South West Water

Best value planning framework for draft Water Resource Management Plan

Report

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1 Introduction

ICS have been supporting South West Water (SWW) in implementing approaches and processes to help develop their business plans and Water Resources Management Plan (WRMP).

SWW identified a need to develop a best-value planning framework for water resources that can be used in conjunction with its S-EBSD optimisation tool, used for business planning, to appraise water resource options, and to test and finalise their WRMP.

The Water Resources Planning Guideline defines a best value plan as one that considers wider factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the environment and society.[1]

The overall purpose of this work was to inform the draft WRMP (dWRMP). This included the scoping of the requirements for developing a best value planning framework, the development of a best value framework and the measurement of best value through a calibrated metric labelled the Best Value Index (BVI).

This report covers these tasks and includes details of how the BVI was used by SWW in the development of its dWRMP.

2 Requirements

To scope the requirements for the best value framework, we reviewed several sources including regulatory guidance and expectations, industry good practice and the recently published draft regional water resource plans.

2.1 Guidance

The requirements for best value planning are defined through Environment Agency guidance:

> *"A best value plan is one that considers factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society"*
>
> *"A best value plan should be efficient and affordable with distributional impacts, societal equity and intergenerational equity considerations transparently discussed"*

This identifies a wide range of factors to be considered as part of best value planning and makes the identification of best value multi-dimensional. These factors (with the size of the text scaled to how often they are mentioned) as reflected in the Water Resource Planning Guideline are shown in Figure 1 below.

[1] Water Resources Planning Guideline Version 9, Environment Agency, Ofwat and Natural Resources Wales. Accessed at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline#section-9--aspects-to-consider-in-compiling-a-best-value-plan

Figure 1: Factors to be considered in Best Value Plan

Source: ICS representation of factors cited in Section 9.2 Water Resources Planning Guideline

As emphasised in UKWIR (2020), there is no statutory requirement to prepare a best value plan. Instead, it is now considered as a matter of best practice for the preparation of regulatory water resource plans – both at regional and water-company level.[2]

2.2 Regional plans

We have been guided by the practice on best value planning presented in the now-established regional water resource groups. SWW is part of the West Country Water Resource Group (WCWRG). Our review of the regional plans identified a range of metrics that have been developed around best value planning – see Figure 2 below.

[2] UKWR (2020) Deriving a best value water resources management plan

Figure 2: Best value metrics in regional water resource plans

West Country	South East	East	North	West
• Meet statutory planning requirements on abstraction • Reduce abstraction from environmentally sensitive sources • Carbon emissions / energy use • Bio-diversity net gain • Enhancing natural capital • Increase resilience to extreme droughts (1 in 500) • Reduce frequency of temporary use / non-essential use restrictions • Increase supply system resilience to other risks • Increase sharing of water resources to improve national resilience • Increase resilience of the non-public sector to drought • Cost to customers and customer affordability • Intergenerational equity and stakeholder priorities • Reduce leakage • Reduce per person water use • Reduce non-household demand • Reduce non-public water supply demand	• Meet the supply demand balance for public water supply and other sectors by 2100 • Halve leakage by 2050 and reduce it further beyond 2050 • Reduce how much water is put into supply by water companies • Options that customers prefer • Reduce how much water is abstracted from identified sites • Environmental disbenefits of the programme • Environmental benefits of the programme • Enhance natural capital • Improve biodiversity net-gain score • The cost associated with offsetting carbon emissions • Achieve 1 in 500-year drought resilience (date achieved) • Reliability - how well the water system can cope with short-term shocks • Adaptability - how well the water system can adapt so it can accommodate short-term shocks • Evolvability - how well the system can be modified to cope with the long term trends • Total cost of the programme • Spread the total cost of the programme across present and future generations	• Supply and supply deficits for energy & agriculture • Export capacity to WRSE region • Cost of supply options • Levels of service and reliability to public water supply • Capital and operating carbon footprint of supply options • Environmental flow indicators at catchment level • Environmental effects of construction & operation of strategic options • Natural capital gains • Biodiversity net gain	• Leakage reduction • Drought Resilience • Total NPV Cost • Biodiversity Net Gain • Human and Social Well Being • Non-Drought Resilience • PCC Carbon (tonnes) • Natural Capital (£ NPV) • Option Deliverability • Customer Preferred Option Type • Stakeholder Preferred Option Type	• Cost (NPV) • Carbon Cost (NPV) • Drought Resilience (Public Water Supply • Flood Risk • Human & Social Well Being • Ecosystem Resilience • Supply Resilience (NPV) • Multi abstractor Benefits

From this wide range of metrics we identified three common themes to best value planning: Environment, Resilience and Society and these provide the core of the best value framework developed below.

2.3 Ofwat expectations

In a public response on the five draft regional plans in February 2022, Ofwat set out some further expectations around the development of best value water resource plans. [3]

These expectations, common across all the regional plans, included:

- Compare least cost plan to best value plan
- Clearer linkages between regional plans and company WRMPs
- Inclusion of demand side options in option set (rather than baseline)
- More clarity on accounting for carbon

All these expectations have been considered and reflected in the best value framework set out in detail below. This has been achieved principally through the metrics included with the best value framework.

2.4 SWW requirements

Based on this review, we agreed the following priorities with SWW for the development of the best value framework:

[3] Available at: https://www.ofwat.gov.uk/regulated-companies/resilience-in-the-round/water-resource-planning/ofwats-engagement-on-wrmp24/

- A framework to be developed around the three central pillars of Environment, Resilience and Society;
- Based on a set of metrics that are comprehensive enough to capture the multi-dimensional nature of best value; and
- A clear and simple methodology for translating these metrics and dimensions into a form that facilitates clear communication with customers and stakeholders about the preferred water resource plan.

These requirements set the benchmarks for the best value framework and metrics described in Section 0 below.

2.5 Aligning with customer views

SWW is currently undertaking a comprehensive programme of customer research and consultation as part of its PR24 planning. This on-going programme of research is being used to evidence customer priorities for their overall water and wastewater services from 2025-30 (as reflected in the PR24 business plan) and through to longer term horizons up to 2050 (as reflected in the Long-Term Delivery Strategy).

The findings from two early phases of this customer research programme were used in the development of the best value approach for the dWRMP. These were:

- The customer research undertaken as part of the West Country Water Resource Group (WCWRG) draft regional water resource plan. This research was commissioned by SWW and covered the three Pennon Group companies of South West Water, Bournemouth Water and Bristol Water. This research was undertaken over the period mid 2021 to early 2022 and considered in detail customer views around long-term water resource planning and their service priorities.[4]
- The PR24 customer willingness-to-pay (WTP) research undertaken for South West Water and Bournemouth Water. This research was designed to refresh the customer WTP values used by SWW in its investment planning, but it also provided broader evidence about overall customer service priorities covering water and waste-water services. This engagement was undertaken in the early part of 2022.[5]

The findings of these customer research studies were reviewed through the lens of identifying the importance placed by customers on the three best value themes of Environment, Resilience and Society.

2.5.1 Customer evidence from the WCWRG research

In the WCWRG study, one of the areas investigated as part of the qualitative customer research was around the importance customers placed on what were termed best value planning factors. A total of 66 household customers participated in the research.[6]

Table 1 below provides more details on the best value planning factors considered in this research.

[4] Customer Research to inform the Best Value Water Resource Plan for the South West Work Package A Qualitative Research, West Country Water Resources Group, September 2021
[5] South West Water, Customer Willingness to Pay, March 2022.
[6] A total of 66 household customers participated in the research, split into eight groups, with each group meeting over two sessions. There were two groups per water company (differentiated by socio-economic group (SEG) with mixed ages), plus specialist groups of future customers (non-bill payers aged 18-24 years) and older customers (aged 65+), three customers from each company recruited for each specialist group.

Table 1: WCWRG Customer Research on Best Value Planning

Best Value Planning Factor	Examples of how factor assessed
Benefitting and affordable for society	– Cost to customers and customer affordability – Intergenerational equity – costs are spread over time across different generations – Meeting the needs of other stakeholders and water users

Improving the environment	– Reducing the
	  o amount of water taken from environmentally sensitive water sources
	  o carbon emissions/energy use
	– Enhancing the environment e.g. biodiversity improvements

Improving supply resilience	– Reducing the
	  o risk of severe water restrictions
	  o frequency of temporary use restrictions, hose pipe bans
	  o Improving the resilience of the water supply system to other risks such as flooding, extreme cold weather

Reducing the demand for water	– Reducing the amount of
	  o water each person uses
	  o leakage
	  o water used by businesses, industry and agriculture

As part of the research, customers were asked to rate or rank the relative importance of these best value planning factors. Table 2, below, presents our summary of the research findings, expressed as a % score (weight) out of 100% for each broad best value theme. The score presented below for 'Society' is the combined score for 'Benefiting and affordable for Society' and 'Reducing the demand water' as this aligns to the best value framework described more fully in Section 0 below.

Table 2: WCWRG Customer Research – Evidence on relative importance of Best Value Factors

Best Value Framework Theme	% share of overall importance to customers
Society – Benefiting and affordable for society – Reducing the demand for water	29%
Environment – Improving the environment	34%
Resilience – Improving supply resilience	37%

Source: ICS calculations from *Customer Research to inform the Best Value Water Resource Plan for the South West Work Package A Qualitative Research, West Country Water Resources Group, September 2021.*

2.5.2 Customer evidence from South West Water PR24 Willingness to Pay study

The willingness-to-pay surveys were conducted in early 2022 based on a representative survey of over 600 households. The findings from this study provided broader evidence about customer views and priorities as it covered water supply and wastewater services. We combined the separate evidence from customers in the South West Water (water and wastewater) and Bournemouth Water (water only) areas and mapped each service area in the WTP research to the closest best value theme.

Based on this approach, Table 3 below provides a comparable summary to that presented above in Table 2.

