Our draft
Water Resources
Management Plan

10:Development of our Best-value plan

Contents

10 Development of our best-value plan

Document Purpose:

This chapter describes the approach that we have used to develop our best value plan and the decision-making process that we are using. It builds upon the previous work where we have developed our forecasts, our baseline and our options (see previous chapters for details). It explains our decision-making framework, covers the modelling that we have undertaken on our best value plan, the scenarios that we have developed, and how these have been used to test our draft WRMP. Finally, we discuss how the draft WRMP will be developed further, to align with our Long-Term Delivery Strategy; our PR24 submission, and our Final WRMP.

Summary

We have developed a robust decision-making approach which aligns with our Problem Characterisation Our approach uses a Stochastic Economics of Balancing Supply and Demand (S-EBSD) modelling suite and a multi-capital best value planning tool. These have been used to develop both a least-cost and best value adaptive plan.

We have developed a wide range of futures, scenarios and sensitivity tests to align with the Water Resource Planning Guidelines and Ofwat's guidance on common reference scenarios. We have assessed the impacts of climate change, population, demand, technology and environmental uncertainties. We have also introduced additional scenarios because of uncertainties around our 2025 baseline position: there are several temporary drought options that may become a permanent solution within our baseline and we are also still understanding our future demand following our recent 2022 drought.

All Water Resource Zones are sensitive to high climate change and to differing levels of increased demand (above those experienced during drought 2022/ covid). These scenarios and sensitivity tests have enabled us to understand the triggers and decision points for each of our Water Resource Zones to enable us to adapt to future uncertainties. These are defined in Chapter 11.

We have used our best value tool to demonstrate how our recommended (best value) plan improves the environmental, societal and resilience scores of our least cost plan. The following tables summarises this comparison.

	Least Cost	Best value
Leakage reduction	Backload our leakage reductions to reduce delivery costs	Continue to target leakage reductions (linear profile to 2050).
Water efficiency / demand-management activities	Backload our demand management activities such as water efficiency. Minimise the use of water efficiency	Continue to focus on water efficiency and other demand-management options including the use of metering.
Metering	Replace meters reactively with smart meters.	Proactively replace meters with smart meters to support reduction in consumption and help identify wastage and customer-side leakage.
Use of drought permits and water-use restrictions	Use these frequently to minimise the need for additional investment on new water sources.	Minimise the use of drought options / water use restrictions.
Supply side schemes	Backload investment in supply side schemes. Develop minimum number of new schemes	Bring forward investment to build resilience and reduce the need for extensive restrictions on water-use.

1 Our approach to decision making

1.1 Introduction

To arrive at the best value plan, we consider the following:

- **Policies and constraints:** The plan must work toward the objectives of existing policies and regulations, while satisfying their constraints.
- **Stakeholder and customer preferences:** The plan will be presented to various stakeholder groups including customers and regulators. The preferences of these groups will be taken into consideration, and where appropriate will guide our decision-making.
- **The impact of our plan on the environment:** Our plan will minimise and manage the negative effects our programmes may have on the natural environment, and it will seek to enhance natural capital in line with our wider environmental objectives.
- **The costs and benefits of our plan**: We will compare the cost of the plan with a multi-capital approach to benefits analysis to demonstrate an improved value position.
- **Best value considerations**: Our final choice will be subject to a multi-capital approach, based on metrics that reflect stakeholder and customer values.

Our decision-making process is based on our forecasts of supply and demand, our customer engagement, and optimising for the choices that deliver the highest value for customers and the environment. Our decision-making process is therefore informed by the findings from our Strategic Environmental Assessments (SEAs), Natural Capital and Biodiversity net gain, carbon emissions, cost, MLD benefits and a range of other metrics. The full range of metrics of our best value multi-capital approach is discussed in Appendix 10.1 and Section 1.6 of this chapter.

In order to choose an appropriate decision-making approach we have used the conclusions from our problem characterisation assessment (Annex A, Chapter 1) to select the modelling process.

We then undertook sensitivity testing of our plan to support our understanding of the risks and uncertainty in the future.

To establish a balanced plan, we have employed a range of methods including modelling, triangulation and expert judgement, in addition to conducting customer research and engaging with stakeholders.

The outputs of the modelling were shared with internal operational, water quality and engineering teams to develop our long-term strategy and to finalise the selection of the options for our shorter-term plan. We also used the outputs to engage with our stakeholders to calibrate and guide the plan as it was developed.

1.2 The decision-making stages

Our decision-making process was divided into five distinct and consecutive stages. These are summarised below and described in more detail in the later sections:

- **Stage 1: Selection of the modelling system and pre-modelling set up** – We established the modelling system, incorporating relevant constraints and policies into the pre-modelling setup (as outlined in Section 1.3).
- **Stage 2: Definition of scenarios and best value planning metrics** – The scenarios were defined (see Section 1.4), as well as the Best Value Planning metrics (see Section 1.5). Appendix 10.1 shows how we developed our best value planning tool.
- **Stage 3: Developing our least cost plan** – The Stochastic Economic Balance of Supply & Demand model (S-EBSD) was run to select an optimised, least-cost investment programme under the given scenarios and constraints. A preliminary appraisal of the programme was also conducted at this stage.

- **Stage 4: Developing our best value plan through** exploring stakeholder and customer influence – To develop our best value plan, we engaged with our stakeholders and customers to understand their preferences (refer to Chapter 3). We used this feedback, along with wider best-value metrics which consider environmental implications, social and economic factors and overall resilience, to develop our preferred plan.
- **Stage 5: Adaptive pathways approach & modelling interventions** – Finally, an adaptive pathways approach was used to set out investment programmes which

    1. fulfil immediate and most probable future needs
    2. respond to external pressures in the future with alternative investment options that are triggered under specific conditions
    3. Identify low- and least-regret investments that enable future options or return benefits under the broadest range of potential futures

The evaluation of the programme is a continual and progressive process until the finalization of the Plan and beyond. As we get more feedback from stakeholders, construct our long-term delivery strategy, and PR24 submission, the modelling will be employed to tune our strategy and Plan to maintain equilibrium between our different investment plans. Our strategy and methods are designed to be adaptive and flexible, and our planning process will keep optimizing our selections going forward. The above process is employed to ensure that we arrive at the most cost-effective and beneficial plan for the future of the region. We will continue to monitor and review our plans and update them as needed based on changing conditions.

1.3 Stage 1: Our modelling system and pre-model set up

1.3.1 Model system selection

Before modelling, we identified and selected a suitable technique for modelling, drawing on the problem characterisation assessment established in Chapter 1, Annex A.

The problem characterisation assessment concluded that we have a large strategic needs score, and moderate to very significant complexity. In comparison to our WRMP19, the current set of metrics shows a marked increase in complexity.

The guidance refers to a choice between aggregated or system-simulation approaches to modelling for assessments that fall into the 'High' complexity and 'Large' strategic needs scores in the matrix.

System simulation involves the modelling of complex supply systems and the development of models that can simulate large raw water and stochastic data sets. We have opted for a type of model that is usually used as part of an aggregated approach. This allows us to model deployable output and demand for each year of the planning horizon but with the added functionality to model stochastic data while still allowing for an adaptive pathways approach to be developed to manage the uncertainty inherent in long-term planning.

Our modelling approach has been chosen to be flexible enough to allow us to account for changes in the supply-demand balance with changing climate and demand requirements, future developments in technology and changes in resource availability. As part of the modelling process, we evaluate multiple scenarios, to compare different combinations of strategies, and to ensure that our plans are as robust as possible to meet the future needs of our customers.

In addition, we include environmental and sustainability considerations into our analysis, ensuring an integrated approach based on a holistic understanding of the system. This allows us to identify and quantify the potential impacts of our modelling decisions on the environment while considering the social and economic objectives and constraints of our region.

We will engage with our customers and stakeholders as part of our public consultation process, to gain feedback on the outputs of our models so that we can explore various policy and management options and identify and agree on a preferred strategy to manage water resources in the region.

1.3.2 The model system

Our consultants, ICS Consulting Ltd, have developed the Stochastic Economics of Balancing Supply and Demand (S-EBSD) modelling suite that has been used for modelling each of our Water Resource Zones (WRZs). The tool is a multiple-criteria optimiser that has been configured for our WRMP planning requirements by running different scenarios to model our adaptive pathways, the uncertainties in the forecasts, and sensitivities to the key modelling parameters.

The S-EBSD modelling suite enables us to use multiple approaches to decision-making and to compare the costs and benefits of different outcomes. It enables us to quantify both the short- and long-term effects of our decisions and to make well-informed decisions about the balance between supply, demand and environmental needs.

Driven by the increased uncertainty facing us in the future, this new tool has been developed by a specialist modelling team, drawing on academic insight and research to develop better mechanisms for reflecting uncertainties in a fully stochastic model.

The modelling uses our forecasts for water available for use (WAFU) and demand to develop the supply-demand balance over the next 25 years. This forms the backbone of the analysis, from which we can apply and test any number of different constraints, options, and sensitivities. These are combined and implemented in different scenarios that define the plausible envelope of future pathways.

The model is provided with yield, costs, and lead times for demand options, including varying leakage reduction profiles (e.g., linear 50% by 2050, 50% by 2050, and 'backloaded'), and supply options such as new resources, and it optimises maintaining the supply-demand balance using the least-cost methods.

The optimisation process looks to minimise the discounted costs over the time horizon 2025-2105 (80 years). It does this by trading off building and using supply options against running restrictions to maintain a positive supply-demand balance within selected uncertainty percentiles (50^{th}, 75^{th}, 80^{th}, 90^{th}, 92^{nd} and 95^{th} percentiles).

Key factors in the Least Cost S-EBSD modelling process are

Supply-demand balance uncertainty: Headroom uncertainty is combined with the forecast baseline supply-demand balance, to produce a stochastic understanding of the likely supply-demand balance. The optimisation process picks options such that the supply-demand balance is maintained, at least cost, over the planning horizon.

Option choices: Leakage and household demand reduction are considered using 25-year reduction profiles which have been built to deliver the reduction targets (50% leakage and 110 l/p/d per capita consumption) in different ways; for example, through a linear reduction profile, or through front- or back-loaded profiles. Supply options are selected to be built in a specific year. The demand-reduction and leakage-reduction strategies developed as an input into the decision-making process are described in Chapter 9.

Drought restriction choices: Drought restriction usage is determined within each uncertainty percentile, and the cost is calculated based on the risk of having to apply different severities of drought restriction and customers' willingness to pay to avoid them. These cuts are balanced against the cost of additional investment that would reduce the risk of them being required.

Objectives: The S-EBDS optimiser has the following objectives to meet:

- Maintaining the supply-demand balance to ensure reliable supply
- Ensuring 1-in-500 year drought resilience by 2040
- Meeting PCC & leakage reduction targets
- Minimising TOTEX costs (£).

The demand strategies to achieve the above objectives have been developed from the strategies and feasible options discussed in Chapter 9, including options for metering, efficiency measures, and our leakage strategies. The process for optimising these strategies is also described in Chapter 9. Our supply options are from the feasible list of options as defined in Chapter 8. In addition, several different consequences are also modelled, such as temporary usage bans (TUB), drought restrictions etc. to model what happens if options are not implemented in time. Our assumptions around how we have treated the drought options currently being implemented as part of our response to Drought in 2022 (options identified within our Drought Plan) are discussed in Section 10 of Chapter 1.

The optimised strategies for leakage and water efficiency/smart metering were input into the model as demand management options using reduction profiles and annual intervention costs. The model was only allowed to select one leakage and demand management scenario as part of least-cost modelling to maintain water supply. Carbon and environmental impacts were assessed for each strategy and used as an input to the decision-making process (best value tool).

Further information on how our S-EBSD model was used to inform our approach to selecting our best value plan is discussed in Section **Error! Reference source not found.** below.

