



DRAFT REGIONAL PLAN

for consultation

Autumn 2022





How to respond to this consultation

Please read this plan and share your views. We have provided a few questions related to several important aspects of our plan:

1. Are you satisfied with our demand management approach? (See Section 7.1)
2. Do you think the supply options included in our preferred plan are good value, given that many of them target improvements to existing assets? (See Section 7.1)
3. Are you satisfied with the range of catchment options we included as part of our environmental destination? (See Section 7.2)
4. Are you satisfied that the strategic choices we have made in developing this plan were robustly informed by stakeholder and customer feedback? (see Section 6)
5. What is your view on the pace of the delivery of our drought resilience and environmental improvements?
6. Do you think the transfers we selected in our plan have been sufficiently explained with regards to their risks and benefits? (see Section 7.3)
7. Do you have any views on how our plan can further develop to meet the needs of other abstracting sectors?
8. Do you have any other comments on ways to improve our plan?

Please send your feedback to: waterresourceswest@outlook.com by 22/02/2023.

With thanks from the abstractors represented in Water Resources West



Note

This regional plan, including accompanying regional planning data tables, has been prepared by the core water company members following the agreed methodologies. These have been subject to governance and assurance within each of the companies, with the level of assurance proportionate to the risks. Where companies determined that risks were higher, they sought external assurance. The core member companies are: Dŵr Cymru Cyfyngedig (here referred to as Welsh Water), Hafren Dyfrdwy Cyfyngedig, United Utilities Water Limited, South Staffordshire Water plc, and Severn Trent Water Limited.

The plan has been reviewed by all Water Resources West members represented in its governance structure.

External assurance has been provided by Jacobs on Water Resources West's use of the company assured data. Jacobs concluded that there is alignment between the draft WRW plan and the companies' draft Water Resources Management Plans and we consider the WRW plan has been developed in accordance with the National Framework and relevant guidance and policy (see Appendix I).

When reading tables and charts in this document, the totals may not add up due to rounding.

Terms that appear grey in the document are clickable and lead to the Glossary, where a full explanation is provided. Cover photo by [Humphrey Muleba](#) on [Unsplash](#).

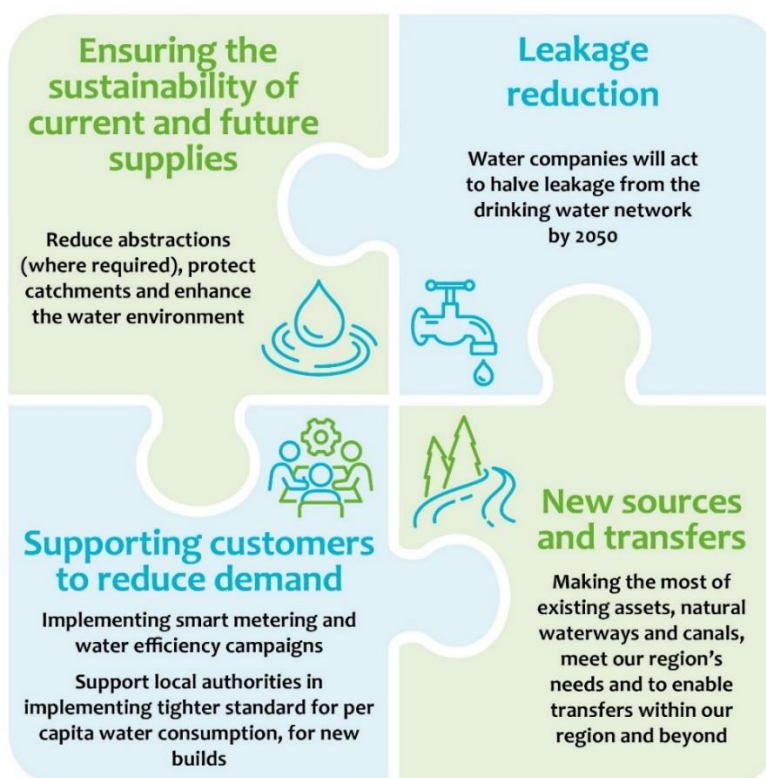


Executive Summary

Managing water resources sustainably is key to ensure future generations will have a plentiful, sustainable supply of water. Our supplies are under pressure from the impacts of climate change, rising demand linked to population growth as well as the need to protect the water environment from over abstraction. Water Resources West members believe that working together with other regions, industry sectors, regulators and other stakeholders, we can identify and progress actions that are needed now, for a sustainable future. Hence, we have built a plan over a 60 year horizon, to meet the needs of customers and the environment.

To meet the needs of the public water sector, we have an ambitious strategy for securing sustainable supplies for the future. We know that sustainability starts with a reduction in use and therefore, by 2050, we are committed to reduce leakage by 50% and support households to reduce their consumption to 110 litres per person per day. Our projections show that by 2050, despite the ambitious demand policies that would be implemented, our region will need an additional 221 million litres per day (Ml/d), to meet public water supply needs and 97 Ml/d to meet the needs of other sectors. Actions included in this draft plan will help increase our public water supply resilience to extreme droughts and help us meet future demand in our region. We estimate that this plan will cost £9.7bn but will bring over £2 billion net benefits to the region. The net benefit stems from resilient public water supplies, environmental improvements and economic gains from transfers bringing investment to the region, the estimated benefits of which outweigh the costs.

Our strategy for sustainable water supplies



We are now consulting on our draft plan, including the outcome of the second inter-regional reconciliation process, between 16th November 2022 and 22nd February 2023. We will use the feedback received to support the development of our final regional plan.



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1. WHAT IS A REGIONAL WATER RESOURCES PLAN?

1.1 Regional Plan expectations

In its 25-year environment plan for England¹, 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 this pledge, the Environment Agency (EA) has developed The National Framework for Water Resources for England. This was necessary as company-level planning alone could not provide the strategic solutions needed to secure water supplies and ensure environmental integrity across England. The Welsh Government, Natural Resources Wales and other stakeholders have also input into shaping this framework, ensuring cross border interests are fully accounted for, aligning with Welsh legislation that promotes the sustainable management of natural resources² and the wellbeing of future generations³. The publication of the National Framework for Water Resources in March 2020 marked the introduction of regional water resources planning expectations (see below) for England.

Regional planning expectations



Set out how the supply of water will be managed across the region, while trying to achieve ambitious leakage reduction and lower per capita consumption targets



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



Increase resilience to drought by reducing the need for rota cuts and standpipes in extreme droughts



Identify all the options needed in their region and how the plan will deliver best value



Explore how the plan will adapt to different future scenarios while considering all opportunities for water transfers (within and between regions, of different scales and lengths)

The development of our plan is in alignment with the Water Resources Planning Guideline⁴ and the Welsh Government Guiding Principles⁵, as applicable to England and Wales. Elements of the guideline have specific legislative or regulatory requirements that align to the England or Wales geographic boundaries, mainly:

¹ [A Green Future: Our 25 Year Plan to improve the environment](#), HM Government, January 2018.

² [Environment \(Wales\) Act 2016](#)

³ [Well-being of Future Generations \(Wales\) Act 2015](#)

⁴ [Water Resources Planning Guideline](#), HM Government, April 2022, including relevant supplementary guidance.

⁵ [Guiding Principles for Developing Water Resources Management Plans](#), Welsh Government, 2022.



- setting the environmental destination
- considering the environment and society in decision making
- complying with environmental legislation - Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA)
- obligations in relation to Environment (Wales) Act 2016 and Well-being of Future Generations (Wales) Act 2015.

As per the guideline, our plan sets out the current needs of the environment, the public and non-public water supply sectors across the region, over a 60 year planning horizon (Section 3) and how these are likely to evolve in the future (Section 4). Our regional plan must be a “best value plan” that embraces all these aspects, translated through clear outcomes and measures. Later, in Table 7, we will show how our ambitions flow through into clear outcomes, measures and environmental objectives. We explain the decision making process we use to decide the make-up of our best value plan in Section 5 and present the options selected in this draft plan in Section 7. We aim to support the water environment’s recovery and resilience, so that future generations can enjoy it. Hence, we developed a clear vision with regards to our environmental destination which aims to satisfy the separate requirements outlined in legislation and guidance for both England and Wales (see Sections 4.1, 5.2, 6.1 and 7.2).

The ‘best value’ plan

It is important that the regional plan we produce is “best value” for the communities we serve. The approach to determining ‘best value’ in each region will feature some differences but overall, the process is very similar (see Section 5). The regional groups worked together through two rounds of reconciliation, to ensure the aligned plans are best value for all five regions. The reconciliation process is akin to resolving a puzzle, where all regions’ needs are identified and transfer solutions are offered by regions that have lower cost and sustainable options available for implementation, to support transfers. The solutions are tailored to ensure they can meet the needs of the region who will receive them, both in terms of volumes and timing (see Section 7.3).

1.2 Policy and Regulatory context

Regional plans must embed the guidance and legislation applicable in the territory they cover. As the only cross-border region, our plan is shaped by both English and Welsh legislation and guidance. This is clearly reflected in the methods we used to develop this plan. We are committed to develop an ambitious plan which complies with English and Welsh legislation and that contributes to the delivery of targets and objectives set out in relevant guidelines and policies (see below). We outline how our plan meets various expectations and complies with guidelines and other policies in Appendix A and provide an overview of the most important policy and legislative pieces that we account for in our regional plan below. Since our region covers areas in both England and Wales, we highlight which requirements apply in each. We also provide an overview of what this regional plan means for Wales in Section 8.3.



Legislation and policies shaping our regional plan





2. WHO WE ARE

Water is essential for both households and a range of industries across urban and rural parts of our region. Water Resources West is a group of abstractors who are committed to take appropriate action now, to ensure we can meet future water demand for all needs in a sustainable way.

**Our region
has 5 core members**



Core members work together with other abstracting sectors, the sectoral regulators and neighbouring water companies.

Quick facts about Water Resources West

We rely on several shared major rivers

such as the Severn, Dee, Trent and Wye to supply



18 million people

and many businesses across a variety of industries



**Our public water supplies are organised in
30 water resource zones**

We rely on:

58 river abstractions

216 groundwater abstractions

281 impounding reservoirs

Clywedog and the Derwent Valley Reservoirs play an important role in providing public water supplies to the Midlands. Vyrnwy, the Pennine reservoirs and the large reservoirs in the Lake District supply the North West.

The Water Resources West region covers an area of 43,000 km² with varied hydrological and geological characteristics. Much of the region's water comes from upland reservoirs, but there are also important river and groundwater abstractions. This includes abstraction from the Triassic sandstone aquifer. Flows in the River Severn and the River Dee support multiple abstractors with releases from upstream reservoirs. These are shared resources which connect our membership and provide opportunities for joint solutions to our shared challenge.

Our region features areas that experience different types of drought (Figure 2) and supply pressures. When the South East is in an extremely severe drought, very rarely is the North West also in a drought at the same time, and vice-versa⁶. According to the Environment Agency's latest assessment of water stress in England⁷, half of our region is under serious water stress.

⁶ M Tanguy, K Haslinger, C Svensson, S Parry, LJ Barker, J Hannaford, C Prudhomme, "Regional Differences in Spatiotemporal Drought Characteristics in Great Britain" Front. Environ. Sci., 12 March 2021
doi.org/10.3389/fenvs.2021.639649

⁷ [Updating the determination of water stressed areas in England](#), Environment Agency, July 2021. Note that water stress classifications are not applicable in Wales and therefore only apply to English areas supplied by Welsh Water but not to Hafren Dyfrdwy (Severn Dee).



Figure 1. Water Resources West's regional characteristics, including the different drought zones (adapted from Tanguy et al., 2021⁶)

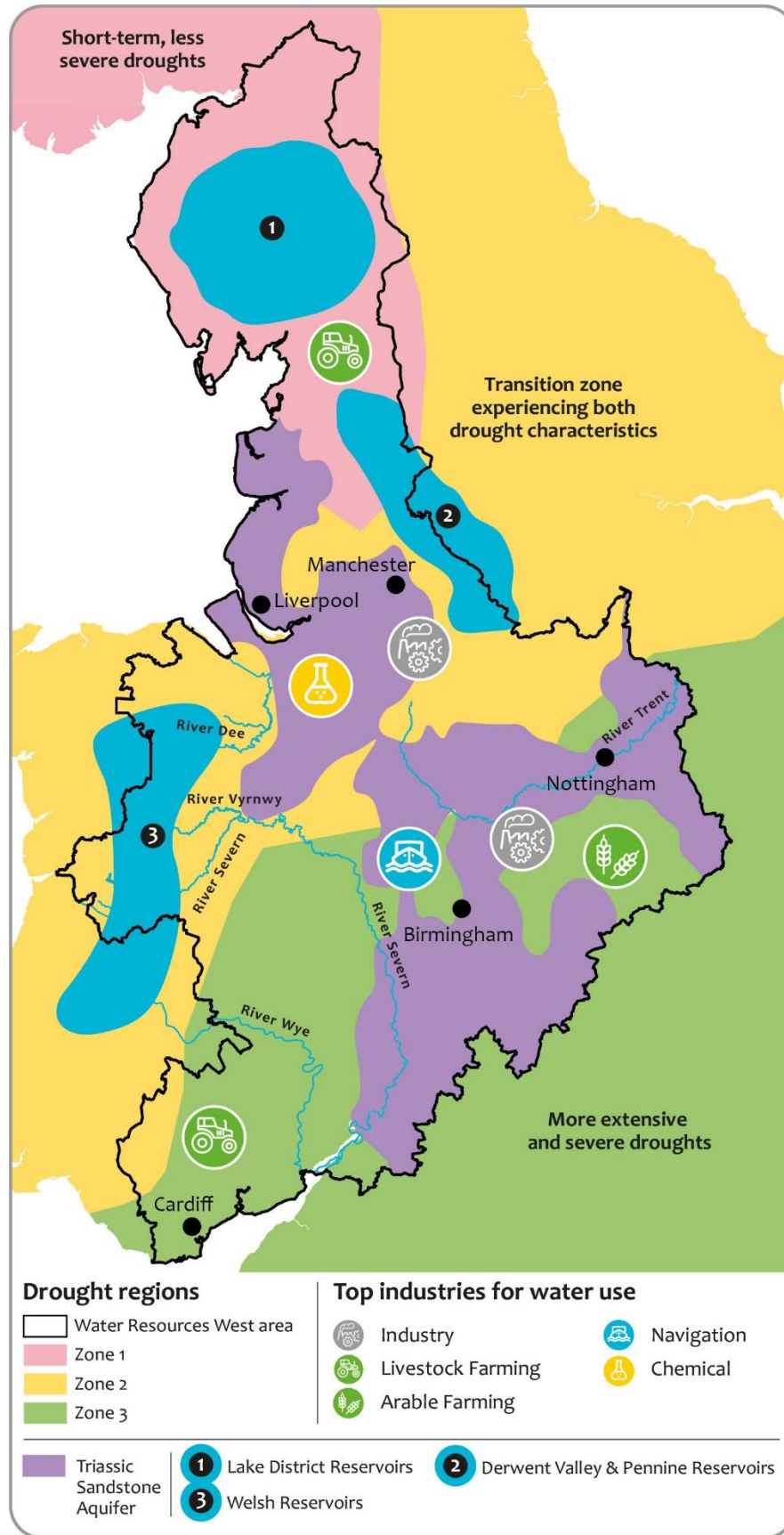
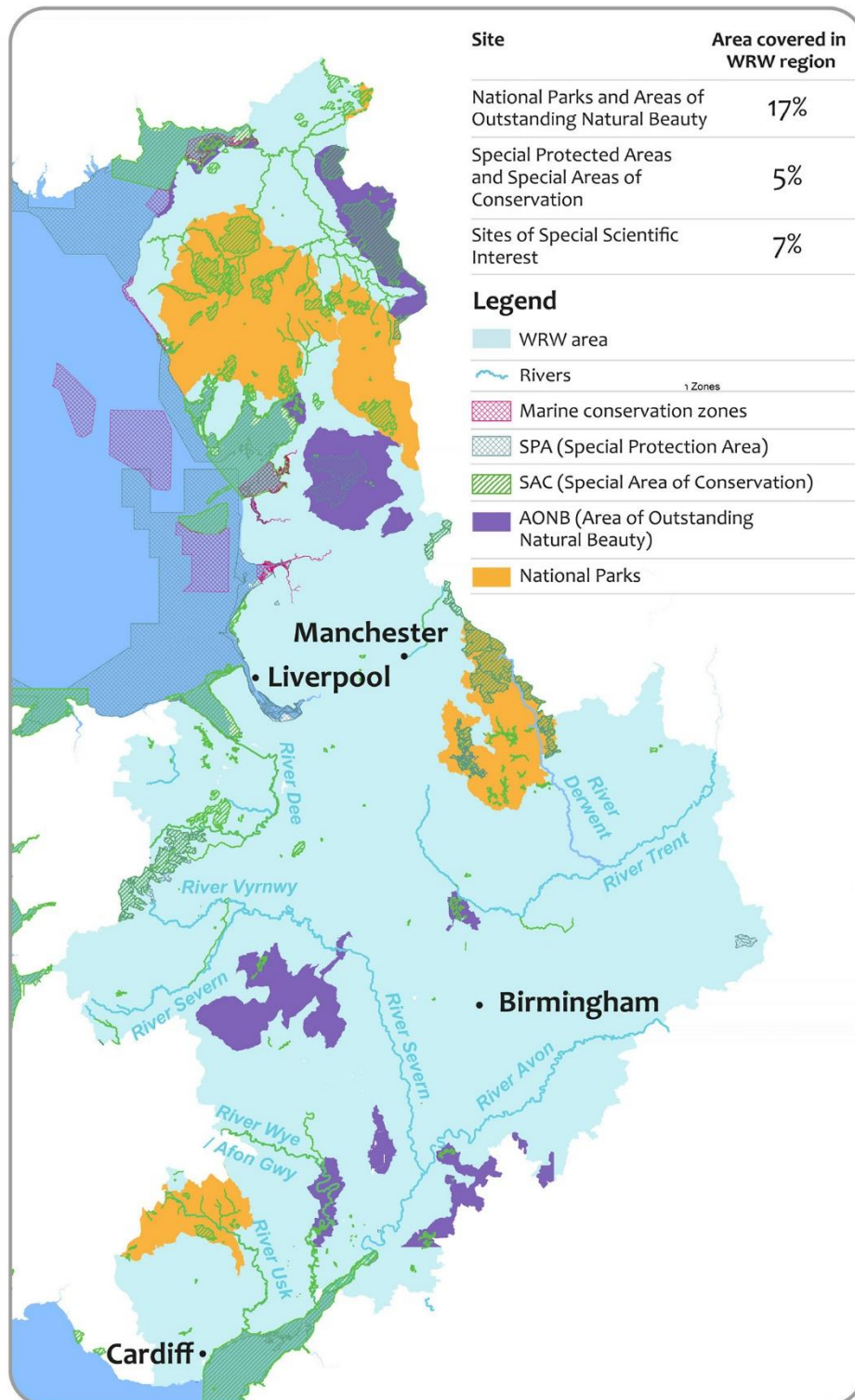




Figure 2. Internationally designated sites⁸, National Parks and Areas of Outstanding Natural Beauty in our region. The map does not show Sites of Special Scientific interest (SSSIs).



⁸ Details for internationally designated sites can be viewed on the Natural England Website here: <http://publications.naturalengland.org.uk/map?category=35016>



As seen in Figure 2 above, our region boasts a wide range of natural environments which support important water dependent habitats and species. National Parks and Areas of Outstanding Natural Beauty cover 17% of our region, Special Protected Areas and Special Areas of Conservation⁹ cover 5% and Sites of Special Scientific Interest¹⁰ cover 7%. Major rivers flow into internationally designated estuaries of the Dee, Severn and Humber. These sites must be supported in their journey to recovery and protected from further damage caused by inadequate flows or water levels. This is a fundamental part of our Environmental Destination, which we explain further in Section 4.1. Nevertheless, it is important to safeguard the water environment as a whole, as areas that are not protected are still important in supporting noted features in the protected sites, through functional linkages. For example, only parts of a river may carry international designations (i.e. an estuary) however ensuring the health of upstream stretches is important to ensure sufficient fresh flows to the estuary and the health of the plants and animals that live there. Our region, like other parts of the world, faces pressure from a changing climate, a growing population and economy. Such pressures are not as extreme as elsewhere, but they are still significant. Despite these pressures, we have the potential to increase its resilience in a sustainable way. Our members can take action to support drought resilience both within and outside our region. This will involve improving catchments, reducing demand, developing new sources and transferring water. To guide us towards the best mix of actions, we defined a set of ambitions and measurable outcomes, shaped by feedback from stakeholders across the region (see below). It is important to note that our ambitions and outcomes are aligned to Welsh and English stakeholders' views.

Water Resources West ambitions and outcomes

Sustainable water supplies and wellbeing

- Deliver social and wellbeing benefit through improvements to the environment
- Strive to deliver against net zero targets for England and Wales

An enhanced water environment, with abundant native species and functioning habitats

- Deliver net environmental gain (England) / biodiversity duty (Wales)
- Deliver environmental resilience

Cost-effective plans

- Identify affordable solutions through innovation and co-operation

Support for economic growth across multiple sectors

- Provide practical support to non-public water supply sectors
- Identify joint solutions to provide mutual benefits

Ambitious water demand management

- Reduce leakage by 50% (from actual 2017-2018 levels) by 2050
- Adopt a planning assumption of achieving an average water usage of 110 litres per person, per day, by 2050*
- Adopt a planning assumption of reducing non-household demand

**Applicable to England only*

Resilience to extreme droughts in a changing climate

- Deliver resilience to extreme droughts, so that restrictions such as rota cuts and standpipes are needed no more than once every 500 years (0.2% annual probability of occurrence)

Later, in Table 6, we will show how our ambitions flow through into clear outcomes, measures and environmental objectives. More information on our planned actions will be given in Section 7.

⁹ These are designation of international importance.

¹⁰ These are designations of national importance.



3. WHERE WE ARE TODAY

3.1 Our current water needs

Today's consumptive water need is around 5,645MI/d¹¹, 81% of which is for public water supplies (see Figure 3). With regards to our regional non-public water supply needs, the largest demand is for the Canal & River Trust, which requires an average of 743 MI/d. All other sectors, including industry, power generation, and agriculture, together have a current consumptive water need of around 334 MI/d. These are averages, yet the water needs for some sectors such as agriculture can be compressed into a shorter period (growing season) to sustain food production, as opposed to an all-year round need.

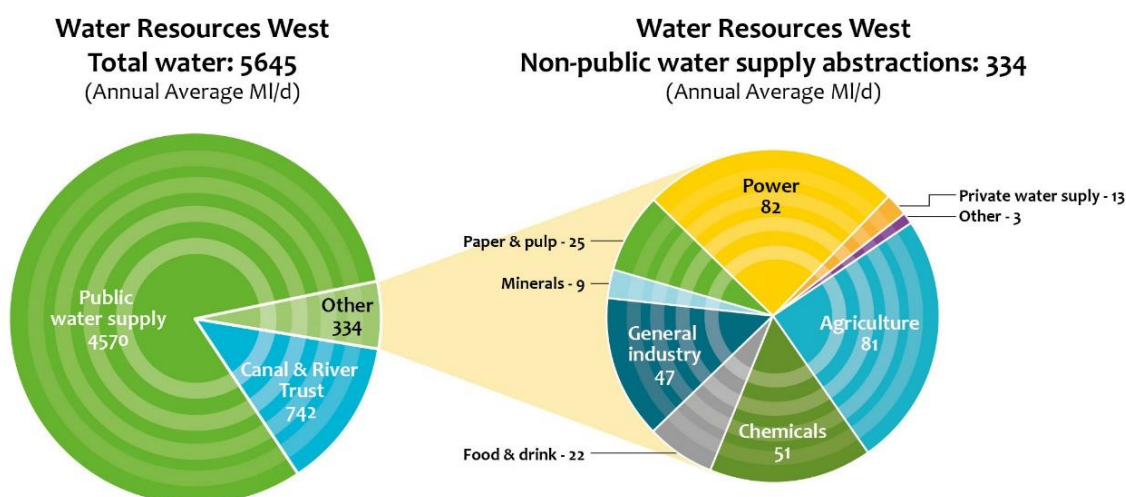
We recognise the paramount importance of demand management, and the water companies are already progressing a leakage reduction of 15%¹² by 2025. Water companies in our region are also implementing a range of measures to help customers reduce their per capita consumption. These actions have shaped the current needs, which are lower than they have been in previous decades. However, the COVID pandemic changed water use patterns and demand over the last couple of years. Although household consumption has reduced from the highs of 2020/21 as consumers return to work, we continue to see high levels of consumption and have factored in short term and long term assumptions for a COVID impact. More information on how we factored in this impact in our demand forecasts can be found in Appendix E.

Our updated forecasts, including further demand reductions, are discussed in Section 4.

A megalitre equates to a million litres. This is the volume of approximately 5 terraced houses or half a football pitch filled to the depth of one foot.

MI/d denotes one megalitre per day.

Figure 3. Baseline recent actual consumptive abstraction for PWS and Non-PWS estimates, MI/d. Numbers have been rounded to nearest decimal.



¹¹ Based on 2019/2020 Dry year annual average distribution input figures.

¹² Relative to 2017 leakage levels.



3.2 The state of our water environment

The water environment in our region is experiencing a multitude of stresses, including over-abstraction in some catchments. This has a negative impact on ecosystem integrity and health, as well as having consequences for the security of our supplies. In the longer-term, climate change and changes to abstraction patterns have the potential to cause further risk to water supplies. As abstractors we must address abstraction issues, as these have an impact on the integrity of rivers, estuaries and wetland habitats. Previously, a review of consents for abstractions that could impact protected areas has been undertaken and licences have been amended across our water company members. Many issues relating to abstraction and flow have been addressed by previous water company-level plans, as we have legal obligations to protect the water environment under the Water Framework Directive (WFD)¹³ and Habitats Regulations. Nevertheless, there are other environmental stresses with a bigger impact in our region. The loss of riparian habitat, declining biodiversity in our rivers and water pollution are all elements which affect the health of water bodies and water dependent habitats. This also means that many designated sites in our region are not in a favourable condition. These should be considered in a holistic way as leaving these issues unresolved will impede the achievement of ‘good ecological status’ of water bodies and improvements to the condition of protected sites.

Good Ecological Status (GES) is the WFD default objective for all water bodies and is defined as a slight variation from undisturbed conditions. The elements¹⁴ that make up Ecological Status include:

- biological elements (including fish, macro-invertebrates, macrophytes and diatoms); and
- supporting elements (made up of hydromorphology, ammonia, pH, phosphates, dissolved oxygen and 18 pollutants including some heavy metals and pesticides).



Case Study

Aquatic insects such as mayflies are perfect biological indicators for the health of our rivers. They require good water quality and adequate flows/water levels to reproduce and reach maturity. They play an important role in the aquatic food chain, being a favourite food for Atlantic salmon and brown trout. The *Riverfly Census* undertaken by the Salmon and Trout Conservation in 2018, showed declining mayfly populations, e.g. in the River Avon (- 37% since 1998) and River Eden (-58% since 1987).

Mayfly photo from Unsplash, courtesy of Erik Karits.