Table 3: PR24 WTP Customer Research – Evidence on relative importance of Best Value Factors

Best Value Framework Theme	WTP attribute allocated by best value theme	% share of overall importance to customers
Society	Change in Bill, Leakage, Customer Contacts	37%
Environment	Drought Permits, Drought restrictions, Pollution Incidents, River Water Quality, Bathing Water Quality	27%
Resilience	Water restrictions, interruptions, water quality, property flooding, water pressure	36%

Source: ICS calculations from *South West Water, Customer Willingness to Pay, March 2022.*

3 Framework for measuring best value

3.1 Objectives

The objectives of the framework were summarised as:

- Alignment with Water Resource planning guidance and expectations (see section 2 above)
- Align where appropriate with customer priorities and preferences (see section 2 above)
- Allow the identification of a best value plan
- Demonstrate the trade-offs between different candidate plans
- Populated from current SWW tools (e.g., S-EBSD) and data availability

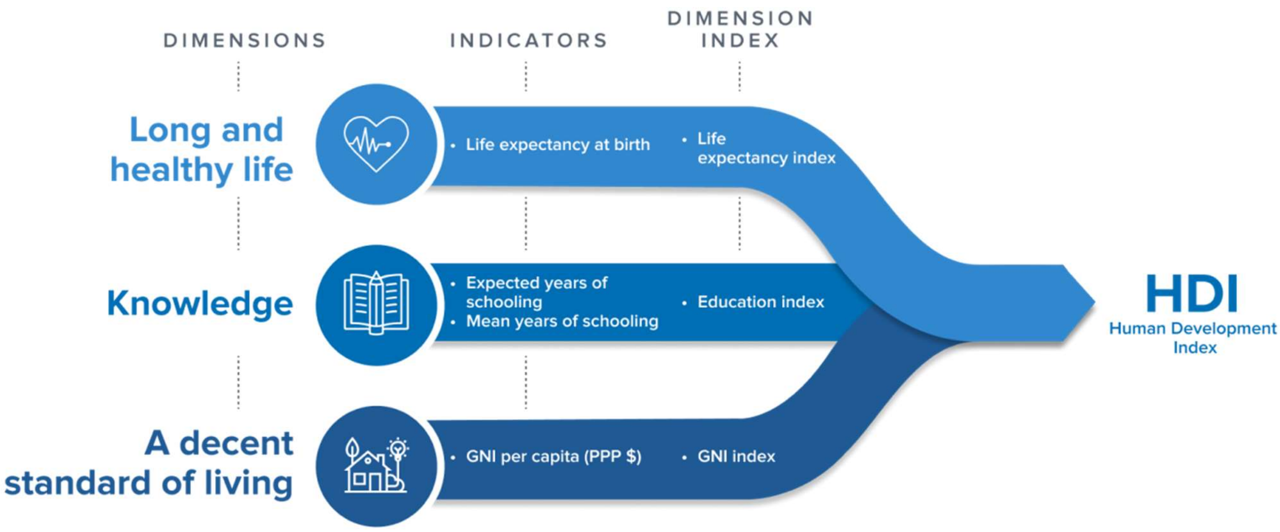
3.2 A model for measuring best value

Our model for Best Value is based on the use of what we have termed the BVI – Best Value Index.

This is a composite index that can be defined to capture multiple dimensions (or inputs) to an overall Best Value Plan. As well as providing an overall index metric for discriminating between alternative plans, it provides the performance of each plan at the level of each (primary) dimension in a transparent way. This allows trade-offs between the primary dimensions to be readily identified.

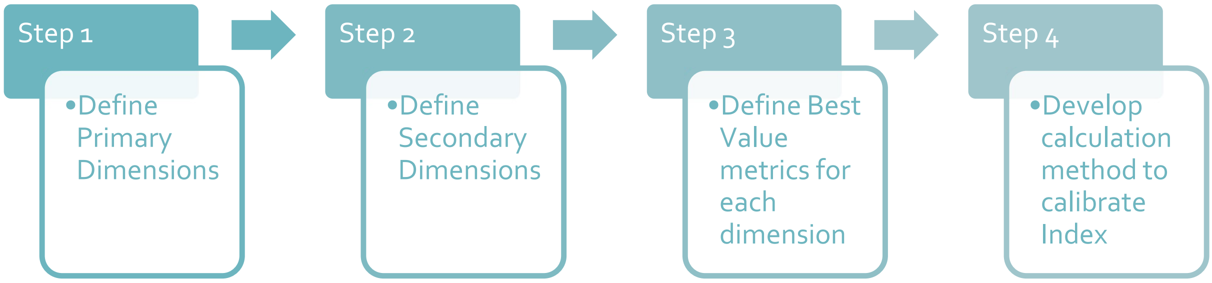
A previous model for this approach would be the Human Development Index (HDI) used and reported by the multilateral agencies like the United Nations and the World Bank. The HDI captures complex information about several dimensions of human development and converts this to a single comparable metric that captures comparative progress in human development across nations – see Figure 3.

Figure 3: The Human Development Index Framework



Source: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI

Our process for developing the best value framework and ultimately calibrating the BVI was summarised as:

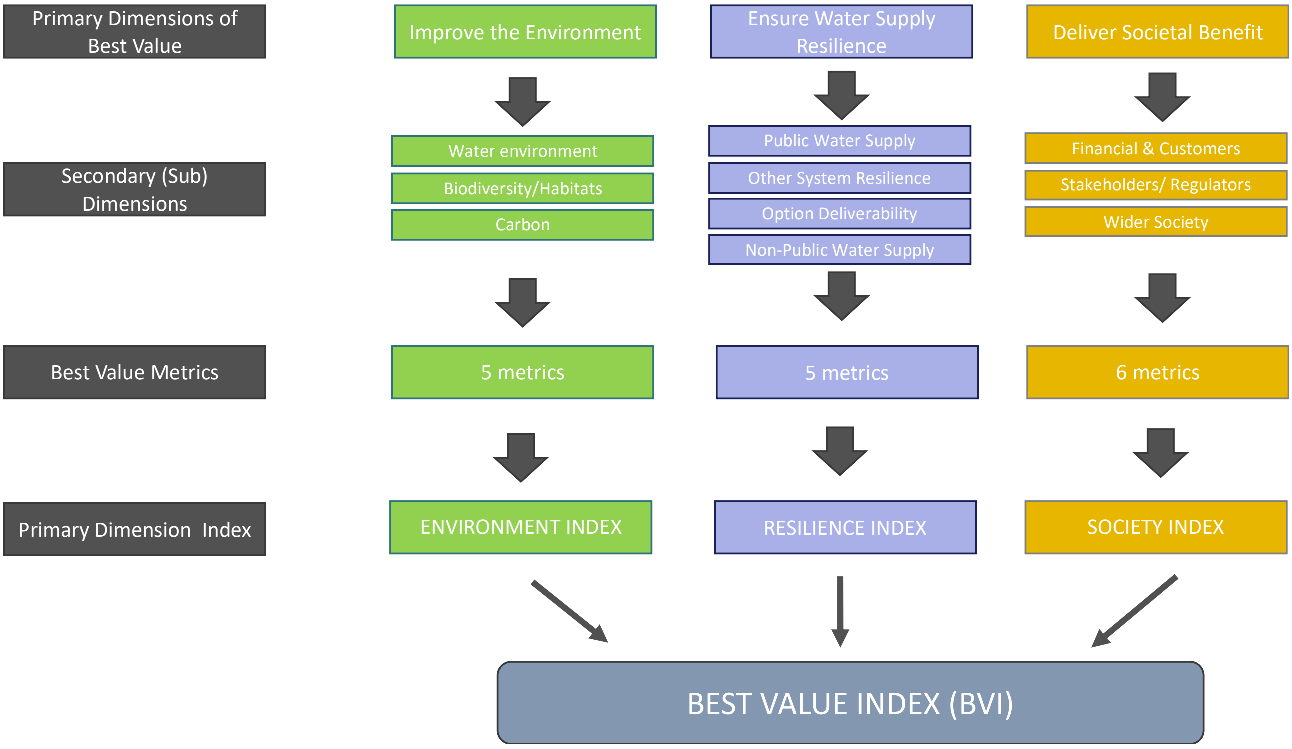


Using the HDI as our model, Figure 4 below represents the initial best value framework that was developed for SWW. This framework extends the HDI model, in that we define primary and second levels for the dimensions of best value that are captured. In effect, the overall Best Value Index is presented as a blended assessment of each primary component of best value. This allows the complexities and trade-offs present in developing water resource plans to be fully represented and made transparent as far as possible within the framework.

We discuss in the following sub-sections a) the definition of the primary and secondary dimensions of best values and b) the specification of the best value metrics within each dimension, including the scoring of each metric. A scoring methodology is required to allow the overall assessment of best value to be calibrated.

As Figure 4 shows, there are a total of 16 metrics across these dimensions which, make up the overall framework for assessing best value.

Figure 4: The Best Value Framework



In the final step of the BVI, separate primary-dimension index-values are calculated and then combined into the overall BVI – the methodology for this final step is set out in Section 0.

3.3 Defining the Primary and Secondary Dimensions

As noted in Section 2, a requirement of the framework agreed with SWW was to structure the framework around the 3 central pillars of Environment, Resilience and Society. The three pillars defined the primary dimensions of the framework.

These three pillars are themselves broad and, within each, it was clear that a secondary level of themes within each primary dimension could be helpfully distinguished to make more transparent where best value was being provided by a candidate plan. In this way, the contributions of each primary dimension to best value are made transparent and the contribution of each secondary sub-dimension to each primary dimension.

The definition of the secondary dimensions shown in Figure 4 was based on consideration of the factors that were felt to represent both comprehensive and material contributions to best value, aligned to the requirements already highlighted in Section 2. This included aligning to the work previously undertaken for the regional WCWRG plan as well as SWW's previous work for the PR19 water resource plan.

A further advantage of structuring the best value assessments using these primary and secondary dimensions is flexibility around the number of metrics within the overall framework. The overall number of metrics within each secondary dimension is not fixed within the framework, which means that the framework can be adapted and refined at a later stage without losing the continuity provided by the primary and secondary dimensions.

3.4 Best Value Metrics

The majority of the metrics included in the framework are existing measures that are already monitored and used by SWW: for example, used for the WCWRG regional planning exercise or used as part of PR24 planning and/or previously in the development of the PR19 water resource plans.

We detail below the set of 16 metrics used for the dWRMP best value assessments. In the descriptions below each metric is labelled M_1 to M_{16} consecutively for reference purposes only.

3.4.1 Environment dimension

A total of five metrics were defined to cover the three sub-dimensions of water environment, biodiversity / habitats and carbon reductions.

3.4.1.1 Sub dimension: Water Environment

This sub dimension is intended to capture the impacts and benefits of each plan in respect of the water environment. Two metrics are used for this purpose:

M_1: Ambition of Environmental Destination (Reducing Abstraction).

This metric measures the level of compliance of each plan with legal requirements and/or regulatory expectations for reductions in Water Available for Use (WAFU). These reductions would reflect policy drivers to minimise environmental damage from water abstractions.

For the purpose of measuring the extent of ambition, three criteria are combined into a score such that each plan is assessed in terms of the pace and scale of the environmental destination that is achieved.

Table 4 below presents the scoring developed for these three criteria. A combined score based on the sum of the individual scores is then used as the as measure for M_1. Different scores between 1 and 5 are applied for each of the criteria.

Table 4: Criteria for assessment of ambition of environmental destination

M1 Criteria	Scale					
	0 (Lowest)	1	2	3	4	5 (Highest)
Nr of Years before Sustainability Reductions Achieved	>10	>8	>6	>4	>2	<2
Average % reduction in WAFU from 2030	<2%	>2%	>4%	>6%	>8%	>10%
Maximum % reduction in WAFU over 2025- 2050	<5%	>5%	>10%	>15%	>20%	>25%

M_2: Expected cost of drought permit restrictions

Drought permits enable water companies to abstract during periods of extreme drought and often will be associated with a level of environmental stress. Therefore, planning to minimise or reduce the likelihood that drought permit restrictions are required within a given water resource plan will provide benefits to the water environment.