1.4 Stage 2: Definition of Scenarios and best value decision making

1.4.1 Scenario definition (futures)

This section sets out the futures and sensitivity tests we have used to inform the development of our adaptive strategies set out in Chapter 11. These scenarios and additional scenario testing align with the Ofwat guidance (PR24 and beyond: Final guidance on long-term delivery strategies)[1]. Additional scenarios and tests have been developed to ensure our plans are robust based on the insights from our experience of drought in 2022 around the higher levels of demand. There are also uncertainties on which drought options will be permanently implemented by 2025-26. The basis for these additional scenarios is explained in Appendix 1.1, and Section 10 of chapter 1.

Our draft WRMP (dWRMP) includes many assumptions regarding the future, some of which are highly uncertain and have the potential to profoundly affect water resources. While some aspects of this uncertainty can be considered by incorporating planning headroom into our forecasts[2], others introduce sufficient uncertainty into the final position that it is better to consider them differently. Three sources of uncertainty fall into this high-uncertainty definition: customer demand, climate change, and environmental need. Each of these presents its own challenges, without a single solution, and there is still a possibility that our assumptions could be either too optimistic or too pessimistic.

Consultation with stakeholders and experts has provided invaluable insights, including their views on best value. Before submitting our revised dWRMP (at Statement of Response), we will carry out further customer and stakeholder engagement to test our assumptions and projections. Additionally, crafting sturdy and realistic models of the probable demand and availability of water resources, informed by up-to-date information on climate change and environmental need, will provide us with the greatest achievable insight into the future of our water resources.

- **Customer demand:** SWW has set out ambitious targets for reducing both leakage and household demand in line with the targets set for the industry. This calls for a marked change in activity and demand levels from multiple stakeholders. As such, there is a degree of uncertainty around achieving the per-capita consumption targets. We have developed several additional demand scenarios to test our plan.
  - **An optimistic position** where current reduction trends persist and the desired reduction targets for PCC of 110 l/p/d, and leakage reduced by half by 2050 are met.
  - **A pessimistic position** which lies halfway between the optimistic position and the baseline (with no additional water efficiency activity after 2025, and leakage held at the 2025 level). Demand is impacted by many different factors and rather than defining a particular combination of these factors in the pessimistic scenario, we have used a generalised approach which can represent differences in things like population growth, demand trends, and technology.
  - A series of increasingly **pessimistic scenario tests** wherein the demand is higher than projected.

The Company faces a challenging task: reducing customer demand while mitigating losses from leakage. Nevertheless, we remain undeterred and are advanced in the process of engaging with stakeholders and assessing the probable effects of varied strategies.

- **Climate change**: Our primary assumption is a medium emissions climate-change pathway (RCP6.0) as defined by the Intergovernmental Panel on Climate Change (IPCC). We have also considered a higher-impact scenario (RCP8.5).

[1] PR24 and beyond: Final guidance on long-term delivery strategies - Ofwat

[2] Refer to Chapter 7 for a discussion of the risks included in the headroom calculations.

- **Under RCP6.0, temperatures** are projected to increase by 0.9-2.2°C towards the end of the 21st century, compared to pre-industrial averages. Precipitation is expected to remain relatively unchanged compared to current levels, with a slight increase in the winter and a slight decrease in the summer.
- **Under RCP8.5**, temperatures are projected to increase by 2.2-4.7°C towards the end of the 21st century, compared to pre-industrial averages. This higher temperature increase will likely lead to a decrease in annual precipitation in most locations, with greater decreases in the winter.
These changes have a direct impact on raw water resources, including river flows and aquifer recharge. Higher temperatures, combined with decreased precipitation, will likely lead to lower river flows and less groundwater recharge. This could have significant impacts on water availability and water quality, particularly in areas where water sources are highly dependent on surface runoff.

- **Environmental need**: We have included the 'BAU+' scenario as our primary assumption but have also considered the impact of higher abstraction reductions ('Enhanced').[3]

For our initial modelling, we developed six primary futures defined by combinations of these factors, summarised in Table 1, that model the uncertainties and variations in the key parameters over the 25-year horizon. We vary these projections to create a range of possible outcomes and to better understand the influence of each variable. We have also presented a baseline scenario (0), which does not use any constraints on reducing leakage, demand reductions or 1-in-500 year drought resilience, to use as a comparator.

No.	Description	Demand	Climate	Environment
0	Unconstrained (not required to select demand or leakage reduction options)	Optimistic	Medium emissions	BAU+
1	**Most likely scenario** **Corresponds to the 'policy' regional plan future**	**Optimistic**	**Medium emissions**	**BAU+**
2	Corresponds to the 'higher demand' regional plan future	Pessimistic	Medium emissions	BAU+
3	'Policy' with high climate change impact	Optimistic	High emissions	BAU+
4	Corresponds to the 'bad' regional plan future	Pessimistic	High emissions	BAU+
5	Corresponds to the 'stretching' regional plan future	Pessimistic	High emissions	Enhanced
6	Corresponds to the 'alternative' regional plan future	Optimistic	Medium emissions	Enhanced

Table 1: Modelling Scenarios

Our preferred, best-value plan aligns to future 1. We consider this as the 'most likely' planning scenario. This scenario reflects a central case for climate change, environmental-destination abstraction reductions in line with our current BAU+ estimates, and successful delivery of 2050 demand management targets.

The outputs of the modelling present the supply-balance forecast over the whole 25 years, the selected options along with the associated investment costs and benefits.

[3] The BAU+ and Enhance Environmental scenario is described in Chapter 4, Section 3.1.1

1.4.2 Scenario testing

These futures were defined prior to Ofwat's long-term delivery strategy being published so were not fully aligned with the reference scenarios. In advance of our final WRMP submission, we will further refine our futures to ensure they incorporate and comply with Ofwat's requirements and those laid out in our 2024 Business Plan. In the short term, we have conducted an additional stage of scenario and sensitivity testing on the outputs of the S-EBSD model and our Best Value plan using the OFWAT reference scenarios as well as applying supplementary testing based on our experience of demand in summer 2022.

Our supplementary testing used the following scenarios (please see "PR24 and beyond Final guidance on long term delivery strategies" OFWAT (April 2022)[4] for a full explanation of scenario requirements):

Table 2: List of scenarios tested

	Scenario definition	Driver	Scenario name
1.	OFWAT benign	Climate change	Climate Change Low
2.	OFWAT adverse	Climate change	Climate Change High
3.	OFWAT benign	Technology	Technology Faster
4.	OFWAT adverse	Technology	Technology Slower
5.	OFWAT benign	Demand	OFWAT Demand Low
6.	OFWAT adverse	Demand	OFWAT Demand High
7.	Company defined	Demand	Demand High
8.	Company defined	Demand	Demand High High
9.	Company defined	Demand	Demand High High High
10.	OFWAT benign	Abstraction reductions	Abstraction Low
11.	OFWAT adverse	Abstraction reductions	Abstraction High
12.	OFWAT wider	Climate change	High CC supply and high CC demand
13.	OFWAT wider	Climate change & demand	High CC supply and OFWAT high demand
14.	OFWAT benign	All benign	
15.	OFWAT adverse	All adverse	

Scenarios 1 and 2 are OFWAT reference scenarios covering the impacts of Low (RCP2.6) and High (RCP8.5) climate change[5] on our water available to supply.

The OFWAT technology scenarios require that we test our plan against its reliance on future technological development and adoption. The factors that will most materially impact the future delivery of our plan are smart water networks and smart metering. Scenario 4 assumes the adoption of smart water networks will be delayed from 2035 to 2040 and full smart meter penetration from 2035 to 2045, as per guidance, while scenario 3 aligns to our proposed demand management strategy.

The OFWAT high demand scenario (6) requires companies to use the higher of either the Local Authority or ONS population growth forecasts. This has been implemented as per guidance, the Local Authority forecasts being the basis for the higher scenario and the ONS data for our low (5).

Summer 2022 showed higher than forecast demand. Tourism and potentially more people permanently living in Devon and Cornwall post-COVID are seen to be elevating demand above previous forecasts. To ensure our plan is resilient to this situation not reducing (returning to 'normal') we are further testing our future strategy against increases in population growth and demand. This forms part of our "Insight into the 2022 drought" Appendix 1.1.

To generate demand scenarios 7, 8 and 9, we applied the following methodology:

- Current 3-year average population growth has been calculated for each WRZ

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[4] PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies_Pr24.pdf (ofwat.gov.uk)
[5] IPCC, 'Climate Change 2014: Synthesis Report', November 2014.
Met Office, 'UK Climate Projections: Headline Findings', July 2021.
Met Office, 'UKCP18 Guidance: Representative Concentration Pathways', November 2018.

- Observed demand increases in 2022 compared to WRMP24 DY (dry year) forecast have been analysed to a MLD (Ml/d) metric which is correlated to a potential extra population equivalent as a unit of population and a percentage increase in population for the WRZ. This forms the Demand High High scenario (8).
- The Demand High scenario (7) has been derived using an increase in population at the mid-point between 3-year average population and the estimated population equivalent of the Demand High High scenario.
- The Demand High High High scenario (9) tests against a 15% increase in demand.

Table 3: Extra demand scenarios (Scenario 5 to 9)

WRZ	Scenario	Population equivalent increase	Population equivalent increase %age
Colliford	3-year average	11,500	2.1%
	Demand High	32,000	5.6%
	Demand High High	52,000	9.2%
	Demand High High High	84,800	15%
Roadford	3-year average	3,600	0.4%
	Demand High	42,000	4.7%
	Demand High High	79,000	9.1%
	Demand High High High	130,200	15%
Wimbleball	3-year average	1,300	0.3%
	Demand High	17,000	4.7%
	Demand High High	32,500	9.1%
	Demand High High High	53,600	15%
Bournemouth	3-year average	4,500	1%
	Demand High	23,500	5%
	Demand High High	42,500	9%
	Demand High High High	70,800	15%

These increased demand scenarios provide a stress test for our plan, allowing us to understand the future impacts of sustained, increased demand on our plans, including our experience of increased demand in summer 2022.

The OFWAT abstraction adverse scenario (11) requires we test our plan against the impact on our supply position based on modelling the impact of moving to the Environment Agency's 'enhanced' scenario. For our low-abstraction common reference scenario (10) we have taken only the abstraction reductions that are legally required under our AMP7 WINEP programme and those that have previously been agreed. These relate to our abstraction from the River De Lank in the Colliford WRZ, and the River Stour in the Bournemouth WRZ.

To test our plan against the full impacts of climate change together we use the RCP8.5 reference position to forecast for supply and demand (scenario 12). This is part of the 'Wider' category of OFWAT scenario testing.

Summer 2022 brought increased levels of demand as well as climatic factors which constrained supply. Therefore, scenario 13 tests the adverse future situation of high (RCP8.5) climate change on supply combined with OFWAT high demand so we can evaluate their potential combined impact on our plan.

Scenario 14 sets all OFWAT reference scenarios to 'benign'. This gives a low range in contrast to scenario 15 where we set the climate change, technology, and abstraction to adverse and combine this with our Demand High High forecast to give a most extreme high impact.

The Ofwat reference scenarios projects plausible extremes, high and low, for our long-term planning. This has enabled us to improve the investment programmes, demonstrate their robustness and develop alternative investment options to be triggered by potential future conditions which are explained in section 1.7.

To test the sensitivity of our proposed investment programmes, we begin by setting all scenarios to an 'All benign' position (AB), i.e., the least negative level of impact to the supply-demand balance, and then setting all scenarios to an 'All Adverse' (AA), i.e. the most negative level of impact on the supply-demand balance. These two extreme positions represent the potential range over which the supply-demand balance will be impacted, with individual scenarios causing impacts somewhere between these two levels. The sensitivity of the investment programme is evaluated by the deviation of the supply-demand balance from the AB position generated by each scenario, expressed as a dimensionless ratio.

1.4.3 Sensitivity testing

The following extra sensitivity tests have been applied to individual WRZs to further assess the resilience of potential future combinations of options.

