WRMP24 Main Technical Plan

Wessex Water

Final Plan
December 2024

Document revisions

Major version number	Details	Lead contact	Date
1	Final Review	Paul Saynor	01/10/2022
2	Final version issued for dWRMP24	Chris Hutton	03/10/2022
3	Revised draft plan for regulators	Chris Hutton	24/07/2023
4	Revised draft plan following Defra Letter on SoR	Chris Hutton	14/03/2024
5	Final published version	Chris Hutton	02/12/2024

Executive Summary

Safe and reliable water and wastewater services are essential for our day-to-day lives and wellbeing. There is a need to plan for the long-term, to adapt to a changing climate and reverse the degradation of the natural world, to protect the planet and the life it sustains. To meet these challenges, we have developed an ambitious long-term plan to deliver great customer services and enhance the environment for nature and people[1]. Within the context of our long-term plan, we have a legal duty to produce a Water Resources Management Plan every five years to set out what we plan to do to ensure a secure supply of water for our customers and to protect and enhance the environment for at least the next 25 years.

We consulted on the draft of this plan for 12 weeks between November 2022 and February 2023 and prepared a statement of response report documenting all the representations made by stakeholders and our responses to them and produced a revised draft final plan version. Our plan and statement of response were also updated in response to a letter received from Defra in December 2023 requesting further information in support of our statement of response and revised draft plan. We received permission to publish our plan as a final plan from Defra in September 2024.

Overview of this plan

Our previous Water Resources Management Plan, produced in 2019, forecasted a surplus of supplies over demand up to 2045. In the current 2020-25 period we are delivering a 15% leakage reduction alongside increasing the proportion of metered households and enhanced water efficiency activities, which contribute to our strategy for secure water supplies. For the development of WRMP24, there have been several step changes in the regulatory planning requirements (see table below). The combined potential impact of these new requirements means that, with no interventions, Wessex Water forecasts to have an overall planning deficit of over 130 Ml/d by 2079/80 under the dry year critical period scenario, with significant licence reductions in 2035.

Step changes in regulatory planning requirements for WRMP24

Requirement	Description
Drought resilience	We must improve resilience to even worst historic droughts, by moving from the current 1-in-200 drought events to 1-in-500 drought resilience by 2039, or 2050 at the latest.
Licence reductions	We must reduce abstraction where necessary from environmentally sensitive sources, particularly in our Chalk catchments by 2035, and not meet new growth in the Hampshire Avon catchment with increased abstraction.
Decision-making	Regulators require us to move away from least-cost planning to best-value planning. This considers least-cost solutions alongside other outcomes, including carbon emissions, natural capita, and biodiversity net gain.
Distribution Input	We should plan as a minimum to meet the industry's commitments to reduce the use of public water supply in England per head of population by 20% by 2038, a target set by Defra under the Environment Act 2021.

[1] Our strategic direction (wessexwater.co.uk)

Leakage	We should contribute to meet the industry's commitments to reduce leakage by 50% by 2050
Household demand	We should contribute to a national ambition on average per capita consumption of 110 litres/person/day by 2050

To address this forecast deficit, we have developed and screened a long list of options to both increase supply and to reduce demand. The screening process consisted of four key stages which moved from a high level of assessing criteria to carrying out in depth environmental and costing assessments. Options were identified at varying scales, from schemes that would assist localised areas of water stress, through to Strategic Resource Options in conjunction with our neighbouring companies within the West Country Water Resources Group. We have also liaised with other water companies at a national scale to recognise any opportunities which would be mutually beneficial to many regions.

We have considered 86 feasible options, made up of both demand side and supply side options. Given the scale of need, water re-use schemes and new reservoirs are among the supply options that have been considered to protect environmentally sensitive chalk river catchments and provide resilience to extreme droughts under climate change. On the demand side, options include various types of metering, further leakage reduction, water efficiency for households and non-households, and rainwater harvesting.

We have developed several scenarios around least cost and policy expectation pathways, and some alternative adaptive pathways at different points in the planning period. These plans have been tested under different future growth and demand scenarios to address the future predicted supply deficits. Optimum combinations of supply and demand options to meet forecasted deficits have been selected for each plan using a bespoke decision-making tool.

Our preferred plan provides best value to our customers and ensures continued protection and enhancement of the environment. Although our forecasts do not predict a step change in the supply demand balance deficit until 2035 under our central planning scenario, in order to ensure supply resilience in 2035 and beyond it is necessary to begin implementing enhanced demand reduction strategies and supply scheme investigations starting in 2025. This will improve our supply resilience in droughts, reducing the risk of supply interruptions or restrictions imposed on customers, and will help to ensure river flows and the wider environment are protected, most notably in the Hampshire Avon catchment.

Key features of our selected plan are:

- We are committing to continue protecting chalk streams, as part of the Environment Agency's Environmental Destination programmes, by substantially reducing further our abstraction licences by 2035.

To achieve these abstraction reductions to protect the environment, and continue to provide a drought resilient service to customers, we will:

- Rollout advanced metering infrastructure (AMI) smart meters to 95% of customers in our region by 2035, initially focusing in the Hampshire Avon catchment where the greatest environmental benefits will be delivered. For the majority of customers,

smart metering will be an upgrade of their existing basic meter. We will extend meter penetration through a continuation of our compulsory change of occupier metering policy. Customers that are currently unmeasured will have a smart meter installed followed by tailored and timely engagement to encourage them to make the switch to metered bills.
- Enhance our household and non-household water efficiency programmes underpinned by data and insight delivered by the smart metering roll out. Building on the successes of our current programmes we will engage with over 12,000 households and over 160 non-households a year from 2025-30. Our plans for engagement with non-households includes a collaboration with retailers.
- Promote the anticipated government water efficient labelling of appliances.
- Continue to reduce leakage levels from 2025 to meet the regulatory target of 50% reduction by 2050.
- Develop in 2025 a stream support option for two upper stour headwater catchments.
- By 2025, take forward several supply side schemes through design and development to be ready for potential delivery to meet licence reductions in 2035, depending on the outcome of future need and the needs of other users in the Hampshire Avon catchment.
- Given the scale of deficit in the long term, continue to investigate new regional strategic resource options, such as water recycling and/or a new reservoir in the Mendips, with South West Water as our main partner on the West Country Resources Group.

In combination the options included in our preferred plan will ensure we meet:
- The statutory water demand target to reduce the demand for water from public water supply per head of population in England by 20% by 2037/38 from the 2019/20 baseline.
- The long-term target to reduce average per capita water consumption to 110 l/p/d by 2050.
- The long-term target to reduce leakage by 50% by 2050.
- The long-term target to reduce non-household water use by 15% by 2050.

Contents

1. Introduction

The aim of a Water Resources Management Plan (WRMP) is to set out how water companies will maintain a balance between the demand for water and the supply of water whilst protecting the environment for at least 25 years.

Water companies have a statutory duty to prepare an updated Plan every five years. Plans are submitted to Defra and reviewed by our regulators, the Environment Agency and Ofwat, and are also subject to public consultation. The Plan is also a key component of our Business Plan for the regulatory price review as it identifies water resources investment needs.

The water resources planning process is based around a calculation of the balance between supply and demand in our supply area. Our demand forecast takes account of population growth, housing development, customer water use behaviour, industrial needs, and leakage. Our supply forecast includes an assessment of the impacts of climate change, infrastructure constraints and abstraction licence changes required to protect the environment and improve river flows.

A headroom allowance is included to allow for uncertainties in our forecasts, and we can then calculate whether enough water is available each year for at least the next 25 years. If deficits are forecast to occur at any time during this period, then it is necessary to appraise a range of options to either manage demand down or increase available supplies and select the most appropriate measure(s) to restore the balance.

If the system is forecast to be in surplus through the planning period, then no further action is required. Nonetheless we can choose to take forward new schemes to meet wider objectives related to government policy, customer preferences and/or environmental benefits.

1.1.1 Regulatory Framework and compliance with guidelines and directions

The legislation that sets out the requirement for water companies to prepare and maintain a Water Resources Management Plan is contained in Section 37 A to D of the Water Industry Act 1991, as amended by Section 62 of the Water Act 2003. The plan has been developed in accordance with this act.

This plan has been produced in accordance with the main Water Resources Planning Guidelines[2], as issues by the Environment Agency (Version 10 updated December 2021), which was produced in collaboration with Defra, The Welsh Government and Ofwat, and the following supplementary guidelines, and referenced reported therein:

- Water Resources Planning Guideline Supplementary Guidance – Adaptive Planning, External guidance: 18645, Published 02/09/2020

[2] Environment Agency, Ofwat, and Naturals Resources Wales (2021). Water Resources Planning Guidelines, Version 10 updated December 2021.

- Water Resources Planning Guideline Supplementary – Outage, External guidance: 18641, Published 18/03/2021
- Water Resources Planning Guideline Supplementary – Water resource zone integrity, External guidance: 18642, Published 18/03/2021
- Water Resources Planning Guideline Supplementary Guidance – 1 in 500, External guidance: 18646, Published 22/03/2021
- Water Resources Planning Guideline Supplementary Guidance – Environment and society in decision-making, External guidance: Version 2, Published 03/02/2022
- Water Resources Planning Guideline Supplementary – Preventing Deterioration, External guidance, Published 04/04/2022
- Water Resources Planning Guideline Supplementary Guidance – Leakage, External guidance: 18640, Published 22/09/2020
- Water Resources Planning Guideline Supplementary – Climate change, External guidance: 18647, Published 18/03/2021
- Water Resources Planning Guideline Supplementary – Stochastics, External guidance: 18644, Published 19/03/2021
- Environment Agency (2017) WRMP19 supplementary information – estimating the impacts of climate change on water supply
- Environment Agency – Long-term water resources environmental destination: guidance for regional groups and water companies
- UKWIR (2019) Methods – Risk Based Planning Report. Ref. No. 16/WR/02/11
- UKWIR (2019) Methods – Decision Making Process: Guidance
- UKWIR (2014) Handbook of source yield methodologies
- UKWIR (1995) Outage allowances for water resources planning
- UKWIR (2012) Water Resources Planning Tools 2012 (WR27), Deployable Output Report. Halcrow Group Ltd, ICS Consulting, Imperial College, and University of Exeter Centre for Water Systems.
- UKWIR (2014) Handbook of Source Yield Methodologies. Report Ref. No. 14/WR/27/7
- UKWIR (2016) WRMP19 methods – household consumption forecasting
- UKWIR (2016) Population, household property and occupancy forecasting
- UKWIR (2006) Peak water demand forecasting methodology

The plan has also been produced following Defra's Water Resources Management Plan (England) Direction 2022[3], and with reference to the Water Resources Planning Government Expectations 2022[4].

1.2 Engagement with customers, stakeholders, and regulators

1.2.1 Pre consultation

Pre-consultation of this Plan was undertaken between Summer 2021 and draft plan submission in October 2022. During this time, we engaged with regulators and other stakeholders to discuss the overall planning process, analysis methods, forecasting methods, initial outputs, and the key emerging issues for the Draft Plan.

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[3] Defra (2022). The Water Resources Management Plan (England) Direction.
[4] Defra (2022). Water Resources Planning Government Expectations.

On 6th May 2022 we started a five-week consultation, and wrote to our regulators, statutory consultees, and a wide range of stakeholder groups to inform them of our development of this plan and invited them to comment on any changes they would like to see to our existing plan or additional issues they would like us to consider in the development of the new draft plan. We also wrote to our neighbouring water companies to discuss the need and potential for bulk supply transfers, including those part of the West Country Water Resources Group to discuss common water resource issues and explore future opportunities to ensure the best use of resources both within our region and out of region by transfer to other companies. Further information is contained in the Pre-Consultation and Customer Research technical appendix.

1.2.2 Consultation Process

The draft plan was submitted to the Secretary of State (Defra) on 3 October 2022. Once given permission to publish, we then ran a public consultation for 12 weeks to 20th February 2023, which opportunity for representations from regulators, statutory consultees, and a wide range of stakeholder groups. As part of this public consultation, we also held an online webinar in January, where we presented the draft plan to stakeholders to help form their representations to the plan.

Overall we received 23 representations from 22 organisations listed here, and from one individual:

- Arqiva
- Batheaston Parish Council
- Bristol Avon Catchment Partnership
- Canal & River Trust (CaRT)
- The Consumer Council for Water (CCW)
- Dorset Campaign to Protect Rural England (CPRE)
- Environment Agency (EA)
- Everflow
- Historic England (HE)
- Market Operator Services Ltd (MOSL)
- National Trust (NT)
- Natural England (NE)
- National Farmers Union (NFU)
- Ofwat
- Somerset Wildlife Trust
- Test Valley Borough Council
- United Kingdom Water Retailer Council (UKWRC)
- Water Scan
- Water Wise
- Wild Fish
- Wiltshire County Council
- Wiltshire Fisheries Association Water Quality Panel (WFA)
- Yate Town Council

We submitted our Statement of Response to the plan, which responded to each representation received and how our plan has been updated to take account of stakeholder comments to regulators at the end of July 2023, alongside our full revised draft plan in August 2023.

In September 2024, the secretary of state provided permission to publish the plan as a final plan.

1.3 Regulatory Sign Off, Board Assurance and Security Sign Off

The Wessex Water Services Limited (WWSL) Board (the Board) confirms it is satisfied that:

- the Company has met its obligations in developing its water resources management plan (WRMP)
- the plan reflects any relevant regional plan, which has been developed in accordance with the national framework and relevant guidance and policy, or provides a clear justification for any differences
- the plan is a best value plan for managing and developing its water resources so it can continue to meet its obligations to supply water and protect the environment, and is based on sound and robust evidence including relating to costs

The supporting statement, which is published alongside this plan, details how the Board has engaged, overseen and scrutinised all stages of development of the Company's plan and the evidence it has considered in giving its assurance statement.

1.3.1 Security Sign Off

Alongside this final plan that has been submitted to the Secretary of State, we have also submitted a statement from our security manager that shows where information has been redacted or modified for reasons of national security. Where information has been redacted/modified from the online version of this plan, this text box will be included.

> For security reasons this section is redacted and not available in the version of this document published on our website.

1.4 WRMP24 Plan Structure

The structure of this plan consists of this document, the Main Technical Plan, a Non-technical Summary, and a series of supporting technical appendices, as shown in Table 1-1, which are referenced and summarised throughout this main document.

This document, the main technical plan provides background to our WRMP, summarises our planning problem, key planning assumptions, links to other plans and our overall levels of service. Section 4 then described our overall baseline supply demand balance. Section 5 described the options appraisal process, and Section 6 described our preferred adaptive plan.

Table 1-1 Water Resources Management Plan Structure

Main Technical Plan	**Non-technical Summary**

Supporting Technical Appendices

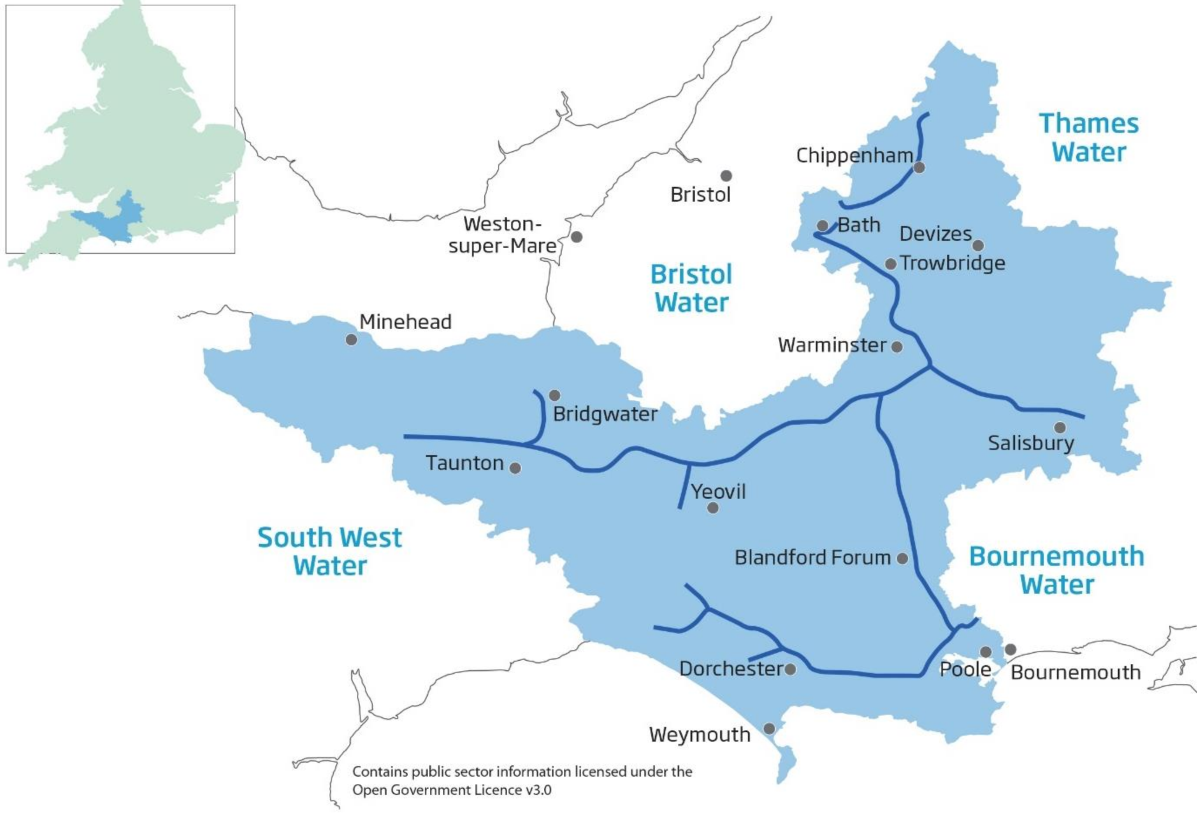
Supply Forecast	Demand Forecast
Options Development and Appraisal	Supply-demand balance, decision making and Uncertainty
Water Resource Zone Integrity Assessment	Problem Characterisation
Pre-Consultation and Customer Research	Environmental Assessments (SEA, HRA, WFD)
Demand Management Strategy	Upper Hampshire Avon Water Resources Strategy
EA planning Tables	

2. Background

2.1 Supply area and Water Resource Zone

We supply 1.3 million people in the south-west of England with high quality drinking water. Our region is predominantly rural but includes the urban areas of Bath, Chippenham, Dorchester, Bridgwater, Poole, Taunton, Salisbury, and Yeovil (Figure 2-1).

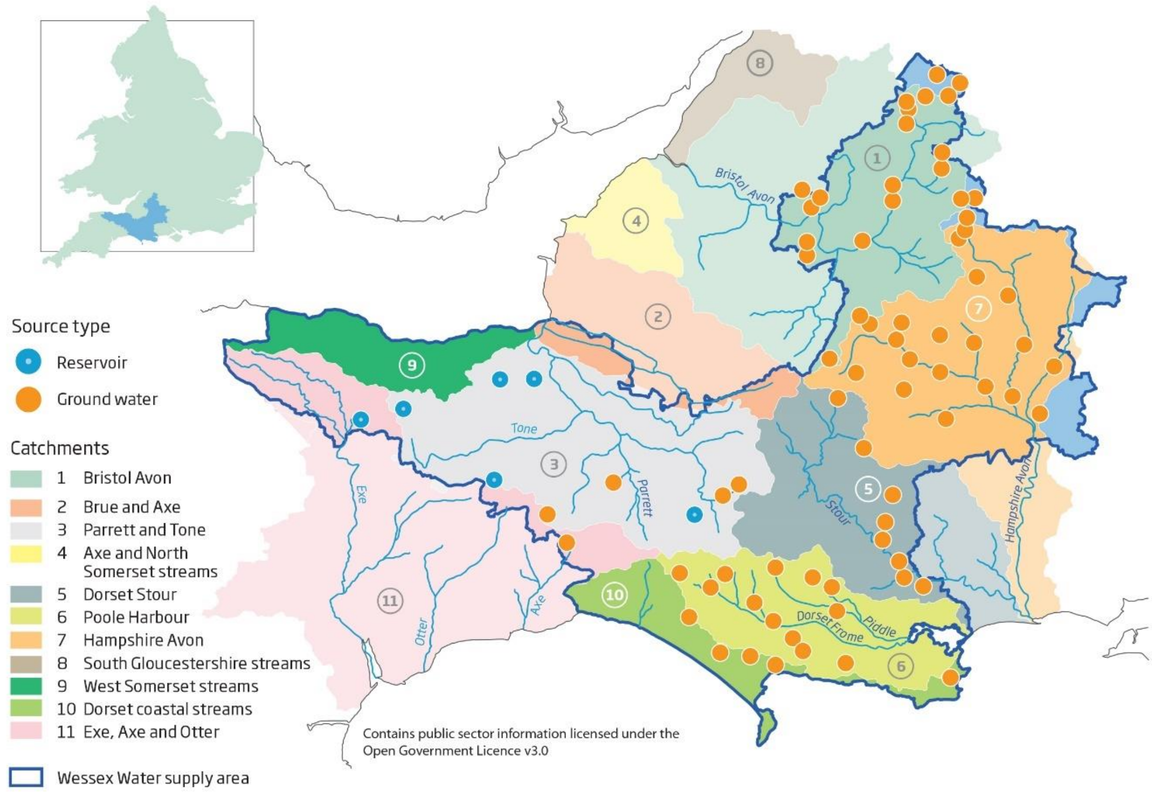
Figure 2-1: The Wessex Water region, with key towns, neighbouring water companies and key water mains shown



We supply our customers via 11,800 km of water mains to distribute approximately 340 million litres of water each day (Ml/d; key mains shown in Figure 2-1). We use more than 70 sources distributed across our supply area (Figure 2-2). Our sources range in capacity from less than 0.6 Ml/d to 45 Ml/d although we have a prevalence of small sources – over 50% have an average output of less than 6 Ml/d.

The main river catchments in the region include the Bristol Avon, which includes the Great Oolite aquifer, in the north, the chalk catchments of the Hampshire Avon, the Dorset Frome and Piddle, the Stour in East and South, and the Parrett and Tone in the West. The majority (75%) of the water we abstract for public water supply comes from groundwater sources. Important aquifers for us are located under Salisbury Plain, the Cotswolds and the Dorset Downs. The remainder of our water supplies (25%) come from impounding reservoirs located in Somerset.

Figure 2-2: Wessex Water Supply Area showing location of reservoir and groundwater sources, and main river catchments



Our region contains a wide range of important landscapes and habitats, and we are committed to playing our part in their continuous protection. The maximum volume of water that can be taken from each source (typically each day and each year) is specified in their respective abstraction licences which are granted by the Environment Agency. The conditions on a licence are the main way of ensuring that our abstractions do not have an unacceptable impact on the environment. For more information on abstraction licensing including recent and upcoming changes to current licences see Section 4.2.5.

The volume of water we abstract from the environment to supply to our customers has been steadily reducing since the mid-1990s. Annual average volumes of water that we put into our supply system have reduced from around 425 Ml/d in 1995 to approximately 340 Ml/d today. For more information on recent and forecast demand patterns see Section 4.3.

The Wessex Water supply area contains a range of cultural heritage sites, including three World Heritage Sites, over 2,000 scheduled monuments, 108 historic parks and gardens, 4 historic battlefields, 6 protected wrecks in close proximity, and around 30,000 listed buildings. There are also a range of important landscape features, including 2 National Parks – Exmoor and the New Forest – overlapping with our supply area, 5 Areas of Outstanding Natural Beauty, 24 National Character Areas and 4 heritage coasts. Further details can be found in the Strategic Environmental Assessment technical appendix.

2.1.1 Water supply network

Our water supply network consists of a number of major transmission systems allowing us to move from areas of surplus to meet demand in the wider supply area (Table 1-1). Our integrated network provides customers with a very resilient water supply service. Key network connections include:

- Transfer of water east from our major surface reservoir sources in Somerset towards Taunton and Yeovil. Whilst this is our most common mode of transfer, in drier weather we have the ability to reverse this transfer and move water from the groundwater sources in the east of the area towards north Somerset.
- Movement of water south into north Bath from groundwater sources in Malmesbury and the Great Oolite aquifer near Chippenham.
- Transfers across the East/West link main in the south of our supply system, both ways between Dorchester and Poole.
- Most recently (2010-2018) our integrated GRID project has added new pipelines to connect sources in the south of our region near Poole north towards Salisbury in Wiltshire via Blandford Forum and Warminster[5]. This scheme, first proposed in our 2009 Water Resources Management Plan, enabled us to reduce abstraction at environmentally sensitive sources in the upper Hampshire Avon Catchment, and improve resilience for our customers without the need to develop new sources.

The GRID project involved over 50 individual schemes with investment totalling £230m over eight years. It has not just included investment in traditional asset infrastructure, but also investment in innovative technology, referred to as 'The optimiser' – which models the operation of the GRID and the demand placed upon it up to 72 hours in advance, repeating this modelling at least hourly to account for potential operational or customer demand changes. The optimiser automatically recalculates the best way to operate the network to mitigate the outage and improves the resilient operation of our water supply system.

2.1.2 The wider environment and catchments

Whilst water resources zones are the key geographical area over which a water company manages the balance between supply and demand, our water supply area also covers a number of hydrological catchments. A hydrological catchment is the watershed area where falling rainfall drains into a river, and including groundwater springs, streams, and rivers. The impact that our water abstractions have on the natural environment is more appropriately assessed at a catchment scale, where we need to account for the impact that our reservoirs and groundwater abstractions, alongside those of other abstractors (including neighbouring companies), have on the amount of water available in the environment.

Many different stakeholders influence catchment water quality and quantity, and have different responsibilities around water quality, flooding, land management and amenity. This can include Local Authorities, farmers, angling clubs, water companies and environmental regulators.

To make a real difference there needs to be an integrated approach to sharing knowledge and delivering improvements between stakeholders that will protect the water, land and people in the long-term. Combining our efforts in a strategic manner and making decisions

[5] Water supply grid (wessexwater.co.uk)

based on good evidence will help us to make progress and protect our catchment for future generations. Working collaboratively can help to identify the problems, solutions and threats to the water environment, often promoting low cost and innovative solutions.

Through our catchment approaches we aim to achieve:

- Sustainable farming, development, water use and sewage treatment that supports healthy rivers and groundwater across the Wessex water region.
- Recognition of the ecosystem services that the catchment can provide and an adequate payment to those that manage the land to provide these services.
- Improvement to biodiversity habitats both in the form of naturally functioning rivers, floodplains and wetlands and appropriately located woodland and low-input grassland.
- National environmental standards for the benefit of wildlife and users of these waters.

Catchment-based strategies are now a business-as-usual approach to protect our service levels and enhance the environment; often this means we are able to deal with the source of the problems not the symptoms.

Ensuring the sustainability of the abstraction licences that we hold is critical to the long-term viability of our activities. Over the last 25 years we have worked in partnership with the Environment Agency and others to investigate sources where there are concerns that the volume of water we are licensed to take has unacceptable impacts on local watercourses, groundwater levels and the wildlife that they support. Some investigations have led to reductions in the licensed volumes or other mitigation measures being made to ensure precious habitats in our region are protected. This is an ongoing process particularly to ensure compliance with the Water Framework Directive. A new group of 17 sites will be investigated in 2020-25 in accordance with the Environment Agency's Natural Environment Programme for the water industry.

2.1.3 Community engagement

We supply 1.3 million people and over 40,000 business with water. Water is a basic requirement for life and our customers rely on us to provide a reliable wholesome supply for daily habits as simple as making a cup of tea and flushing the toilet.

Customers are at the heart of what we do, and we are keen to support their engagement in our services through a variety of initiatives including our water efficiency and metering programmes, support for customers in vulnerable circumstances and community outreach.

The customers we serve have diverse needs and motivations. We aim to encourage water saving through promoting the benefits to both the local water environment and through the financial savings. We are keen to motivate even the minority of our customers that are not yet on a meter with the financial energy savings that can be made from making reductions in hot water use.

Our water efficiency services help customers to reduce their usage for daily practices like showering and reduce water wastage from leaking toilets and taps. Our Home Check programme is currently engaging with over 4,000 households a year – we fit water saving devices, provide tailored behavioural advice and identify and fix leaking toilets and taps.

We also provide online water efficiency services for customers – our GetWaterFit platform helps customers to understand their water use through a series of simple questions. Free water saving devices that are suitable for their home are available to order to be self-fitted. We have over 25,000 GetWaterFit users and this grows every year.

In 2022 we relaunched a water efficiency programme for non-households. We are also working with schools to help them reduce water wastage from leaking toilets and taps.

We offer support to customers that find themselves in vulnerable circumstances by funding and working in partnership with Citizens Advice Bureau, debt advice agencies and other charities, and encouraging the uptake of social tariffs and discounts where possible.

Our work within communities includes our popular schools' education programme that offers classroom sessions on topics such as water efficiency and the value of natural resources helps to shape future customers understanding, attitudes and habits.

Other community engagement approaches include attending community events to promote advice around saving water and preventing blockages, our Wessex Watermark awards that provide funding to support environmental projects and employee volunteering days.

We use a variety of channels to communicate information, news, and opportunities to participate in our services and water saving including our social media channels, customer magazine (which reaches over one million customers), print and online media, radio and, new for 2022, television advertising.

2.2 Progress of implementing WRMP19

There were no supply side options in our WRMP19 plan as we forecasted a surplus of supply over demand throughout the planning period. Instead, the plan proposed a range of demand side options to be implemented over the 2020 to 2025 period. These schemes were reduced leakage, metering, Home Check, and development of a customer digital engagement tool.

As a three-year average, we had a target to reduce leakage by 3.9%. As of the 2021/22 financial year, we have reduced leakage by 10.8%, which is a 6.9% outperformance as a three-year average, see Table 2-1. It should be noted that in 2020/21 we restated our leakage baseline following industry-wide leakage method changes, so recent published figures are not comparable to those in the WRMP19 Planning Tables. The excellent progress in our leakage reduction is largely attributed to:

- High performance on data assets and meter availability.
- Continued pressure management programme, based on servicing assets and maintaining operability settings.
- Continued rollout of our acoustic logging approaches to reduce leak awareness time.

- All round excellent Active Leakage Control performance (both in skills development and operating with a low open leak repair job).
- Stable network conditions, with largely mild summer and winters leading to little leakage breakout.

Table 2-1: Baseline and 2021/22 leakage performance

Actual leakage outturn	2017/18	2018/19	2019/20	2020/21	2021/22
In year out turn Ml/d	76.5	75.6	67.9	65.1	63.3
In year reductions Ml/d		-0.9	-7.7	-2.8	-1.8
Three-year average Ml/d			73.3	69.5	65.4
Three-year average reductions % (PC Target)				5.2%	10.8%
PC Target				1.6%	3.9%

Our WRMP19 set out plans to increase meter penetration in our region as part of our overall demand strategy. This strategy involved the continuation of free optional metering services and a policy to compulsory meter households on change of occupier. The number of change of occupier meters installed in 2021/22 was significantly higher than the previous year due to the impact of Covid-19 reducing staff resources and only allowing essential work to be carried out. The number of optant meters installed has not returned to pre pandemic levels, possibly due to the uncertainty of a metered bill. Looking forwards cost inflation puts additional pressures on approved metering budgets for this period which may also impact on metering activity relative to the WRMP19 projections. Therefore, as shown in Table 2-2, we are currently behind on our metering programme, but we are continually seeking ways to optimise the efficiency of this programme, such as our Money Back Guarantee which was launched in December 2017.

Table 2-2 Metering forecasts in comparison to actuals

	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Meter Options WRMP Forecast (000's)	N/A	5.25	4.82	5.89	6.30	6.31	6.03	4.92
Meter Options WRMP Actual (000's)	5.68	5.22	5.62	3.30	3.2			
Change of Occupier WRMP Forecast (000's)	N/A	6.02	5.42	4.89	4.39	3.92	3.50	3.14
Change of Occupier Actual (000's)	7.08	1.71	3.71	2.92	4.04			
Percentage Metering WRMP Forecast (excluding voids) %	63.7	66.2	68.4	70.7	72.8	74.9	76.7	78.3
Percentage Metering Actual (excluding voids) %	63.7	65.9	67.7	69.2	70.7			

*Note 2017-18 was the base year for the WRMP19 and 2018-19 were estimates at the time WRMP19 submission. The method for calculating percentage metering excludes all voids which is different to the method used in the WRMP AR tables.

We were unable to launch our Home Check programme in the first two years of the AMP cycle due to Covid-19 restrictions. In place of this we trialled a leaky loo service in 2020/21 which achieved a small amount of savings and ran until the end of March 2022. The number of houses visited, and toilets fixed increased to 78 and 144, respectively, in 2021/22. We launched the Home Check in April 2022, so aim to achieve 0.55 Ml/d of saving in each of the remaining years of the AMP.

We have heavily promoted a Customer Digital Engagement Tool over the last 18 months, with over 14,000 customers signing up in 2021/22, and will continue to promote in the remaining years of the AMP. Users of this tool were also provided with a virtual consultation service in place of our Home Check programme during the period of Covid-19 restrictions. As Covid-19 measures ease, we are aiming to reintroduce all our water efficiency measure including Home Check and change of occupier and optant metering, so may not need to push the digital engagement tool as much as in the coming years.

We are keeping a flexible strategy for the remaining years of the AMP so that we can tweak to focus on the optimal way of achieving savings.

2.3 A review of the 2022 extended period of dry weather and drought

The drought in 2022 was one of the driest periods on record, the ten months leading up to and including September were all below average rainfall apart from February. The Wessex region was declared in environmental drought status by the Environment Agency at the end of September, later than most regions in the country. Some of our reservoirs reached their lowest levels on record. Peak demand periods coincided with temperatures in excess of 30°C in the middle of July and again in the middle of August. Our Drought Plan was activated with carefully managed supply side and demand side actions as the drought management level increased through the summer but remained in Level 1b overall.