None of the surface waters in our region achieve ‘good overall’ status under WFD, and a large proportion fail to achieve ‘good ecological status/potential’, as seen in Figure 4. The main reasons for failing to achieve ‘good overall status’ are pollution from farming and agriculture, urban pollution, physical modifications and changes to the natural flow and level of water. It is important to note that 9% of surface waters in the English side and 8% of surface waters in the

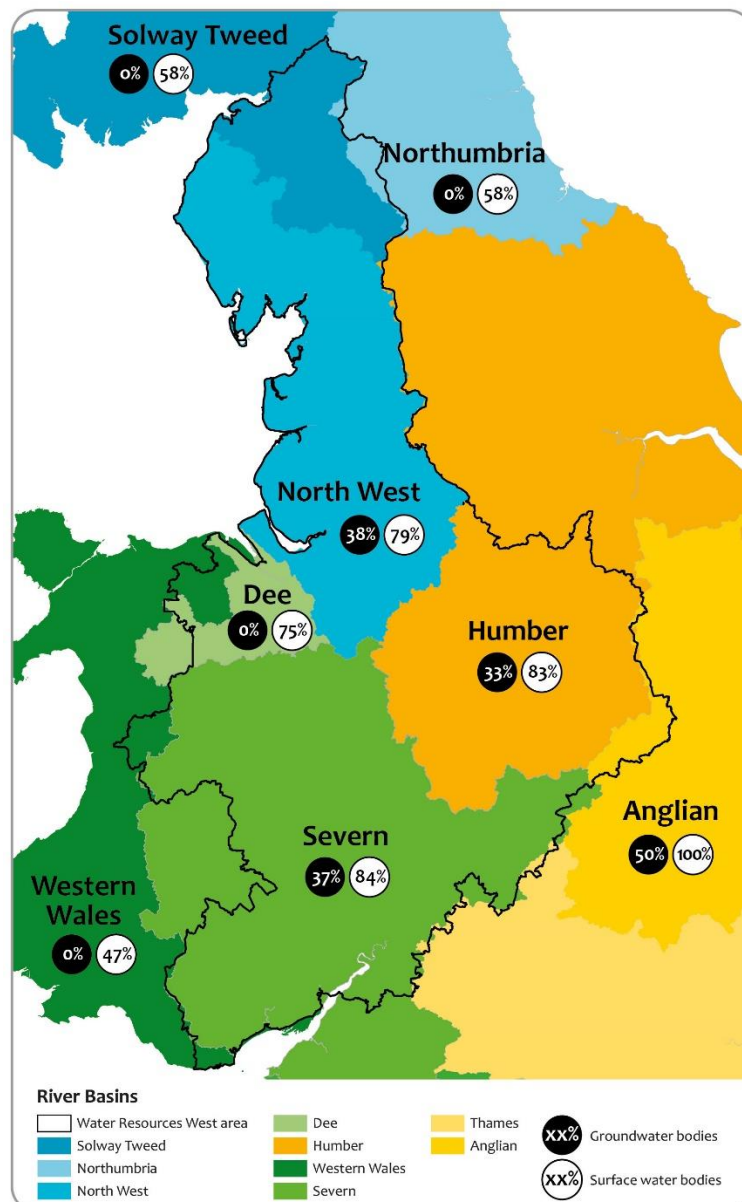
¹³ [Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations](#), UK Government, 2017

¹⁴ Each of these elements contributes to the overall ecological status. A lowest common denominator rule is applied to the elements, so the lowest scoring element denotes the overall status of the water body. For example, if a biological quality element was at moderate and other quality elements were at good, it would be assumed that the water body as a whole is at moderate status.



Welsh side of our region have a hydrological regime that does not support ‘good ecological status’. In 54% (Welsh side) and 64% (English side) of the cases, alterations to the hydrological regimes are caused by the water industry (via alterations to flows or physical modifications). With regards to ground waters, none of those in the Welsh side are adversely affected by abstraction for public water supplies; however, 21% of those in the English side fail to achieve ‘good quantitative status’, and in all cases, this is due to abstraction for public water supply. Since good flows and adequate lake and groundwater levels help support good ecology, it is paramount to ensure our abstractions are sustainable.

Figure 4. Proportion of ground waters not achieving ‘good quantitative status’ and surface waters not achieving overall ‘good ecological status or potential’ under the WFD, across each river basin district¹⁵ in our region.



¹⁵ Please note that the statistics have been calculated based on the water bodies falling within our region’s boundary only and hence, they are not representative for river basin districts only partially within our region.



3.3 Customer views

In order to support the development of our plan, we have conducted a fresh round of customer research, building on previous research undertaken at company level. All the research done has been collated and analysed to identify common themes and areas of divergence. Overall 95 pieces of research were used, involving around 60,000 customers. This allowed us to compare between our new research insights and previously acquired data, to paint a regional picture of customer's views on a range of topics. It also allowed us to highlight any differences between customer views in different areas of the region, to better understand the nuances in our data. The resulting outputs constitute a robust evidence base for customers' preferences and views on options (supply and demand), resilience, environment and transfers across the region, both pre and post COVID-19 conditions. A high-level summary of customer views is presented below and the full customer research review reports can be found in Appendix F.

Customer views



Affordability

- This is a main concern for customers especially now, due to inflation and the cost of living crisis.



Environmental destination

- Environmental concerns are still top of mind with customers, as reflected in customers' preference for the implementation of the highest level of environmental protection.



Demand management

Leakage

- Leakage is still seen as wasteful and customers do not think leakage reductions are being achieved at a fast enough rate; there is strong support for stretching targets for leakage reductions.
- Leakage management is preferred as an option before the implementation of water efficiency measures by customers.

Water efficiency

- Customers are reluctant to take action to reduce their water use as the need to do so is not on their radar; however, when they understand the issues they can see the need for it but they want help to achieve savings.

Metering

- When given information on supply and demand options, customers have a strong preference for metering.
- There is a growing acceptance for smart meters and mandatory metering once the need and context are explained.



Levels of service and resilience

Supply restrictions and interruptions

- Customers are comfortable with the current levels of service however there is more willingness to pay to increase the levels of service in United Utilities' area.

Water salience and resilience

- There is no significant change in customers' views; customers assume water resources are plentiful and climate change is still a far concern. Customers are reassured water companies are planning long-term.



Investment in water resources options

Options preferences

- Customers prefer the implementation of demand management options first, then sustainable options that are focused on making the most of current infrastructure.
- Water transfers are seen as sensible however rural communities exporting water (i.e. Cumbria and Wales) want reassurances on the lack of negative implications resulting from sharing their water.

Investment priorities






- Customers prefer investments which can improve the efficiency of the current supply system alongside demand management before investing in completely new assets.



3.4 Stakeholder views

Water Resources West has been proactive in engaging with a variety of stakeholders throughout the regional planning process, to ensure the draft plan is shaped by stakeholder input, alongside customers' preferences. We engaged with stakeholders on our Initial Resource Position (March 2020), followed by consultations on our environmental destination (December 2020 – February 2021), water transfers (December 2021), and our Emerging Regional Plan (January-February 2022). Below we present some highlights from the Emerging Regional Plan consultation. A total of 133 stakeholders participated in our consultation workshops, and we had 33 detailed responses. Appendix G provides more information on the stakeholder feedback we received and how we used this to shape our plan. Section 3.4.1 also provides a summary of the most important regulatory feedback and how this influenced our draft plan.

Stakeholder views

	Affordability <ul style="list-style-type: none">Stakeholders highlighted that it is important for affordability to be taken into consideration when planning investments in solutions.
	Environmental destination <ul style="list-style-type: none">Most stakeholders (79%) supported an enhanced level of environmental protection implemented across the region (level 3). In Wales, stakeholders favoured embedding education and engagement into conversations around water resources.
	Demand management <ul style="list-style-type: none">Stakeholders have shown strong support for our target to reduce personal water consumption by 20% and leakage levels by 50% by 2050.In Wales, reducing personal consumption by 20% did not go far enough, with support for demand management initiatives, education, and the use of grey water and drain water as part of a holistic package to drive down consumption.
	Levels of service and resilience <ul style="list-style-type: none">Stakeholders with more frontline experience of drought and the effects of climate change supported the idea of bringing the drought resilience standard forward to 2025, while others felt that 2039 was a reasonable target implementation date.
	Investment in water resources options <ul style="list-style-type: none">Stakeholders thought that our mix of options was diverse and adequate. Stakeholders preferred options that lower demand, make the most of existing assets and delivered multi-benefits (i.e. greater catchment management and surface water enhancement). Options preferences <ul style="list-style-type: none">There was strong support for effluent reuse and using flood waters, especially in the Midlands. Hard engineering options such as bulk water transfers and new reservoirs were the most contentious, due to potential environmental consequences and political sensitivity. Nevertheless, the vast majority of stakeholders agreed that sharing water between regions is acceptable and beneficial but that care must be taken to ensure any transfers wouldn't negatively impact our region.

3.4.1 Regulatory feedback to the emerging draft plan (January 2022)

This section aims to highlight the most important feedback points raised by regulators in response to our emerging plan submission in January 2022. Full details of all the feedback received and how we addressed it can be found in Appendix G.

Environment Agency

The Environment Agency raised concerns that our emerging plan did not achieve minimum regulatory commitments by 2050, across the whole Water Resources West area. They advised



that more work is required to generate a central scenario which would account for abstraction reductions required to meet legal obligations under WFD as well as enhanced requirements to meet Protected Area objectives (BAU+).

In response to this, we have used source reduction from the BAU+ scenarios as our principal scenario for the draft plan. The abstraction reductions scenarios have been generated from the EA's water body Abstraction Tool which have then been reviewed by water companies in our group. The outputs of the tool and individual water company reviews have been shared with the Area EA teams to gain their input on the scale of the reductions from the national tool and how this relates to catchment specific ecological outcomes.

Natural Resources Wales

Natural Resources Wales said that it would be beneficial for Hafren Dyfrdwy to become full members of Water Resources West, which would provide better representation of how the regional plan is being affected by cross border zones within Wales. We have worked with the company and are pleased to report that Hafren Dyfrdwy is now a full member.

Natural Resources Wales (NRW) also asked for clarity around our intention to support the reduction in greenhouse gas emissions and meeting net zero targets for Wales under the Climate Change (Wales) Regulations 2021. Welsh Water and Hafren Dyfrdwy have appraised high and medium emissions scenarios in line with NRW and Welsh Government guidance and have built in the Dee reductions to the Alwen Dee Climate Change assessment. Welsh Water has a strategy to achieve net zero by 2040 and Hafren Dyfrdwy by 2035.

Ofwat

Ofwat asked us to include more information compared to our emerging plan, to allow for meaningful stakeholder consultation and allow it to assess the plans further at the draft plan stage. The main areas were:

- The drivers of surplus and deficit. We have included a summary of this in Section 4.2 and a full and detailed breakdown by resource zone is provided in the planning tables (Appendix H).
- The approach to achieving demand side savings. We have included information on this in Section 7.1. We have also set out how we profiled changes in Appendix E.
- How the best value plan has been derived. A summary is given in Section 5.5 and a comparison of best value and least cost plans is given in Section 6.5. More detail on best value is provided in Appendix O.

Ofwat also asked us to consider if more options were available, particularly licence trades or catchment management. We are currently working on more licence trading options but recognising that such options can take some time to finalise, we may have them in the mix before the final plan. Regarding catchment options, we now have a list of options in Section 7.2 that will be delivered via our environmental destination journey. We opted to present these separately from the rest of our feasible options.



4. WHAT THE FUTURE LOOKS LIKE

This section shows our forecasts of water needs across public and non-public water supply sectors, with a primary focus on the first 25 years of our regional plan. The starting point for assessing these future needs is an estimation of the environmental needs for water to achieve our environmental destination for sustainable water supplies. This is a key factor affecting the balance between water supply and demand balance and ultimately the need to develop new sustainable water sources.


4.1 Our environmental destination

As outlined in Section 3.2, the issues affecting our water environment mean that we are still far from achieving the UK Government's ambition of restoring 75% of water bodies to their 'near natural' status in England or meeting the aims for the Sustainable Management of Natural Resources (SMNR) in Wales. Nevertheless, our regional plan brings the opportunity to create and deliver a set of ambitious measures to help us deliver improvements to our region's water environment. These measures, which sit above and beyond any routine water company led environmental projects and programmes¹⁶, take us to our 'environmental destination'. It is longer term and more holistic, aiming to mitigate multiple pressures affecting the water environment, not only abstraction pressures.

Our environmental destination is defined by a specific vision (see Box 1) and underpinned by work designed to address issues in at catchment level. In events, we shared potential future environmental destination scenarios with stakeholders. This vision reflects feedback from those events and consultation responses.

Improving water quality and flows were top of the agenda for stakeholders, who wish to see us address these issues via catchment management options. Our options are primarily identified to improve water resource resilience, however, benefit for water quality will be considered where ever possible. Hence, our approach set out in Section 5.2 ensures that such options are shaped by a range of stakeholders and are therefore specific, proportionate and targeted to tackle the issues faced in the respective catchments.

Achieving our vision for an enhanced water environment will involve reducing the volume of water abstracted, improving water quality and restoring habitats. In England, such abstraction reductions will need to be implemented by 2050 and these are mainly driven by the National Framework requirements. In Wales, water companies are proposing to include a programme of



“Our vision is for an enhanced water environment, with abundant native species and functioning habitats, supporting wellbeing and the regional economy. To deliver this vision, Water Resources West will champion the necessary actions for our water resources and facilitate multi sector working to achieve them. Our plan will describe actions by our members, stakeholders and regulators to deliver net gain, deliver environmental resilience and avoid deterioration.”

Box 1. Water Resources West's environmental destination vision statement

¹⁶ i.e. Water Industry National Environment Programme (WINEP) in England and [National Environment Programme \(NEP\)](#) in Wales, as well as other biodiversity and conservation projects.



investigations delivered via NEP¹⁷, designed to improve their understanding of how to achieve long term sustainable abstraction, in order to meet the enhanced biodiversity duty, as defined under Section 6 of the Environment (Wales) Act.

In addition, we are looking to implement a range of catchment solutions across England and Wales to supporting other issues (e.g. water quality) as part of our Environmental Destination (see Section 4.1, 5.2 and 7.2).

In many water bodies, particularly groundwater, abstraction will be capped at recent rates, to avoid further deterioration. In some cases where groundwater and surface waters are highly connected, abstraction from both may need to reduce to improve river flows, meet WFD targets, and adapt to less water being available due to climate change. The needs of Protected Areas are considered in the scenarios we modelled and this is explained further in the section below and Appendix D.

4.1.1 National Framework Scenarios for Environmental Destination in England

The National Framework presents the challenges posed by climate change, population growth and changes in demand for water by defining several national scenarios showing how climate change and demand might affect water resources. The scenarios include assumptions related to the level of abstraction reductions we would have to make, to ensure we can protect the environment given the pressures outlined above.

To this end, we incorporated existing legal requirements into our supply forecasts in the short to medium term (2025 – 2040) and are working within guidance provided under the Environment Agency's National Framework for further abstraction reduction by 2050 and Ofwat's guidance for long-term planning scenarios. Although there is significant uncertainty in the underlying datasets, we have modelled the following scenarios:

- 'Low' – this scenario represents a plausible low estimate of abstraction reductions needed to meet existing legal requirements.

Case Study

The Permo-Triassic Sandstone aquifer is one of the most important in England covering a large area in the Midlands and is a strategic resource in the region. The Worcestershire Middle Severn is one example area where this aquifer supports abstractions for both Severn Trent and South Staffs. Naturally groundwater supports river flows, particularly in lower flow summer months. Historically the aquifer has been over licenced and over abstracted so there is not enough water left for the environment which leaves some water courses with low flows and some wetlands compromised due to low groundwater levels. To prevent further degradation of environmental conditions, no increase in abstraction from this aquifer will be permitted. If the same level of abstraction continues in the longer term climate change impacts mean that there is likely to be even less water available for the environment in summer months. Future abstraction reductions and measures to increase groundwater recharge, to achieve our Environmental Destination, will make more water available to support river flows and wetlands.

¹⁷ These investigations will be undertaken during 2025-2030.



- ‘BAU+’ – this scenario incorporates abstraction reductions to ensure flows support the environment and European protected sites in a dry climate impacted future.
- ‘Enhanced’ – in addition to the BAU+ scenario, this scenario includes abstraction reductions to protect SSSI rivers and wetlands, and principal salmon rivers.

The majority (80%) of our stakeholders support the adoption of an enhanced level of protection for the environment. For our region, the ‘Enhanced’ scenario and the ‘BAU+’ scenario are very similar. We have used the ‘BAU+’ scenario as our base position and the ‘Enhanced’ scenario to inform our adaptive plan, noting that both scenarios are representative of a high ambition.

All scenarios will create supply deficits in water resources zones that are also facing other pressures. For more information about exploring the uncertainty present in the Environment Agency’s National Framework data, see Section 6.1.

Reducing and capping¹⁸ abstraction will have a significant impact on public water supply because it will reduce the amount of water available for abstraction. However, they will also bring significant benefit to the environment, which we estimate to be of the order of £1.5bn (see Section 7.5). The scenarios we considered are further defined in Appendix D and the implications to the public and non-public supply sectors are discussed in the sections below.

4.1.2 Implications of abstraction reductions for public water supplies in England

The three abstraction scenarios reduce the water available for use by the English water companies to different extents (Table 1). The BAU+ scenario modelling results identified a potential reduction in water available for use of 621 Ml/d. In the Enhanced scenario, which sees greater environmental protection for non-economic water bodies, SSSIs and principal salmon rivers, there is an additional (~43 Ml/d) reduction. This relatively small difference reflects the amount of protection already included in many abstraction licences and the current conservative assessment of the potential future abstraction licence impacts. The abstraction reductions included in our regional plan mean that by 2030, we will deliver >30% of the total deployable output reductions required to achieve the full environmental destination (i.e. all the licence changes for WFD no deterioration and BAU+ combined).

Table 1. Total impact on deployable output as a result of combined licenced abstraction reductions due to shorter term regulatory needs and longer term environmental destination needs.

Scenario	Reduction in water available for use by the end of 2050 (Ml/d)					Total
	United Utilities	Severn Trent	Welsh Water ¹⁹	South Staffs	Hafren Dyfrdwy ²⁰	
Low	131	338	0	48	N/A	517
BAU+	131	442	0	48	N/A	621
Enhanced	133	471	0	60	N/A	664

Our demand management options will go a long way to meet some of the deficits caused by abstraction capping and reductions. However in some local areas licence changes will take away

¹⁸ Applicable only to England

¹⁹ Applicable only to Welsh Water’s water resource zones situated in England.

²⁰ Not applicable to water companies in Wales.



nearly all the available water: addressing the resulting deficits will require significant changes to existing public water supply infrastructure through the development of new, more sustainable, water sources. In parallel, our members will invest and influence others to invest in improving habitats, water quality and flow within our rivers and lakes, and boost recreational opportunities.

4.1.3 Implications of abstraction reductions for other abstracting sectors in England

Abstraction reductions are also likely to be needed by other sectors, including navigation, energy, agriculture and industry. Abstraction licence changes could have significant impacts on the UK's energy and food security and could have unintended environmental consequences. They will therefore need careful planning by the Environment Agency.

The first step in this will be for the Environment Agency to take action to prevent WFD status deterioration (i.e. introduce caps to abstraction licences based on recent actual abstraction). Such actions are necessary under WFD regulations to prevent deterioration. This will mean that any growth in abstraction above recent actual abstraction rates may require new sustainable water resources to be developed. Over the longer-term reductions in abstraction may be required in certain catchments. This means that new sustainable water resources may be needed even to continue current economic activity. Such changes can be problematic for non-PWS abstractors who are often dependent on a single local source to supply a factory, power station or farm.

The Environment Agency has said that new and improved data and modelling from the work done to develop the current set of regional plans will be used to inform a refreshed National Framework. A key part of the refreshed National Framework will be looking at improving assessment of water need outside the water industry, particularly in energy and agriculture. We welcome this and will work with the Agency to explore ways that further develop catchment strategies as a key part of the regional planning process.

We understand that permanent licence changes for non-PWS abstractions will take place in catchment reviews from 2028 onwards, and that licence holders will be notified of possible reductions ahead of any changes. Based on the Environment Agency's estimates provided to us, the total licence reductions required across the non-public water supply sector in Water Resources West could reach 304 Ml/d by 2050. The extent that this affects the different abstractors will greatly depend on local circumstances in each catchment.

4.2 Public water supply forecasts

As a group, we are challenged to balance increased demand for water and resilience with a dwindling supply. Having determined that we must meet the needs of the environment by potentially reducing our abstractions, we updated our supply and demand forecasts across all our water resource zones (see Figure 5) following consultation on our emerging plan. These forecasts take into account our ambitious demand management policies to reduce leakage by 50% by 2050 (relative to 2017 leakage levels) and to reduce per capita consumption (PCC) to 110 litres per person per day (l/p/d)²¹.

Under baseline conditions²², by the end of 2050...

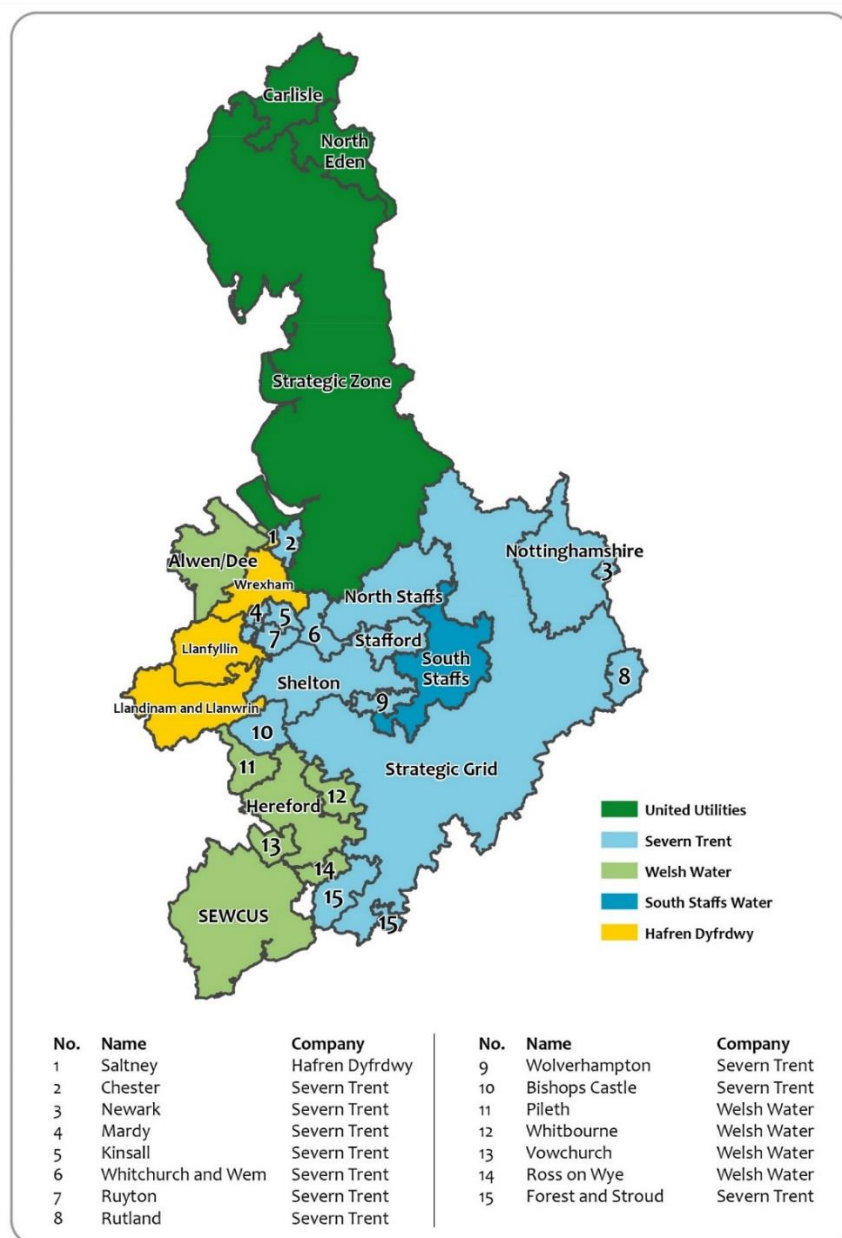
²¹ The Welsh Government has not specified a PCC reduction target for water companies in Wales, however Welsh Water has adopted the 110 l/p/d in line with the English water companies.

²² The baseline conditions account for changes to the water available to supply due to abstraction reductions (to deliver our environmental destination and restore sustainable abstraction) but do not include demand management



- Environmental needs cause the biggest change with the loss of 621 Ml/d of water availability (see Section 4.1.2)
- Climate change will result in a further loss of 84 Ml/d of water availability
- Population growth will lead to 267 Ml/d of increased water demand
- We will need 224 Ml/d to meet new drought resilience standards²³

Figure 5. Water Resource Zones in our region.



This means that we need around 1,200 Ml/d to satisfy additional public water supply needs. Around 590 Ml/d of this need can be met by implementing our leakage and PCC policies, in broadly equal measure. Existing surpluses and measures included in drought plans can meet around 390 Ml/d. Nevertheless, even after these measures, by 2051 we will still have around 221

policies. The data reported in this section is based on RCP6.0 climate change, although RCP8.5 has also been considered.

²³ This standard is termed the '1:500 years' drought standard and baselining our forecasts to this standard enables us to achieve resilience to extreme drought events that have a 0.2% probability of occurring in any given year.



MI/d deficit. This will have to be mitigated by implementing new water resource supply options. These options range from those targeted at making the most of our existing assets, to transfers and new sustainable sources of water (see Section 5.3 and 7.1).

Table 2 shows the additional water we will need to source via transfers or new sources to cover the remaining deficits, after accounting for environmental needs, climate change, population growth, drought resilience standards and demand policy reductions²⁴. Deficits decrease from 60 MI/d in 2031 to 26 MI/d by 2050, as demand management policies take effect. Deficits markedly increase in 2050/51 as abstraction reductions for environmental destination take effect in Severn Trent Zones. As seen from Table 2 below, all deficits arise in the Midlands and Welsh Water's SEWCUS water resource zone. After applying demand reductions, United Utilities and South Staffs do not present any deficits. Hafren Dyfrdwy does not present any deficit even in the absence of demand reductions. More details on our supply-demand balances can be found in our accompanying supply-demand balance tables in Appendix H and supplementary commentary in Appendix E.

Table 2. Summary of deficits across the first 25 years covered by the regional plan. Water resources zones that remain in surplus are not shown in this table. Numbers have been rounded apart from small ones (<1 MI/d)

Company	Zone	Summary of likely resource needs following the implementation of demand management policies (MI/d)			
		2030/31	2040/41	2049/50	2050/51
Severn Trent	Mardy	-	0.1	-	3
	North Staffordshire	3	14	7	80
	Nottinghamshire	29	18	4	64
	Shelton	11	22	15	57
	Strategic Grid	-	9	-	-
	Wolverhampton	-	-	-	4
	Stafford	-	-	-	12
Welsh Water	SEWCUS	18	-	-	-
Total		60	63	26	221

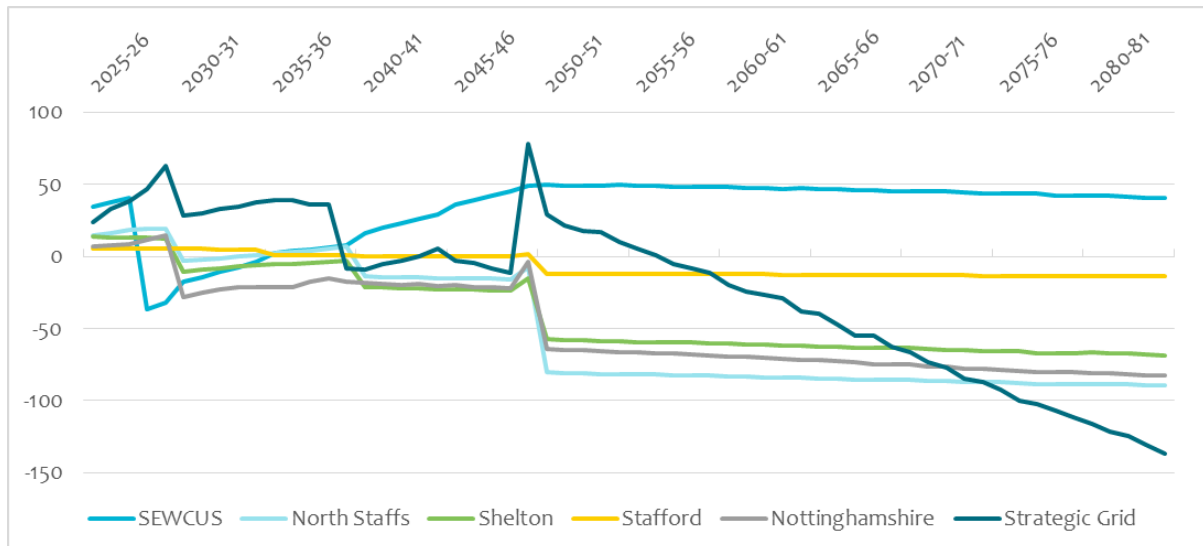
Although our planning horizon stretches over 60 years, beyond 2050 the projections become much more uncertain (see Figure 6). The year 2050-2051 represents a turning point, and deficits rise sharply in the Severn Trent Water's supply area, owing to the start of further abstraction licence reductions for environmental destination. After the 2050s, our forecasts show that deficits will increase progressively to exceed 400 MI/d by 2085. These longer term deficits are as a result of two planning assumptions: (1) continued population growth and (2) further reductions in per capita consumption and leakage are no longer feasible. These longer term projections and

²⁴ These calculations assume schemes committed for development by 2025 are completed, but no further options are implemented.



those two key assumptions are inherently uncertain²⁵. Therefore, our focus is on the period up to 2050 but the longer term projections are still useful to inform the decisions that we need to take in the earlier planning period. Commentary on the basis of these forecasts is provided in Appendix E.

