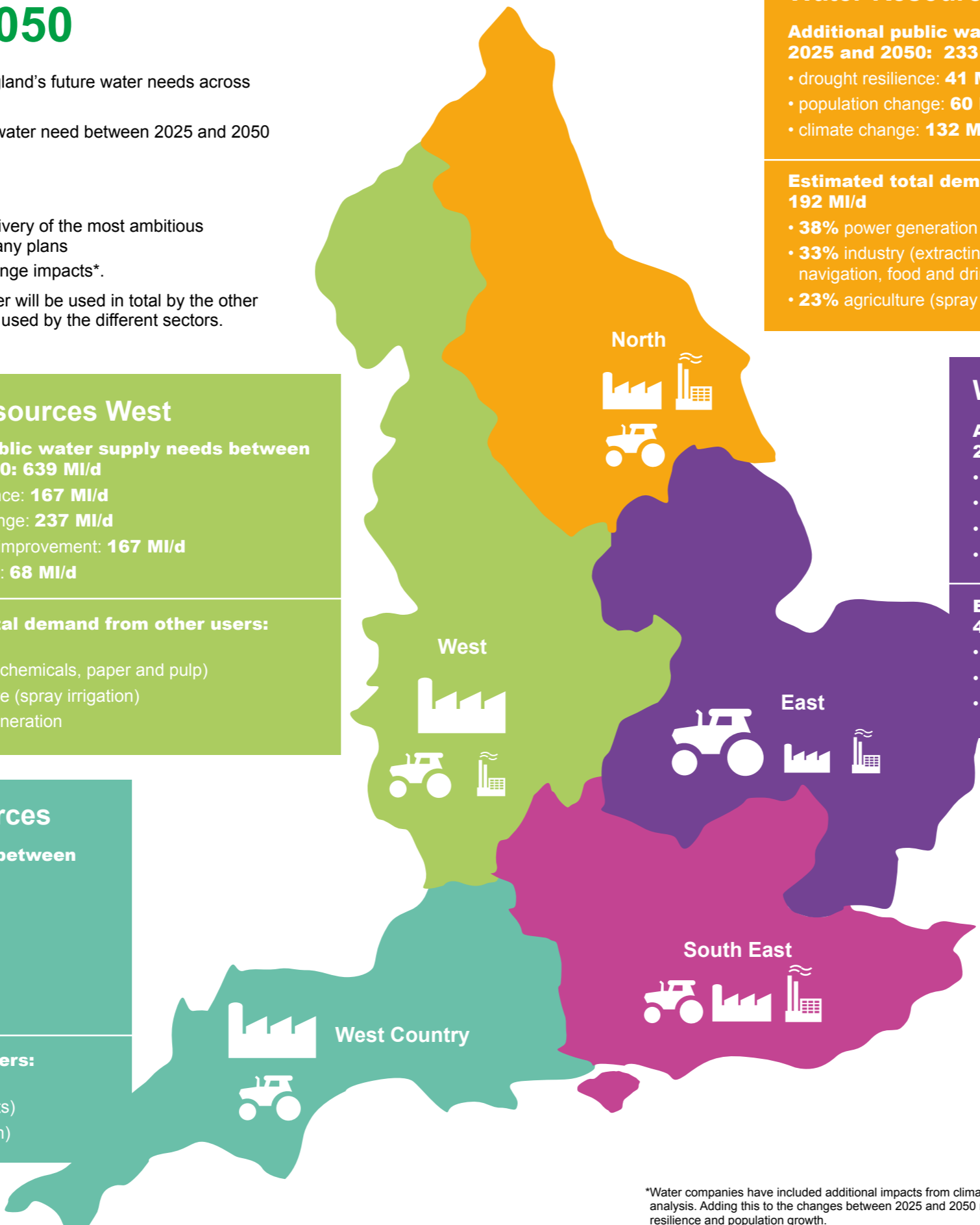
Water Resources South East

Additional public water supply needs between 2025 and 2050: 1765 MI/d

- drought resilience: **640 MI/d**
- population change: **459 MI/d**
- environmental improvement: **431 MI/d**
- climate change: **111 MI/d**
- other: **124 MI/d**

Estimated total demand from other users: 175 MI/d

- **32%** industry (paper and pulp, golf courses)
- **30%** agriculture (spray irrigation)
- **20%** power generation



*Water companies have included additional impacts from climate change of around 640 MI/d in their plans up to 2025 which is before the start date for this analysis. Adding this to the changes between 2025 and 2050 makes the total impacts from climate change comparable to the two biggest drivers, drought resilience and population growth.