A balanced view of our overall drought management level was taken, considering our 80% volume contribution from groundwater compared to 20% from reservoirs. Our extensive customer communications, advertisements and water saving messaging helped to reduce demand and as such we were able to avoid imposing demand side actions such as Temporary Use Bans, which would have been triggered in Level 2 of our Drought Management Levels. An overall supply side strategy of reservoir conservation was enacted as we entered Level 1a, Table 2-3, with groundwater supplies being utilised to the maximum and later operational network changes to aid recovery. Weekly Drought Action Group meetings kept communications agile and ensured all relevant parts of the business were informed and could contribute to the supply side strategy.

Table 2-3: 2022 Drought triggers timeline

Drought Trigger	Reservoirs	Groundwater	Overall position
Normal Operation	Since start of 2022	Since start of 2022	Since start of 2022
Level 1a	08/07/2022	10/06/2022	10/06/2022
Level 1b	22/07/2022	08/07/2022	08/07/2022
Level 2	12/08/2022	-	-
Level 1b	28/10/2022	-	-
Level 1a	04/11/2022	13/11/2022	04/11/2022
Normal operation	11/11/2022	18/11/2022	11/11/2022

The 2022 Drought Review technical appendix outlines the supply and demand actions taken during the dry summer and a review of our emergency supplies, coordination with neighbouring companies, drought permit options, and the key lessons learnt and considerations. The main lesson learnt are as follows:

- Greater understanding of risks around our key reservoir, Wimbleball, which we share with South West Water. A greater understanding of lower reservoir levels and improved communications with South West Water. Over-pumping plan developed and costed and on the shelf.
- Greater understanding of the agility of customer promotions and the associated time lag.
- Recognition that it is challenging to measure the absolute benefit of the water efficiency engagement on demand and to separate this from the other influences (not least leakage, NHH demand and wider behavioural influences) on Distribution Input or PCC.
- Drought permit application readiness. During pre-application of our Empool drought permit we identified that the EA process of review of permits during their development had not allowed for full consultation across EA departments. A review process of all drought permit options is underway, with first workshop with local EA having taken place in February 2023. This was to ensure all additional requirements by the EA in advance of future pre-applications are captured, discussed and implemented as appropriate.
- A hydrogeological review of critical groundwater sites to understand maximum capacities and in dry years is ongoing.

Since the publication of the draft WRMP24, we have updated our demand and leakage forecasts to incorporate the 2022-23 in year data. Leakage was also significantly higher in 2022-23 as a result of the extreme weather events in year, both the dry hot summer and the winter freeze-thaw event. Outages were managed carefully during the drought period and deficits incurred from planned outages with regulatory deadlines were met from other sources and transfers. Due to our integrated GRID network allowing deficits to be covered by other sites, we have not needed to make any change to our WRMP24 outage forecast following the 2022 drought.

Nationally, several water companies imposed temporary use bans this summer for some or all of their customers. Our Drought Plan sets out demand side actions such as Temporary

Use Bans when we are in Level 2 of our Drought Management Levels. We entered this level for our reservoirs in early August. However, we remained in Level 1b overall throughout the summer due to our groundwater levels remaining in Level 1b and the majority of our supply sources being from groundwater. Due to our demand and supply side actions throughout the summer we were able to avoid imposing temporary use bans on our customers and therefore have not made any update to the assumed benefits of such options in the WRMP24. It is however likely that we benefited from a "neighbouring effect" when our closest water company neighbours imposed their restrictions, likely encouraging a number of our customers to be more efficient with their water use during this time.

During the drought, regular communication occurred with our neighbours at Bristol Water, South West Water (including Bournemouth Water) and Veolia Water. Bristol Water were not as impacted by the drought as ourselves and others with their main supply from the River Severn holding up well. Towards the end of the drought, we requested an increase in the bulk transfer we receive from them at Newton Meadows, and they agreed to supply us with up to 15 Ml/d. This required some infrastructure improvements on our side which were completed. We never used the additional quantities due to demand having subsided and the start of recharge occurring, but this increase in peak demand has now been included as an option in WRMP24.

We did not identify any new drought permit options in 2022 that have not been included in our Drought Plan, so no update has been made to such options in WRMP24. We also already operate as a single water resource zone and our integrated GRID network and Optimiser model enables connectivity and zone integrity; therefore we have not included any new schemes related to this as a result of the 2022 drought.

2.4 Links to other plans

Here we specify how our plan links with and relates to other key plans:

<u>Wessex Water Business Plan and DWMP</u>

Wessex Water submitted its business plan in October 2023, following the publication of Ofwat's draft methodology in July 2022, and received Ofwat's draft determination in July 2024. This Water Resources Management Plan will form a key input component of the Business Plan. To align this plan with the Business Plan, we have aligned our decision-making to our Strategic Direction and outcomes led approach[6] to deliver our outcomes in 2050, and to play our part in delivering national policy ambitions, including on net zero and environmental enhancement as set out in the 25 Year Environment Plan. We have also accounted for Ofwat's final guidance on long-term delivery strategies and considered in our decision-making the importance of other needs drivers for investment, not least as contained in Wessex Water's Drainage and Wastewater Management Plan[7]. The investments initially identified in this plan will carry forwards to the business plan decision-making process, where greater consideration will be given to overall plan affordability and delivery of overall outcomes at a company level.

[6] Our strategic direction | Wessex Water
[7] Drainage and wastewater management plan | Wessex Water

Wessex Water Drought Plan

We recently published our Drought Plan as a final plan, which sets out how we will manage our water supplies during an extended period of dry weather and drought[8]. Our drought plan is linked to this plan through options to manage drought, like Temporary Use Bans and Drought Permit Orders, which have been incorporated into our options appraisal, as well as through analysis of technical analysis of drought impact.

River Basin Management Plans

This plan has been subject to the required Water Framework Directive (WFD) assessments, accounting for the objectives set out in River Basin Management Plans (RBMPs).

West Country Water Resources Group (WCWR) Regional Plan

This WRMP has been developed alongside the development of our regional plan, in collaboration with our neighbouring companies South West Water and Bristol Water. We have collaborated closely since the initiation of the WCWRG in 2017. As part of this group and to help with plan alignment, we have collaborated in the development of:

- strategic resource options (SROs) or regional schemes, in particular including Mendip reservoir and Poole water recycling scheme as part of the RAPID gated development process, as well as consideration of smaller inter-company options in our feasible options development.
- components of the supply-demand balance, including the non-household demand forecast, household demand forecast and the spatially coherent regional stochastic weather dataset.

For the WRMP24 round of planning, the regional plan has been developed “bottom-up” from individual company plans in the region as a combination of the individual plans. Our WRMP does not therefore reflect or is influenced by a central decision-making process as a region, which has then been propagated down and reflected in individual company plans. As part of the development of the regional plan however, we have collaborated closely with South West Water and Bristol water to ensure WRMP alignment, in particular with respect to SROs, and to ensure our WRMPs are aligned with respect of the use of these schemes, and inter-company transfers. The regional plan will be published later this year.

WCWRG are now scoping the creation of regional planning tools, which forms a key component of our adaptive plan, and will allow us to better understand company supply system interaction in drought, as well as on the operation of strategic schemes cross company and cross-catchment, to inform our adaptive plan decision points in 2027-28.

National Framework

Our plan has taken account of and developed the evidence base behind the Environment Agency’s National framework[9] in development of our Environmental Destination. Further technical information can be found in the Supply Forecast Technical Appendix. We have also considered the national targets for per capita consumption and leakage reduction within our options appraisal.

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8 Drought plan | Wessex Water

9 Meeting our future water needs: a national framework for water resources - GOV.UK (www.gov.uk)

2.5 Levels of Service

Our overall planned levels of service are shown in Table 2-4. The technical assumptions made that underpin the derivations of these levels of service, including on drought severity and how this has been determined, are shown in more detail in the Supply and Demand forecast. The assumptions on implementation frequency of hosepipe bans, drought orders and non-essential use bans, is based on the drought event testing undertaken as part of the development of the company Drought Plan.

Table 2-4:Overall planned levels of service

Plan Restriction	Likelihood	Average Annual Risk (%)
Temporary Use Bans	1 in 30	3.3%
Drought Permits/Orders	1 in 75	1.3%
Non-Essential Use Bans	1 in 100	1%
Emergency Drought Orders	1 in 200 (up to 2039-40) 1 in 500 (from 2040-41)	0.5% 0.2%

3. Planning Problem and Decision-Making Approach

When developing a WRMP, if we identify a deficit in supplies compared to demand, we are required to develop a **preferred programme** of options to either increase supply or reduce demand so that we achieve an environmentally sustainable, secure supply of water.

For this round of Water Resources Planning, the joint regulatory guidance[10] requires us to develop a **best-value plan**, which is one that considers other factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society. We are also required to consider if we need to develop an **adaptive plan**, which is a plan that can adapt to future uncertainties.

To develop a best value plan, our regulatory planning guidance sets of a set of steps to develop the best-value plan:

1. Set clear objectives for the plan
2. Identify and consider best-value metrics
3. Identify your least-cost plan to provide a benchmark for your other programmes
4. Develop a decision-making approach
5. Appraise and compare different programmes
6. Undertake effective engagement
7. Consider whether an adaptive plan is appropriate
8. Test your plan
9. Present and justify your preferred plan clearly.

This section introduces our baseline planning assumptions, plan objectives, an overview of the scale of the planning problem we need to solve and provides an overview of the decision-making approach taken. Further details can be found in the Supply-Demand Balance, Decision-Making and Uncertainty Technical Appendix.

3.1 Baseline planning assumptions

Table 3-1 lists the assumptions incorporated into our baseline supply-demand balance forecast, that set the basis for solving the decision-making problem.

Table 3-1: Baseline planning assumptions for WRMP24

Area	Assumptions
Water Resource Zones	Supply Area
Base-year	2019-20
Planning horizon	2019-20 to 2079-80
Planning Scenarios	Dry Year Annual Average (DYAA) and Dry Year Critical Period (DYCP)
Supply Forecast	Estimated supplies availably in a drought with likelihood of 1 in 500 years, or 0.2% in any one year by 2039, and in 1 in 200 drought for alternative level of service prior to 2039.

[10] Environment Agency, Ofwat (2021) Water Resources Planning Guideline. Version 9: For publishing. Here-in referred to as the **regulatory planning guidance**.

Demand Forecast	DYAA and DYCP demand when demand is high before temporary use bans imposed.
Leakage	Leakage should remain static from the first year of the plan (2025-26) throughout the planning period
Customer Demand	Forecast without any further water company intervention; all AMP7 water efficiency and metering programmes should end.
Transfers	Existing transfers to the extent of bulk supply agreements
Sustainability Reductions	Impact of any confirmed or likely sustainability changes as identified for implementation in AMP8.
Drought options	No demand side (e.g. temporary use bans or non-essential use bans) or supply side options (e.g. drought permit options) included in the baseline plan supply-demand balance.

3.1.1 Water Resource Zones

Based on the Water Resource Zone Integrity Assessment Technical Appendix, and reflecting recent investments in the new water supply grid[11], we plan on the basis of a single water resource zone. It is at this level that we aggregate our available supplies and forecast demand to calculate the supply demand balance.

3.1.2 Planning Horizon and base year

The base year for the forecast was chosen as 2019-20, with a forecast horizon running to 2079-80. This forecast horizon is beyond the statutory minimum of 25 years from 2025-26 to help ensure alignment with other companies, regional plans, and to understand potential planning issues further out into the future, in particular given the potential lead times required for some potential investment options.

The base year was chosen as 2019-20 to forecast from primarily as this is the first planning year prior to the impact of the Covid-19, which is important to forecast from to help separate out the short-term impact of the Covid-19 pandemic from any longer-term changes on water demand. Further details can be found in the Demand Forecast document.

3.1.3 Planning Scenarios

Our previous Plan was developed with a dry year annual average (DYAA) and dry year critical period (DYCP) scenarios. This means, in each year of the planning horizon calculating how much water is available to supply on an annual average basis during a drought – as constrained by reservoir storage, annual abstraction licences, and dry year annual average demand, and how much water is available during a critical period – as constrained by peak abstraction licence availability, infrastructure constraints in peak source output, and peak demands. As described in our drought plan[12], our supply system is potentially vulnerable to both types of constraint/failure. We have therefore calculated the supply demand balance for both planning scenarios over the planning horizon, as well as calculating option benefits under both scenarios and running out investment model to solve both planning scenarios simultaneously.

[11] Water supply grid (wessexwater.co.uk)
[12] Drought plan | Wessex Water

3.2 Key regulatory planning requirements and constraints

To satisfy the requirements of the Water Resources Management Planning process, we have to solve the supply demand balance so there is zero deficit under our planning scenarios, whilst seeking to maximise the performance of the chosen plan in terms of a set of objectives. The planning problem has a series of components:

- **Inputs** – the potential investment options to solve the problem.
- **Activity** – the methods used to solve the decision-making problem.
- **Outputs** – factors that contribute to achieving the outcomes – investments and components of the supply-demand balance.
- **Outcomes** – identify what we are trying to achieve, as represented by metrics that are included in best-value decision-making.

Regulatory planning requirements provide a series of soft or hard **constraints** on different areas of the planning problem, depending on the language used in the planning guidelines:

- **Must** refers to actions that are related to a statutory requirement
- **Should** refers to actions that are believed to be needed to produce an adequate plan

In addition to the statutory environmental planning requirements[13], the key regulatory and government expectations on the planning problem are:

- **Drought resilience** – Supply system **should** be resilient to 0.2% (1 in 500) annual chance of failure caused by drought. This should aim to be achieved by 2039, or by 2050 at the latest. This is a constraint on the plan **Outcome**
- **Leakage** – We **should** plan as a minimum to meet Water UK's commitment to reduce leakage by 50% by 2050 (from 2017 levels). This is a constraint on **Inputs** and **Outputs**
- **Distribution Input** - We **should** plan as a minimum to meet Defra's water demand target set under the Environment Act 2021 to reduce the use of public water supply in England per head of population by 20% from the 2019-20 baseline by 31 March 2038[14]. This is a constraint on **Inputs** and **Outputs**
- **Household Demand** – Should take actions required to reduce per capita consumption to 110l/h/d by 2050. This is a constraint on the plan **Outputs**
- **Metering** - Should evaluate charging by volume on universal metering for water stressed areas, or if compulsory metering would be one of your preferred options. Government expects smart meters to become the standard meter installed. This is a constraint on **Inputs**
- **Drought Permit Options and Orders** – should plan to use drought permits and orders less frequently in the future. This is a constrain on **Inputs**.
- **Environmental benefit** – should plan to deliver overall positive environmental benefit and use Biodiversity Net Gain and Natural Capital to inform decision-making. This is a constraint on how plan **Outcomes** are assessed.

[13] Strategic Environmental Assessment, Water Framework Directive and Habitats Regulations Assessments

[14] Defra Water demand target, Environmental Improvement Plan, and Plan for Water

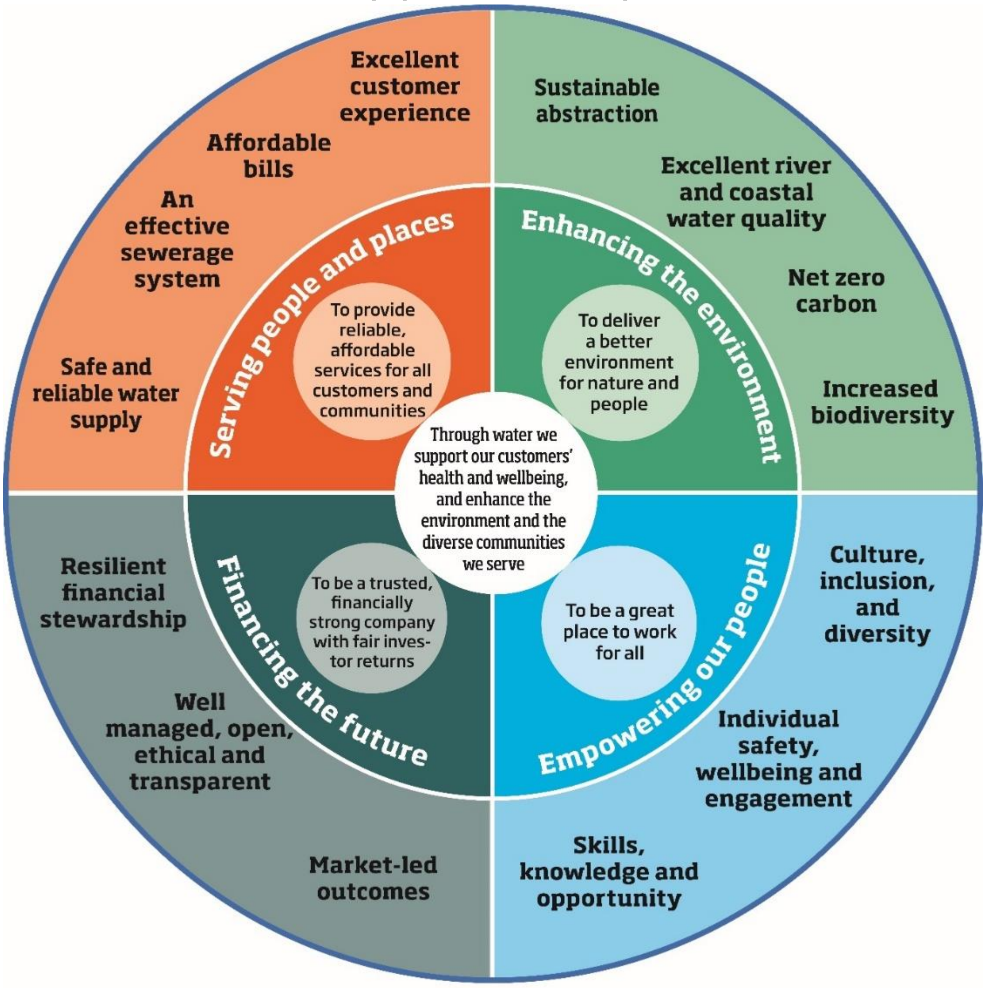
- **Smart metering** – We should plan to increase smart metering for households and businesses through accelerated investment between 2020 and 2030 as per the Environmental Improvement Plan to meet the Defra water demand target, as per the letter from Defra in March 2023. This is a constraint on **Inputs.**

3.3 Our Strategic Direction and best-value planning objectives

The challenges facing society today are extreme. There is a compelling need to plan for the long term, to mitigate and adapt to a changing climate, and to reverse the degradation of the natural world. This is to protect the planet itself, and all the people and life it sustains.

Our overall purpose is to improve public health, enhance the environment, and create value for the people we service. Wessex Water's Strategic Direction Statement[15] is our long-term plan, that sets out our vision through to 2050. At its heart are eight outcomes that our customers and stakeholders have told us are their priorities. Figure 3-1 summarises our 25-year plan; in the top half are the eight outcomes, and in the lower half are the enablers that support the outcomes and together comprise the heart of our Strategic Direction.

Figure 3-1: Wessex Water's Outcomes-led approach, with 8 outcomes to serve people and places and enhance the environment (top half outer circle)



15 Our strategic direction | Wessex Water

Based on the outcomes-led approach, and combining with the key regulatory planning constraints, Table 3-2 summarises our key plan criteria, and the associated metrics that will be used to derive the best-value plan, and how these relate to the outcomes and the policy requirements. These metrics capture the key trade-offs we need to consider in developing the WRMP between delivering drought resilience, the carbon and financial cost of achieving this, and the environmental benefit of doing so. These metrics align with the core regulatory planning guidance expectations.

Table 3-2: Summary of Plan criteria, associated metrics, PR24 outcomes and policy requirements.

Criteria	Metric	PR24 Outcome	Policy Requirements
Programme Cost	Net Present Value (NPV)	Affordable Bills	Should consider a range of programmes including "least-cost", and consider how application of policy expectations affects costs
Drought Resilience	Timing of achieving 1 in 500	Safe, Reliable Water Supply; Great Customer Experience	Should achieve 1 in 500 no later than 2039, but explore sensitivity to this, no later than 2050
Carbon	Carbon Dioxide Equivalent Emissions	Net-Zero Carbon	Minimise carbon to contribute to Net-Zero by 2050
Biodiversity Net Gain	Biodiversity Score	Increased Biodiversity	Plan should provide net-gain at scheme and plan level
Natural Capital	Natural Capital Metric	"Enhancing the Environment"	Plan should deliver natural capital benefits
Abstraction reduction - Environmental Destination	Achieve Required Environmental Destination Licence Reductions	Sustainable Abstraction	Plan should explore an enhanced environmental scenario beyond the BAU and a "best environment" plan

In addition to the specific metrics considered above, the decision-making approach also incorporated WFD, SEA, INNS and HRA assessments as constraints to feasible options used in the decision-making tool.

As described above in Section 3.2, there are regulatory and government expectations relating to leakage and household demand targets e.g., expectations on the inputs and outputs of the planning problem to meet the overall outcomes set out in Table 3-2. Meeting these constraints is considered in our programme appraisal.

3.4 Problem Characterisation, Decision-Making Method and Risk Composition

Once the planning outcomes are defined, the next key stage in the planning process is to undertake a problem characterisation assessment[16], which identifies the scale and complexity of the planning problem that needs to be solved. This in turn informs what is called the risk composition, and the complexity of the methods that should be adopted to solve the planning problem.

In overview, our planning problem was identified as having a **moderate level of concern**, reflecting potentially significant supply demand imbalances driven by a range of factors (Figure 3-2).

Figure 3-2: Problem characterisation summary matrix

		Strategic Needs Score ("How big is the problem")			
		0 (none)	**2 (small)**	**4 (medium)**	**6 (large)**
Complexity Factors Score ("how difficult is the problem")	**Low (<7)**				
	Medium (7-11)			X	
	High (11+)				

Changes in WRMP24 planning requirements since the development of the UKWIR guidance in 2016 require more complex planning methods to be adopted to an extent. These changes are the move to 1 in 500 system level response drought resilience, and the need to produce a best-value (multi-objective) and potentially adaptive plan. Our assessments also account for potential future water trading agreements due to our involvement in inter- and intra-regional planning: a separate regional group problem characterisation assessment has been undertaken in the West Country Water Resources Group.

Our assessments highlight supply side factors outweigh the contribution from demand side factors to the problem characterisation. This is mainly driven by new requirements for a move to 1 in 500 system level response drought resilience, the scale and extent of licence reductions under the Environment Agency's Environmental Destination programme.

Although overall demand has been falling since the mid-1990s and is predicted to continue, owing to reductions in leakage and commercial demands, and an increase in water efficiency through customer metering, the reductions are not enough to combat the forecasted supply side losses. Under a business-as-usual scenario, the Environmental Destination work may lead to licence reductions in the region of 60-70 Ml/d by 2050, mainly in the Chalk catchments of the Stour, Frome, and Piddle rivers.

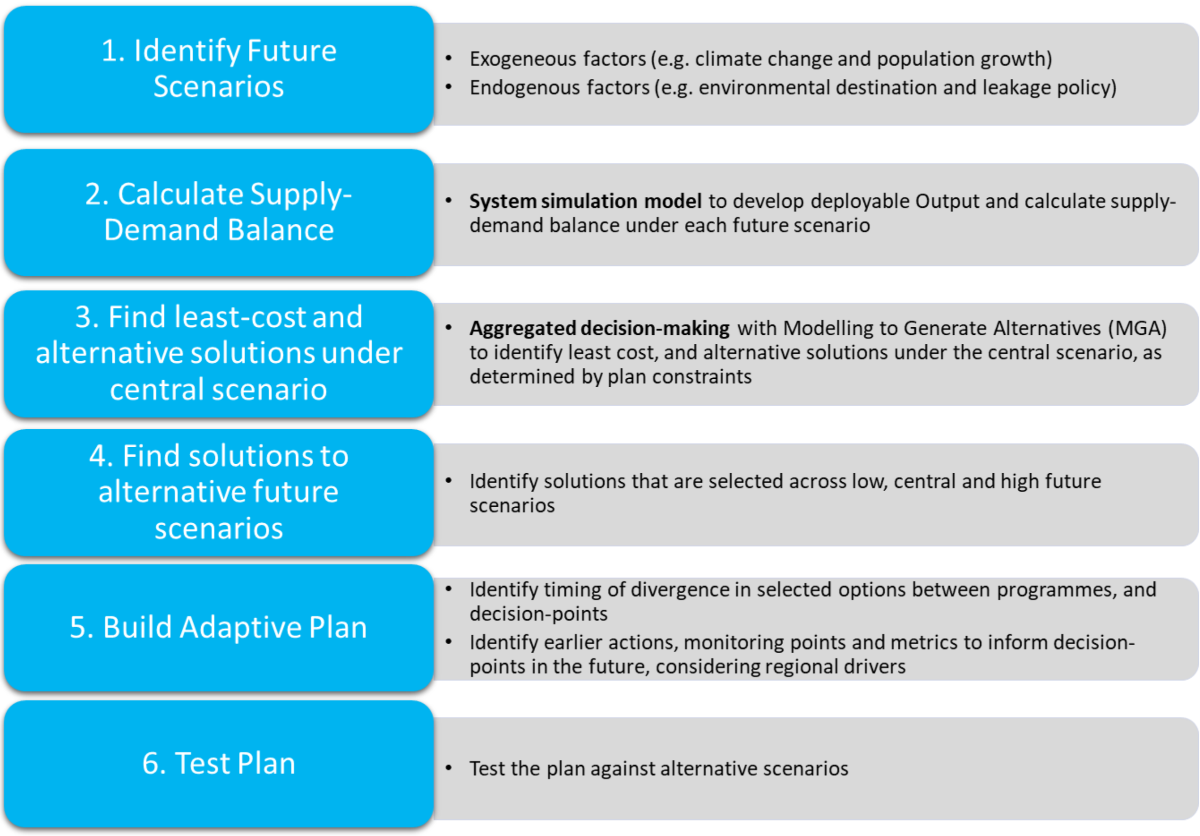
Spatial and temporal variation of deficits resulting from above drivers, and uncertainty in how these might operate to meet annual average and critical period demand, increase the complexity of the problem. Based on the identification of a moderate level of concern, and

[16] Further details of the problem characterisation assessment can be found in the Problem Characterisation Assessment Technical Appendix

guided by the UKWIR decision-making guidance, we chose to implement a hybrid decision making approach, and consistent with risk composition 2 of the risk-based planning guidelines, a scenario-based integration method, which enables us to develop an adaptive plan.

A summary of our decision-making approach is shown in Figure 3-3. In the adopted approach we have evaluated a range of future uncertainties affecting the planning problem and used these to construct multiple potential future scenarios alongside our central "most likely" future planning scenario, and derived the supply-demand balance under each of these futures. We have then undertaken our decision-making modelling with an aggregated decision-making tool to identify least cost and alternative plans under our central planning scenario, as affected by different planning constraints, government expectations on demand strategy, and environmental screening of poorly performing options. We then identified solutions to our planning problem under the alternative future scenarios and used these to build an adaptive plan which shown how our decision-making will adapt to future uncertainties.

Figure 3-3: Schematic of WRMP decision-making process



4. Baseline Supply Demand Balance

4.1 Overview

To develop the WRMP, we must establish the balance between our supply of water and the demand from customers. If we identify a deficit in supplies compared to demand, we are required to develop a preferred programme of options to either increase supply or reduce demand so that we achieve an environmentally sustainable, secure supply of water. This section provides an overview of our supply and demand forecasts. Further details can be found in the Supply Forecast Technical Appendix and Demand Forecast Technical Appendix.

We have developed forecasts for a wide range of components in order to establish whether our supply demand balance will be in surplus or deficit. An overall projection of the average volume of water that we will need to put into our distribution network each day, known as Distribution Input or DI, is built up from component forecasts of population, property, household water use patterns, commercial usage, leakage, and other minor elements.

The volume of water available (Water Available for Use, or WAFU) is determined by removing the source outage allowance and the losses occurring due to system operation from our Deployable Output (DO) calculation. Changes to WAFU over the planning period may occur as a result of licence reductions, climate change impacts, and changing water quality. The Total WAFU is then calculated by combining the forecast of bulk supply imports and exports to and from neighbouring water companies.

Once we have a supply forecast and demand forecast, we can compare the two to identify if we have a supply-demand balance surplus or deficit. Before we do this, however, we must account for uncertainty.

4.1.1 Handling uncertainty in the supply-demand balance

Uncertainty in our plan is handled through two approaches. Baseline uncertainties associated with how much water we have and what demand would be like today under the extreme planning drought conditions are dealt with through **headroom analysis**, where we make an allowance in the supply demand balance for this uncertainty. The headroom allowance is described in Section 4.4. Future uncertainties, associated with how demand and supplies might change in the future, are handled through **scenario analysis**.

Table 4-1 shows the future uncertainties that are considered in scenario uncertainty analysis, with reference to the plan section that provides further details of the derivation of the forecasts. For each factor a low, central, and high forecast has been derived to represent the range of uncertainty in the factor in the future. Our main central forecast, or most likely plan, combines the central forecasts from each uncertainty factor in the supply-demand balance. We have also generated alternative combinations of these factors to generate plausible future scenarios to develop our adaptive plan and test the chosen plan options.

Table 4-1 Scenario Uncertainty Factors

Scenario Uncertainty	Description
Environmental Destination	Uncertainty in the level and timing of environmental destination and sustainability reduction licence losses
Per capita consumption	Uncertainty in future household demand
Climate change emissions uncertainty	Uncertainty in the impact of climate change on available supplies
Population and Property Growth	Uncertainty in future population and property growth in the supply area
Non-Household demand	Uncertainty in future non-household demand
Water quality pollution (e.g. future Nitrate changes)	Uncertainty in water quality pollution (Nitrates) driven supply availability in drought

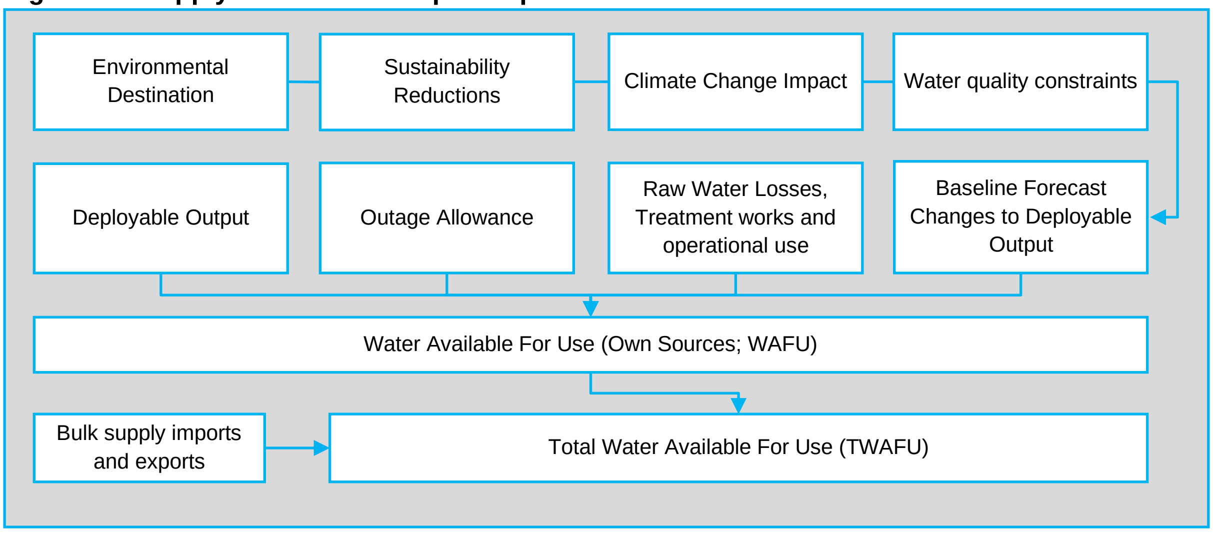
4.2 Water Supply Forecast

Our forecast of available water to supply to customers is constrained by the availability of water in the environment, the licenced quantities Wessex Water has available to abstract, and the infrastructure to abstract, treat and distribute the water to customers. This section outlines how we determine our current volume of water available for supply, and how we forecast how this might change over the planning period due to a range of factors such as sustainability licence reductions, and climate change impacts.

4.2.1 Overview

The Water Resources Management Plan requires us to forecast how much water is available in the base year, and how this forecast will change throughout the planning period from 2019-20 to 2079-80. Our baseline Water Available For Use (WAFU) is derived from the combination of Deployable Output (Section 4.2.2), an allowance for source outages (Section 4.2.3), and any losses occurring due to system operation (Section 4.2.5). This will change over time during the planning period due to licence reductions, climate change impacts, and changing water quality. To obtain our Total Water Available For Use (TWAFU), we combine WAFU with our imports from and exports to neighbouring water companies (Section 4.2.8). An overview of this process is presented in Figure 4-1.