Table 4: Sensitivity tests

Test	WRZ	Notes
Porth and Stannon (4 + 1.5 Ml/d) in use by 2025	Colliford	Tests the impact of bringing Porth and Stannon into operational output in AMP7. We are permitting these options as part of our drought response and will be looking to create a permanent licence change in 2023.
10 Ml/d uplift in deployable output (DO) by 2025	Colliford	Tests the impact of bringing Porth and Stannon and extra supply options into operational output in AMP7.
Increase water available for Wimbleball WRZ through a regional option.	Wimbleball	Tests the impact on Wimbleball WRZ of increasing the supply available through a strategic, regional option.

The Defra Accelerated delivery programme (Refer to Chapter 1, Section 9) is not currently included in our baseline. The quoted benefits of 0.6% additional leakage reduction and 0.1% reduction to PCC is deemed immaterial to the outcomes of our adaptive planning and is considered to be within the sensitivity tests outlined above.

1.5 Stage 3: Developing our least cost plan

We have set out how we selected our modelling tool and defined our model set up and constraints as well as how we identified our range of scenarios and multi-capital (best value) decision-making tool in Stages 1 and 2.

In Stage 3, we use our modelling tool to develop our least cost plan and carry out testing to understand initial risks and uncertainties.

The S-EBSD model was used to optimise and compare multiple combinations of demand and supply side management options under different sets of futures explained above in Section 1.4.1.

The results of the S-EBSD model were assessed against a range of criteria including:

- Cost effectiveness
- Water security
- Environmental outcomes
- Social and stakeholder outcomes

The S-EBSD model was used to identify the preferred and least cost options for WRMP implementation, both in terms of the individual interventions and the overall programmes. The model enables us to compare and optimise the costs and benefits of different management strategies. It also helps to inform our implementation plans by identifying the most cost-effective way to achieve targeted water security and environmental outcomes.

1.6 Stage 4: Developing our best value plan

1.6.1 Best Value Planning introduction

ICS have supported SWW in developing a best value approach to assessing the multi-dimensionality of a 25-year plan within a logical, clear decision-making framework. The 'best value' approach moves us away from a limited consideration of cash expended and ML produced towards a richer picture which accounts for environmental, resilience and societal benefits. The detailed methodology for developing this tool and how this tool was aligned with the Regional Plan and best practice guidance is discussed in **Appendix 10.1** to this chapter.

The initial step in developing our best value plan was to consider the UKWIR (UKWIR 2020: Deriving a best value water resources management plan) and WRMP guidance (UK Gov 2022: Water resources planning guideline).

1.6.2 Best Value Plan Objectives

We considered three pillars from the WCWRG Regional Plan to form the basis of our BVP objectives: ensure water supply resilience, improve the environment, and deliver societal benefits. These objectives were identified via engagement with customers through the WCWRG and SWW Willingness to Pay and are aligned with our company values and commitments.

1.6.3 Best Value Plan Metrics

We created a framework based on these objectives, incorporating metrics that could be used to evaluate the performance of different plans to give our Best Value Index (BVI). As well as providing a multi-faceted overall index metric for discriminating between alternative plans, it provides a transparent way to understand the performance of each plan with respect to Environment, Resilience and Society (primary dimensions). This allows trade-offs between the primary dimensions to be readily identified.

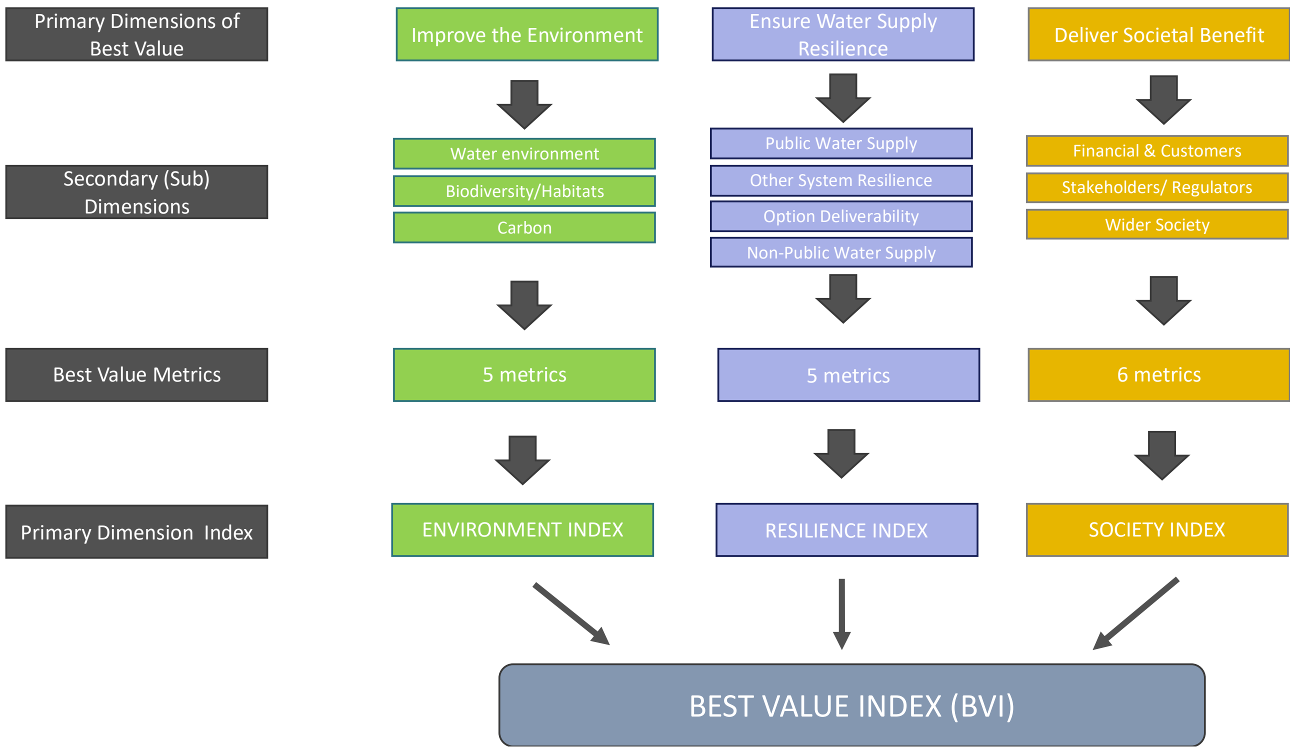

Figure 1 Overview of our best value plan metrics.

We identified secondary dimensions within each of the three BVP objectives (Primary Dimension) to support the development of 16 metrics, as outlined in Figure 1 listed in Table 5. The metrics are mostly already used by SWW as part of Regional Planning and ahead of PR24.

Ultimately, the BVI is a tool for the evaluation of strategic options against a common scale, enabling more effective decision-making when identifying the best overall value. Variations to the preferred plan can be compared in terms of environment, resilience and societal impacts, while taking into account long-term uncertainty.

No.	Primary Dimension	Sub-Dimension	Metric
1	Environment	Water environment	**Ambition of Environmental Destination** (Reducing Abstraction): A combination of the number of years before reductions achieved and the average and max % reduction in WAFU
2			Expected **Cost of Drought Permit Restrictions** (weighted by Frequency): NPV of willingness-to-pay valuation of drought options over planning period.
3		Biodiversity/Habitats	**Enhancing natural capital/biodiversity:** SEA outputs comprising habitat units, natural capital £'s metrics.
4			**SEA Qualitative options scores** (+ve or -ve) for each SEA measure
5		Carbon	**Reduction in Carbon emissions:** Operational and embodied carbon used to estimate a tCO2 for each option.
6	Resilience	Public Water Supply	Increase **resilience to extreme droughts** (1-in-500): Estimates the probability of a level 4 drought during a 1-in-500 year event over the full 25-year planning period.
7			**Cost of Temporary Water Use restrictions**: Willingness-to-pay assessment based on modelled likelihood of each level of water-use restriction.
8		Other System Resilience	**Resilience to other risks** (e.g., Single Source Dominance): Level of supply resilience provided by additional supply options.
9		Deliverability	**Benefit Certainty**: The confidence in the supply side yield (Ml/d)
10		Non-Public Water Supply	**Available headroom for Water Sharing**: A reliable surplus is needed across the planning period
11	Society	Financial & Customers	**Bill impacts for customers**: An average annual bill increase across the planning period.
12			**Intergenerational equity** - Plan 'Gini' Coefficient[6]
13		Stakeholder & Regulators Priorities	**Leakage reduction targets**: qualitative measure on scale and pace of leakage reductions selected.
14			**PCC targets**: qualitative measure on scale and pace of PCC reductions selected.
15			**Non-household water efficiency:** Level of ambition on water efficiency to achieve PCC targets.
16		Wider Society	**Recreational/amenity benefits delivered through plan**: £m monetised score for recreational benefit from all options.

Table 5: Our Best Value Indices

The BVI metrics cover the wide range of benefits from the investments, i.e. environmental protection; resilience to droughts; and societal benefits. These are used to inform and present to our planning team and stakeholders. Early stakeholder and customer engagement informed the weightings between each of the primary dimensions.

[6] The Gini coefficient is a widely used measure of income inequality, it is reported by the ONS.

Each metric is scored individually based on an appropriate calculation of the benefit of our actions through whichever plan we are testing. The scoring generated is in bands of 0 to 4 shown in Table 6.

Level score	0	1	2	3	4
Description	No change	Minimal	Low	Medium	High

Table 6: Our Best Value scoring approach

To generate scorings at the sub-dimension level, a multiplicative form is used to aggregate the metric scores and weightings appropriately. The same formula structure is then used to construct the index value for each primary dimension. The overall BVI is calculated in the same way.

Each metric attracts a score between 0 and 1. The closer to 1 that a metric scores, the greater benefit the plan has in this dimension.

The BVI framework was then used for comparing between the plans, as well as to reveal the performance of each plan in terms of the primary dimensions. Finally, the overall BVI was calculated for each WRZ plan, with the highest BVI reflecting the plan with the highest overall performance across our BVP objectives.

The BVI scores at each level of aggregation are sensitive to the weightings which are created from customer and stakeholder engagement. We will be continuing to refine these values through appropriate stakeholder engagement before producing our final plan and carry out sensitivity testing on the weighting of each dimension on BVI scores. Refer to Appendix 10.1 for further information on the Best Value Planning methodology.

1.7 Stage 5: Developing our adaptive plan and Ofwat core pathway

We developed our adaptive plan using a combination of the UKWIR and WRMP guidance, tools such as the S-EBSD model, scenario modelling and the BVI framework. The BVI framework was used to identify the best value plan for each WRZ and to understand the performance of each plan across the primary dimensions. The adaptive planning approach was used to test individual and combined scenarios to identify any future risks to delivering a resilient supply to our customers. We have also generated a framework to ensure that the plan is monitored and adjusted over time in response to changing conditions, scenarios, and events.

Our Ofwat core pathway sets out the investment needed in each WRZ for options that are required across multiple scenarios to meet short-term needs and enable future options. These are therefore our 'low regret' options across the 25-year planning period.

1.7.1 Our approach: adaptive plan

Our adaptive planning uses a problem-solving approach to understand, plan and manage risks and uncertainty into the future.

Our adaptive pathways are investment programmes that supplement the Best Value (preferred) plan when external drivers impact water available for use (WAFU) or demand. We have established a package of adaptive pathways to respond to the scenarios listed in section 1.4.2 that our sensitivity analysis has identified as having a material impact on our forecast supply-demand balance in a high-uncertainty future.

Each scenario was tested in isolation, relative to the 'All benign' position, so we were able to understand the comparative impacts. Scenarios 12 and 13 combined impacts to explore more extreme future positions.

This enables a decision-making process that adjusts the plan in response to identifying potential risks and opportunities as our monitoring and assessment process helps us identify the need to react in the future.

Our adaptive plan is a more structured approach to the previous process of resource planning and includes a number of key steps such as risk-benefit assessment and stakeholder engagement. The plan outlines how interventions or investments should be monitored and evaluated over time and how any changes to performance should be made to ensure positive outcomes, success and cost-effectiveness.