Understanding regional needs

Having identified the main pressures on public water supplies in each region, the National Framework explores how much of the need could be met by reducing demand for water and how much additional water is likely to be needed from new infrastructure, such as reservoirs, desalination plants and water transfers.

Our analysis is based on achieving a higher level of drought resilience (1 in 500-years) and greater environmental protection than currently included in water company plans.

The aim of our work is not to identify the optimum mix of solutions that could address each region's challenges – rather we are setting the context of a much bigger water resources picture for each regional group. They will explore the options available to them in more detail, and develop a deeper understanding of the specific needs of their region, including those of other sectors.

The following graph shows two things:

1. how much additional water we estimate will be needed in each region by 2050; and
2. the contribution that demand savings, infrastructure options in the current water company plans and drought measures can make towards meeting those water needs.

For each region we show its future water needs including and excluding any surplus water that may be available in that region. So, the higher need estimate is where surplus water can't be used, and the lower need estimate is where it can be used.

We have estimated it this way because having a surplus of water is not always an automatic fix to meeting a water need. Often it cannot be used because of where it is located within the region or because using it may damage the environment.

The latest water company plans – called Water Resources Management Plans (WRMPs) – have set out targets for reducing both household water use and leakage.

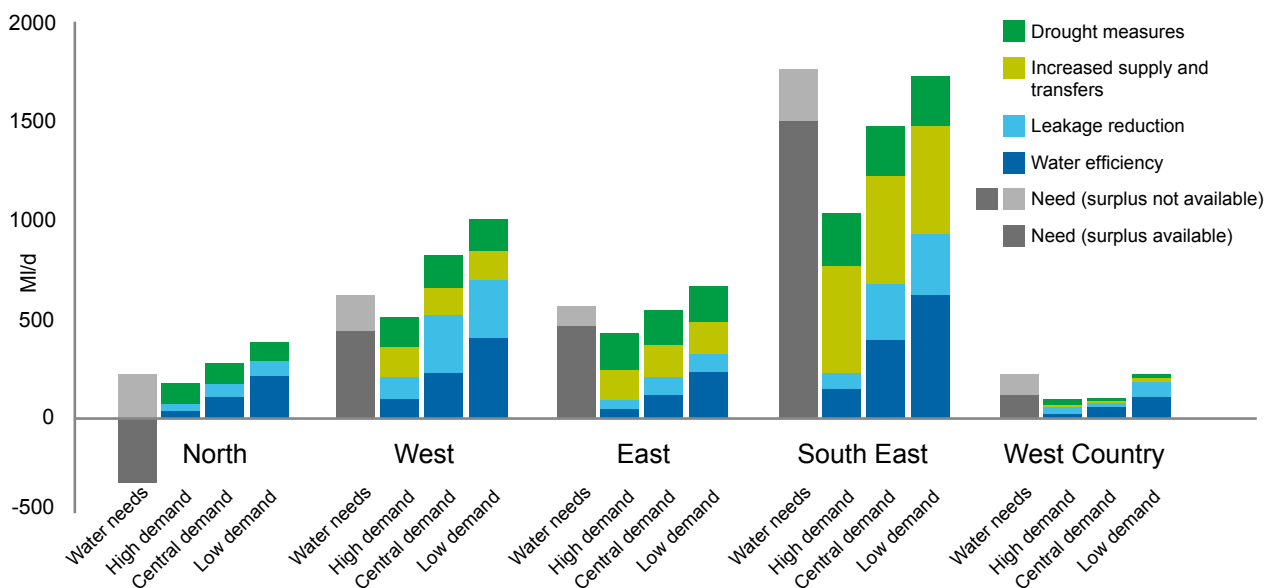
However, we recognise there is uncertainty around whether these ambitious targets can be met, or even exceeded, because they depend on many external factors such as customer behaviour, technology and weather conditions.

To help us understand the role of different options in the future, we've considered three levels of water use by 2050. These are:

- **high** – daily water use of 127 litres per person per day, no change to non-household consumption and 30% leakage reduction
- **central** – daily water use of 119 litres per person per day, no change to non-household consumption and 50% leakage reduction
- **low** – daily water use of 110 litres per person per day, 4% reduction in non-household consumption and 50% leakage reduction.

We modelled how much extra water could be provided by all the options selected in the individual water companies' most recent WRMPs and through specific drought measures*.