Figure 6. Water Resources West surplus and deficit forecasts up to 2085 for zones in the region (at >5 Ml/d deficit up to 2051), assuming PCC and leakage targets have been achieved.



There are a few important points to note from the deficit trends:

- In contrast to our previous forecasts, in which the largest deficits were mainly affecting Severn Trent Water's Strategic Grid, the new forecasts show deficits also affect North Staffordshire, Nottinghamshire, Stafford, Shelton and SEWCUS water resources zones.
- In SEWCUS, deficits are moderate and they disappear with time owing to the positive effect of demand management policies. Other water resource zones such as Stafford and Wolverhampton show no deficits up to 2050-2051. This is because abstraction reductions to realise our environmental destination have been profiled from 2051 onwards for Severn Trent and causes deficits in areas where otherwise there would be none.
- We now have an improved understanding of drought resilience owing to improvements in modelling methods and underlying datasets. Our plan allows the extreme drought resilience standard to be achieved by 2039/40 for all zones in Water Resources West.
- The volume of abstraction potentially at risk due to environmental destination driven licence reductions means that there would be a need for new and alternative resources to be developed in order to maintain the long term security of public water supplies.
- Deficits would be greater in all zones and new deficits would appear in zones otherwise not in deficit, if demand reductions can only be partially realised. Hence we are partly reliant on government intervention to introduce water labelling and have factored this into our forecasts. We have also tested our plan against a scenario where we would only achieve half of the demand reduction we anticipate to deliver otherwise (see Section 7.7.1).

²⁵ For example population may start to decline (see [How far will global population rise? Researchers can't agree](#) Adam D, Nature 597, 462-465 (2021)) or per capita consumption may reduce below 110 l/p/d.



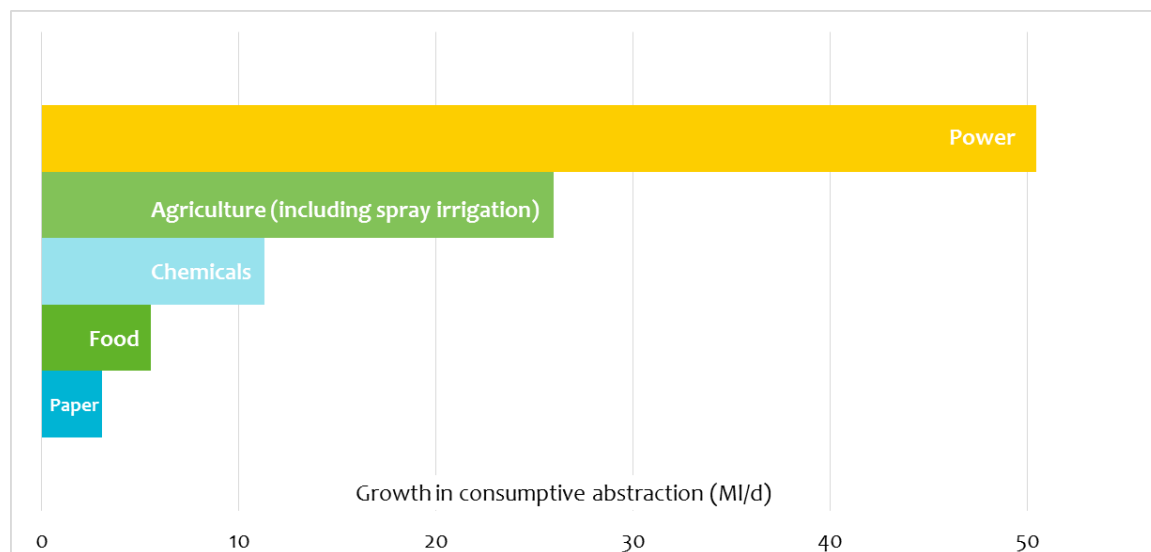
In later sections, we explain how we explored scenarios, appraised options and explored trade-offs to develop a plan to meet these needs. First, we examine the needs of the other abstracting sectors.

4.3 Non-Public Water Supply forecasts

In addition to public water supply needs, our plan also considers the needs of other abstracting sectors including navigation, energy, agriculture and industry. We liaised closely with a range of sector representatives to build a demand forecast over the planning horizon²⁶, building on work in the National Framework. The forecast shows a need for approximately 97 MI/d²⁷ of additional water, spread across a range of sectors (Table 3 and Figure 7). The increase between current needs (334 MI/d) and those we expect by 2050 (430 MI/d) are driven by predicted growth calculated using national (EA/Defra) factors for most sectors. For the energy (power) sector we have used the latest projections from the sectors Joint Environmental Programme²⁸. All these projections, like all other forecasts, are subject to uncertainty, which is further explored in Appendix J.

This growth may be accommodated in some areas within existing licenced volumes. There are many multiples of the 97 MI/d available in unused and recently underused licences. However, as noted in Section 4.1, licences may need to be capped at recent actual abstraction to prevent environmental deterioration. Therefore, as a worst case assessment, all this 97 MI/d growth may be required from new sustainable sources.

Figure 7. Projected growth to 2050 in non-PWS abstraction by sector



²⁶ These forecasts have been made available to the non-public water supply members of Water Resources West, at both regional and catchment level.

²⁷ These numbers do not account for the abstraction reductions potentially required for environmental destination.

²⁸ [Scenarios for the projection to 2050 of Water Use by Power Producers – updated using FES21](#), A Moores, Joint Environmental Programme, Report ref. ENV/695/2021



Table 3. Updated forecasts for non-PWS abstraction by sectors across the whole Water Resources West region. For this analysis we assumed all the Canal & River Trust demand is consumptive.

Primary Sector	Secondary Sector	Baseline ²⁹ Total Abstraction Recent Actual Consumptive (MI/d)	Future Total Abstraction in 2050 Consumptive (MI/d)
Agriculture (including spray irrigation)	Aquaculture	0.5	0.5
	General	15	15
	Horticulture	0.1	0.2
	Other Agriculture	7	7
	Spray	59	85
Chemicals	Chemicals	51	63
Food and Drink	Food and Drink	22	28
Industry	General Industry	47	47
	Minerals	9	10
Paper and Pulp	Paper and Printing	25	28
Power	Power	82	132
Water Supply	Private Water Supply	13	13
Amenity and Environment	Other	0.5	0.5
Other Industry	Metals	2	2
Non-PWS Sub-total		334	430
Canal & River Trust		743	743
Non-PWS Total (including navigation)		1075	1173

To put the growth forecasts into context, the 97 MI/d additional water need for the non-public water sector in our region is small in comparison to the scale of the region. As an example, 90 MI/d is available every year, on average, at a single assessment point on the River Mersey. 97 MI/d is less than 2% of the current public water supply need for the region and it is well within the range of uncertainty in demand forecasts. However, such regional comparisons can be misleading. The 97 MI/d is a net position across a huge area and water availability can vary greatly in time and space. This is especially important since the vast majority of our non-PWS abstractors are dependent upon a single source to support and plan their business activities; for these abstractors, water security is a very local issue. In addition to the 97 MI/d of growth there is potential for abstraction licence reduction of up to 304³⁰ MI/d to cause a need for new water resources (Section 4.1.3) which will also have very local implications. This provides important context to our approach for meeting non-PWS needs, focussing on local issues in prioritised catchments.

Further information on the non-PWS approach can be found in Appendix J.

²⁹ Baseline abstraction is taken to be the recent actual abstraction. In England, this is taken for the 2010-15 period in the Environment Agency WRGIS system. In Wales, this period is the 2015-19 period (based on available data). For data provided by the Canal & River Trust this period is between 2012 and 2017. Although these dates are not the same, which could lead to some uncertainty, this baseline represents the most recent data available.

³⁰ Under BAU+ scenario, based on 'Abstraction reduction data by sector WRW_V2', Environment Agency, April 2021



5. OUR APPROACH

5.1 Overall approach

Our regional plan is built through the collaborative working of its members, as well as a wider group of stakeholders, including Local Enterprise Partnerships, Internal Drainage Boards, Catchment groups and many others. This includes stakeholders in both Wales and England, and ensures that the plan reflects the needs of the whole region. Water Resources West members agreed that the regional plan will be developed by aligning planning assumptions and dependencies for common options and that our approach is appropriate for the scale and complexity of the region.

Our approach allows iterative development of the optimal plan for the region, thus enabling us to meet the needs for quantifying volumes available for regional transfers. We are retaining accountability of water companies and achieving consistency across the Water Resources West region by addressing coordination gaps. More details on the alignment of the regional plan to water company WRMP24 plans can be found in Appendix I.

In preparing this document and its accompanying data, Water Resources West has followed a dedicated approach to governance and assurance. Our multi-sector senior management group has been actively engaged in the development of this plan. The group takes decisions by consensus to ensure transparency in the planning process. The plan has been subject to external assurance and has been approved by the Water Resources West CEO group. Further detail of our governance and assurance is provided in Appendix I.

Figure 8 shows a timeline of our regional plan development, the start of which was marked by sharing our initial resource position with regulators (first in March 2020 and then an updated version in February 2021). This first step has helped shape our problem characterisation and the ongoing work on options to address the problem, taking into account our wider ambitions.

We published the emerging version of our regional plan for public consultation in January 2022, gathered feedback from a variety of stakeholders and used it to shape our draft plan. We will now gather feedback on our draft plan and use this to refine it ahead of the final plan submission in autumn 2023.

March 2020 February 2021 update

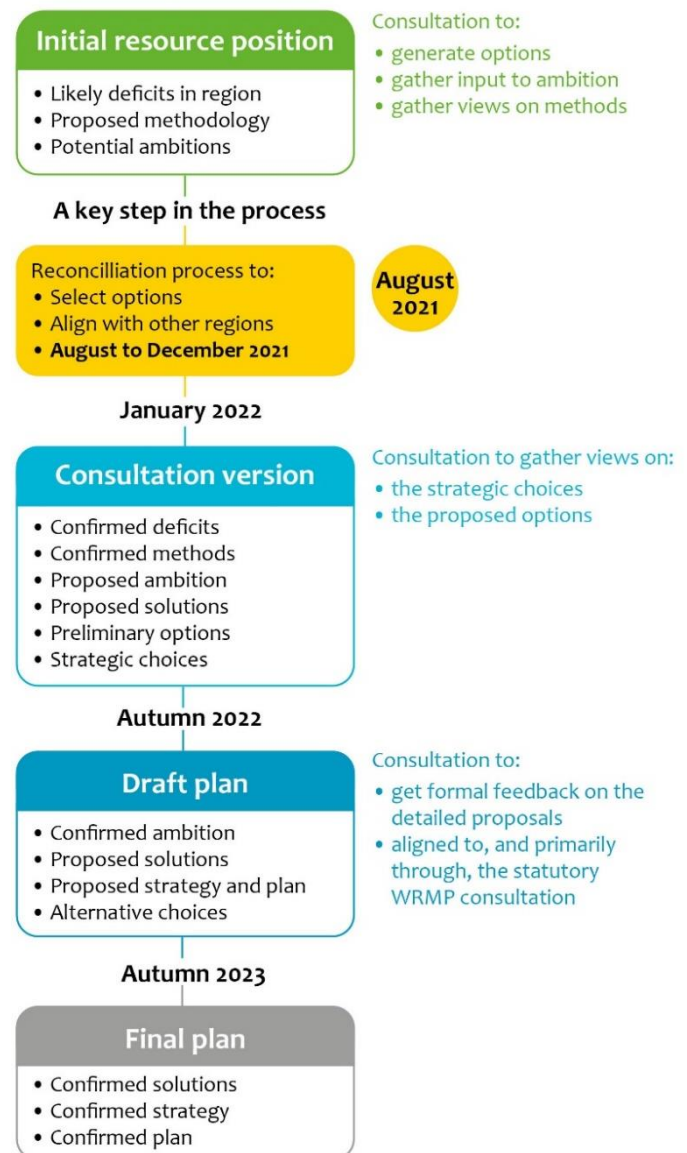
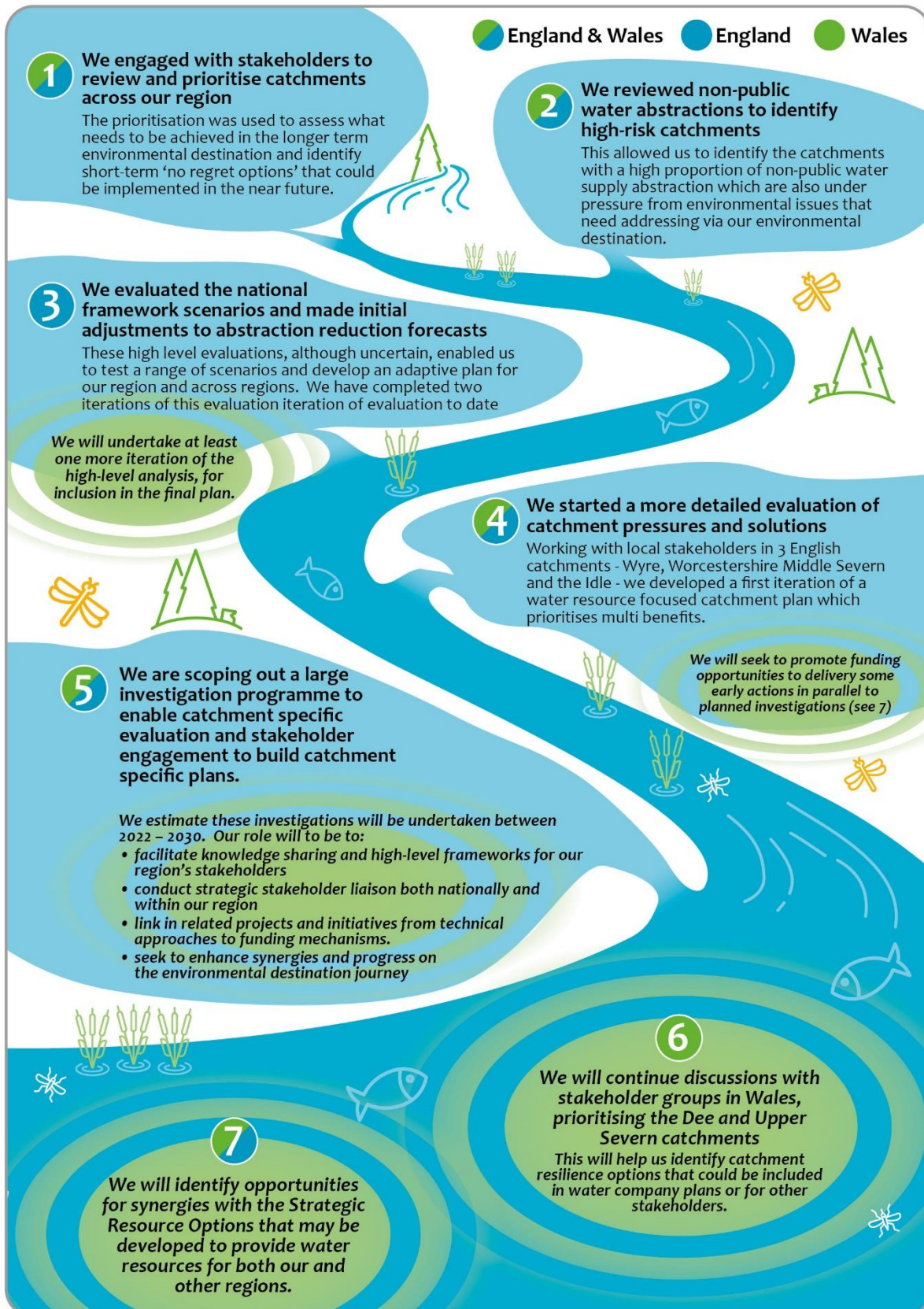


Figure 8. Outline process and key milestones in regional water resources planning.



5.2 Environmental destination planning journey





Although, as a regional group, our remit is to ensure the security and sustainability of water resources for the future, our members have an important role to play in other aspects of safeguarding the environment (i.e. improving water quality, reducing carbon emissions, improving habitats, etc). Therefore, our members will set out plans to address these challenges elsewhere and through our regional planning we are contributing to realising these aspirations (see Section 7.2).

Our environmental destination vision goes beyond restoring river flows and groundwater levels; hence, we must move towards an approach informed by catchment level knowledge if we are to deliver the benefits we envisage. We have already started working towards our environmental destination and we presented an overview of our progress to date, as well as future planned activity illustrated above. More information on the investigations we will conduct to tackle the inherent uncertainty present in the data we rely on to inform our environmental destination scenarios can be found in Section 6.1.

5.3 Supply and demand options explored

5.3.1 Public water supply options

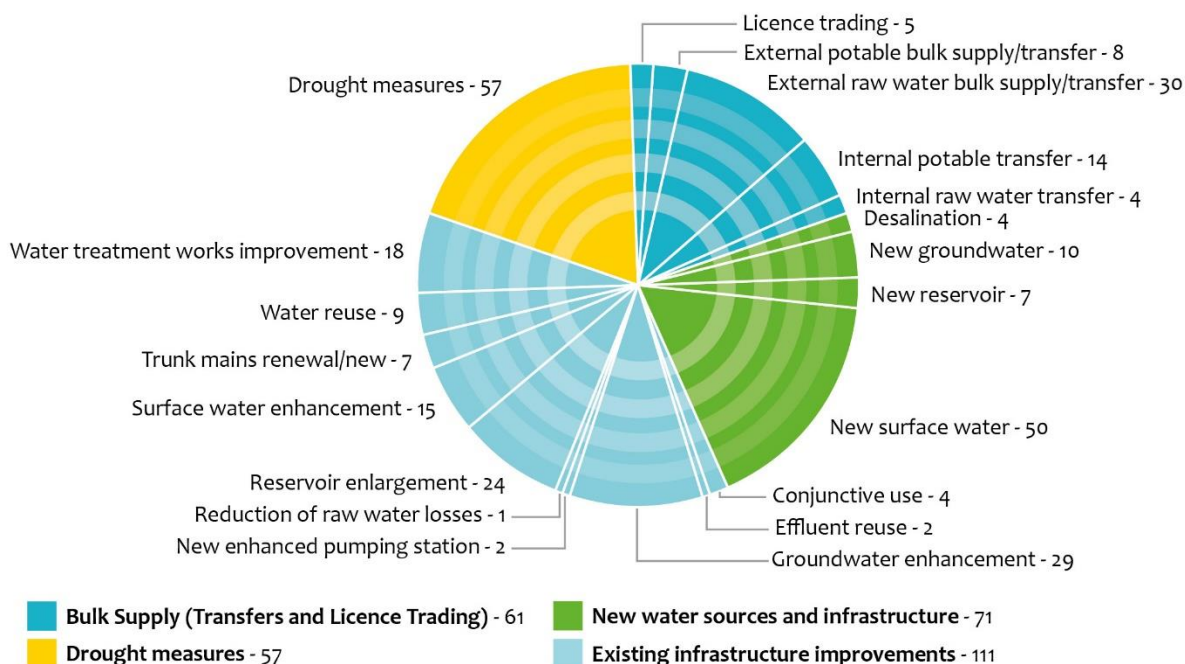
We have worked to identify a wide range of feasible options (300 in total) to meet our future water resources needs. As a first step in proposing options for the regional plan, we reviewed the feasibility of options previously identified for WRMP19. New options have been identified following our stakeholder engagement and projects by the Regulators Alliance for Progressing Infrastructure Development (RAPID). We then applied our updated understanding of regional and national needs to undertake high-level screening of the options. Each company shared their lists of unconstrained, rejected and feasible supply options with Natural Resources Wales and the Environment Agency for feedback in February 2021. Based on regulatory feedback and further screening, some options have been dropped from the list and others have been added.

All feasible options have been through a detailed strategic environmental assessment (SEA) process (see Appendix K). The outcome of this process was considered in our decision-making process (see Section 5.5.2) to select a draft preferred plan. A summary of the number and type of supply options³¹ considered by each company is presented in Figure 9. A table in Appendix B lists the number and type of supply options assessed by each company. Appendix D contains a summary of catchment resilience options identified for three catchments in our region.

³¹ Categorised based on Environment Agency option types – as per version 2 of Environment Agency regional plan data tables.



Figure 9. Types and number of feasible options assessed for the regional plan (for catchment options see Section 7.2).



5.3.2 Non-public water supply options

Demand for non-public water supplies are forecast to increase steadily due to economic growth in some sectors (see Section 4.3). At a regional level, and taking into account the uncertainty in the data we hold, at first sight there appears to be enough licence headroom to support growth in non-public water supply abstractions in general. Nevertheless, a few individual licences may exceed their licence capacity, and abstraction licence changes may create additional needs.

We have prioritised two catchments where Water Resources West is seeking to develop collaborative water resources solutions with other sectors. For those catchments as examples, we estimate the total abstraction reductions could reach 24 Ml/d in the Weaver Gowy catchment and 7 Ml/d in the Staffordshire Trent Valley. The clear feedback from our stakeholders is that if any licence changes are proposed, assessment and engagement has to take place at a very local level, looking at the impact of individual abstractions at a water body and (downstream) catchment level.

There are important co-dependencies between public water supply and non-public water supply abstractions. In many catchments actions by more than one sector will be required to meet our Environmental Destination and WFD objectives. We therefore call for the Environment Agency to follow a

Members' voice

National Farmers Union

"Farmers and growers as food producers are an essential user of water and need an integrated water management strategy that gives them a fair share of regional water resources and access to secure supplies of water for the irrigation of crops and livestock watering, on a long-term basis. This is critical to support their economic growth and investment, and recognition as food producers who are making significant contributions to food security and keeping the nation fed."



transparent, consistent and proportionate approach to abstraction licence change across all sectors. We are ready to support the Environment Agency and abstractors in collaborative working to achieve the Environmental Destination.

It is important to note that the planning horizon for non-public water supply is often as long as it is for public water supplies. For example, the energy sector is currently planning options for the transition to a hydrogen economy beginning in 2030 and extending to 2050. Farmers in our region often plan crop rotation, which depends upon water availability, ten years in advance. All of our non-public water supply sectors will need as much time as possible to plan for any reductions in their abstraction licences. For this planning cycle there are significant uncertainties in the size, timing and location of the non-public water supply deficits. As such it is not possible to identify options that individual abstractors will take forward to meet the deficits that they face in the way that water companies can. Instead we have identified a range of actions that can support the sectors in meeting their needs in a joined-up way.

From our conversations with stakeholders we have identified some types of solution that may be helpful to non-public water supply abstractors in meeting their predicted water needs, these include:

- water trading and sharing
- shared storage
- catchment-based solutions
- sharing knowledge
- new technology roll-out to improve efficiency

These ideas can be investigated further once the scale and need for additional water becomes clearer. Since the publication of our emerging regional plan in January 2022, it became clear that the potential for non-public water supply abstractors switching to a public water supply is small. The cost is prohibitive and the demand put upon the public network could be large and sudden (e.g. the water taken to irrigate a field for a day would empty a service reservoir in a matter of hours).

In the absence of specific non-public water supply options, we endeavoured to give these sectors a voice through our regional plan. We therefore collated the most salient points from our liaison with different sectors and summarised them in Table 4, to highlight the main issues faced by these sectors and how Water Resources West can support them going forward. For more information on other aspects related to the non-public water supply sector that must be considered in future regional planning rounds see Section 8.

We are planning to hold workshops in the prioritised catchments in the autumn. The purpose of the workshops will be to bring local abstractors together, to build a common understanding of the water resource challenges in each catchment, and identify options and opportunities to meet these needs.



Table 4. Water Resources West summary of recommendations and support for key non-public water supply sectors.

Sector	Projected water needs for sector	Issues for the sector	What Water Resources West are doing to support the sector
Energy	<p>Energy is the sector with the largest projected increase in non-public water demand. Work with the energy sector indicates potential for increased freshwater usage for carbon capture usage and storage and the move to a hydrogen economy.</p> <p>This transition to a decarbonised energy system will initially be focussed on industrial clusters in the UK. The leading cluster project is HyNet in the North West. Around 12 Ml/d may be needed for this scheme by the end of the decade. However, there are significant uncertainties due to the different ways the energy system might de-carbonise.</p> <p>Additional hydrogen production may occur in a localised way or a more distributed way, depending on the development of technology.</p>	<p>Energy producers should carefully consider water availability when selecting development sites.</p> <p>Abstraction reductions for environmental destination and actions to prevent WFD status deterioration (i.e. licence capping) may mean the loss of historic licence capacity at some sites. Not only could this result in a stranded asset owner, it also has the potential to affect electricity prices for consumers and affect electricity system security.</p> <p>However, we recognise that the energy sector differs from the water sector due to the market competition between energy providers. As such, the whole sector is unable to make long-term joint plans. Moreover, selecting sites in a planned way, based on water resources availability, is not always possible as there maybe overriding reasons which affect site selection. Nevertheless, Water Resources West welcomes engagement to support planning at a company level.</p>	<p>National research is underway to understand future water needs for hydrogen production. This research would also consider ways in which hydrogen could be produced in a way which would require less water e.g., from final effluent and other waste streams.</p>
Agriculture (including spray irrigation)	<p>This sector is expected to experience the second largest overall increase in abstraction, for irrigation. This increase in abstraction will be especially prominent in the Midlands, where horticulture and potato growing is intensive.</p> <p>The second largest increase in abstraction from this sector is expected to occur in Wales. Lastly, there will be less growth in abstraction in the North West, where there is relatively more livestock as opposed to horticulture.</p> <p>The farming sector, its trading arrangements and government support is still in transition</p>	<p>Abstraction reductions for environmental destination and actions to prevent WFD status deterioration (i.e. licence capping) will have a significant impact on the sector and act as a cap upon growth. This has potential implications for national food security. Agriculture will need to find new ways of storing, sharing and using water to support farming activity.</p>	<p>Water Resources West will continue to support the sector, sharing knowledge to help with this. We are seeking opportunities for joint options between agriculture and other sectors.</p>



	following Brexit. This may have large, as yet unknown, impacts on the sector's water needs.		
Canals and Navigation	There is no significant growth in abstraction expected for this sector. However, canal demands for water are complex: abstraction supports environmentally sensitive water bodies and ecological needs, as well as statutory navigation functions. The Canal & River Trust was previously exempt from abstraction licensing; however, they have recently transitioned into the licensing regime.	Existing canal transfers play an important role for public water supply. Abstraction reductions for environmental destination and actions to prevent WFD status deterioration (i.e. licence capping) is likely to have an impact upon levels of service experienced by canals.	Through our regional planning, we are seeking to facilitate opportunities to change canal operations for wider benefit (environment/society/economy). Canals are already used for water transfer in our region and have the potential to supply and transfer more. The Canal & River Trust is currently updating its water resources strategy and Water Resources West is providing support in this regard. Currently there are several opportunities for transferring water between regions, using the existing canal infrastructure.
Industry (including chemical, paper, food and drink)	<p>This sector is expected to experience the largest overall increase in abstraction. These increasing needs are particularly linked to the chemical industry.</p> <p>The largest expected increase will be in the North West, where there are clusters of chemical industries (e.g. pharmaceutical industry).</p>	<p>Industrial production is localised and needs good quality, reliable water supply.</p> <p>The North West is a good location that can foster the projected growth in demand from this sector. This is due to the fact that the North West is experiencing less scarcity and the public water supply needs are reducing significantly.</p> <p>Nevertheless, there are some catchments which face environmental pressures. Hence, the sector should consider a range of water management options, including operational efficiency gains, to help us in our effort to drive demand down.</p>	Although the Chemical Industry Association and the Food and Drink Federation are not formal members of Water Resources West, our regional group is proactively engaging with these two bodies to identify opportunities for support.



