

Water Resources North Initial Resources Position

March 2020



Contents

Executive Summary	3
About Water Resources North	3
Our current position	3
Our ambition	4
Introduction	6
Water Resources planning	6
The need for change	6
A new approach	6
Purpose of this report	7
A national perspective	7
Our approach to regional planning	7
Our region	9
Our initial resources position	11
Current resources position in 2020	11
Future resources position	13
Beyond 2050	16
What this means for our water resources planning and how we will take this into account in our Regional Plan	17
Our ambition	18
Resilience – water, the environment and our economy	18
Environmental ambition	18
Involving other sectors	19
Contributing to national resilience	19
How to get involved	20
Appendices	
Appendix 1 – Water Resources North data tables (1 in 200 and 1 in 500)	

Executive Summary

About Water Resources North

Water Resources North is a new group that is designed to oversee water resources planning for Yorkshire and the North East of England. Our ambition is to be a national leader for water resource management. By doing this, we will help to facilitate sustainable growth across Yorkshire, the Humber and the North East, in support of the ambition of the Northern Powerhouse. Water Resources North will ensure that the region has a sustainable, long-term plan for water resources that protects our region's resilience in the face of challenges such as climate change and population growth. We will work with other regions to help secure resilient water supplies for the country as a whole.

Although the core of the group is formed, and funded, by Yorkshire Water, Northumbrian Water and Hartlepool Water, Water Resources North will engage with, and actively involve, all of those who have an interest in water resources in our region. This will include sectors other than public water supply who make beneficial use of the water in our environment, such as agriculture, industry and energy. The importance of water to our region's environment, ecology and biodiversity will also play a key role in shaping our future plans.

Over the next couple of years, Water Resources North will be working with customers, water dependent sectors of the economy, other stakeholders such as environmental groups and regulators, to shape a long-term plan for managing water resources in the region. Where this plan impacts on public water supply, it will be reflected in water companies' statutory Water Resource Management Plans in 2024. Where this plan affects other sectors, we will look to work with those sectors to understand how they can also support long term water resources resilience in the north, including looking for opportunities for collaborative solutions.

Our current position

Public water supply

Across the region as a whole, Water Resources North currently has the most drought resilient public water supply in England. This is partly down to geography. The west of our region includes the upland areas of the Pennines and the Cheviots. These hills have an average annual rainfall generally in excess of 1000mm, and in some places as high as 1500mm. The topography and geology of the Pennine areas also makes them ideal for the construction of impounding reservoirs, which capture and store this rainfall for use in water supply.

However, some parts of our region, along the east coast and in lower lying areas of east and south Yorkshire – are among the driest in the country¹. The resilience of our public water supplies is therefore also down to the highly integrated network that both of our major water companies – Yorkshire Water and Northumbrian Water – operate. 98.3% of public water supply customers in our region are in either Yorkshire Water's Grid surface water resource zone, or Northumbrian Water's Kielder zone. Within these zones, our supply networks allow us to move water between different parts of our region in order to balance supply and demand. The remaining 1.7% of customers are in one of three smaller resource zones – Hartlepool Water, Yorkshire's East surface water zone and Northumbrian's Berwick zone. Although these zones are not connected to the broader regional network they are also highly resilient to drought; in all of these zones, the volume of water available for public water supply significantly exceeds demand, even in dry years.

The Water Resources National Framework² (WRNF) has set an ambition that, by 2050, no water resource zone in England should have a risk of Level 4 drought restrictions (rota cuts) that is worse than once every 1 in 500 years on average. For the reasons described above, we consider it likely that all of the water resource zones in Water Resources North already meet this target level of service³. However, we must not be complacent and the work carried out for the WRNF reinforces what we already know, which is that climate change presents a risk to our future water resources resilience if we do not continue taking action to protect and enhance what we already have.

¹ <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/regional-climates/north-east-england-climate--met-office.pdf>

² <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

³ Yorkshire Water has modelled its zones to this level of resilience. NWL and Hartlepool have not yet completed this, but have significant surpluses in their zones.

Population growth will also affect the volume of water that we need in the future, and we also need to better understand our regional resilience to different types and durations of drought.

Other sectors

Data provided by the WRNF shows that, in our region, consumptive water use in sectors outside public water supply currently amounts to approximately 160 MI/d (when annual use is averaged by day). This compares to our region's public water supply which is typically around 2,000 MI/d.

At face value, this suggests that other sectors have a relatively small impact on water resources when compared with public water supply. However, it should be noted that this is a daily average figure and there will be periods during the year when some other sectors use significantly more than their daily average – for example, spray irrigators may use most, if not all, of their permitted abstraction over a period of three or four months during the summer. In addition, the use in other sectors may be concentrated in particular areas or catchments, whereas the public water supply abstractions are typically spread across many parts of the region. These different patterns of abstraction and demand may offer opportunities for trading of water resources to balance use in different areas and at different times of the year.

The WRNF data shows that almost 40% of consumptive abstraction by other sectors in the north is for the power industry. Approximately 20% is abstracted by agriculture and 35% by other industries. The remaining 5% is split between private water supplies and other smaller sectors. Going forward, Water Resources North will seek to work closely with other sectors to better understand their existing water use and their plans for the future, and how we can work collaboratively to plan for future water resource needs. This will also include working to help promote improved water efficiency across the region, for example through planning policies for new development.

Environment

In some parts of England, the impact of water abstraction – for public water supply or other uses – on the environment is causing considerable concern. Whilst this is currently less of an issue in the north, we recognise that it is vitally important that our precious environment is further protected and enhanced into the future. We also recognise that for many rivers in our region, the primary issues that cause concern at present are not ones of water quantity but instead relate to water quality and man-made changes to our rivers that impact on their ecosystems. However, this may change in the future and our plans will need to consider how to protect and enhance our environment taking a holistic view of all risks.

The water companies in WReN have an ongoing programme of investigations to better understand the impacts that their abstractions have on the environment, and we will take action to address any issues that these investigations identify. We will continue to work to restore more natural flow regimes on rivers that are impacted by reservoir impoundments, balanced with our water supply needs. We will also work with other sectors to better understand the impacts that their abstractions have and how these can be mitigated where required. WReN is committed to engaging with the environmental sector in our region, to recognise their ambition for our water environment and how we can support this. We will continue to grow our catchment-based approach to water management, working closely with catchment partnerships and other groups to support their existing activity and plans.

Our ambition

Water Resources North will protect and support sustainable economic growth across our region. We will do this by ensuring that our region's water resources resilience is protected and enhanced into the future in the face of challenges such as climate change and population growth.

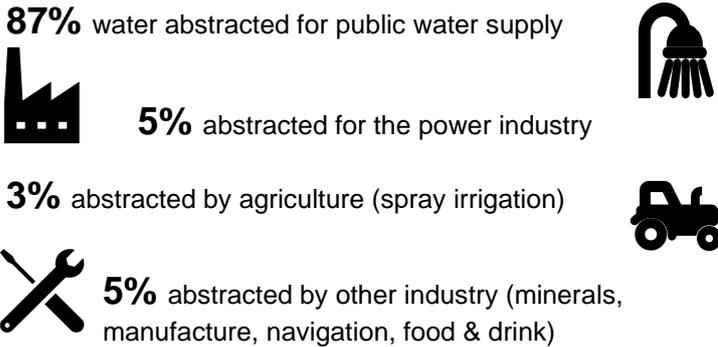
We will also work to protect and enhance our region's precious and diverse environment, and recognise the importance of contributing to regional, local and sectoral ambitions towards zero climate emissions. We will lead an integrated catchment approach to water management, recognising the importance of water quality and flood risk, as well as the need to protect water resources for all sectors. Alongside our work to protect our own region's water resources resilience, we will work with other regional groups to contribute to national resilience. This will include carrying out detailed work over the next couple of years to understand whether there are any truly viable, and economically and environmentally acceptable, options for transferring water from our region to other areas.