Figure 4-1:Supply forecast development process

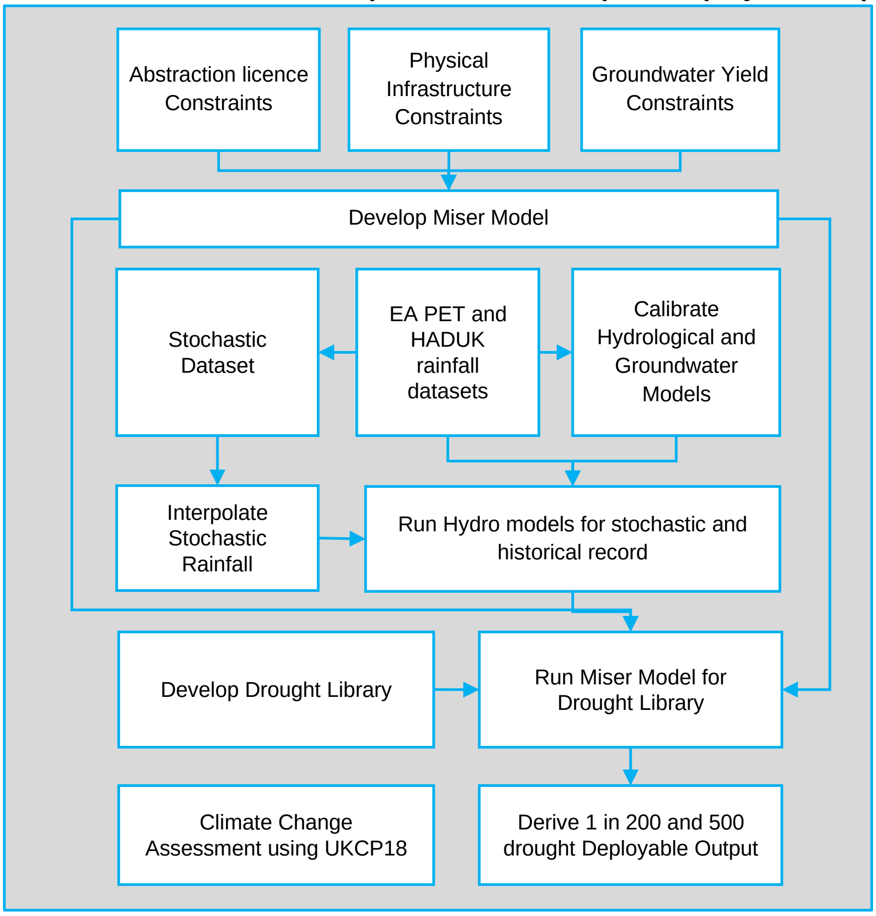


We have forecasted our TWAFU to decrease over the planning period, from 384 Ml/d in 2020-21 to 343 Ml/d in 2079-80 in the DYAA scenario, and from 437 Ml/d in 2020/21 to 388 Ml/d in 2079/80 in the DYCP. The main drivers of this decrease in both scenarios are licence losses due to sustainability changes that will occur in 2035 and 2050. The decrease in TWAFU in the DYAA is also attributed to a gradual decline caused by climate change impacts, and a reduction in our imports from neighbouring water companies in 2025-26.

4.2.2 Deployable Output

The Deployable Output (DO) calculation determines, under drought conditions, the maximum volume of water that is available from sources to supply to customers and is the main component of our supply forecast. Figure 4-2 shows a schematic workflow of the steps taken to develop the deployable output forecast, which is summarised here – full details of which can be found in the Supply Forecast Technical Appendix, Section 2.

Figure 4-2: Schematic Workflow of the steps taken to develop the deployable output forecast



<u>System constraints</u>

Our deployable output is constrained by licence constraints, the capacity of our water treatment works and network to treat and distribute water to customers, the capacity of our reservoirs, and the yield available from sources as constrained by groundwater levels. We have undertaken a systematic review and update of all of these constraints, which have been included in our system simulation model – Miser – which is used to simulate our system under drought conditions.

Miser system model

Our Miser system model has been continually developed since its first use in 1997, and for water resources planning simulates our supply system under drought conditions and includes all of our sources and 134 demand nodes. Following regulatory feedback from WRMP19, we have updated the model with the inclusion of control curves so that the model may be run using continuous simulation to simulate a larger range of drought events to inform the derivation of 1 in 200 and 1 in 500 Deployable Output.

Stochastic dataset and hydrological modelling

To derive our deployable output we based our model development on the latest available historical Met Office and Environment Agency weather datasets, and along with our fellow regional companies used these datasets to develop a stochastic dataset of 20,000 years of weather for the region to help inform a more reliable estimation of 1 in 200 and 1 in 500 drought resilience. These datasets were also used to re-calibrate hydrological and groundwater models that feed into our Miser system model. These were used to constrain how much water flows into our reservoirs, groundwater yield, and low flow licence conditions. The models were run for the whole historical and stochastic record to provide a large time-series of inflows to derive our 1 in 500 deployable output.

Drought Library and Deployable Output Derivation

Based on analysis of the stochastic record and return period analysis of groundwater level predictions and reservoir deployable output return period derived from stand-alone reservoir models, a drought library of representative droughts from the 20,000 year stochastic record was derived. These droughts were run through the Miser system model. Based on a relationship between the stochastic record return period estimation and deployable output across the drought library, 1 in 200 and 1 in 500 year return period deployable outputs were then obtained. The deployable output for DYAA and DYCP scenarios is shown in Table 4-2. Given that both 1 in 200 and 1 in 500 droughts are both relatively extreme/rate in the stochastic record, there is only a relatively small difference between 1 in 200 and 1 in 500 deployable output.

Table 4-2: Deployable output in each drought scenario return period

Drought event	DYCP Deployable Output (Ml/d)	DYAA Deployable Output (Ml/d)
1 in 200	447.11	397.68
1 in 500	440.61	393.65

4.2.3 Outage

Outages are defined as a temporary loss of deployable output (UKWIR, 1995[17]) due to planned maintenance or capital work, or unplanned events such as power failure, asset failure or water quality issues (including source pollution). The actual achievable output from our sources could be temporarily reduced at any one time as a result of outages and restriction, therefore sufficient allowance must be made in our DO.

[17] UKWIR (1995). Outage allowances for water resources planning.

We have derived a total outage allowance for both dry year annual average (DYAA) and dry year critical period (DYCP) scenarios by considering the frequency magnitude and duration of historical outage events. The overall outage allowance was determined following Monte Carlo sampling of the selected probability distribution of frequency magnitude and duration for each source, and then comparing the results with historical distributions of annual and monthly averages.

Using the 90th percentile for outage throughout the planning period, the determined allowance is 17.78 Ml/d for the DYAA scenario, and 13.63 Ml/d for the DYCP. For the baseline scenario, there are no investments planned which would alter our level of outages and therefore there are no changes to the outage figure over the planning period.

4.2.4 Climate Change

The climate in the UK is changing[18] with average temperatures and winter precipitation in recent years having increased compared to the 1961-1990 average. This trend of an increased chance of warmer, wetter winters and hotter, drier summers is projected to continue in the Met Office's latest assessment of climate change impact on weather in the UK, UKCP18. It is therefore necessary to assess the impacts of such climate change on our deployable output.

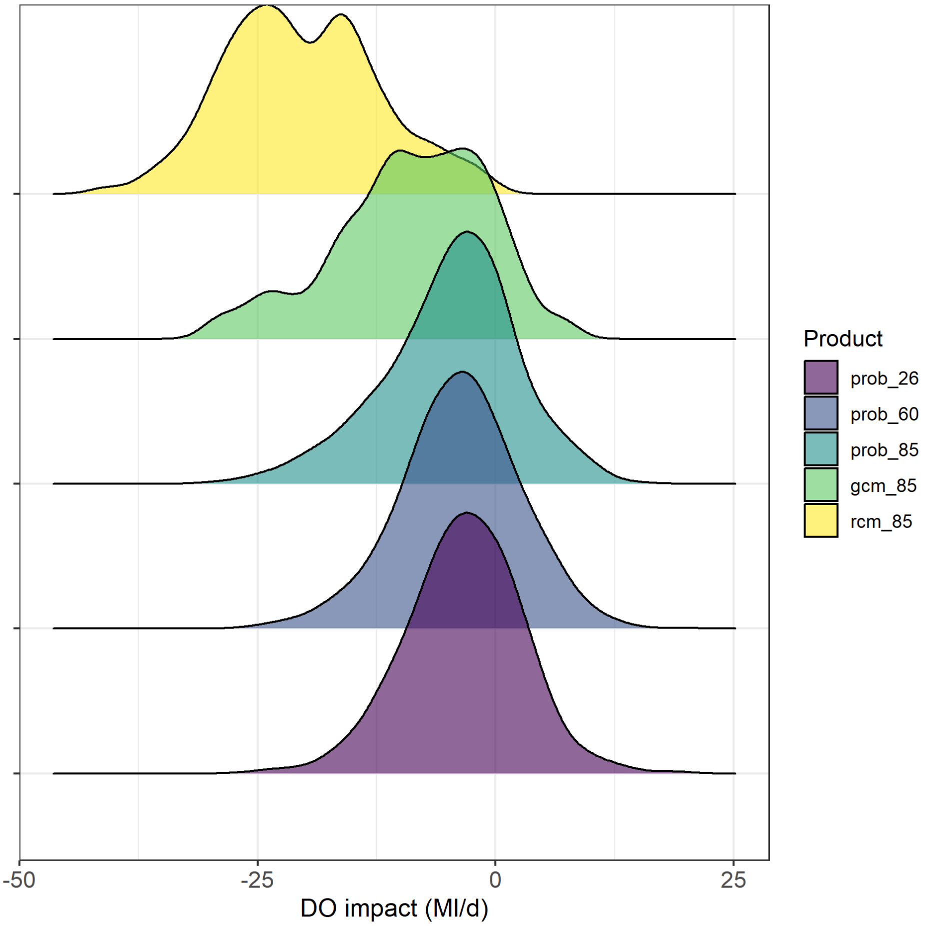
Following regulatory guidance, we carried out a new Basic Vulnerability Assessment to understand our vulnerability to climate change, considering the plan changes driving this round of planning. The assessment resulted in a low level of vulnerability for DYCP assessment, and a medium level of vulnerability for DYAA assessment. However, given an anticipated need for an increased level of investment, we decided to undertake a higher level of climate change impact assessment, using the full range of uncertainty within the UKCP18 data product[19] than suggested in Stage 2 of the guidance[20].

For our climate change impacts modelling, we perturbed the input rainfall and PET for our catchment models with 328 sets of climate change perturbation factors representing the alternative UKCP18 data products (RCM, GCM and probabilistic datasets, as well as alternative future emissions scenarios). We then ran these catchment models for extreme drought events and ran these inflows through stand-alone reservoir models and our groundwater models to assess the impact of climate change on Deployable Output. The perturbation factors were applied in the 2060s-2080s future time slice, and linear scaling has been used to derive time-series of DYAA and DYCP climate change impacts, for low, central, and high DO impacts, across the planning horizon.
The model assessment shows relatively little variation in the impact of climate change on DYCP DO across UKCP18 data products. In contrast, there is a more negative impact of climate change on water availability across UKCP18 products in the DYAA scenario (Figure

[18] Met Office (July 2021) UK Climate Projections: Headline Findings: ukcp18_headline_findings_v3.pdf (metoffice.gov.uk), last accessed June 2022.
[19] As also required by Ofwat's Strategic Planning Framework (PN 25/22 Price Review 2024: Ofwat sets out framework to deliver better outcomes for customers and the environment - Ofwat)
[20] Water Resources planning guideline supplementary guidance – climate change, External guidance: 18647, Published 18/03/2021.

4-3). The majority of this is attributed to impacts on reservoir DO compared to groundwater systems. However, in both scenarios, the climate change impacts are relatively small compared to the overall respective Distribution Input.

Figure 4-3: Example of distribution of climate change impact on DO for the DYAA from the different UKCP18 products*



*prob = probabilistic data products; gcm = global climate model; rcm = regional climate model; 26, 60 and 85 refer to the 2.6, 6.0 and 8.5 representative concentration pathway scenarios representing alternative potential futures of greenhouse gas emissions.

To capture the range of impacts across products, the following datasets have been selected for the low, central, and high climate change impact future scenarios, on DO for the future period of 2060-2079. These are the same for both the DYAA and DYCP scenarios:

- Low – median of the probabilistic RCP 2.6 distribution
- Central – median of the probabilistic RCP 8.5 distribution
- High – mean of the median RCM RCP 8.5 distribution and GCM RCP 8.5 distribution.

The low and central scenarios map to the low and high scenarios required by Ofwat[21], so our high scenario therefore represents a higher stress test to cover the range of uncertainty represented in the UKCP18 dataset.

[21] Ofwat (April 2022) PR24 and beyond: Final guidance on long term delivery strategies.

4.2.5 Sustainable Abstraction

Our region contains a wide range of important landscapes and habitats, and we take our responsibility to minimise the impact of abstraction very seriously. The main way of ensuring our water supply activities do not have an unacceptable adverse impact on the environment is through abstraction licensing. Our licences specify the maximum amount of water that can be taken each day and each year, and in some cases also link abstraction rates to flow thresholds in local watercourses. At other sites, when river flows are low, we add water that we take from the ground to the river, this is termed stream support. We have also committed to the Abstraction Incentive Mechanism (AIM) at some sites where we reduce abstraction at key sites during periods of low groundwater and river flows to protect the local river environment.

At some sources, concerns have been raised that the existing licences do not adequately protect the environment – in response, we have worked in partnership with the Environment Agency (EA) and Natural England to investigate the issues and identify mitigation measures where appropriate. In several of these investigations, unacceptable impacts on the environment had been identified and the EA have then required changes to licence conditions (i.e. reductions) or other mitigation measures have been made. A summary of the changes required is outlined in Table 4-1 in the Supply Forecast Technical Appendix.

Since the publication of our draft plan, further engagement with the Environment Agency under the WINEP programme has led to updates to the forecast of licence changes based on revised information from ongoing investigations. However, for the AMP6 and AMP7 studies, some outcomes are not yet concluded and therefore the expected sustainability reductions have not been confirmed. These expected changes have been accounted for as sustainability reductions alongside future reductions form Environmental Destination reductions through scenario analysis.

In collaboration with the Environment Agency, potential future licence losses, and thus DO losses may occur as a result of Sustainability Reductions which are largely related to the Water Industry National Environment Programme (WINEP) and the longer-term Environmental Destination Programme. We have worked closely with the Environment Agency through the development of this plan to identify scenarios of potential future licence losses incorporated into our supply-demand balance, reflecting uncertainties in the potential licence reductions required (Table 4-3; Figure 4-4). For these scenarios, we have included a low, central and high scenario to reflect this uncertainty. We have also undertaken sensitivity analysis to explore delaying licence changes beyond 2035. Further details can be found in the Supply Forecast Technical Appendix.

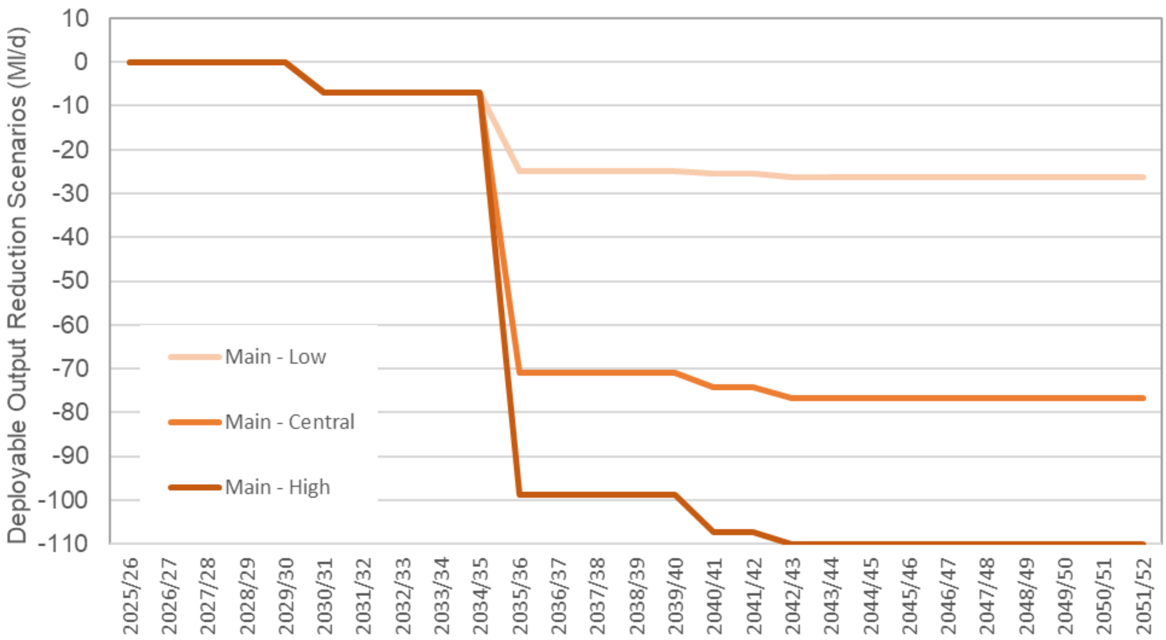
Further work will be undertaken in AMP8 (and AMP9) to reduce the uncertainty in the licence changes required to deliver sustainable abstraction and inform our adaptive plan regarding the scale of future investments required to be delivered for 2035.

No licence losses/DO losses have been proposed earlier than 2035, with the exception of changes at Mere in relation to the stream support scheme, as there is uncertainty on the scale of future licence in some river catchments which needs to be established between 2025-2030 as part of our adaptive planning process. It is important to establish these changes so that holistic solutions can be found to all needs within a catchment, which depends on outcomes of further investigations in AMP8 to ensure there is an integrated understanding of need and the appropriate solutions. Furthermore, a number of these licence changes are in very specific parts of our supply system that will require network investments (new transfers) to move water from new schemes, demand reductions and elsewhere in the supply system to make these changes without causing local security of supply issues. These schemes will take AMP8 and AMP9 to deliver. The greatest DO losses in both scenarios will be in the South and East of our supply region, particularly in the Chalk catchments of the Stour.

Table 4-3: Total DO losses in the baseline SDB resulting from licence reductions in 2035 and 2050

	DYAA			DYCP		
Source	Low	Central	High	Low	Central	High
Sustainable abstraction (WINEP AMP7) and Environmental Destination for 2035	-17.61	-53.69	-87.58	-25.02	-70.91	-98.67
Sustainable abstraction (WINEP AMP7) and Environmental Destination for 2050	-17.69	-60.13	-102.36	-26.35	-76.84	-109.96

Figure 4-4: Main Licence Change Scenarios with alternative scenarios reflecting uncertainty in future licence changes under DYCP scenario. Note: Deployable Output loss shown.



4.2.6 Licence capping and Hampshire Avon

Wessex Water were notified on the 15th November 2021 of the EA's intention to consider capping abstraction licences. Following our plan consultation period, we have had further engagement with the Environment Agency and Natural England through the WINEP process, and also following receipt of representations on the draft version of this plan. Specifically Natural England have raised concerns about the impact of our current abstraction on the integrity of the River Avon Special Area of Conservation and Sites of Special Scientific Interest (SSSI) in the catchment, as well as the impact on the Somerset Levels and Moors Ramsar site. Of key importance was the requirement from the EA and NE to ensure first that new growth in the catchment is not met through additional abstraction, so that abstraction would remain at recent actual levels, and second, that abstraction will be reduced as soon as practicable. A key cited driver is to keep abstraction at recent actual levels is to avoid the imposition of "Water Neutrality" which may inhibit planned development growth.

We have liaised with the EA to calculate our recent actual abstraction in the five-year period since the implementation of the grid project in 2018 for the Hampshire Avon and compared this to our proposed abstraction in the Water Resources Management Plan Deployable Output (DO) calculation to understand the extent to which our WRMP DO effectively includes headroom to meet new catchment growth. Our annual average DO in our WRMP for the catchment sources totals 62.36 Ml/d compared to a recent peak actual abstraction of 62.87 Ml/d (in 2021-22). As a result of licence changes already implemented in the catchment in 2018, that led to the construction of the grid project, we already abstract to these new licences, and therefore there is no proposed headroom on our licences in the WRMP that is available to meet new growth at the catchment level.

On an individual source level, we have agreed to cap abstraction at Shrewton source at the recent actual level of 1.26Ml/d. The only other source in the Hampshire Avon where recent actual abstraction is notably below that proposed in the WRMP is at Fonthill Bishop where recent actual abstraction is 90% of that proposed in the WRMP. This is as a result of winter water quality issues that have, in recent years, reduced available abstraction. We are currently implementing a blending scheme at this site to increase winter abstraction from the source. Assessment of the impact of the source at full abstraction at the top of the Hampshire Avon SAC in the Nadder (e.g. at the point of maximum potential impact) shows at full licence the abstraction is within 10% at Q95 and therefore compliant with CSMG (Common Standards Monitoring Guidance).

Our preferred plan shows how we will implement a demand management strategy to reduce leakage and demand through water efficiency visits and smart metering, with particular focus on the Hampshire Avon catchment to ensure new growth in the catchment can be met through existing abstraction (both within the catchment and elsewhere using the integrated grid). Further details can be found in the Upper Hampshire Avon Water Resources Strategy and the Demand Management Strategy technical appendix.

In regard to headroom on our existing licences above our recent actual abstraction, we have agreed to take this forward with the Environment Agency in 2023/24 to cap abstraction at recent actual levels to provide further assurance regarding sustainable abstraction, prior to the implementation of demand reductions in the short term, and longer-term supply solutions from 2035.

We have worked closely with the EA to identify these licence changes, and have ensured that in deriving the overall sustainability reductions in the supply demand balance, we have not double counted licence capping and environmental destination licence changes.

4.2.7 Raw Water Losses and Operational use

Any water abstracted from our sources that does not enter distribution as it is 'used' during treatment processes and other losses is known as Treatment Works Operational Use (TWOU). The total volume of water lost during the treatment process was calculated at all of our sites. We excluded any volumes that coincided with a logged outage as this would result in a double counting of the allowance already made in the outage allowance. Values of 2.96 Ml/d and 3.01 Ml/d have been determined for 2019-20 and 2020-21, respectively. We selected to use the 2020-21 figure as the baseline and forecast in the Supply Demand Balance model as operational use would not be significantly impacted by any upcoming maintenance programmes, and no options to reduce TWOU have been considered due to its small volume.

4.2.8 Bulk Supplies

Wessex Water is not entirely isolated from supply networks owned and operated by neighbouring companies. Water is imported and exported between companies, but volumes are often small due to the rural nature of the boundaries, resulting in small infrastructure connections. The volumes are reconciled each year and submitted to our regulator, Ofwat.

Since WRMP19, our total number of bulk supply agreements has changed with the removal of one of our imports and the termination of one of our exports. In addition, the volume of water that we export to New Appointment and Variation (NAV) sites is forecasted to increase as 30 new agreements have been included, reporting from 2022-23. For completeness, we have included any transfers which are not routinely used, are inactive, or used for resilience purposes, but reported their expected DYAA and DYCP volumes as zero.

Discussions have been held with neighbouring companies to confirm and agree a DYAA and DYCP value to include in the WRMP24 planning assumptions. As per WRMP19, the Bristol Water import into Bath at Newton Meadows will drop from 11.37 to 4.4 Ml/d post 2024-25 in the DYAA scenario. No other changes to the agreements outlined in WRMP19 are expected over the planning period in both scenarios and therefore the baseline numbers have been used throughout the entire planning period (Table 4-4).

Table 4-4: Total volumes of water imported and exported to the Wessex Water network in both the DYAA and DYCP scenario, excluding new NAV sites.

	DYAA (Ml/d)		DYCP (Ml/d)
	Baseline	Post 2024/25	Baseline
Imports	15.04	8.07	15.48
Exports	2.16	2.16	2.65

For the new NAVs, all sites are currently in the process of development and so demand is not reflective of the volumes stated in the agreements for the maximum properties on site. Due to limited useable metered data, our NAV demand forecasts are calculated based on the build rates provided to us by developers, adjusted as necessary, Wessex Water's measured household PHC, a leakage estimate and an adjustment for headroom. The forecasted exported volume is therefore forecasted to increase over the planning period (Table 4-5).

Table 4-5: Total volume of water exported from the Wessex Water network both in the DYAA and DYCP scenario from 2022/23 up to 2029/30, including new NAV sites.

	Baseline	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
DYAA	2.21	2.33	2.66	3.22	3.74	4.08	4.33	4.56	4.77
DYCP	2.65	2.79	3.17	3.81	4.38	4.72	4.99	5.26	5.52

4.2.9 Veolia Water and MoD

Veolia Water and the Ministry of Defence (MoD) sites situated within the Hampshire Avon catchment are also facing sustainable abstraction licence reductions. We currently receive two bulk imports from Veolia at Tidworth and Leckford. Through ongoing engagement between abstractors and regulators in the Hampshire Avon, our baseline supply-demand balance has accounted for additional need at the MoD sites, of 2.27Ml/d from 2035/36.

We have liaised with Veolia water through WINEP investigations that have completed between the draft and final plan development to understand the potential for changes to the import and explore alternative scenarios as part of the WRMP. The preferred solution to meet Veolia's needs is a stream support option for the nine-mile river.

Based on scenario analysis by Veolia Water and from the MoD we have considered in the plan alternative scenarios where an additional 9.84Ml/d is needed in the Hampshire Avon by 2035.

4.2.10 Drinking Water Quality

In order to protect public health, the Water Supply (Water Quality) Regulations, enforced by the Drinking Water Inspectorate (DWI), include mandatory standards for the quality of drinking water and the management of risk. We aim to uphold these standards at all times. Therefore, it is essential that our drinking water quality obligations are fully considered in the long-term planning of water resources.

Our Strategic Direction Statement[22] describes our long-term priorities which reconfirm a commitment to providing the highest quality drinking water. The actions points include use of source-to-tap drinking water safety plans, continued use of catchment management, and proactive maintenance of our sources and water treatment centres.

A combination of methodologies is used in the long-term planning process and the identification of proposals for drinking water quality improvements. Drinking Water Safety Plans (DWSP) enable us to understand risk to water quality from source to tap. For these, we continually assess the risk at the catchment, treatment, distribution, and customer stage and use the data to prioritise investment and inform a rolling programme of capital

[22] Our strategic direction | Wessex Water

maintenance and other interventions. Particular strategies that arise from our DWSP reviews include catchment management to mitigate rising nitrates and pesticides, cryptosporidium risk reduction, and strategic maintenance.

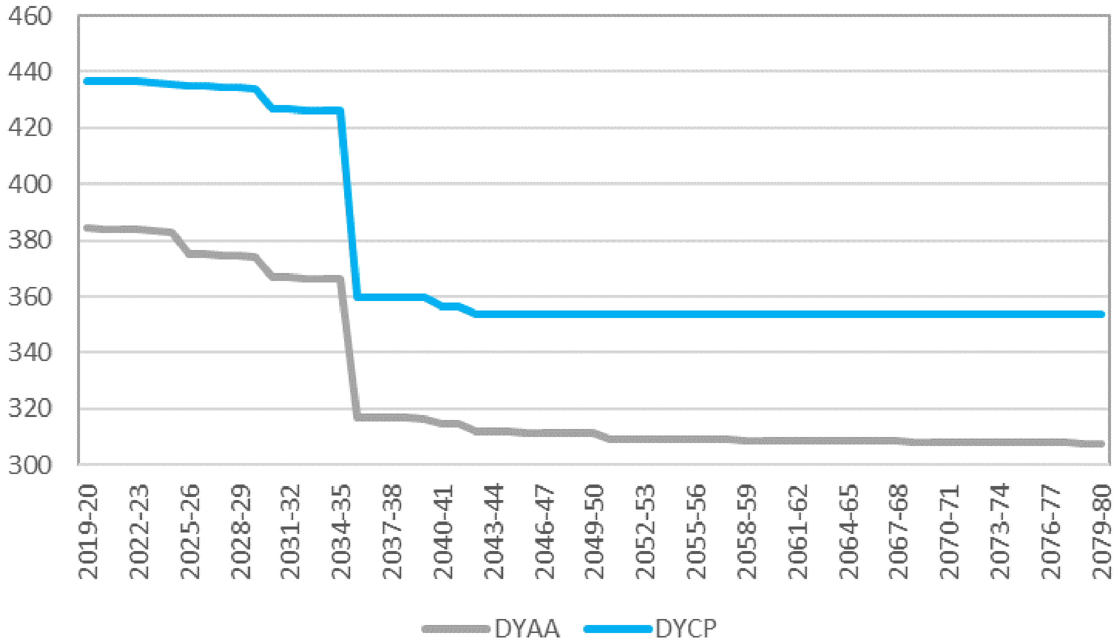
To reduce the risk of nitrates and elevated pesticides, for the last 17 years we have been taking a catchment management approach over the traditional costly carbon-intensive approach of building new water treatment processes. This approach often involves working closely with farmers in the areas around our reservoirs and boreholes and actively monitoring and managing nitrate levels. As the method itself has a greater risk than the traditional approach, we have sought to mitigate by interconnecting our sources as far as possible, particularly through our integrated supply Grid developments.

4.2.11 Total Water Available For Use

The Total Water Available For Use (TWAFU) is calculated for each reporting year over the planning period to account for changes in climate change and sustainability reductions. This value is the subtraction of climate change impacts, sustainability losses, raw water losses, outage, and bulk transfer exports from the total source Deployable Output, plus the bulk transfer imports.

Figure 4-5 shows TWAFU decreasing over the planning period in our central DYAA scenario and DYCP scenario. Climate change causes the gradual decrease over time in the DYAA forecast, and a loss of imported volumes causes a drop in 2025-26 in the DYAA scenario. All other reductions are as a result of licence changes, most notably in 2035-36.

Figure 4-5: Timeseries of TWAFU over the planning period for the DYAA scenario

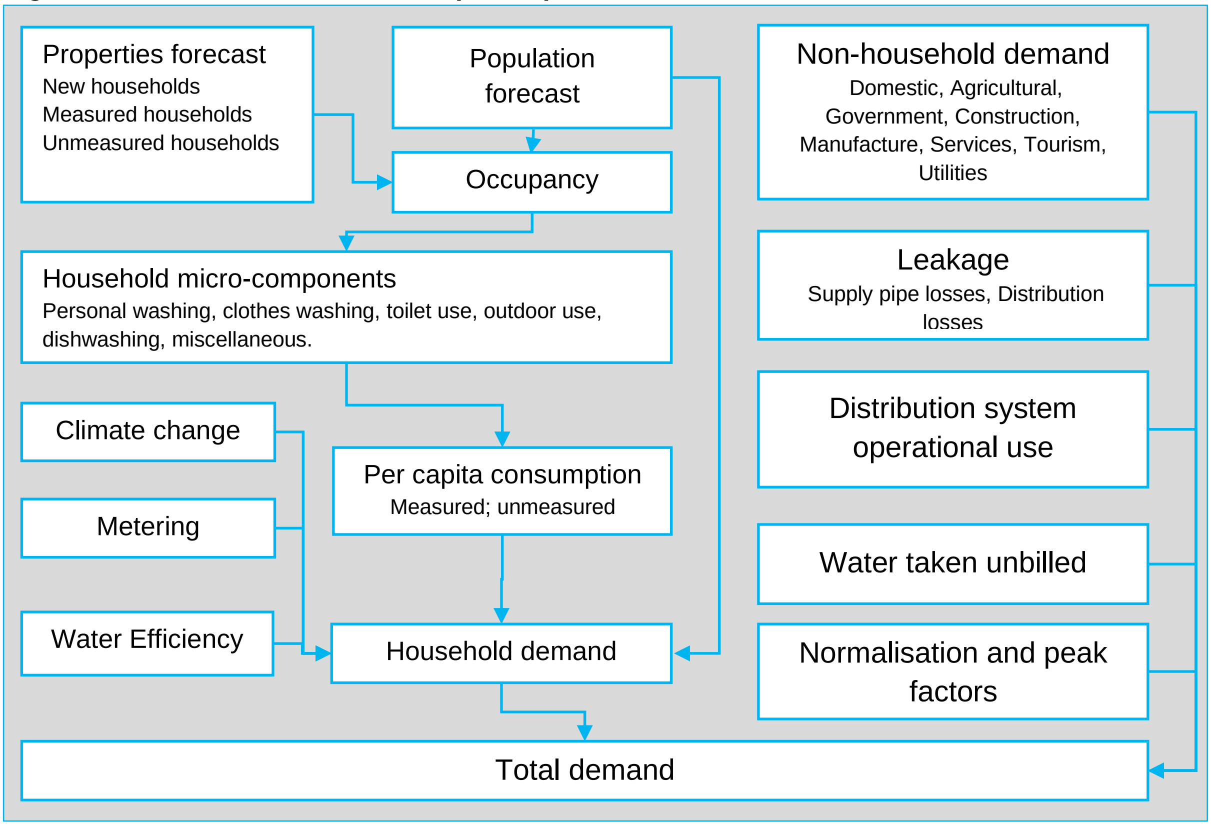


4.3 Water Demand Forecast

4.3.1 Overview

To understand and project how much water we will need to put into our distribution network each day (known as 'Distribution Input', or DI), we must forecast our future water demands. The demand forecast is built up from component forecasts of population, property, household water use patterns, commercial usage, leakage, and other minor elements (Figure 4-6). It takes account of projections made by Local Authorities of expected housebuilding rates in our area, the impact that increased metering and water efficient behaviours by our customers will have, and an allowance is made for the possible impact that climate change may have on water usage.

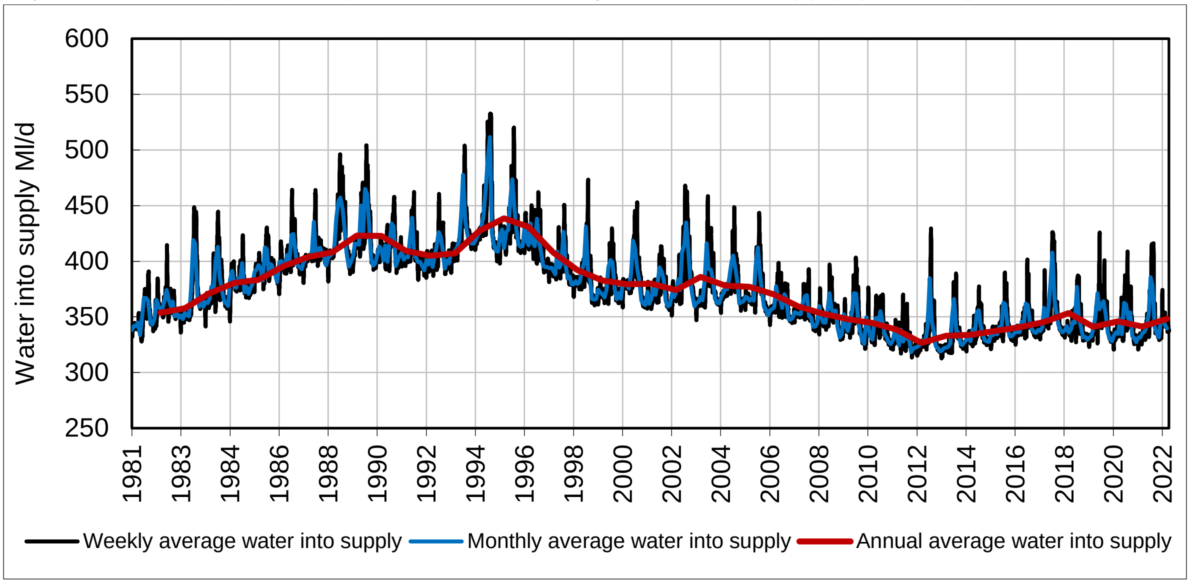
Figure 4-6: Demand forecast development process



A demand forecast has been generated for a Dry Year Annual Average (DYAA) and Dry Year Critical Period (DYCP). Where needed, a Low, Central, and High forecast for each component of demand has been determined to support the assessment of uncertainty and scenario analysis.