The S-EBSD modelling tool used by SWW includes the use of drought permits as an option to balance supply and demand under drought conditions. The model compares the expected cost of using a drought permit restriction versus the expected cost of avoiding the use of these restrictions (through the implementation of alternative options). Each modelled plan and/or scenario therefore provides a profile for the expected use of these restrictions and an associated expected cost of their use. This expected cost is based on evidence available to SWW about the value customers place on not using these types of restrictions – it represents the value to customers of avoiding the environmental stress associated with drought permits.[7] Hence, a lower expected cost of drought permit restrictions measures an improvement to the water environment.

Profiles of expected (undiscounted) drought permit costs are provided directly by the S-EBSD model. For the best value assessments these profiles are aggregated across the restrictions active in each modelled plan/scenario. The year-on-year expected costs are then discounted to provide a net present value (NPV) for these costs across the entire planning period. It is these NPVs that are then scored for the best value assessment. The scorings are presented in Section 3.5.

3.4.1.2 Sub dimension: Biodiversity / Habitats

This sub dimension is intended to capture the impacts and benefits of each plan in respect of biodiversity/habitats. This is a dimension that features prominently in the Environment Agency guidance for best value planning (recall Figure 1). Two metrics are used for this sub-dimension:

M_3: Enhancing Natural Capital / Biodiversity

This metric combines the natural capital assessments (NCA) and biodiversity net gain (BNG) assessments undertaken for SWW by Mott McDonald (2022) as part of the wider dWRMP plan development.

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[7] This customer willingness to pay evidence is provided in *South West Water, Customer Willingness to Pay, March 2022*.

These assessments were applied to the options/schemes selected within each plan/scenario and combined the following qualitative and quantitative measures:

- BNG data in numeric format (number of habitat units)
- NCA environmental financial metrics (£)
- NCA qualitative effects for water regulation and water purification.

The list of values for BNG, NCA environmental financial metrics, and NCA qualitative data (water purification and water regulation) for each option were normalised between 1 and 4 with the highest receiving a '4' and the lowest receiving a '1'. Any schemes missing data were assigned the average of the list of normalised values (these were identified in the metrics). This was to ensure that options which were scoped out of the BNG and/or NCA assessments were not unduly disadvantaged in the overall best value modelling. These three elements were then averaged to produce a single NCA environmental metric for each option as the input into the BV framework.

For the BNG component, the total net unit change in habitat value was normalised between 1 and 4 for each option, with the highest value receiving a '4' and the lowest receiving a '1'.

The environmental financial NCA data was already a numeric metric (£). This was also normalised between 1 and 4 for each option, with the highest value receiving a '4' and the lowest receiving a '1'.

NCA water purification and water regulation were in a qualitative format and used the assessment scale from the SEA framework (see M_4 below). The water purification and water regulation effects were converted to a numeric value for modelling purposes. The same numerical scoring conversion as for the SEA was applied to water purification and water regulation to produce a value for each option (i.e. +/-1 for positive/negative minor effects; +/-4 for positive/negative moderate effects; and +/-8 for positive/negative major effects).

As a final step for this metric, plans were then scored on the basis of the percentage change in the overall metric score (based on the options selected in each plan) relative to a 'no change' position.

M_4: Strategic Environmental Assessments

This metric uses option level information provided by the Strategic Environmental Assessments (SEA) undertaken for SWW by Mott McDonald (2022) as part of the wider dWRMP plan development. As part of water resource planning, SEAs are a mandatory way of assessing the environmental impact of proposed plans and schemes.

For all options selected within a given plan, positive and negative effects were allocated a numerical score according to the following scale:

- +/-1 for positive/negative minor residual effects
- +/-4 for positive/negative moderate residual effects
- +/-8 for positive/negative major residual effects

These values were applied to construction and operational effects for each option.

For each option, four categories of SEA data were then produced, which were:

- Short term (construction) positive: The sum of all short-term positive scores
- Long term (operation) positive: The sum of all long-term positive scores
- Short term (construction) negative: The sum of all short-term negative scores
- Long term (operation) negative: The sum of all long-term negative scores

Values in the four categories were normalised with respect to values across all of the SEA categories, with the lowest value receiving a '1' and the largest receiving a '4'. For each scheme, the four values across the categories were then averaged. This averaged list was then normalised again with the smallest receiving a '1' and the largest receiving a '4' to enable differentiation between values in the best value model.

Again, as a final step, the overall assessment of M_4 for each plan/scenario was expressed as a percentage change in the overall metric relative to a 'no change' position.

3.4.1.3 Sub dimension: Carbon

This sub dimension is represented by the single measure of reductions in carbon emissions. The inclusion of this metric is intended to align the best value assessments with the overall commitments of SWW to its net zero commitments by 2030.

M_5: Reduction in Carbon Emissions

Carbon reduction is a metric that is used within the EBSD tool as part of scenario development. The set of options that are presented to the modelling tool includes a measure of the carbon footprint (tCo2) of each option. The carbon assessments are based on work undertaken by Stantec for SWW (Stantec, 2022).

For each option, assuming a 60-year design life, the operational carbon total over that period was added to the embodied carbon of an option to obtain a total carbon value. The totals for each scheme were normalised between 1 and 4 with the lowest total receiving a '4' and the highest receiving a '1'. Any schemes missing carbon data were assigned the average of the list of normalised values (values highlighted red in the table).

Consistent with the other environment metrics, the final input to the best value assessment is expressed as a percentage change in this normalised score (relative to a no change position).

3.4.2 Resilience dimension

A total of five metrics were defined to cover the four sub-dimensions of public water supply, other system resilience, deliverability and non-public water supply.

3.4.2.1 Sub dimension: Public Water Supply

M_6: Increased Resilience to Extreme Droughts (1 in 500)

This metric is intended to measure the ability of each modelled plan/scenario to provide a 1-in-500 resilience standard. This standard is designed to ensure that the chance of experiencing the most severe restriction on water use (e.g. Level 4 rota cuts) under drought conditions is no greater than once in every 500 years (or 0.2% in any given year).

One of the outputs provided by SWW's S-EBSD modelling tool is a profile of when these Level 4 restrictions are used within a modelled plan/scenario. The output measures the expected number of months of active Level 4 restrictions in each year (at water resource level).

For the best value assessment this profile is re-expressed as the cumulative number of expected months of Level 4 restrictions and then normalised relative to the cumulative number of total months over the planning period (a total of 300 months by the end of the planning period in 2050). This measures the rate of expected emergency Level 4 restrictions in each year of the planning period under each plan/scenario. Where this rate exceeds the resilience standard of 0.2% (1 in 500), then the period is classed as above risk (=1, otherwise = 0).

For the final scoring in the best value assessment, these annual classifications are summed to give the proportion of above risk years across the full 25-year planning period. A value of 0% implies that the resilience standard of 1-in-500 is met in all years up to 2050, a value of 100% implies the standard is met in no years and a value in the range 0% to 100% implies the resilience standard is met in some but not all years.

These scores are then mapped to the best value scales as shown below in Section 3.5.

M_7: Expected Cost of Temporary Water Use Restrictions

Temporary water use restrictions (e.g., hosepipe bans, non-essential use bans) enable water companies to manage water demand during periods of extreme drought and water availability shortages. Therefore, planning to minimise or reduce the likelihood that water use restrictions are required within a given water resource plan is an indicator of the supply system's resilience to droughts.

The S-EBSD modelling tool also includes the use of temporary water use and emergency drought restrictions as options to balance supply and demand under drought conditions. The model compares the expected cost of using these restrictions versus the expected cost of avoiding the use of these restrictions (through the implementation of alternative options).

Table 5 below summarises the full set of restrictions that are available in the S-EBSD tool.

Table 5: Restriction Types in the S-EBSD model

Restriction ID	Restriction Level	Restriction Description
Dem-L1	Level 1 Demand	Campaigns, water company use optimisation
Dem-L2	Level 2 Demand	Temporary Use Bans (TUBs),
Dem-L3	Level 3 Demand	TUBs + Drought Orders, Non-essential use bans
Sup-L1	Level 1 Supply	Drought orders , minor environmental impact
Sup-L2	Level 2 Supply	Drought orders , minor environmental impact
Sup-L3	Level 3 Supply	Drought Orders , major environmental impact
Sup-L4	Level 4 Supply	Emergency Drought Orders, including rota cots

Each modelled plan and/or scenario therefore provides a profile for the expected use of these restrictions and an associated expected cost of their use – calculated as the probability a restriction is used multiplied by the unit cost of a restriction per day per customer. This expected cost is based on evidence available to SWW about the value customers place on not experiencing these types of restrictions – it represents the value to customers of avoiding the loss of welfare associated with restricted water use.[8] This value increases as the severity of the restriction increases. Hence, a lower expected cost of water use restrictions measures represents a benefit to customers of providing a higher level of system resilience.

Profiles of expected (undiscounted) restriction costs are provided directly by the S-EBSD model. For the best value assessments, these profiles are aggregated across the restrictions active in each modelled plan/scenario. The year-on-year expected costs are then discounted to provide a net present value (NPV) for these costs across the entire planning period. It is these NPVs that are then scored for the best value assessment. The scorings are presented in Section 3.5.

3.4.2.2 Sub dimension: Other System Resilience

M_8: Resilience to other risks (e.g., Single Source Dominance)

This metric captures the level of supply failure risk associated with a given supply side option / scheme when it is selected over the planning period. A lower failure risk contributes to a more resilient water supply system and is scored more highly.

[8] This customer willingness to pay evidence is based on customer valuations derived for South West Water at PR19.

The metric is derived from a SWW assessment of this resilience to failure risk. Only supply-side options that are selected as part of a plan/scenario contribute to the assessment. The level of supply failure risk for an option is assessed on a 1 (highest risk) to 5 (lowest risk) scale.

The option level assessments are weighted by the proportion of total yield (Ml/d) in a resource zone. These weighted ratings are then summed across each plan / scenario to give the total rating for a given plan/scenario. These scores are then mapped to the best value scales as shown below in Section 3.5.

3.4.2.3 Sub dimension: Deliverability

M_9: Benefit Certainty

This metric captures the level of confidence in the yield (Ml/d) that a supply side option / scheme is expected to deliver over the planning period. A higher level of confidence in the yield benefit contributes to a more resilient water supply system.

The metric is derived from an SWW assessment of this yield certainty applicable to supply-side options. Only options that are selected as part of a plan/scenario contribute to the assessment. The certainty of an option's yield is assessed on a 1 (lowest) to 5 (highest) scale.

The option level assessments are weighted by the proportion of total yield (Ml/d) in a resource zone. These weighted certainty ratings are then summed across each plan / scenario to give the total benefit certainty score. These scores are then mapped to the best value scales as shown below in Section 3.5.