What is Water Resources North and why do we need a regional plan?

Water Resources North is a new group that is designed to coordinate long-term water resources planning for Yorkshire and the North East of England, looking ahead to 2050 and beyond. Our ambition is to be a national leader for water resource management, to help to facilitate sustainable growth across Yorkshire, the Humber and the North East.

Water Resources North will ensure that the region has a sustainable, long-term plan for water resources that protects our region's resilience in the face of challenges such as climate change and population growth, as well as our region's precious and diverse environment. We will work with other regions to help secure resilient water supplies for the country as a whole.

Current water use in the WRn region



Regional plans are guided by Defra. They will inform water company Water Resources Management Plans and aim to:

- Reduce water use across all sectors by bringing down demand to 110l/h/d by 2050
- Halve leakage rates by 2050
- Develop new **cross-sector and multi-sector water supply options**
- Move water to where it's needed through **more and bigger water transfers**
- Reduce use of **drought measures** that impact on the environment
- Determine the **long term environmental ambition** for our region

Our key opportunities and challenges

- Currently we have the most drought resilient public water supply in England, due to large resources in Kielder, high rainfall across the upland areas and well-connected public water supply systems
- However climate change is a significant future uncertainty and we need to understand what this looks like, for both future drought and flood risk
- Reservoirs are an important source of water supply and recreation in our region but are also used for flood storage which needs to be maintained
- Key issues are not a lack of water quantity but instead relate to water quality and man-made changes to our rivers and ecosystems
- Develop options to better utilise our water surplus and provide regional, and national, benefits
- Support development of the Northern Powerhouse

Did you know?

The Northumbrian coastline is one of the **driest** parts of the UK, compared to the Pennines which is one of the **wettest**



The inventor of the **modern toilet**, Thomas Crapper, was born in Yorkshire

Yorkshire is famous for a good brew and Northumberland is the birthplace of Earl Grey. The UK drinks around **165 million cups of tea**, using over 41.25 Ml water, per day¹.



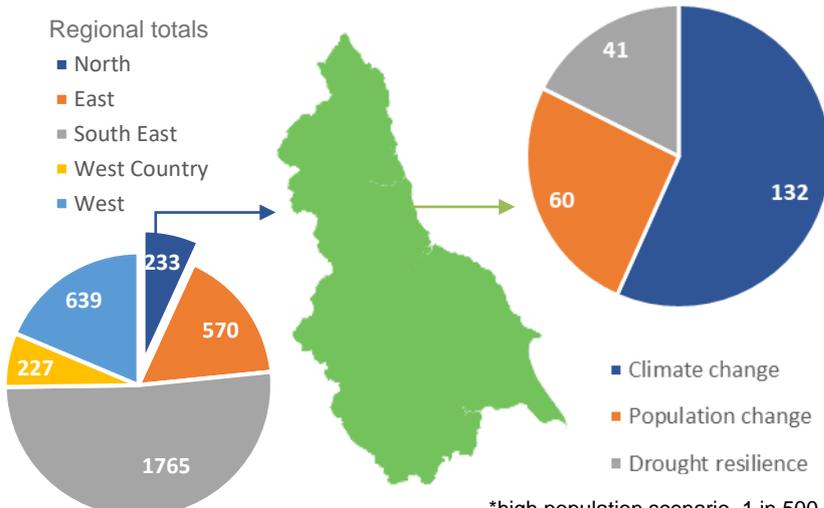
¹Friends of the Earth, Mind Your Step: the land and water footprints of



Hartlepool marina has long been a favourite amongst seafarers and is home to an **18th century replica seaport**

Worst case* future water pressures by 2050

calculated by the Water Resources National Framework (2019) (in mega litres per day, Ml/d)



Water Resources North additional public water supply needs between 2025 and 2050 = 233 Ml/d:

- Climate change: 132 Ml/d
- Population change: 60 Ml/d
- Drought resilience: 41 Ml/d

Estimated total future demand from other users = 185 Ml/d:

- 39% power generation
- 31% other industry
- 24% agriculture

*high population scenario, 1 in 500 drought resilience, and assuming existing surplus cannot offset need

Introduction

Water Resources planning

Water resources planning has, for several decades, been carried out by individual water companies within a framework that is set by Government, through legislation and Defra, and is regulated by the Environment Agency. The primary objective of water resources planning has been to ensure that public water supplies are secure and resilient in the face of challenges such as a growing population, the climate crisis, and the need to protect our valuable water environment.

The need for change

The approach to planning at individual water company level has served many parts of the country well, notably where companies – such as Yorkshire Water and Northumbrian Water – cover large geographical areas and so are able to plan water resources, and mitigate drought risk, at scale. Both companies' supply systems include intra-company transfer capabilities, which mean water can be transferred relatively long distances to provide security of supply. However, in other parts of the country, such as London and the South East there are multiple companies within a relatively small geography. Here, planning at company level has often led to sub-optimal and smaller solutions, and has inhibited the sector's ability to invest in schemes that could secure water resources at a regional level and across multiple companies' areas.

This historical context is being exacerbated by accelerating climate change and population growth, and increased awareness of the fragility of ecosystems that depend on our water environment. Often these drivers are most acute in those areas of the country – such as the South East – that also have challenges in planning for water supply infrastructure. In addition, it is now recognised that there is a need to plan more holistically for all users of water – including sectors such as agriculture, power, recreation and other industries that directly abstract water from the environment – and not just for public water supply. Our environment also needs a greater voice in the decisions that we make about water use.

This need for change has been recognised by Government, regulators and the water industry alike, and has resulted in a new approach to the way in which we plan water resources for the future.

A new approach

In August 2018, the regulators of water in England (Defra, DWI, EA and Ofwat) jointly wrote to all water companies. Amongst other things, the regulators' letter set out an expectation for greater co-ordination of water resources planning, the need to consider solutions that meet the needs of multiple sectors and placed greater emphasis on the need to consider regional and inter-regional solutions. Importantly, the letter also stated the regional groups would have the "flexibility to tailor their organisation and governance structures, as well as the plans they produce, to match the challenges they face".

Regulators wrote again to companies in October 2019, recognising the progress towards regional planning that had been made up to that point. This second letter also referenced the five regional groups which had by this time been set up. These are shown on the map opposite. Water Resources North, shown in orange, covers the area served by Yorkshire Water, Northumbrian Water and Hartlepool Water.

In March 2020, the Environment Agency published the Water Resources National Framework⁴ (WRNF). This sets out the forecast future need for water across the whole of England, including that from sectors other than public water supply. It also considers future scenarios for reductions in abstraction to help protect the environment and asks each region to define its own ambition for the environment.



⁴ <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

Purpose of this report

This report is the first publication from Water Resources North. Building on information included in the WRNF and data from companies' Water Resources Management Plans 2019, it sets out the current resource position for Water Resources North. As well as setting out our resources position, this report describes our initial thoughts on environmental ambition, and how we will engage with other sectors in a way that is useful and meaningful to the water resources planning process, so that we can create a plan that is relevant to our region and it reflects its priorities.

A national perspective

In its 25-year environment plan, the UK Government pledged that we would be the first generation to leave the environment in a better condition than we found it. To help meet the pledge to improve resilience to drought and minimise interruption to water supplies the Environment Agency has led the development of a Water Resources National Framework.

The report identifies the strategic long-term water needs of England both nationally and within the boundaries of the regional water resources groups. It does this for all sectors that depend on a secure supply of water while also ensuring the environment is improved.

The WRNF, while led by the Environment Agency, has been developed in collaboration with Ofwat, the Drinking Water Inspectorate (DWI) and Defra as well as a wide range of stakeholders represented through the senior steering group comprising around 40 representatives from the water industry, other water users, environmental NGOs and government & regulators from England and Wales.