The demand for water in the Wessex region has followed rising and falling trends through time but has generally decreased since the mid-1990s, as illustrated in Figure 4-7. Despite the population in our area rising from 1.1 million in 1994/95 to over 1.3 million in 2021/22. Peak week demands have fallen from approximately 525 Ml/d to around 425 Ml/d, and annual average demands have reduced from around 425 Ml/d to less than 350 Ml/d. This reduction in demand has occurred due to reduced leakage from the network, customers switching to a metered supply, increased efficient use of water by customers in homes and businesses, and reduced commercial demands following closures of some large user industrial sites.

Figure 4-7: Weekly, monthly, and annual average water into supply (demand)



We have made a projection of future demands using 2019-20 as the base year, as this is the first year prior to the impact of Covid-19. Baseline demand is divided into categories for forecasting purposes (Table 4-6) and highlights household consumption as the main demand component, comprising 54% of Distribution Input. Nearly 70% of households were metered in the base year so measured consumption is the main component of household demand.

Table 4-6: Base year 2019/20 (un-normalised) water balance components

Water Balance Component	Demand (Ml/d)	Demand (%)
Measured Non-Household Consumption	75.0	22.4%
Unmeasured Non-Household Consumption	4.1	1.2%
Measured Household Consumption	101.2	30.0%
Unmeasured Household Consumption	80.0	24.0%
Water Taken Unbilled	4.4	1.3%
Distribution System Operational Use	3.1	1%
Total Leakage	67.9	20.1%
Total Distribution Input (Demand)	335.7	-

4.3.2 Peak factors

Demand varies both seasonally, typically increasing during drier periods with lower rainfall and during sunnier (and typically warmer) periods, and over the longer term, particularly during dry years. Isolating the effect of long-term trends from annual variability in weather conditions is necessary to understand what demand would be today (reflecting current usage and leakage), under a low-rainfall year, and during a critical dry period.

We achieve this by first normalising the base-year demand by removing the influence of weather in that year and then uplifting the normalised demand using peak factors to derive demand under dry weather conditions for the DYAA and DYCP planning scenarios. We do not apply normalisation or peak factors to minor water balance components such as run to waste and treatment works operational use, nor to leakage as they are not considered to be influenced by peak demands.

We derived peak factors through analysis of household and non-household demand using different datasets available to us which each have their strengths and weaknesses in terms of temporal resolution and historical coverage. We applied a top-down bottom-up approach to reconcile the peak factors derived from these different products, to get a more robust estimate of demand under dry and hot conditions. Uncertainty in the peak demand was also included in headroom assessment.

4.3.3 Population, Properties and Occupancy

In accordance with section 6.3 of the Water Resources Planning Guideline (2021)[23] and the UKWIR supporting guidance[24], we have developed forecasts of the growth in properties, population, and occupancy.

Base year population and property data determines household and non-household occupancy, which in turn impacts upon overall demand. We disaggregate these figures into measured and unmeasured households/non-households, as summarised in Table 4-7, to structure our demand forecast. Our base year property data is derived from our billing system property records and our base year population is calculated following adjustments to the 2020/21 Office of National Statistics (ONS) mid-year population estimate, as outlined in the Demand Forecast technical appendix.

Table 4-7: Base-year properties and population supplied (as per water balance for 2020/21)

Property type	Properties	Population	Occupancy
Measured households	392,636	824,257	2.10
Unmeasured households	174,545	492,223	2.82
Total households billed water	567,181	1,316,480	2.32
Measured non-households	40,991	22,263	0.54
Unmeasured non-households	3,149	18,184	5.77
Total non-households billed water	44,140	40,447	0.92
Void properties	14,120	NA	

We have based our household property and population forecasts on local plans published by local councils and unitary authorities that overlap with our supply area. However, the forecast period of local plans typically only covers 12 years into our WRMP planning period. So, to extend our forecasts up to our 2080 planning horizon, we have applied trend-based forecasts derived from the Office for National Statistics (ONS) to compare against local authority (LA) derived trajectories. Any future uncertainties have then been accounted for through low, central, and high household population and property forecasts which have been produced based on the uncertainty range of ONS forecasts, LA trajectories, and uncertainty

[23] Environment Agency (2021) Water Resources Planning Guideline, Version 9: For publishing
[24] UKWIR (2016) Population, Household Property and Occupancy Forecasting (15/WR/02/8)

bounds produced following supporting UKWIR guidance. We have also updated our properties and population forecast to reflect the current and forecast impact of New Appointments and Variations (NAVs) on our water demand, and new population and properties in our supply area, and made updates to the forecast reflecting further discussion with Wiltshire Country Council on their latest growth forecasts in the Hampshire Avon area. The resultant population and properties forecasts are shown in Figure 4-8 and Figure 4-9.

Figure 4-8:Total property forecasts for the Low, Central and High forecast

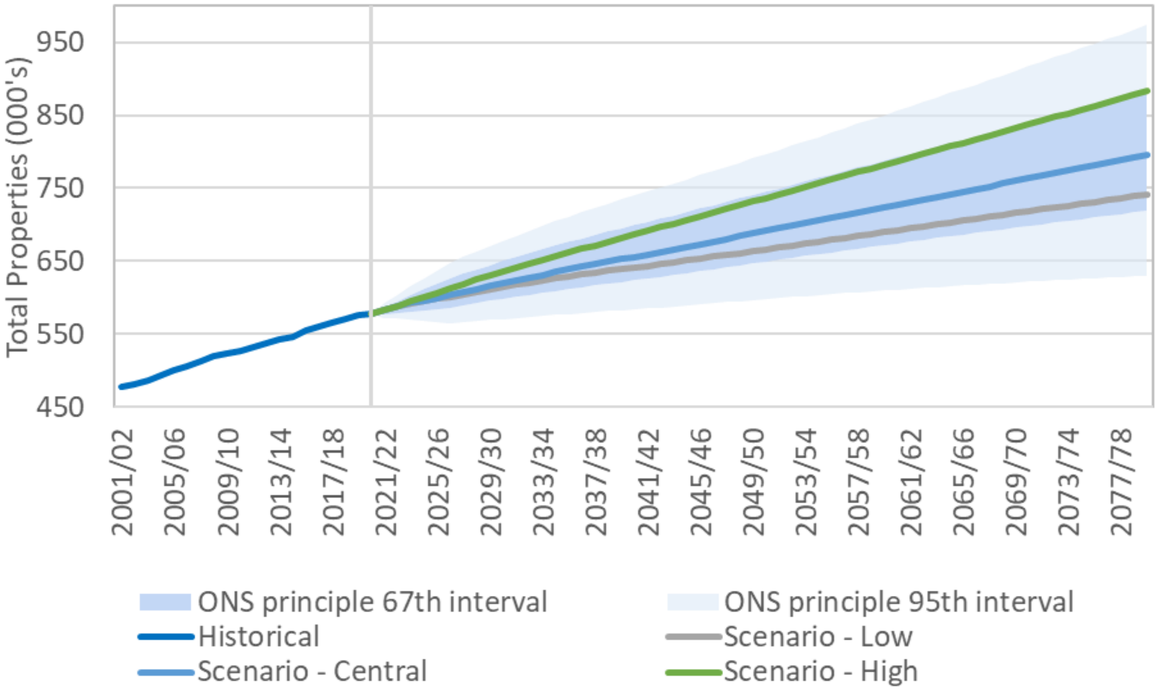
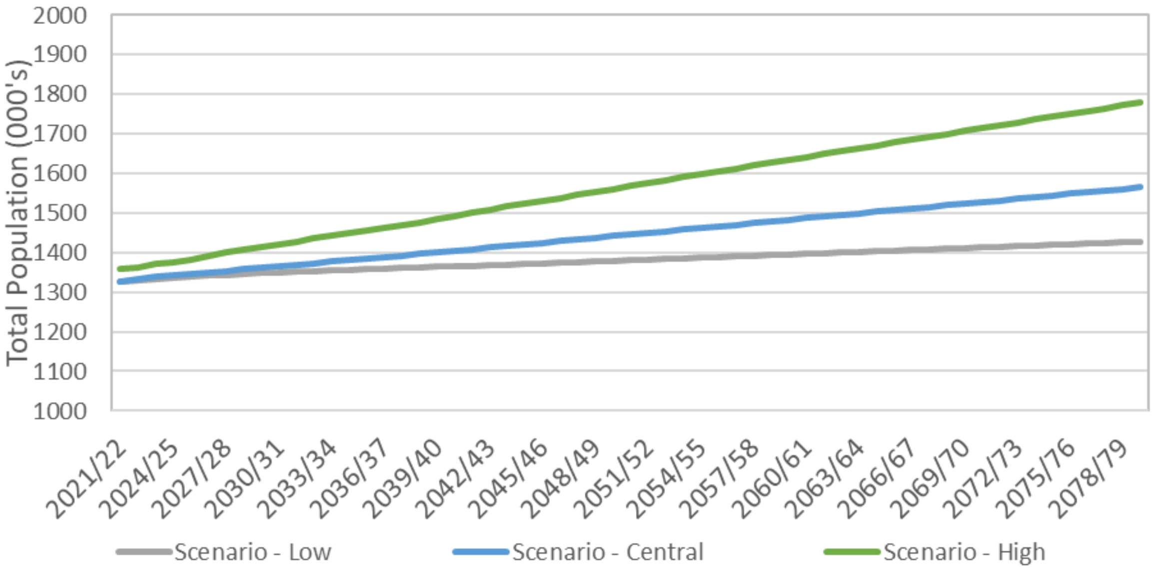


Figure 4-9: Selected Low, Central and High population scenarios

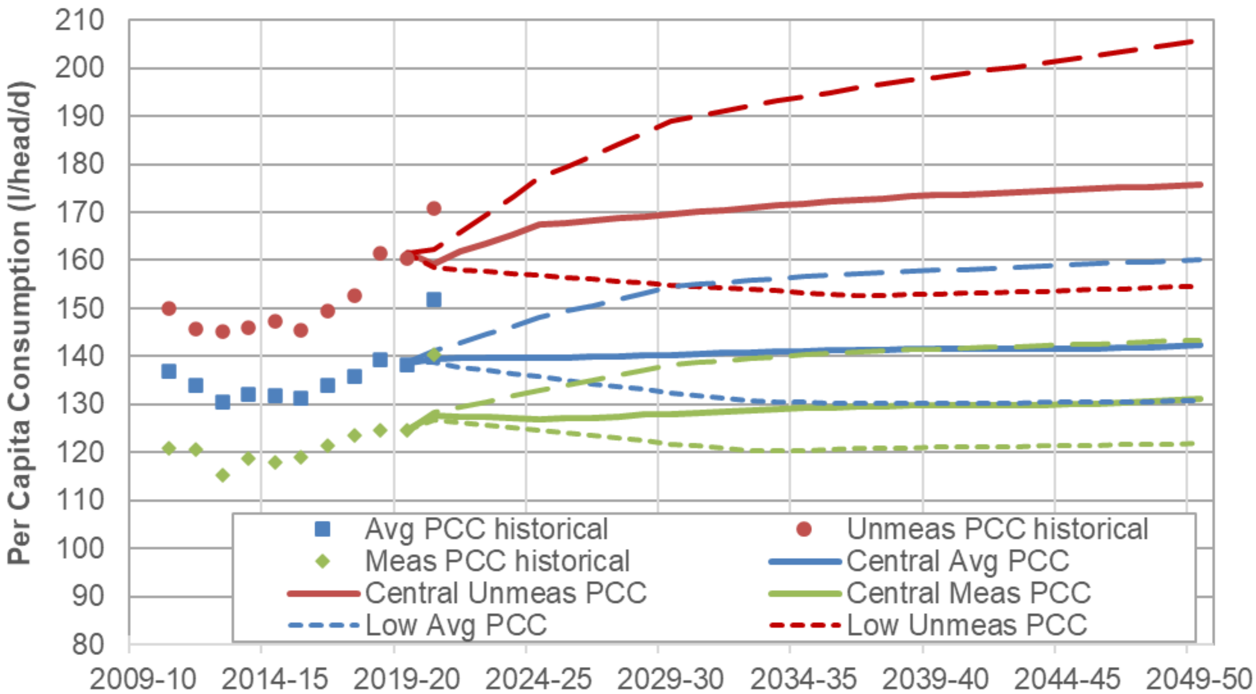


4.3.4 Household Demand Forecast

In parallel to determining the size of the population and the number of households we expect to supply in our region, we need to also consider how much water on average each person will require (PCC or per capita consumption) and how these demands may change into the future. We have seen a recent upwards trend in PCC, which was driven by the Pandemic and an increased number of people working from home[25]. This has however been followed by the cost-of-living crisis driven by rising energy prices, rising inflation generally and some bounce-back in office working. We have seen some evidence of reductions in average PCC in our most recent data from 2022-23 and into 2023-24 and have updated our final plan demand forecast to reflect this most recent data. Our household demand forecast has built on the analysis undertaken as part of WRMP19, where we have updated and re-applied our micro-component model to model household consumption in the future.

How domestic water consumption will change in the future is highly uncertain due to a variety of factors outside of our control that influence water use behaviours, including changes to adoption of water efficient appliances, different water use habits of different generations, particularly of young adults, and whether their increased shower use will continue as they become adults and the next generation of bill payers, as well as uncertainty in how climate change will impact on outdoor activities like garden watering and leisure use. To account for these uncertainties we have developed low, central, and high forecasts of demand in the future for measured and unmeasured household customers, which are incorporated into our scenario analysis (Figure 4-10).

Figure 4-10: Normal year PCC low, central, and high scenario trends for existing customers



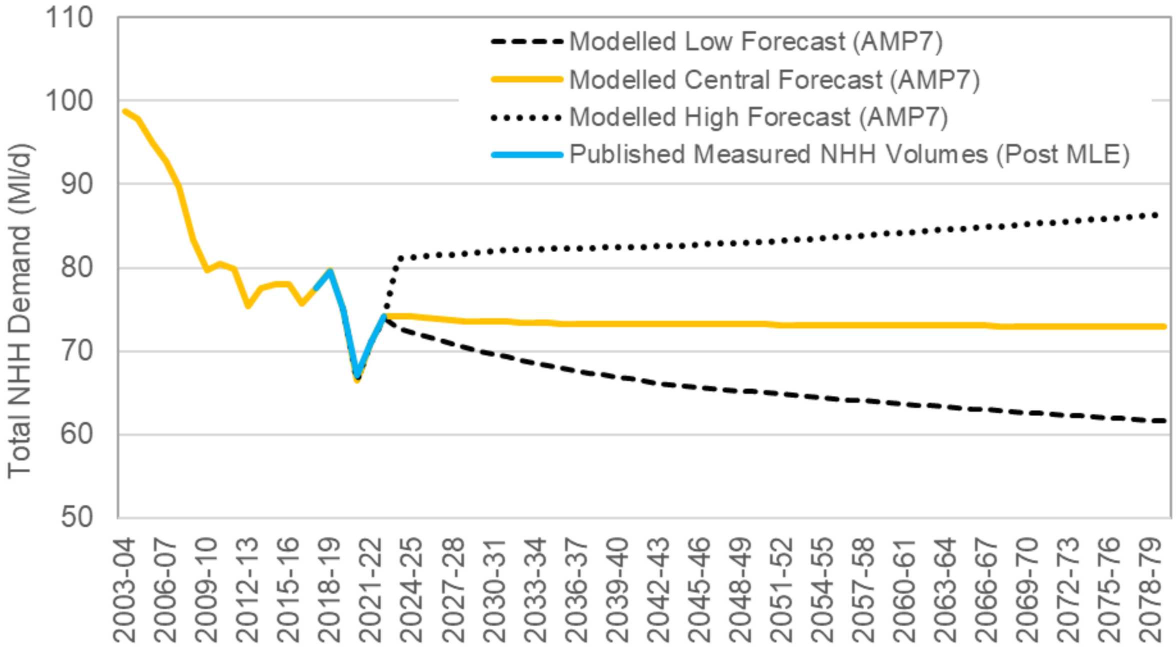
25 Note: none-household demand has seen an opposite trend, implying that during the pandemic there has been a move in water consumption from households to non-households.

4.3.5 *Non-Household Demand Forecast*

Non household (NHH) demand makes up a significant contribution to our overall demand, of which the majority is from measured NHH with a small proportion being unmeasured. Until 2019-20, NHH demand has remained relatively flat in recent years, but decreased significantly in 2019-20 and 2020-21 as a result of a large proportion of NHH sectors closing down under national lockdown restrictions during the Covid-19 pandemic. We have reviewed our forecast since the publication of our draft WRMP to reflect the most recent data from 2023-24: since the publication of that forecast, we have seen a post-covid rebound in non-household demand close to pre-pandemic levels, and have updated the forecast accordingly. However, emerging issues concerning world food security may result in a higher proportion of food being grown in the UK, or a growth in more water intensive crops due to a changing climate, causing an increase in water use in the sector. Therefore, there is a high level of uncertainty in NHH demand which has been reflected in our forecasting approach.

The non-household forecast is based on the measured NHH outturn data for 2019-20 which is pre the significant influence of Covid-19 on demand, which is 75.03 Ml/d. Our consumption forecast was determined through econometric analysis to identify the historical relationship between NHH water demand and a range of explanatory factors such as industrial output, employment, and efficiency of water use. For each NHH sector (agriculture, construction, manufacturing, services, utilities, and public sector), a Low, Central and High demand forecast has been selected and the sum of the sectors is the total forecast for each scenario. Each of the forecasts were then adjusted to account for meter under registration, other water balance adjustments, and finally to align the 2019-20 forecast with the base year (2019-20) post Maximum Likelihood Estimation (MLE) volume. The overall Low, Central and High forecasts which form the basis of the measured NHH demand model inputs are presented in Figure 4-11.

Figure 4-11: Overall Low, Central and High Measured NHH forecasts



Unmeasured NHH demand represents a small proportion of total demand; the 2019-20 base year volume was 4.1 Ml/d in comparison to the 75.03 Ml/d for measured NHH. The approach to calculating unmeasured NHH is consistent with the annual water balance where an average per property allowance is generated (based on equivalent measured NHH types such as commercial or public sector). The overall volumes are forecast to decrease from around 2.5 Ml/d in 2024/25 to 0.2 Ml/d in 20179/80 due to the drop in number of unmeasured NHH properties across the planning period.

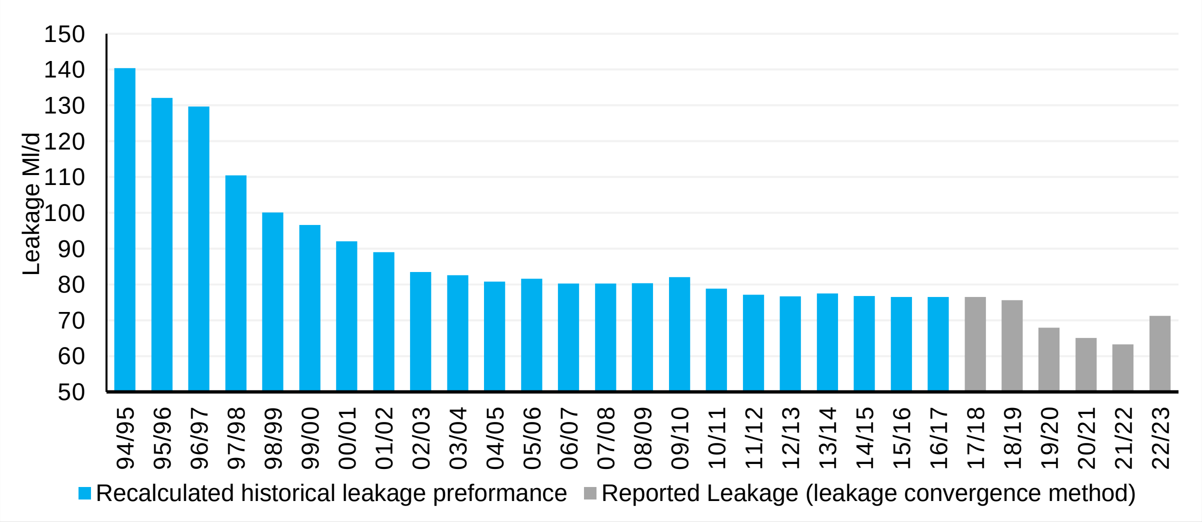
The WCRG commissioned a study[26] into potential additional demand from private supplies, agriculture and mining in drought conditions which may wish to switch to a Wessex Water supply. However, partly due to the time delay in connecting a customer to the supply network (this could be 2-5 months depending on the scale of work and concentration of applicants in specific supply regions) it is unlikely that this scenario would come to fruition, so no demand allowance has been made.

4.3.6 Leakage and other losses

Since the mid-1990s, we have halved the amount of water that leaks from our network and continued the downwards trend despite our network growing each year by approximately 30 km of new water mains.

The long-term leakage trends since 1995 are presented in Figure 4-12. The 2017-18 to 2022-23 numbers are actual reported leakage figures as per the updated leakage consistency guidelines[27] for AMP7 in 2020-21 which have been restated in the Ofwat Annual Performance Review in 2020-21 and 2021-22. The leakage figures from 1999-00 to 2016-17 have been back calculated based on the difference between the leakage figures between the old method and the new method for leakage consistency, and therefore should only be considered indicative of leakage trends. Therefore, these numbers are not comparable to those published in WRMP19 where the leakage convergence method was used.

Figure 4-12: Leakage reduction since 1995



[26] ARUP. West Country Water Resources Assessment of Water Demand in Private Water Supply, Agriculture (Livestock) and Mining sub sectors to inform the Regional Plan Final Report. June 2022.
[27] Reporting guidance - leakage - Ofwat

Our baseline leakage forecast assumes a continuation of current leakage strategies such that we will achieve the end of AMP 2024-25 target of 63.79Ml/d.

The guidance[29] sets out ambitious leakage reductions, including a target of leakage being 50% lower than in 2017-18. Further information on options to reduce leakage beyond the baseline are outlined in the Options Appraisal and Supply-Demand balance, decision making and uncertainty technical appendices.

Other minor demand elements which make up the water balance include Distribution System Operational Use (DSOU), other legal uses of water such as fire authorities and standpipes, and other illegal uses such as void properties and illegal standpipe use. DSOU is the intentional use of water in the operation and maintenance of our supply network, often related to meeting statutory obligations. Estimates are calculated in line with the leakage convergence methodology, with DSOU typically representing a small component of demand, around 1-2%, which has fallen over the last 15 years from 6.5 Ml/d in 2002/03 to 3.11 Ml/d in 2019/20. The base year value of 3.11 Ml/d is consistent over the planning period with any potential increases in line with population growth likely being offset by increased operational efficiencies. The estimate of other water uses, both legal and illegal, is calculated as per the Ofwat leakage guidelines and assessed on a comparable basis each year. The WRMP24 estimate is based on the 2019/20 value of 4.38 Ml/d which is not expected to increase significantly over the planning period.

4.3.7 Climate Change

In the entire period of record since 1884 all of the top ten warmest years have occurred after 2002. Hot, dry summers in the UK, such as the ones experienced in 2018 and 2022, are becoming more common; by the mid-century, future warming predicts that they will be close to 50% more likely to occur[28]. Whilst the impact of climate change on water consumption is uncertain[29], the observed increase in demand with warmer, sunnier, and drier periods, suggests water consumption patterns may alter with climate.

A 2013 UKWIR study on the *impact of climate change on water demand*[30] examined the relationships between water use and weather variations for five case studies, as outlined in Section 10 of the Demand Forecast technical appendix. The weather demand relationships were combined with climate projection data from UKCP09 to estimate the future impacts of climate change on household demand in different regions. A central estimate of the impact of climate change suggests that demand will increase by 0.68% and 0.99% up to 2040, depending on the model used., yet both models suggest broadly similar impacts.

WRMP24 planning guidelines state that in most cases, the expected impact of climate change on demand is likely to be no more than 1% over the planning period, and should not

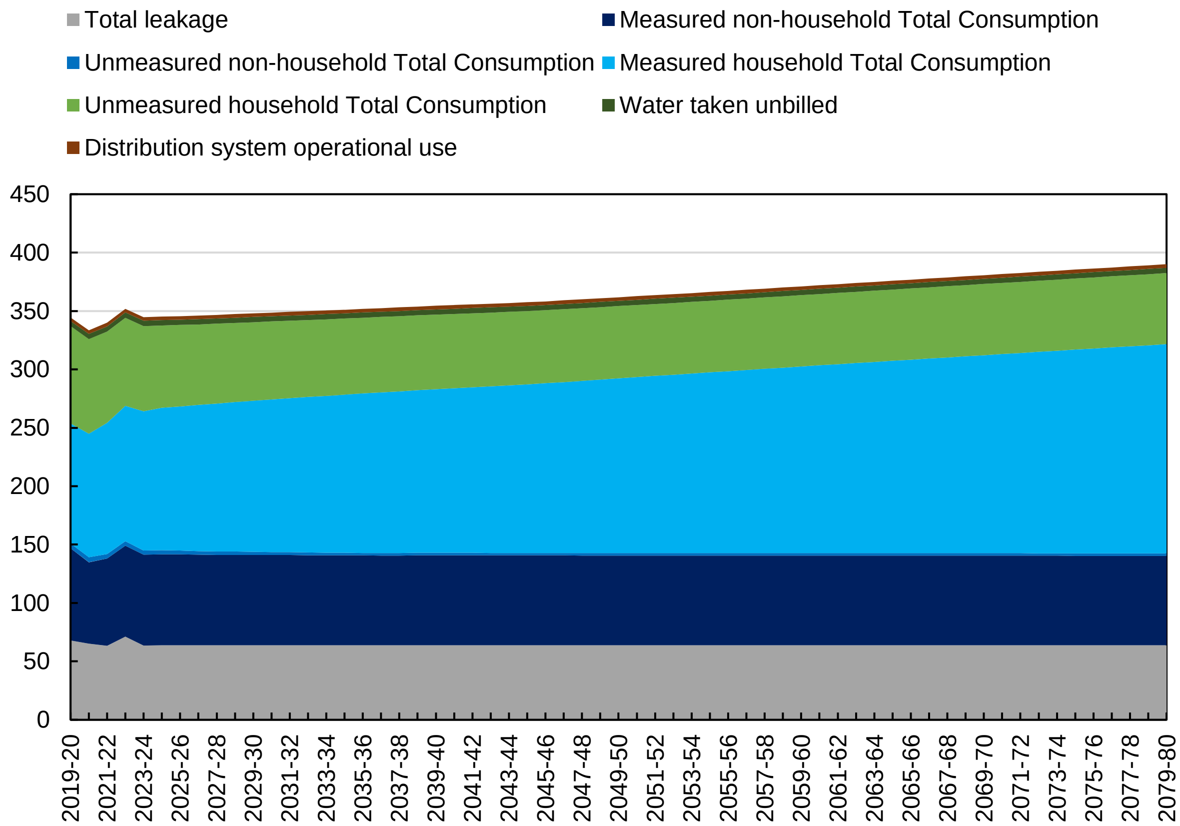
[28] Met Office UK Climate Projections: Headline Findings, July 2021: ukcp18_headline_findings_v3.pdf (metoffice.gov.uk).
[29] Water resources planning guidelines
[30] UKWIR (2013). Impact of climate change on water demand. CL/04.

be more than 3%, unless an exception can be demonstrated[31]. We have assumed a maximum 1% impact on household demand over the planning period up to 2079/80. We have also accounted for uncertainty in climate change impact on demand in headroom analysis as outlined in the Demand Forecast technical appendix.

4.3.8 Total Demand

For our central "most likely" planning scenario, overall demand is forecast to remain relatively stable with a rise of 53Ml/d from 2024-25 to 2079-80 (Figure 4-13). The main change driving this overall rise is an increase in measured household consumption, above and beyond a rise that would be expected as a result of unmeasured properties switching but resulting from changing overall forecast consumption trends.

Figure 4-13: Total demand forecast over the planning period in the DYAA scenario.



4.4 Target Headroom

To account for any uncertainty in our forecasted figures in all aspects of the supply demand balance calculation, we have carried out a headroom assessment. The headroom allowance is an additional amount of water available for use that acts as a safety buffer for our forecasts. As described in Section 4.1.1, future uncertainties have been accounted for through scenario analysis, and baseline planning uncertainties associated with our baseline uncertainties in supply and demand today have been accounted for in the headroom allowance.

[31] Water Resources Planning Guideline – December 2021

Headroom has been assessed for the uncertainty of reservoir and groundwater yield, bulk transfers, and the accuracy of both supply- and demand-side data. We have not made any headroom allowance for the uncertainty in vulnerable licences, including time limited licences, as per the WRMP guidance. Similarly, the impacts of gradual population and climate change on supply have not been accounted for in the headroom allowance and have instead been addressed in scenario analysis.

The change in headroom allowance over time is outlined in Table 4-8. The target risk profile was determined by selecting the 85th percentile in the base year, 2019-20, and then calculating the associated headroom value (14.41 Ml/d DYAA and 28.61 Ml/d DYCP) as a percentage of the dry year annual average distribution input for the year. This resulted in a headroom percentage of 4.2% for DYAA and 7% for DYCP scenarios. By fixing target headroom as a fixed percentage of distribution input through the planning period the uncertainty percentile decreases with time meaning that a greater level of risk is accepted in the future. The slight growth in headroom over time reflects the growth in distribution input in the future. For the DYAA scenario, supply uncertainties are the main component of headroom uncertainty, whereas for the DYCP scenario, uncertainty in groundwater yield is the main source of uncertainty, followed by uncertainty in peak demand.

Table 4-8: Headroom Allowances over time

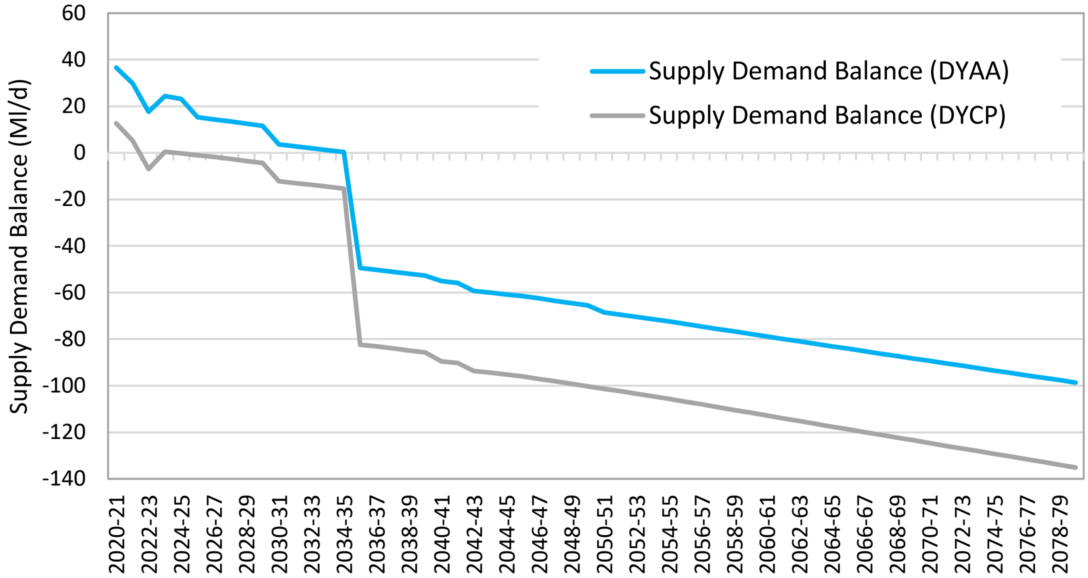
	2019/20	2024/25	2029/30	2034/35	2039/40	2049/50	2079/80
DYAA Headroom (Ml/d)	14.41	14.44	14.53	14.69	14.83	15.13	16.32
DYCP Headroom (Ml/d)	28.61	28.48	28.64	28.86	29.10	29.66	31.93

4.5 Baseline Supply Demand Balance

The Supply-Demand Balance (SDB) has been generated for our central “most likely” planning scenario alongside a range of alternative futures. The supply-demand balance under the central planning scenario is shown in Figure 4-14 for the DYAA and DYCP scenarios. This scenario looks at what would happen in the future if we did nothing apart from hold leakage steady at current levels, do no more meter installations, but account for uncertainties such as climate change, and meet a 1 in 500 drought resilience.

The planning period starts with a surplus which gradually declines throughout the planning period primarily as a result of a growing demand forecast into a deficit by 2079-80. On top of this long-term trend, further declines in available water occur primarily due to licence losses in 2035, resulting in overall planning deficits of over 130Ml/d by 2079/80 under the DYCP scenario.

Figure 4-14: Supply Demand Balance for the DYAA and DYCP over the planning period.