3.4.2.4 Sub-dimension: Non-Public Water Supply

M_{10}: Available headroom for Water Sharing

This metric captures the ability of a given plan/scenario to make available water to the non-public water supply. This provides a measure of SWW's capacity to support the resilience of water availability to other sectors in the South West region (e.g., farming and transfers to other regions), particularly at times of extreme drought.

This capacity is assessed as conditional on several factors that are used to identify if a reliable surplus of WAFU is available in each year of a given plan/scenario. This surplus is measured as the percentage headroom (supply demand balance/WAFU). Both the percentage headroom and WAFU data used for this measure are provided directly by the S-EBSD model.

The factors used to assess this capacity were:

- First, the potential for sharing is only available when the supply / demand balance is not in deficit. This score ranges between 1 to 3.
- Second, the potential for sharing depends on the proportion of years in the planning period not in deficit. The maximum potential is 100%.
- Third, the potential for sharing also depends on the absolute level of average headroom over the planning period. A higher average headroom is scored higher.
- Finally, the potential for sharing is only recognised if there is a positive supply-demand balance at the end of the planning period. This is a binary indicator with End of Period Deficit = 0 and End of Period Surplus = 1.

These four factors are combined multiplicatively to produce an overall score which is then mapped to the best value scoring scales (see Section 3.5).

3.4.3 Society dimension

A total of six metrics were defined to cover the three sub-dimensions of financial & customers, stake-holders & regulators, and wider society.

3.4.3.1 Sub dimension: Financial & Customers

This sub dimension represents the recovery of the costs of each candidate 25-year plan. Two metrics are used for this sub-dimension:

M_{11}: Bill impacts for customers

The inputs to this metric are the total operating and capital expenditure profiles for each modelled plan, which are provided as outputs of the S-EBSD model. This metric is used to represent the affordability of each candidate plan within the overall best value assessment.

In a pre-calculation step these expenditures are converted to an estimated average bill impact over the 25-year planning horizon. This conversion uses the same inputs and assumptions that are used in the financial modelling of SWW's revenue control limits together with data on SWW's number of billed customers. In effect, this provides a ready reckoner for converting plan expenditures into estimated bill impacts.

The pre-calculation steps are as follows:

- *Step 1:* Each £1m of totex is allocated 50:50 to the regulatory wholesale controls of Water Resources and Water Network+;
- *Step 2*: To determine the revenue requirement for these totex amounts under each control, regulatory assumptions for (Pay As You Go) PAYG, Regulatory Capital Value (RCV) run-off, Weighted Average Cost of Capital (WACC) and CPIH inflation are applied. This is the building blocks approach whereby the total cost recovery from customer bills is calculated as PAYG + RCV Run-off + (Nominal) Return on Capital. For simplicity, tax is excluded from these calculations.

  The PR19 Final Determination values for South West Water were used for this purpose. These assumptions are presented in the table below for reference.

Table 6: Assumptions used to convert Totex to Allowed Revenues

Conversion of Totex to Allowed Revenues	Water Resources Control	Water Network + Control
PAYG %	83.08%	57.1%
RCV Run-off %	4.56%	4.65%
WACC (Post-tax Real)	2.92%	2.92%
CPIH	2%	2%

- *Step 3*: Using the assumptions in Table 6, the allowed revenue requirement (per year) is calculated. For example, the Water Network + 50% share of £1m totex would be calculated as: (0.571 * 0.5) + (1-0.571) * (0.0465 * 0.5) + [(1- 0.571) * (0.5 – 0.0465 * 0.5)] * (0.0292 + 0.02) = £0.306m. The total is then the sum of the Water Resource and Water Network + values (= £0.729m). This implies that in each year where £1m totex is incurred, customer bills would recover in the same year £0.729m, with the difference recovered from bill payers in future years.
- *Step 4*: The bill impacts are calculated for household customers, which requires a further assumption for the household share for wholesale cost recovery. Using SWW data this assumption was set at 74.2%.
- *Step 5*: Combining the calculations at Step 3 and Step 4 gives a value of £0.54m = 0.742 * 0.729 as the change in household revenue recovery from each £1m of totex.
- *Step 6*: This can be expressed as a bill impact per household of £0.55 (Based on SWW number of bill households of 986,956 (2022-23 forecast)) or equivalently a bill increase per household of 0.30% (based on average household water wholesale bill of £181.20 for 2022-23).

The value at step 6 gives the bill impact per household for each £1m unit of totex.

These per unit of totex conversions are then applied to the cumulative totex position in each plan by the end of the planning period (2050) to approximate the bill recovery required from households over the full planning period. This total cumulative bill impact is then converted in a final step to the average annual bill increase over the 25 year plan and it is these average annual bill increases that are scored for the best value assessment. Lower average percentage bill increases are scored highest (see details of the scoring provided in Section 3.5).

M_{12}: Intergenerational equity

The measurement of intergenerational equity features notably in the WRMP guidance and is also captured in various ways in several of the regional water resource plans (see Sections 2.1 and 2.2).

Our measure for intergenerational equity is based on the principles that underly other well-known measures of societal equity (like the Gini Coefficient for income equality).

This metric can be derived from the profile of expenditures (totex) in each candidate plan – a direct output of the S-EBSD model.

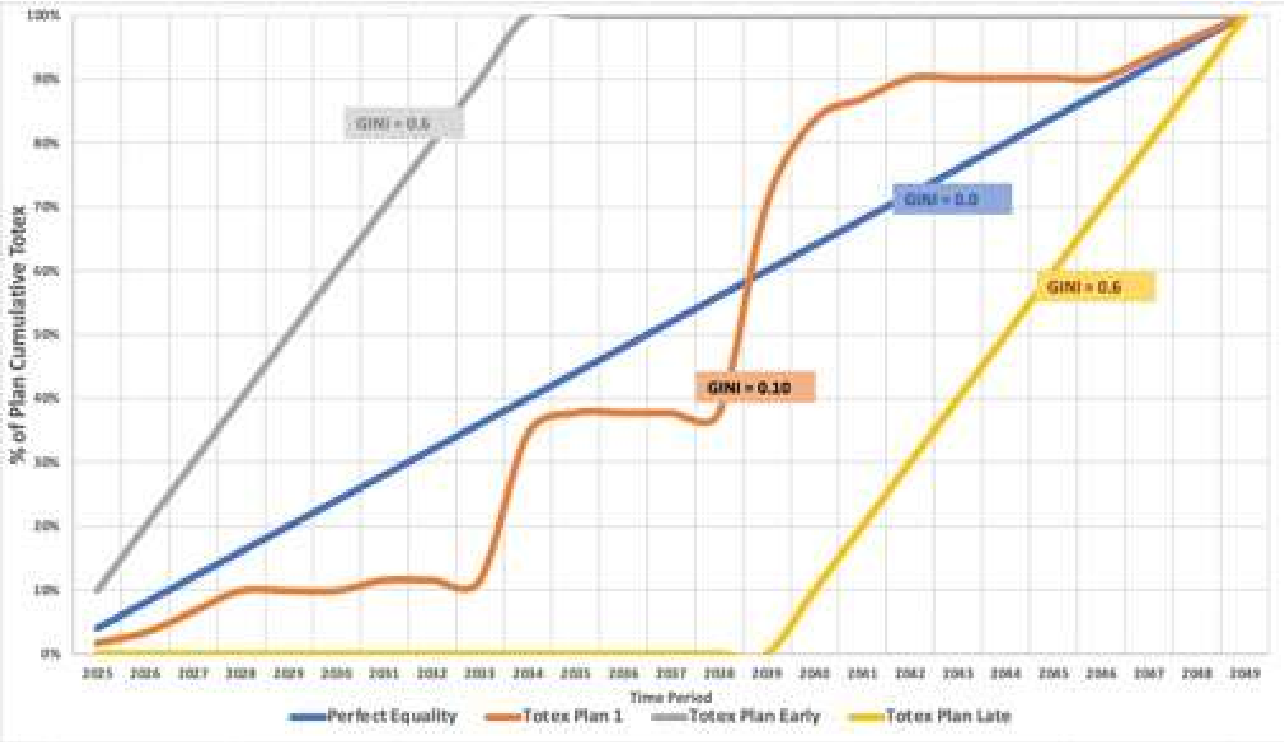
Like the principles of the Gini Coefficient (and underlying Lorenz curves), the idea is to express the totex profile of each plan *relative* to the ideal of a profile of perfect equality. Perfect equality is defined simply as an equal level of (undiscounted) totex in each year of the planning period – bill payers in each year in effect would face an equal share of the plan totex over the 25-year period. A value for the coefficient closer to zero would equal greater equality (i.e. more equal sharing of cost burdens across the planning period). Closer to 1 (perfect inequality) would signal that cost burdens are concentrated in segments of the planning period and hence would disproportionately impact bills in those segments.

This "Gini" Coefficient measures the area (deviation) between the "Lorenz curve" for each expenditure plan and the perfect equality curve.

The construction of this metric should measure as 'unequal' any front-end-loaded expenditure plan or any back-end-loaded expenditure plan – as both imply a skew in the burden of cost recovery between different years/generations of bill payers.

This concept is illustrated with the example shown below. The more even Totex Plan 1 would be scored more highly (closer to zero Gini coefficient) than the front-loaded and back-loaded totex profiles.

Figure 5: Example of "Gini" metric for inter-generational equity



3.4.3.2 Sub dimension: Stakeholders & Regulators Priorities

This sub dimension is designed to capture wider external priorities in respect of the demand reduction outcomes that any given plan is expected to deliver. These priorities are expressed through wider stakeholder and in particular regulatory requirements and expectations around leakage reduction, per capita consumption (PCC) reductions and improvements in non-household water efficiency.

M_{13}: Leakage reduction targets

This metric provides a qualitative indicator of the pace and scale of leakage reductions selected in each given plan and/or planning scenario. Higher scores are awarded to earlier and larger leakage reductions while lower scores apply where leakage reductions are deferred to later in the planning period. The full details of the scoring used for this metric are provided in Section 3.5.

M_{14}: PCC target

The approach for this metric is like that used for leakage reduction. The mix of demand management options in each plan are scored in terms of the pace and scale of demand reductions that are expected from that mix of selected options. Higher scores are awarded to earlier and larger PCC reductions while lower scores apply where demand reductions are deferred to later in the planning period. Again, full details of the scoring are provided in Section 3.5.

M_{15}: Non-household water efficiency

The PCC metric (M_{14}) is targeted at the household sector and the expected reductions in household water use. This metric complements the PCC target metric through capturing the scale of activity to achieve reductions in non-household water use through targeted water efficiency improvements.

The basis for this metric is a set of three demand-reduction options specific to the non-household sector. They are:

1. Targeted water efficiency -sectors = accommodation, health, education
2. Targeted water efficiency – sectors = retail, food, beverage
3. Holiday rentals water efficiency

The costs and yields for these options are inputs to the S-EBSD modelling, and one of the outputs from this modelling is an indicator of whether these options are selected in any given plan/scenario.