The WRNF is part of the water resources planning cycle, and it sets the challenge for regional groups to work collaboratively to develop ambitious regional water resources plans that provide resilient and efficient water supplies into the future and have environmental protection at their core.

Regional groups are critical to the development of integrated plans that include the right strategic solutions for the challenges facing the nation. Five regional groups have been set up that cover England. Each regional group has been tasked with pulling together a regional plan. They are led by water companies and will also include other large water users, as well as groups who can speak on behalf of the environment.

These regional plans, which will include strategic and regional solutions, will then be translated into the next water company Water Resources Management Plans (WRMPs). Company's individual plans may also still include 'tactical' (not strategic or regional) activity that companies may require to address more local issues.

Our vision is that by working together regionally and nationally across all sectors, we will have a joined-up view of the actions that are needed now for a sustainable future. Working collaboratively will increase the resilience of water supplies, protect and improve the environment and drive efficiency, providing value for customers.

Our approach to regional planning

Our vision is for Water Resources North to be a national leader for water resource management. We will play our part in helping to facilitate sustainable growth across Yorkshire, the Humber and the North East, in support of the ambition of the Northern Powerhouse. In order to achieve this vision, we will:

- Protect and support sustainable economic growth across our region.
- Protect and enhance our region's resilience.
- Protect and enhance our region's precious and diverse environment.
- Contribute to regional, local and sectoral ambitions towards zero climate emissions and using a six capitals⁵ approach.

⁵ The Capitals are the valuable assets which are critical to the success of any organisation, and effective management of the Capitals helps ensure resilience. The six capitals are: Financial, Manufactured, Natural, Social, Human and Intellectual capital.

- Lead an integrated catchment approach to water management, recognising the importance of water quality and flood risk, as well as the need to protect water resources for all sectors.
- Work with other regional groups to contribute to national resilience.

We will take an evidence-based approach to environmental ambition, seeking to work across sectors and with regional and local groups to deliver environmental improvements that are meaningful to our region and its catchments. We are planning to do this through using existing forums, such as Local Nature Partnerships and Catchment Partnerships, and by supporting existing plans where relevant, rather than creating new plans where many already exist. Through this approach, we will also seek to coalesce themes from those existing plans, where they have commonality that can be articulated at a regional level (whilst recognising that there will also be specific local priorities to support).

Recognising that water resources, and broader issues of water management, will not be a priority for every stakeholder in our region, we will engage with other sectors at a level that is appropriate to the challenges that our region faces and in a way that adds value to all of our forward planning.

In the next two years we will complete studies that will help to identify whether we can play a wider role in supporting national water resources resilience, how that might work and what the barriers to delivery may be. Given the scale of our region, and its already highly interconnected nature, we will not be building a new regional water resources model at this stage. Instead, we will aggregate data from individual company models, using common datasets for consistency where this is possible to do.

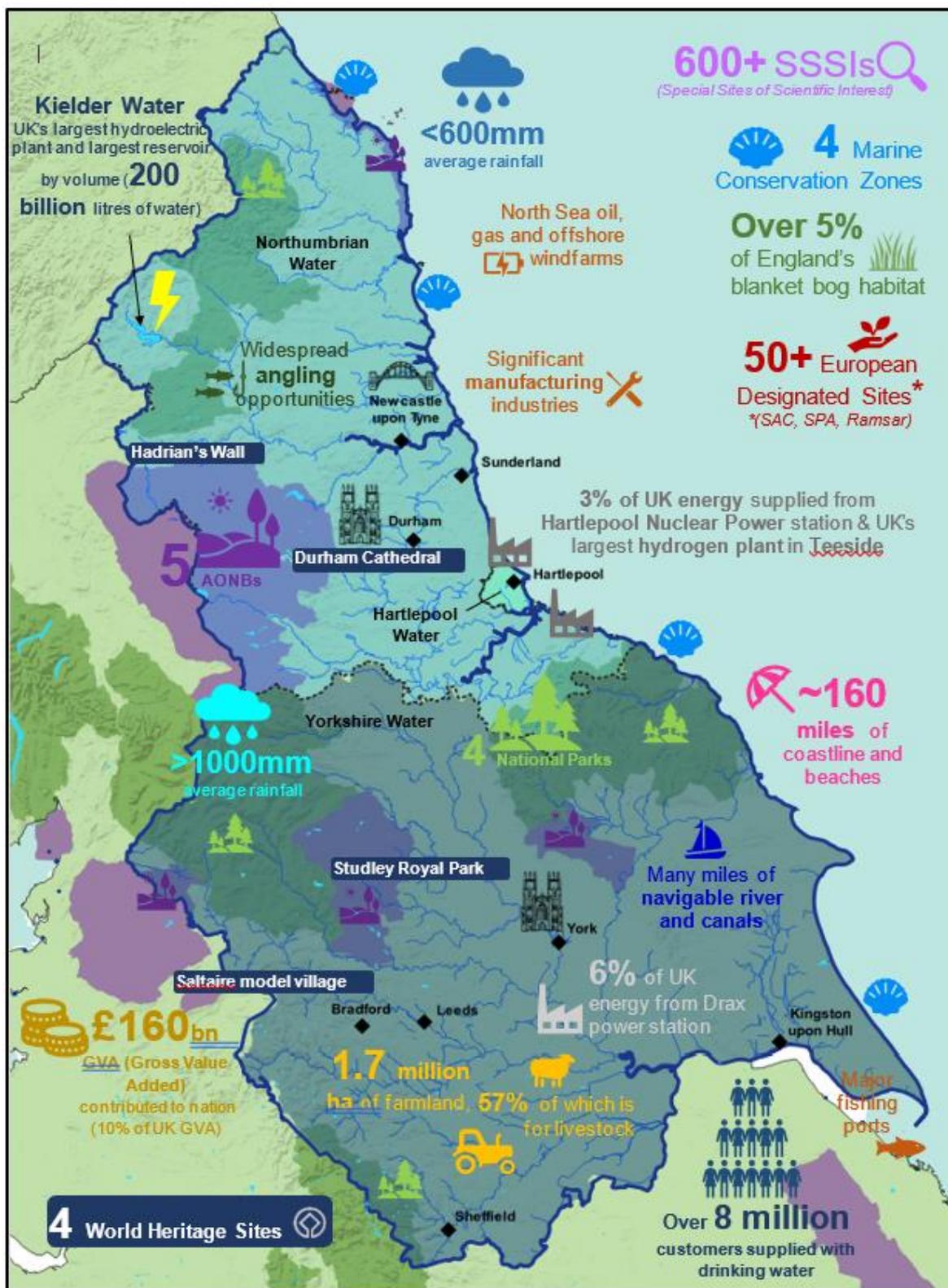
Questions to prompt your feedback

Throughout this report, we are posing questions that we would like your feedback on. The questions are presented in text boxes like this one. See the 'How to get involved' section at the back of the report for how to send us your comments.



- Do you agree with our vision, and our proposed approach to regional planning?
- Have we identified the right priorities for our region?
- What does environmental ambition mean to you when thinking about water and water resources?