1.7.2 Our approach: Ofwat core pathway

To develop a core pathway, we initially looked across all futures and the S-EBSD model choices in each future to ensure we considered as many future eventualities as possible. A preliminary 'core' of investments was identified by the tool under the greatest number of scenarios. The model selected the optimum options for each of the futures to ensure the supply-demand balance was in surplus (not in deficit).

Firstly, we ranked the frequency of interventions selected by the model under each future scenario for the 4 WRZs. For our draft core pathway, we selected the intervention packages which have been chosen by the modelling in more than 60% of future scenarios (at least 4 of the 7 futures). An example of this analysis is shown in Table 7.

Table 7: Core pathway analysis example for Wimbleball WRZ.

Option reference	F0	F1	F2	F3	F4	F5	F6	Freq	%
WIM8	2025	2025	2025	2025	2025	2025	2025	8	100
DemW-NHH1		2037		2037	2037	2037	2037	6	75
WIM9	2031	2025	2025	2025	2025	2025		6	75
WIM7	2035	2025	2025		2030	2030	2025	6	75
WIM2				2030	2030	2030		5	43
WIM5				2031	2031	2031		5	43
DemW-NHH2		2037					2037	2	25
WIM6					2031	2031		2	25

The selected investments were scenario tested using the OFWAT reference scenarios set to benign and adverse, see Section 1.4.2 above.

These investments were then assessed through expert judgment against the criteria of 'least' and 'low' regret, 'short-term need', 'ability to keep future options open' and 'minimise future cost'. These interventions then became our OFAWT Core pathway.

We consider our ambition on leakage performance not to be part of the core pathway analysis as this is an activity which inputs to our future planning but is measured separately through a regulatory measure and is not influenced by the WRMP. Similarly, our Household water efficiency programme remains the same as it forms the basis of our ambition on per-capita consumption (PCC) reduction measured through our regulatory commitments.

1.8 Next steps planned for completion for our final submission.

We will test and validate the weighting of our best value indices with customers and stakeholder preferences, to further refine and optimise our best value (preferred) and adaptive plans.

We are aware that our futures do not fully align with the required Ofwat Common Reference Scenarios and, in our draft Plan, we have carried out additional sensitivity analysis to address this. This will be fully aligned for our revised draft plan.

2 Programme appraisal

The purpose of the programme appraisal is to develop the best value plan for customers over the long term. This must balance the costs of investing, and hence cost to customers, to maintain water supply with the wider benefits from the investments to customers, such as negating water use restrictions, and protecting the environment or creating new amenities from new reservoirs. We follow the WRPG and other technical guidance when performing our program appraisals. This includes WRPG 10.9, which sets out the requirements for testing our plans.

To do this, we must first identify **the least cost approach** that will offer the lowest bill impacts to customers while still delivering the necessary requirements to preserve water supply. This serves as a baseline enabling us to continue evaluating which additional investments bring desirable benefits that are cost-effective and provide optimal value to customers and society.

We consider a wide range of factors within our program appraisal and decision-making process to then develop our best value plan, using our best value indices which include:

- **Reducing our abstractions**: how quickly and what size of reductions are achieved?
- **Expected Cost of Drought Permit Restrictions** – based on willingness-to-pay figures from avoiding drought restrictions
- **Enhancing natural capital/biodiversity and minimising environmental impact**
- **Reduction in Carbon emissions**
- **Increased resilience to extreme droughts (1-in-500):** Estimates the probability of a Level-4 drought during a 1-in-500 year event over the full 25-year planning period.
- **Cost of temporary water use restrictions:** Willingness-to-pay assessment based on modelled likelihood of each level of water-use restriction.
- Level of **supply resilience** provided by additional supply options (removal of single sources)
- **Benefit certainty**: The confidence in the supply-side yield (Ml/d)
- **Available headroom for water sharing**: Are we providing a reliable surplus across the planning period?
- **Bill impacts for customers**: An average annual bill increase across the planning period
- **Intergenerational equity** - Plan 'Gini' Coefficient
- **Leakage reduction targets**: qualitative measure on scale and pace of leakage reductions selected.
- **PCC targets**: qualitative measure on scale and pace of leakage reductions selected
- **Non-household water efficiency:** Level of ambition on water efficiency to achieve PCC targets
- **Recreational/amenity benefits delivered through plan**: £m monetised score for recreational benefit from all options

2.1 Outputs from scenario analysis

This section provides discussion and analysis for all the scenarios we modelled, analysis on the sensitivity of the plan to the scenario testing, key considerations for the development of the adaptive strategies and an overall summary of our least cost and best value plans. It then provides a more detailed programme appraisal for each WRZ, providing further justification for the chosen best value plan.

The graphs presented in this chapter illustrate the projected annual supply-demand balances assumed to be achieved by the selected investments, under various scenarios all subject to 1-in-500-year drought conditions. This is in line with our primary resilience metric and shows progress toward the objective of achieving resilience to a 1-in-500-year drought event by the target date of 2039, as set out in the WRMP guidance pathway to resilience. It is worth noting that by using the 1-in-500-year drought conditions to generate the supply-demand balance, a very pessimistic view is presented which effectively demonstrates an absolute worst case. Furthermore, as the pathway to resilience (i.e. achieving positive supply-demand balance by 2039) is an objective, it is therefore reasonable for the supply-demand balance to be below 0 and within drought conditions prior to 2039.

The brown lines show our baseline position, and the blue lines show the projected supply-demand balance delivered by our best value plan in our most likely scenario for a 1-in-500 drought event.

The dashed lines show the impact of applying in combination the most adverse scenarios: 3. Climate Adverse Supply + 7. Demand High High + 9. Technology Adverse + 10. Abstraction Adverse. These are denoted with AA (All adverse).

For each WRZ, we have explored the sensitivity of the best value plan to the impacts arising from each scenario relative to the 'All benign' position. This indicates which external drivers have the greatest impact on supply-demand balance over the 25-year planning period and they are presented as relative comparators.

In each of the pathways shown in Figure 2 to Figure 5 below steps down in supply demand balance are driven two factors:

- Abstraction license changes and renewals and reductions to restore sustainable abstractions – see Chapter 5 Section 3 and Chapter 4 for further information.

Steps upwards are driven by the options selected to improve the supply demand balance, described in section 2.2 below.

2.1.1 Results: Bournemouth WRZ

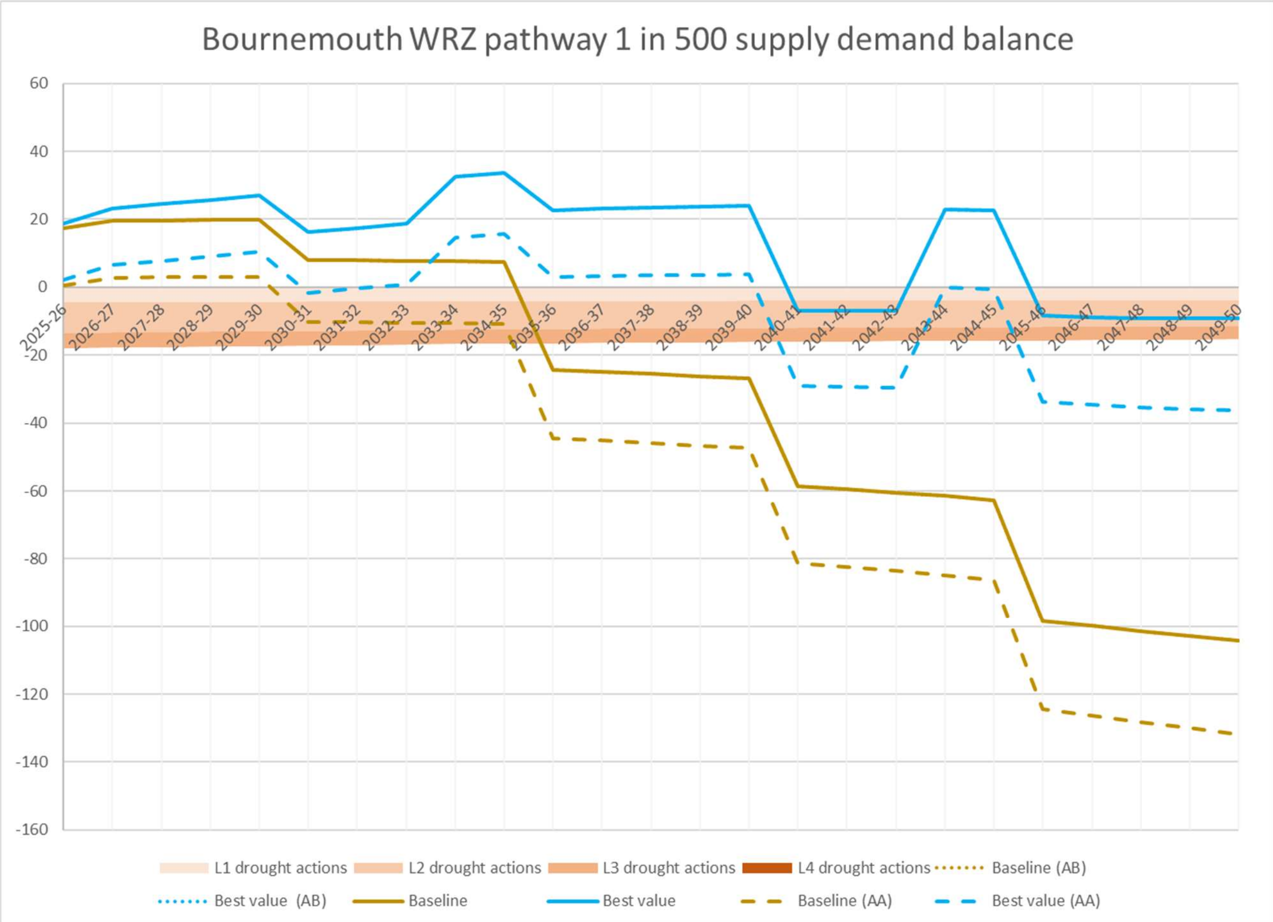

Figure 2: Best Value/preferred plan SDB for Bournemouth for 1-in-500 drought event

Table 8: Scenario test outcomes for Bournemouth WRZ

	Scenario tested	Impact	Scenario outcome classification
2	Climate Change High	Push 2040 to 2043 to limit of drought options and 2045 to 2050 beyond drought options	Adverse
6	OFWAT Demand High		
12	High CC supply and high CC demand		
7	Demand High	Push 2040 to 2043 beyond drought options and 2045 to 2050 beyond drought options	Extreme
8	Demand High High		
9	Demand High High High		
13	High CC supply and OFWAT high demand		
1	Climate Change Low	No impact on plan	
4	Technology Slower		
10	Abstraction Low		
11	Abstraction High		

In the climate-change and increased-demand scenarios, due to abstraction reductions in 2040 and 2045, the periods 2040 to 2043 and 2045 to 2050, are pushed into supply-demand deficit, overreaching the available benefits from drought options.

Drought options become a critical situation from 2040 onwards if the abstraction reductions and supply-side options are not aligned. To address this potential deficit in a 1-in-500 event, we must continue to develop further supply options to support our Bournemouth zone, including a possible Strategic Resource Option, throughout AMP8.