The metric is calculated as the number of options selected in each given plan/scenario (min = 0, max = 3). This is then mapped to the best value scoring scale (1 = min to 4 = max).

3.4.3.3 Sub dimension: Wider Society

M_{16}: Recreational and amenity benefits

This final metric represents the wider society sub-dimension.

This metric used the natural capital assessments (NCA) undertaken for SWW by Mott McDonald (2022) as part of the wider dWRMP plan development.

These assessments were applied to the options/schemes selected within each plan/scenario. The source values for the recreational and amenity benefits associated with water resource options are provided in Environment Agency guidance: *WINEP Wider Environmental Outcome Metrics to use in the WINEP Options Development and Appraisal.xlsx*.

This guidance provides financial values for the wider societal benefits associated with improving the water environment. This includes the recreational benefits provided by improving access to woodlands, green spaces in urban areas, moorlands and country parks and coastal and beach sites. Values for these benefits are provided in the Outdoor Recreation Valuation Tool (ORVAL, https://www.leep.exeter.ac.uk/orval/) and Defra's ENCA Service Databook (https://data.gov.uk/dataset/3930b9ca-26c3-489f-900f-6b9eec2602c6/enabling-a-natural-capital-approach).

These recreational benefit categories and valuations were mapped by Mott McDonald to the options selected in each plan/scenario. This approach enables a monetary benefit value (£m) to be calculated for each option. The £ values for all options were then normalised between 1 and 4, with the highest receiving a '4' and the lowest receiving a '1'. Any options missing data were assigned the average of the list of normalised values.

It can be noted that the only option that attracted a positive score for this metric was the Mendips Quarry to River Stour supply-side scheme in the Bournemouth water resource zone. As we continue to develop our options in consultation with stakeholders, we aim to increase benefits identified.

3.5 Scoring matrix

The tables below confirm the metrics, units and scorings for each dimension of the best value framework. Each metric within the dimensions is scored against the categories of 'No Change/No Impact' (=1), 'Low' (=2), 'Medium' (=3) and 'High' (=4). The common scale for best value will represent either increasing benefit or decreasing cost, dependent on each metric.

Figure 6: Scoring matrix for the Environment Dimension

Increasing benefit or decreasing cost

Dimension	Sub-Dimension	Metric	Unit	No Change / No Impact	Low	Medium	High
Improve the Environment	**Water environment**	M_1: Ambition of Environmental Destination (Reducing Abstraction)	Combined Score	<4	4 to 8	8 to 12	> 12
		M_2: Expected Cost of Drought Permit Restrictions	£mNPV	No change	>3	1 to 3	< 1
	Biodiversity/Habitats	M_3:Enhancing Natural Capital/Biodiversity	% Change in Score	No change	<+3%	+3% to +8%	+8% or more
		M_4:SEA	% Change in Score	No change	<+3%	+3% to +10%	+10% or more
	Carbon	M_5: Reduction in Carbon emissions	% Change in Score	< +10%	+10% to +15%	+15% to 25%	+25% or more

Figure 7: Scoring matrix for the Resilience Dimension

Increasing benefit or decreasing cost

Dimension	Sub-Dimension	Metric	Unit	No Change / No Impact	Low	Medium	High
Resilience	Public Water Supply	M_6: Increase resilience to extreme droughts (1 in 500)	Proportion of Years in Plan where standard met	no change	Met in no years to 2050 (0%)	Met in some years to 2050 (0% to 100%)	Met in all years to 2050 (100%)
		M_7: Expected Cost of Temporary Use Restrictions	£mNPV	No change	>3	1 to 3	< 1
	Other System Resilience	M_8: Resilience to other risks (e.g. Single Source Dominance	Yield Weighted Score	<1	1 to 2	2 to 3	>= 3
	Deliverability	M_9:Yield Benefit Certainty	Yield Weighted Score	<1	1 to 2	2 to 3	>= 3
	Non Public Water Supply	M_{10}: Available Headroom for Water Sharing	Combined Score	0 to 3	3 to 6	6 to 9	>= 9

Figure 8: Scoring matrix for the Societal Benefit Dimension

Increasing benefit or decreasing cost

Dimension	Sub-Dimension	Metric	Unit	No Change / No Impact	Low	Medium	High
Deliver Societal benefit	Financial and Customers	M_{11}: Bill impacts for customers	Average Annual % Change in Bill	No Change	+3% or more	+1% to 3%	Up to +1%
		M_{12}: Intergenerational equity - Plan "Gini" Coefficient	Score (Zero = Perfect Equality)	No change	> 0.5	0.25 to 0.5	< 0.25
	Stakeholder & Regulators	M_{13}: Leakage reduction targets	Profile of Reductions	Back Loaded	Linear	Front Loaded	Early
		M_{14}: PPC targets	Profile of Reductions	Back Loaded	Linear	Front Loaded	Early
		M_{15}:Non-household water efficiency	Nr. of Targeted Programmes	Zero	1	2	>=3
	Wider Society	M_{16}:Recreational / amenity benefits delivered	Total Normalised Score	No Change	9 to 18	18 to 30	>30

It is these best values scorings that are then input to the calculation of the Best Value Index described more fully in section 4.2.

4 Methodology for the Best Value Index

4.1 Calculating the Best Value Index

The overall BVI and its components are calculated following a step-by-step methodology. We have provided a companion EXCEL workbook that provides a worked example of these steps. This workbook was the basis for the BVI calculations used by SWW for the dWRMP.

The required steps are summarised as:

Step 1: Score the BV metrics for each candidate Plan against the scale No Change/Impact = 1 to High = 4. This scoring depends on the impact levels defined in the tables above and the values presented can be refined by SWW without any impact on the calculation methodology.

Step 2: Convert the metric scores to an individual metric (relative) index value (see below). This would use the formula:

$$M_{i,s} = \frac{Plan\ Score_{i,s} - Min\ Score_{i,s}}{Max\ Score_{i,s} - Min\ Score_{i}, s}$$

Where *i* denotes a metric within each sub-dimension *s*.

Step 3: Calculate for each sub-dimension an index score from the $M_{i,s}$ values. We use a multiplicative form (which allows for imperfect substitutability) between each component of the index:

$$BVI_s = \prod_i M_{i,s}^{\alpha_{i,s}}$$

This basically means that changes in one metric dimension are not exactly equivalent to changes in other metrics, which we consider preferable to the assumption of perfect substitutability that would be implied with a linear arithmetic average. The assumption of imperfect substitutability ensures that changes in all metrics and dimensions matter and carry some weight in the overall BVI, with this weight to be determined by the exponent weights. These weights can take any value between 0 and 1, and the only constraint is they sum to unity. It also means that setting any weight to zero would remove that metric from the index calculation.

The remaining steps are summarised as:

Step 4: The same formula structure is then used to construct for each plan a Primary Dimension index:

$$BVI_p = \prod_s BVI_{s,p}^{\gamma_{s,p}}$$

This calculation combines the sub dimension index values and a further set of weights for each sub-dimension within each primary dimension level.

Step 5: The final step is to follow the same calculation method but applied at the overall BVI level to combine the primary dimension index values. This aggregation follows the formula:

$$BVI_{overall} = \prod_p BVI_p^{\beta_p}$$

The overall BVI would be measured on a scale of 0 to 1 (or equivalently 0 to 100 if scaled by *100) with 0 = (lowest) and 1 (highest).

It is also possible to extend this presentation to delineate the calculated BVI. For example, it follows from the mathematical structure of the BVI that:

- Setting the score of all metrics to the value 1 (No Change/Impact) will, irrespective of the exponent weightings, give a maximum BVI value of 0.25. This value for the BVI therefore represents the upper threshold for zero Best Value.

- Setting the score of all metrics to the value 2 (Low) gives a maximum BVI value of 0.5. This means that a calculated BVI in the range 0.25 < BVI < 0.5 can be used to indicate 'Low' Best Value.
- Setting the score of all metrics to the value 3 (Medium) gives an upper BVI value of 0.75. This can be interpreted as indicating that a calculated BVI in the range 0.50 < BVI < 0.75 represents 'Medium' Best Value.
- Finally, setting the score of all metrics to the value 4 (High) gives a maximum BVI value of 1.0. This can be interpreted as indicating that only a calculated BVI in the range BVI => 0.75 represents 'High' Best Value.

4.2 Best Value Outputs

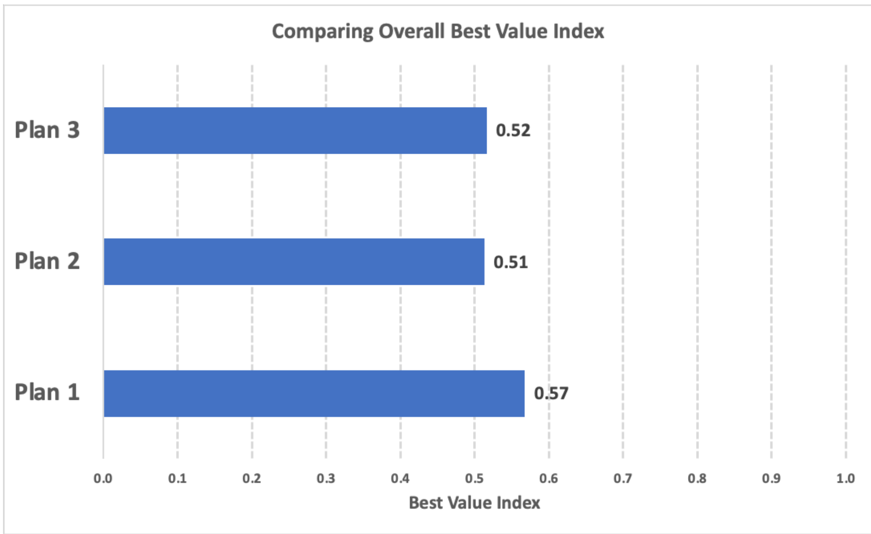
In the EXCEL workbook, we have included two examples of visual graphics that can be used to present the outputs of the best value framework. They are:

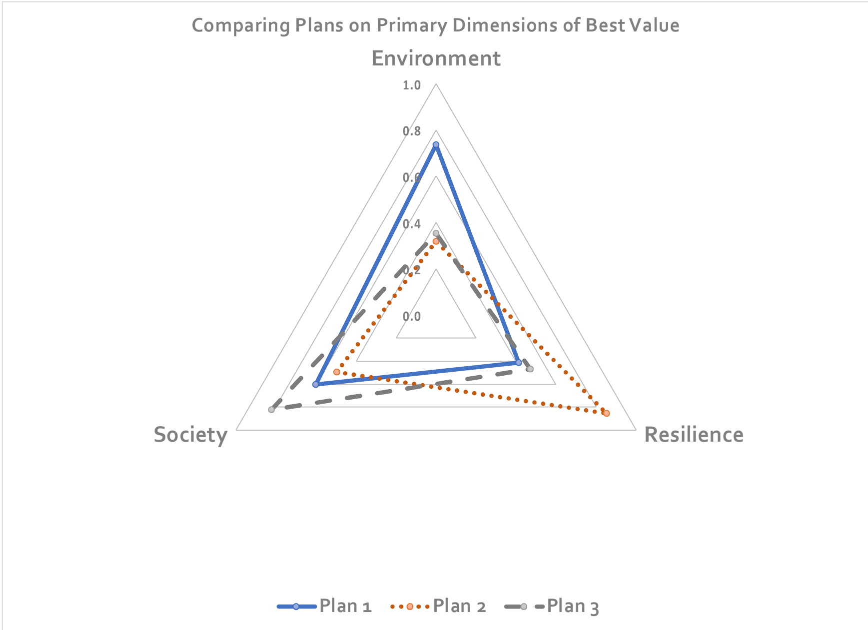
- A simple bar chart plot comparing the overall BVI for candidate plans
- A radar plot that reveals how each plan compares on each of the primary dimension index values.