5.3.3 Demand options

To help us choose the best value range of demand management options for our preferred plan, we explored a range of measures such as:

- Household and commercial water efficiency audits – to identify ways to save water and reduce bills.
- Smart metering (voluntary and where required, compulsory) – to instigate responsible use of water via metered supply and generate bills reflective of actual consumption.
- Active leakage management – to increase the number of leaks detected, to deploy resources to tackle these, and to reduce the time between breakout and repair.
- Active pressure management – to manage pressure within the system in real time, to prevent bursting of water mains due to accumulation of pressure in the system, and reduce the flow rate of leaks before they can be repaired.
- Mains replacement (not trunk mains) – replace mains that are old or damaged and present higher risk of bursting and causing leaks.
- Deploying new leakage management technologies.
- Retrofitting indoor water efficiency devices – to increase water efficiency via easy to install devices.
- Water efficiency campaigns to increase awareness and encourage water saving behaviour.
- Visits to homes, schools or businesses to assess water use, provide advice and install water saving devices.
- Rainwater harvesting – provision of water butts to households that can be used to collect rainwater for outdoor use, such as watering gardens.

The options we selected to form part of our best value plan are shown in Section 7.1.

5.3.4 Drought management options

Alongside actions to reduce demand or increase water availability in a long term way that reduce the likelihood of drought, there are also shorter term actions that can be taken during times of drought. These shorter term actions can be effective in reducing the consequences of drought by slowing the drawdown of water sources and helping them refill faster. Such drought management options can therefore form part of the best value plan to provide resilient supplies.

Drought permits are drought management options that increase water availability by temporarily varying abstraction licence conditions. Water companies can apply for drought permits to protect public water supplies and the Environment Agency or Natural Resources Wales can apply for drought orders to protect the environment. Most drought permits increase the environmental risk, although the extent of this varies. They are used relatively infrequently and the alternative may be more supply infrastructure which can also have adverse environmental impacts.

Water demand can also be managed in times of drought by introducing Temporary Use Bans, which restrict the use of hosepipes and similar activities. A more severe demand management option is a drought order to ban non-essential use, which would affect a range of business uses.

Water companies state a level of service for how often such drought measures are expected to be used in the future. Including fewer, or less frequent, drought options in the plan would require more long term options, e.g. infrastructure, but would reduce the dis-benefits of drought options.



5.4 Exploring water transfers

The National Framework identified significant water resources pressures across the country, with the greatest pressures in the South East. The National Framework identified that transfers from the north and west towards the south and east could play an important role. Transfers greater than 100 km were identified as being particularly resilient to droughts.

As shown in Section 4.2, despite our wider needs, some of our WRZs (water resource zones) are already highly resilient to extreme drought events and have some surplus water while other WRZs present only small deficits. We are therefore able to implement relatively low-cost options in the North-West, to support transfers of water both within and beyond our region. Although investigations are still ongoing on these options, we are confident that they are feasible and can yield the stated benefit (see Section 7.1). Transfers can support the needs of our region as well as other regions, such as the south east of England, which is a water scarce region. We believe inter-regional transfers have the potential to bring investment and multiple benefits to our region. Moreover, we know customers are supportive of transfers as long as they are not detrimental to our region. Therefore, we explored a variety of transfers (see Table 5 for a summary) in our quest to bring resilience benefits to our region and beyond. The same concept applies within region, with a greater number of smaller sized opportunities. We also evaluated³² strategic resource options which could help us contribute to the national resilience goals (see Appendix C).

Stakeholder voice

“We’re one island and we need to work together to tackle this problem.”

Table 5. Summary of transfer options included in the accompanying planning tables. The figures here include all transfers, such as transfers between different WRZ’s in the same company, intra and inter-regional transfers as well as those between a water company and a third party.

Number of transfer options		United Utilities	Severn Trent	Hafren Dyfrdwy	To Welsh Water	South Staffs	Other regions / third parties
From	United Utilities	2	10	-	-	4	1
	Severn Trent	-	16	-	-	-	5
	Hafren Dyfrdwy	-	-	-	-	-	-
	Welsh Water	-	-	-	-	-	-
	South Staffs	-	-	-	-	-	-
	Other regions / third parties	19	-	-	-	3	N/A

³² The national resilience goal of coping with extreme drought events is applicable to England only.



We proposed a total of 16 potential transfer options from our region to other regions, as highlighted below:

- **Water Resources West to Water Resources North** (3 options)
- **Water Resources West to Water Resources South-East** (11 options)
 - Severn-Thames Transfer - unsupported flow element (4 options)
 - Severn-Thames Transfer - supported from United Utilities sources via Vyrnwy (1 option)
 - Severn-Thames Transfer - support mitigation via alternative supplies to Shrewsbury (1 option)
 - Severn-Thames Transfer - support from Severn Trent sources (2 options)
 - Severn-Thames Transfer - supported by Minworth wastewater treatment plant effluent (1 option)
 - Grand Union Canal with supported by Minworth wastewater treatment plant effluent (2 options)
- **Water Resources West to West Country Water Resources** (1 option)

No transfers to Water Resources East are included in this list. Nottingham, Newark and Rutland zones were previously included in Water Resources East to align with their planning. The Nottingham and Newark zones are particularly affected by abstraction licence changes and have limited options available. It became clear that the best opportunities for these zones were from an eastward extension of Severn Trent's strategic grid and therefore these two zones were moved into Water Resources West to allow for better alignment of planning. Given the impact of licence reductions in the near term through licence capping and longer term through Environmental Destination there is limited availability of resources, and so no further transfer options to Water Resources East have been identified. Nevertheless we work closely with Water Resources East, particularly through the River Trent Working group and on joined-up assessments of those options from both our regions which draw on the River Trent. This includes the South Lincolnshire Reservoir option which would take some of its water from the Trent at a point within the Water Resources West boundary. The Rutland zone is currently supplied by Anglian Water via Rutland Water and no change to this is proposed; however, the Rutland zone has been included in Water Resources West to ensure alignment of demand forecasts.

5.5 Decision making process

5.5.1 Environmental appraisal

Water Resources West is taking an integrated approach to the environmental appraisal of the regional plan, aligned to that adopted for company-level WRMP24s. This approach ensures all water resources options we have considered have been appraised in accordance to the legislative requirements in England and Wales. The required environmental appraisals included:

- Strategic Environmental Assessment (SEA)³³ – applicable to England and Wales
- Habitats Regulations Assessment (HRA)³⁴ – applicable to England and Wales.

³³ [The Environmental Assessment of Plans and Programmes Regulations, 2004](#)

³⁴ [The Conservation of Habitats and Species Regulations 2017](#)



- Water Framework Directive (WFD) Assessment³⁵ - applicable in England and Wales
- Biodiversity Net Gain (BNG) and Natural Capital Assessment (NCA)³⁶ - applicable in England only

These appraisals ensure that any adverse effects associated with these options are avoided, minimised or mitigated and that any positive environmental effects are enhanced. Appraisal findings were used to support decision making on the selection of the best value combination of demand and supply-side options (see Section 5.5.2). This helps ensure that decision making is evidence based, consistent and considers environmental effects.

The environmental effects identified were wide ranging, with potential effects on designated sites, features and assets highlighted, along with carbon emissions, resource use and effects on air quality, health and well-being. The positive effects from investment, infrastructure provision, increased resilience, natural capital and biodiversity net gain were also identified. It is important to note that the draft preferred plan has also been appraised to account for interactions with policy objectives contained within other international and national plans and programmes that are relevant to our regional plan. This step was important to determine whether our regional plan would have any negative effect on these objectives and consequently, inform our decision to amend the plan, should this be the case. Further information can be found in the full strategic environmental assessment report in Appendix K.

In addition, water companies have other plans and strategies in place to further their environmental work. Welsh Water has a [biodiversity strategy](#) to set out how they will deliver against the Biodiversity and Resilience of Ecosystems Duty under Section 6 of the Environment (Wales) Act 2016. Welsh Water are therefore taking action to improve biodiversity in their supply area but this activity sits outside of the WRMP remit. South Staffs Water are currently working on updating their Biodiversity Action Plan and Severn Trent water has published their approach called 'Caring for our environment' earlier in 2022. United Utilities has an internal strategy for managing natural capital and have outlined their approach to improving the environment on their [website](#).

5.5.2 ValueStream

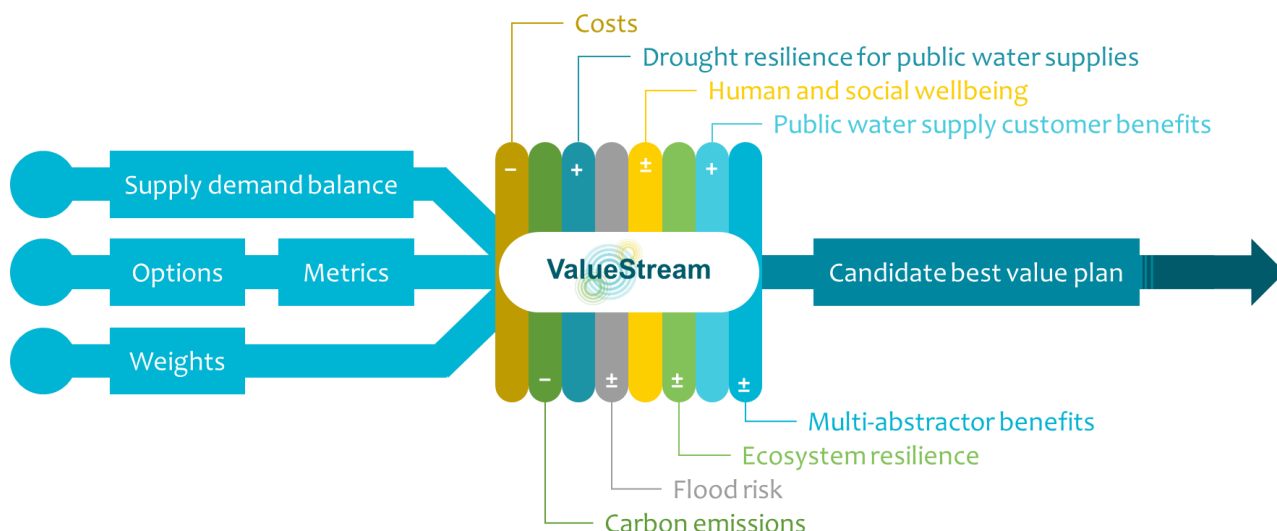
We are using a best value optimisation tool named ValueStream as part of our methodology to determine best value scores for options. The tool, developed by Water Resources West and expert partners – is based on multi-criteria analysis (MCA) and is designed to accommodate a range of metrics and objectives into the decision making. The tool takes different value metrics and weights them according to relative preferences to form an optimisation which maximises value according to the values and weights (see Figure 10). This is being used as part of the decision making to inform, and evidence to support, the selection of best value plans.

³⁵ [The Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations 2017](#)

³⁶ Environment Agency (2021) Water resources planning guideline supplementary guidance – Environment and society in decision-making (March 2021)



Figure 10. Decision-making process using ValueStream, showing the input information (including the eight selected metrics) that the process relies upon to select a candidate best value plan



Our multi-sector senior management group selected eight metrics to be used consistently across the region to select our best value plan. The weightings of the metrics was informed by the group's understanding of customer preferences and stakeholder views as well as the technical definitions of the metrics. These metrics (see Figure 11) were used in our decision-making process to select the best value draft regional plan. We assigned a planning status against each metric, to indicate whether we plan to achieve, minimise or maximise these metric constraints (see Table 6).

A number of these metrics are derived from our environmental appraisals (see Section 5.5.1 above). This helps embed these appraisals into decision making, in a way that complements but does not replace other ways those appraisals are used to inform the plan selection. These metrics have positive effects (benefits) and negative effects (dis-benefits) captured in separate metrics to avoid the netting off of such effects, which could be hidden from decision makers if they were combined into single measures. Other metrics are directly monetised: the direct financial costs, carbon costs³⁷ and water company customer valuations of service levels.

More information on the best value scores obtained to date can be found in Section 7.5.

ValueStream has been used to explicitly explore the trade-offs between different candidate plans (for example, more environmental improvement versus more resilience versus lower cost). The tool offers the flexibility to incorporate:

- wider water needs
- environmental
- improvements resilience to events other than drought well-being goals

³⁷ Calculated using [carbon values from the Department of Business, Energy and Industrial Strategy](#)



Figure 11. Definition of metrics and initial weightings.

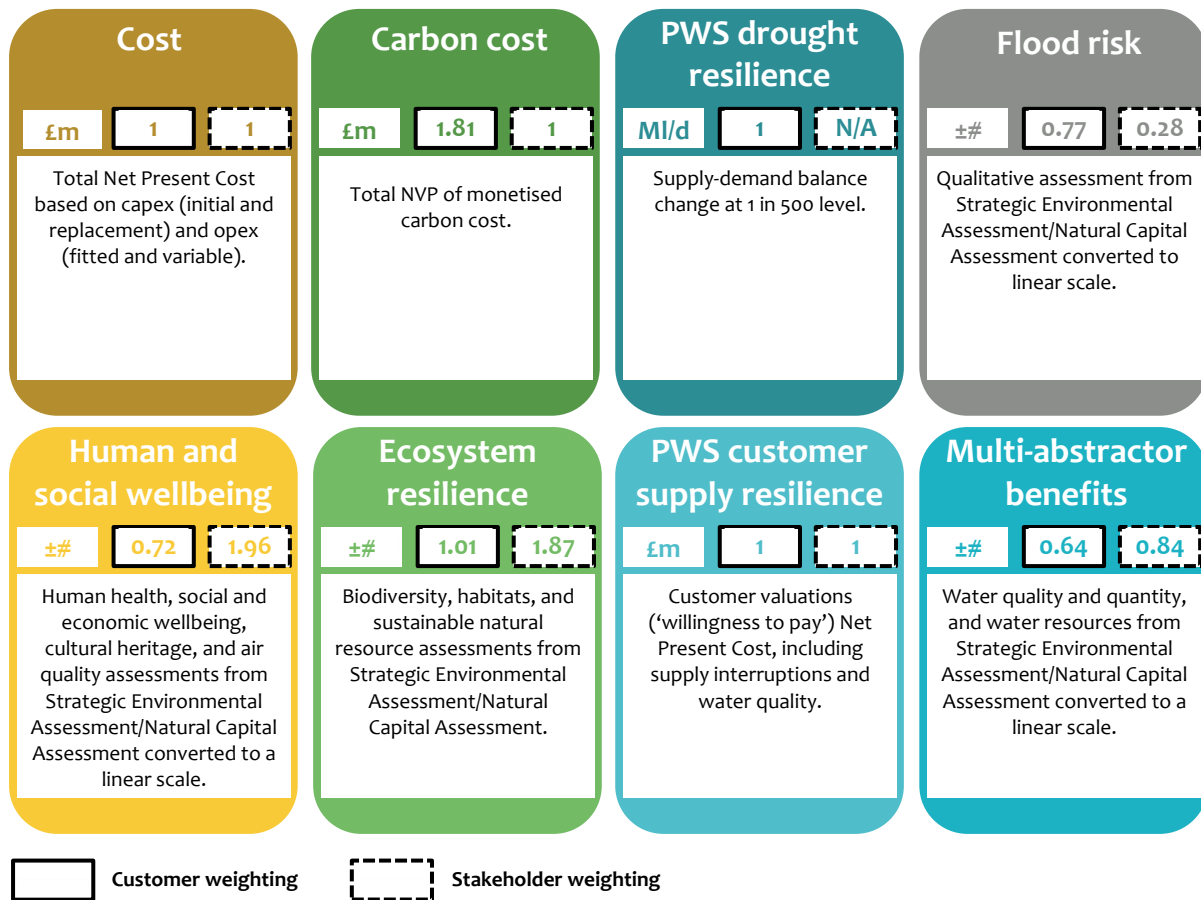




Table 6. Summary of Water Resources West's ambitions, objectives and metrics.

Water Resources West's Ambitions	Water Resources West's regional plan outcomes	Water Resources West's Metrics	Planning status	SEA objectives
<i>This is what we are aiming to achieve as a group</i>	<i>These are the measurable outcomes for our plan, for 2050 or earlier</i>	<i>This is how we measure it in our decision making</i>	<i>This is how we use the metrics in our decision making</i>	<i>Assessment objectives through which the potential environmental, economic and social impacts of the options and plans will be identified</i>
Resilience to extreme droughts in a changing climate	Deliver resilience to extreme droughts, so that restrictions such as rota cuts and standpipes are needed no more than once every 500 years on average	PWS drought resilience	Achieve constraint	
Sustainable water supplies, meeting wider societal needs for wellbeing	Deliver social and wellbeing benefit through improvements to the environment	Carbon costs	Minimise subject to trade-offs	9. Greenhouse Gas Emissions
		Flood Risk: negative effects	Minimise subject to trade-offs	7. Flood Risk
		Flood Risk: positive effects	Maximise subject to trade-offs	
		Human and social wellbeing: negative effects	Minimise subject to trade-offs	8. Air Quality
				10. Climate Resilience
				11. Economy
				12. Tourism and Recreation
		Human and social wellbeing: positive effects	Maximise subject to trade-offs	13. Human Health and Well-being
				16. Cultural Heritage
				17. Landscape



Water Resources West's Ambitions	Water Resources West's regional plan outcomes	Water Resources West's Metrics	Planning status	SEA objectives
Water available to support economic growth across multiple sectors	Provide planning support to non-PWS abstractors (see Table 4)	Multi-abstractor dis-benefits	Minimise subject to trade-offs	5. Water Quantity
		Multi-abstractor benefits	Maximise subject to trade-offs	6. Water Quality
Continued environmental improvement for sustainable water resources	Deliver net environmental gain	Ecosystem resilience: negative effects	Minimise subject to trade-offs	14. Water Resource Use
				1. Biodiversity
	Deliver environmental resilience	Ecosystem resilience: positive effects	Maximise subject to trade-offs	2. Sustainable Natural Resources
				3. INNS
Cost-effective plans, identified though innovation and co-operation so solutions are affordable	Be cost-effective, efficient and affordable	Cost	Minimise subject to trade-offs	4. Soils, Geodiversity and Land
		PWS customer supply resilience value	Maximise subject to trade-offs	15. Waste and Resource Use
Ambitious water demand management	Reduce leakage by 50% (from actual 2017/2018 levels)	Total leakage	Achieve constraint	
	Adopt a planning assumption of achieving, on average, 110 l/p/d	Per capita consumption	Achieve constraint	
	Adopt a planning assumption of reducing non-household demand	Non-household demand	Achieve constraint	



5.5.3 Sensitivity analysis

We are building an adaptive plan, which accounts for the eventuality that the future may look different from what we envisage now. To do this, we have formulated six different ‘what-if’ scenarios to test the preferred and alternative plans. These represent plausible future states of the world driven by factors outside the control of the abstractors.

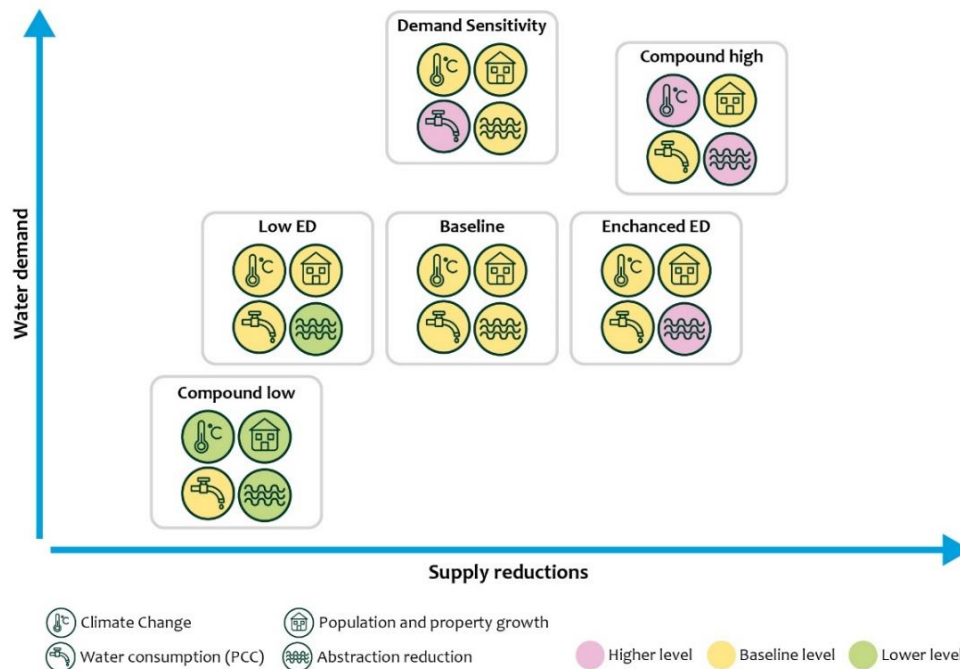
Ofwat recently published proposals for common scenarios to be used for long term planning³⁹. We welcome the proposal for common scenarios, and have sought to include them into our work. In collaboration with the other four regional groups we agreed an interpretation of the common Ofwat scenarios, along with other scenarios to be used when aligning plans through a reconciliation process to select transfers.

Our baseline aligns to the Water Resources Planning Guideline and relates to the numbers presented in Section 4.2. Around this lie a range of plausible futures to test the sensitivity of the plans to changes in various factors and inform adaptive planning. To avoid confusion and maintain consistency, we have not sought to introduce any additional in-region scenarios beyond those agreed with the other regions for reconciliation.

The scenarios we tested our plan against are illustrated in Figure 12 and the factors that vary are explained below.











The use of ‘What-If’ scenarios ensures that decision points, at which the plan could change, are embedded in the plan.

Figure 12. Sensitivity scenarios tested for the draft regional plan



³⁹ PR24 and beyond: Long-term delivery strategies and common reference scenarios, Ofwat, November 2021.



Climate change	 1°C warming (RCP 2.6)	 2°C warming (RCP 6.0)	 4°C warming (RCP 8.5)
Population and property growth	 ONS projections	 Local authority housing plan	
Abstraction reduction	 Low	 BAU+	 Enhanced
Water consumption (PCC)		 Policy target of 110 l/p/d by 2050 achieved	 Half of policy target achieved (124 l/p/d) ⁴⁰

Compound scenarios involve variation from the baseline, involving multiple factors at the same time. They are therefore less likely to occur than scenarios which just vary one factor. Nevertheless, they are useful to test the plans, to inform how robust they are and under what circumstances they may need to change.

The scenario results, in Table 7, show a range of deficits that could be experienced in the future, between 2026 and 2050. The greatest deficits can be found in the compound high and the demand sensitivity scenarios. This is because the compound high scenario simulates a scenario where our world is 4°C warmer than today, where enhanced protection for the environment via abstraction reductions is required. On the other hand, the demand sensitivity scenario simulates a scenario where we only manage to achieve 50% of the ambitious demand reduction targets we are proposing. The results also indicate that for some companies, the maximum deficits in the planning period are not much different between some of the scenarios. For example, United Utilities' deficits are the same between Low ED and High ED, because the impact on deployable output of abstraction reductions doesn't vary between those scenarios.

These scenarios have been considered in the formulation of the adaptive plan. Greater deficits would require more supply side options to maintain resilient water supplies (see Section 7.7). The demand sensitivity scenario highlights the importance of coordinated action to reduce demand. This is discussed further in Section 7.7.1.

Table 7. Total deficits, after demand policy reductions, for each sensitivity scenario tested.

Scenario	Largest PWS deficits in period 2026-2050 by scenario (MI/d) ⁴¹				
	South Staffs	Severn Trent	United Utilities	Welsh Water	Hafren Dyfrdwy
Compound low	0	0	0	51	0
Low ED	0	273	41	N/A	0
Baseline	0	395	41	53	0
High ED	0	404	41	N/A	0
Compound high	0	516	110	57	0
Demand sensitivity	0	411	64	50	0

⁴⁰ The 124 l/p/d is an average across the Water Resources West region. This will vary by water resource zone.

⁴¹ For Severn Trent Water, the maximum deficits is reported based on the period 2026-2051, in order to catch the effects of the environmental destination abstraction reductions which have been phased in from 2051. Illustrating deficits at based on 2026-2050 would therefore be misleading in Severn Trent's case. For United Utilities the deficits are reported after the proposed move to 1 in 40 TUB level of service.



6. STRATEGIC CHOICES

Strategic choices represent the significant decisions to be taken in developing the regional plan. These strategic choices are focussed solely on the implications of water company plans for their customers. Water companies' plans account for approximately 90% of the water needs within Water Resources West. Other abstractors are also considering their choices in relation to how they will meet their future water needs. Water Resources West is supporting abstractors through engagement in prioritised catchments, as they consider choices and actions needed to meet their needs.

We developed a set of strategic questions, informed by analysis on stakeholder engagement, responses to the statement of resource need consultation, and the expectations of the National Framework and government policies in England and Wales. The questions we present in Sections 6.1 to 6.4 are those we used to engage with stakeholders in our informal consultation (January and February 2022), to gather views on key areas of interest.

We used the feedback received from this consultation, together with customer research insights, to inform our choices for the draft regional plan. We worked on our supporting analysis (e.g. best value assessment) to select the draft preferred plan for autumn 2022 (see Section 7.1). We also examined the potential bill impact on our customers and considered this in relation to the affordability of the resulting investment programme. This analysis will continue in 2023, based on the feedback we receive on the draft regional plan, which will determine the final selection of strategic choices and the preferred plan.

6.1 Improving the environment

Setting ambitious targets for reducing the amount of water abstracted from the environment has significant implications for water availability across our region. We have evaluated the full range of environmental destination scenarios. All scenarios show there will be proportionally very significant reductions in abstraction in Severn Trent Water's and South Staffs Water's areas.

The views gathered from customers and stakeholders which informed our environmental destination are summarised below.



Should we adopt more environmentally sustainable water resource options at a higher overall cost? Proportionately how much additional cost would you consider acceptable?

Do you consider an increase in water companies' customers' bills acceptable to support the delivery of our plan and outcomes for long term environmental improvement (i.e. our environmental destination)? This includes a range of environmental measures to enhance and protect the environment, such as river restoration, natural flood management and activities that will bring multiple benefits. Annual water bills could increase by less than 50p to around £10 by 2050 depending on the scenario and assuming all other elements of the bill remain unchanged.