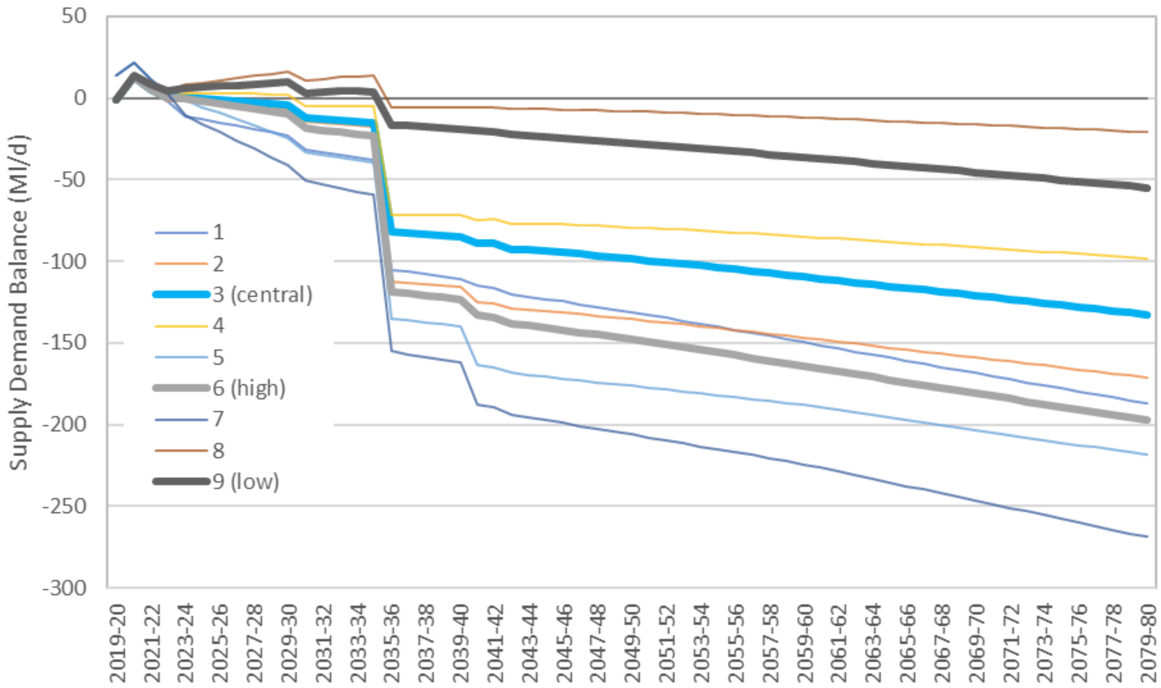
This baseline position is strongly influenced by the need to reduce our abstraction licences to further protect Chalk streams, and the requirement to plan for more extreme droughts than historically experienced. We have taken a balanced approach in our discussions with regulators concerning giving up licences and sources sooner, in order to protect supplies and not trigger the wrong solutions. It is important that adequate time continues to be given for our AMP cycle investigations to confirm the actual licence reduction requirements, so that the right licences are reduced at the right time.

To account for future uncertainties, we have generated alternative Supply-Demand Balance scenarios based on the future uncertainty factors, for which we generated low, central, and high forecasts. Table 4-9 shows how the alternative factors have been combined to produce a set of nine overall scenarios to develop and test our adaptive plan, and Figure 4-15 shows the range of supply-demand balances under each of the scenarios. The final deficit in 2079-80 under the DYCP scenario ranges in 2079-80 from approximately -21Ml/d to -268Ml/d. This range in these forecasts is primarily driven by different levels of demand growth, and the extent of licence reductions, which is the main driver of uncertainty in our plan.

Table 4-9: Supply Demand Balance scenarios considered

SDB Scenario	Future Uncertainty Factors				
	PCC	Population and Property Growth	Non-Household Demand	Climate Change	Environmental Destination
1	Central	High	High	High	Central - main
2	Central	Central	Central	High	High - main
3 (central)	Central	Central	Central	Central	Central - main
4	Central	Low	Low	Low	Central - main
5	High	Central	Central	High	High - main
6 (high)	Central	High	Central	Central	High- main
7	High	High	High	High	High - main
8	Low	Low	Low	Low	Low- main
9 (low)	Low	Central	Central	Central	Low - main

Figure 4-15: DYCP Supply Demand Balance under alternative future scenarios (low, central, and high scenarios in bold)



To develop the adaptive plan, we have chosen from the scenarios a low, central, and high scenario to represent the spread of potential future supply-demand balance need. These scenarios have been chosen following Ofwat's final guidance on long-term delivery strategies that states then when combining plausible extremes of different factors, combining them together risks producing a very low probability scenario. Therefore, we have chosen the low, central and high forecasts to avoid these extreme and implausible scenarios/combinations of uncertainty (e.g., scenarios 5, 7, and 8). For each of these scenarios we have run the investment model to identify alternative plans, and investments across those plans to construct the adaptive plan.

We have also undertaken sensitivity testing of the plan to some alternative scenarios, which includes:

- Additional need from Veolia Water and MoD in the Hampshire Avon catchment from 2035
- Delaying meeting the 1 in 500 level of service to 2049-50
- Delaying licence changes and abstraction reductions from 2035-36 to 2042 for non-Hampshire Avon sources and for all licence changes.
- Scheme availability and scheme environmental uncertainty

5. Options Appraisal and Decision-Making

5.1 Options Appraisal overview

The consideration of options to increase supply and reduce demand across our water supply area has been carried out through a thorough options appraisal process based on the planning stages outlined in the Environment Agency's planning guidelines. The process involves four key stages with an increasing level of detail from high level screening in Stage 1, through to carrying out relevant environmental assessments and cost profiling in Stage 4:

- **Stage 1:** Development of the Unconstrained Options list
- **Stage 2:** Screening of the Unconstrained Options to produce a list of Feasible Options
- **Stage 3:** Technical review and analysis of the Feasible Options, reviewing the risks and benefits to produce a Constrained Options list (including the environmental and social assessment metrics).
- **Stage 4:** Constrained Options and environmental and social metrics are inputted into the EBSD model to generate a best-value preferred programme per scenario which is then reviewed as part of the options appraisal process.

Our options appraisal process identifies options at varying scales, from those that would assist localised areas of water stress, through to Strategic Resource Options (SROs) which would be promoted in conjunction with our neighbouring companies within the West Country Water Resources Group (WCWRG). On a national scale[32], we have liaised with other water companies to identify any opportunities which would mutually benefit multiple regions. We have also identified the necessary options that would enable us to meet the requirements of the Direction[33] and expectations[34] set out by government, including reductions to leakage and consumption. Full details of the options appraisal and decision-making approach are contained in the Options Appraisal Technical Appendix and the Decision-Making Technical Appendix.

5.1.1 Unconstrained options development

Our initial list of Unconstrained Options was developed by using the inputs outlined in the Environment Agency guidance. At this stage, no screening criteria was applied and a large list of over 360 options was generated. The starting point for collating our unconstrained list of options was reviewing our previous WRMP options lists (including those from WRMP14[35] and WRMP19[36]). To account for the evolution of our water supply network over recent years, and changes to the technology available within the industry, we updated and revised options where necessary.

Alongside the review of previous options, internal workshops and meetings were scheduled with colleagues from environmental teams to identify current licences which could be up for review, or potentially reduced, under WINEP investigations or the EA's Environmental

[32] Environment Agency (March 2020). Meeting our future water needs: a national framework for water resources

[33] The Water Resources Management Plan (England) Direction 2022, 28 April 2022

[34] Government expectations for water resources planning, 28 April 2022

[35] Wessex Water (July 2014). Water Resources Management Plan

[36] Wessex Water (Aug 2019). Water Resources Management Plan

Destination Programme. We also worked with our operational teams to assess how our existing assets, sites, and supply network could be improved or adjusted to increase available supply in the required areas of our network. In addition we included the drought permit options from Wessex Water's latest drought plan[37] in the Options Appraisal process, in line with the guidance.

We worked with our consultants to develop potential reservoir storage options using analysis of GIS. Other new large scale water resource options, such as water recycling, desalination plants, and reservoir enlargement, were also assessed by consultants. To ensure that our work was consistent with the work being undertaken by other companies in the region, we liaised with the West Country Water Resources Group (WCWRG) and other neighbouring water companies to identify large scale water resource projects, Strategic Resource Options (SRO), that would provide benefits for the whole South-West region, as well as in the Water Resources in the South East (WRSE) area. SROs considered new raw and potable bulk transfers, as well as the Mendips Quarry reservoirs[38] and Poole water recycling[39], both of which are currently going through the gated process as part of The Regulators' Alliance for Progressing Infrastructure Development (RAPID).

On the demand side, consultants investigated the feasibility of customer side options deployed across the whole region in addition to leakage reduction options. Research included the use of customer challenge groups (CCGs) to understand the option types favoured by household and non-household customers. Including the development of some new options, an extensive unconstrained list of over 130 options was produced. Options that help to reduce both leakage and consumption were later combined or removed to avoid double counting. The separate options for both customer side and leakage management were then blended to create a range of scenarios to meet government expectations and to create an adaptive plan, in line with Ofwat expectations.

We advertised our expectation of a supply-demand deficit from future sustainable abstraction licence changes and restrictions on the Wessex Water Market Place[40] to seek third party support. This information was also shared with our neighbouring water companies to allow discussions surrounding water availability and trading opportunities throughout the WCWRG.

5.1.2 Feasible options screening and development

After the collation of the unconstrained list, the options were evaluated against screening criteria in order to produce a list of feasible options. Initially, this was relatively high level with the aim to highlight negative impacts and risks of options, as well as allowing for positive benefits to be recognised. Each option was scored according to the screening criteria outlined in the Options Appraisal technical appendix and assigned to either the 'Feasible List' or a 'Rejection Register', accompanied by details on the reason for rejection.

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[37] Drought plan | Wessex Water

[38] South West Water and Wessex Water (December 2021). Strategic Regional Water Resource Solutions: Gate one submission for Mendip quarries – new solution

[39] Stantec (July 2021). Strategic Regional Water Resource Solutions: Preliminary Feasibility Assessment. Standard Gate One Submission for West Country South – Sources and Transfers.

[40] Water Resources Management Plan 24 - Option suggestions - Wessex Water

The decisions on where the cut-off point was drawn to derive the feasible options was inevitably subjective and was dependent upon creating a manageable list of options, as per the environmental assessment guidance[41]. Internal reviews assessed whether the 'Feasible List' would provide enough choice to meet the supply demand planning requirements (in terms of yield, lead time, and geographical location), as well as a good range of option types. It was also necessary to assess options which were exclusive of each other, such as two reservoir sites on the same river but flow levels mean only one could be constructed, to decide which was best to include in the 'Feasible List'.

Detailed assessments were then undertaken on each of the feasible options to generate a list of constrained options for programme development. Each supply and demand management option was scoped and designed, incorporating the type and location of water abstraction, water treatment, and transfers to service reservoirs. For example, for reservoir options, the approximate location, requirements for the embankment and routes for the pipelines were identified. For leakage and demand management options, a range of scenarios were developed to reduced leakage and consumption (using a mix of different metering technologies, leakage techniques, water efficiency projects and assumptions about government labelling of appliances).

Overall, 86 feasible options (7 demand options and 79 supply options) we taken forwards for inclusion in our decision-making modelling. These have included:

- Demand options - including various types of metering (including options around speed of smart metering roll-out), further leakage reduction, with different volumetric leakage targets to meet by 2050), water efficiency and rainwater harvesting.
- Supply options - including yield enhancement of existing sources, water recyling, desalination, aquifer storage and recovery, new reservoirs, network/transfer enhancements, and resurrecting currently unused sources.

5.1.3 Feasible options valuation

Once designed, options were valued and assessed to determine:

- Operational and capital costs (OPEX and CAPEX)
- Carbon emissions
- Strategic Environmental Assessment
- Water Framework Directive Assessment
- Habitats Regulation Assessment
- Natural Capital Assessment
- Biodiversity Net Gain Assessment

5.1.4 Decision-making modelling

To derive the least cost solution under alternative scenarios, we have adopted a hybrid decision-making approach, combining a least cost optimisation "EBSD" model, and our

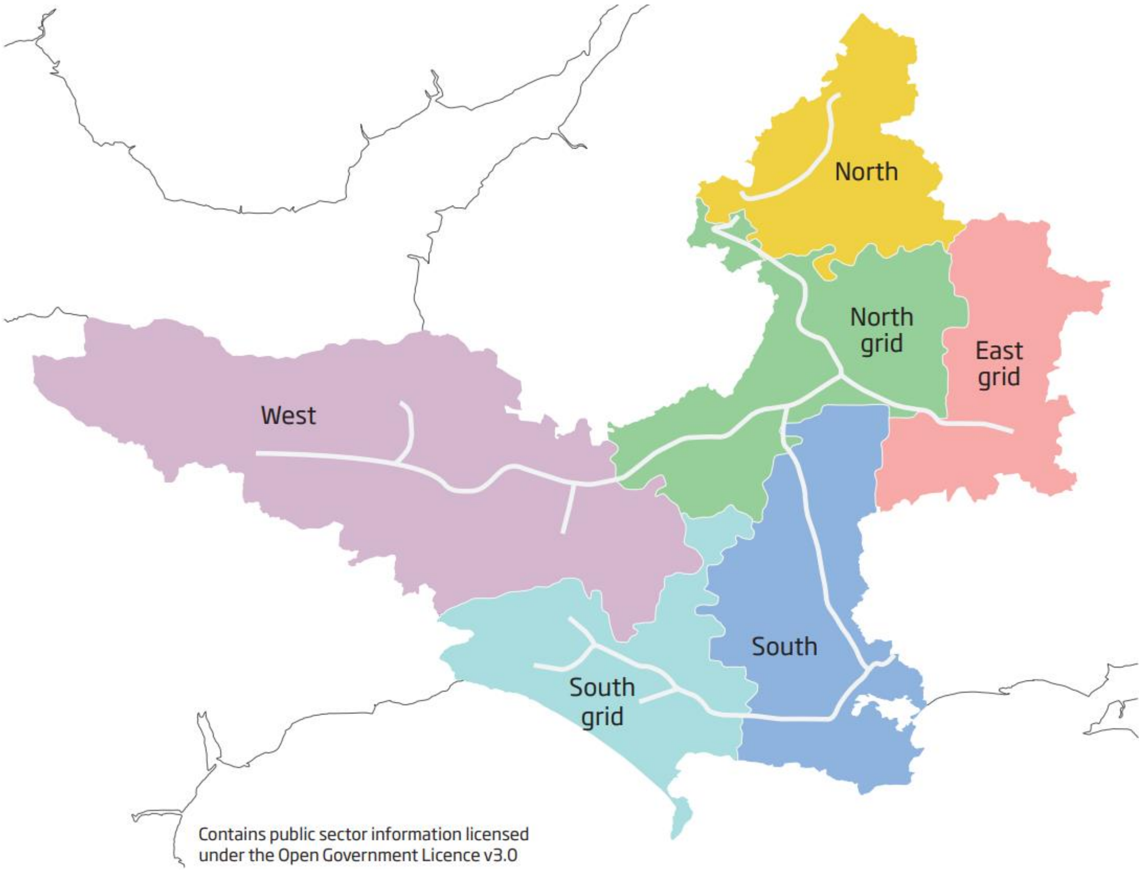
[41] Environment Agency (Mar 2021). Water resources planning guideline supplementary guidance – Environment and society in decision-making

distributed system model for scenario testing. The decision-making approach proceeded as follows:

- **EBSD model testing –** run the least cost optimisation model for different supply-demand balance scenarios (Section 4.5) to identify solutions for different model run-types, including true least cost runs, and to derive alternative best-value scenarios that meet government expectations on demand management strategies and where the worst performing options environmentally are excluded from the optimisation. The model works by satisfying the constraints that the supply demand balance must be positive under both DYAA and DYCP planning scenarios simultaneously whilst finding the least cost solution. An aggregated decision-making approach was used to ensure that options were appropriately scheduled and least cost solutions identified.
- **Scenario testing –** undertake alternative scenario testing of the identified plans, including in relation to the timing of 1 in 500 resilience, licence change scheduling and
- **System simulation model testing** – test the chosen options at key time-slices through the planning horizon in our distributed system simulation model to ensure the model can satisfy all local deficits, given the spatially localised focus of the environmental destination licence losses.

To help avoid circumvent the need for significant iteration between an aggregated least cost model, and system simulation modelling at specific points in the future to test the performance of the chosen solutions, we disaggregated the supply-demand balance into six Water Resources Sub Zones (Figure 5-1). All new supply options were assigned to an individual sub-zone, and transfer options that would typically be linked to specific supply-side schemes were included as transfers between the different zones. Demand reduction options were selected globally across zones, with proportional benefit in each zone. The advantage of the approach taken is that it allows us to account for the "downstream" costs associated with transfer options to move water from where it is created through demand reductions (which will mainly be achieved in demand centres) to where it is needed associated with licence reductions, as opposed to any a priori assignment of specific transfer schemes to specific supply schemes.

Figure 5-1: Wessex Water supply area, with 6 sub-zones used for investment modelling, and the existing grid connections between zones



Options Screening

Once we ran the true least cost optimisation runs, a key step in deriving the best value plan was to use some of the best value planning metrics to screen out unacceptable supply options from environmental grounds, prior to the best investment modelling. Based on the relative performance of options for WFD, SEA, carbon, Natural Capital and Biodiversity, options were initially grouped into three bands based on their annual average yield to ensure options were assessed comparability. The options were scored relative to the 50th percentile for each of the environmental metrics to allow the option performance against the average to be assessed. The worst performing options were removed from the investment model to some of the Some options were also rejected based on updated information on the scheme feasibility, whilst some schemes were kept in based on qualitative assessment or if the scheme was a regional SRO.

5.2 Feasible Demand Management Options Summary

Seven feasible demand management strategy options were considered (summarised in Table 5-1 below). Each option comprises one of four different leakage strategies, one of five smart metering strategies and one of four water efficiency strategies. Strategies for each area represent different levels of ambition towards achieving associated demand reduction targets. All options include the same assumed savings arising from government water efficiency labelling on appliances (Defra scenario 1) as per the WRMP guidelines.

Of the seven demand management options considered, options 1, 5 and 7 meet the statutory target for 20% reduction in distribution input (DI) per capita by 2037/38. Options 1, 5 and 7 also meet other key targets on leakage reduction (50% reduction by 2050), and per capita consumption (PCC, reduction to 110 l/h/d by 2050). All options apart from option 6 meet the target to reduce NHH demand by 9% by 2037/38 and three options (1,5 and 7) meet the 2050 NHH demand reduction target of 15%. Most options fail to meet interim targets in 2026/27 and 2031/32 for DI and leakage reduction (see Figure 5-2 and Figure 5-3), however as these targets are non-statutory and only represent a guideline glidepath, we are satisfied that our feasible options show an adequate range of ambition, considering our forecast position at the start of AMP8 and with statutory and key targets being met in several options.

Figure 5-2: Demand management options alignment with statutory distribution input target NYAA (including interim targets in 26/27 and 31/32)

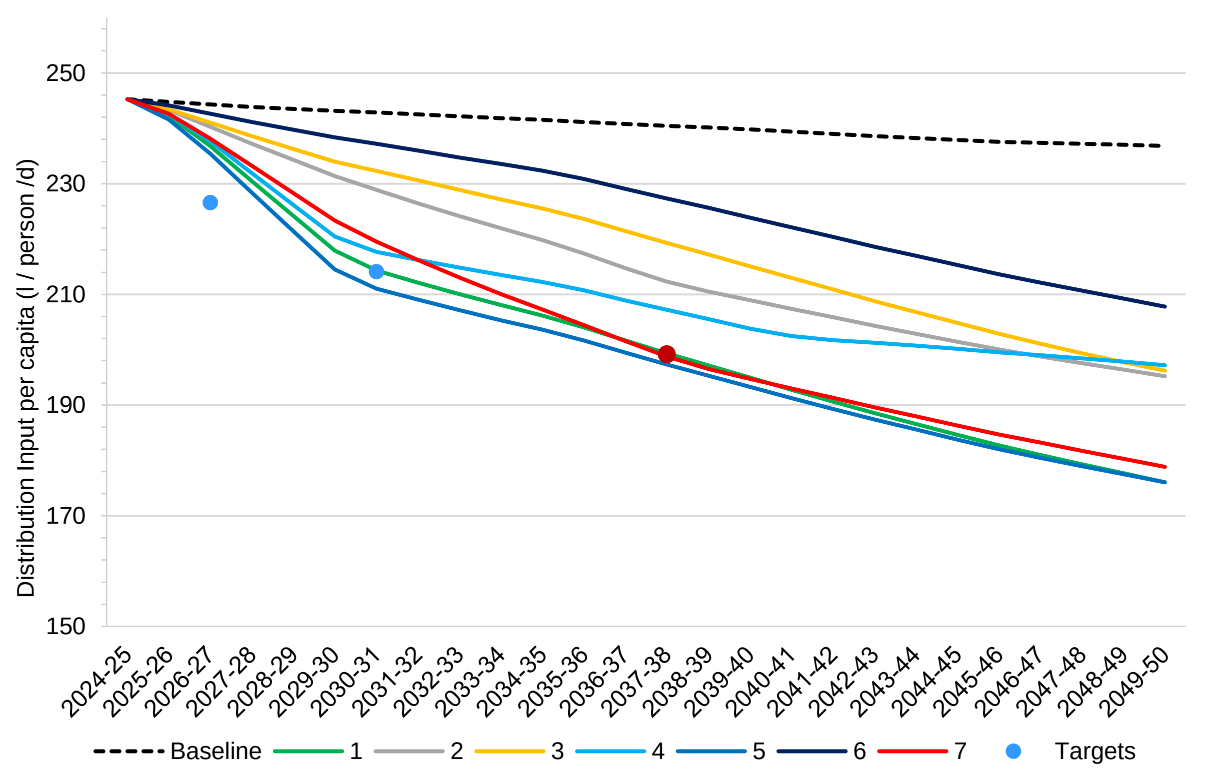


Figure 5-3: Demand management options alignment with leakage targets (including interim targets in 26/27 and 31/32)

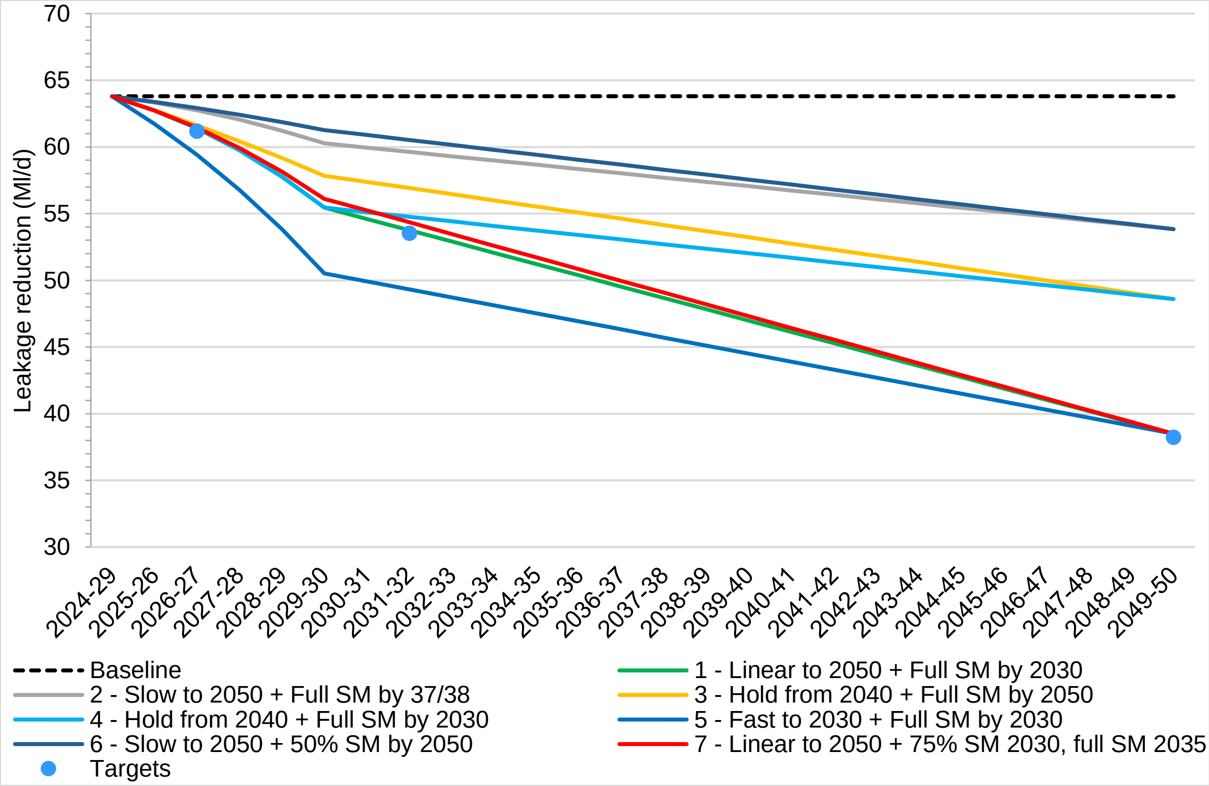


Figure 5-4: Demand management options alignment with per capita consumption targets NYAA (including interim target in 37/38)

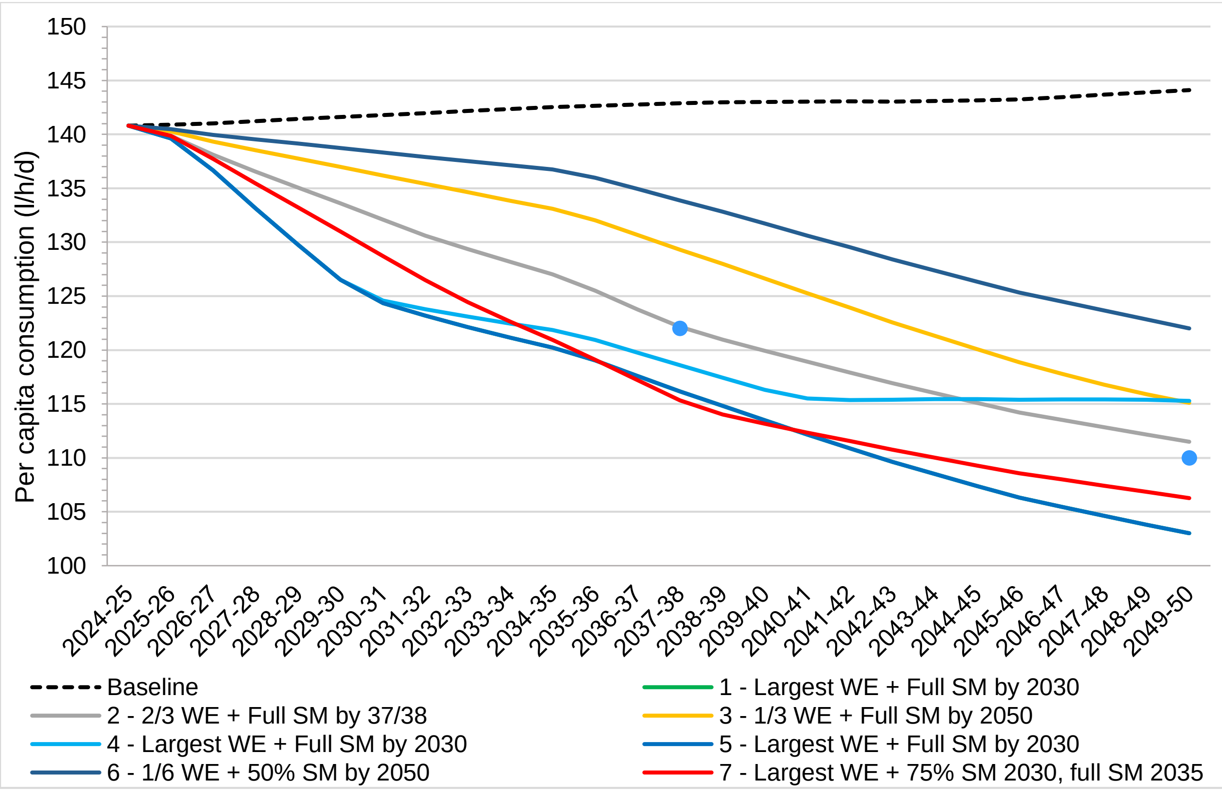


Figure 5-5: Demand management option alignment with non-household (NHH) demand reduction targets

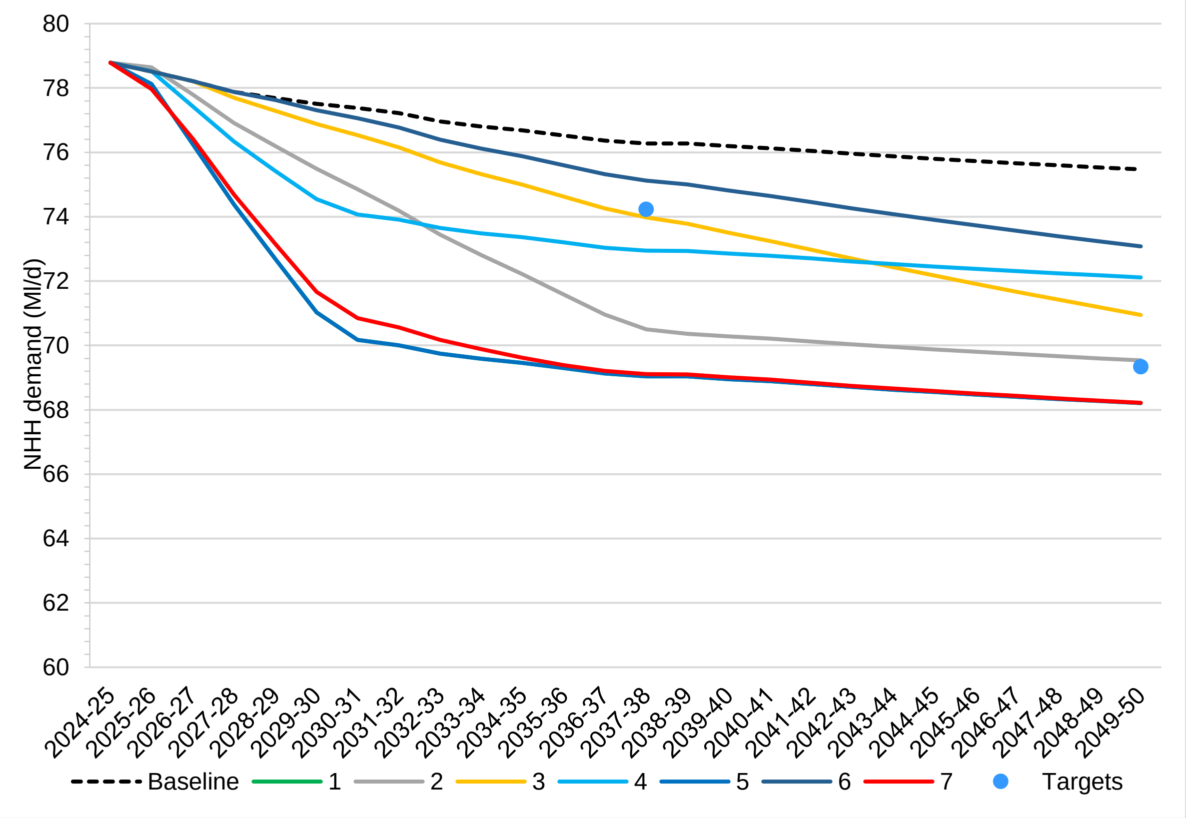


Table 5-1:Table of demand management strategy options considered and alignment with statutory and other targets.

Option Name	Option Description	DI reduced by 20% by 31/03/38	Leakage reduced by 50% by 31/03/50	PCC reduced to 110 l/p/d 31/03/50	NHH demand reduced by 15% by 2050	Total demand saving (Ml/d)
Demand Strategy 1	**Leakage:** Linear to 2050 **Metering:** Full smart metering by 2030 **HH WE:** largest feasible scale by 2030 **NHH WE:** largest feasible scale by 2030 **WE labelling:** Defra Scenario 1	Yes	Yes	Yes	Yes	2030: 36.50 2038: 60.12 2050: 92.74
Demand Strategy 2	**Leakage:** Slow to 2050 **Metering:** Full smart metering by 2037/38 **HH WE:** 2/3 largest feasible scale by 2037/38 **NHH WE**: 2/3 largest feasible scale by 2030 **WE labelling:** Defra Scenario 1	No	No	No	No	2030: 17.02 2038: 41.02 2050: 63.46
Demand Strategy 3	**Leakage:** Hold from 2040 **Metering:** Full smart metering by 2050 **HH WE:** 1/3 largest feasible scale by 2050 **NHH WE:** 1/3 largest feasible scale by 2050 **WE labelling:** Defra Scenario 1	No	No	No	No	2030: 13.23 2038: 30.95 2050: 62.10
Demand Strategy 4	**Leakage:** Hold from 2040 **Metering:** Full smart metering by 2030 **HH WE:** Home Check largest feasible scale by 2030	No	No	No	No	2030: 32.88 2038: 48.62 2050: 66.50

	NHH WE: largest feasible scale by 2030 **WE labelling:** Defra Scenario 1					
Demand Strategy 5	**Leakage:** Fast to 2030 **Metering:** Full smart metering by 2030 **HH WE:** Home Check largest feasible scale by 2030 **NHH WE:** largest feasible scale by 2030 **WE labelling:** Defra Scenario 1	Yes	Yes	Yes	Yes	2030: 41.44 2038: 63.08 2050: 92.74
Demand Strategy 6	**Leakage:** Slow to 2050 **Metering:** 50% smart metering by 2050 **HH WE:** Home Check 1/6 largest feasible by 2050 **NHH WE:**1/6 largest feasible by 2050 **WE labelling:** Defra Scenario 1	No	No	No	No	2030: 6.89 2038: 19.23 2050: 44.43
Demand Strategy 7	**Leakage:** Linear to 2050 **Metering:** Full urban smart metering (75%) by 2030, rural also by 2035. **HH WE:** Home Check largest feasible scale by 2030 **NHH WE:** largest feasible scale by 2030 **WE labelling:** Defra Scenario 1	Yes	Yes	Yes	Yes	2030: 28.44 2038: 61.26 2050: 88.39

WE = Water efficiency

5.3 Feasible Supply Options Summary

For security reasons this section has been edited in the version of this document published on our website.