2.1.2 Results: Colliford

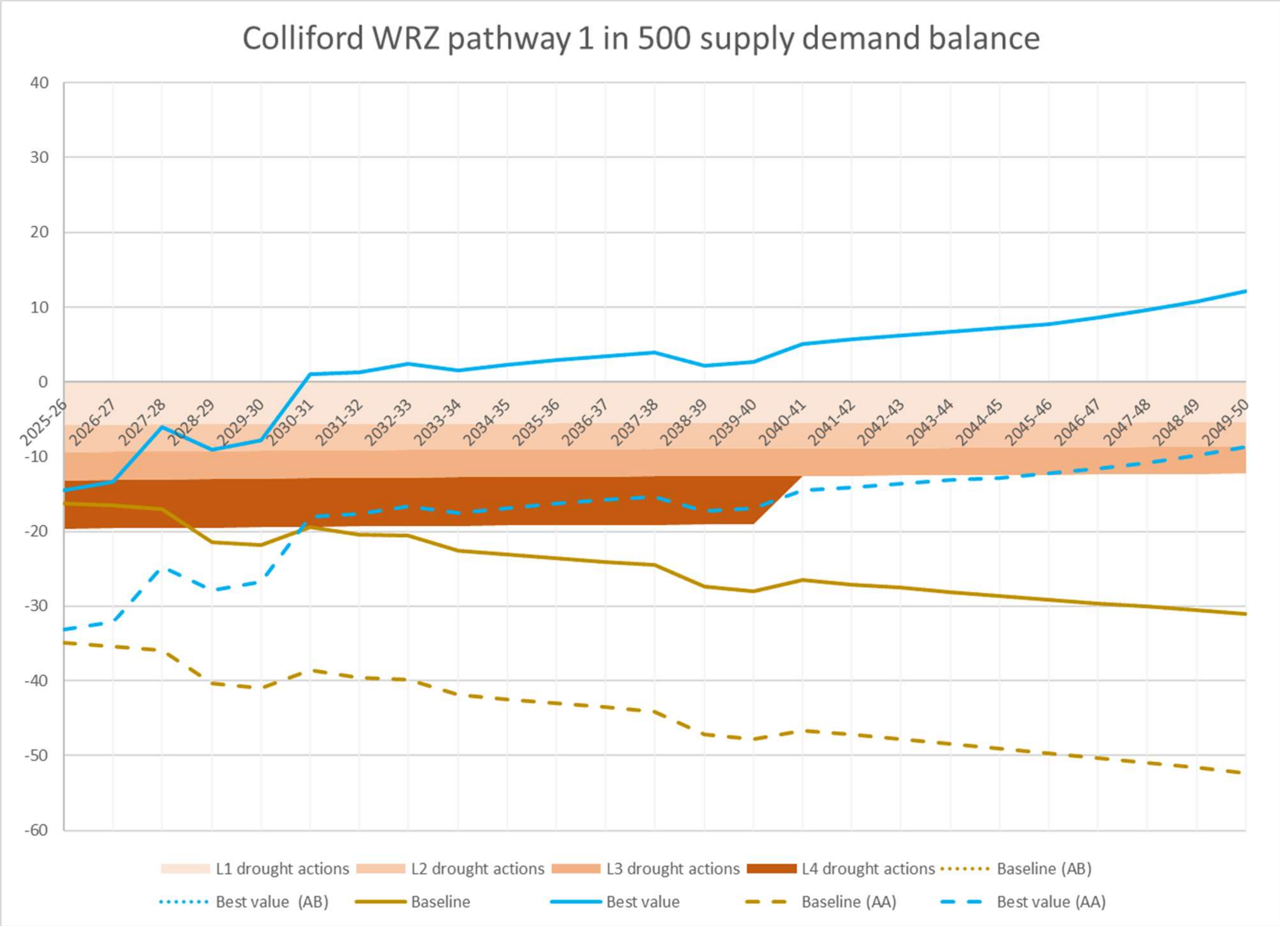

Figure 3: Best Value/preferred plan SDB for Colliford for 1-in-500 drought event

Table 9: Scenario test outcomes for Colliford WRZ

	Scenario tested	Impact	Scenario outcome classification
6	OFWAT Demand High	Pushes 2038 to 2040 into deficit within drought options	Adverse
2	Climate Change High	Wouldn't leave drought options until 2040 at the earliest	Extreme
7	Demand High		
8	Demand High High		
9	Demand High High High		
12	High CC supply and high CC demand		
13	High CC supply and OFWAT high demand		
1	Climate Change Low	No impact on plan	
4	Technology Slower		
10	Abstraction Low		
11	Abstraction High		

Colliford WRZ is forecast to start the planning period in deficit with the significant investment in AMP8 bringing the Supply Demand Balance (SDB) into surplus in 2030. The OFWAT high demand scenario (6) combined with an abstraction reduction in 2038 moves the SDB into deficit until 2040.

In the increased climate-change and increased-demand scenarios, the extra impacts push Colliford supply-demand balance further into deficit from 2025. Even with extra investment, a surplus is not forecast until 2040 at the earliest. Emergency drought orders would be required in a 1-in-500 year drought during the first 2 years of the plan; these are represented in the data tables by the option COL_EDO. Customers would experience Level 1 & 2 drought options from 2030 to 2040.

Sensitivity testing in Colliford WRZ shows that our activity in AMP7 will impact our adaptive plan. If we can bring in extra supply options in AMP7, it would provide enough resilience across the 25-year planning period for us to potentially not need another adaptive option.

2.1.3 Results: Roadford

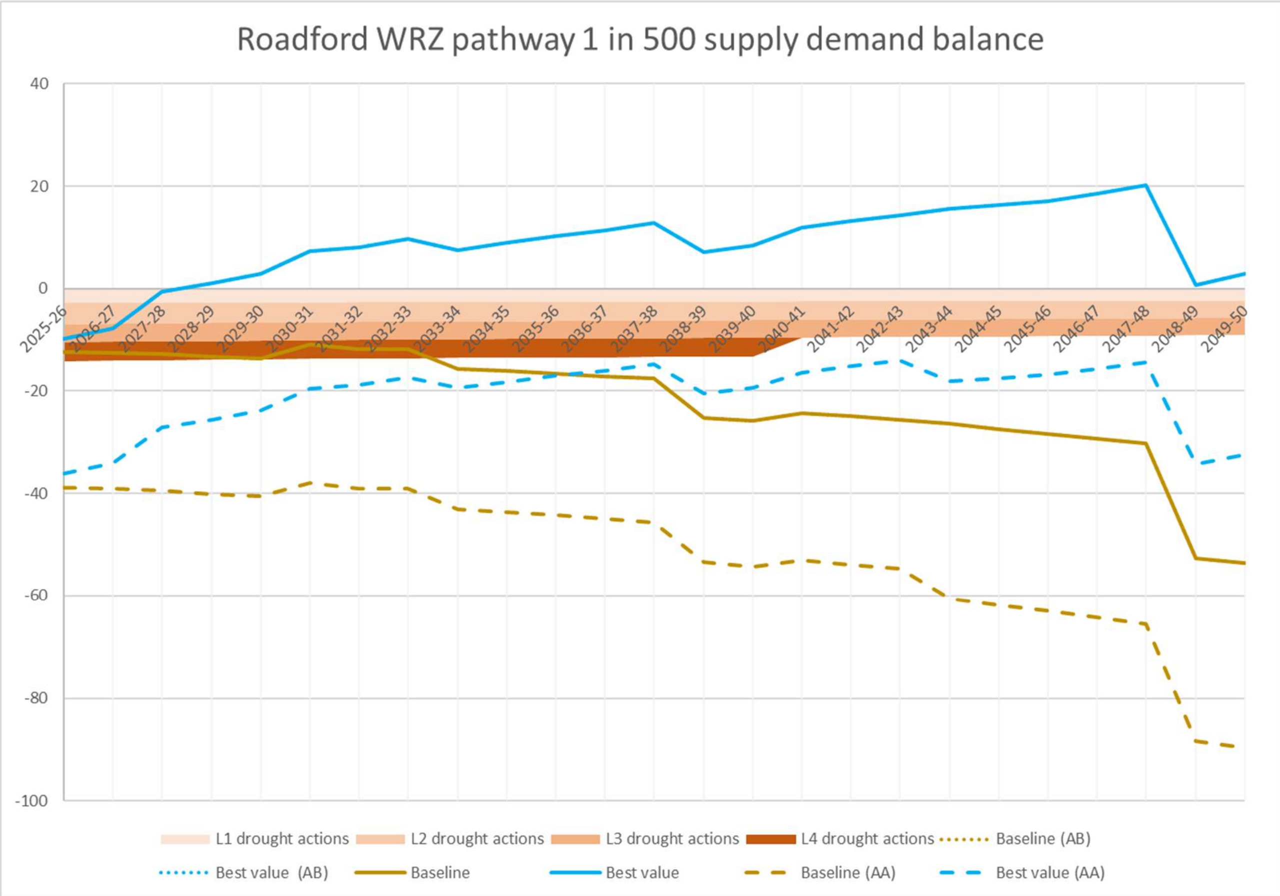

Figure 4: Best Value/preferred plan SDB for Roadford for 1-in-500 drought event

Table 10: Scenario test outcomes for Roadford WRZ

	Scenario tested	Impact	Scenario outcome classification
2	Climate Change High	Pushes 2048 to 2050 into drought options	Adverse
6	OFWAT Demand High		
11	Abstraction High		
12	High CC supply and high CC demand		
7	Demand High	Wouldn't leave drought options until 2040 at the earliest	Extreme
8	Demand High High		
9	Demand High High High		
13	High CC supply and OFWAT high demand		
1	Climate Change Low	No impact on plan	
4	Technology Slower		

10	Abstraction Low		

Roadford WRZ is forecast to experience two years of supply-demand deficit at the start of the planning period until the supply-side investment in AMP8 moves the zone into surplus in 2027. Four scenarios (2,6,11 & 12) affect the SDB for the last two years of the planning period, moving them into deficit. The higher impact demand scenarios and the combined climate change and OFWAT high demand scenario (13) all push the WRZ into deficit from 2025 and, even with the AMP8 investment, a surplus is not forecast until 2040 at the earliest. Customers would experience severe drought options from 2025 to 2040.

2.1.4 Results: Wimbleball

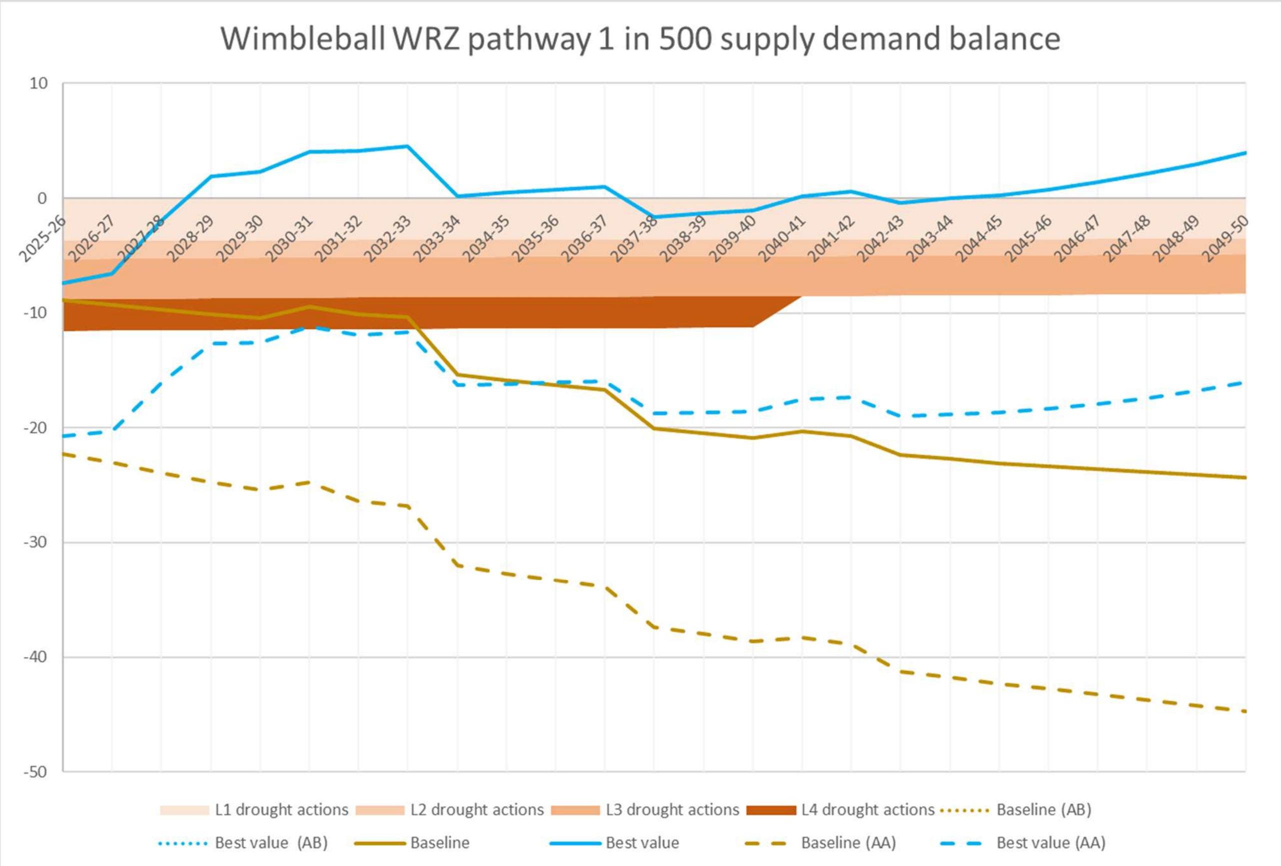

Figure 5: Best Value/preferred plan SDB for Wimbleball for 1-in-500 drought event