The first of these provides a summary identification of the plan that achieves the highest overall BVI. Best value is measured as increasing with the BVI within the bounds of 0 to 1. The second radar plot see below provides further output information about the respective contributions to overall best value of each primary dimension.

In the example below the highest overall BVI is achieved by Plan 1, with Plan 1 scoring most highly on the environment primary dimension. It performs relatively less well on the resilience dimension.

Figure 9: Examples of summary best value outputs





4.2.1 Testing the sensitivity to dimension weightings

At each stage, key inputs in the calculation of the BVI are the weightings applied to each metric, sub-dimension and primary dimension.

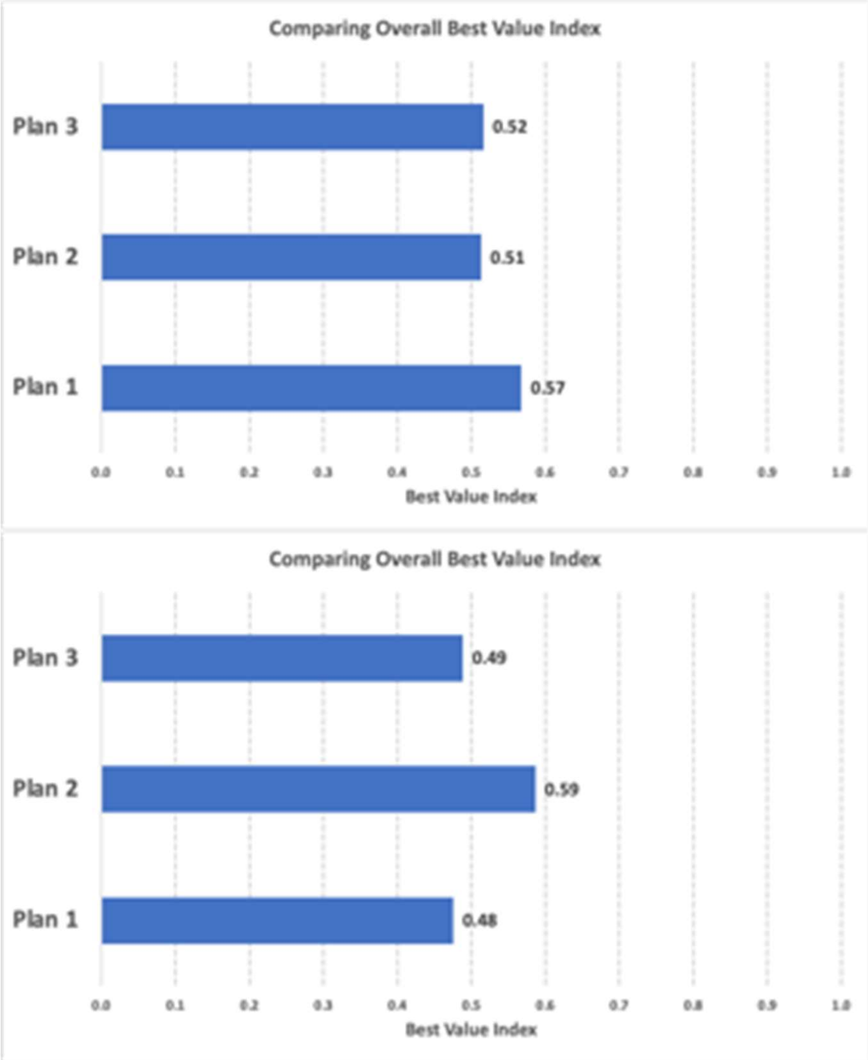
There are several options for determining what the weightings to use in the framework should be. The most likely sources are expert judgements (based on understanding of business priorities), customer preferences/priorities or some combination of both. It was this combined approach that was used for the dWRMP (see Section 5.2 below).

However, for the approach used to determine the weights, our key recommendation would be to include sensitivity analysis as part of determining the final BVI outputs.

For example, the previous example graphic that shows Plan 1 to have the highest BVI is based on equal (1/3) weightings for the three Primary Dimensions.

As we show – see Figure 10 below – changing these weightings to 50% Resilience, 30% Society, 20% Environment changes this conclusion – Plan 2 now achieves the highest BVI. The ideal would be to identify a maximum BVI plan that is robust to different weightings but, failing that, the framework allows key trade-offs between the plan dimensions still to be revealed.

Figure 10: Testing sensitivity - example



5 Calibration of the Best Value Index for the dWRMP

The framework and calculation methodologies described above was developed, tested (with dummy data) and refined in May/June 2022. The framework was populated with 'live' S-EBSD model outputs from July 2022.

A total of seven S-EBSD scenarios were produced by SWW and the outputs from these scenarios were used to develop the required inputs and scorings for the BVI.

5.1 Scenarios

These scenarios were defined in terms of forecast demand profile, baseline forecast supply profiles (combined with environmental destination), demand reduction policies and the extent of environmental destination. These scenarios are summarised in Table 7 below.

Table 7: Modelled Scenarios for the dWRMP

Future	Demand Curve	Supply Curve	Demand Reductions	Environmental Destination
F0	Medium*	Medium_BAU*	All	BAU
F1	Medium	Medium_BAU	Full	BAU
F2	Medium	Medium_BAU	Half	BAU
F3	High	High_BAU	Full	BAU
F4	High	High_BAU	Half	BAU
F5	High	High_Enhanced	Half	Enhanced
F6	Medium	Medium_Enhanced	Full	Enhanced

From these scenarios, the following outputs were provided by the S-EBSD tool:

- Option choices by water resource zone and option timing
- Projected supply demand balance
- Projected WAFU
- Profiles for projected plan expenditures
- Profiles for modelled restrictions and restriction costs

These outputs are provided at the level of the 4 SWW water resource zones – Bournemouth, Colliford, Roadford and Wimbleball.

5.2 Index weightings

As noted in 4.2.1 above, key inputs in the calculation of the BVI are the weightings applied to each metric, sub-dimension and primary dimension.

The weightings used for the dWRMP were a combination of customer priorities evidence and ICS expert judgement. The customer priorities evidence cited in Section 2.5, above, was used to inform the weightings for the primary dimensions, while the weightings for individual metrics and the sub-dimensions drew upon expert judgements.

5.2.1 Primary dimension weightings

The customer evidence from the WCWRG research (Section 2.5.1) is most closely matched to the best value framework and provides direct evidence on how customers would prioritise the broad themes of Environment vs. Resilience vs. Society within the water resources plan.

The WTP evidence (Section 2.5.2) is broader and provides more indirect evidence on how customers would prioritise Environment vs Resilience vs. Society within an overall plan.

We recognise this in Table 8 below which provides a simple weighting of the two evidence sources – 80% on the WCWRG evidence and 20% on the WTP evidence.

Table 8: Customer evidence sources for Primary Dimension weightings

Best Value Framework Theme	Weighted % share of overall importance to customers	Weighting applied in dWRMP
Society	31%	33.333 %
Environment	37%	33.333%
Resilience	32%	33.333%

Source: Based on evidence in *Customer Research to inform the Best Value Water Resource Plan for the South West Work Package A Qualitative Research, West Country Water Resources Group, September 2021* and *South West Water, Customer Willingness to Pay, March 2022*

It was also important to recognise that these weighted estimates combine source evidence that comes with respective margins of error. The conclusion was that the weighted shares are indicative of broadly equal importance for the three Primary Dimensions. For this reason, the weightings applied in the dWRMP assessments were set to be equal (1/3).

5.2.2 Sub-dimension weightings

The sub-dimension weightings are designed to sum to unity within each primary dimension. The weightings based on ICS expert judgment are presented in Table 9 below. Within each primary dimension, most weight is applied to the impacts directly related to the water sector. Sub-dimensions capturing impacts beyond the water sector are afforded less weight. However, this relative weighting was differentiated across the primary dimensions in recognition that wider impacts were likely to be relatively more important in some areas (for example environment).

Table 9: Expert judgements to support Sub-dimension weightings

Primary Dimension	Sub Dimension	Within Weighting
Environment	Water environment	0.5
Environment	Biodiversity/Habitats	0.2
Environment	Carbon	0.3
Resilience	Public Water Supply	0.75
Resilience	Other System Resilience	0.1
Resilience	Deliverability	0.1
Resilience	Non-Public Water Supply	0.05
Society	Financial & Customers	0.75
Society	Stakeholder & Regulators Priorities	0.2
Society	Wider Society	0.05

5.2.3 Individual metric weightings

A more uniform approach was adopted for the weighting of individual metrics within each sub-dimension. The approach was to apply weights of 1/n where n = the number of metrics within each sub-dimension. Thus, at the individual metric level, the metrics within each sub-dimension were equally weighted.

5.3 Metric scoring

For the final assessments ahead of the dWRMP, the candidate plans for each zone were: F6, F1, F5. Plans F1 and F5 represented variants of the Least Cost plan, while F6 represented a best value plan. The BVI was used to validate this conclusion (see outputs below).

The tables below provide the best value scorings associated with all 16 metrics for each resource zone.

The scorings reflect the standardised best value scale as follows:

- BVI category No Change/No Impact: Metric score = 0 or 1
- BVI category Low: Metric score = 2
- BVI category Medium High: Metric score = 3
- BVI category High: Metric score = 4.