Response summary

The majority of respondents agreed with the notion of paying more to implement the highest level of environmental protection, going well beyond the bare minimum legal requirements we have to satisfy. There were some regional differences that are worth noting, with stakeholders representing farming and agriculture in the Midlands opting for less ambitious environmental protections. This was a direct response to the negative impact that abstraction licence reductions would have on this sector. Some stakeholders felt that the onus on paying to protect and enhance the environment should not fall solely on domestic customers, but focus on major polluters, such as agriculture and industry.



**Impact of response
on draft plan
choices**

We agree with the ‘polluter pays’ principle and we recognise safeguarding the environment is a duty that must be shared across society. However, there are current limitations to the funding mechanisms we can access to enact environmental improvements, recognising that most of this work is funded by water customers using the money paid for water bills. Nevertheless, as highlighted in Section 6.1.2, we are planning to explore alternative funding mechanisms to enact our environmental destination vision, in recognition of the fact that this should be a joint effort with other stakeholders.

With these views in mind, we have made the following choices:

- We shaped our plan to deliver options in line with the abstraction reductions in the BAU+ scenario, as asked by regulators (EA). This scenario is very similar to the ‘enhanced’ scenario preferred by stakeholders.
- We choose to invest into an investigation programme aimed at reducing the uncertainty in the National Framework datasets for the BAU+ scenario. This is necessary to understand whether the abstraction reductions under BAU+ scenario are likely to be needed and whether they can deliver the benefits we expect.
- We choose to work with our partners and stakeholders to identify opportunities for environmental benefit in cost-effective ways. As part of this, we will consider the evidence for and affordability of environmental improvements through all the stages of our plan development.

More detail on the type of environmental improvements we would like to implement as part of our environmental destination can be found in Section 7.2. Our choices in this area have been shaped by customer’s preferences voiced via the January 2022 informal consultation on our emerging regional plan.

6.1.1 Environmental destination data uncertainty

As outlined in Section 4.1, the National Framework data upon which the environmental destination scenarios are based present a high degree of uncertainty. This means that we cannot have certainty that the abstraction reductions that may be needed in any given catchment have been estimated correctly and that they would indeed have the desired benefit (i.e. to improve river flows or groundwater levels). Relying on uncertain data would lead to potentially investing in solutions that ultimately do not work to secure resilience benefits and improvements in those catchments.

To reduce the uncertainty in our abstraction licence reduction data for England and to inform the selection of catchment measures and investments required, the water companies will run detailed environmental investigation programmes over the next few years to gather the evidence needed. These investigations will target the following considerations:

- potential climate change impacts
- hydroecology requirements
- catchment resilience needs and balancing this against the resilience needs of water supply across sectors
- the need to maintain affordability for customers.

There are a series of key actions that we need to take to ensure our exploration of these uncertainties is successful. Firstly, the climate change scenarios we use will impact the scale of abstraction reductions that we plan for. Updating the assessment to utilise the latest data and regional specific scenarios is essential to improve our regional planning. We will have to allocate time and resources to engage with local stakeholders in catchments targeted for abstraction



reduction. This represents a key area of work, as it will allow us to understand current and future flow and land use change pressures that will arise due to climate change. We expect climate change to generate both high and low flow pressures; understanding these will allow us to develop ambitious plans in the context of what can realistically be achieved.

These investigations will also bring the opportunity for us to identify synergies and areas of mutual benefit with other plans and programmes. We will have the opportunity to supplement environmental monitoring data with newly gathered accurate information on abstraction utilisation and use this to forecast future needs. We plan to use more catchment specific hydroecology models or other frameworks to refine the data on the flows that are required to support a healthy ecosystem and to better predict how and where protection is likely to be needed in a changing climate.

We will also have the opportunity to develop a host of new water resources options (both demand and supply) and environmental catchment enhancement measures that bring multiple benefits and are tailored to each catchment. This area is strongly supported by stakeholder feedback. This will allow us to develop costed plans which account for multi-sector benefits and which allow us to choose how to protect the environment, through a range of interventions.

6.1.2 Further considerations

The extent of the water companies' investigation programme is still to be agreed with the environmental and financial regulators. Nevertheless, we propose that all catchments where potential public water supply abstraction reductions have been identified should be assessed. In these catchments, assessments should also assess the co-dependency between the needs of both public and non-public water supply sectors to achieve the desired environmental outcome; however, there is no clear funding route to achieve this at present.

It is important to recognise that we need a consistent, flexible framework for these investigations that can be applied to specific catchments and regions. This will ensure the investigations undertaken nationally provide adequate evidence that does not favour one region's needs over another. Water Resources West is keen to work with other regions and the regulators to develop this framework at speed, to enable early work to commence prior to the next water company business planning period (subject to individual company funding). This will enable us to consider more evidence for the next regional plan in 2027. Currently, to facilitate the investigations from 2025 -2030, the adaptive planning decision point is likely to be 2030, after the next regional plan. We outlined our role within this framework in the roadmap shown in Section 5.2.

We know that part of our environmental destination can be achieved within the scope of funded investments by water companies; nevertheless, much will still need to be done to reduce the uncertainty of environmental outcomes and support actions by others. While water companies may seek funding for a share of the implementation of some of the higher priority options in their next business plan, Water Resources West will use these plans to promote the delivery of these options by other stakeholders and the use of other funding mechanisms.

Last but not least, further clarity from the environmental regulators is needed on how changes to non-public water supply abstraction licences will be applied. Licence capping and abstraction reductions could have important implications for energy security, food security and industrial production. From our liaison with other sectors, we know that there is a high level of concern regarding these reductions. Therefore, we believe cross-sector working should continue alongside exploration of other funding streams, to deliver multiple environmental benefits across public and non-public water supply sectors in our region.



6.2 Managing demand

The supply demand balance set out in Section 4.2 is based on the assumption that per capita consumption⁴² and leakage policy targets⁴³ in England will be met by 2050. Stakeholder feedback has provided support for our choice to adopt these policy targets in our planning. The companies have now reviewed their demand management options and selected the ones that will be required to meet those targets. These commitments to reduce demand are also baked into the company-level Water Resources Management Plans, ensuring alignment between these and the regional plan. We have also tested several alternative demand scenarios to understand what would happen to our supplies if the leakage policy targets and per capita consumption reduction assumptions would not be fully met by 2050. These scenarios are further explored in Section 7.7.

Customer voice

"I think they should promote meters. You see a lot of waste at home because I'm not on a meter and I think if I was... I would think twice about what I was using."

As mentioned in Section 2, since a large part of our region is now deemed to be under serious water stress, we have consulted with customers to understand the level of support for the potential implementation of compulsory metering across those parts of the region, to help us drive further demand savings. The feedback received during the informal consultation on our emerging plan (January-February 2022) clearly indicates that stakeholders regard metering as a good solution to help reduce demand, despite the risk that costs could increase when moving to a metered supply. Stakeholders are supportive of moving away from unmetered water consumption and instead placing a greater responsibility on the consumer who would pay for the actual usage, akin to other household bills (see table below).



Do you support a plan that relies on an average of 20% reduction in personal water consumption, and corresponding reductions in peak and non-household consumption?

Would you support government measures to help reduce water consumption, e.g. water labelling and building standards, alongside measures that the water companies can take?

Would you support a plan with increased metering to help customers reduce their consumption with more and better information, and charges based on the amount used?

Do you consider an increase in customers' bills acceptable to solve deficits by reducing demand?

Response summary

Stakeholders were supportive of a 20% reduction in personal water consumption, acknowledging that customers need to be supported by national measures, product manufacturers, and access to efficient technologies. There was strong support for more government intervention to help drive this via building regulations to mandate water efficiency, caps on water use, and the installation of water-smart technologies. In Wales, a focus on innovation was emphasised, with ideas including incentives for water reduction.

In general, increased metering was seen as a good solution to help reduce demand and paying for the water that is actually used. However, stakeholders indicated that this is only a piece of the puzzle and that we need to think much more holistically. Stakeholders urged Water Resources West to

⁴² Per capita consumption reductions to 110l/p/d does not apply to Wales and thus will only apply to Welsh Water Zones falling within England.

⁴³ There is uncertainty related to the achievement of these targets and we will explore these through scenario testing and the development of the adaptive plan. These leakage targets do not apply to Wales, thus will only apply to Welsh Water Zones falling within England.



	<p>make connections between environmental restoration and demand management.</p> <p>As with the points made under smart metering, managing peatlands more effectively for a joined-up approach was seen as a way to effectively create more supply to mitigate the growth in demand. Many stakeholders asked whether there could be a location-based element to any bill increases, or a tariff similar to council tax.</p>
Impact of response on draft plan choices	<p>We are echoing the support shown by our stakeholders for water efficiency measures and water efficiency labelling as a means to drive down per capita consumption. We will continue to support local authorities in applying a more stringent per capita consumption target of 110 l/p/d for new builds, in areas of our region that are already under serious water stress. To this end, the demand management options included in our draft plan have been selected to ensure we achieve the envisaged 20% reduction in per capita consumption by 2050.</p> <p>We have taken into account the positive feedback regarding metering and reflected this through the demand management options included in our draft regional plan. Through our environmental destination vision, we will implement holistic catchment measures such as peat restoration and woodland planting where deemed appropriate. With time, these will bring water resources resilience and flood risk reduction benefits. These are examples of mid-longer term measures that can bring significant direct benefit to water resources (see 7.2).</p> <p>Although peatland restoration can be an effective solution to increase supply resilience in the longer term, it will not be sufficient to address the size of our deficits. Moreover, as this is a mid to longer term solution, it will not be readily available to help with deficits arising in the next 10-15 years. In the meantime, we are focussing on investing into our leakage reduction to meet policy requirements, this being a priority area in our draft regional plan.</p>

We are actively engaging with non-PWS sector stakeholders via meetings and workshops, to discuss their aims for reducing their water demand over the regional planning horizon. We are also aware that some sectors need support (e.g. farming sector) so we will seek to understand how we and our regulators can support them in future. We are currently in discussion with representatives across the non-PWS sector to understand opportunities for reducing abstractions going forward. However, it is recognised that this is not a straightforward process, especially since this is the first time such liaison is taking place at a regional level.

In July 2021, the Government announced new measures⁴⁴ to balance the growing demand on water supplies with the ambitions in its 25-Year Environment Plan to achieve clean and plentiful water. This was in response to a consultation on measures to reduce personal water use⁴⁵. The majority of respondents to this consultation thought the current standards were not effective and that the Building Regulations should mandate a tougher standard (removing the optional standards at the discretion of local authorities). This standard was perceived as being achievable. Part of the Government's response is to encourage local authorities to adopt a tighter standard of 110 litres per person per day. This view has also been echoed by our stakeholders who expressed support for the government's initiative to help reduce consumption alongside water

⁴⁴ [Reducing demand for water](#), Statement made to UK Parliament on 1 July 2021

⁴⁵ [Consultation on measures to reduce personal water use](#), Summary of Responses, Defra, July 2021.



companies' own measures. This was seen as a good way for customers to take responsibility for what they use and pay accordingly, as they pay for other goods/services.

The Government also committed to develop a roadmap towards greater water efficiency in new developments and retrofits, including the exploration of revised building regulations and how the development of new technologies can contribute to meeting these standards. In further recognition of the need for water efficiency, the Government also announced that it would make regulations to introduce a mandatory water efficiency label to inform consumers and encourage the purchase of more water efficient products for both domestic and business use.

Through our engagement with local authorities and Waterwise, we developed an evidence paper to support the adoption of water efficiency standards. We have since updated this paper to reflect the Government's commitment to the introduction of mandatory water efficiency labels on domestic appliances⁴⁶ and the latest water stress assessment. This evidence paper should now be used to inform Local Plans with regards to policy on adoption of the 110 litre per person per day target for new developments.

Water Resources West welcomes and supports these measures by the Government and asks that they are implemented in a timely way. The reductions in water demand we need to maintain sustainable supplies can only be met by a combination of action from water companies, national and local government, developers and consumers.

6.3 Service levels

The tables below summarise the views expressed by our customers and stakeholders with regards to their service levels. Service levels include a range of factors, but two key ones in terms of the direct service to customers are the frequency of temporary use bans (also known as hosepipe bans) and the frequency of more extreme drought measures, linked to the proposed extreme drought resilience standard.

Q	Water companies currently plan for temporary use bans (TUBs) to have a likelihood of being required once every
<ul style="list-style-type: none"><li data-bbox="400 1283 762 1305">• 40 years for South Staffs Water<li data-bbox="400 1330 687 1352">• 20 years for Welsh Water<li data-bbox="400 1377 762 1400">• 33 years for Severn Trent Water<li data-bbox="400 1424 794 1447">• 20 years for United Utilities Water.	
Do you consider an increase in water companies' customers' bills acceptable to achieve a better level of service? For reference, increasing the level of service for temporary use bans from 1 in 20 years to 1 in 40 years would cost between 50p and £8.	
Response summary	With regards to levels of service, most respondents felt like bills should not increase to improve these, but rather education and demand savings should naturally tip the balance so that these are not needed as frequently. This is an indication that most stakeholders are comfortable with the current levels of service. However there is strong support for improving the levels of service for TUBs in United Utilities' supply area.
Impact of response on draft plan choices	Given the feedback received, we are not seeking to increase our levels of service across the region but individual companies have respond to their own customer research. It is being considered where there are multiple benefits.

⁴⁶ [Water efficiency in new homes](#), Water Resources West



United Utilities has therefore proposed to improve to 1 in 40, in a joined-up plan linked to water transfers (see Section 7).

Q Resilience to extreme drought means that water companies are only likely to have to implement rota cuts and standpipes once in every 500 years. We are aiming to achieve this level of resilience by 2039 in England, and in Wales only for areas where external transfers are proposed. Do you consider an increase in water companies' customers' bills between 50p and £4 as acceptable, to help us achieve this resilience standard from 2025 rather than the statutory target of 2039?

Response summary There were mixed views on bringing the resilience standard forward to 2025. Stakeholders with more frontline experience of drought and the effects of climate change, such as those working in agriculture, wanted to see much more urgency on the issue, and agreed a more ambitious target should be instated. However, others felt that although they might like to see the target brought forward, 2039 was a reasonable compromise on the issue, particularly when measured against strategies to reduce flooding.

Impact of response on draft plan choices Given the feedback from our stakeholders, we consider that bringing the resilience standard forward to 2025 across the region is not a priority. The investment necessary in most zones would be disproportionate to the need. Companies are planning to achieve the standard by 2039/40.

6.4 Water Transfers

As well as our emerging plan consultation, we also sought the views of our stakeholders on water transfers through a more targeted consultation in December 2021. Then we collated feedback from customer research undertaken in 2021-2022 to be able to compare our customer and stakeholder views and identify any discrepancies. A high level summary of the response we received from stakeholders and customers and how this shaped our plan is given below.

Q Should we share water resources outside of the region to reflect national challenges?
If yes, then what would you expect in terms of avoiding adverse economic, environmental, wellbeing, resilience or water quality impacts to the source area?

Response summary The vast majority of stakeholders agreed that sharing water between regions is acceptable and beneficial but that care must be taken to ensure any transfers wouldn't negatively impact our region. Transfers that would utilise existing assets such as canals to move water within and beyond regions were particularly favoured as they are sustainable and require less investment.

The majority of respondents expect that the source area should receive financial rewards for sharing the water with other regions. There was also an expectation that economic, environmental, wellbeing, resilience and water quality impacts should be balanced, recognising that there is always an element of risk in doing something, but that doing something to resolve the issue is better than doing nothing.

Impact of response on draft plan choices Given the widespread support for water transfers, our draft plan includes several options to transfer water both within our region as well as some strategic transfer options to transfer water to Water Resources South East



region. This water is available for transfer and new, cheaper and sustainable options will be developed in the United Utilities supply area to free up additional water for the Severn-Thames transfer. As the North West and the South East are less likely to be affected by droughts at the same time, these transfers provide resilience benefits to the South East without prejudicing supplies in our own region.

It is undeniable that large water transfers could have environmental impacts upon a variety of environmental receptors. However, there are environmental assessments (WFD, HRA, SEA, BNG and NCA) that have already been conducted (at strategic level) and those that will be done further (in more detail) as the two strategic transfer options (Severn Thames Transfer and Grand Union Canal) progress towards implementation. These assessments will identify all such negative environmental impacts and will propose mitigation measures to ensure any such impacts are removed or minimised to acceptable levels (i.e. to not cause deterioration in water body WFD status or impacts on designated sites). These assessments form part of our legal obligations to protect the environment.

The transfers of water we propose, whether inside or outside our region, will improve the water environment and bring well-being benefits to our region. The money gained from water transfers to the South East will be used to invest in new sources to protect our supply and environmental resilience and alleviate issues in our region (see Section 7.3.3).

The selection of transfers in our plan is discussed in Section 7.3.

6.5 Trade-off exploration

In our planning approach there are multiple objectives and a wide range of options available to meet these objectives (see Table 6). Some options will be better at meeting certain objectives than others. In forming our plan from these options, we need to select a mix of options that balance the different objectives. Our starting point has been to translate the objectives into performance metrics and use value weightings to select options to optimise the plan's value based on these weightings. This is our ValueStream approach (Section 5.5.2). However, to make sure we pick the right mix for the region we also need to explore trade-offs between those objectives as the selection of options changes. For example, there may be ways to get higher ecosystem resilience, but higher costs. These trade-offs have been explored where appropriate through our ValueStream approach to understand how plan value changes.

The starting point was a comparison between the candidate best value plan, optimised from the value weights, and the least cost plan. The least cost plan was derived by optimising the plan to meet policy objectives and the supply demand balance constraint, and minimising the cost metric. Other aspects of value were ignored in the derivation of the least cost plan.

For South Staffs, Severn Trent, United Utilities and Welsh Water the least cost plan set of supply options to meet the residual deficits was the same as the set of supply options selected in the preferred plan. This means the additional benefits in the best value preferred plan are delivered for the same cost to customers as the least cost plan.



7. PROPOSED REGIONAL PLAN

7.1 Our draft best value plan

Stakeholder voice

"I think it's immoral to start looking for new sources of water before addressing options to reduce demand."

Based on consultation feedback and our resulting choices, we have developed a plan which can meet the needs of our region whilst also reflecting also the needs of other regions. We have worked with other regions to reconcile our plans, and transfers from Water Resources West have been selected as part of Water Resources South East's plan.

The starting point of our plan for public water supplies is a significant reduction in water demand, through reduction in consumption and a reduction in leakage from the potable water network. Consumption reduction to 110 l/p/d by 2050 will be achieved through a range of measures rolled out by water companies:

- Targeted water efficiency campaigns, with household and non-household setting visits supported by partnership working.
- A significant roll-out of water meters, using enhanced or smart technologies.
- In the Midlands, adopting a policy of metering all households, linked to the water stress classification in that area.

Moreover, we rely on the government to introduce water labelling to reach our 110 l/p/d target (see Table 9).

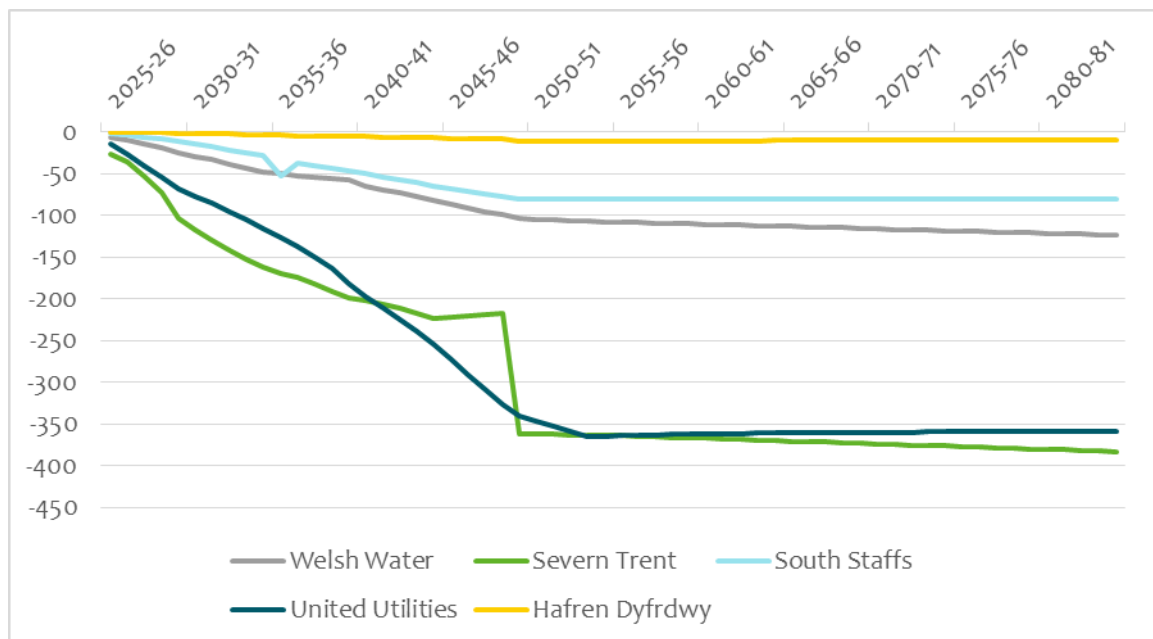
A 50% reduction in leakage by 2050 (relative to 2017 levels) will be achieved by a wide range of measures (see Table 8). This includes investing in more pressure control and replacing water mains to reduce the breakout of leaks, more metering and smarter monitoring within the water networks to allow faster detection of leaks when they do occur and more people to find and fix leaks through active leakage control.

In summary, some key actions the water companies will take to reduced demand are as follows:

- South Staffs will invest approximately £72 million from 2025 to 2050 to tackle leakage, this resulting in water savings equivalent to 25 Ml/d. They will also roll out > 400,000 meters from 2025 to 2035.
- United Utilities will install >2 million water meters (2026-2041), provide >66,000 rainwater harvesting and water reuse systems (2046-2061) and conduct >187,000 household water efficiency audits (2026-2058).
- Severn Trent plan to introduce compulsory metering from 2026 and replace > 2 million meters by 2035. They also plan to conduct >250,000 household audits between 2025 and 2043 and replace >6,500 km of water mains to decrease leakage between 2025 and 2050.
- Welsh Water will start metering all household properties from 2026 to 2035. By 2035, the percentage of meters installed in their SEWCUS zone will reach 95%. Moreover, Welsh Water will repair an estimated 6,000 leaks.
- The combined benefit of the demand management options selected in our preferred plan, including government intervention via water labelling, is around 898 Ml/d across the region (see Figure 13). Note that this is larger than the 665 Ml/d contribution to resolving the deficits noted in Section 4.2. This is because the effect of the demand policies is to reduce demand in all zones, not just those with deficits.



Figure 13. Demand reductions achieved through demand management options included in our preferred plan, from 2025 to 2085.



The largest need for new water resources arises in the Midlands to offset reductions in abstraction licences to meet environmental needs. Severn Trent requires a large number of supply options to tackle deficits (see Table 10). This includes raising the height of dams in the Derwent Valley and at other reservoirs to increase storage, investing in a number of water treatment works to increase deployable output, significant increases in interconnectivity and a small number of new sources. Severn Trent also proposes to take 75 Ml/d from the North West transfer for a period until it is required by Water Resources South East (see Section 7.3). In addition, use of water from Minworth and Netheridge wastewater treatment works is included to support transfer of water to the South East. South Staffs does not select any supply options, as they present no deficits in the 2025-2050 horizon.

In the North West, development of new water resources is linked to supporting water transfers, both within Water Resources West and to the South East. This also provides additional benefit to United Utilities customers. The proposed new sources are: increasing groundwater abstraction capability within existing licence volumes and new river abstractions from the Rivers Ribble, Irwell and Bolin which all have water available. As part of the joined-up plan linked to the water transfers, this improves the level of service for temporary use bans to 1 in 40 years from 2031. Enabling works on the Vyrnwy Aqueduct are also required to enable the transfers.

In Wales, Hafren Dyfrdwy does not require any supply options, as it has no deficits to cover even in the absence of demand management policy being implemented. Welsh Water will be implementing two supply options, one which focuses on upgrades to the network in SEWCUS and one which looks at recovering losses from a water treatment works.

Water transfers are a key area where our plan may need to adapt in the future. Further information on the selected water transfers is given in Section 7.3 below.



We are proposing several options as part of our environmental destination (see Section 7.2). These are mainly targeted at natural flood management to benefit aquifer recharge, alongside creation of new wetland habitat, removal of fish passes and water quality improvements, including a reduction in sedimentation in the River Worfe. These options will create new habitats or enhance existing ones that will benefit aquatic insect populations (such as mayflies) and fish already present at these sites.

In addition to the direct opportunity to improve the environment through our environmental destination work, any options needed to meet water resources needs provide further opportunities. Through our decision making process (Section 5.5), options which bring ecosystem resilience benefits are more likely to be promoted ahead of other options which do not present such benefits.

We have also assessed the impacts of each of our feasible options (including transfers) on water body status to ensure no deterioration risks arise from the construction and operational phase of each option. Any options that were found to pose deterioration risks to a water body's WFD status were either excluded from the plan or had robust mitigation measures put in place to ensure this does not happen.

Our analysis of non-PWS abstraction data indicates that the vast majority of projected non-PWS growth can be accommodated within existing licences, although the power sector is a special case that may have significantly different needs for water with the change to a hydrogen economy. The need for additional water for most non-PWS abstraction will be determined by changes to licences by regulators to ensure no-deterioration of Water Framework Directive classification, or to achieve environmental flows in 2050, and it is not the role of Water Resources West to inform individual abstractors of these reductions. Additionally, most non-PWS abstractors rely upon a single source in a particular location, meaning that any new water will have to be found locally – this will be a bespoke process and cannot be done in the same way that planning for conjunctive water resource zones is undertaken by water companies.

We have set out in Section 8.4 a list of actions that need to be undertaken by regulators, water companies and abstractors to ensure no-deterioration and achievement of our environmental destination. To achieve the outcomes we seek there will need to be timely and co-ordinated action by all players. Changes to water company licences alone will not prevent deterioration in many cases, nor will they deliver environmental destination without similar changes to non-PWS licences.



Table 8. Demand management options selected in Water Resources West's draft best value plan. Most benefit figures apart from very small ones (<1 Ml/d) have been rounded.

Water Company	Option ID	Option Name	Water saving benefit in 2050 (Ml/d) ⁴⁷	Implementation dates ⁴⁸	Total benefit in 2050 by company (Ml/d)
Hafren Dyfrdwy	173+174	Retrofitting indoor water efficiency devices	0.01	2025-2055	9
	176	Home water efficiency check with social housing	0.03	2025-2054	
	N/A	Leakage reduction	6	2025-2100	
	N/A	Enhanced/Innovation led household water efficiency	3	2030-2100	
Severn Trent	180	Compulsory metering	51	2026-2084	218
	173+174	Retrofitting indoor water efficiency devices	1	2025-2054	
	541	Household water audit	0	2025-2049	
	181	Non-household water audit (leak alarm)	0	2025-2049	
	176	Social housing water audit (leak alarm)	0.6	2025-2068	
	N/A	50% Reduction in leakage	166	2025 - 2051	
South Staffs	2021-116	Fitting of Enhanced Meter Technology over 2025-2035 to all non-household	12	2025-2100	60
	SN_02	Fitting of universal smart meter technology throughout AMP8 and AMP9 (enabler option with no benefit)	0	2025	
	2021-001	Proactive trunk mains leakage reduction	3	2025-2100	
	2021-003	Advanced pressure optimisation	3	2025-2100	

⁴⁷ Zero values indicate that the option does not have any benefit in 2050 either because the benefit has finished before that date or due to the option being an enabler for another option, with no Ml/d benefit.

⁴⁸ An option may start to be implemented at different times in different water resource zones.