Table 11: Scenario test outcomes for Wimbleball WRZ

	Scenario tested	Impact	Scenario outcome classification
6	OFWAT Demand High	Pushes 2033 onwards into drought options.	Adverse
11	Abstraction High		
2	Climate Change High	Wouldn't leave drought options and potentially exceed available drought options from 2040 onwards.	Extreme
7	Demand High		
8	Demand High High		
9	Demand High High High		
12	High CC supply and high CC demand		
13	High CC supply and OFWAT high demand		
1	Climate Change Low	No impact on plan	

4	Technology Slower		
10	Abstraction Low		

Wimbleball WRZ is forecast to experience two years of SDB deficit at the start of the planning period until the supply-side investment in AMP8 moves the zone into surplus in 2027. Abstraction reductions in 2037 move the WRZ into deficit between 2037 and 2040.

Wimbleball is influenced significantly by climate change or any changes in available supply or demand. The OFWAT Demand High (6) and Abstraction Low (10) scenarios move Wimbleball into deficit from 2033 to the end of the planning period. The other testing scenarios (2, 7, 8, 9, 12 & 13) move the WRZ into deficit for the whole 25-year period with deficits greater than available options from 2040 to 2050.

The sensitivity testing in Wimbleball shows that in extreme scenarios it would be necessary to consider a single strategic resource option to deliver resilience across the planning period.

2.1.5 Key adaptive pathway observations

The scenario testing naturally groups into two outcomes which we have classed as 'adverse' and 'extreme' according to their impact on our plan. These terms are used to describe the adaptive paths in Chapter 11.

The number of adaptive pathways across the WRZs is limited, with the majority only having two alternative options based on the scale of the scenario impacts. The more extreme scenarios are potentially driving a need for more strategic resource options.

From our scenario testing, we have found that environmental destination abstraction reductions (refer to Chapter 4) are the greatest risk factor driving adaptations to our best value plan.

Adaptive planning has identified six supply-side options in addition to our best value plan. In extreme scenarios, Strategic resource options with wider regional engagement would be required in Bournemouth and Wimbleball. See

2.1.6 Ofwat Core Pathway

Our Bournemouth WRZ is significantly impacted by future possible abstraction reductions. Without the proposed environment destination targets on the River Avon, we would remain in a surplus despite planning for 1-in-500 resilience; so, all our supply options become a potential adaptive pathway that we might not need to implement until formal agreement on the River Avon is made.

In Colliford, Roadford and Wimbleball, the AMP8 best value programme satisfies our supply requirements for the next 25 years and forms our core pathway for these WRZs. Refer to Table 8.

Table 12: Summary of Ofwat Core Pathway for AMP8

WRZ	Option ID	Title
Bournemouth		*No supply options required*
Colliford	COL2	New source: Colliford pumped storage Stage 2
	COL11	New source: Hawks Tor Pit
	COL15	WTW output change: Restormel WTW increased WTW capacity
Roadford	ROA7	WTW output change: Expansion of Northcombe WTW
Wimbleball	WIM7	WTW output change: Increase Pynes to licence limit
	WIM8	New source: Brampford Speke borehole
	WIM9	New source: Stoke Canon borehole

2.1.7 Environmental Destination

As outlined in section 2.1.5 our Environmental Destination is the biggest driver in our long term investment programmes. This is particularly true for Bournemouth where our investment programme presented in section 2.2 is almost entirely driven by the supply reductions required to meet Environmental Destination and therefore the costs and benefits of our programme can be ascribed to this. In our other WRZs Environmental Destination has a smaller influence with the exception of Roadford at the end of the 25 year planning period. As part of our statement of response we will be undertaking work to derive separate WRZ assessments to demonstrate the costs and benefits of Environmental Destination for all our WRZs.

2.1.8 Least cost summary

For the least cost modelling, we optimise with the goal of minimising financial costs to maintain water supply over the 25-year horizon integrated with the 25-year targets for per capita consumption (PCC) and leakage reductions, and the requirement to be resilient to 1-in-500 year droughts by 2039. A variety of demand and supply options are then selected for the different scenarios being modelled. The outputs provide the selected options, the costs and benefits of these and the overall performance and cost profile over the 25 years.

The least cost model does not consider benefits beyond delivery of MLD reductions and will leave interventions until the last possible (deliverable) timestep. It does not value environmental, resilience or societal benefits.

In summary, the outputs of the least cost modelling were to

- Backload our leakage reduction to 2050
- Backload our demand management activities such as household water efficiency
- Minimise non-household water efficiency
- Backload our smart metering plan to a ‘reactive only’ programme
- Review abstraction licences with minimal investment in supply-side schemes
- Backload investment in supply schemes
- Use water use restrictions and drought permits frequently

2.1.9 Best value summary

We have developed our best value (preferred) plan to go beyond focusing purely on the economic benefits of the least cost plan, working to benefit customers, the environment and society for a 25-year period while also remaining affordable and efficient. This outcome has been achieved because of our stated BVP objectives to; ensure water supply resilience, improve the environment, and deliver societal benefits

Some key decision points in moving from least cost to best value are made to align with company ambitions, stakeholder direction and regulatory expectations, such as leakage, PCC, and smart metering. For example, the least cost model continually selected the backloaded leakage option. This does not however reflect the ambition of SWW to maintain performance in leakage reduction in line with the expectations of customers and regulators. Therefore, the selected option for the best value plan is a linear reduction to 2050 (including achieving interim milestones). Early delivery was assessed through the best value analysis but had a significant impact financially on customers when compared to the linear programme.

In terms of demand management options, our least cost plan featured backloaded options including reactive smart metering. However, we recognize that metering helps support the reduction of per capita consumption and customer-side leaks and plumbing losses. Therefore, through our best value analysis, we selected compulsory metering for Bournemouth (and Isles of Scilly) and proactive smart metering for Colliford and Wimbleball by 2035 to minimize demand and conserve resources in these zones.

The least-cost output minimised and backloaded water efficiency measures, for household and non-household, in favour of water use restrictions. We believe water efficiency is the right action for the company and customers, being sustainable in the long term and promoting engagement with customers and communities as well as driving innovation.

To maximise supply, the least cost model selected all levels of drought permits rather than developing supply-side options. We prefer to investigate investment in our supply system to provide a more resilient service to customers.

The following section sets out the results of our least cost and best value plans for the four WRZs on the mainland to enable comparison of the plans. We then discuss and present justification for the choices in our best value plan.

2.2 Programme appraisal by WRZ

2.2.1 Colliford

The following table sets out the key features of our least cost and best value plans for Colliford.

Components of Plan	Least Cost plan	Best Value plan	Notes
Metering	Backloaded, reactive metering to 2050	Proactive metering programme by 2035	Both plans contribute to the 110 l/p/d PCC target
Leakage	Backloaded profile to 50% reduction by 2050	Linear profile to 50% reduction by 2050	Both plans achieve the same leakage reduction by 2050
Drought restriction reliance	High	Low	Extra supply side option in best value reduces use of drought restrictions
Water efficiency: Non-household	None	Proactive, targeted programme	
Supply-side options	1. WTW output change: Restormel WTW increased WTW capacity (2025) 2. New source: Colliford pumped storage Stage 2 (2026)	1. WTW output change: Restormel WTW increased WTW capacity (2025) 2. New source: Hawks Tor Pit (2025) 3. New source: Colliford pumped storage Stage 2 (2026)	Extra supply side option in best value at start of AMP8 reduces use of drought restrictions and provides extra resilience
Strategic Resource Options (Regional Plan)	None	None	No SRO options currently exist for Colliford WRZ

*Table **13**: Comparing least cost and best value plans: Colliford*

Meeting leakage and household consumption reductions will provide a sufficient supply-demand surplus to meet future requirements but cannot deliver adequate headroom in the early years of the plan to avoid the use of exceptional demand restrictions in conditions less severe than a 1-in-500 year drought. The EBSD model chooses to implement two supply-side measures in AMP8 to remove that risk, as these provide a lower cost solution than implementing severe restrictions, even if they are only used infrequently. With these options in place, back-loading leakage and demand reductions is sufficient to maintain the supply-demand balance, so the EBSD model chooses to spend less money on these at the beginning of the planning period and increase spending later.

The best value index (BVI) scoring reveals that the least-cost programme described above is particularly weak on environmental and societal benefits. It relies on relatively frequent use of drought actions to maintain the supply-demand balance, which is damaging to the environment and unpopular with customers (reducing the score). Back-loading demand reduction measures means that more water is taken out of the environment in the early years.

The best-value plan addresses these shortcomings in several ways. It replaces the back-loaded demand reduction profiles with linear ones. This provides environmental benefits by reducing abstraction pressure on the environment in the short to medium term and reducing reliance on drought actions during dry years.

Best value also favours the implementation of non-household water efficiency schemes. While the benefits of these are relatively small in comparison to the household consumption and leakage reductions, they spread the responsibility of reducing consumption and contribute towards meeting the proposed "National Framework for Water Resources: March 2020" [7] demand reduction target.

[7] Meeting our future water needs: a national framework for water resources - GOV.UK (www.gov.uk): March 2020

Finally, an additional small supply-side option is introduced in AMP8. The use of Hawks Tor Pit provides additional resource to significantly reduce the probability of requiring more severe drought restrictions early in the planning period[8]. This is important as the benefits of demand reductions are not high enough in the early years of the plan to mitigate this risk.

This set of best value options provides much greater benefit to both customers and the environment than the least cost plan.

Best value indices	Least Cost	Best Value
Environment	0.05	0.43
Resilience	0.84	0.89
Society	0.41	0.71

Table 14: Detailed best value indices scores for Least cost vs best value plan

The resulting scores of the least cost vs best value plan are shown in the following plot.