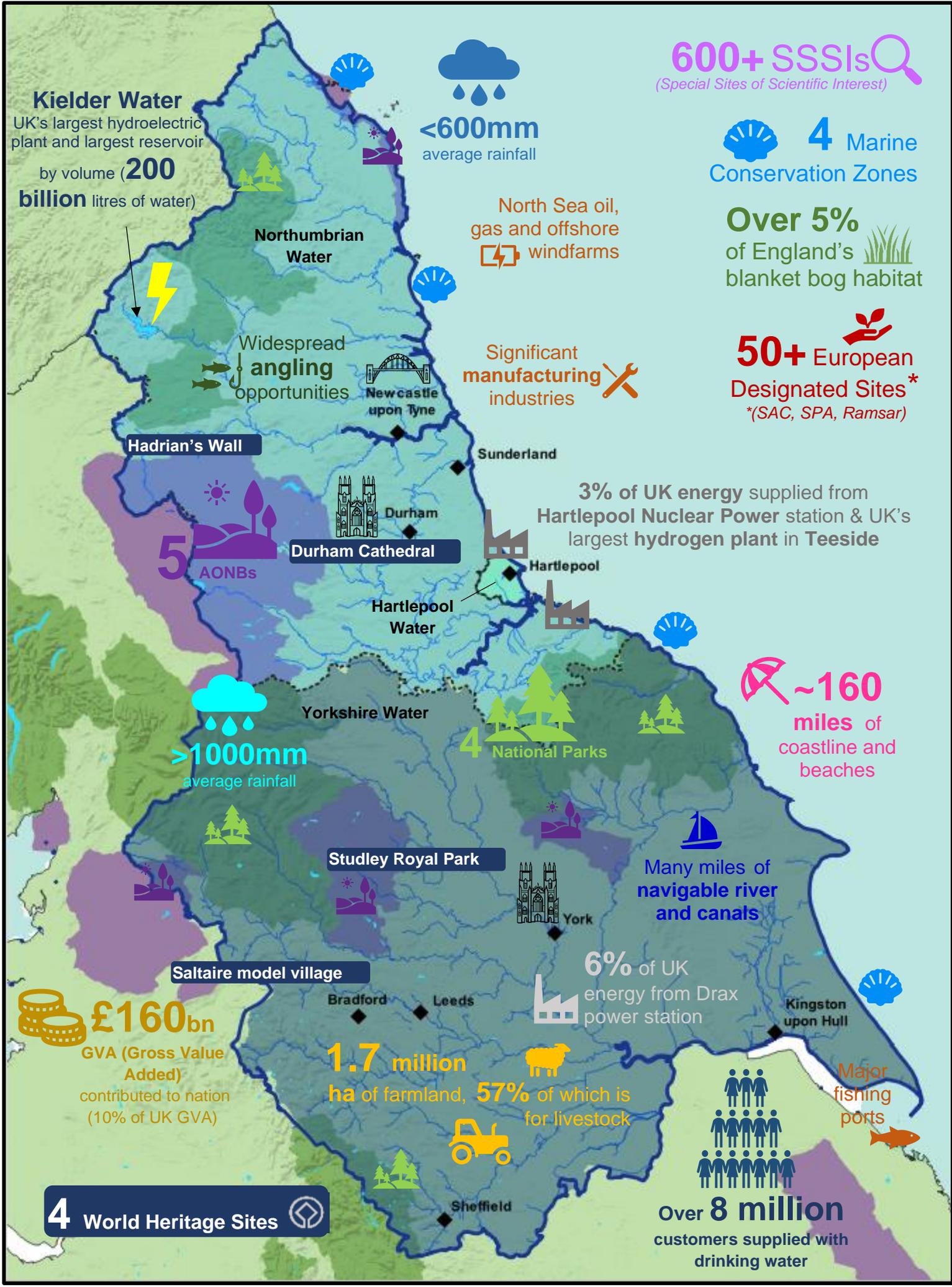
Our region



Questions to prompt your feedback

- What is it that makes our regional special to you?
- Which parts of our water environment are particularly important to you and why?





Kielder Water

UK's largest hydroelectric plant and largest reservoir

by volume **200**

billion litres of water)



Northumbrian Water

Widespread **angling** opportunities



Newcastle upon Tyne

Hadrian's Wall

5 AONBs

Durham Cathedral

Hartlepool Water

Yorkshire Water

>1000mm average rainfall

4 National Parks

Studley Royal Park



York

Saltaire model village

Bradford

Leeds

6% of UK energy from Drax power station

Kingston upon Hull

£160bn

GVA (Gross Value Added)

contributed to nation (10% of UK GVA)

1.7 million ha of farmland, **57%** of which is for livestock



Sheffield

Many miles of **navigable river and canals**

6% of UK energy from Drax power station

Major fishing ports



over **8 million** customers supplied with drinking water

600+ SSSIs (Special Sites of Scientific Interest)

4 Marine Conservation Zones

Over **5%** of England's blanket bog habitat

50+ European Designated Sites* (SAC, SPA, Ramsar)

<600mm average rainfall

North Sea oil, gas and offshore windfarms

Significant **manufacturing** industries

3% of UK energy supplied from Hartlepool Nuclear Power station & UK's largest hydrogen plant in Teeside

~160 miles of coastline and beaches

4 World Heritage Sites

Our initial resources position

We need to ensure that there are sufficient water resources available in our region to satisfy the current and future demands of people, our economy and the environment. We know that both supply and demand will change in the future, with climate change, population growth, economic development and changing environmental needs. Therefore, we have looked at current water use and produced forecasts out to 2045 to understand what the future water needs for our region could be.

Current resources position in 2020

This section of our report sets out Water Resources North's Initial Resources Position (IRP). At this early stage of developing our Regional Plan, the information presented uses Water Resources Management Plan 2019 (WRMP19) data for public water supply, and information from the WRNF for other sectors. The IRP reflects and includes WRMP19 plans for maintaining a secure supply of water, including those to manage demand and reduce leakage.

All water companies are required to publish WRMPs every five years. These complex plans use a wide range of information to look at how the balance between public water supply and demand is forecast to change over the next 25 years as a minimum. Data used to create this forecast includes current available water resources and demands, and likely changes to these due to climate change, drought, population and economic growth and environmental pressures, as well as mitigation measures such as demand management, leakage management and new resources. The forecast is used to understand what investment may be required to maintain a secure supply of water into the future.

For the Regional Plan, WRMP forecasts for public water supply will be coupled with forecasts for other sectors, although it needs to be recognised that planning and policy for other sectors' water use is less mature than that for public water supply. The Regional Plan will look at our challenges and needs as a region as a whole. Water resources planning is a significant process involving detailed technical appraisals, following regulatory guidance and industry frameworks, and extensive consultation. This document represents a transition to the next set of long-term water resources plans, providing a view of our initial resource position in 2020.

This initial regional position will be updated in early 2021, following a period of further work to develop our regional planning approach and engagement with our stakeholders. In particular, we are keen to better understand what other sectors' water use currently looks like and how this might change in the future. We will take into account new data that becomes available, new guidance and policies, and the aspirations of the region. However, whilst the headline figures paint a picture for the region as a whole, the demand for water is often very localised to where it is both needed and available. As we develop the plan for the region it will be important to consider local needs, at a catchment scale, as well as the wider strategic requirements. In addition, we will need to be sensitive to the unique challenges of our region, including flooding and water quality concerns, as well as vulnerability to droughts such as in summer 2018. It is also important to recognise that the future is inherently uncertain. In our plan we will consider different scenarios for how the future might look, to test our plan and ensure that it can cope with, and adapt to, change.

We are also looking at regionally strategic options as part of the water resources planning process. By strategic options we mean possible schemes to interconnect water companies' supply zones and provide large scale transfers of water which could provide enhanced regional, or even national, water resources in the future – for example, whether the resources in Kielder Water could be used to greater benefit. Where we are looking at potential transfers to other regions, we will work with neighbouring regions to assess options. In developing these options, we will need to engage with stakeholders and interested parties. These options will be considered in the Regional Plan. As they are at a very early stage of development, they are not included in our 2020 initial resource position discussed below.

Public water supply demands

Despite WReN's large area, there are only five potable Water Resources Zones (WRZs)⁶ defined in the region. Indeed, 98.3% of the region's population is supplied by just two zones: Grid (YW, 65.9%) and Kielder (NWL, 32.4%). The remaining 1.7% is split across Hartlepool (1.1%), East (YW, 0.3%) and Berwick (NWL, 0.3%). The two largest zones are well connected at a WRZ level (ie within their respective zones), but the region is less well connected between zones.