Water Company	Option ID	Option Name	Water saving benefit in 2050 (Ml/d) ⁴⁷	Implementation dates ⁴⁸	Total benefit in 2050 by company (Ml/d)
	2021-045	Customer supply pipe repair or replacement (without smart networks)	2	2025-2100	
	2021-099	Distribution Mains/Comms pipe replacement	6	2045-2100	
	2021-106	Customer supply pipe repair or replacement (with smart networks)	3	2035-2100	
	2021-107	District Metered Area MOT (with smart networks)	0.3	2039-2100	
	2021-108	District Metered Area Active Leakage Control plus (with smart networks)	8	2039-2100	
	2021-118	District Metered Area MOT (without smart networks)	0.06	2029-2100	
	2021-012	Household water efficiency programme (partnering approach, home visit)	4	2025-2100	
	2021-036	Housing associations - targeted programme	2	2035-2100	
	2021-048	Innovative tariffs	13	2035-2100	
	2021-091	Targeting properties for efficiency audits (without smart metering)	1	2025-2100	
	2021-094	Water neutrality (without smart metering)	2	2025-2100	
	2021-093	Community Water Efficiency Scheme (without smart metering)	0.3	2025-2100	
United Utilities	WR601a+WR601e+WR603b	Enhanced metering of households (smart meters)	91	2025-2100	257
	WR619a+WR619d	Upgrade existing household meters to smart	16	2025-2100	
	WR658a+WR658c+WR659a+WR659c	Free water efficiency devices (inside/internal and outside/external)	5	2025-2100	



Water Company	Option ID	Option Name	Water saving benefit in 2050 (Ml/d) ⁴⁷	Implementation dates ⁴⁸	Total benefit in 2050 by company (Ml/d)
	WR661c+WR661a	Free water efficiency audits (households)	2	2025-2100	
	WR669a+WR669b	Flow regulators	4	2025-2100	
	WR677a+WR677c	Non-household water efficiency programme	7	2025-2100	
	WR685a+WR685c	Rainwater harvesting and water reuse (new builds)	2	2026-2100	
	WR502a+WR502c	Permanent network sensors	21	2025-2100	
	WR524c	Upstream tile optimisation	3	2025-2100	
	WR516a1+WR516h1+WR516h2	Mains rehabilitation, renewal or replacement	101	2025-2100	
	WR511c	Pressure management	0.5	2045-2100	
	WR520a	District Metered Area optimisation	0.2	2041-2100	
	WR510	In-pipe repairs and lining technologies	4		
Welsh Water	DCW METER	Metering-customer demand saving	60	2025-2100	93
	DCW CO INT	Water efficiency customer education / awareness – company led intervention	21	2041-2100	
	DCW ALC	Active leakage control	12	2025-2100	



Table 9. Benefit arising from the Government's introduction of water labelling⁴⁹ by water company.

Water Company	Option ID	Option Name	Water saving benefit in 2050 (MI/d)
Hafren Dyfrdwy	539	Government intervention (water labelling)	2
Severn Trent	N/A		145
South Staffs Water	N/A		20
United Utilities	WR694d+WR694e+WR694f		82
Welsh Water	DCW GOV INT		12
Total water labelling benefit across region			261

Table 10. Supply options (including transfers) selected in Water Resources West's draft best value plan⁵⁰.

Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
Severn Trent	Kinsall	101	Kinsall additional resource (United Utilities import)	1	2062	0	0	0.35 surplus
	Mardy	103	Mardy support link	1	2035	3	3	0.44 surplus
	Ruyton	105	Ruyton support link	1	2050	1	0	1 surplus

⁴⁹ Water labelling benefits do not include benefits from the introduction of minimum standards as part of Building Regulations.

⁵⁰ Large surplus figures in the Strategic Grid and Nottinghamshire occur due to the way Severn Trent has accounted for the impact of water labelling (i.e. assuming the benefits of the intervention will be seen later in the planning horizon), which then offset deficits beyond 2050.



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
	Stafford	44	New river Sow abstraction and water treatment works near Stafford	23	2045	23	12	11 surplus
	Strategic Grid	303A	North West Transfer: Vyrnwy	68	2030	121	0	149 surplus
		66	Strensham water treatment works expansion	15	2030			
		434	Trimpey water treatment works deployable output recovery	4	2030			
		435	Whitacre water treatment works deployable output recovery	4	2030			
		29	Homesford water treatment works capacity increase	5	2030			
		426	Little Eaton water treatment works deployable output recovery	5	2030			
		122A	Draycote Reservoir expansion (6%)	9	2030			



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
		169	Terminate raw water export to Yorkshire Water	35	2035			
		95B	Ogston water treatment works expansion	15	2045			
		6	Upper Derwent Valley reservoir expansion (UDVRE)	60	2050			
		190	Eyebrook Reservoir and new water treatment works	18	2050			
		84A	Standofrd minor dam expansion	3	2050			
		84B	Lower Shustoke minor dam expansion	3	2050			
		84C	Whitacre minor dam expansion	3	2050			
		423	Draycote deployable output recovery	4	2050			
		64	Rehabilitation Milton groundwater source	4.5	2050			
		528	New groundwater source Soar - Permian	5	2050			



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
			Sandstone near Coalville					
		557	Oldbury to Meriden capacity increase	15	2050			
		31C	East Midlands raw water storage (CQ)	24	2050			
		134A	Blackbrook reservoir to Cropston water treatment works	8	2059			
		420	Campion Hills water treatment works deployable output recovery	2	2058			
		31D	East Midlands raw water storage (CHQ)	45	2060			
		187C	Expand Carsington reservoir (25000 MI)	110	2067			
	Shelton	33Z	Shelton water treatment works expansion	12	2030	82	57	20 surplus
		301B	United Utilities import from Llanforda to Shelton (large)	25	2040			
		143	West Midlands raw water storage	33	2050			



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
	Nottinghamshire	309Z	Transfer from Hampton Loade water treatment works to Nurton service reservoir (small)	12	2050	90	64	26 surplus
		305	Heathy Lea to North Notts transfer	30	2030			
		304	Ambergate to Mid Notts transfer	30	2050			
		406	New abstraction and water treatment works on river Trent	30	2050			
	North Staffs	128	Carsington to Tittesworth main (large)	30	2030	90	80	10 surplus
		128Z	Carsington to Tittesworth main (small)	14	2050			
		22	Recommission Elmhurst groundwater source	2	2050			
		117	Peckforton bulk import from United Utilities	5	2050			



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (Ml/d)	Operational date	Total benefit in WRZ by 2050-51 (Ml/d)	Baseline deficit in WRZ by 2050-51 (Ml/d)	Residual deficit or surplus in final plan (Ml/d)
		523	United Utilities Mow Cop borehole treated water import	2	2050			
		552	United Utilities Bearstone treated water import	1	2050			
		123B	Raise dam at Tittesworth reservoir (25%)	14	2050			
		58	River Weaver to new water treatment works at Stoke	20	2050			
	Wolverhampton	79A	Wolverhampton-Birmingham strategic link main (large)	30	2050	16	4	12 surplus
United Utilities	Strategic	WE015	New surface water (River Irwell)	27	2031	111	0	202 surplus
		WR111	Groundwater enhancement (Woodford)	2	2031			
		WR113	Groundwater enhancement (Tytherington)	2	2031			
		WR149	Increased Treatment capacity (Wigan)	7	2031			



Water Company	Zone	Option ID	Option Name	Option Benefit (Water Available for Use on full implementation) (MI/d)	Operational date	Total benefit in WRZ by 2050-51 (MI/d)	Baseline deficit in WRZ by 2050-51 (MI/d)	Residual deficit or surplus in final plan (MI/d)
Welsh Water		STTA4	Northwest Transfer (Vyrnwy)	0 ⁵¹	2031	36	0	72 surplus
		WR076	New surface water (River Bollin)	16	2041			
		WR107a2	Groundwater enhancement (Aughton Park)	5	2060			
		WR049d	New surface water (River Ribble)	22	2060			
	SEWCUS	WRMP24-SEW166	SEWCUS network upgrade	21	2027			
		WRMP24-SEW168	Llwynon gravity	9	2027			

⁵¹ Vyrnwy enabling works to facilitate bulk transfer of surface water for external trade so no WAFU benefit to United Utilities Water.



7.2 Environmental destination options

In addition to the demand and supply options needed to fill the water company supply demand balance gap, our focused catchment level engagement has been to identify short to medium-term ‘no regret’ actions to improve the water environment.

In the three English catchments we are working in (the Wyre, Worcestershire Middle Severn and the Idle), we have the first iteration of a water resource focused catchment plan which prioritises multi-benefits (for details see Appendix D). So far, we have identified a total of 89 options (see Appendix D, Annex 1) which range from in-stream work to enhanced wetlands to flow augmentation and abstraction reduction. Many options are catchment specific but they also link to the strategic water resource and demand management options in the water resource and regional plan. In total, we are now progressing 36 (25 of which are in Welsh catchments) options for further assessment while more option identification work is underway.

A summary of the options that we intend to take forward for further assessment and potential implementation is presented in Table 11.

Water companies will also be investing in catchment solutions relating to other activities such as mitigation to ensure no deterioration of the water environment, waste water management, carbon and biodiversity targets. Water companies will be seeking to optimise interventions to maximise multiple benefits while achieving the regulatory outcome the actions support.

Table 11. Selection of environmental destination options to be assessed further.

ID	Option Description	Benefits	Risks
Idle_43 (SVT)	Poulter & Clumber wetland and flood meadow restoration with natural flood risk management and aquifer recharge	Improves water quality, flood management, biodiversity. Enhanced recharge - trade off against future reductions.	Water resources benefit uncertain: how much could recharge be enhanced? GW body will remain poor.
Idle_19 (SVT & AW)	Retford links to existing flood risk management programme to enhance recharge		
Idle_07 (SVT & AW)	Wetland creation in Bawtry & Idle Washlands to support SSSI restoration and store winter flows	As above. Also benefits SSSIs and potentially aids drainage	This area may be too far distant from STWL sources to have an appreciable benefit for STWL. Closer to Anglian Water sources
Idle_41 (SVT)	Rainworth Water wetland creation as part of local CaBA masterplan	Improved water quality, habitat, hydromorphology. Enhanced recharge - trade off against future reductions. Improved flow regime in Rainworth Water.	Landowner permission required. May require protected species and archaeological surveys
WMS_02	Worfe on the Wildside extension and Worfe Water Environmental	Improve ecological resilience, Reduced	None known



ID	Option Description	Benefits	Risks
(SVT)	Improvement Fund for sedimentation control, fish barrier removal and , tree planting	sedimentation, Improved access for fish, Improved water quality.	
WMS_09 (SSW)	Collaborate with/expand on existing Salmon in the Stour project (Severn Rivers Trust/EA). Remove barriers or create fish passes in Smestow and/or Stour catchment. Opportunities to improve WFD failings including habitat, water quality and fish passage.	Improved habitat for salmonids and access to tributaries at lower flows. Improving fish access could reduce requirement for future abstraction reductions. Improved habitat and water quality.	WR benefit uncertain
WMS_39 (SVT)	Bromsgrove Brooks building on the Love Your River work, STWs Sanders Park restoration and the work of NWWM. Bromsgrove is important as one of the last breeding locations of water voles, it also suffers flooding and low flow issues.	Improved hydromorphology, Improved ecological resilience, Flood alleviation, Wetland creation – biodiversity, water vole habitat. Flow enhancement, groundwater recharge	None known
Wyre farmer engagement (UU)	Farmer engagement project in partnership with the Wyre Rivers Trust, building on AMP6 and 7 activity in the safeguard zone. Raise awareness, offer advice, educate, monitor demonstrate and intervene to improve raw water quality.	Improved water quality, flood management, biodiversity, infiltration.	Proposed WINEP scheme. Not yet agreed. Water resources benefit is uncertain.
Natural Course Fylde Hub (UU)	Develop a cohesive ‘placed based’ delivery plan for the Fylde catchment area with all stakeholders to drive joint decision making on catchment interventions to meet flooding and water quality needs.	Improved water quality, flood management.	Water resources benefit is uncertain.
Wyre Natural Flood Management (UU)	A partnership project to unlock a new innovative funding model for nature based solutions to build flood resilience.	Reduction in river and soil erosion, improvement in water quality, biodiversity, climate change mitigation.	Water resources benefit is uncertain.
Dee_1 (UU & HD)	A collaborative catchment scheme with HD, STW, DCWW to work together with NRW and EA through the existing River Dee Catchment Group carry out catchment based interventions with farmers / landowners to reduce turbidity,	Improves water quality, flood management, biodiversity. Reduced phosphate reduction in SAC river (Welsh Government priority), flood management, biodiversity	Water resources benefit uncertain. Cost contribution will be limited to how much HD can contribute in light of other ED



ID	Option Description	Benefits	Risks
	nutrient and pesticide run-off into water bodies		priorities across supply area
Severn_1 (UU & HD)	Working with HD, RSPB and stakeholders at Lake Vyrnwy to continue to manage the catchment for the benefit of raw water quality, peatland restoration, grassland and woodland habitat improvements and invasive species management.	Biodiversity, improve water quality, flood management, carbon sequestration	
Severn_2_UU (UU)	Working with Welsh stakeholders in the Upper Severn to deliver natural flood management interventions in the catchment as part of the proposed water transfer scheme.	Flood management, biodiversity, water quality.	
SEW-01 to 16 (WSH)	WFD sediment management. WFD downstream flows, catchment based solutions and investigations into long term sustainable abstractions	Improved fisheries habitat, geomorphology and flow regime.	Actual need uncertain, benefits unclear.
Dee_2_HD (HD)	Investigation into possible cryptosporidium sources following recent increase in positive results	Improves water quality	None known
Dee_3_HD (HD)	Work with the Clywd Range and Dee Valley AONB to identify opportunities to restore the upland habitats around our upland reservoir catchments, with the aim of slowing the flow of water through the catchment and capture minerals and nutrients, reducing adverse run off into our reservoirs	Improve water quality, flood management, improve water resource resilience, biodiversity	
Dee_4_HD (HD)	Work with the neighbouring landowner at Pendinas reservoir to undertake repairs and maintenance of the leat which feeds the reservoir, thereby improving water capture from the catchment and improving water quality	Improved water quality, improve water resource resilience, biodiversity	Landowner permission required.
Severn_2_HD (HD)	Explore opportunities on land at Penygwely reservoir, a disused source which has potential for biodiversity enhancement works.	Biodiversity	None known
Severn_3_HD (HD)	Explore opportunities on land at Esgareira reservoir, a disused source which has potential for biodiversity enhancement works.		



ID	Option Description	Benefits	Risks
Severn_4_HD (HD)	Investigations at Vyrnwy and Clywedog for improvements to gravel beds downstream of dams	Improve fish passage, fish spawning habitat creation, biodiversity	HD customers do not benefit from either of these sources so will likely need input from d/s abstractors

7.3 Transfers

7.3.1 Selection considerations

As mentioned in Section 1.1, the regional groups have undergone two rounds of regional reconciliation (one to inform the regional plan and one to inform the draft plan). The main focus of the second interregional reconciliation was to select transfer options for consultation. In doing this, we recognised the need to protect the resilience and environment in our region whilst supporting other regions. The transfer options we have considered (to be used both within our region and beyond) are presented in Section 5.4. During the reconciliation process, the transfer options were modelled by both the source and the recipient regions in order to identify the dates the transfers would need to start operating and the volumes required (which could fluctuate in time, as needs in recipient regions increase). The benefits of the transfers considered for selection into regions' best value plans were carefully assessed. As such, the following aspects were considered when weighing up the benefits of transfer:

- Ensuring that supply resilience and the environment are protected in the areas from which water transfers are sourced
- Ensuring that there are benefits to the source areas (see Section 7.3.3), so that transfer options can be selected as part of best value plans for those areas
- Optimising solutions so that the best use is made of the options to meet the needs of both source and recipient areas
- Optimising solutions to provide level of service, environment or wellbeing benefits, or reduce pressure on customer bills.

7.3.2 Draft plan transfer selection

Following the second reconciliation between the regions which ended in May 2022, we selected two strategic transfers from Water Resources West to Water Resources South-East into our draft plan. These are the Grand Union Canal transfer and the River Severn to River Thames. These transfers and the support sources to enable them are illustrated in Figure 14.

The Grand Union Canal (GUC) strategic transfer will utilise the existing canal infrastructure to transfer water from the Midlands to areas of planning deficit in Hertfordshire and North West London. The scheme plans to utilise treated discharge from Minworth wastewater treatment works (WwTW) as the resilient source of water to supply this canal transfer. This transfer has been selected by Water Resources South East to supply 50 Ml/d of water into the South East starting in 2031 and raising to 100 Ml/d by 2040.

The Severn to Thames Transfer will convey raw water from the River Severn into the River Thames via an interconnector. Water Resources South East has assessed many variants of this



and selected the 500 MI/d pipeline option⁵² as part of their adaptive plan. The earliest this could come into operation is 2040, however in the reconciliation baseline scenario it is first used to provide a supply demand balance benefit to the South East in 2050. While this transfer can access available water at high flows in the lower Severn, it also has multiple support options that can be called upon to support abstraction from the Severn. The support elements selected by Water Resources South East in the reconciliation baseline scenario are set out below. Not all available support options were selected in the baseline, but there are plausible scenarios where they would be needed.

In addition, the North West transfer, which is one of the support elements of the Severn Thames transfer, is also selected to meet needs within Water Resources West (see Section 7.1 above). This is part of a joined-up adaptive plan, which uses 75 MI/d of this water by Severn Trent in a low regrets way until it is needed by the South East. Severn Trent can develop other sources to be ready whenever the need in the South East arises. At that point this element of the North West transfer can switch over to Water Resources South East, via the Severn Thames Transfer.

Table 12 below presents the volume and dates of selection for GUC (Grand Union Canal) and STT (Severn Trent Transfer) by Water Resources South East, under their preferred plan. Table 13 presents the volumes and dates of selection for transfers selected by Water Resources South East under an alternative pathway scenario, in which a proposed new reservoir in the upper Thames Valley does not progress. The decision as to whether to switch pathway will be made in 2025 based on the conclusions of investigations into the feasibility, value and acceptance of Thames Valley Reservoirs and the STT/GUC transfers.

Table 12. Water Resources South East- Water Resources West updated baseline reconciliation position.

Transfer option selection	Vol (MI/d)	Date
GUC supported by Minworth WWTW effluent	50	2031
GUC supported by Minworth WWTW effluent (additional amount)	50	2040
STT supported by Netheridge	35	2050
STT supported by North West Transfer (Vyrnwy reservoir)	135	2060

⁵² The choice between conveying the water via pipeline or the existing canal network rests entirely with Water Resources South East.



Table 13. Water Resources South East- Water Resources West alternative pathway, assuming no new reservoir development in the upper Thames Valley.

Transfer option selection: alternative pathway	Vol (Ml/d)	Date
GUC supported by Minworth WWTW effluent	50	2031
GUC supported by Minworth WWTW effluent (additional amount)	50	2040
STT supported by Netheridge	35	2040
STT supported by North West Transfer: Vyrnwy	25	2048
STT supported by North West Transfer: Vyrnwy (additional amount)	80	2050
STT supported by Minworth	58	2050
STT supported by Minworth (additional amount)	57	2055

Although through reconciliation we have identified that transfers use resources that could also meet needs within Water Resources West, there are sufficient resources to satisfy both internal and extra-regional needs.

7.3.3 Transfers benefits

It is important to highlight that the costs incurred in our region to implement the options needed to support transfers would be paid for by the receiving water company. Therefore, the implementation of any transfer to another region will not negatively impact customer's bills within our region. In addition, there will be other benefits arising from transfers, as monetary gains from transfers to other regions can be reinvested within our region. In our December 2021 consultation stakeholders reported that the main benefits they would like to see were enhancements to the environment and economic benefits (i.e. creation of new jobs), opportunities for well-being (recreation and access to nature) and flood risk reduction, while ensuring their supplies were protected.

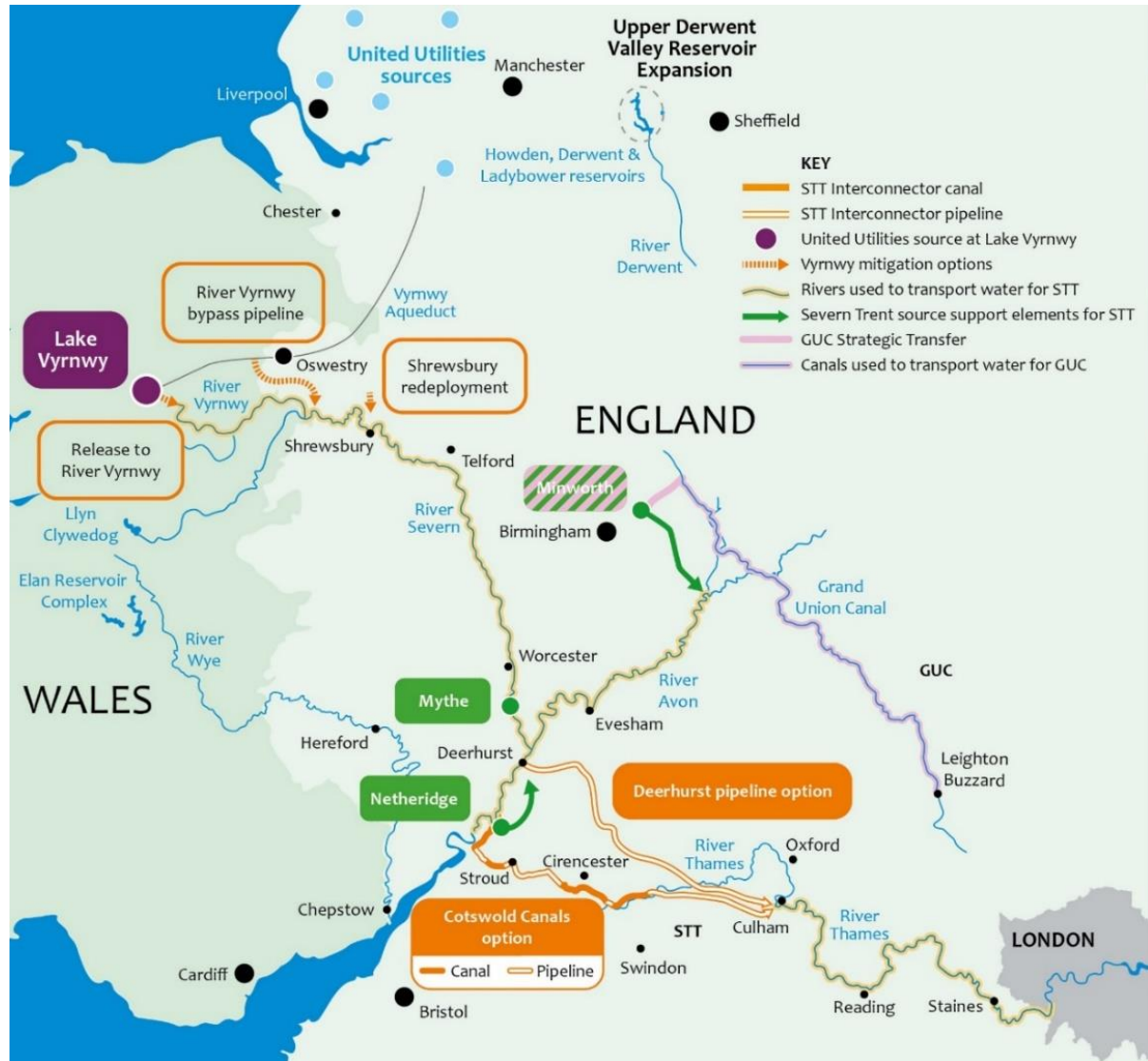
These benefits arise in four ways:

- The revenue benefits of transfers offset costs that companies would face, making improvements in those other areas more affordable for their customers, e.g. programmes to improve river and canal water quality
- Investment in assets to enable the transfers creates job opportunities and has a multiplier effect across the economy in the region (without the transfer investment would have gone elsewhere, e.g. in the South East). Therefore transfers support levelling-up.
- The investments bring net gain opportunities and wider benefits through the multi-benefit approach to selecting options. Improvements to the environment such as natural flood management, biodiversity enhancements, increasing catchment resilience, promoting SMNR in the Welsh areas of our region
- Accelerated delivery of supply options by United Utilities to support a future water transfer from 2030, enables improved resilience to temporary use bans by that date. This will improve the level of service from 1 in 20 to 1 in 40. By the time the water transfer is required to be operational, our demand management plans will ensure that there is sufficient capacity to support water trading whilst still maintaining the improved level of service for customers in the North West. Delivering the service improvement in that way is more efficient than options being developed purely to improve levels of service.



It is important to note that the benefits of the regional plan and more specifically, the transfer options, are likely to be localised in areas where the sources of water for the transfer are developed (North West, Shropshire and West Midlands). An investment strategy informed by further engagement with the communities in which investment will take place will be created.

Figure 14. Severn Thames Transfer and Grand Union Canal transfers.



7.3.4 Risks associated with transfers

Like any large infrastructure project, there are also some risks associated with the water transfers. The sector regulators working together through RAPID, run a “gated process”. This involves significant up-front work by the water companies, working together to progress feasibility and initial design work to better understand the costs and risks of these strategic resource options. At each gate the regulators assess the evidence. All the transfer schemes from Water Resources West have passed the first gate, which looked at feasibility. The Gate 2 evidence reports are being published in autumn 2022 so they can be reviewed alongside the regional plans and WRMPs⁵³. We have outlined the main risks considered below.

⁵³ [United Utilities Gate 2 report](#) and [Severn Trent Gate 2 report](#)



Water Availability

With sources located further from the recipient there is a lower correlation of drought events than more local sources. Nevertheless there are risks to the recipient that are assessed in the recipient's plans. Bulk supply contracts will set out allocations of water and there is work by RAPID on such commercial aspects. Risks to the areas from which the water is sourced from are mitigated by the development of new options to maintain resilience (the support options).

Delivery risks

The gate assessments have concluded that the schemes are feasible and that the proposed delivery timescales are realistic.

Environmental risks

Transfers via river systems will modify the flow regime and transfers between river basins can convey invasive species. These risks are mitigated in the scheme design, e.g. with treatment in the Severn Thames transfer to remove invasive species. SEA, HRA, and BNG assessments have been completed alongside initial WFD and NCA assessments. Assessments will be refined as the SROs progress through the gated process and this will be done robustly, with monitoring and mitigation put in place where required to ensure no unacceptable environmental impacts occur.

For most appraisal topics we have identified only minor or negligible negative effects on the environment from the transfer SROs. Like many large construction schemes, we have identified the potential for moderate negative effects on land use, geology and soils, and the traffic and transport, e.g. due to temporary loss of high grade agricultural land while pipelines are laid, and temporary increased traffic movements during construction. However these impacts will be readily mitigated through embedded design measures as the sub-options progress to detailed design, and implementation standard best practice construction and operation methods.

Where the assessments identified the potential for adverse operational effects, we have also proposed mitigation measures. These include an alternative Vyrnwy Bypass to the River Severn and a reduced direct release volume from Vyrnwy reservoir. Several major beneficial effects have been identified in respect of providing additional water resources, creating significant opportunities for enhanced biodiversity value, and/or economic benefits. Enhancement opportunities, including for Natural Capital increases have been investigated.