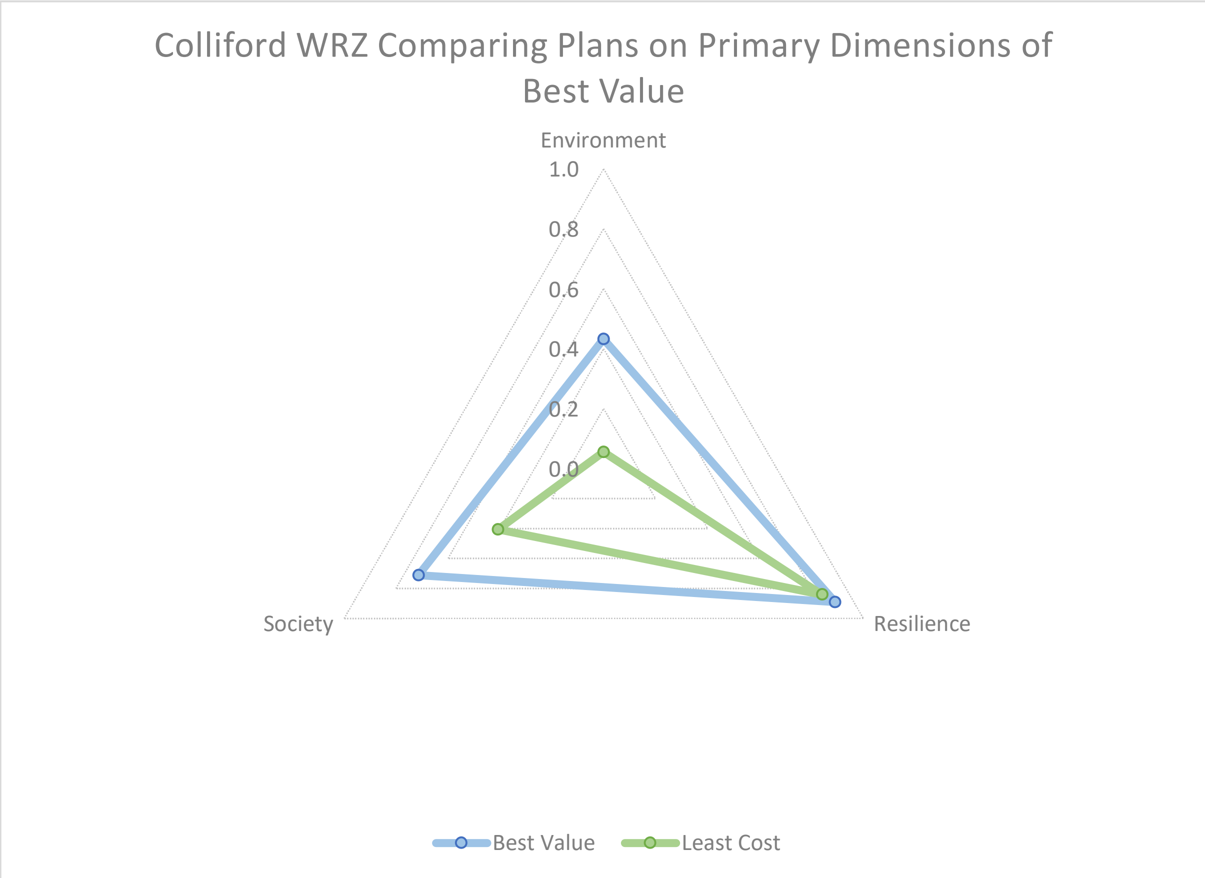

Figure 6: Performance of the Recommended Plan by primary dimensions of the best-value index: Colliford

[8] NB we are considering the use of Hawks Tor Pit as part of our 2022 drought response. If this scheme is brought into permanent supply ahead of final WRMP, we will need to feed this change through the plan development process.

2.2.2 Roadford

The following table sets out the key features of our least cost and best value plans for Roadford.

Components of Plan	Least Cost plan	Best Value plan	Notes
Metering	Backloaded, reactive metering to 2050	Backloaded, reactive metering to 2050	Both plans contribute to the 110 l/p/d PCC target
Leakage	Backloaded profile to 50% reduction by 2050	Linear profile to 50% reduction by 2050	Both plans achieve the same leakage reduction by 2050
Drought restriction reliance	High	Low	Extra supply side option reduces use of drought restrictions
Water efficiency: Non-household	None	Proactive, targeted programme	
Supply-side options	1. Increase abstraction: Erme intake relocation (2046) 2. Increase abstraction: Yealm intake relocation (2046) 3. WTW output change: Reduce Avon minimum capacities (2046)	1. WTW output change: Expansion of Northcombe WTW (2025)	Extra investment in a single supply-side option in best value at start of AMP8 negates need for other options and reduces reliance on drought restrictions
Strategic Resource Options (Regional Plan)	None	None	No SRO options currently exist for Roadford WRZ

*Table **15**: Comparing least cost and best value plans: Roadford*

Roadford WRZ starts the planning in a relatively strong supply-demand position. Comparable to Colliford WRZ, leakage and household consumption reductions will provide sufficient headroom to meet future requirements in all but the later years of the plan. Towards the end of the plan, a large environmental destination supply reduction is implemented, requiring options to be selected to maintain the supply-demand balance. The EBSD model selects a combination of small supply schemes to do this, which are sufficient to back-load the leakage and demand reductions and maintain the supply-demand balance. The S-EBSD model chooses to spend less money on demand reductions at the beginning of the planning period and increase spending later.

Like Colliford WRZ, the best value index (BVI) scoring shows the least cost programme to be weak on environmental and societal benefits. It relies on relatively frequent use of drought actions to maintain the supply-demand balance, which is potentially damaging to the environment and unpopular with customers. Back-loading demand reduction measures means that more water is taken out of the environment in the early years.

The best value plan improves the situation by replacing back-loaded demand reduction profiles with linear ones to reduce abstraction pressure on the environment in the short to medium term and reduce reliance on drought actions during dry years.

Best value favours the implementation of non-household water efficiency schemes to spread the responsibility of reducing consumption and contribute towards meeting the proposed "National Framework for Water Resources: March 2020" demand reduction target.

For supply-side options, best value replaces the three small supply-side schemes late in the planning period with a larger one at the start, which reduces the reliance on drought options throughout the 25 years of the plan and enables the supply-demand balance to be maintained without the need for additional supply options.

The best value plan for Roadford significantly improves on the least cost programme, increasing the society score from 0.35 to 0.64, and the environment score from 0.12 to 0.65.

Best value indices	Least Cost	Best Value
Environment	0.12	0.65
Resilience	1.00	1.00
Society	0.35	0.64

*Table **16**: Detailed best value indices scores for Least cost vs best value plan*

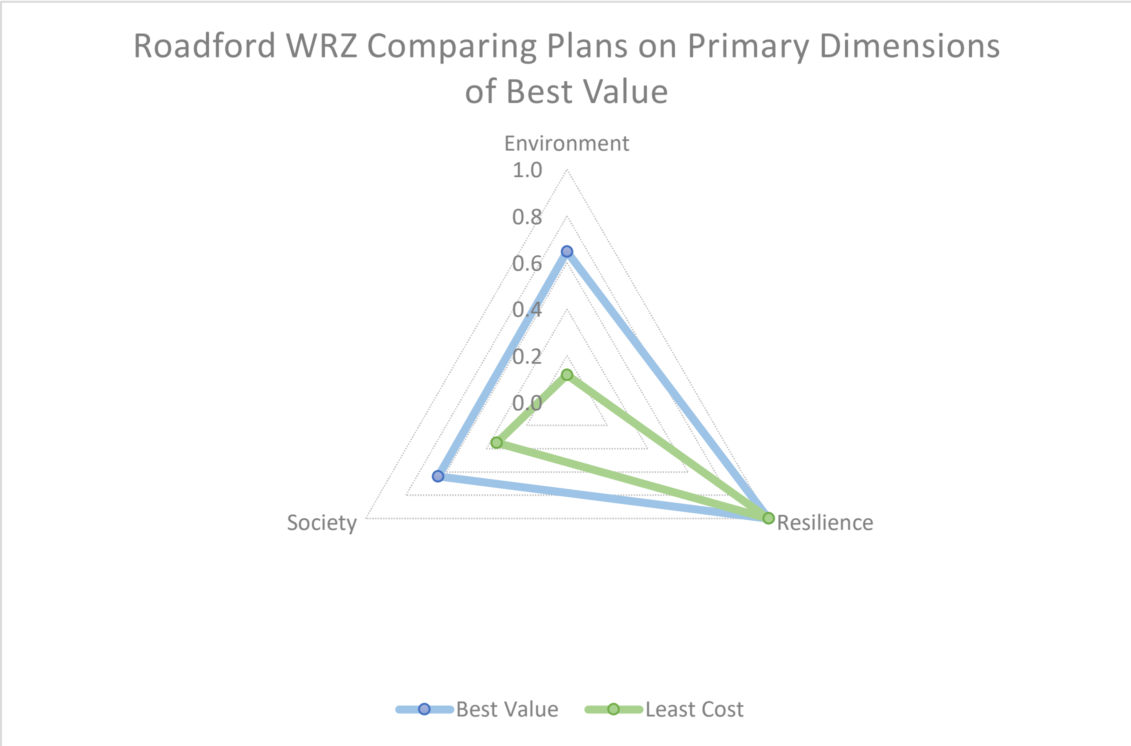

Figure 7: Performance of the Recommended Plan by primary dimensions of the best-value index: Roadford

2.2.3 Wimbleball

The following table sets out the key features of our least cost and best value plans for Wimbleball.

Components of Plan	Least Cost plan	Best Value plan	Notes
Metering	Backloaded, reactive metering to 2050	Proactive metering programme by 2035	Both plans contribute to the 110 l/p/d PCC target
Leakage	Backloaded profile to 50% reduction by 2050	Linear profile to 50% reduction by 2050	Both plans achieve the same leakage reduction by 2050
Drought restriction reliance	High	Low	Extra supply side option reduces use of drought restrictions
Water efficiency: Non-household	None	Proactive, targeted programme	
Supply-side options	1. New source: Brampford Speke borehole (2031) 2. New source: Stoke Canon borehole (2031)	1. New source: Brampford Speke borehole (2025) 2. New source: Stoke Canon borehole (2025) 3. WTW output change: Increase Pynes to licence limit (2025)	Extra supply side option in best value and early implementation of boreholes reduces use of drought restrictions and provides extra resilience
Strategic Resource Options (Regional Plan)	None	None	Cheddar 2 may support this WRZ indirectly.

*Table **17**: Comparing least cost and best value plans: Wimbleball*

Assumed environmental destination abstraction reductions push the Wimbleball WRZ into a deficit in the early 2030s, and the scale of these reductions is such that demand reductions are insufficient to address them within the required timeframe. Therefore, the EBSD model chooses to implement some small borehole schemes to overcome this deficit and then back-load the leakage and demand reductions to ensure the 110 litres per person average household consumption and 50% leakage targets are met by 2050.

The least value plan scores more highly in Wimbleball WRZ compared to Colliford and Roadford, but improvements are still possible.

Best value accelerates demand reductions to a linear reduction profile, reducing the amount of water needing to be abstracted from the environment and reducing the frequency of demand options needing to be used. Non-household water efficiency schemes are included to spread the responsibility of reducing consumption and contribute towards meeting the proposed demand reduction target[9].

Even with these demand reduction measures, Level 3 drought restrictions would still be required relatively frequently, and customers dislike these. The best value plan chooses to implement supply-side options early in the plan, using the same borehole options as the least cost plan but implementing them six years earlier and adding an increase in the maximum output from Pynes WTW. These options provide much greater supply resilience for customers and reduce stress on the environment during low-flow periods by reducing the frequency with which supply-side drought permits are used.

The difference in the best value plan compared to the least cost one is relatively modest in Wimbleball WRZ, improving the overall BVI index from 72 to 74. This is due to the deficit and limited supply options in Wimbleball driving similar approaches for least cost and best value. The iterative process of finalising best value for Wimbleball will refine this further before final submission.