Table 10: Bournemouth Resource Zone - Best Value Scorings

Metric	F6	F1	F5
M1: Ambition of Environmental Destination (Reducing Abstraction)	4	4	4
M2: Expected Cost of Drought Permit Restrictions	4	3	3
M3:Enhancing Natural Capital/Biodiversity	3	2	1
M4:SEA	2	1	0
M5: Reduction in Carbon emissions	2	0	3
M6: Increase resilience to extreme droughts (1 in 500)	4	4	4
M7: Expected Cost of Temporary Use Restrictions	4	3	3
M8: Resilience to other risks (e.g. Single Source Dominance	2	2	1
M9:Yield Benefit Certainty	2	2	1
M10: Available Headroom for Water Sharing	4	0	0
M11: Bill impacts for customers	4	3	3
M12: Intergenerational equity - Plan "Gini" Coefficient	4	3	3
M13: Leakage reduction targets	3	2	0
M14: PPC targets	3	2	1
M15:Non-household water efficiency	4	0	0
M16:Recreational / amenity benefits delivered	1	0	0

Table 11: Colliford Resource Zone - Best Value Scorings

Metric	F6	F1	F5
M1: Ambition of Environmental Destination (Reducing Abstraction)	1	1	1
M2: Expected Cost of Drought Permit Restrictions	3	3	2
M3:Enhancing Natural Capital/Biodiversity	1	0	3
M4:SEA	3	0	0
M5: Reduction in Carbon emissions	3	3	3
M6: Increase resilience to extreme droughts (1 in 500)	3	3	2
M7: Expected Cost of Temporary Use Restrictions	4	4	3
M8: Resilience to other risks (e.g. Single Source Dominance	4	3	3
M9:Yield Benefit Certainty	4	3	3
M10: Available Headroom for Water Sharing	2	1	1
M11: Bill impacts for customers	4	3	3
M12: Intergenerational equity - Plan "Gini" Coefficient	4	4	4
M13: Leakage reduction targets	3	2	0
M14: PPC targets	3	2	1
M15:Non-household water efficiency	4	0	2
M16:Recreational / amenity benefits delivered	0	0	0

Table 12: Roadford Resource Zone - Best Value Scorings

Metric	F6	F1	F5
M1: Ambition of Environmental Destination (Reducing Abstraction)	1	1	1
M2: Expected Cost of Drought Permit Restrictions	3	3	2
M3:Enhancing Natural Capital/Biodiversity	1	0	3
M4:SEA	3	0	0
M5: Reduction in Carbon emissions	3	3	3
M6: Increase resilience to extreme droughts (1 in 500)	3	3	2
M7: Expected Cost of Temporary Use Restrictions	4	4	3
M8: Resilience to other risks (e.g. Single Source Dominance	4	3	3
M9:Yield Benefit Certainty	4	3	3
M10: Available Headroom for Water Sharing	2	1	1
M11: Bill impacts for customers	4	3	3
M12: Intergenerational equity - Plan "Gini" Coefficient	4	4	4
M13: Leakage reduction targets	3	2	0
M14: PPC targets	3	2	1
M15:Non-household water efficiency	4	0	2
M16:Recreational / amenity benefits delivered	0	0	0

Table 13: Wimbleball Resource Zone - Best Value Scorings

Metric	F6	F1	F5
M1: Ambition of Environmental Destination (Reducing Abstraction)	2	2	2
M2: Expected Cost of Drought Permit Restrictions	4	4	2
M3:Enhancing Natural Capital/Biodiversity	3	3	3
M4:SEA	2	2	2
M5: Reduction in Carbon emissions	3	3	3
M6: Increase resilience to extreme droughts (1 in 500)	4	4	2
M7: Expected Cost of Temporary Use Restrictions	4	4	3
M8: Resilience to other risks (e.g. Single Source Dominance	4	3	4
M9:Yield Benefit Certainty	4	3	4
M10: Available Headroom for Water Sharing	4	1	1
M11: Bill impacts for customers	3	3	3
M12: Intergenerational equity - Plan "Gini" Coefficient	4	4	4
M13: Leakage reduction targets	3	2	2
M14: PPC targets	3	3	1
M15:Non-household water efficiency	4	3	4
M16:Recreational / amenity benefits delivered	0	0	0

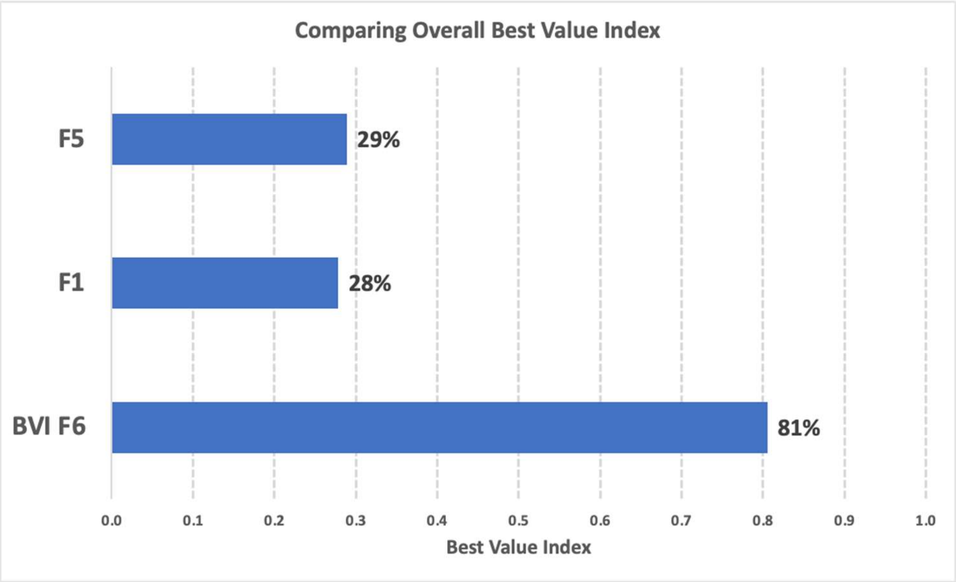
5.4 BVI Outputs

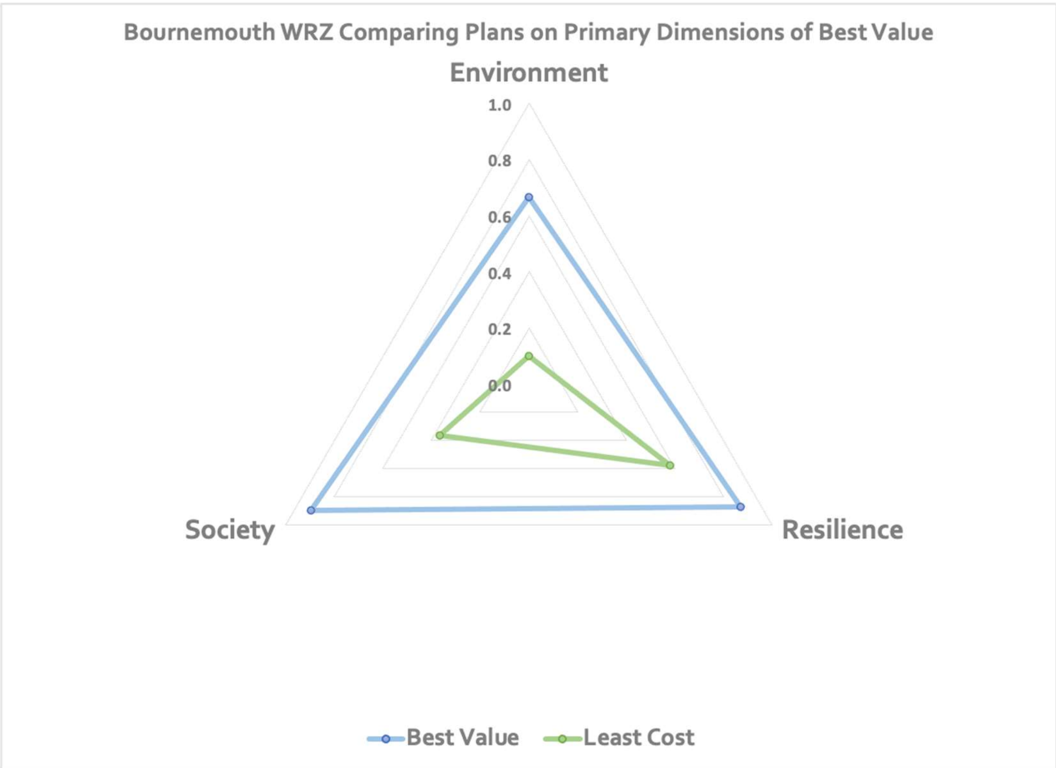
The weightings described in section 5.2 and the best value scorings summarised in Section 5.3 are combined using the BVI methodology detailed in Section 4.

The outputs for each resource zone that are generated are summarised below.