In addition to the potable WRZs, Northumbrian Water also operates a non-potable Industrial WRZ in Teesside, which supplies water to industrial water users in that area.

As part of WRMP19 water resources planning, NWL and HW WRZs have been assessed against resilience to at least 1 in 200 year drought event. All zones in WReN show a surplus against 1:200 year event, providing them with a good baseline resilience to drought. There is an emerging new national target of a 1 in 500 year drought resilience (prior to the use of standpipes or similar emergency measures), which WReN will need to consider. YW's zones have already been assessed against a 1 in 500 year drought event through its WRMP19, and are able to meet this in the future with investment in leakage reduction. YW's resilience is largely due to investments made after the 1995/96 drought, which led to expansion of its grid network that allows YW to balance the use of water from reservoirs, rivers and groundwater sources.

NWL and HW WRMP19 data also indicates significant surpluses (relative to demand) in all of their WRZs over at least the next 25 years. Northumbrian Water and Hartlepool Water zones, whilst not being reported to a 1 in 500 year drought resilience in their WRMP19, are considered to be resilient to this level due to their large surplus and low drought vulnerability. A full 1 in 500 year assessment is currently being worked on as part of the next round of water resource planning, with a new groundwater model being built for the Berwick zone to help inform this. Any updated results will be presented in our 2021 Resources Position. As a result of this, the data for the 1 in 200 and 1 in 500 year scenarios is the same and only one dataset presented in below and in the accompanying data tables.

The public water supply data used below is taken from companies' WRMP19 data where this has been published. At the time of publishing this report, the Yorkshire Water data is different to the WRMP19 data on YW's website. This is mainly because of changes to leakage targets that have been made as a part of the PR19 business planning process.

Non-public water supply demands

Demands for non-public water supply sectors have been taken from information collated by Defra in a report that was written to provide data for the WRNF, *Understanding future water demand outside of the water industry*⁷. At present, there is uncertainty around some of these data. In particular, it is difficult for many industries to know how much water they will need in the future. For example, climate change and the global nature of food markets will influence how much water agriculture will need. National and international policies, such as 'net zero carbon', will affect the amount of water needed for energy generation. The emergence of new technologies such as the hydrogen economy, and carbon capture and storage processes (which received support in the recent Budget) will also influence future water needs. The forecast future use figures are therefore highly uncertain.

In addition, the numbers presented here reflect comparable average annual forecasts of the demand for water. This may not reflect specific pressures and needs by other sectors at particular times of year or in certain conditions, or their resilience to drought. On the counter, this brings potential opportunity, where it might be possible to mitigate specific sectoral challenges if effective mutual sharing of resources can be achieved.

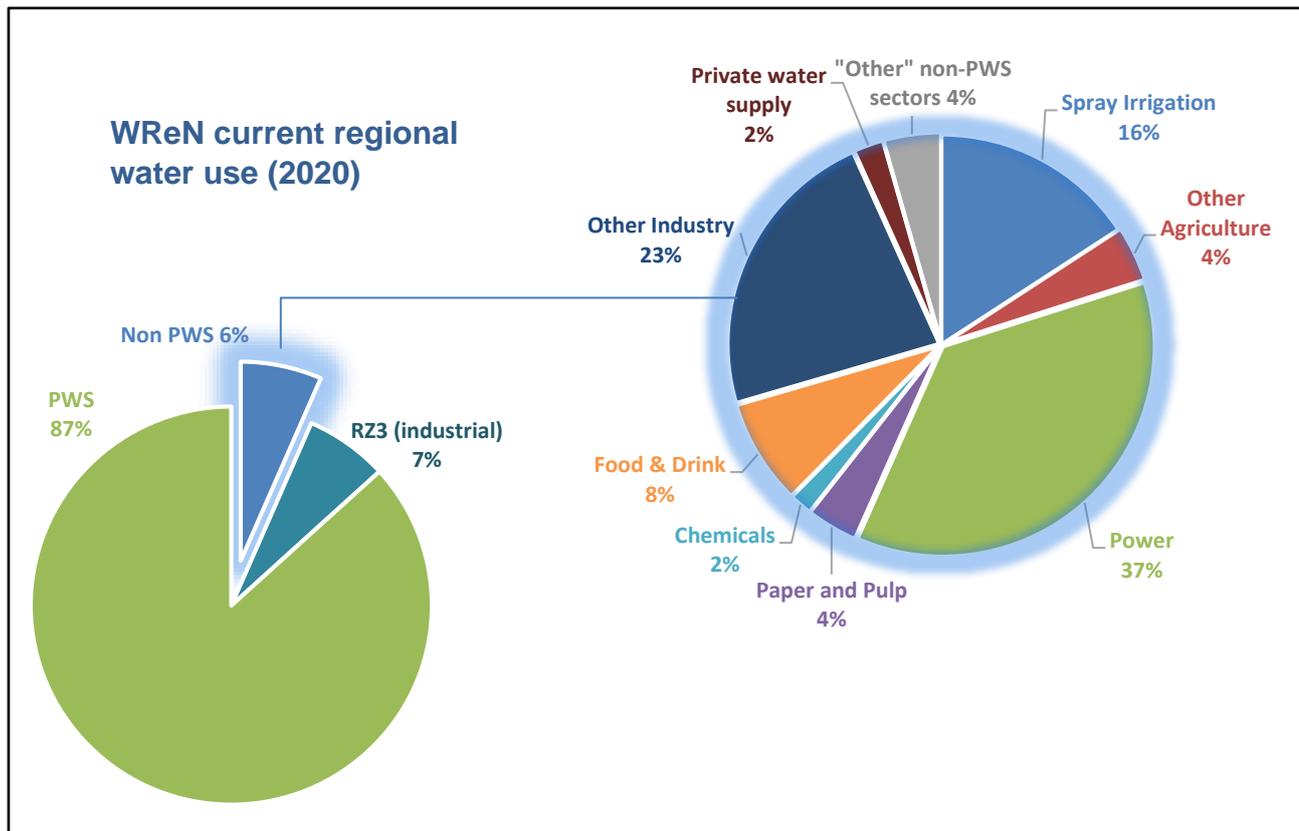
We will engage with other sectors to better understand their use and ensure that the data used in our planning is representative of each sector.

⁶ A water resource zone is an area within which water sources can be shared effectively. Customers within a resource zone should experience broadly the same risk of supply failure from a resource shortfall.

⁷ <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20172&FromSearch=Y&Publisher=1&SearchText=WT15107&SortString=ProjectCode&SortOrder=Asc&Paging=10>

Current water use

Currently the public water supply sector uses significantly more water than other sectors in our region. 87% of water abstracted is used for public water supply compared to 13% for other sectors. The major users in other sectors in our region are predominantly power and industry.



Future resources position

For public water supply, we have assessed current and forecast future water use to look at the balance between water demand and supply availability up until 2045. We also include in this calculation allowances for uncertainty and other factors like water treatment works availability because of maintenance activity. Where there is not enough headroom between the available supply and the forecast demand we consider that an area will have a deficit. When an area is in deficit, we need to identify options to close the gap. These options could include actions to reduce demand, or to increase supply, or a combination of both.

For our forecast, we have assumed a baseline of 2025 as this represents the starting point for the next round of plans. This means that the public water supply data stated for 2025 assumes that all of the investment that water companies have planned in their WRMP19 between 2020 and 2025 goes ahead. This includes reducing leakage and working with customers to reduce the amount of water that they use (per capita consumption, PCC). Over the next five years, across our region, water companies already plan to reduce leakage by 12%, and are aiming to reduce customers' use to 125 litres of water per person per day (calculated based on a weighted average reflecting size of resource zone).

Scenarios

We have shown below two different future scenarios to indicate what the range of water resource needs in our region might be beyond 2025.