- *Each scenario assumes:
- Drought measures with higher environmental risks are not available for use and 70% of those with a lower risk are available
 - 2% savings through temporary use bans during drought are achieved.



Graph showing our estimate of future water needs in each region and the contribution different options can make across the high, central and low demand scenarios

Each region faces pressures on water resources. We expand on this graph to set out the relationship between the pressures faced in each region, the options they have available and highlight key areas for each of the regional groups.

Water Resources North

The North has a significant surplus of water which, if it could be made available, could help offset the future water resource and environmental challenges we face and potentially be made available to other regions. The options identified in the relevant water company WRMPs – in this case Northumbrian Water, Yorkshire Water and Hartlepool Water – are enough to meet the higher need estimate but if water users in the region can become more efficient, through reducing how much they use, more water could be available to transfer elsewhere.

Water Resources West

The West will face pressures in the future; however, it has a significant surplus, the potential to make savings by reducing demand further, and options to supply more water. The options identified in the company WRMPs – in this case United Utilities, Severn Trent Water, Dŵr Cymru Welsh Water and South Staffs Water – are enough to meet the higher need estimate explored in the modelling and again, if greater reductions in water use can be achieved or further options brought forward, there is potential for more water to be transferred to other regions.

Water Resources East

The East faces significant pressure and has little surplus water available. Our modelling shows that the amount of water needed is equivalent to all the new supply options selected in the company WRMPs – in this case Anglian Water, Essex and Suffolk Water, Affinity Water, Severn Trent Water and Cambridge Water – but more ambitious reductions in water use and potentially additional capacity is necessary to meet the higher need estimate. Water Resources East's focus will be on reducing the demand for water by all users and increasing the amount of water available through new water resource options and transfers. Exploring the potential for schemes that benefit other water users is also a priority given the high level of demand from other sectors in this region, particularly agriculture.

Water Resources South East

The South East faces the greatest pressures on public water supplies. If surplus water can be made available, the region will still need to develop options to supply more water, equivalent to all the new water resource options and transfers selected in company WRMPs – in this case Thames Water, Southern Water, South East Water, Affinity Water, SES Water and Portsmouth Water. This is as well as achieving ambitious efficiency reductions. If it can't access the surplus water, then demand in the region will need to be reduced further or further resources developed. Water Resources South East needs to track progress on demand management particularly closely because, if savings are less than expected, it could develop a large shortfall which may reduce resilience, limit progress on environmental improvements or lead to more frequent use of drought measures.

West Country Water Resources

The West Country sees relatively modest pressures. However, these are more significant when viewed as a proportion of the water supplied in the region. It has a significant surplus in parts of the region and if this can be used to meet the pressures faced by the region, the options in the company WRMPs – in this case South West Water, Wessex Water and Bristol Water – will deliver the extra water needed. West Country Water Resources' priority is to make the region more efficient by achieving the ambitious reductions in water use and leakage; and to explore the potential to transfer water to other regions – particularly the neighbouring South East.

Progressing strategic options

Work is already underway to explore a number of the strategic options that will be needed to meet the nation's future needs, including new water resource infrastructure and transfers already identified in company Water Resources Management Plans.

Up to £469 million of funding is available between 2020 and 2025 for water companies to progress this work with the support of RAPID – the Regulators' Alliance for Progressing Infrastructure Development – a team made up of experts from the Environment Agency, Ofwat and the Drinking Water Inspectorate. RAPID's work will be co-ordinated with that of regional groups and the National Framework.

How regional plans will be assessed

Regional plans need to identify how best to provide an efficient, sustainable and resilient supply of water for all water users in the region until at least 2050.

They must also embed the National Framework principles, expectations and challenges identified for each region. In summary, a regional plan must include:

- a resource assessment that informs an Initial Resource Position for the region. This will include future scenarios that explore key challenges and sensitivities
- a statement of ambition and agreed regional policies and principles
- a list of options considered that meet the needs within a region and contribute to the national need
- the preferred plan for the region that identifies the best value options that meet all future water needs, across multiple sectors and users.

While the approach to regional planning will need to be flexible – each region faces different pressures – the plans must be compatible so that together they make up the national water resources picture we need.

In order to define the scope of each of the regional plans we've set out what they must, should and could include.

Governance and decision making

The development of the National Framework has been a collaboration between government, water industry regulators, water companies, major water using sectors, academics and a range of stakeholders. We set up three groups to support its development and the delivery of co-ordinated regional plans.