Following screening, a list of 79 feasible supply options was developed and consist of a range of option types, as outlined in Table 5-2. Each of these options would supply a different annual average and critical period supply-demand benefit to different regions of our supply network and would carry different delivery lead times. Each of these factors are key inputs into the decision-making process.

Table 5-2: Number of each option type in the feasible list

Option type	Description	Number of feasible options
Demand Reduction Portfolios	Portfolio options to reduce demand, including leakage, smart metering and water efficiency	7
Desalination	Construction of a new desalination plant	1
Drought Option, Temporary Use Bans and Levels of Service	Options related to the drought plan, drought permits, or drought resilience	4
Water reuse	Reuse of treated effluent in our supply network	6
Groundwater	New borehole sources, use of underutilised existing licences, reinstatement of mothballed sources, and Aquifer storage and recovery	17
Import	New imports or increase to existing imports from neighbouring water companies into our network	13
Works capacity increases	Increases in the capacity of existing treatment works	3

Reservoir	Construction of new, or upgrades to current water storage reservoirs or pump storage	17
Internal Transfers	Construction of new, or upgrades to current transfers within the supply network	18
Total		**86**

These options include Strategic Resource Options of Poole Water Recycling and variants of the Mendip Quarries options in terms of yield and connection to our supply system. Since the development of our draft plan, and following discussion with South West Water as part of our regional plan development, a new reservoir option in Bristol Water's area is excluded from the feasible options list as it will be selected as part of South West Water's WRMP (See Section 8.1.1)

5.4 The Preferred "Most Likely" Plan

For security reasons this section has been edited in the version of this document published on our website.

This section describes how the best value **preferred "most likely" plan** has been chosen, prior to the development of the adaptive plan shown in Section 6, through assessment of the least cost plan and how this compares to alternative "best-value" programmes. Further details can be found in the Supply demand balance, decision-making and uncertainty technical appendix.

We have developed three different alternative plans to our **central** supply-demand balance to derive our **preferred "most likely" plan**. These alternative plans are designed to help shape our chosen best value plan:

- **Plan 1** – the **true least cost** plan derived with no constraints on demand management strategy or consideration of environmental metrics
- **Plan 2** – plan options constrained to those that meets government expectations on 50% leakage reduction by 2050, 110l/p/d per capita consumption target by 2050, and the Defra 20% reduction in per capita distribution input (demand) by 2037/38
- **Plan 3** – plan that meets government expectations, and also derived with the worst performing environmental options screened out from the decision-making tool.

The decision-making tool was run based on the input/options constraints identified above for each plan to derive three alternative portfolios of options scheduled to solve the supply-demand balance across the planning period. Additional system simulation modelling was undertaken to test that the portfolio of options was successful in solving the spatially distributed supply demand balance at the 2035-36 time-slice – the main driver of supply-demand balance deficit. A comparison of the options selected for each of the three plans is outlined in Table 5-3.

Across plans a 1 in 200 level of service to 2039-40, Temporary use bans and Drought permit options are selected to 2050, alongside some smaller supply side enhancement schemes, a 7Ml/d import from Bristol Water, and a more significant change in our system to increase reservoir capacity in the West and transfer this, alongside surplus created through demand reductions, to the East.

Under the true least cost plan, one of the lowest demand reduction benefit scenarios - Demand Strategy 6 - is selected alongside Poole Water Recycling and a larger import from Bristol Water to solve licence change needs in 2035. Under Plan 2 (Meet demand targets) and Plan 3 (Meet demand targets + environmental screening) the same options are selected; selection of Demand Strategy 7 which includes more ambitious leakage, smart metering, and water efficiency activity to meet government demand targets is sufficient to meet most of the licence changes required in 2035, without investment of more significant and potentially environmentally damaging supply-side schemes. Therefore, in addition to the options selected across all scenarios, only two additional smaller supply side schemes are required and not until later in the planning period (from 2049).

Table 5-3: Types of options selected in the central scenario for each of the plans (first year of option benefit shown in brackets)

<table>
<tr><th></th><th>Plan 1 -
True Least Cost</th><th>Plan 2 -
Meets Demand Targets</th><th>Plan 3 -
Demand Targets + Environmental screening</th></tr>
<tr><td>Options selected across all scenarios</td><td colspan="3">- 9.16 Temporary Use Bans (2025-26)
- 9.19 Reduced Level of Service 1 in 200 to 2039-40, 1 in 500 from 2040-41 (2025)
- 41.01 and 41.06 Drought Permit Options to 2050 (2025-26)
- 59.01 Stream Support option – Upper Stour (2025-26)
- 39.01 and 39.02 Under-utilised licences in North Bath and North Warminster (2063-64 and 2035-336, respectively)
- 70.06 Increased peak reservoir capacity output and main reversal from West WRSZ to East WRSZ (2035-36)
- 70.01 Import Increase from Bristol Water and internal transfers (2035-36)</td></tr>
<tr><td>Demand Management Strategy</td><td>Strategy 6:
Total Demand Saving:
• 2030: 6.89 Ml/d
• 2038: 19.23 Ml/d
• 2050: 44.43 Ml/d
Leakage: Slow to 2050
Metering: 50% smart metering by 2050
HH WE: Home Check 1/6 largest feasible by 2050
NHH WE:1/6 largest feasible by 2050
WE labelling: Defra Scenario 1</td><td>Strategy 7:
Total Demand Saving:
• 2030: 28.48 Ml/d
• 2038: 57.90 Ml/d
• 2050: 91.61
Leakage: Linear to 2050
Metering: Full urban smart metering (75%) by 2030, rural by 2035. Non-compulsory measured billing.
HH WE: Home Check largest feasible scale by 2030
NHH WE: largest feasible scale by 2030
WE labelling: Defra Scenario 1</td><td>Strategy 7:
Total Demand Saving:
• 2030: 28.48 Ml/d
• 2038: 57.90 Ml/d
• 2050: 91.61
Leakage: Linear to 2050
Metering: Full urban smart metering (75%) by 2030, rural by 2035. Non-compulsory measured billing.
HH WE: Home Check largest feasible scale by 2030
NHH WE: largest feasible scale by 2030
WE labelling: Defra Scenario 1</td></tr>
</table>

Supply Options Selected	- 52.02 Poole Water Recycling and Transfer - Stour use - 50% (2035-36) - 70.03 Bristol Bulk Import and internal transfers (2035-36) - 38.11 Under-utilised Licence - East Dorchester Source (2040-41) - 34.1 New Boreholes (Hampshire Avon) (2035-36) -18.28 North Bath Resilience (2040-41)	- Under-utilised licence - East Weymouth Source (2063-64)	- Under-utilised licence - East Weymouth Source (2063-64)

The programme of options selected for each of the three plans has been reviewed against the key metrics in order to determine our preferred programme. The summary of the assessed plans and programmes, across metrics, is outlined in Table 5-4.

Table 5-4: Comparison on plans in terms of best-value criteria (NC = Natural Capital; BNG = Biodiversity Net Gain)

Plan	Programme Cost (£NPVm)	Drought (1 in 500 resilience by 2039/40)	Environment		Carbon tCO_2 equivalent	Abstraction reduction - Environmental Destination	Government Demand Expectations
			NC	BNG			
Plan 1	£550M	2039/40	-76	22	290,724	Meets 2035 licence reductions	No
Plan 2	£834M	2039/40	-39	14	397,103	Meets 2035 and licence reductions	Yes
Plan 3	£834M	2039/40	-39	14	397,103	Meets 2035 licence reductions	Yes

All plans meet abstraction licence reductions in 2035 as well as providing drought resilience to 1 in 500 drought by 2039/40. Plan 2 and Plan 3 meet the government demand reduction targets, and in doing so achieve this at a greater programme cost and carbon cost. The higher programme cost is associated with the higher cost of the demand management strategy, and the higher carbon cost is mainly driven by the carbon cost over the whole planning horizon to 2080 of reducing leakage by 50% by 2050 and the carbon cost associated with holding this steady for the remainder of the planning period. In comparison the carbon cost of Plan 1 is smaller as the demand reduction strategy volume, coupled with new supply-side schemes is balanced slightly more by reduced carbon emissions associated with abstraction licence reductions.

As a result of fewer supply-side schemes, Plan 2 and Plan 3 score more favourably than Plan 1 in relation to Natural Capital losses and plans score similarly in terms of Biodiversity Net Gain, but with fewer losses as a result of fewer supply side schemes, and as a result of the screening process of environmentally worse options. The majority of the negative performance scores result from transfer options which are assumed could be mitigated via best practice construction methods and pipeline routes to avoid certain routes or habitats.

Of the demand management strategies that meet government policy expectations and the statutory DI target, Strategy 7 which is selected in Plan 2 and Plan 3 is more acceptable under our AMP8 affordability and acceptability testing for PR24 than the other strategies due to the slower roll out of smart metering.

Based on the assessment of least cost versus alternative best-value planning scenarios, Plan 3 is the preferred plan. Whilst the plan comes at a greater financial and carbon cost that the least cost plan, the plan meets government targets for demand reductions, and the higher costs for reducing demand are required to meet the statutory DI target on 2037/38. Whilst the plan comes with a larger carbon cost over the lifetime of the planning horizon, much of this carbon cost is associated with reducing leakage to 50% of 2017-18 levels by 2050 and holding steady for the remainder of the planning horizon. We expect much of this activity will have lower future carbon costs through our activity to achieve net zero carbon[42].

As part of Plan 3, Demand Management strategy 7 is considered to be the best value strategy as it:

- Meets government targets for PCC, leakage and non-household demand reduction
- Meets statutory government target for DI reduction
- Does not ‘over deliver’ on the above at significant cost to customers, through appropriate phasing of smart metering.
- Is ambitious enough to impact on requirement for future supply side schemes in areas affected by licence reductions
- Is considered acceptable to customers, measured billing will be encouraged but only compulsory through change of occupier
- Associated programmes of work are considered deliverable

A key benefit of this strategy is that by meeting 2035 targets for licence reductions through demand management measures, the strategy is reducing abstraction from the environment whilst supply side schemes are put in place by 2035. This strategy therefore has more of a benefit in the short term on the supply demand balance and abstraction from the environment (Figure 5-6). This provides more of a benefit in the short term to chalk catchments such as the Hampshire Avon where the majority of sites targeted for licence reductions are located. In the Hampshire Avon, the need to offset future population growth through demand reductions to ensure no additional abstraction from the catchment is required is a key driver for preference of Plan 3.

Figure 5-6: Comparison of Supply-Demand Balances between plans

[42] Carbon and climate (wessexwater.co.uk)

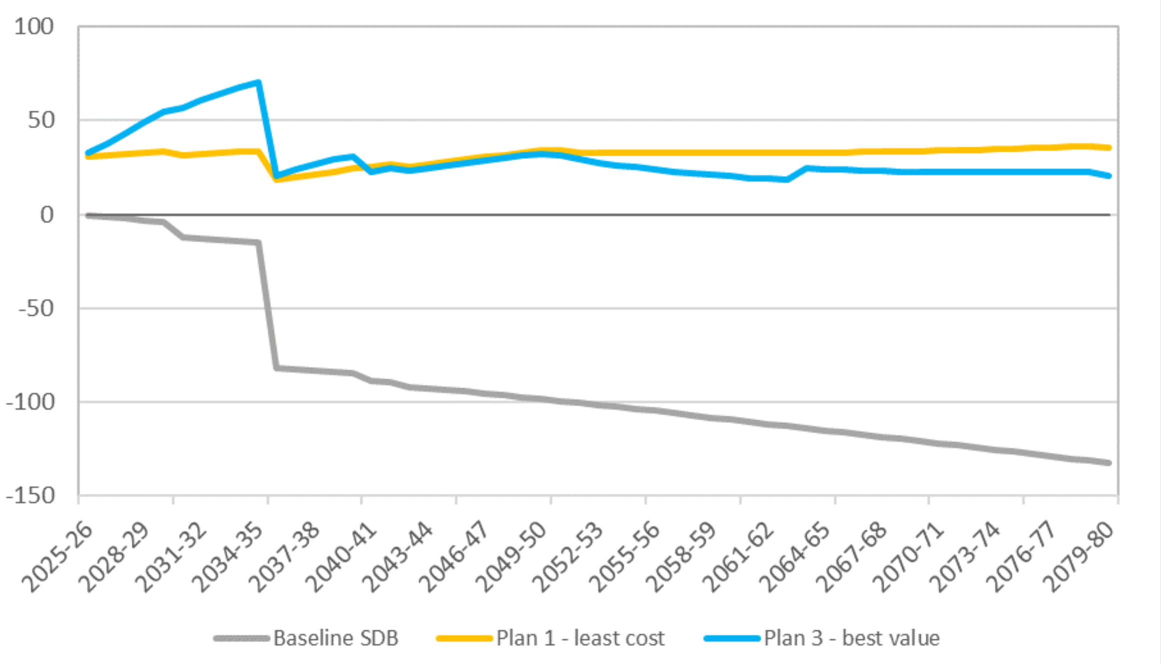
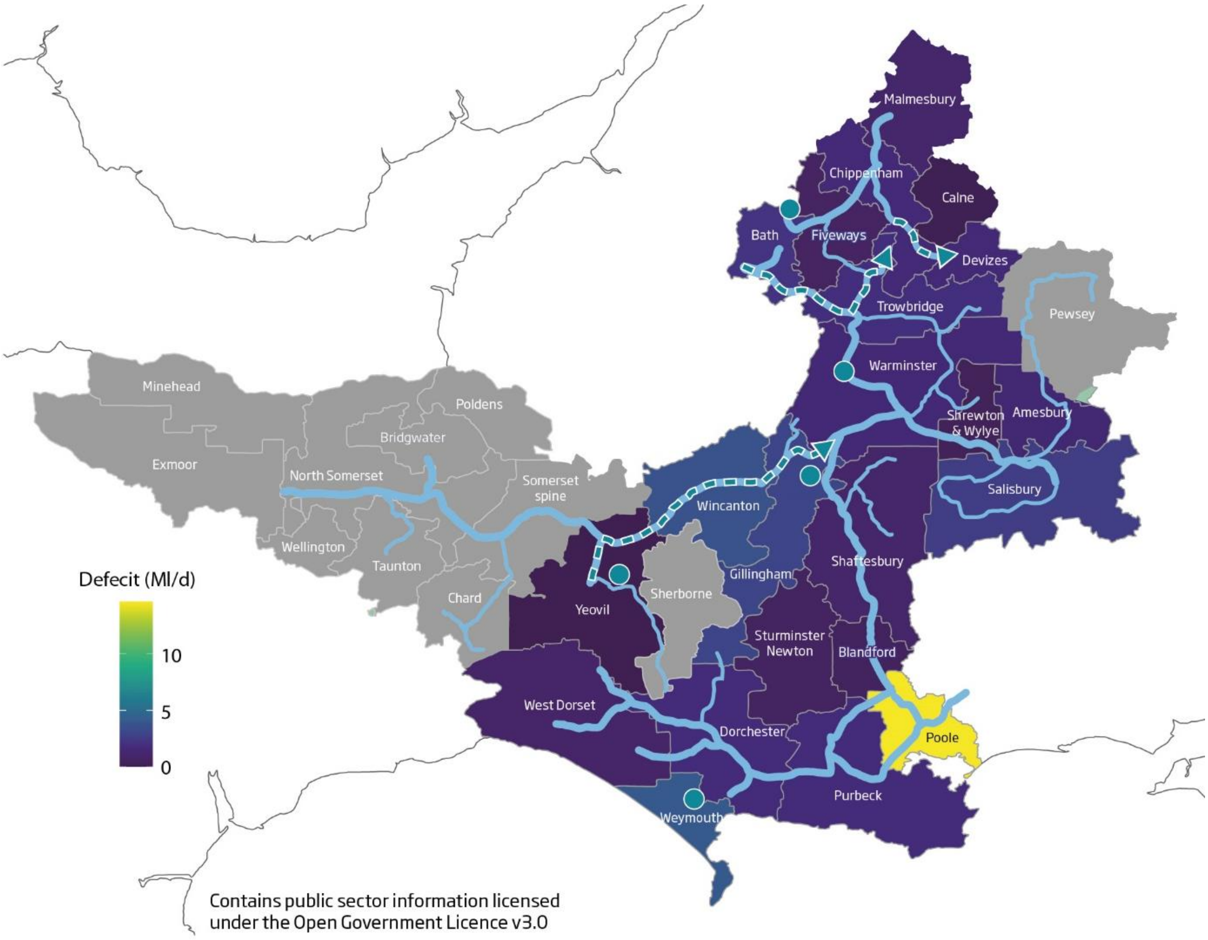


Figure 5-7 shows the spatial location of baseline supply-demand balance deficits under the central supply-demand balance scenario in 2035-36, overlain with the location of selected supply options. Demand management measures provide the main source of supply-demand balance benefit. By reducing demand at key demand centres, our existing grid system allows the benefit of these reductions to be moved through the supply system. The two key supply-side options that provide changes to the way in which the supply system will operate are option 70.06, which will increase peak reservoir output in the West and, alongside the benefit of demand reductions made in the West of the supply system, this water will be moved East from Yeovil towards Warminster to help meet peak demands in the groundwater dominated parts of our supply system. The other option is 70.01, which will increase the import of water from Bristol Water, and move this water into our supply system and onwards to the Devizes area to help meet the licence reductions in the Upper Western Arm of the Hampshire Avon catchment.

Figure 5-7 Spatial location of baseline supply-demand balance deficits overlain with location of selected supply sources and transfers under the preferred "most likely" plan



Whilst the preferred plan has been identified that meets the central planning scenario, there are key uncertainties in future need, as well as other drivers that need to be considered to derive our preferred adaptive plan, that are considered in Section 6. Demand management strategy 7 as selected in Plan 3 is also selected under the higher need future scenario, and therefore to adapt to a greater potential need for licence changes in 2035, it features under the core pathway.

5.5 Changes to phasing of demand management strategy 7

Two of the three programmes making up demand management strategy 7, leakage reduction and smart metering, have been rephased between AMP8 and AMP9 for our final WRMP to align with the demand management strategy submitted as part of PR24 business plan. Our water efficiency programme remains unchanged from our revised draft WRMP. Hereafter in this document, demand management strategy 7 refers to the final version of this strategy – changes to leakage and smart metering are summarised in Table 5-5.

Table 5-5. Final demand management strategy 7 – re-phased leakage and smart metering

	AMP8 2025-2030		AMP9 2030-2035	
	rdWRMP	final WRMP	rdWRMP	final WRMP
Smart meters installed (000s)	487.2	256.7	145.5	383.0
Total leakage reduction (Ml/d)	7.7	3.5	4.4	8.6

The key driver for the re-phasing of our leakage and smart metering programmes centres around deliverability, affordability and financeability in the context of our overall AMP8 investment programme.

For PR24, we have proposed more than a doubling of our investment programme in AMP8 (£3.5 billion in total in new capex investment), compared to the current AMP (~£1.5 billion). This is primarily due to a significant increase in requirements to meet nutrient improvements requirements under our PR24 WINEP. This work is underpinned by statutory drivers, and so is entirely non-discretionary. We also face a major increase in our bioresources investment programme, driven by Industrial Emissions Directive compliance requirements.

We have been required to make difficult but necessary trade-offs in how we prioritise investment expenditure for AMP8. In developing our plan for the next five years, we need to carefully balance the increasing requirements from regulators across all relevant areas of the programme; the deliverability constraints at both sub-programme level and in totality; and the overall need to maintain affordability for customers.

In recognition of these concerns regarding the deliverability, financeability, and affordability of PR24 business plans, the EA wrote to companies with an opportunity for them to undertake a WINEP and WRMP phasing exercise, particularly to identify whether any elements could be phased from PR24 into future price review periods. We subsequently undertook an exercise to understand how WRMP activities could be phased. Although the focus of this letter was on supply-side options, we also considered the potential to re-phase demand management activities (as our PR24 plan was relatively insensitive to alternative supply-side options considered).

We also completed our Affordability and Acceptability Testing (AAT) of our PR24 business plan. This allows us to understand customers’ views on how acceptable and affordable they view the plan to be. We use the outputs of this testing to ensure that our plan appropriately balances these considerations and is delivering on customers’ priorities.

Our response to the EA’s letter presented the outputs of the phasing exercise, also taking into account outputs from our AAT work. We proposed to adjust our demand management strategy from that in our revised draft WRMP by phasing a greater proportion of the rollout of our smart metering programme into AMP9, and reducing our target leakage reduction from 7.7 Ml/d to 3.5 Ml/d. This approach defers £98 million of investment in AMP8 and significantly mitigates deliverability risk in these areas, thereby ensuring that our overall PR24 plan is both affordable and deliverable. The final demand management strategy still enables us to meet our statutory 20% DI reduction target in 2037/38, halve leakage by 2050 and reduce abstraction to protect the environment. AMP8 activity will be focused in the

Hampshire Avon catchment and connected areas where demand reduction will have greatest environmental benefit.

Our revised demand management strategy, reflecting the changes summarised above, was submitted alongside our PR24 business plan in October 2023 and our final WRMP has now been updated to align with our business plan submission (See 6.4.1). Further justification for the re-phasing of our Demand Management Strategy can be found in our Statement of Response document, Section 27.1.5 Response 283.

6. Preferred Adaptive Plan

For security reasons this section has been edited in the version of this document published on our website.

In addition to the identification of a preferred "most likely" plan under the central planning supply demand balance scenario, in this section we consider alternative future scenarios to ensure our plan can adapt to future uncertainties. Further details can be found in the Supply Demand Balance, Decision-Making and Uncertainty technical appendix.

6.1 Key future uncertainties

The key future uncertainties that have been considered in developing the adaptive plan are:

- **Supply demand balance scenarios** – alternative supply demand balances, as summarised in 4.5, where uncertainty in future licence reductions, demand growth and climate change are considered. We have developed our adaptive plan using plausible low and high supply-demand balance scenarios, as shown in Section 4.5.
- **Demand management strategy effectiveness** – the effectiveness of future demand management measures are uncertain, as demand is influenced by a range of factors beyond the control of the company, including future climate change, changing demand resulting from post-covid changes and in response to changing economic circumstances and the recent cost of living crisis. We have tested whether whilst investing in Demand Strategy 7, only half the benefits of the strategy are achieved.
- **Additional need from Ministry of Defence Sites and Veolia Water Services –** Alongside licence reductions in the catchment to achieve sustainable abstraction for Wessex Water, both the Ministry of Defence and Veolia Water Services may require additional volumes of water to meet their future needs that those already accounted for in our central supply-demand balance, which in part depends on the outcome of subsequent environmental investigations in the 2025-2030 period. We have modelled scenarios where an additional 9.84Ml/d is required. These additional demands would be in the eastern part of our supply system in the Hampshire Avon.
- **Hampshire Avon options –** one solution to meet the needs of licence changes in the Hampshire Avon catchment for both Wessex Water and other users' needs is to combine existing abstractions and move them further downstream to different locations that have more water in the river and then supply this water back upstream to existing demand centres. Investigations are being taken forwards under the WINEP programme in the 2025-2030 period to assess option feasibility. Whilst these options have not been selected under our preferred "most likely" plan, it is important our plan adapts to uncertainty in availability under other plausible future scenarios.

Whilst these factors can be considered in isolation, it is important to consider them together, as combinations of these factors evolving in the future are plausible - e.g. additional need in the Hampshire Avon catchment but no additional options in the catchment available. Therefore, in addition the preferred "most likely" plan, and also based on some of the option selection under some scenarios, we have developed the following alternative scenarios to develop the adaptive plan[43]:

- **Lower Need scenario –** Supply-demand balance follows the low need supply demand balance.
- **Higher Need Alternative Programme 2 (AP2)** - Supply-demand balance follows a high need scenario (supply-demand balance scenario 6).
- **Higher Need Alternative Programme 3 (AP3) – Hampshire Avon options not available -** Supply-demand balance follows a high need scenario (supply-demand balance scenario 6), but not Hampshire Avon options are available to be selected
- **Central Alternative Programme 4 (AP4) – Demand Management Strategy 7 less effective** – supply-demand balance follows the central SDB scenario, demand savings achieved only follow the savings associated with Demand Strategy 3 (approximately half of the savings)
- **Central Alternative Programme 5 (AP5) – Demand management less effective + Hampshire Avon options not available** - supply-demand balance follows the central SDB scenario, the demand management strategy is less effective, and Hampshire Avon options are not available.
- **Central Alternative Programme 6 (AP6) – Additional need from MoD and Veolia** - supply-demand balance follows the central SDB scenario, and there is additional need in the Hampshire Avon from MoD and Veolia.
- **Central Alternative Programme 7 (AP7) – Additional need from MoD and Veolia and no Hampshire Avon Options**

To develop the adaptive plan, we have run the decision-making tool based on the above supply-demand balance scenarios and option constraints.

6.2 Options Selected Across Scenarios

For security reasons this section has been edited in the version of this document published on our website.

The first step in developing the adaptive plan is to assess the options selected across alternative scenarios, to identify common options, and understand the start dates of the different options to inform decision-making and trigger timing. Table 6-1 shows the options selected under the alternative planning scenarios. With the exception of the demand management strategy, the options are ordered from top to bottom in the table by the frequency with which the option is selected.

[43] We also considered the scenario where under the preferred "most likely" plan there was not Hampshire Avon options available, however these were not selected under the main pathway (Note: AP == Alternative Pathway and Cen == Central).

Please also note that the names of the alternative programmes has been selected to line up with the accompanying planning tables, and also to the Ofwat long term delivery strategy (PR24 long-term delivery strategies - Ofwat), where the preferred "most likely" WRMP plan is presented as an alternative programme to the Ofwat core programme. Therefore the preferred "most likely" plan in the WRMP is referred to as Alternative Programme 1 (AP1), and the alternative scenarios

Under the alternative central scenarios (AP1-4) Demand Strategy 7 is selected as a mandated scheme to explore alternative futures to the preferred “most likely” plan. However, the option is selected as the least cost option under high need SDB scenarios AP1 and AP2. Under the low future SDB, Demand Management Strategy 6 is selected, which has approximately a 3rd of the demand saving benefit of Strategy 7, alongside the 5 options that are included under all scenarios – drought measures, reduced levels of service and a stream support option.

Table 6-1 Options selected under alternative scenarios, as indicated by the date at which scheme development needs to start. Blue shading of option names indicated those options taken forwards in the Ofwat Core Programme

ID	Option Name	Preferred AP1	Low	High AP2	High AP3	Cen. AP4	Cen. AP5	Cen. AP6	Cen. AP7
57.07	Demand Strategy 7	2025		2025	2025	2025	2025	2025	2025
57.06	Demand Strategy 6		2025						
9.19	Reduced levels of service, moving to 1:500 to 1:200	2025	2025	2025	2025	2025	2025	2025	2025
9.16	Temporary Use Bans	2025	2025	2025	2025	2025	2025	2025	2025
41.01	Drought Permit - Stour catchment	2025	2025	2025	2025	2025	2025	2025	2025
41.06	Drought Permit - Bride catchment	2025	2025	2025	2025	2025	2025	2025	2025
59.01	Upper Stour Stream Support	2025	2025	2025	2025	2025	2025	2025	2025
39.01	Underutilised licence: North Bath	2056		2048	2028	2028	2028	2057	2053
39.02	Underutilised licence: North Warminster	2028		2028	2028	2028	2028	2028	2028
70.06	Increased Reservoir Capacity and East Transfer	2026		2026	2026	2026	2026	2026	
22.04	Weymouth Source Improvements	2054				2026	2026	2054	2054
52.02	Poole Water Recycling and Transfer – Stour use 50%			2025	2025	2025	2025		
70.01	Bristol Import and onwards transfer I	2026		2026				2026	2026
38.01	Underutilised licence due to water quality: Purbeck			2028			2053		2050
70.02	Bristol Import and onwards transfer II				2026	2026	2026		
38.12	East Weymouth Source – treatment improvements			2046	2046				

34.1	New boreholes (Hampshire Avon)			2025		2055			
32.36	New Reservoir: Bristol Avon			2034	2032				
33.01	Groundwater: Aquifer Storage Recharge - Wareham Basin			2043	2028				
18.1	West Somerset Reservoirs transfer upgrade			2056	2057				
30.02	Pump Storage - Quantock Reservoir			2051	2052				
21.13	Salisbury to Amesbury to Tidworth Transfer			2070	2057				
38.11	Underutilised licence: East Dorchester Source			2028	2028				
23.01	Yeovil Reservoir increased peak capacity								2027
18.28	North Bath Resilience				2029				
55.05	North Grid to South Grid reinforcements - 5.5Ml/d				2026				
54.06	Mendips to Grid – 50% capacity				2049				
21.12	Pewsey resilience			2049					
25.03	Grid reinforcements – Wylye valley				2057				
70.03	Bristol Import and onwards transfer III			2026					
70.04	Bristol Import and onwards transfer IV				2026				
70.05	Bristol Import and onwards transfer V								2026
70.07	Hampshire Avon Boreholes and Transfer							2025	

Under the two higher need scenarios, alternative programme 2 and 3, more options are selected to solve the supply-demand balance. In AP2, this includes 3 options brought forwards, two in to AMP8, that are also included in the preferred "most likely" programme (39.01, 39.02 and 70.06). In the shorter term, the largest options selected to meet the higher need environmental licence reduction need in 2035 include 52.02 Poole water recycling scheme, Amesbury boreholes scheme (34.1) in the Hampshire Avon, and an increased import from Bristol Water (70.03). There are also some larger schemes selected to meet longer term need (33.01 and 54.06). Under AP3 – where Hampshire Avon options are unavailable - scheme selection is similar; most schemes also selected under AP2 are brought forwards, and in addition an increased import from Bristol is selected alongside a longer-term transfer of 17.5Ml/d from Mendip quarries.

Under the central alternative programmes, a less effective demand management strategy (AP4) results in the selection of 52.02 Poole water recycling scheme, and increase in transfer from Bristol Water (70.02) instead of option 70.01 to move water further into the Hampshire Avon, alongside the selection of a new borehole option in the Hampshire Avon (34.1) later on in the planning horizon in 2055. If the demand management strategy is less effective and the Hampshire Avon options are not available (AP5) then the same schemes are selected as with AP4, except instead of the new boreholes option (34.1) option 38.01 underutilised licence at an existing source is selected in 2053.

If under the central SDB scenario additional need is also required by the MoD and Veolia Water Services (AP6) then the new borehole option in the Hampshire Avon and onwards transfer is selected from 2025 (70.07). If, however there is additional need, but no Hampshire Avon options (AP7) then instead of a more local supply solution, then the primary plan change is to bring in additional water from Bristol Water (70.05) which distributes the water further into the Hampshire Avon catchment into Salisbury to meet the additional need from 2026.

6.3 Adaptive pathways

For security reasons this section has been edited in the version of this document published on our website.

Based on the scenario analysis undertaken, the adaptive plan and associated pathways have been developed accounting for Ofwat's PR24 and beyond – Final guidance on long term delivery strategies[44]. The development of the adaptive pathways is as follows.

Ofwat Core Programme

All activities which are selected under all scenarios are considered no- and low-regret options and are included in a **core pathway** as these activities need to be undertaken to be ready for all plausible future scenarios. This includes:

All activities under the low scenario – the only option selected under the low scenario that differs to the other scenarios is the demand management strategy. However, given Demand Strategy 7 is required under the preferred "most likely" programme to meet government policy expectations, and is also required to meet needs under the two high SDB programmes (AP2 and AP3), and that the strategies are mutually exclusive, means **Demand Management Strategy 7** is selected under the core pathway. Further details about the Demand Management Strategy 7 can be found in the Demand Management Strategy technical appendix.

[44] PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies_Pr24.pdf (ofwat.gov.uk)

All activities selected under all scenarios – drought permit options (41.01 and 41.06), temporary use bans (9.16), the local stream support option (59.01) and reduced levels of service (9.19).

Activities to be ready for all plausible future scenarios – Programmes AP2 to AP7 are included in the plan alongside the preferred "most likely" programme (AP1) as the plan alternative pathways/programmes. Under the core programme, in addition to those schemes being taken forwards across all scenarios, there are 12 additional schemes to be taken forwards under the core pathway in AMP8 2025-2030. These options are being selected in the core programme because across all pathways the earliest start date fall between 2025 and 2028, and therefore activity is required under those schemes to keep alternative future pathways open. The schemes selected in the core pathway are highlighted in Table 6-1.

For these schemes, to keep future pathways open, we plan to take these 12 options forwards through the design and development phases (enabling work) of the schemes towards the date of the next WRMP (draft in 2027 and revised draft/final plan in 2028) towards the **trigger point** for determining which future pathway to follow in 2030. Of the supply schemes being taken forwards in AMP8, a number of the schemes have common source and transfer elements – for example there are several schemes that utilise an import from Bristol Water and onwards transfer to different parts of the supply system. The costs included in the plan under the core pathway for scheme design and development do not duplicate these elements.

The key reason for needing to take a range of options forwards in AMP8 is due to the significant need that must be met in 2035, and the key uncertainties that need to be resolved in the next planning period. Six options are also selected under the core pathway, which have their earliest start dates across pathways from 2028 (39.01, 39.02, 38.01, 33.01, 18.28 and 38.11). We will narrow down our future uncertainties by the time of the next draft plan in 2028, and use dWRMP28, and the information gathered to date, to determine whether these additional six schemes need to be taken forwards. For these schemes, depending on the outcome of dWRMP28 in 2027-28, we would seek AMP9 transition funding to take these options forwards to design and development, to inform our decision point in 2030.