In **Scenario 1**, we have assumed that only options committed between 2020 and 2025, as set out in companies' WRMP19 data, are completed. All commitments included in the WRMP19 data beyond 2025 have been removed, and are fixed at 2024-5 numbers, allowing this scenario to act as a baseline supply/demand balance (SBD) for future water resource planning. These commitments reflect enhanced investment to reduce leakage and customer consumption but only up to 2025. It should be noted this is a simplistic assessment for the IRP, and in reality, it is

likely that there would still be an ongoing reduction in leakage and customer demand through business as usual activities. To reflect that this is effectively the new regional planning baseline, have termed this scenario “Baseline WReN SDB”.

However, water companies plans already go beyond 2025. Therefore, in **Scenario 2** we have used all WRMP19 data including commitments and options beyond 2025 so that we are representing current longer term plans through to 2045. This data is presented as WRMP19 final supply/demand balance.

Table 1. Scenario 1 (Baseline WReN SDB) – summary of resource position

Water Resources Zone		2020	2025	2045
RZ1	Hartlepool	10.4	10.3	10.0
RZ2	Northumbrian Berwick	2.0	2.3	3.4
RZ3	Northumbrian Industrial (non-potable)	68.3	68.2	67.4
RZ4	Northumbrian Kielder	50.0	61.7	80.1
RZ5	Yorkshire East Surface Water Zone	5.0	5.9	6.3
RZ6	Yorkshire Grid Surface Water Zone	89.9	125.0	23.6
Sum of deficits in resource zones		0.0	0.0	0.0
Sum of surpluses in resource zones		225.7	273.4	190.8
Total SDB		225.7	273.4	190.8

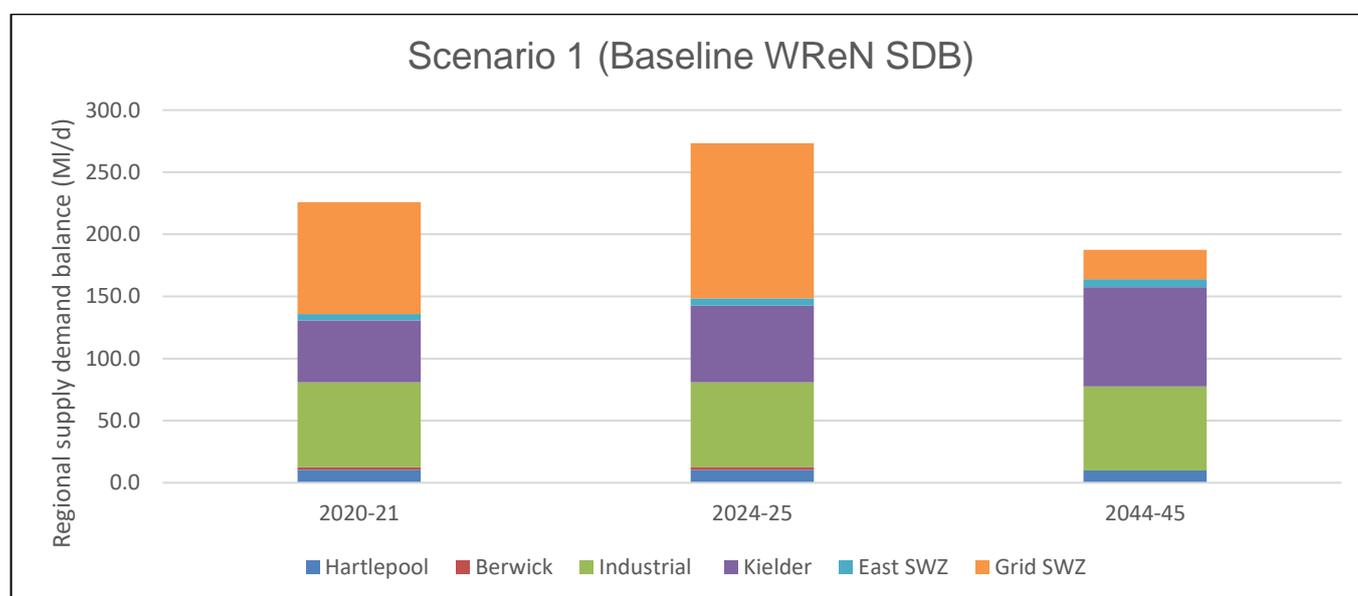


Figure 2. Regional surplus/deficit for Scenario 1, assuming AMP7 WRMP19 committed options only

Table 2. Scenario 2 (Final WRMP19 SDB) – summary of resource position

Water Resources Zone		2020	2025	2045
RZ1	Hartlepool	10.4	10.3	10.1
RZ2	Northumbrian Berwick	2.0	2.3	4.0
RZ3	Northumbrian Industrial (non-potable)	68.3	68.2	67.4
RZ4	Northumbrian Kielder	50.0	61.7	120.0
RZ5	Yorkshire East Surface Water Zone	5.0	5.9	6.3
RZ6	Yorkshire Grid Surface Water Zone	89.9	125.0	107.2
Sum of deficits in resource zones		0.0	0.0	0.0
Sum of surpluses in resource zones		225.7	273.4	314.9
Total SDB		225.7	273.4	314.9

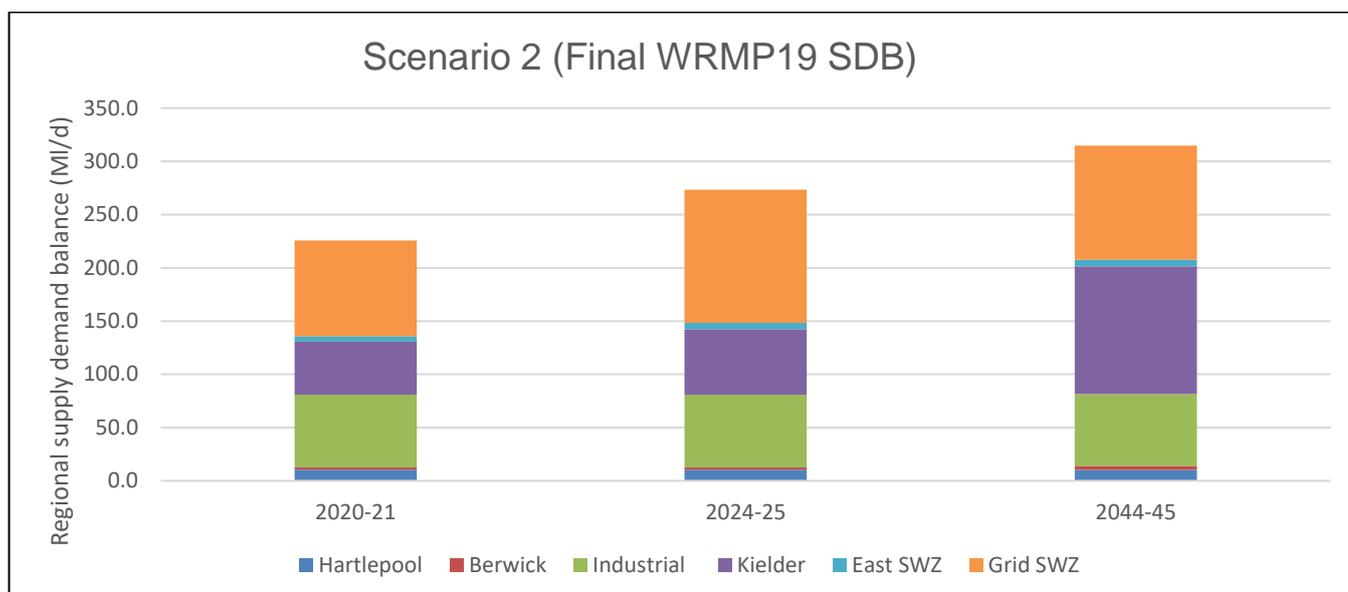


Figure 3. Regional surplus/deficit for Scenario 2, with all WRMP19 committed options as per the final plan