Senior Steering Group

Role: to provide strategic steer on key decisions and oversight of ongoing work

Members: 40 representatives from government, regulators, water companies, water using sectors, academics and environmental NGOs

Regional Coordination Group

Role: to deliver progress, drive ambition and ensure alignment between plans

Members: regional groups, government and regulators

Modelling Advisory Group

Role: to ensure technical methods are aligned so cross regional options can be explored

Members: technical experts from regional groups

MUST

- take account of the National Framework and set out its potential contribution to the national need
- be reflected in Water Resource Management Plans
- forecast supply and demand over at least 25 years and set out solutions to any deficits
- be a single strategic plan with a preferred adaptive solution
- take a multi-sector approach
- look beyond regional boundaries and use technical approaches compatible with other regions
- include enhanced environmental improvements and demand management
- take a catchment-based approach
- consider wider resilience benefits, including reducing flood risk, when developing options
- be open to market mechanisms
- take into account growth ambition
- comply with Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) legislation

SHOULD

- engage widely with interested groups
- set out how the region will respond to drought and agree common scenarios for drought actions
- join up with drainage and wastewater management plans
- seek to improve resilience to events other than drought, particularly floods
- look ahead 50 years or more

COULD

- contain all the detailed information required for Water Resource Management Plans
- contain all the detailed information required for Drought Plans

Next steps for the National Framework

This report is an important milestone in the programme of work that will ultimately deliver a set of co-ordinated regional plans that together provide the national blueprint for future water resource planning. It has set the direction and expectations for regional groups and provided findings on which each group can build. Furthermore, it has provided evidence which will be used to challenge each group's findings and inform our advice to government on the water company Water Resources Management Plans that are submitted.

Our future priorities for the National Framework include activity across a range of areas.

Delivering long-term environmental improvement

– by working with regional groups to explore further abstraction changes so that we move towards a more sustainable abstraction regime; develop a natural capital valuation methodology to inform future investment decisions; and reduce the use of drought measures in sensitive areas.

Developing our modeling – so we continue to build our understanding of future water needs to help shape regional plans.

Supporting reductions in water demand – by introducing a new monitoring framework to track progress in reducing demand and establishing a sub-group to recommend the action needed to enable the delivery of the ambitious daily water use targets such as policy changes and public campaigns.

Development of new supply infrastructure – by continuing to work with RAPID and the water companies to explore the strategic schemes already identified and support the development of additional options that may be needed.

Enabling collaboration – helping water companies work more closely and addressing the barriers to collaboration that currently exist. We will also support increased cross-sector work to make our data on future water needs more widely available and bring a wider set of stakeholders together to work with regional groups.

Longer term regulation

The water sector has come together to support the National Framework. The sector is also making real progress in developing new, regional plans. We believe that regional planning will identify the right strategic solutions for the future. These plans will add a vital layer to inform individual water company Water Resources Management Plans and how new solutions are delivered via their five-yearly business plans. We will continue to monitor progress closely and will consider alternative regulatory approaches if regional plans do not deliver what is expected of them.

The development of the National Framework and move to regional planning

The following timeline sets out the journey that has been taken to develop the National Framework and establish regional planning across England and the key next steps.

September 2016: Water UK Water Resources Long Term Planning Framework

April 2018: National Infrastructure Commission, Preparing for a drier future: England's water infrastructure needs

August 2018: Regulators set out vision for strengthened regional planning

October 2018: Five regional groups established - Water Resources North, Water Resources West and West Country Water Resources join Water Resources South East and Water Resources East

December 2018: National Framework Senior Steering Group established made up of 40 representatives

April 2019: Work to identify and prioritise barriers to collaboration that engaged with a broad set of stakeholders completed by JBA Consulting

July 2019: Senior Steering Group takes decision in principle to support increased drought resilience to 1 in 500-year event

October 2019: Senior Steering Group supports the case for reducing per capita consumption to 110 litres per person per day, pushing efficiency further in non-households and putting in place measures to manage the uncertainty surrounding demand reductions

November 2019: Modelling work by Universities of Oxford and Manchester completed

March 2020: National Framework published, and regional groups set out their initial statement of regional water needs

July 2020: Regional groups publish the approach they will take to developing their plans

February 2021: Regional groups will update their statement of regional water needs

August 2021: Regional groups share their draft plans to ensure alignment

January 2022: Informal consultation on draft regional plans

August 2022: Regional groups publish final draft regional plans

September 2023: Regional groups publish final regional plans

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