The key areas of uncertainty, and therefore the key aspects that will be monitored on the core pathway, are as considered above for alternative pathways, and principally include:

Required licence reductions and other needs – the main driver for our supply-demand balance reductions is licence changes in 2035. However, there is significant uncertainty in the amount of licence changes required, which will only be resolved when the investigations into source sustainability are completed under the WINEP programme in AMP8. Overall there are 38 water resources WNEP investigations in AMP8. In addition, there is further need in the Upper Hampshire Avon catchment from MoD and Veolia water.

To identify the most appropriate solution for the catchment, as with other locations, it is important to have a complete understanding of all future needs so that future investment is efficient. To help achieve this, we have set up the Upper Hampshire Avon Water Resources Steering Group to align understanding of future catchment need and solutions that meet all needs to help protect the catchment in the long-term. Further detail can be found in the

Upper Hampshire Avon Water Resources Strategy technical appendix. By the next WRMP, we will not have complete conclusions from investigations so will seek to use the information to date for the draft WRMP in 2027 and revised draft WRMP in 2028 to narrow down our uncertainty in which future pathway will likely be followed, subject to a complete set of investigation outcomes by 2030 to determine which pathway and programme is to be followed.

Future demand – there is uncertainty about the forecast of future demand growth, as accounted for in the alternative SDB scenarios, as well as uncertainty in the effectiveness of demand side measures that will be implemented in the Wessex Water area – including in the effectiveness of smart metering, which will be rolled out in the Wessex Water area for the first time. Between now and the next WRMP development, and by 2030 we will monitor and gather data on demand reductions and demand forecasts.

Supply side scheme investigation – The design and development steps undertaken for those options in the Hampshire Avon will help inform feasibility of those schemes from an environmental perspective, to then determine whether these local schemes can be taken forwards. By the next WRMP we expect only interim outcomes of these investigations, but will use this information to inform the decision-making process for WRMP28.

Alternative Pathways

As identified under the core pathway above, work undertaken in AMP8 will help inform:

- a **decision point** in 2027-28, aligned and informed by the next WRMP as to whether alternative schemes need to progress for design and development from 2028 towards the trigger point in 2030
- a **trigger point** in 2030 where one of the alternative pathways will be followed.

Table 6-1 shows the options that will be selected under the different alternative programmes and implemented following the trigger point in 2030. Table 6-2 shows the approximate likelihood of following each pathway from 2030 (where the core is followed to 2030), and the Net Present Value (NPV) of following each pathway. As per progress our activity in AMP8, we will gather further information to narrow down the uncertainties on which pathway is most likely.

Table 6-2 Likelihood and NPV cost of the alternative pathways

Programme	Description	Approximate Likelihood Post 2030	NPV
Ofwat core	Ofwat Core Pathway	20%	£754m
AP1	Preferred “most likely” programme	21%	£834m
AP2	High Alternative Need	10%	£1,259m
AP3	Higher Alternative Need and Hampshire Avon Options Not Available	10%	£1,368m

AP4	Central need and Demand management less effective	10%	£917m
AP5	Central need, demand management less effective and Hampshire Avon options not available	5%	£923m
AP6	Central need and additional need from MoD and Veolia	12%	£921m
AP7	Central need, additional need from MoD and Veolia and no Hampshire Avon options available	12%	£932m

The key decision to be made to follow each pathway are summarised in Table 6-3 alongside the monitoring plan in Table 6-4. The adaptive plan is also shown schematically in Figure 6-1. Further details about the monitoring plan for the implementation of the demand management strategy can be found in the demand management strategy technical appendix, Section 7.

Table 6-3 Key Decisions to be made to determine which pathway is followed in 2030

Programme	Description	Conditions under which the pathway is followed
Ofwat core	Ofwat Core Pathway	Low future supply demand balance need
AP1	Preferred “most likely” programme	If volume of licence changes required and future demand forecasts follow the central supply-demand balance scenario, demand management strategy is effective, and there is no additional need in the Hampshire Avon, then this pathways is followed.
AP2	High Alternative Need	If volume of licence changes required and future demand forecasts follow the high supply-demand balance scenario, the demand management strategy is effective, and Hampshire Avon options selected are viable, then this pathway is followed.
AP3	Higher Alternative Need and Hampshire Avon Options Not Available	If volume of licence changes required and future demand forecasts follow the high supply-demand balance scenario, the demand management strategy is effective, and Hampshire Avon options are not viable, then this pathway is followed.
AP4	Central need and Demand management less effective	If volume of licence changes required and future demand forecasts follow the central supply-demand balance scenario, demand management strategy is less effective, Hampshire Avon options are viable, and there are no additional needs in the Hampshire Avon, then this pathway is followed.
AP5	Central need, demand management less effective and Hampshire Avon options not available	If volume of licence changes required and future demand forecasts follow the central supply-demand balance scenario, demand management strategy is less effective, Hampshire Avon options are not viable, and there are no additional needs in the Hampshire Avon, then this pathway is followed.
AP6	Central need and additional need from MoD and Veolia	If volume of licence changes required and future demand forecasts follow the central supply-demand balance scenario, demand management strategy is effective, Hampshire Avon options are available, and there are

		additional needs in the Hampshire Avon, then this pathway is followed.
AP7	Central need, additional need from MoD and Veolia and no Hampshire Avon options available	If volume of licence changes required and future demand forecasts follow the central supply-demand balance scenario, demand management strategy is effective, Hampshire Avon options are not available, and there are additional needs in the Hampshire Avon, then this pathway is followed.

Figure 6-1 WRMP24 adaptive plan showing alternative pathways and alternative investments (shown for reference against supply-side capex investment to see specific investment timing (as also shown in Table 8-1)

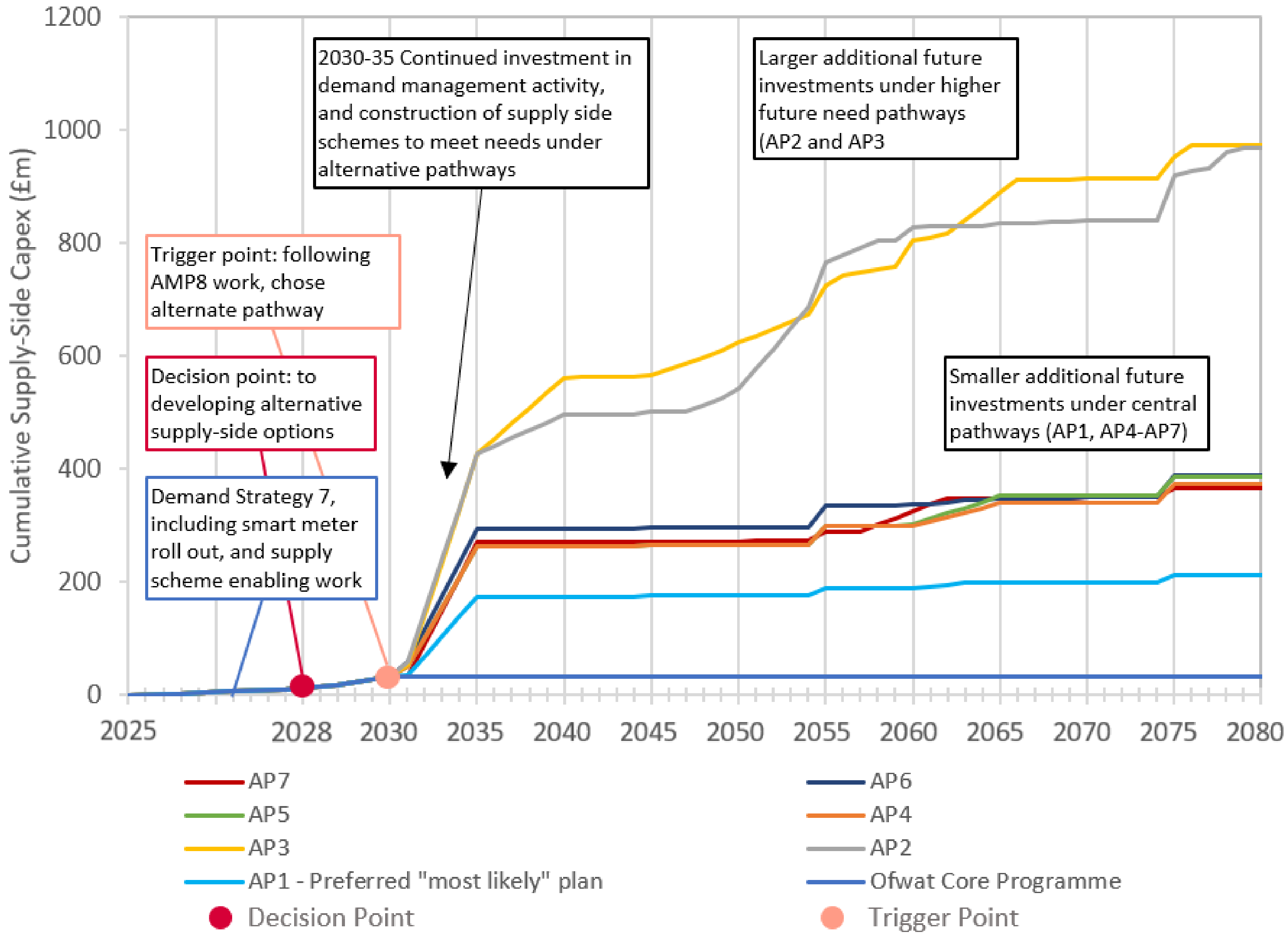


Table 6-4 Monitoring and enabling activities as part of the adaptive plan

Area	Monitoring/ Enabling Activity	Metrics being measured	Relation to Decision/Trigger Point
Supply and Demand Side Options Benefits	Design and development of all schemes that may progress under each pathway to construction in AMP9	Yield, Cost, Overall feasibility (planning/environmental barriers), notably environmental feasibility of options in the Hampshire Avon catchment	By 2027/28 inform WRMP29 scheme selection, and by 2030 to inform trigger point for following alternative pathways
	Strategic scheme investigations of Mendip Quarries and Poole Water Recycling Scheme	Yield, Cost, Overall feasibility (planning/environmental barriers), Proportional need across potential beneficiary companies	By 2027/28 inform WRMP29 scheme selection, and 2030 to inform trigger point
	Demand Management Strategy: Smart metering, water efficiency and leakage effectiveness.	Water saving benefits at household/non-household level of metering and water efficiency measures (both internally and nationally), cost, customer acceptability.	By 2027/28 inform WRMP29 scheme selection, and by 2030 to inform trigger point
	System modelling	- Regional and company modelling of internal transfers and strategic schemes	By 2027/28 to inform WRMP29 to inform scheme benefit assessment
Supply Demand Balance Components	WRMP annual review, and development of supply-demand balance components	Annual monitoring of: distribution input, non-household demand, household demand (as related to effectiveness of metering and water efficiency programmes), metering (installations compared to forecast) and leakage	By 2027/28 inform WRMP29 baseline for supply-demand balance scenarios and need of whether to progress additional schemes for design and development in AMP8.
	WINEP investigations	Licence losses required and associated drought Deployable Output, and timing of licence losses required	by 2027/28 inform WRMP29 supply demand balance scenarios, and 2030 to inform scheme feasibility of Hampshire Avon options and licence reductions needed
Policy direction and external developments	Population, Household growth and planning	- New Local Authority Plans and changing developments on household growth. - ONS census 2021 and updated forecasts	by 2027/28 inform WRMP29 and growth forecasts compared to low and high growth scenarios
	Regional and neighbouring company, and other user needs in shared catchments	Developments in licence changes required for South West Water in Stour and Hampshire Avon, and MoD/Veolia licencing requirements in Hampshire Avon.	By 2027/29 to inform WRMP29 strategic scheme benefit and selection, and whether we need to move to
	Liaison with Environmental Groups, Natural England, and the Environment Agency	Environmental policy changes, developments of chalk stream group (CABA) and Moors protection policies	by 2027/28 inform WRMP29 supply demand balance scenarios and licence loss policies
	Water efficiency labelling	Government policy on water efficiency labelling: implementation and likely savings	By 2027/28 inform WRMP29 scheme selection and yield benefits

Low regret import from Bristol Water

As outlined in the adaptive plan, we are implementing our demand management strategy to reduce abstraction from the environment, prior to the delivery of alternative supply side schemes by 2035. To mitigate the risk of demand side delivery effectiveness, we have included in the adaptive plan alternative pathways if demand reductions are not as large as forecast. We are also targeting our demand management strategy to the benefit of the Hampshire Avon catchment.

Following further consultation with Defra and the Environment Agency since the development of the revised draft plan, we have reviewed the options included within our Core Pathway to determine whether any of these options could be accelerated as an alternative pathway in case demand forecast savings do not materialise.

Two of these options, 70.01 and 70.02, consist of a common component to increase the capacity of the existing import from Bristol to Bath, through expansion of the existing pump capacity, as well as new additional (and different) internal transfers to get this additional water to where it is needed within the system to offset licence reductions.

We have explored the timescales of option delivery and are able to accelerate the delivery of the first, common component of these schemes – new pumps and associated network investments to maximise the volume of the existing import from Bristol Water at our import site in Bath. Increasing the transfer into Bath will allow us to offset current transfers that are sent north into Bath and reverse this flow down towards the Warminster area in the Upper Wylye catchment, which is part of the broader Hampshire Avon. This will allow us to therefore offset water abstracted from Hampshire Avon sources.

Given the existing interconnectivity from here to other sources, the new transfer can work in conjunction with our demand management measures and be used to mitigate the impact of abstractions on European sites, prior to the implementation of the broader supply solution from 2035. The option will therefore also mitigate the potential that implemented demand-side measures does not lead to the demand savings forecast.

This will allow us to bring an additional 4Ml/d Dry Year Annual Average and 7Ml/d Dry Year Critical Period, as consistent with the current capacities of schemes 70.01 and 70.02. To place this transfer into context, we forecast additional demand in the Upper Hampshire Avon catchment of between 2.8Ml/d and 3.9Ml/d based on new growth up to 2037/38. This is alongside our targeted demand management strategy in the catchment which we forecast will deliver 10Ml/d of demand reductions by 2030. Relative to the volume of forecast growth in the catchment, the new transfer volume therefore provides further mitigation to the Hampshire Avon in addition to what we already plan to implement through the targeted demand management strategy. Further details can be found in the Upper Hampshire Avon water resources strategy technical appendix.

Following a review of the lead times for the option, the additional benefit of this scheme can be delivered in 2032, with full benefit realised in the 2032/33 planning year. This timescale is based on an accelerated timescale - there are some uncertainties that will affect this lead time and could lead to a longer lead time that is outside of the company's control, including additional land requirements, and most importantly the impact of weather conditions on outage and demand during upgrading and commissioning work, which given it is currently a live system, will affect how necessary outages to commence the work will be possible. For example, if we have an extended dry period or drought during upgrading, this may mean we need to use the main for a longer period of time to import water under the existing system to meet demand, therefore delaying the necessary outages required to deliver the scheme. There may also be circumstances where we can deliver earlier than 2032, which we will explore as we develop the scheme.

The option will therefore deliver the yield benefit into our system to benefit the Hampshire Avon in 2032/33, prior to the broader system investments required on each pathway, including the additional transfers of 70.01 and 70.02, to get the water where it is needed more broadly in our supply system to offset licence reductions.

As stated above, this element of the scheme is part of two other schemes 70.01 and 70.02. Scheme 70.01 is selected in the preferred plan (AP1), and in three alternative pathways (AP2, AP6 and AP7). 70.02 is selected in AP3, AP4 and AP5 (See Table 6-1). Therefore, with the exception of the low need scenario used for the core pathway, this common element of these schemes to be brought forwards is selected under all adaptive pathways. Therefore, based on the likelihoods of following each of the adaptive pathways from 2030 built on these scenarios (Table 6-2), there is an 80% likelihood of requiring the scheme. We have also confirmed with Bristol Water as part of our wider regional planning that the yield of the option is available across common planning scenarios.

As well as having an 80% likelihood of being required as stated in the plan, there are a number of other drivers that demonstrate that the option is a low regret option. First, the environmental licence changes under the low scenario that are used for the core pathway beyond 2030 – the main driver of differences in need across scenarios - are unlikely to materialise, especially given more recent indication from the Environment Agency in 2024 regarding changes to the no-deterioration capping policy, which indicates that these low changes are unlikely to be enough to meet required EFI targets. Second, the EA are also considering the policy around stream support. Wessex Water has a number of sources where stream support is used alongside abstraction to maintain river flows. A change in policy away from stream support will increase the already significant licence changes required in the Wessex Water area. Finally, an increased connection between Bristol Water and Wessex Water will provide additional resilience benefits to our supply system in the case of outage.

We will progress the design and development of the scheme, as per our other core pathway options towards a decision-point in 2027-28, which is aligned with the decision-making process of our next WRMP. At this point, and as described above, we will have narrowed down uncertainty in key components of the planning process. At this point we will decide whether we need to progress development of the option.

In the WRMP planning tables, we have also brought forward the yield benefit of the option to our overall supply-demand balance from the 2035/36 financial year when the full yield benefit of options 70.01 and 70.02 are realised to 2032/33, even though there will still need to be development to deliver the full scheme benefit to where it is needed in the supply system up to 2035/36.

6.4 Key Features of Our Preferred Adaptive Plan (best value plan)

Section 6.3 describes the adaptive plan with four alternative pathways. This section provides further details and justification for our preferred adaptive plan. Key features of the plan include.

6.4.1 Demand Management Strategy

Our demand management strategy comprises demand reductions arising from programmes of activity relating to:

- The roll out of smart metering to households and non-households
- Water efficiency support for households and non-households
- Leakage reduction
- The introduction of water labelling by government

This section contains details of how our demand management strategy will be specifically applied in the Hampshire Avon catchment and how government mandated demand reduction targets for the sub-components of water demand will be addressed. Further details on our approach can be found in the Demand Management Strategy and Upper Hampshire Avon Water Resources Strategy technical appendices.

<u>Smart metering</u>

Smart metering roll is at the heart of our demand management strategy to ensure we deliver our statutory distribution input reduction target and reduce the requirement for future supply side schemes. The rollout of advanced metering infrastructure (AMI) smart meters to 95% of households and non-households in our region by 2035 will provide high resolution usage data allowing us to better target both leakage reduction and water efficiency services.

We plan to install 257,000 smart meters by 2030 covering 40% of properties (HH and NHH) in our region. We are comfortable with the deliverability of this speed of rollout following market engagement sessions held with prospective suppliers, and review of deliverability of our proposed plan by Artesia (see Artesia_Wessex_Considerations-for-smart-meter-rollout). Our AMP8 smart meter roll-out will focus in the Hampshire Avon catchment and connected areas where supply resilience is at risk due to planned abstraction licence reductions. Associated demand reduction achieved in these areas will provide the greatest environmental benefits and help offset future population growth. Our approach to the roll-out of smart metering aims to deliver the maximum demand reduction benefits in the most efficient way.

Where customers are currently unmetered, we will install smart meters, but will not automatically switch them to measured billing. We will use the meter installation as an opportunity for engagement around water use and water saving and will encourage customers to switch to metered bills. We will still collect smart usage data from these properties that initially remain on unmeasured billing enabling us to identify and support reduction in supply pipe leakage and plumbing losses. We forecast that initial demand reduction linked to leakage and plumbing losses, coupled with customers transferring to measured bills voluntarily or through change of occupier over time will be sufficient to ensure we meet our statutory distribution input reduction target by 2037/38.

In addition to the demand reduction benefits of smart metering to the environment from reduced abstraction, there are also direct benefits for customers and for us through the significant opportunities it provides for enhanced customer services. Our smart metering roll out will include the launch of an app or digital portal that enables customers to view their water use information and understand where savings can be made thus empowering them to be more in control of their bill.

We will be able to easily alert customers to changes in their usage that might indicate a leak. Links with our water efficiency and leakage programmes will support customers in resolving these issues far sooner than is possible with only 6-monthly meter read information.

Regular, timely and insightful engagement underpinned with smart metering data will enable us to drive change in water use habits at home through behavioural comparison methods and facilitate community scale change when roll-out and supporting promotional campaigns focus in specific areas such as the Hampshire Avon.

We'll also seek to embed other services within this digital platform to add more value to the customer offering – our vision is that customers will be able to use the app to report a leak, track a job, use our water efficiency calculator, order water saving devices and pay their bill.

In the 2025-30 period we'll also be able to explore how smart data can be used within innovative tariff structures to stimulate further demand reductions in the future.

Household water efficiency

The availability of high-resolution consumption data arising from the smart metering roll out will facilitate ever better targeting of water efficiency services, and in particular our Home Check programme for household customers. Our existing Home Check programme which involves an in-home visit from a technician to fit water saving devices, check for plumbing leaks and offer tailored behavioural advice on water saving, targets the highest water using households using 6-monthly meter read information to maximise the savings per visit. The availability of hourly data will allow even more effective targeting and the rapid identification of continuous flows to reduce the run time of plumbing losses from leaking toilets and taps. Our Home Check service offers free plumbing leak fixes for customers that need it.

From 2025-2030 our preferred programme will include 12,000 standard Home Check visits and 4,800 plumbing leak fix visits a year. This is a significant increase in activity level from the current period (2020-25) which is seeing us deliver around 4,500 standard visits and 750 plumbing leak fix visits a year. Our experience of delivering in-home support to customers in programmes like these since 2016 will make the expansion of this Home Check programme feasible when paired with the smart metering programme to provide data and insight to target and drive the focus areas.

To help us meet the statutory demand reduction target by 2037/38 we expect to step up the Home Check activity level from 2030 to over 17,000 standard visits and over 8,500 plumbing leak fixes a year. This will represent a further significant increase in scale, and is undoubtedly ambitious, but will follow a further five years of delivery, monitoring, innovation and collaboration with customers though our water efficiency and smart metering programmes.

An example of the innovation we are currently applying to our Home Check service is our community 'Rainsavers' project in Chippenham. This trial involving over 200 households has seen us expand the Home Check offering to include the installation of free water butts and 'soaker hoses' to include garden water savings into the programme. A soaker hose is a porous pipe that, in this context, allows a water but to rapidly drain the water being collected during a rainstorm directly into borders and vegetable patches. Importantly though, the soaker hose is diverting rainfall away from combined sewers and therefore represents a holistic approach that benefits not only demand management but also our drainage and wastewater strategies. The findings from this project, undertaken in 2023, are still being assessed but customer feedback is indicating that it has expanded the community's awareness of the issues of water use and rainfall drainage and that there is an appetite for engagement of this nature.

Learning from innovative approaches like 'Rainsavers' will help to shape and optimise the delivery of our future water efficiency engagement programmes and overall adaptive plan.

Government water labelling

The water resource planning guideline requires us to include in our preferred plan the assumption that government will introduce mandatory water labelling for appliances from 2025/26.

A Mandatory Water Efficiency Label will give consumers the information they need to make informed decisions when purchasing new water using products for their home. It will also help developers and water companies to improve water efficiency in buildings. It will likely involve a tiered labelling approach that allows products to be rated at levels of water consumption, similar to the energy efficiency label. The label would be applied to common household products such as toilets, taps, shower outlet devices, dishwashers and washing machines.

As per the September 2022 Defra consultation on labelling we have assumed that labelling will be introduced without associated changes to building standards or regulations. The impact of this scenario will be to reduce per capita consumption by 1.5 litres per person per day by 2035 and by 13 litres by 2050. For the Wessex Water supply region this amounts to savings of 2.2 Ml/d by 2035 and nearly 20 Ml/d by 2050.

To ensure customers understand and engage with the new water labelling information our preferred plan includes an allowance for engagement campaigns and activities to help realise the demand savings plus engagement with building developers. While changes to building standards are not being included in this government measure at this time, we are keen to support future work in this area through partnerships, research and lobbying.

Non-household (business) demand

Our smart metering roll out will include non-household properties and we commit to working with MOSL, retailers and business users to ensure the data captured by smart meters is appropriately available within the market to improve billing accuracy and stimulate demand reductions through the identification of continuous flows which may be indicative of wastage, plumbing losses and external leaks.

In 2022 we relaunched a non-household water efficiency programme following a hiatus of several years since market separation. Our current programme has focussed support to schools and has been delivered through collaboration with both retailers and the Department for Education. The programme focusses on identifying and resolving leaks and wastage arising from toilets, urinals and taps. In 2022-23 we visited 91 schools; this activity was one of the most cost-effective elements of our water efficiency strategy.

Our preferred plan for non-household demand management for 2025-30 will include over 160 visits a year to non-households to fix leaks and reduce water wastage. We anticipate continuing to work with schools and other not-for profit or community focussed organisations. This programme will be supported by the smart metering roll out that will provide high resolution usage data to identify continuous flows – which can be investigated for leaks/wastage – and therefore enhance targeting.

Our assumed model of delivery for the non-household water efficiency programme of visits is wholesaler-led, although collaboration with retailers is integral to the engagement with individual business users. We are actively engaged with the Retailer-Wholesaler Group's Water Efficiency Sub-Group which we see as a vehicle to support innovation for collaboration between wholesalers and retailers to enhance water efficiency in the non-household market.

The combination of a smart metering for non-households and the targeted water efficiency programme will ensure we meet the targets to reduce business demand by 9% by 2037/38 and 15% by 2050.

Leakage

We are committed to meeting the regulatory target of 50% leakage reduction by 2050, based on a 2017/18 leakage baseline. Our preferred plan forecasts a 3.5 Ml/d leakage reduction between 2025 and 2030. To achieve this, we will build on our current leakage reduction strategy with greater focus on expanding our acoustic logging and smart network capabilities, using data to bring about efficiencies in the 'find and fix' backbone of our operation.

Smart meter data will also play a key role in our leakage reduction strategy, allowing us to identify and resolve customer supply pipe leaks to realise associated benefits much sooner than current detection methods allow. Smart meter data will also enable a better understanding of zonal flow balance, helping identify areas of higher leakage to focus 'find and fix' activities.

In addition to these 'fix' activities we will also expand strategies that prevent future leakage such as pressure management. By focusing on both fix and prevent elements, our leakage reduction strategy will enable us to meet our targets and achieve sustainably low levels of leakage.

Hampshire Avon

As described in Section 4.2.6, to help protect the Hampshire Avon catchment, there is a regulatory requirement from the EA and NE to ensure that first new growth in the catchment is not met through additional abstraction, so that abstraction would remain at recent actual levels, and second, that abstraction will be reduced as soon as practicable. A key cited driver is to keep abstraction at recent actual levels is to avoid the imposition of "Water Neutrality" which may inhibit planned development growth.

To help achieve this and reduce pressure on the catchment whilst environmental investigations are undertaken to identify the holistic need for the catchment, and prior to implementation of supply side solutions in 2035 to meet this holistic need, we plan to focus the demand management activities within the catchment to help ensure new growth can be met through existing abstraction. The integrated supply grid will also allow us to move water into the catchment that is created through demand reductions in connected areas. (See Section 2.1.1). Further details can be found in the Upper Hampshire Avon Water Resources Strategy and the Demand Management Strategy technical appendix.

Meeting National Demand targets

Under the Environment Act 2021, a statutory water demand target has been set to reduce the demand of water from public water supply per head of population in England by 20% by 2037/38 from the 2019/20 baseline. The Environmental Improvement Plan[45] outlines how this target is to be achieved through various policies and expectations of water companies on consumption and leakage.

To achieve the water demand target, expectations are to reduce household water use (per capita consumption) to 122 litres per person per day, reduce leakage by 37% and reduce non-household water use (business demand) by 9% by 31 March 2038. These are part of the trajectory to achieving 110 l/p/d household water use, a 50% reduction in leakage and a 15% reduction in non-household water use by 2050. It should be noted that the leakage target uses a different baseline of the 2017-18 in year reported figure, as stated in the Water targets Detailed Evidence Report[46].

Given the broader long-term targets for water resources planning are to achieve demand reductions by 2050 (50% leakage reduction by 2050 and 110 PCC target by 2050), which is the end of the statutory 25 year period of the plan, we have focussed our demand management strategy in the Water Resources Management Plan on how to deliver to achieve these 2050 targets.

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45 Environmental Improvement Plan 2023 - GOV.UK (www.gov.uk)

46 Water targets Detailed Evidence report.pdf (defra.gov.uk)

Therefore, for the plan beyond 2050 our demand management strategy has not made any assumptions about delivery of further water efficiency activity post 2050. This approach represents a pragmatic approach to forecasting of water efficiency benefits given that there is significant uncertainty in customer behaviour and associated demand at this point, as well as uncertainty in the ongoing benefits of potential water efficiency activity, and what emerging technologies and societal changes will take place that will affect the most appropriate strategy at this point. It therefore gives us an early indication of the potential supply-side investments that may be required during this post-statutory 2050 period of the planning horizon without further demand management activity.

In our next WRMP in 2029, as well as in subsequent plans, we will incorporate the knowledge gained from implementation of water efficiency activity in this planning round – notably in relation to smart metering activity – as well as learning of other technology developments, to shape our ongoing activity as we move towards meeting the demand reduction targets in 2050 and beyond.

6.4.2 Meeting Regulatory demand expectations and targets

There are several regulatory targets for demand management which have been set out under the Environment Act 2021 to reduce the use of public water supply in England per head of population by 20% by 2038 from the 2019/20 reporting year figures[47]. To achieve this, the target trajectory in Table 6-5 has been outlined. These are part of the trajectory to achieving 110 PCC, 50% leakage reduction and 15% non-household consumption by 2050, forecasts use the normal year planning scenario.

Table 6-5: Target trajectory to meet a 20% reduction in Distribution Input (DI) per head by 2038, and the targets to be met in 2050.

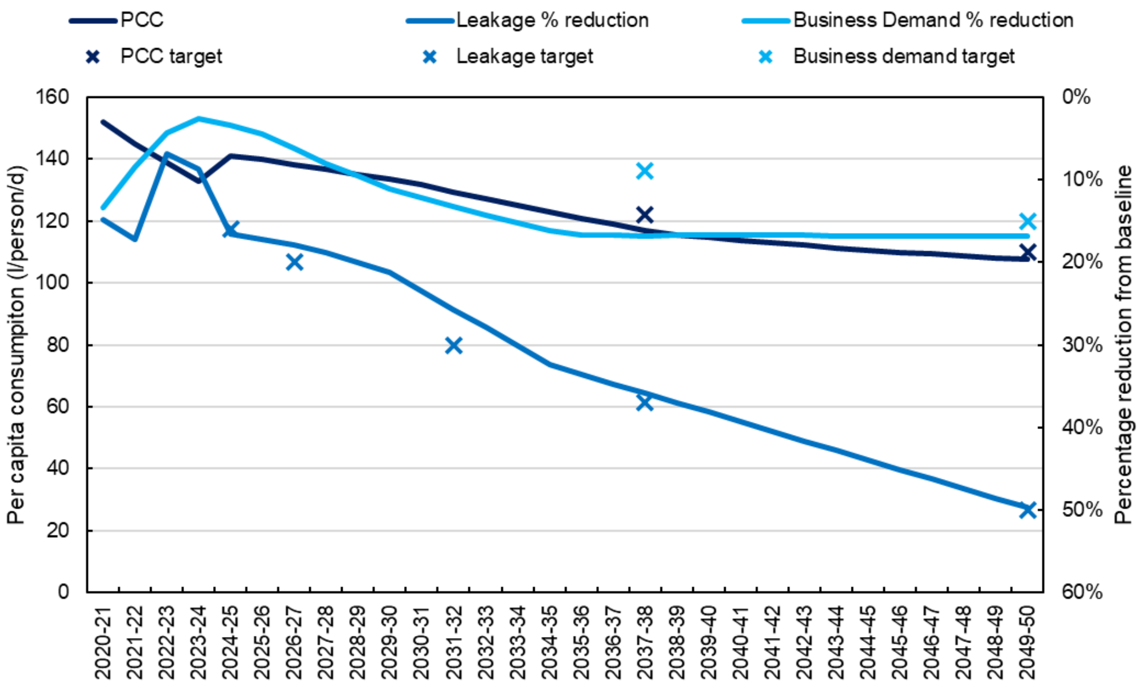
Target	Units	2024-25	2026-27	2031-32	2037-38	2049-50
DI per head	% reduction	-	9%	14%	20%	-
Leakage	% reduction	16%	20%	30%	37%	50%
PCC	l/person/d	-	-	-	122	110
Business Demand	% reduction	-	-	-	9%	15%

We will achieve the statutory water demand target in 2038 and the 2050 leakage target. Our preferred demand management strategy will additionally reduce per capita consumption (PCC) and non-household consumption (business demand) ahead of the trajectory outlined in the Environmental Improvement Plan (EIP) summarised in the table above. The forecasted in year PCC figures and percentage reduction in leakage and business demand in the preferred plan are outlined in Figure 6-2. It should be noted that the PCC target is reflective of actual in year positions whereas leakage and business demand are percentage reduction targets from different baselines. The leakage baseline is the 2017-18 reported

[47] Water targets Detailed Evidence report.pdf (defra.gov.uk); Environmental Improvement Plan (publishing.service.gov.uk); Plan for Water: our integrated plan for delivering clean and plentiful water - GOV.UK (www.gov.uk)

figure of 76.5 Ml/d; the business demand baseline is the three-year average reported in 2019-20, 81.6 Ml/d.

Figure 6-2: Reduction in PCC, leakage, and business demand against the government trajectory targets.



Each of these measures have their own performance commitment which will be reported annually and will ensure that we are on track to achieving overall reduction in distribution input per capita, Figure 6-3. The performance commitments are a measure of the percentage reduction of the three-year average from the 2019-20 baseline, current performance and forecasts up to the end of AMP9 are outlined in Table 6-6.