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

Best value indices	Least Cost	Best Value
Environment	0.63	0.63
Resilience	0.94	1.00
Society	0.61	0.64

*Table **18**: Detailed best value indices scores for Least cost vs best value plan*

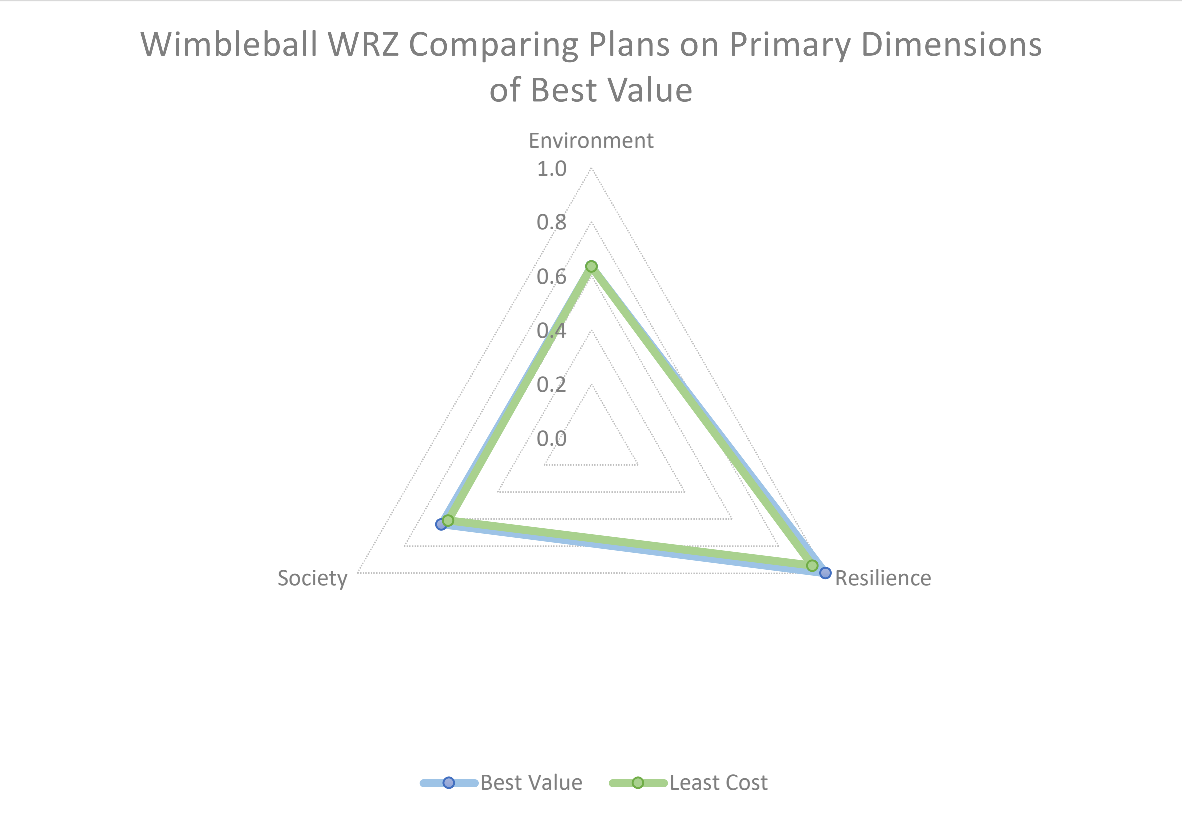

Figure 8: Performance of the Recommended Plan by primary dimensions of the best-value index: Wimbleball

2.2.4 Bournemouth

The following table sets out the key features of our least cost and best value plans for Bournemouth.

Components of Plan	Least Cost plan	Best Value plan	Notes
Metering	Backloaded, reactive metering to 2050	Compulsory metering programme by 2035	Both plans contribute to the 110 l/p/d PCC target
Leakage	Backloaded profile to 50% reduction by 2050	Linear profile to 50% reduction by 2050	Both plans achieve the same leakage reduction by 2050
Drought restriction reliance	High	Low	Extra supply-side option reduces use of drought restrictions
Water efficiency: Non-household	None	Proactive, targeted programme	
Supply-side options	1. New source: Groundwater at Ampress (2034) 2. New storage: Longham Aquifer recharge (2035) 3. New source: Indirect Potable reuse - Christchurch WWTW final effluent transfer to Longham Lakes (2036) 4. Licence change: Wimborne/Longham conjunctive use (2044)	1. New source: Groundwater at Ampress (2025) 2. New storage: Longham Aquifer recharge (2030) 3. New source: Indirect Potable reuse - Christchurch WWTW final effluent transfer to Longham Lakes (2031) 4. Licence change: Wimborne/Longham conjunctive use (2044)	All supply-side options need to be implemented in both plans to meet supply requirements after abstraction reductions. The best value plan brings forward the implementation to reduce the use of drought restrictions and provide headroom as the reductions occur.
Strategic Resource Options (Regional Plan)[10]	1. New source: Poole Harbour effluent reuse (2035) 2. New storage: Mendips Quarry to River Stour (2038)	1. New source: Poole Harbour effluent reuse (2028) 2. New storage: Mendips Quarry to River Stour (2036)	Both SROs are required to meet supply requirements after abstraction reductions. The best value plan brings forward the implementation to reduce the use of drought restrictions and provide headroom as the reductions occur.

Table **19***: Comparing least cost and best value plans: Bournemouth*

The Bournemouth WRZ is impacted by very large Environmental Destination abstractions reductions which result in the loss of more than half of its peak deployable output. The reductions push the zone into deficit in the mid-2030s, with the shortfall growing rapidly. This leads to more pressing supply-demand challenges for the least-cost model to address.

Like the other WRZs where back-loaded demand reduction profiles are selected the S-EBSD model uses a back-loaded profile of reduction in Bournemouth. This still leaves a large deficit to address, so the model then brings in several supply options, including the Poole effluent recycling and Mendip Quarries strategic resource options (SROs).

While the best value plan in Bournemouth uses a similar selection of options compared to the least cost plan, it adjusts the demand reductions to linear and the timing of the supply options to provide benefits to the environment and customers earlier in the plan, increasing the BVI score. The Poole effluent recycling SRO is not available before 2027 due to how long it will take to develop, and the preferred quarry under consideration in the Mendip Quarries scheme will not be worked until around 2040, so these schemes have limited potential to be accelerated.

[10] We are also considering how the SRO, Cheddar 2, could be used to bring additional benefits to Bournemouth

Bringing forward supply schemes means that drought options are required less frequently in the short to medium term, providing customer benefit through improved resilience.

Best value also favours the implementation of non-household water efficiency schemes. While the benefits of these are relatively small in comparison to the household consumption and leakage reductions, they spread the responsibility of reducing consumption and contribute towards meeting the proposed demand reduction target[11].

This plan delivers better value for customers while also delivering very large abstraction reductions to benefit the environment.

Best value indices	Least Cost	Best Value
Environment	0.10	0.67
Resilience	0.77	0.87
Society	0.37	0.89

Table ***20****: Detailed best value indices scores for Least cost vs best value plan*

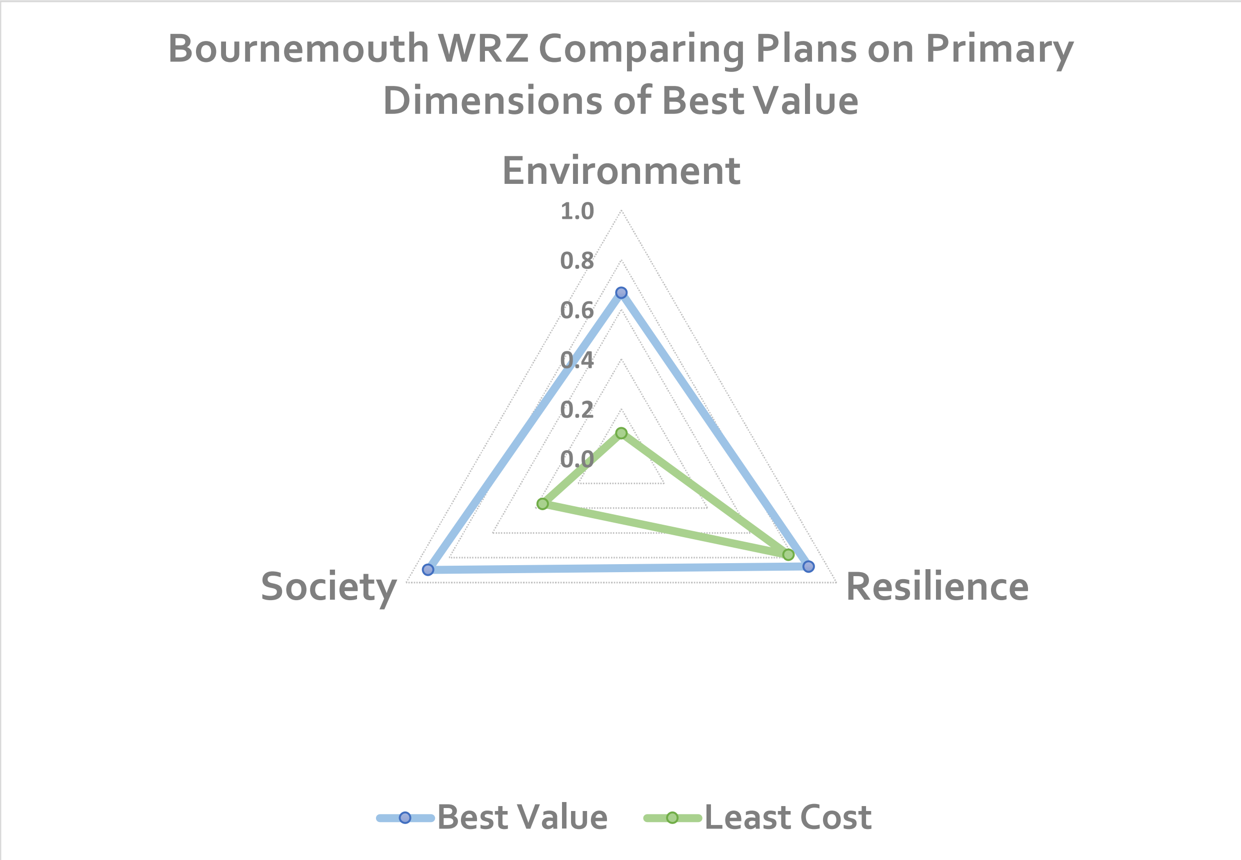

Figure 9: Performance of the Recommended Plan by primary dimensions of the best-value index: Bournemouth

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

3 Conclusion

To develop a balanced plan that works for customers, the environment and society as a whole, we employ an adaptive approach to decision-making. This is an iterative process of challenge and review which begins with extensive internal and external stakeholder engagement and input. The conclusions drawn from this process are presented in Chapter 11, where we present our draft plan.

We use modelling as an analytical tool to form decisions. We evaluate options based on their environmental, social, economic, technical and customer outcomes. Our model looks at various scenarios to identify the best value option that meets our needs in terms of affordability and sustainability. We then use this feedback when considering changes or modifications to our proposed solutions.

In every water resource zone, our best value (preferred) plan scores significantly better than the least cost plan, showing that the process of deriving a balanced, efficient plan through our BVI is successful.

The outcome of better meeting a wider range of objectives in our best value plan, including the needs of our customers and protecting the environment, justifies the extra spend, and there is also assurance that this is an efficient investment through a much-improved BVI.

The OFWAT reference scenario testing in Bournemouth WRZ potentially emphasises the importance of a multi-capital approach and stakeholder engagement as the difference between our best value plan, incorporating environmental destination (ED) reductions on the River Avon, and our core pathway, without the River Avon reductions, is significant. Currently, our estimated additional spend is £378m across the 25-planning period but may increase if an additional SRO is needed. Scenario testing has also shown in Colliford WRZ that any supply-side option implementation that is possible during AMP7 will potentially negate, or at least delay, the need for us to adapt our best value plan in the future.

We can see, through our adaptive planning, that our AMP8 programme delivers significant resilience and the limited number of adaptive options needed across the planning period, despite the uncertainty tested through our scenarios gives confidence that we have a resilient plan. The greatest sensitivity from the scenario testing is from increased demand (Bournemouth and Roadford) or climate change (Colliford and Wimbleball) magnifying the impacts from potential ED abstraction reductions. This shows that we will need to monitor and engage stakeholders into the future to make sure we align our pathway with stakeholder expectations and maintain resilience. Testing the uncertainty in the future implementation of technology showed this scenario had the least impact on our plan; so, while technological advances or early delivery will assist our programme delivery, we will not be significantly affected by delays.

Regional liaison with Wessex Water will form a crucial part of our future adaptive strategy as we explore strategic options that benefit the region and could underpin our options in Bournemouth and Wimbleball. Ensuring we review and continue monitoring during AMP7 is also crucial in Colliford where our adaptive strategy is dependent on any AMP7 supply options implemented.

We will continue to update and expand our supply option portfolio as an ongoing process to ensure our plans are based on viable, deliverable options.

South West Water

Bournemouth Water

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