In WRMP19, with the exception of Yorkshire Water's Grid Surface Water Zone (SWZ) (RZ6), the supply demand balance for WReN's water resource zones showed a surplus in the baseline (2020 start year) dry year annual average scenario over 25 years without the need for interventions. The Grid SWZ WRMP19 baseline (2020) forecast showed a risk of the zone falling into deficit, starting from 6MI/d in the mid-30s, increasing to 34MI/d by 2045. This deficit is due to the risk that climate change will significantly reduce the available water resources. However, through inclusion of AMP7 WRMP commitments this deficit is resolved and is therefore not seen in either Scenarios 1 or 2. Through its WRMP19, Yorkshire Water have committed to closing the Grid SWZ deficit through an enhanced leakage detection and repair programme that will aim to reduce leakage by a minimum of 15% by 2025 compared to its 2019/20 position. There will also be some investment in existing borehole supplies by 2025 to improve resilience after 2025 to ensure the longer-term deficit in the Grid SWZ is

All three WReN water companies have committed to reduce leakage throughout the WRMP19 25-year planning period. Scenario 1 demonstrates that without this continued investment in leakage, the surplus in the Grid SWZ (RZ6) is reduced by 2044/45, when compared to Scenario 2 which includes all WRMP19 commitments. There is also a reduction in the available surplus in the Kielder zone (RZ4 The zone is constrained by infrastructure (rather than water resources) and there is significant additional water available from Kielder Water that could be put into supply in the future if needed. Further understanding of this constraint and the possible uses of Kielder surplus water will form part of the regional option development. The Berwick zone, East SWZ and the Hartlepool zone all show a fairly stable surplus, due to their small size. RZ3 is non-potable and remains a constant across the planning period and scenarios.

Overall, in both scenarios presented, from a baseline starting point of 2025 to include AMP7 WRMP19 commitments, the region sees a healthy surplus through the planning period to 2045. However, for all zones there is a risk that climate change could be more severe than forecast in WRMP19 baseline scenarios. It is important that we reserve sufficient headroom in our regional plan to allow for this uncertainty and are able to meet the needs of all sectors before committing to any transfers.

Impact of water industry commitments

The water industry has committed to continuing to take long term action on leakage, proposing a reduction of 50% by 2050. In addition, the industry is committed to supporting the emerging national target of reducing per capita consumption to 110 l/hd/day by the same date. We know that meeting these new targets will be challenging and will require innovation as well as contributions from other sectors including Government, developers, manufacturers of white goods, etc. It should be recognised, therefore, that there is uncertainty over the speed at which these new targets will be met, and so we will need to monitor our progress against these targets and adapt our plans if we are not on the right trajectory towards them.

It is worth noting that, notwithstanding the above new commitments, water companies in WReN have already set ambitious leakage and PCC targets in their WRMP19. By 2045, leakage across the region is forecast to be reduced by 43% and PCC to 113 MI/d (this is reflected in the large regional surplus in Scenario 2 above).

Resilience

We have also assessed our regional position against a 1 in 500 year drought event. As discussed above, all resource zones in WReN are already considered resilient to such an extreme event, and therefore the supply demand balance position does not change in this scenario. However, we acknowledge that the NWL and HW systems have not yet been fully tested against a 1 in 500 year event, and this will be addressed as we move forward towards a regional plan and WRMP24.

Non-public water supply sector

Work carried out for the WRNF has estimated that certain sectors are likely to see growth in their abstractions in the period to 2050. These growth factors applied to WReN show a total increase in non-public water supply (non-PWS) abstraction of 26.1 MI/d by 2050 (Table 3). The significance of this growth will be dependent on local factors and if there is sufficient resource available to meet this need whilst meeting the needs of the environment in individual water courses. However, as mentioned above, there is significant uncertainty over the forecasts of future use in other sectors. It is also worth noting that this information also only represents those sectors for which the WRNF has data. Going forward there will be a need to ensure that all sectors are included, for example those that were previously exempt such as navigation and quarry dewatering.

We recognise we need to engage with other sectors to better understand the water demands so, at present, these forecast changes have not been included in our region's estimated balance for 2050.

NWL also have a solely non-PWS resource zone included in WReN – Resource Zone 3 (Industrial). This is included in its WMRP19 and as such we have included it in the scenarios above, but it should be noted that it is another element of the non-PWS demands in the region. Its comparable contribution to the region can be seen in Figure 1.

Table 3. Non public water sector demands estimated over 2020-2050

Sector	2020 Baseline demand MI/d	2050 Best Estimate MI/d	Forecast growth MI/d
Spray Irrigation	25.9	37.3	11.4
Other Agriculture	7.1	7.2	0.2
Power	60.1	73.3	13.2
Paper and Pulp	6.5	7.3	0.8
Chemicals	2.9	3.6	0.6
Food & Drink	13.4	16.7	3.3
Other Industry	37.6	35.6	- 1.9
Private water supply	3.8	3.7	- 0.1
"Other" non-PWS sectors	7.2	7.2	-
Total other sectors	164.3	191.87	27.52

Beyond 2050

Water resources planning is subject to significant uncertainty in the long-term. Factors that affect our plans, such as climate change, economic development and population growth may result in the future looking significantly different than we foresee today. Our current plans take into account these factors where they affect public water supply.

Taking climate change as a key example, our forecast supply-demand balance position shown in the previous sections include both a mid-estimate of climate change in the assessment of supply availability, as well as an uncertainty allowance for the range of potential impacts. The impacts of climate change influence some areas of our region more than others, mainly the Kielder and Grid SWZ resource zones.

By 2080, assessment of the Yorkshire Water Grid SWZ shows the potential for around 60 MI/d further lost supply availability in 2080 compared to 2045 (~4.6% additional reduction) on the baseline / mid impacts. In 2080, more severe scenarios⁸ show further losses in supply availability of over 300 MI/d (>25% additional reduction) compared to the baseline case. Similarly, estimates in 2080 by Northumbrian Water for Kielder show the most extreme climate change scenarios have an overall 112 MI/d impact compared to the 30 MI/d average estimate.

This highlights how long-term future uncertainty may influence the water resources outlook and opportunities. The choices we make in our regional plan need to be made in the context of this future uncertainty (including those other than climate change), to demonstrate that it is suitably adaptable. It is also important because whilst our system is resilient today, resource pressures and other challenges will increase in the future.

What this means for our water resources planning and how we will take this into account in our Regional Plan

The information on water resources in our region shows that our public water supply is already very resilient to drought and so our plan needs to show how we will protect this resilience into the future. However, this does not mean we are unaffected by drought, and we also need to recognise the uncertainty inherent in this calculation of our existing position. We expect that updated climate change allowances from UKCP18 may show that our changing climate could have a greater impact than has previously been assessed, and the WRNF clearly shows the potential impact that climate change could have on our regional water resources position. The apparent surplus in WRn may not be as large as current data indicates. We need to understand our true position on this so that we can establish whether there is surplus available to be traded.

However, when considering the region as a whole there are already a number of supply and demand options indicatively available within water companies' WRMP19. No doubt there will also be other options within our region that water companies are not yet aware of and which the market may choose to offer to us. This demonstrates that further water trading may be possible through the deployment of new options, which may offer a more cost-effective solution to needs at national level than resources or options in other areas, if they do not have adverse environmental impacts and can be achieved in a way that does not conflict with the need to move towards net zero carbon emissions. Similarly, there are a range of options that could be implemented to meet future risks and challenges, and/or to deliver benefits to drivers other than the supply-demand balance.

For other sectors, the information that is currently available to us shows that their use is a relatively small proportion of overall regional use when compared to public water supply. We will analyse the available data to better understand the areas or catchments where other use is most significant, and focus our efforts on engaging with other sectors to those areas. We will also work closely with other sectors to understand how we can reduce the significant uncertainty that there is around their forecast water use and better understand what their water use might look like in the future.