Figure 6-3: Distribution per capita in year forecast in the normal year planning scenario, and its percentage reduction from the 2019-20 baseline against the target trajectory.

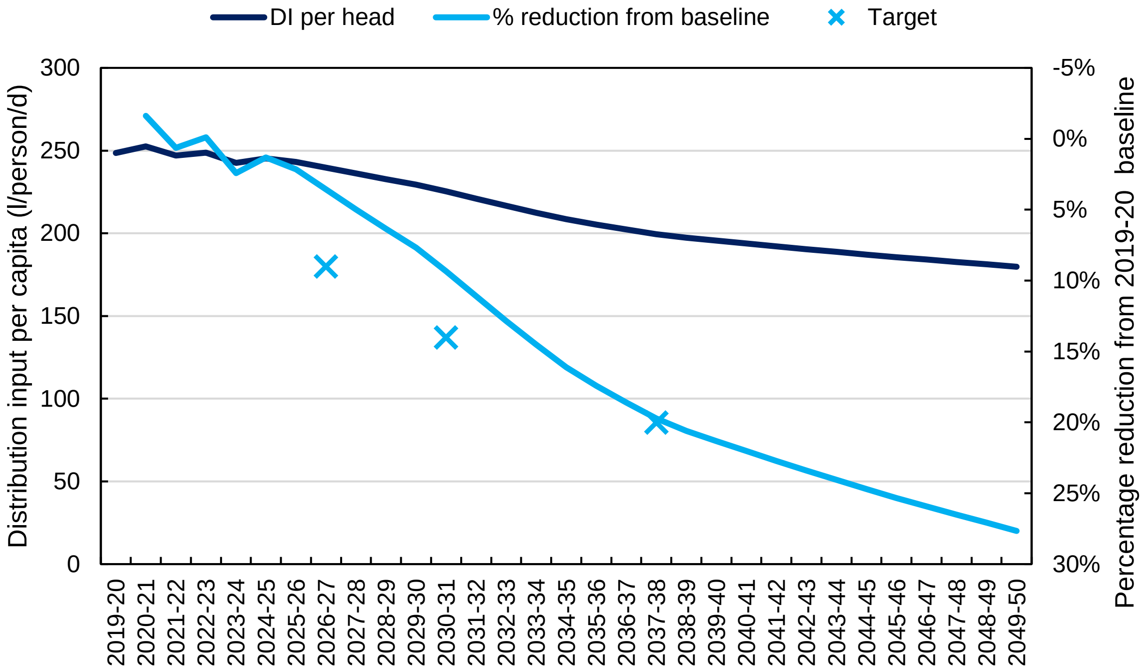


Table 6-6: Reported and forecasted values for the PCC, Leakage, and Business Demand performance commitments in AMP7 and AMP8.

		AMP7					AMP8				
		2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
PCC (l/person/d)	In year	151.8	144.9	138.8	132.9	140.8	140.0	138.2	136.6	135.1	133.6
	3-year average	143.1	145.0	145.2	138.9	137.5	137.9	139.7	138.3	136.7	135.1
	%reduction from baseline	-3.8%	-5.2%	-5.3%	-0.7%	0.2%	-0.1%	-1.3%	-0.3%	0.9%	2.0%
Leakage (Ml/d)	In year	65.1	63.3	71.2	69.8	63.8	63.3	62.8	62.0	61.2	60.3
	3-year average	69.5	65.4	66.5	68.1	68.3	65.6	63.3	62.7	62.0	61.2
	%reduction from baseline	5.2%	10.8%	9.3%	7.1%	6.9%	10.5%	13.7%	14.5%	15.4%	16.6%
Business Demand (Ml/d)	In year	70.6	74.6	78.0	79.4	78.8	77.9	76.5	75.0	73.8	72.5
	3-year average	77.8	74.8	74.4	77.3	78.7	78.7	77.7	76.5	75.1	73.8
	%reduction from baseline	4.6%	8.3%	8.8%	5.2%	3.5%	3.5%	4.7%	6.3%	8.0%	9.6%

Demand management strategy monitoring plan

In addition to monitoring our performance against common performance commitments as outlined above, we plan to monitor the progress and success of each programme within our demand management strategy on a regular basis as we move through AMP8 and beyond. For example, we'll monitor the volume of smart meters installed and quality of data we receive from these meters, as well as associated consumption and leakage reduction compared to assumptions set-out in our plan. This will allow us to monitor the effectiveness of our strategy and inform whether there is a need to trigger alternative adaptive pathways to meet our supply demand balance deficit in the future. Further details of this monitoring plan can be found in section 7 of our Demand Management Strategy technical appendix.

6.4.3 Supply side strategy

- As part of the Agency's Environmental Destination programme we will commit to continuing to protect Chalk streams by substantially reducing further our affecting abstraction licences over the next 30 years (resulting in a 50 Ml/d loss in supply by 2050). This will be achieved initially through demand management measures so that we can meet new growth without increasing abstraction from the catchment, prior to the implementation of supply-side schemes to reduce abstraction in 2035.
- Investigations (in AMP8 and beyond) will be required under the WINEP programme to assess the actual impact of our groundwater abstractions on river/stream flows in order to corroborate environmental destination requirements. This is essential so that we can reduce uncertainty in future needs, and implement the most effective long term solutions, both for Wessex Water's customers, but also for other users, notably in the Hampshire Avon catchment.
- During AMP8 we will take forwards design and development of several schemes under our core pathway to ensure our plan can adapt to the significant near term uncertainty in licence reductions in 2035. These are 'least regret' investments since many of them appear in all plan options.
- As we can't fully discount the far long term need for new regional strategic resource options such as Poole water recycling and/or a new reservoir in the Mendips, and these schemes still feature in more severe possible futures we have modelled, we aim to continue to investigate these with South West Water as our main partner on the West Country Water Resources Group.

6.4.4 Customer views on water resources planning issues

Our preferred plan has been shaped by customer research undertaken specifically for this WRMP and by insight projects associated with our wider PR24 business planning programme. At the time of writing, we have outputs from the draft triangulation of relevant insight prepared by Sia Partners for our October 2023 business plan. This is presented in Table 6-7 but may be subject to change as further triangulation is undertaken as part of the business plan. To triangulate insight sources Sia Partners' followed CCW's best practice guideline for triangulation for the water industry.

Table 6-7: Summary of customer insight from Sia Partners' draft Triangulation Report, June 2023

<table>
<tr><th colspan="3">Sustainable abstraction – customer insight</th></tr>
<tr><td colspan="3">Relative priority ranking: 8th
Total number of people engaged: 18,594</td></tr>
<tr><td>Robustness of evidence</td><td>High</td><td rowspan="3">Key sources of insight
E001 Reviewing Strategic Direction and Social Purpose, Oct 21
E003 2021 Young People's Panel, Dec 21
E004 2022 Young People's Panel, Nov 22
E006 Garden Water Use, Nov 21
E007 Customer motivations: water saving & smart meters, May 228
E009 Best Value SW Water Resource Plan (qual research), May 22
E010 Best Value SW Water Resource Plan (quant research), Jun 22
E016 Estimating customers' WtP for Sustainable abstraction, May 23</td></tr>
<tr><td>Divergence of views</td><td>Low</td></tr>
<tr><td>Regional differences</td><td>Low</td></tr>
<tr><td colspan="3">With a high number of sources used, the analysis includes the views of all customer segments and stakeholders resulting in the robustness of evidence score to be high. No significant and recurring divergence of views have been found, however, insight tensions have been identified regarding leakage. While leakage was not given great importance by customers, stakeholders have stated that they thought of leakage as a top concern. As for the difference between customer segments, household customers favoured increasing the investment in leakage reduction to achieve Wessex Water's 2050 goal, whereas non-household customers did not want to change the current level of investment. As for the regional differences, no significant variations have been identified.</td></tr>
</table>

Customers generally have a low awareness of the importance of water conservation.	• The majority of customers are just not engaged enough with the water conversation to commit to water conservation. [E001] • The need to preserve water is not totally unfamiliar territory but people are generally unaware that water stress is an urgent problem and feel they haven't been educated on the topic. [E006] • Attitudes towards waste don't necessarily ring true when it comes to water behaviour. [E007]
Customers either underestimate their water usage or don't pay attention to it at all.	• Customers revealed that many regularly carry out seemingly 'wasteful' water usage behaviours without thinking about how much they're wasting. [E007] • 2/3 of customers stated that they are not very water conscious [E001] • Most customers were shocked to hear how much they used each day and said that it seemed like a lot of water. However, customers were still unsure how their usage might compare to average usage; even though it sounds like a lot they're unsure if it's more or less than other people [E007] • Most struggled to even make an estimation as people don't really consider what volume of water they might be using day to day. [E006]
A common perceived benefit of installing smart meters is to save money on water bills.	• Of those interested in a smart water meter, aside from the functional benefit of being able to monitor water use, the main themes mentioned were to reduce use / waste, save money, and (for a smaller minority) to identify leaks. [E007] • A high proportion of customers with a meter (7 in 10) claim to want to reduce their bill by using less water. [E002]

	• Uninformed interest in smart water meters is reasonable amongst the panel – 4 in 10 are interested. There's more enthusiasm amongst those keen to save on utility bills, the environmentally conscious, and younger customers. [E007]
Leakage is commonly a preferred solution for reducing demand and reliance on abstraction.	• Reducing leakage and using education and awareness campaigns to encourage reductions in water usage were the most supported demand options. [E009] • Regarding the relative preferences expressed by customers between these alternative options, the evidence suggests that customers tend to place most value on leakage reduction and reservoir construction [E016]
Customers expressed strong support for reducing reliance on abstraction from vulnerable sources, even beyond the proposed targets for reduction, and to pursue a combination of alternative supply and demand options.	• There was a positive view on measures to protect and improve the environment by reducing the dependency of water supply on surface and groundwater abstractions. [E010] • Participants' preference for supply options was reinforced by a c.60:40 split between supply and demand options…customers recognise the need for multiple approaches for water resource planning, rather than rely on a single approach or solution. [E009] • Customers are willing to pay for improvements in these areas and expressed a desire to see Wessex Water going beyond the reduction target of 10ML/d. [E016] • Whilst cost was a secondary consideration for many, customers are more willing to choose a combination of less expensive methods in order to achieve more improvement in sustainable abstraction for the same overall bill impact. [E016]

Table 6-8 summarises how the preferred adaptive plan meets customer preferences.

Table 6-8: How the plan meets customer preferences

Key customer insight	How our plan addresses the insight
Customers generally have a low awareness of the importance of water conservation.	The combination of smart metering roll out and wider water efficiency services for households (Home Check) and non-households will help customers understand their water usage, drive reductions in water wastage (leaking toilets and taps) and support behaviour change through enhanced engagement.
Customers either underestimate their water usage or don't pay attention to it at all.	
A common perceived benefit of installing smart meters is to save money on water bills.	
Leakage is commonly a preferred solution for reducing demand and reliance on abstraction.	Our preferred plan will see leakage reduce by 50% over the 25 year long term horizon
Customers expressed strong support for reducing reliance on abstraction from vulnerable sources, even beyond the proposed targets for reduction, and to pursue a combination of alternative supply and demand options.	The demand and supply measures we'll implement will mean we can accommodate licence reductions from the most sensitive sources.

6.4.5 *Assessment of the Preferred (Best Value Plan)*

This following section details the assessment of the preferred plan and why it is considered best value. This is summarised in Table 6-9.

Table 6-9: preferred adaptive plan performance against WRMP24 best value plan expectations

Area	Covered in best value plan
Government policy and regulator expectations	The core pathway and preferred "most-likely" plan meet government expectations for 20% Distribution Input target per-capita reduction by 2037-38. See Section 8.3.5
Regional plans	Plan aligns with South West Water regarding use of regional SRO schemes including Cheddar 2 reservoir, Poole Water Recycling scheme and Mendip Quarries
Customers' preferences	See Table 6-8
Protecting and meeting the needs of vulnerable customers	Our commitment to supporting vulnerable customers remains unchanged. Further information can be found here: Vulnerable customer contact - OUR FUTURE PERFORMANCE | Wessex Water Our Business Plan submission in October 2023 will set out how we plan to extend support to customers that struggle to pay their bills.
Environmental improvements	The Preferred Plan has been assessed against SEA and HRA but also BNG and Natural Capital. These selected supply-side schemes all perform well against the environmental metrics generated for the feasible options (see Options Appraisal report) relative to other new supply schemes. The plan will bring significant benefit to the environment by reducing demand significantly in the short term, and therefore by reducing abstraction from the environment, most notably in the Hampshire Avon catchment, whilst additional supply side schemes are developed. The worst performing supply side schemes from environmental assessment were excluded.
Biodiversity	Scheme meets the SDB need under the preferred "most likely" plan without new abstraction sources and therefore considered to have minimal impact on biodiversity. Licence changes and reduced abstraction from the environment will have a positive benefit for the biodiversity and the environment.
Benefits (both monetary and non-monetary) for customers, Environment, and society (such as public health, well-being, and recreation) and how these are distributed spatially and over time	The plan comes with more cost than the least cost plan, but some of this impact will be mitigated through reduced customer demand. Substantial demand reductions will benefit the local environment for the public.
Natural capital both short and long term risks and benefits, including delivery risk	See Natural Capital Report
The flexibility and adaptability of your options to meet future uncertainties	Plan results in large demand reductions which are considered no regret options. The enhancement of current production sites allows for increased resilience and also the ability to meet peak demands. The

	adaptive plan allows the plan to adapt as needed depending on which SDB future plays out.
The resilience of your network and supplies	The plan proposes investment at a number of existing abstraction sources and therefore brings resilience benefits for unplanned outages and meeting peak demands. Improved system inter-connectivity as a result of transfers internally and improved connectivity to Bristol Water will also provide an additional resilience benefit to source outages.
The regional and national need and the needs of other sectors	The plan has been developed with liaison with South West Water/Pennon Group. The plan is aligned Pennon Group regarding additional imports from Bristol Water, the use of Cheddar 2 for South West Water need, and Poole Water recycling scheme. The plan also selects a 17Ml/d option from Mendip quarries under a lower probability, higher need scenario. Further work is required through the gates process to progress these schemes, reduce uncertainty in cost and feasibility, for inclusion as feasible options in WRMP28. The plan solves the supply-demand balance for all our customers, both household and non-household. The needs of other sectors is covered in the regional plan.
The impact of your preferred programme on the affordability of your customers' bills	Overall bill affordability is being tested as part of our wider business plan – results will be published on our customer insight webpage once completed and will form part of our Oct 2023 submission to Ofwat.
Achieving net zero and the climate emergency	The reduction in carbon from the preferred plan will be supported by our Net Zero ambitions. Further information can be found here: Wessex Water route map to net zero carbon emissions
Ofwat's public value principles (Ofwat's Public Value Principles - Ofwat): further social and environmental value in the course of delivering core services beyond minimum statutory obligations.	The plan considers environmental and social value by delivering a plan which goes beyond the least-cost plan to provide protection for the environment and through delivering a best-value plan that considered objectives beyond least-cost.

6.4.6 Regulatory Environmental Assessments

The preferred plan has been subject to environmental assessments including HRA, SEA, WFD and INNS alongside the wider Biodiversity Net Gain and Natural Capital assessments. The details of the performance of the preferred plan in these assessments (which includes all options selected under the Core and Central "Most Likely" Pathways) is contained within the relevant supporting technical appendices, and summarised in the SDB, Decision-making and uncertainty Technical Appendix, and the Options Appraisal Technical Appendix.

6.4.7 WINEP investigations, Environmental Projects and Nature-based solutions

A key part of our preferred adaptive plan is to undertake WINEP investigations in AMP8, which alongside the outcomes of investigations in AMP7, will narrow down uncertainty in future water resources need, and therefore provide a more cohesive understanding of need to feed into WRMP29 and inform our next decision-point for further supply-side investment in AMP9.

Overall there are 38 water resources WINEP investigations actions across six WINEP drivers, including the investigation work in the Hampshire Avon catchment:

- The Wylye, Bourne and Nine Mile River Investigation will extend the work of the AMP7 CSMG investigation to these parts of the Hampshire Avon SAC system;
- Catchment-level assessment of the effects of climate change on the yield of our sources;
- Quantifying abstraction in terms of available recharge (rainfall) in addition to river flow;
- Investigation the potential to move abstraction downstream to the Salisbury area and reduce abstraction in the headwaters
- Investigating the potential for abstraction from four disused sources and one active source to cause deterioration in WFD status of waterbodies

In addition to these investigations, Wessex Water is leading on through further investigation work and partnering with external stakeholders on a number of projects in AMP8 and beyond that will lead to environmental catchment improvements and lead to development of nature-based solutions to feed into our next Water Resources Management Plan.

<u>Hampshire Avon catchment Partnership: Resilient Avon Programme</u>

Co-designed with the Catchment Partnerships and stakeholders, including the Wessex Rivers Trust, Wilshire Wildlife Trust and Bournemouth Water, the primary driver of the project is to deliver Habitats Regulations improvements, delivering a wide range of interventions for water quality, flow and biodiversity. Wessex Water's financial contribution will largely contribute towards flow resilience-based outcomes to deliver Chalk Stream restoration, including habitat and wetland creation, development of flood storage and removal of in-channel barriers.

<u>Stour Catchment Partnership project: Chalk Streams and Clay Vales</u>

The partnership project lead by Dorset Wildlife Trust, in partnership with Wessex Rivers Trust, FWAG SW and Bournemouth Water will deliver 25 year Environment Plan (25YEP) outcomes over a 10-year period to 2035. Aligning with Dorset Catchment Partnerships' Strategic Programmes and the EAs strategies for the Stour and Chalk streams, the project aims to reduce agricultural impacts on water quality and quantity, restore and improve natural hydrological function, increase climate resilience and increase biodiversity through removal of in-channel barriers and wetland and habitat creation.

<u>Poole Harbour Catchment: Frome Headwaters Flagship (Chalk Stream) Project</u>

As part of the Chalk Stream Restoration Strategy (CaBA) flagship catchment restoration projects, Wessex Water will deliver the Frome headwaters flagship project in four water bodies collectively known as the Frome Headwaters. A scoping study undertaken in 2022 in collaboration with Dorset Wildlife Trust identified a number of pressures impacting the project area. Based on this study, a number of potential activities have been identified through stakeholder engagement, including removal of instream structures and channel restoration, as well as water quality improvements. Alongside these interventions, an ongoing monitoring plan has been developed to be delivered through the ten-year duration of the project to provide an appropriate assessment of Chalk Stream health.

WINEP Environmental Destination option investigation

Under the WINEP programme, we are undertaking an investigation which will focus on options to meet Environmental Destination not considered in company-level WRMPs and Strategic Resource Options. The exact scope of this assessment will be determined based on EA guidance published later in 2023, however we propose to focus on taking a more catchment-based approach to that, to mitigate the impacts of climate change, means there are potential benefits for both public water supply and flooding of "slowing the flow" in the winter to provide support for lower flows in the summer. We propose to explore options to achieve this for inclusion in our next WRMP decision-making process, including:

- Nature based solutions – measures that 'slow the flow' and improve catchment water resource resilience under a changing climate. Examples may include wetlands and similar catchment interventions.
- Storage options – further investigation of storage for ED benefit with focus on chalk catchments. This includes consideration of the benefit to wider system/catchment resilience to climate change.

We propose to focus on Chalk catchments, and in particular the Stour catchment, which has clay headwater catchments that lead to higher run-off to the downstream chalk; slowing these flows could reduce flooding on the lower stour and support our abstractions downstream. Local storage options instead of importing water from further away in Chalk catchments will also potentially be lower carbon options.

6.4.8 Mere Investment

The Mere stream support option is selected under the core pathway is to offset the influence of current abstraction, although this is to provide a local amenity benefit in the area and is not driven by requirements under the Water Framework Directive or the Habitats Regulations.

The benefits of the stream support option upon the local river and the required augmentation will be reviewed through AMP8 as the trials complete, to consider the effect on deployable output. The trialling will also assess the ecological wellbeing of the two augmented streams, a continuation of ongoing monitoring.

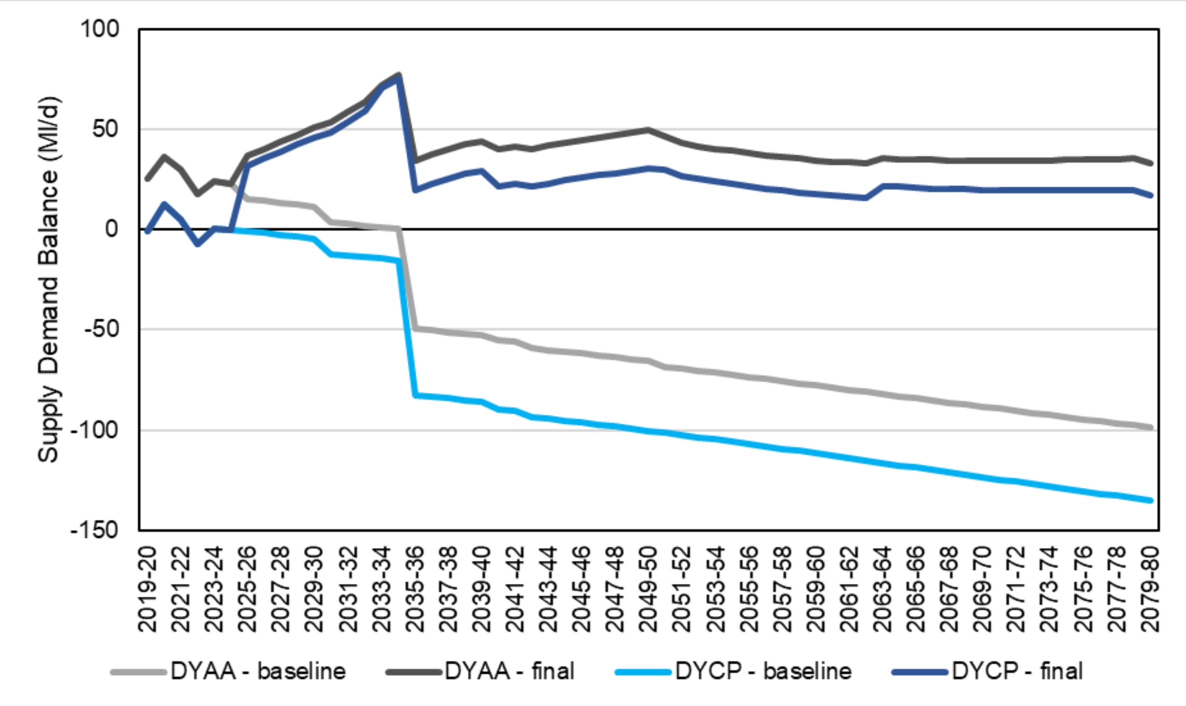
During AMP8 we will review the scheme effectiveness and applicability in light of the Environment Agency's developing policy on river augmentation and the concerns around mitigation rather than prevention. We will consider this in the context of the River Stour catchment sustainability as a whole, given Wessex Water's other abstractions downstream. This will include in relation to the outcomes of the wider WINEP investigation work being undertaken on abstraction licence sustainability in the catchment, which will input to our next WRMP29 on potential scenarios for licence changes, and what the best value approach will be for meeting this broader need.

It is noted that if the EA policy moves to ‘preventing damage’ and not allowing mitigation, then abstractions from sources near headwaters will effectively have to cease or be severely restricted, not just at Mere but at several other sources, leading to a significant overall DO reduction. At Mere the use of augmentation, to date, has provided acceptable (amenity) flow along the Ashfield even during the environment drought of 2022. A policy change to ‘prevention’ would reduce the Mere DO to 1-2 Ml/d, with the consequential need to import water from a new source, with associated higher treatment and pumping costs, and associated carbon impacts. Stream augmentation at Mere could, trial dependent, restore acceptable flows to the streams, with a commensurate reduction in DO, but with the source still supplying water to the local area, but with a reduced export from the local area.

7. Final Supply Demand Balance

The Final Central SDB for both the DYAA and DYCP scenarios are presented against the baseline in Figure 7-1. Under both scenarios, the main driver of the final supply demand balance is demand management reductions in the short term to achieve licence reductions in 2035. At the end of the planning period, in 2079-80, the final SDB in the DYAA is forecasted to be 33 Ml/d. For the DYCP, the 2079/80 SDB is 17 Ml/d.

Figure 7-1: Baseline and Final Supply Demand Balance for the DYAA and DYCP



8. Operational Resilience

8.1 Background

Resilience is the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment, now and in the future. We recognise that our resilience affects our ability to maintain high-quality and reliable services for our customers, protect the natural environment and ensure the long-term viability of our services. Our overall approach to resilience brings together our existing and ongoing activities into a system-based resilience framework that complements our current risk management approach.

Operational resilience is defined as 'the ability of an organisation's infrastructure, and the skills to run that infrastructure, to avoid, cope with and recover from disruption in its performance'. As part of Wessex Water's strategic operational resilience assessment, we have defined the individual systems that make up our business, summarised as follows:

Table 8.1. Definitions of our systems

System	Definition
Catchment management	This system covers the land and property operations, including any catchment management programme.
Water resources	Activities related to the identification of new raw water sources, management of licences and schemes in accordance with legal obligations and water abstraction infrastructure. Includes abstraction activities with third parties and charges.
Water treatment	This system includes all activities related to: Raw water transport (including to treatment works, raw water storage or customers and utilities providers); Raw water storage (including construction, operation, and maintenance activities); and Water treatment.
Water networks	Activities related to transporting treated water from the treatment works to the customer. This includes network construction, repair and maintenance activities, storage facilities and ancillaries (e.g. pumps, air valves etc.).

There is a direct correlation between the needs of our WRMP and operational resilience. For example, in supply forecasting there is a tendency to make implicit assumptions that the assets that generate water into our distribution network are fully resilient and never fail, or that the design parameters and tolerances they operate to never need to change. An example of this would be design parameters for a treatment process which assumes a particular range of water quality from influent raw water. If subsequently, due to raw water deterioration (e.g. rising nitrate trend), the influent water quality were to fall outside of the original design parameters then this would mean the water could no longer be treated to the required standards.

We have looked at operational resilience in the context of the identified systems through the output of the resilience maturity assessment and the risk identified in our Drinking Water Safety Plans.

8.2 Operational hazard assessment

In line with customer expectations, we have assessed the potential risk to our water supply system against a number of potential hazards.

A multiple hazards approach was used to provide an initial high-level resilience assessment of our water supply systems. The assessment gives each possible point of failure a risk score, which relates to the likelihood of failure, the consequence of failure and the mitigation control factors and was used to prioritise key threats where additional mitigation may be beneficial.

8.1.1 Site name redacted

For security reasons this section has been redacted in the version of this document published on our website as it contained detailed descriptions of a specific site resilience and operation

8.1.2 Site name redacted

For security reasons this section has been redacted in the version of this document published on our website as it contained detailed descriptions of a specific site resilience and operation

8.1.3 Other resilience areas

In addition to standalone sources, treatment, and network resilience there are other related areas operational resilience relevant to our WRMP including:

Table 8-2: Other Key Areas of Operational Resilience

Resilience Area	Considerations/Examples
Drought Resilience	Essentially covered by this WRMP24 and our Drought Plan. Our Drought Plan is a tactical document that set out triggers and measures in response to drought events, and therefore primarily focusses on the response and recovery aspects of drought resilience.
Freeze-thaw Resilience	In March 2018, we experienced the “Beast from the East” weather event, that brought an extended period of freezing conditions to much of the UK, and red weather warnings of severe snow and ice to our region. We managed the event without any material disruption to our services and with no customer experiencing any supply interruption that lasted longer than three hours.

Resilience Area	Considerations/Examples
Flood Resilience	All of our larger sites and those highlighted at risk of flooding were subject to review to a 1:1000 year flood event, termed an 'Extreme Flood Outline'. The flood risk assessment conducted at each site assessed the source of flooding from potential sources including impacts of climate change up to the 2050 horizon following consideration of a number of different return periods. A hierarchy of mitigation methods have been used to assess ways of improving the resilience to an extreme flood event and any investment is subject to an appropriate cost benefit assessment.
Resilient catchment partnerships	We favour an innovative catchment programme to improve the water environment with catchment management at its centre and much more integrated management of land and watercourses. The outcome of investing in a catchment-based approach is improvements in the resilience of the natural ecosystem of the catchment that improves resilience not just for Wessex Water but society as a whole.
Resilience from malicious damage	The dynamics of malicious threats are changing. Increases in information dependency and interconnectivity, which has brought significant benefits in managing our supply system, has increased the risk and potential impact of a software cyber-attack, as we have reduced the scope for standalone and manual operation of the water supply system. We have made significant investment to provide physical security protection for our water supply infrastructure and comply with current advice from the Centre for the Protection of National Infrastructure.
Asset reliability and maintenance	Our business-as-usual asset management framework and the findings from bottom-up assessments and life cycle analysis have been used to formulate a long-term investment programme for our key sites. These are refurbished or renewed as part of a long term proactive strategic programme. For some assets such as boreholes, dams, and service reservoirs we undertake proactive cyclical maintenance inspections which lead to asset maintenance and refurbishment programmes. For other assets we use a run to fail model resulting a set of reactive capital maintenance tasks. The result is the delivery of a resilient supply service to customers in a cost-efficient manner whilst maintaining an appropriate level of risk.
Integrated resilience	An example of our long-term resilience planning and integrated resilience approach has been the development over AMP5 and AMP6 of our strategic integrated water supply grid completed in 2018 The development of the GRID has improved supply security through removing the majority of standalone sources, providing a means of addressing some issues of deteriorating water quality, and addressing localised increases in demand. In addition the GRID has been an enabler to reducing abstraction licence and thereby starting to address issues of low flows in Chalk streams.

8.2 Raw Water Quality and Drinking Water Protected areas

Raw water quality deterioration is a considerable risk to our operational resilience, from both a quality and quantity perspective. Raw water quality is likely to experience further deterioration as a result of climate change and more frequent extreme weather events. There also remains uncertainty around the impact of emerging raw water contaminants such as PFAS and microplastics.

Catchment management has been a key feature of our raw water quality management since the early 2000s. Our recently established Raw Water Performance Team combines agricultural advisers and hydrogeologists/hydrologists working in our drinking water source catchments (groundwater and surface water), in order to assess and manage catchment and source risks to raw water quality, and to understand and minimise the constraints on source deployable outputs (DO).

We will continue our catchment management work in both surface water and groundwater catchments. Details of our PR24 catchment management proposals are given in proposals submitted to the Drinking Water Inspectorate (DWI) in March 2023 entitled, “PR24 drinking water quality submission to the Drinking Water Inspectorate”

8.3 Resilience summary

This section has described the resilience of our system and services in relation to a wide range of potential threats and hazards. Our generally good levels of resilience are related to the investments we have made in infrastructure and asset management, technology and data management, and catchment partnerships and solutions.

The risks we face are continually evolving and providing resilient services remains a priority area for us and our customers.

Our future strategy for continued improvements to the resilience of our assets and systems relevant to this WRMP includes:

- Resilience improvements to our largest WTC through accelerating our programme of continual investment and increasing our capability to off-set demand through additional potable water transfer from a second WTC at a Bristol Water site.
- Nitrate treatment at a WTW in the Dorset Stour catchment to mitigate the risk from rising nitrate raw water deterioration.
- Continuing to invest to improve cyber security across our treatment and network asset base.
- Continued partnership working to provide environmental resilience in the most sustainable way.

9. Summary and vision towards WRMP29

We have presented an affordable plan supported by customers, to deliver a positive supply demand balance, and therefore a secure supply of water to 2079-80, which meets a 1 in 500 level of service for emergency drought orders by 2040, and also delivers important abstraction licence reductions to help protect Chalk streams in 2035 and 2050.

A key part of this plan is the delivery of demand reductions through a wider approach to smart metering, helping both household and non-household customers to be more water efficient, so that we can build drought resilience in the region, and appropriately adapt to future uncertainties in WRMP29. A key benefit of this approach is that it will offset future demand growth in the Hampshire Avon, and reduce pressure on the chalk catchment prior to the implementation of longer term schemes.

As shown in our adaptive plan, to inform our next key planning decision point in 2027-28, when we will produce our next plan (WRMP29) we will undertake a range of investigations and enabling works to reduce planning uncertainties, in particular:

- **Effectiveness of demand reduction strategies –** through implementation, we will improve understanding of demand reductions and costs associated with smart metering and water efficiency activities in the region, as well as nationally, alongside government policy direction on water efficiency.
- **Supply scheme investigation –** we will continue our work with neighbouring water companies as part of the West Country Water Resources Group to improve understanding of cost, yield benefit and feasibility of larger scale and shared schemes and develop our regional modelling capability to better understand cross-company system water use under drought with strategic schemes. We will also progress through more detailed design and development (enabling works) phase the schemes that are required to be built under AMP9 under all alternative pathways, and in doing so work to refine understanding of scheme design, costs and yield benefits.
- **Environmental investigation –** we will work to narrow down uncertainty of future needs for licence reductions and timing of these reductions, in collaboration with regulators and neighbouring companies in the region, in particular in the Chalk catchments of the Piddle, Frome, the Stour and Hampshire Avon.
- **Demand growth** – we will monitor and update our forecasted demand growth based on updated Local Authority information, alongside monitoring of demand post pandemic to understand likely trajectories of household and non-household demand.
- **Regional Modelling** – we are currently developing our new regional models which will provide greater understanding of inter-regional needs and connectivity requirements to improve our regional option selection for WRMP29.
- **Upper Hampshire Avon Catchment** – we will lead the new steering group to coordinate understanding of future needs in the catchment, and the supply solutions to be implemented to meet all users needs for 2035. In the interim we will focus our demand reduction strategies for the benefit of the catchment, prior to implementation of new supply-side schemes.

We look forward to continued engagement and communication with all stakeholders as we develop our plans further towards WRMP29.