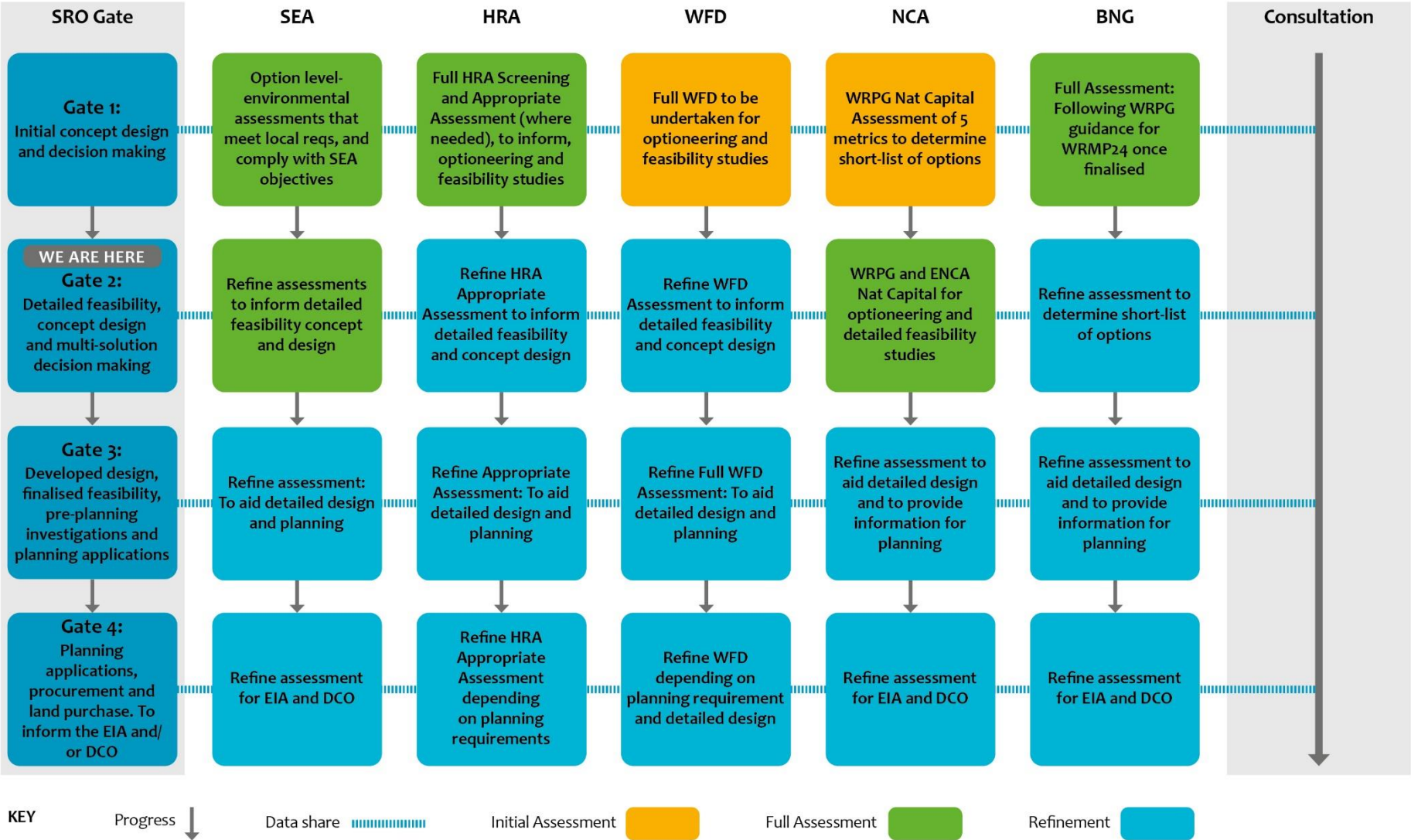
For the Minworth option an investigation into potential hydrological linkages showed that flows and levels in the lower River Mease (a tributary of the River Trent and an SAC river) are not expected to be affected by reduction in discharge at Minworth WwTW. This has supported a conclusion of no likely significant effects the River Mease SAC, either alone or in combination with other projects. The SRO partners have been liaising extensively with the EA to jointly understand the potential impacts of reduced discharge from Minworth WwTW on the North Muskham Hands off Flow (HoF), and the mitigation options.

The assessments have not identified any 'showstoppers' to indicate that the sub-options for any of the SROs are unlikely to be feasible at this stage. There remain key risks and uncertainties, and further data gathering and assessment is required to provide sufficient evidence that the SROs and their sub-options will be compliant with environmental regulations.

An illustration of the gated process and the assessments that will be progressed as the process progresses is presented in Figure 15 below.



Figure 15. Strategic Resource Option Gated Process and environmental assessments





7.4 Adaptive plan

7.4.1 The need to adapt

The sections above illustrate the plan aligned to default planning assumptions, in line with the Water Resources Planning Guideline. The future is however uncertain, and our plan can adapt to change over time. Water resources plans get updated on a five yearly cycle, and incremental changes can be accommodated naturally within that cycle. However, there are some factors that have significant implications for large, long-lead time investments in infrastructure. For these big decisions, we need to be clear on the decision points and how the plan changes, so we can prepare for that eventuality.

The points of adaptation within Water Resources West's area at a regional scale relate to the transfer options selected.

Derwent Valley Options

Figure 16 illustrates the adaptation linked to the Derwent Valley options and transfers to Yorkshire Water in Water Resources North (WReN). Seven Trent faces a significant loss of abstraction licence in the Nottinghamshire area, initially in the 2030's but also in the longer term. There are limited options in this area to provide alternative sources, and the main ones are located upstream in the Derwent Valley. One option is to stop an existing transfer to Yorkshire Water, freeing up water to meet Severn Trent's needs, but this would have detrimental impacts for Yorkshire Water. Other options involve increasing reservoir storage in the Derwent Valley in various ways⁵⁴. It is not yet clear if reservoir storage could be increased to a size large enough to meet both Severn Trent's and Yorkshire Water's need. Decision points in 2025 about the feasibility and 2030 about best value, allow the best option to be in place by 2035.

Severn-Thames Transfer and supporting options

Figure 17 illustrates the adaptation linked to the River Severn options and transfers. There are two decision points. The first one relates to decisions in the South East, in 2030, about a potential new reservoir in the South East. If the reservoir does not progress, then the Severn Thames transfer and its support options are needed earlier than they would otherwise be. In this situation Minworth is also required to support the Severn Thames transfer.

The second decision point relates to the environmental destination abstraction reductions in Water Resources West:

In the BAU+ scenario, Severn Trent needs to develop significant new options to offset large abstraction reductions. The best value solution for Severn Trent is to develop enough sources to also offset the use of 75 Ml/d from the North West transfer, which frees this water up to go to the South East instead.

In the low environmental destination scenario, Severn Trent needs to develop less new sources. In that situation, the best value solution for Severn Trent is to continue using the 75 Ml/d. Therefore, the North West transfer is called on to support both the South East and Severn Trent and the maximum available from the North West transfer is reached.

In practice, when environmental investigations have concluded and this decision point is reached, the precise requirements will be updated and best value decisions at the time could result in different allocations than shown in these illustrative pathways.

⁵⁴ Note the Derwent Valley SRO runs on slower timelines than those for the main RAPID gated process.



Figure 16. Adaptive plan for Derwent Valley options, showing key decision points.

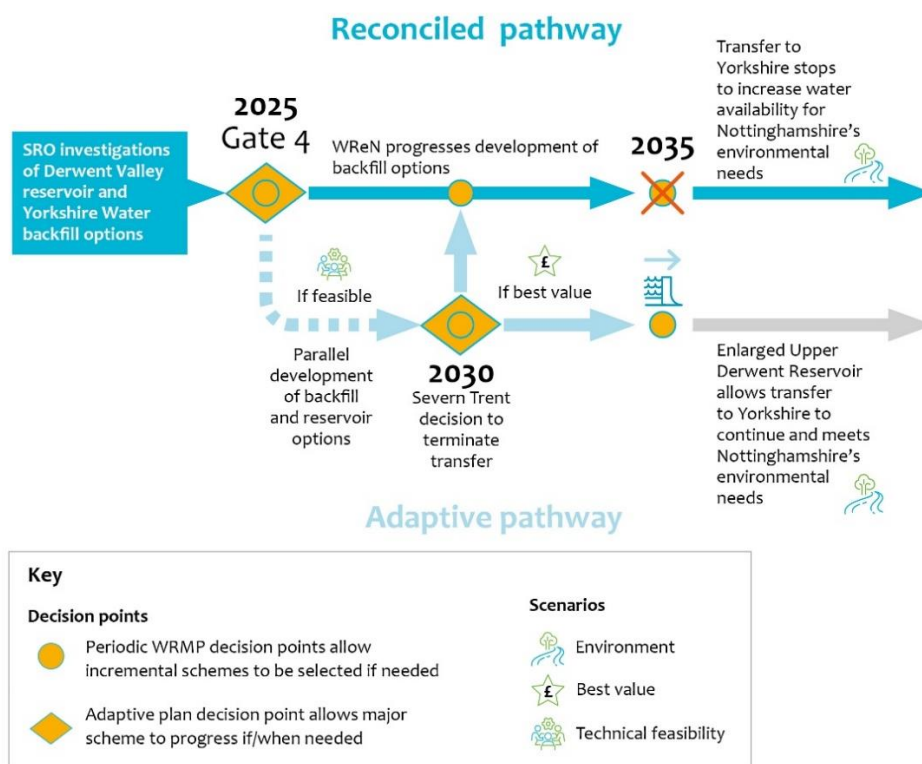
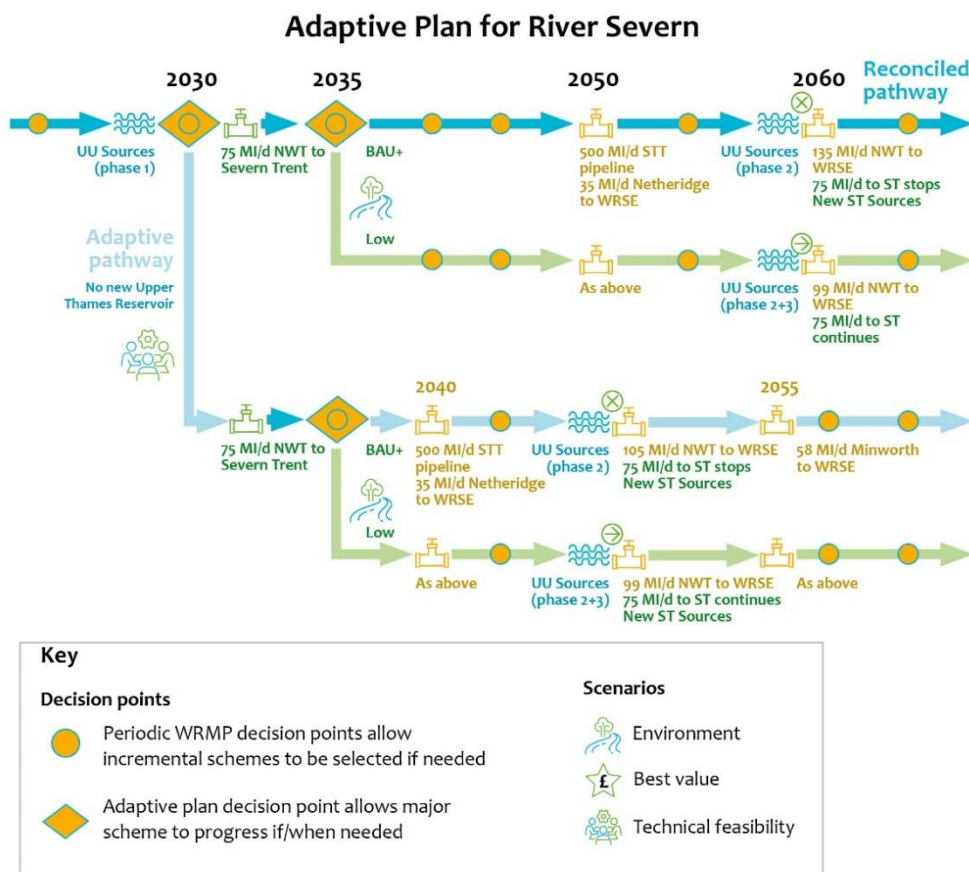


Figure 17. Adaptive plan for large options linked to the River Severn, including the Severn Thames transfer and North West Transfer.





We reviewed the range of scenarios to inform our regional adaptive plan development. The greatest uncertainties are in climate change, environmental destination and future water demand. For the regional plan we sought to identify any cross-regional trends or interdependences.

For Welsh Water and South Staffs the selected supply options remained the same. For Welsh Water, the SEWCUS options are selected early in the planning horizon and even the date of selection of the options does not change. For South Staffs, while it is the same options that are required when greater deficits arise, they would be needed earlier than in the preferred plan. The timing varies across scenarios, however the adaption remains the same. The companies will monitor climate change, water demand and potential abstraction licence change and accelerate the development of options if necessary. This will be picked up through annual reviews of their water resources management plans and the cyclical five-yearly updates to WRMPs and the regional plan. This is the same for United Utilities under the environmental destination scenario.

For United Utilities under the high climate change scenario, deficits appear early in the planning horizon. Rather than investing now to address this scenario, customers' interests are protected by the company's optimised plan to improve the temporary use ban level of service alongside preparing for water transfers. In the central forecast of climate change new supply options allow the level of service to improve from 1 in 20 to 1 in 40 by 2031. Under the high climate change scenario those same options would protect against the climate impacts and allow the existing 1 in 20 level of service to be maintained. Subsequent improvement to 1 in 40 level of service would then be considered in future planning rounds.

For United Utilities under scenarios where water labelling isn't introduced or demand management measures are ineffective, additional surface water and groundwater options would be needed. Under the common demand sensitivity scenario we have used for regional planning this would result in an addition £100m of supply side investment for the 2050's onwards. However the actual need would vary according to the demand variation which will be monitored by the company and reflected in future planning rounds.

For Severn Trent, beyond the adaptations linked to strategic options on the Severn and Derwent Valley, other elements of adaptive plan relate to climate change and environmental destination. The decision point for the transition to alternative pathways is linked to the next planning round in 2028 / 2029. Both the high environmental destination scenario, linked to enhanced protection, and the high climate change scenario require more supply side deployable output coming on-line from 2035 onwards. This would be provided by a mixture of surface water and groundwater options and would mostly be an acceleration of preferred plan options. For example, Derwent Valley reservoir raising could be accelerated to the 2035-40 period.

7.4.2 Post-reconciliation changes

The inter-regional reconciliation was designed to select the transfer schemes in sufficient time for all companies and regions to incorporate them into their plans. The plan shown above and all the technical analysis in this plan is based on the reconciled position. However as this plan, and the associated WRMPs were being finalised a number of changes were identified.

The changes requested by Water Resources South East are:

- Minworth and Grand Union Canal. Change from 100 MI/d in 2031, to 50 MI/d in 2031 and increasing to 100 MI/d in 2040.
- North West transfer: Vyrnwy via STT. Change from 135 MI/d in 2060, to Vyrnwy 25 MI/d in 2054, increasing to 60 MI/d in 2054, increasing to a total of 105 MI/d in 2060.
- Minworth via STT 115 MI/d to be included in the plan in 2060. In reconciliation this was only included in an adaptive pathway.



The changes requested by Severn Trent are:

- North West transfer: Vyrnwy raw water. Change from 75 Ml/d in 2031 to 25 Ml/d in 2031, with an adaptive pathway that increases this to 75 Ml/d in 2050.

The Severn Trent requested change has been included in the planning tables only for the affected Severn Trent zones and in its draft WRMP. Due to insufficient time to implement these late changes, they have not been included elsewhere in the regional plan. United Utilities has reflected the change in an adaptive pathway in its draft WRMP.

In a strategic sense, these late changes are relatively minor and reflected in the range of potential changes in the adaptive plan over the long term. The same schemes are selected and the same transfers are involved, but there are some changes to the dates and volumes of water. All the schemes have been assessed for their environmental impacts. We can therefore fully incorporate these changes for the final plan, alongside consultation feedback and updated schemes assessments developed through the gated process.

7.5 Best value plan performance

Through our best-value planning approach we can demonstrate the performance of the emerging regional plan against the metrics discussed in Section 5.5.2. This therefore indicates the value the plan provides and gives an indication of how well the plan supports the achievement of the ambitions and outcomes.

7.5.1 Overall plan performance for Water Resources West

Firstly we look at the combined plan for public water supplies, with the costs and benefits of all the options selected. We can place an order-of-magnitude indicative estimate of the value created by the plan looking at the benefits and disbenefits of what is proposed.

The largest benefits of the plan arise from providing public water supplies that are resilient to drought, and by reducing abstraction to improve the environment. Another large benefit is the economic gain from water transfers, which is discussed further below.

The largest disbenefits are the costs to deliver the demand reductions and new supplies, and the carbon impact of these interventions. Carbon is more prominent in the Water Resources West analysis than a standard economic appraisal because our customers put almost twice the value on carbon reduction than in government published carbon prices. This incentivises the selection of lower carbon options. The resulting net carbon impact is then being factored into companies plans to achieve net zero⁵⁵, and will be offset for example by green energy and reducing wastewater process emissions.

⁵⁵ The whole water sector in England has made a commitment via Water UK to achieve net zero carbon emissions by 2030. Welsh Water and Hafren Dyfrdwy plan to achieve net zero by 2040 and 2035 respectively.



Other benefits and disbenefits are estimated using our plan metrics, following our ValueStream approach. Some metrics represent benefits, i.e. they create value. Other metrics represent negative effects or disbenefits which remove value. The metrics are explained and mapped to our plan outcomes in Table 6. Weightings allow monetised and non-monetised metrics to be compared to each other (Figure 11). In doing so this inevitably assigns implicit value to the non-monetised metrics. Water Resources West's approach allows this to be presented transparently so that stakeholders can understand the implied value even where direct monetisation may not be appropriate.

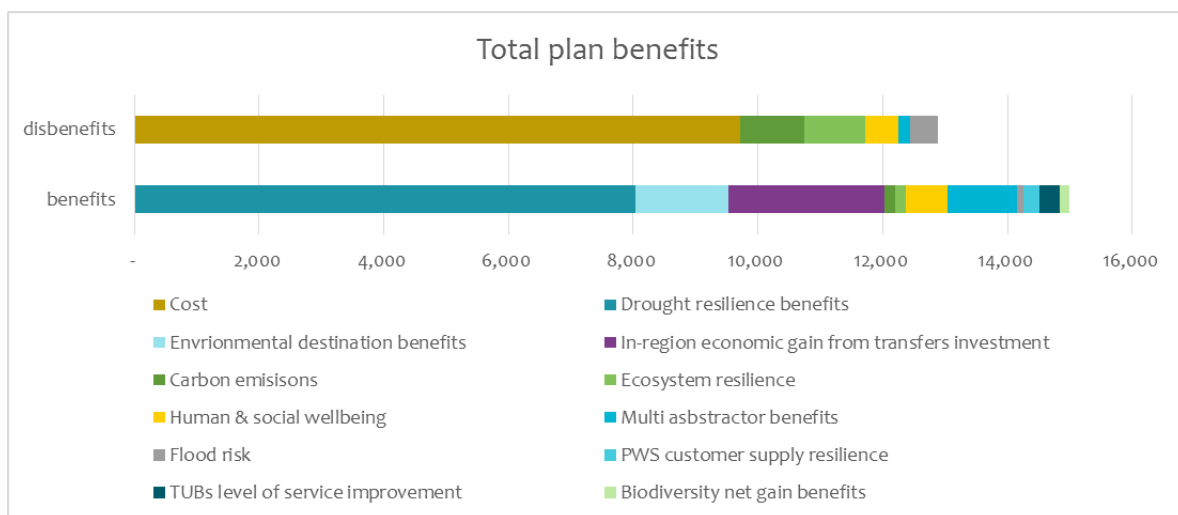
Biodiversity net gain benefits are also shown. In monetary terms these are relatively small due to the limited negative impact our plan has on biodiversity. Net gain was excluded from the optimisation to avoid the perverse effect of selecting more damaging schemes to generate a net gain. Nevertheless this represents an important enhancement to biodiversity in the region once the net gain is included. Further details of our biodiversity net gain assessment see Appendix N.

The overall plan benefits and disbenefits are shown in Figure 18 below. The plan includes both types of effect and the overall value is the net impact of both. Overall, as can be seen, the benefits at a regional level are expected to be greater than the disbenefits. Indicatively, the net benefit is greater than £2bn.

Biodiversity net gain

This is an approach that identifies any adverse impact of water resources options on biodiversity. These are quantified in terms of "biodiversity units". After seeking to minimise any loss of biodiversity units, any residual losses are replaced. The replacement habitat is sized to be 10% greater than the loss. This results in an overall net gain in biodiversity.

Figure 18. Total benefits and disbenefits of the public water supply elements of the plan, £m 80 year net present value (NPV).



7.5.2 Impact of water transfers on plan performance

We can also focus in on the difference that water transfers make on our plan. We will look at the relative impact on the plan performance metrics, and then estimate the value of including the inter-regional transfers.

In relative performance across the metrics, we look at how each metric performs on a normalised scale. This approach was developed with the other regions to allow better comparison between

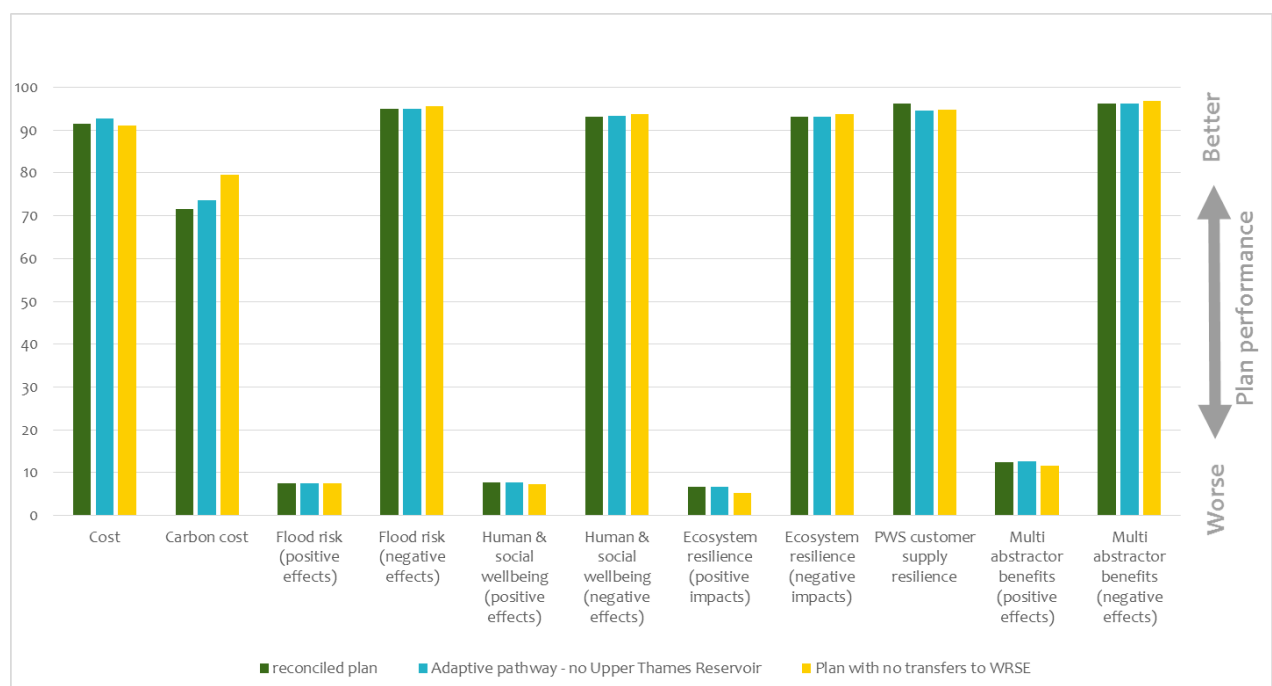


different approaches. In this approach a score of 100 represents the best possible performance for the metric, in a hypothetical plan that was focussed on delivering performance in that metric alone. Similarly, a score of zero represents the worst possible performance for the metric, in a hypothetical plan that was focussed on not delivering performance in that metric alone. This comparison is shown in Figure 19 below.

A number of features are apparent in Figure 19. The general pattern is that the plan shows relatively good performance in avoiding adverse effects (i.e. scores for the negative effect metrics are close to 100). It also shows that there are some beneficial effects, since the scores for most positive effect metrics are not zero. More pertinent to this section is the relative change in plan performance once the inter-regional transfers are included in the plan. This shows that there is limited overall change in performance, i.e. the support options for transfers are not significantly affecting plan performance within the range of possible plans. Generally, there is a small reduction in the performance of the negative effects metrics and a small improvement in the performance of the positive effects metrics. This reflects that more options are needed to be selected to support transfers, which brings the potential for more effects both positive and negative.

The cost performance with the transfers is better (a higher bar in in Figure 19) due to cost recovery from the other regions. This is even better when the transfers are selected earlier. The carbon costs show the most notable change. Although most of the water transfer operates by gravity down the River Severn there is some significant pumping involved. These carbon impacts have been included in Water Resources South East's assessment of the options to meet those needs, including comparison of the carbon impact of other options and this has still resulted in the selection of the transfer option for them. Carbon emissions have a non-local impact and the impact on climate change is the same whether the emissions occur in Water Resources West's area or Water Resources South East's area. Carbon emissions for operating pumps can be offset by the switch to green electricity in line with the UK electricity sectors' plans for net zero.

Figure 19. Normalised best plan performance, showing the change in plan performance once transfers to other regions have been included. A higher bar always represents better performance.





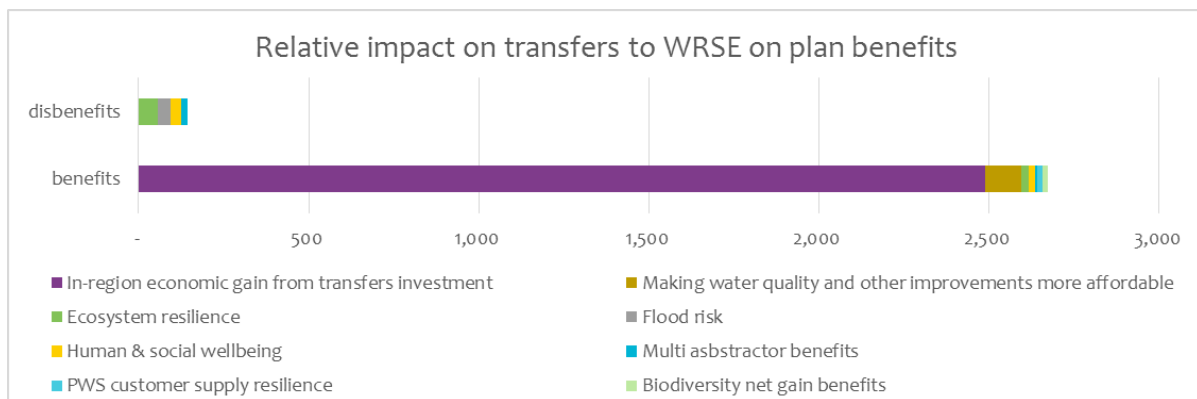
Looking now at the monetised benefits and disbenefits, Figure 20 below effectively shows a “zoomed-in” version of Figure 18 above. This highlights the net benefits and disbenefits arising from the inclusion of the transfers to Water Resources South East in the reconciled plan.

The largest benefit of the transfers is the in-region economic gain arising from the transfers. This is a significant contribution to “levelling-up” of over £2bn. The gain to the Water Resources West region is the infrastructure investment in the region paid for by consumers outside the region. This investment will create revenue for businesses in our region and jobs within the region. This will result in additional spending within the region by those businesses and employees. The additional money in the region will ripple through the local economy, causing a bigger overall economic benefit than the direct investment. We have made a conservative estimate of a 1.5x multiplier to estimate this effect.

The second largest effect arises due to the additional revenue that would flow to water companies within the region, above the direct cost recovery needed for the infrastructure investment. This is a proportional contribution to all the other costs of running the water company, and would offset other pressures on the water bills for customers in region. In doing so it makes water quality and other improvements more affordable for them. Affordability is an important consideration for Water Resources West companies, which have a higher proportion of customers facing water poverty than South East companies.

The other effects, linked to the plan metrics as discussed above, are proportionately much smaller. They are linked to the effects of implementing the water resources options to deliver the transfer.