Questions to prompt your feedback

- Have we missed any key water users within the region? If so, can you provide details.
- Do you agree with the key challenges and opportunities we face in the region with regard to water resource availability? Are there any we have missed?



⁸ Based on the 10th percentile impacts.

Our ambition

So far in this report we have described our current vision and priorities for Water Resources North, and our current regional position for water resources. This section sets out in more detail some of our emerging thinking around the ambition for water resources planning in our region into the future. This is currently our water company view, but we know that we need to co-create this ambition with other stakeholders in our region. So, we want your feedback on this emerging ambition to ensure that it reflects our region as a whole.

Resilience – water, the environment and our economy

- The national ambition is for public water supply to be resilient to Level 4 restrictions (rota cuts) in a 1 in 500 drought: we believe that we already meet this. We will ensure that we continue to meet this into the future and recognise that protecting the resilience of our water supplies is a vital part of protecting the resilience of our region's communities, economy and environment. This is a water company metric for public water supply, and not an expectation for all other sectors.
- However, we also recognise that when thinking about water, resilience is not just about droughts but also the environment and floods. NWL already operate Kielder in agreement with the Environment Agency to help provide better flood protection to communities on the River Tyne. YW is working on a similar approach at Hebden Bridge in Calderdale. It is important that we work with our stakeholders in the region to understand how best to make use of any regional surplus of water that we may have or how assets could be deployed for alternative purposes.
- By working towards a holistic view of water resources resilience, we hope to be able to better balance the needs of public water supply with other sectors, the environment and flooding, in order to play our part in protecting and growing the economy of our region.

Environmental ambition

We need to shape an ambition for the water environment in our region, within a water resources planning context. We need to do this in a way that is evidence based and is complementary to the many other strategies and plans for water that already exist. Some of our initial thinking about how our regional plan can help to protect and enhance the environment includes:

- Increasingly flexible compensation flow regimes to move away from historical artificial fixed flows and have seasonal and annual variability to flows. This could help to protect reservoir stocks for both public water supply and the downstream environment, whilst also improving environmental resilience by exposing it to a more natural range of flows. This may also help to reduce the need for Drought Permits during prolonged periods of dry weather.
- The impact of abstraction on chalk stream habitats is a very high-profile issue in some other regions of the country. In Yorkshire, we are fortunate enough to have the most northerly chalk streams in the country (Gypsey Race, Driffield Beck, Settrington Beck). Whilst water abstraction does not impact these chalk streams to the same scale as elsewhere, it is still crucial that these valuable habitats are protected into the future. Over the next 5 years we will be carrying out investigations to understand what impact water abstractions have on the chalk streams in our region. This will provide evidence to help inform our future decision making.
- Considering how the regional plan can support other activity to deliver against Defra's priority catchments, which, in our region, are the Idle and Torne, and Till and Tweed.
- The way in which our catchments are farmed can have a significant impact on the quality and quantity of water in our becks and rivers. As a water industry, we are already working closely with the agricultural sector to promote more sustainable farming practices. For example, improving soil management practices can help to reduce fertiliser and pesticide use, and result in reduced sediment entering our rivers. Done properly, this can help not just to improve the water environment but also make agricultural businesses more financially sustainable.
- Our region is home to a significant number of England's blanket bog habitats. Both YW and NWL have a longstanding and continuing programme of working with multiple partners to restore these habitats by rewetting, inoculating with sphagnum and changing management practices. This work will continue to improve the

resilience of these habitats recognising that there are multiple benefits to be had, including water quality, flood risk reduction, carbon sequestration and increased biodiversity.

- The Environment Agency is responsible for ensuring all catchments have an environmentally stable abstraction regime. If current abstractions are found to be detrimental to the in-stream environment, or there is a risk they could be detrimental if abstractors were to take their full licensed volume, the Environment Agency will reduce the abstractors' permitted volume. This is referred to as a sustainability reduction, WReN will help abstractors and stakeholders impacted by current or future risks to abstraction volumes work collaboratively to find sustainable solutions.

Involving other sectors

We want to involve other sectors in co-creating our regional plan. This work will build on what the WRNF is showing us about water use in other sectors, and how this varies between sectors and across our region and catchments. We intend to arrange engagement sessions through workshops or webinars, and will establish a group of leading stakeholders who will be able to influence decision making. By engaging with other sectors and stakeholders, WReN will provide the opportunity and mechanism to help us all plan for the future, and to better refine forecasts of future use in other sectors where possible. Through co-creation of the regional plan we will understand where new or alternative resources could be required, and if cross sector solutions can deliver a better value plan to our region than traditional water supply solutions.

As well as looking at other sectors, we will play an active role in supporting the emerging water bidding market, and it may be that some of our future options for water resources resilience in the region come to us through that marketplace.

We also know that demand management is vitally important, and that ambitious reductions in water use can't be achieved by water companies acting in isolation. We will engage with others in the region, to promote more sustainable use of water. In particular, we will work with planning authorities and developers to help ensure that new developments use water sustainably. We've already started this by working with Leeds City Council to support them in moves to adopt a 110 l/hd/day water efficiency standard for new development. This standard was added into the Council's Core Strategy when it was reviewed in September 2019. We will seek to gain similar agreement with other planning authorities across our region.

Contributing to national resilience

We recognise that the WRNF shows that the north as a whole is currently in surplus for water resources. However, much of that surplus is specifically Kielder Water and there are challenges with getting water from Kielder to where it might be required in the future. We are currently carrying out a number of strategic studies to understand if, and how, we might be able to support national water resources resilience in the future. One of these studies is looking at options for greater use of Kielder. We are also looking at whether connecting YW's strategic grid to neighbouring companies could help support water trading. Over the next couple of years, we intend to have these evaluated to a point where they could be included in water company business plans at AMP8 if they are viable and if the demand is there. We need to ensure that any inter-regional transfers do not unacceptably degrade our own region's resilience, and that the transfer would be environmentally acceptable and sustainable (six capitals assessment) in the long term. However, the WRNF is also clear in showing the risk that climate change poses to our future water resources resilience, and so we must ensure that we do not see our exposure to drought risk increase as a result of trading water to other regions. A key part of our programme going forward will be to use the latest available data on climate change to better understand our future water resources risks.

Questions to prompt your feedback

- What is your view on our ambition? Are there any areas that we have missed and which you think should be included in our ambition?
- We have set out our first thoughts on environmental ambition. Do you think this is focussed on the key opportunities in our region? Please provide details of any areas you think we should consider in the plan
- This plan requires engagement across a wide range of stakeholders. Do you have any views on how best to achieve this and are there any key stakeholders the plan needs to engage with?

How to get involved

Questions to prompt your feedback

Throughout this report, we have posed questions that we would like your feedback on. The questions are presented in text boxes, and we have summarised them all here.

Our approach to regional planning

- Do you agree with our vision, and our proposed approach to regional planning?
- Have we identified the right priorities for our region?
- What does environmental ambition mean to you when thinking about water and water resources?

Our region

- What is it that makes our regional special to you?
- Which parts of our water environment are particularly important to you and why?

Our initial resources position

- Have we missed any key water users within the region? If so, can you provide details.
- Do you agree with the key challenges and opportunities we face in the region with regard to water resource availability? Are there any we have missed?

Our ambition

- What is your view on our ambition? Are there any areas that we have missed and which you think should be included in our ambition?
- We have set out our first thoughts on environmental ambition. Do you think this is focussed on the key opportunities in our region? Please provide details of any areas you think we should consider in the plan
- This plan requires engagement across a wide range of stakeholders. Do you have any views on how best to achieve this and are there any key stakeholders the plan needs to engage with?

We will be starting to engage with other stakeholders through early 2020. If you are interested in getting involved in this work, or would like to provide us with some feedback on the report and its questions, please email us on waterresources@yorkshirewater.co.uk.