Figure 20. Relative impact of the transfers to Water Resources South East on the plan benefits, £m 80 year NPV.



Because the benefits and dis-benefits shown in Figure 20 are related to supply options, they will largely accrue in the areas where those options to support the transfers will be located. The main areas include the North West, Shropshire, Gloucestershire and the West Midlands. Although some water for the transfer will come from Vyrnwy in Powys, the proposed transfer does not affect the volume taken from Vyrnwy. Instead, it diverts water that would go to the North West to go south instead. Impacts in Powys are therefore very limited. The bigger impacts are in the North West where new sources and treatment are needed to offset their loss of access to this water.

Overall, we can conclude that the plan offers a range of benefits. Further information on these assessments is provided in Appendix O.



7.5.3 Environmental assessments

Environmental assessment reports for the plan are provided in Appendices K, L, M and N. In summary, SEA has been assessed as posing a low risk across Severn Trent, South Staffs, United Utilities and Welsh Water component draft WRMPs. Hafren Dyfrdwy requires no options and therefore, has been screened out of requiring environmental assessment.

For HRA, South Staffs, United Utilities, and Welsh Water provisionally no adverse effects, alone or in combination, on internationally designated biodiversity features, sites or assets has been identified (noting that conclusions remain interim reflecting current information and the draft nature of the plan). The exception is Severn Trent.

For Severn Trent, the HRA has highlighted that a HRA Stage 2 Appropriate Assessment is required for 23 individual options, covering 18 from the preferred plan and five alternative plan options. Additional in-combination assessment of options may also be required. The HRA Stage 2 Appropriate Assessments are being progressed and the outcomes are not yet confirmed.

For WFD, both South Staffs' and Welsh Water's dWRMP24's are considered low risk.

The initial findings from our WFD assessment have highlighted risks around seven Severn Trent supply options and seven United Utilities supply options. Some of these assessments are on a precautionary basis linked to the availability of Abstraction Licensing Strategy (ALS) information at this stage. We will continue to explore these potential impacts and whether additional mitigation measures may need to be built into option design.

The current WFD assessment is without consideration of additional mitigation not currently in the scheme design that could make the scheme WFD compliant. As such, highlighting risks at stage this is not a definitive statement of WFD non-compliance. The risk of WFD non-compliance at final plan stage is low, anticipating likely outcomes of further work and mitigation and that United Utilities has other feasible options available to support the transfers.

7.6 Costs to deliver the regional plan

The regional plan includes significant investment to provide resilient and sustainable water resources for public water supplies. Expressed as an 80 year net present cost, it equates to £9.7bn for the water companies in the region. This is equivalent to investing £363m every year over that period. Approximately 70% of the cost is related to demand management, and 30% related to supply options (excluding transfers and their supporting options). The costs for the transfers and their supporting options are recovered from the receiving company outside the region.

These £9.7bn costs will be met through water company investment, which would then be reflected into the prices they charge customers. This is subject to regulation by Ofwat, which sets a limit on the prices that the companies can charge. Prices are set at a company level and the impacts of this plan are not evenly spread over the Water Resources West region. The scale of the investment needed to meet the environmental destination is much greater for companies in the midlands. The companies have reported the following impacts on their average household bills in their draft WRMPs:

- Hafren Dyfrdwy is not reporting bill impacts in its WRMP
- Severn Trent: annual household bill will be £43 higher by 2050
- South Staffs: annual household bill will be £13.40 higher by 2030⁵⁶

⁵⁶ South Staffs Water also supplies customers in Cambridge, which is outside the Water Resources West region, but whose water resources investment requirements is included in the bill impact.



- United Utilities: annual household bill will £16.59 higher by 2030
- Welsh Water is not reporting bill impacts in its WRMP

These bill impacts are related to water resources investment only, and assume everything else remains the same. In practice, there are many other pressures on the water bills and also offsetting efficiencies. These will be considered by the companies as part of their price review with Ofwat. The resulting bills could be higher or lower than they are today depending how the different factors play out for each company.

7.7 Sensitivity analysis impact on option selection

The purpose of sensitivity testing is to show how the plan might change under different circumstances. Stress testing our regional plan is recommended for two reasons:

- To give confidence – how do changing assumptions in the forecasts of each region affect the selection of options?
- To support the consultation – by providing information about how plans might vary, to gather broader feedback on the implications of the strategic choices we will need to make

The agreed approach between the regions was to use the five scenarios introduced in Section 5.5.3. These tests allowed us to understand whether these scenarios may give rise to different scheme choices or if the choice is stable. The stress tests also helped inform the development of the adaptive plan.

Results of the sensitivity tests are shown in Table 14. For the Welsh companies and South Staffs Water, there are no changes to the preferred plan, demonstrating that planned demand reductions are sufficient to accommodate a range of stresses in the long term. For the English companies, whose supply demand positions are affected by abstraction licence changes, there is less capacity to absorb these stresses. In a number of scenarios, the same options are required as in the preferred plan, but the timing of selection changes. In the more stretching scenarios, more supply options may be required. However, in United Utilities' case an alternative response may be to retain the current 1 in 20 level of service for TUBS, rather than improve to 1 in 40. This would then not require the additional supply option. The demand sensitivity is discussed further below.



Table 14. Stress-test scenarios used to test regional plans. For Welsh Water and South Staffs the options selection remains as per the preferred plan for all scenarios. For Hafren Dyfrdwy and South Staffs, no supply options are selected in any of the scenarios.

Scenario	Summary of options selected in each scenario relative to the preferred plan		Best value score £m (lower is better)
	Severn Trent	United Utilities	
Compound low	Less options required under this scenario. Changes to the timing of selection for three imports of water from United Utilities, one reservoir capacity increase and two infrastructure enhancement options.	Same options selected. Changes to the timing of selection for three groundwater options.	1,305
Low ED	Reduced selection of options compared to preferred plan and changes to the timing of selection for several options.	No difference to preferred plan	4,505
Baseline	No difference to preferred plan	No difference to preferred plan	4,358
High ED	Additional deployable output needed from 2035 onwards. This would be provided by a mixture of surface water and groundwater options and would mostly be an acceleration of preferred plan options.	No difference to preferred plan	5,368
Compound high	Additional deployable output needed from 2035 onwards. This would be provided by a mixture of surface water and groundwater options.	Additional options required in the plan from 2030 to 2078: four groundwater enhancement options, a licence trading option, two reservoir enlargement options, a water reuse option and a new surface water option. Changes to the timing of selection of a new surface water abstraction already in the plan.	8,285



Demand sensitivity	<p>Additional deployable output needed from 2035 onwards. This would be provided by a mixture of surface water and groundwater options and would mostly be an acceleration of preferred plan options.</p>	<p>Additional options required in the plan from 2031 to 2080: a new surface water option, three reservoir enlargement options, an effluent reuse option, a licence trading option, two groundwater enhancement options. Changes to the timing of selection for two groundwater enhancement options already in the preferred plan.</p>	5,941
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7.7.1 Risks and consequences of not achieving demand reductions

Demand reductions are an important element of this plan, but they do carry risks as they rely on action by a number of different parties. The water companies have an important role to play in supporting their customers to save water, with metering, advice etc. Government action is needed, in a coordinated way across the UK, to introduce water labelling. National and local governments also need to act on building standards for water efficient homes. Developers and product manufacturers need to act to meet the new standards. Most importantly, consumer behaviour needs to change so that efficient water use becomes the norm. Many properties already use 110 l/p/d or less, but many more need to do so in the future to achieve the targets.

The introduction of mandatory water efficiency labelling for new appliances by government is a critical part of the plan to reduce consumption. In a Ministerial Statement made on 1 July 2021 the Government announced that it will make regulations to introduce a mandatory water efficiency label to inform consumers and encourage the purchase of more water efficient products for both domestic and business use. Water policy is a devolved matter, however we understand that with product standards a UK wide approach would be more efficient for manufacturers and retailers, and that therefore the Welsh government is working with Defra on this policy area. Without this government action and consequential action by manufacturers, retailers and consumers, the demand reductions to 110 l/p/d that this plan relies on cannot be achieved.

We estimate that without this government action, per capita consumption could only reach 118 l/p/d. This would leave a gap of over 140 Ml/d across the region compared to the 110 l/p/d target by 2050. Nevertheless, we could be more than two thirds of the way towards the target if water company action alone was successful in influencing consumer behaviour.

The ability of company action to influence consumer behaviour is also uncertain. For example, hotter drier summers might result in more outdoor water use, exacerbated by ever larger paddling pools, hot tubs etc. Or consumers may not be willing to buy more water efficient appliances. We have therefore tested a scenario where, through any combination of reasons, demand reduces only to the extent equivalent of half-way to the 110 l/p/d target. This scenario was used consistently by all regions through reconciliation and still represents a considerable reduction in demand compared to today's consumption levels.

The scenario test leaves a gap of over 230 Ml/d across the region compared to the 110 l/p/d target by 2050. This would require the development of a number of additional supply side options across the region. It would include more reservoir capacity raising, in the North West as well as the Midlands, more river abstractions, groundwater and effluent re-use.

The additional cost of the supply options needed in this demand scenario is over £1bn. There would also be a corresponding impact on the other plan metrics, valued at over £500m additional net disbenefit to customers. The largest component of this additional disbenefit is additional carbon emissions.



8. NEXT STEPS

8.1 Towards WRMP24

The information presented in this document and in our supply demand tables is reflective of the best available data we had in the run up to the draft plan publication. As we move forward, the feedback we receive as part of our draft plan consultation will be important in influencing any changes we will make ahead of the final regional plan submission. In light of the dry weather event experienced across the UK in 2022, we will seek to apply any lessons learned from this experience to our approach to the final regional plan and future work. We will continue following our established approach to align our regional plan to the water company level WRMP24, ensuring the information presented in both plans is consistent.

8.2 England

As seen in Section 4.2, the English area of our region faces substantial deficits that need to be resolved, as we need to reduce abstractions to prevent WFD deterioration and meet our legal obligations. Most of the solutions we proposed to cover the deficit we face are options to reduce demand and improve the capacity and efficiency of existing infrastructure. We have purposely avoided taking more water from the environment wherever possible and have discarded any unsustainable options. This is in line with the feedback we received from stakeholders and customers. We are confident that the solutions we have chosen as part of our preferred plans are sustainable even if resource needs become greater in the future.

We have also worked hard on our environmental destination in collaboration with regulators and shaped this based on the feedback we received in our January 2022 emerging plan informal consultation. We are continuing our efforts in this area, recognising that there is a lot of uncertainty in the National Framework data that we must seek to minimise via the extensive investigations described in Section 6.1.1. This is important as we need to have the right information to make choices on where and what we implement. We will then need to go through a collaborative option development programme; this will be promoted by water companies in the Water Resources West region to stakeholders in catchments with significant PWS reductions forecast. This is a crucial aspect, as any options we propose will need stakeholder buy in.

There is overlap between the environmental destination driven abstraction reductions and the needs of the non-PWS sector. Some of the solutions required to achieve our environmental destination vision may bring disbenefits to current farming practices for example, (e.g. if groundwater levels recover and wet / flood the land making it unsuitable for current practices). Therefore, we will take steps to identify options that are likely to influence other stakeholders and will engage with them to instigate collaborative decision making. We will also advocate for parallel planning and implementation of business adaptation / alternative funding streams to ensure a positive outcome for both stakeholders and the environment.

8.3 Wales

As seen in Section 4.2, Welsh Water has a relatively small deficit in their SEWCUS area arising early in the planning period and therefore they have selected two supply and two demand options to reconcile this deficit and enhance resilience. On the other hand, Hafren Dyfrdwy has no deficits even in the absence of demand policy reductions and thus, have not put forward any supply options. Consequently, since the many of the direct benefits and disbenefits in the plan



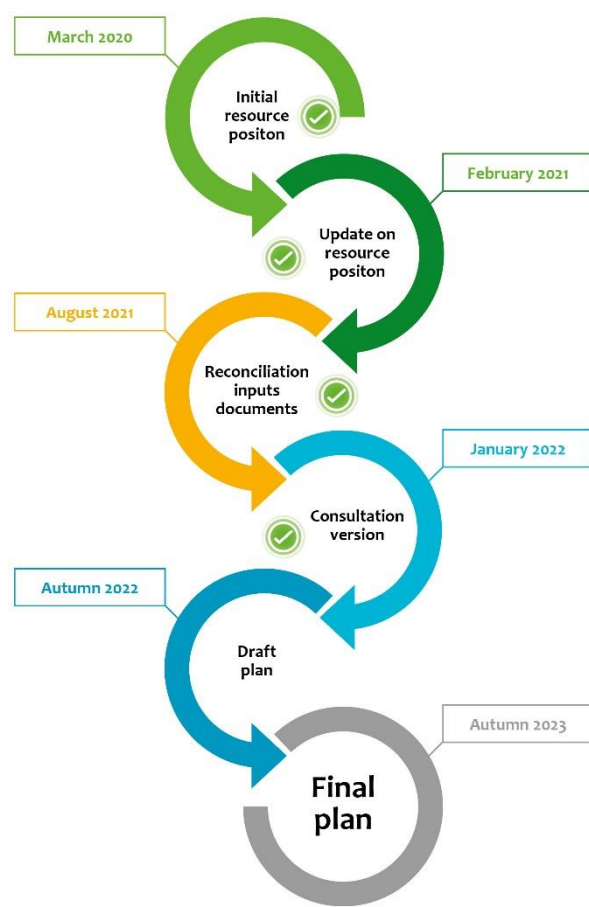
are a function of the number and type of supply options each company puts forward, there is a more limited impact on the Welsh areas of our region. Nevertheless, we have identified the upper reaches of the River Severn as a priority area as it supports regional significant abstractions for both PWS and non-PWS abstractors and is the location for a number of Strategic Resource Options. The Upper Severn Catchment is also upstream of a European designated SAC and enhancement of functionally linked habitats will benefit our region. We will work with stakeholders, including the River Severn Partnership to promote catchment resilience solutions in this area.

We hope to gain some useful insights from customers and stakeholders to further shape our work in this area through the WRMP consultations led by Welsh Water and Hafren Dyfrdwy.

8.4 Feedback and support required

This draft plan is being published for consultation alongside the water companies' WRMPs. We are seeking feedback from all stakeholders to help shape the development of our regional plan. The following areas of feedback and engagement will be particularly helpful:

1. Feedback on our updated tables containing information for transfers, environmental destination, adaptive plan and non-public water supply
2. Further views on the strategic choices we have made in developing this plan.
3. Feedback on our Environmental Destination
4. Views on the options and their environmental assessments, highlighting any options of particular concern with regards to the options included in our draft plan.
5. Feedback on the selection of water transfers.
6. Views on how our plan can further develop to meet the needs of other abstracting sectors



We will ensure that any feedback received on the regional plan consultation is shared with water companies so they can take it into account in revising their WRMPs following the WRMP consultation. Similarly in developing our final regional plan, we will take into account views shared with water companies through their WRMP consultation and any subsequent changes to public water supply needs or options.

Furthermore, as discussed with regulators, we have compiled a list in Table 15, which summarises the support we need from regulators to deliver our environmental destination and support non-PWS sectors with information on abstraction reduction that would impact them.

Figure 21. Next steps in the regional planning process



Table 15. Regulatory support needed to deliver our multi-sector regional planning.


Action	Who	When
Investigations to determine non-PWS licence reductions required to meet 2050 EFI for Environmental Destination. Water companies will be undertaking investigations in AMP8 (2025-2030) to determine the impact of their abstractions upon predicted flows in 2050 and the ecology they support. We estimate that a further 1,500 non-PWS licences will need to be assessed in a similar way. We recognise that many abstractors will not have the capability to undertake such investigations.	Non-PWS abstractors Environment Agency	By 2030 to match water company investigations
Assessment of no-deterioration risk for non-PWS abstractions in the Water Resources West area. Water companies are assessing their abstraction licences to ensure that they pose no risk of (WFD) class deterioration and licence capping will be implemented where necessary. We estimate that there are a further 14,725 non-PWS abstraction licences that need to be assessed.	Environment Agency and Natural Resources Wales	By 2030 to match assessment of PWS licences and minimise risk to the environment
Implementation of PWS and non-PWS licence reductions to address co-dependency. To achieve the Environmental Destination licence reductions for PWS and non-PWS abstractions should be implemented simultaneously in any given water body. Environment Agency will need to calculate and impose licence reductions for up to 1,500 non-PWS licences by 2049.	Environment Agency	By 2049 to achieve Environmental Destination
Review of zero recent actual licences. We have identified 466 Ml/d of licence capacity (2661 licences) that was unused in the period 2010-2015 (England) and 2015-2019 (Wales) across the Water Resources West region. This is licence capacity that could be surrendered by abstractors or revoked by NRW/EA for the benefit of the environment. A detailed joint review is required to establish which licences are reasonably held for contingency purposes and which could be surrendered or revoked.	Water Resources West Water Companies Non-PWS abstractors Environment Agency Natural Resources Wales.	By 2030 to match actions for PWS licences and minimise risk to the environment
Research into 2050 EFI and production of an investigation methodology. The 2050 EFI is predicated on UKCP09 climate change projections and may need to be updated to ensure the projections are robust. In addition, investigations of PWS and non-PWS abstractions to ensure that the environment has sufficient flow to support ecology in 2050 will be expensive. To make the process efficient for regulators and even-handed for their customers a national methodology/template should be produced that can be used by all.	Water Resources West Water Companies Non-PWS abstractors Environment Agency	By 2025 to support AMP8 investigations by water companies and non-PWS abstractors



GLOSSARY

Term	Definition
Adaptive plan	An adaptive plan is one which responds to future uncertainties by setting out a sequence of manageable steps or decision-points over time. At each decision-point the plan could follow two or more different <i>pathways</i> . Each pathway would specify the options needed and implementation dates to meet the objectives in a particular future state. The full range of pathways in an adaptive plan can then be shown to allow stakeholders to understand how different options could be needed in the future.
Adaptive pathway	Adaptive pathways indicate how the plan would change in certain circumstances within an adaptive plan. Each pathway is a portfolio of options with a schedule of dates by which each option in the portfolio will be implemented.
Asset Management Period (AMP)	A five year management period carried out across water companies which considers asset management.
Catchment Based Approach (CaBA)	CaBA embeds collaborative working at a river catchment scale, delivering a range of environmental, social and economic benefits and protecting our precious water environments for the benefit of us all.
Catchment Plan (CP)	A catchment plan identifies the main issues within a catchment and prioritises work which will improve the catchment as a whole. This puts the catchment in a better position to achieve Water Framework Directive (WFD) targets, as well as other environmental and social goals.
Constrained options	The list of options remaining after all three stages of screening: <i>high-level screening</i> , <i>secondary screening</i> and <i>detailed screening</i> . These options are suitable candidates for selection and are part of the preferred plan or alternative plans.
Detailed screening	A process in which if, during more detailed consideration of the <i>revised feasible options</i> , constraints that make an option unsuitable for promotion are identified, then that option is removed from the list. The outcome of detailed screening is the list of <i>constrained options</i> .
Environmental Destination	Describes how you will achieve and maintain sustainable abstraction to 2050 (and beyond), considering climate change impacts and future demand. In England, environmental destination is realised via abstraction reductions based on National Framework scenarios. In Wales, environmental destination work is delivered across several plans and not based on the aforementioned scenarios.
Environment Agency (EA)	The EA is a non-departmental public body, sponsored by the United Kingdom's Department for Environment, Food and Rural Affairs, with responsibilities relating to the protection and enhancement of the environment in England. It is the competent authority for producing and updating River Basin Management Plans in England. It is the environmental regulator for water resources plans in England.
Extreme drought resilience standard	This standard is termed the '1:500 years' drought standard and baselining our forecasts to this standard enables us to achieve resilience to extreme drought events that have a 0.2% probability of occurring in any given year.
Feasible options	A set of options that are suitable to assess for inclusion in the preferred plan. Feasible options are identified from a longer list of <i>unconstrained options</i> by a process of <i>high-level screening</i> to remove options with unalterable constraints that make them unsuitable for promotion.
High-level screening	The process where unconstrained options are filtered using a set of screening criteria. Any options with unalterable constraints that make them unsuitable for promotion are identified and removed from the list. Defined screening criteria are used to ensure options are screened consistently. The output of high-level screening is the set of feasible options.



Level of service	The frequency at which specified actions would need to be taken to help maintain water supply during dry weather events.	
l/p/d	Abbreviation for litres per person per day, used to express personal water consumption.	
MI/d	One million litres per day. A million litres is also called a megalitre. This about the same volume as five average terraced houses. It's a bit less than an acre filled to the depth of one foot.	
Multi-criteria analysis (MCA)	Multi-criteria analysis is a structured approach to determine overall preferences among alternative options, where the options accomplish several objectives. It can also be used to explicitly explore the trade-offs between different candidate plans to inform the selection of preferred or <i>alternative plans</i> .	
National Environment Programme (NEP)	The NEP outlines the improvements which water companies operating in Wales need to make to comply with new or amended environmental legislation and identifies investigations needed to inform, in an evidence led way, potential investment requirements in subsequent planning periods.	
National Framework	The Environment Agency's National Framework for Water Resources sets out the indicative scale of challenge for water resources in England over the next generation.	
Natural Resources Wales (NRW)	Natural Resources Wales (Welsh: Cyfoeth Naturiol Cymru) is a Welsh Government sponsored body and the environmental regulator for Wales. The General purpose of Natural Resources Wales is pursue sustainable management of natural resources in relation to Wales, and apply the principles of sustainable management of natural resources, in the exercise of its functions, so far as consistent with their proper exercise.	
Net Present Value (NPV)	NPV accounts for the time value of money. It provides a method for evaluating and comparing capital projects or financial products with cash flows spread over time, as in loans, investments, payouts from insurance contracts plus many other applications.	
Non-Household Demand (NHH)	Demands which originate from non-domestic properties. For example offices, factories or retail units.	
Non-public water supply (non-PWS)	Non-PWS is any water supply that is not provided by a water company, i.e. not a "mains" supply.	
Ofwat	The Water Services Regulation Authority, or Ofwat, is the body responsible for economic regulation of the privatised water and sewerage industry in England and Wales.	
Planning assumptions	Used to structure each supply-demand balance. This may include for example, population growth, per capita consumption, leakage, economic growth, industrial and agricultural demand trends (which will be defined by the "demand" methodology). It will also include environmental improvements (e.g. sustainability changes to abstraction licences or other improvements related to the sustainability of abstraction, defined in the "environmental destination" methodology) and climate change (which will be defined in the "supply" methodology).	
Preferred options	The set of water resources options included in the <i>preferred plan</i> .	
Preferred Plan	Comprises a set of options and a schedule of dates for implementing these options. These options have been selected through the planning process and evidence provided as to why they perform better against the objectives of the plan. Sometimes also referred to as the preferred programme of options.	
Regulators' Alliance for Progressing Infrastructure	Formed to help accelerate the development of new water infrastructure and design future regulatory frameworks.	



Development (RAPID)	
Regional plan	A long-term multi-sector adaptive water resource plan.
Representative Concentration Pathway (RCP)	A RCP is a greenhouse gas concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC). Four pathways were used for climate modelling and research for the IPCC fifth Assessment Report in 2014. The pathways describe different climate futures, all of which are considered possible depending on the volume of greenhouse gases emitted in the years to come.
Revised feasible options	A subset of the <i>feasible options</i> which are considered in more detail through the decision-making process. The list of revised feasible options is generated by secondary screening.
River Basin Management Plan (RBMP)	These are plans that set out the environmental objectives for all the water bodies within the river basin district and a summary of the programme of measures that will be taken to achieve those objectives. The plans are based upon a detailed analysis of the pressures on the water bodies and an assessment of their impacts. The plans must be reviewed and updated every six years.
River Severn Partnership	The River Severn Partnership has partners spanning Mid Wales, Shropshire, Telford and Wrekin, Herefordshire, Worcestershire and Gloucestershire. The aim is to make the Severn Catchment Britain's most vibrant and resilient river network; where an exceptional quality of life, prosperous local economies and an outstanding natural environment is driven by a programme of innovation to reduce flood risk, secure future water resources and improve and deliver shared natural assets. To achieve this aim, the partnership will look to help people, businesses and the environment along the River Severn to be prepared for and resilient to the impacts of climate change, across an area which covers the Rivers Severn, Teme, Warwickshire Avon and Wye. Proposals to achieve this include options for flood risk management, improving water quality, environmental enhancement and developing an integrated approach to water resource storage and management.
Secondary Screening	A step following <i>high-level screening</i> to further reduce the number of <i>feasible options</i> being considered in detail through the decision making. Its purpose is to reduce complexity, resource requirements and computational burden without affecting the final plan. It therefore seeks to remove those options which would not in any case be selected as part of the best value plan, e.g. because of exceptionally high cost compared to other options. The output of secondary screening is the set of revised feasible options.
SEWCUS	The water resource zone which supplies Cardiff and other parts of South East Wales. SEWCUS stands for South East Wales Conjunctive Use System.
Strategic choices	Each strategic choice represents a significant decision to be taken in developing the plan. They might be company or zone specific or region wide.
Strategic Resource Options (SROs)	Large, strategic transfers of raw water being considered by companies and regional groups.
Supply demand balance (SDB)	Supply minus demand and target headroom. An annual average presented for each year of the planning horizon (2025-2085).
Sustainability change	A sustainability change is any change to a water company abstraction licence to protect (prevent deterioration) or improve the environment. The Environment Agency provides sustainability changes to the water companies via the Water Industry National Environment Programme (WINEP).
Target headroom (headroom)	Provides a quantified buffer to ensure that planned supplies are greater than expected demands within an acceptable risk appetite. This is based on statistical analysis of uncertainties.
Temporary Use Bans (TUBs)	Temporary use bans (historically known as hosepipe bans) are temporary restrictions that a water company can impose on customers in times of drought with regard to the use of hosepipes for activities such as filling a pool or watering a garden.



Water Resources Management Plan (WRMP)	WRMPs are developed and published by water companies. They set out how water companies intend to achieve a secure supply of water for their customers and a protected and enhanced environment. These plans are prepared every 5 years and reviewed annually. Supply and demand must be forecast over a statutory minimum period of 25 years. The two numbers following 'WRMP' indicate the year the plan is published.
Water Resource Zone	A water resource zone is the term used to describe the largest area of a water company's supply system where all customers have the same supply risk.
'What-if' scenarios	Used to test the preferred and alternative plans. They will be used to explore what would happen if one of these plans was adopted and the future was different to that assumed in the "central" planning assumptions. For example, what if population growth was higher than forecast or the impacts of climate change were more severe than forecast.
Water Industry National Environment Programme (WINEP)	WINEP represents a set of actions that the Environment Agency have requested all 20 water companies operating in England, to complete between 2020 and 2025, in order to contribute towards meeting their environmental obligations.



LIST OF APPENDICES

- Appendix A Policy and legislative framework for regional water resources planning and Regional Plan Expectations Checklist
- Appendix B Options and Screening Process
- Appendix C Strategic Resource Options and Transfers
- Appendix D Environmental Destination
- Appendix E Supply-Demand Balance Table Commentary & Forecast Assumptions
- Appendix F Regional Plan Customer Research
- Appendix G Stakeholder Engagement Report, including January 2022 consultation feedback summary
- Appendix H Supporting Planning Data Tables
- Appendix I Regional plan and WRMP alignment, governance and assurance
- Appendix J Non-public water supply sector projections
- Appendix K Water Resources West Draft Regional Plan: Strategic Environmental Assessment Environmental Report
- Appendix L Water Resources West Draft Regional Plan: Habitats Regulations Assessment Report
- Appendix M Water Resources West Draft Regional Plan: Water Framework Directive Regulations Compliance Assessment Report
- Appendix N Links to Natural Capital and Biodiversity Net Gain assessments
- Appendix O Best Value Planning