5.4.1 BVI outputs for Bournemouth Resource Zone

Figure 11: BVI outputs for Bournemouth dWRMP

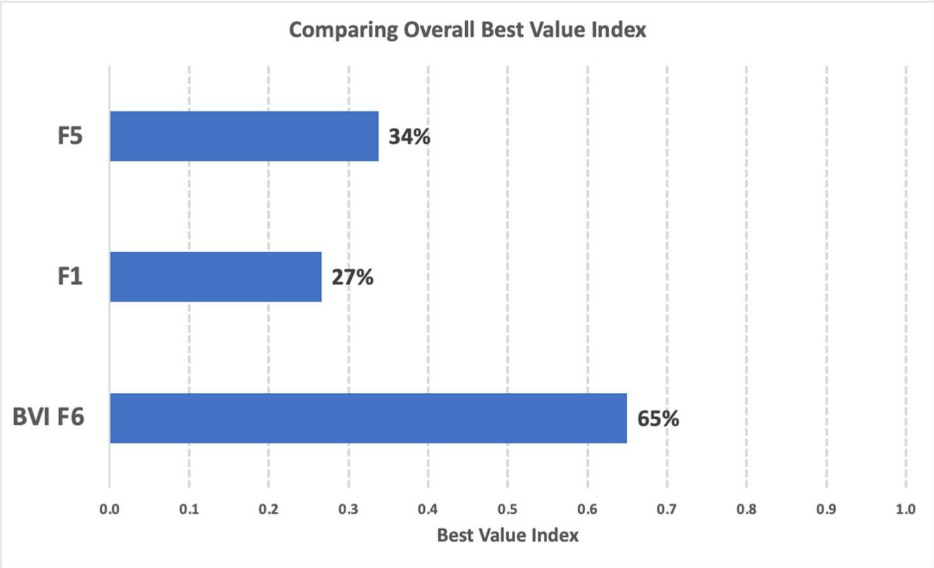


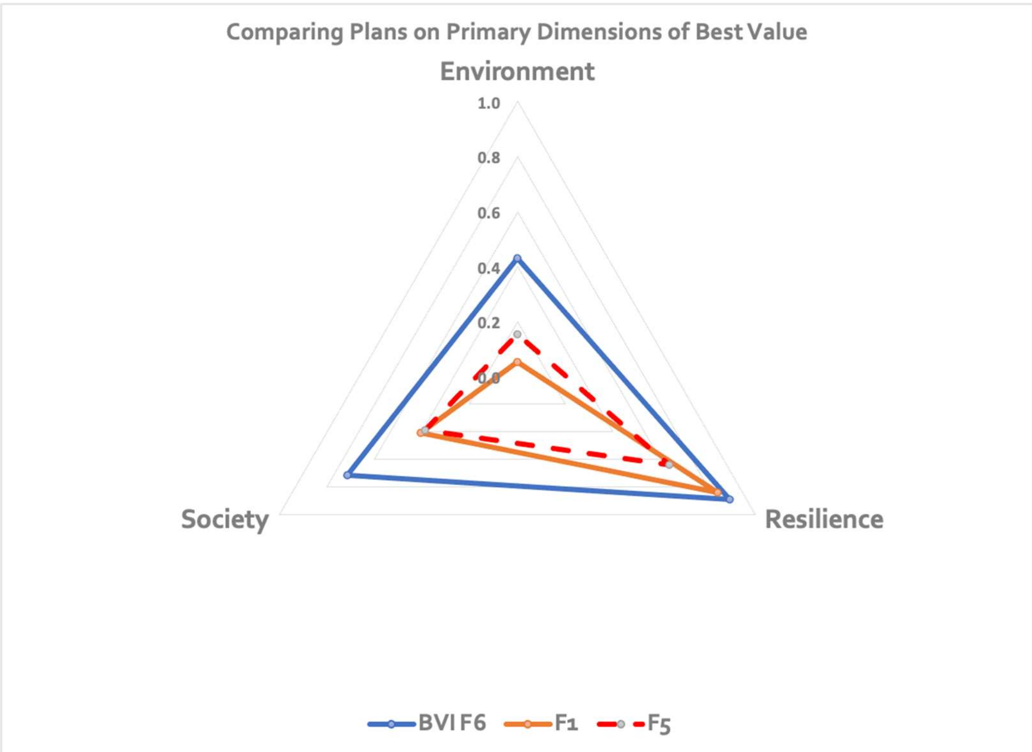


The Bournemouth best value plan achieves overall high best value and scores particularly highly on Resilience (0.871) and Societal benefit (0.898).

5.4.2 BVI outputs for Colliford Resource Zone

Figure 12: BVI outputs for Colliford dWRMP

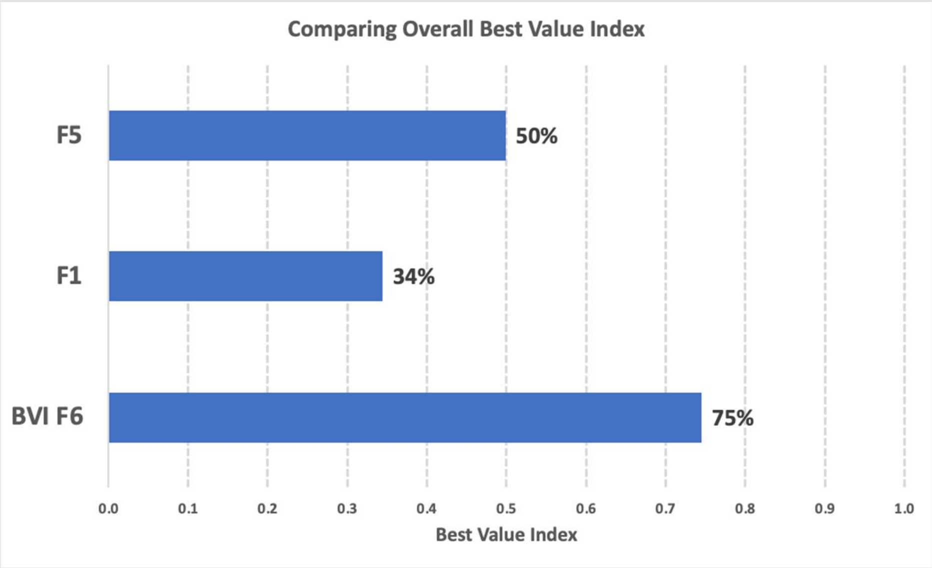


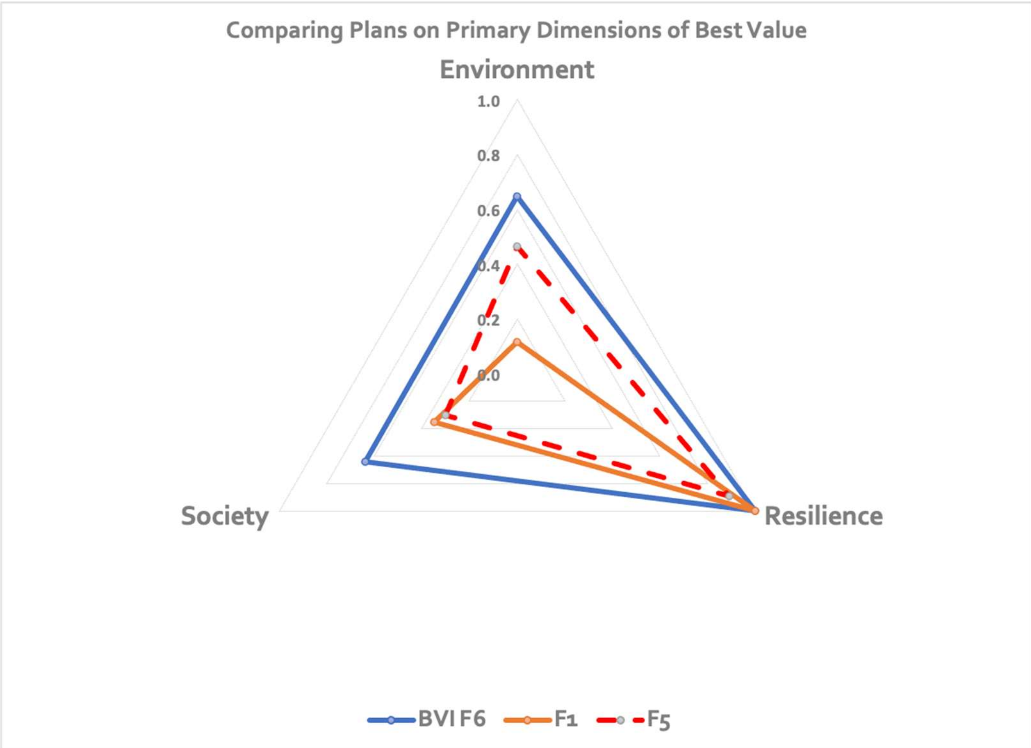


The Colliford best value plan achieves overall medium best value, with this best value weighted highest on Resilience (0.891). It achieves the lowest BVI for Environment (0.432) compared to the other zones.

5.4.3 BVI outputs for Roadford Resource Zone

Figure 13: BVI outputs for Roadford dWRMP

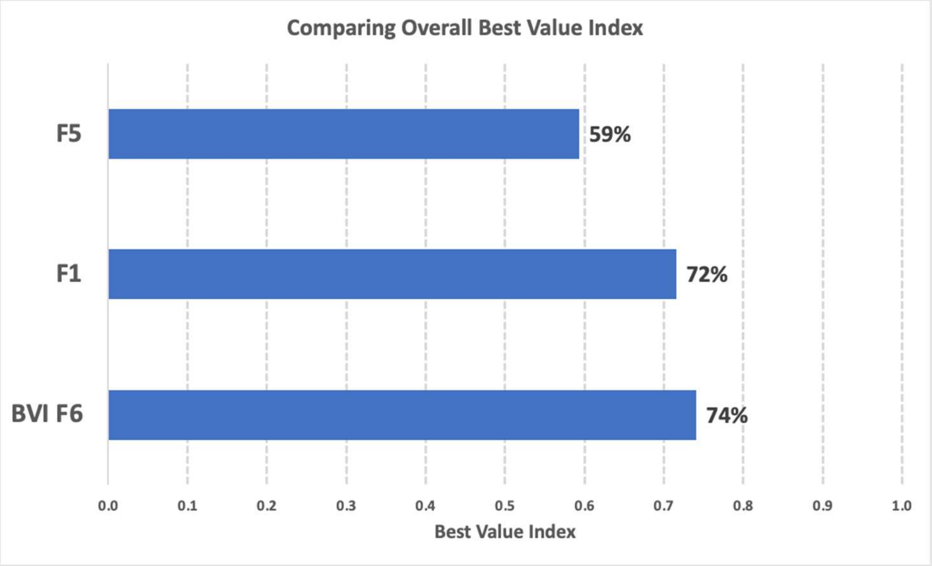


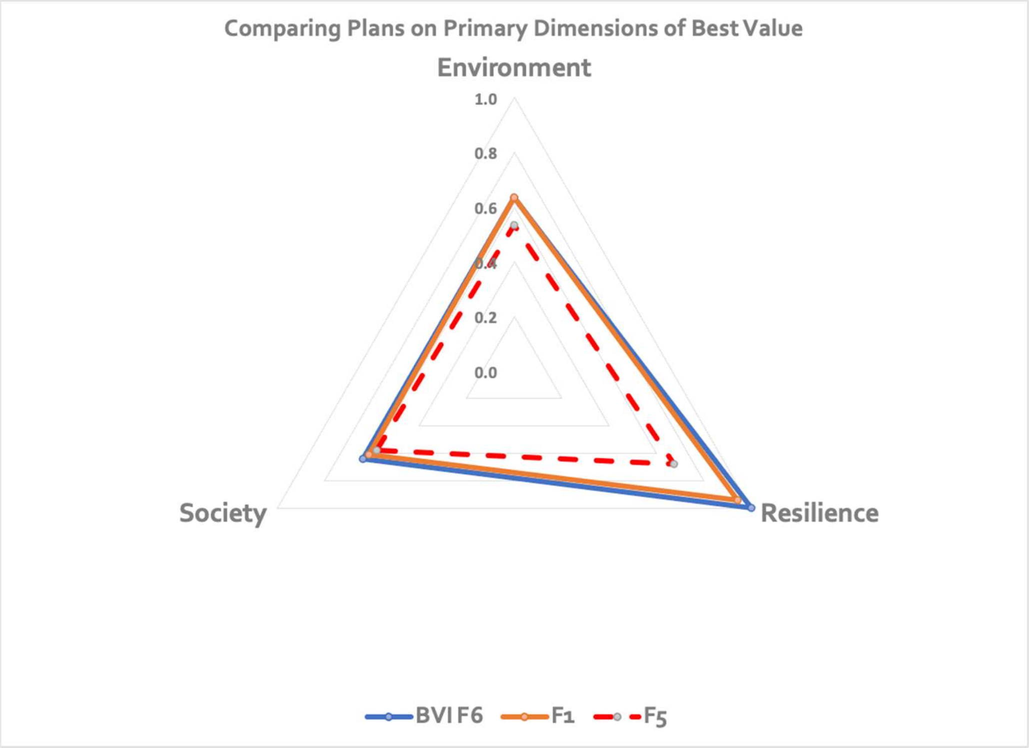


The Roadford best value plan achieves overall high best value, with this best value weighted highest on Resilience (1.0) and equally weighted between Environment (0.647) and Society (0.64).

5.4.4 BVI outputs for Wimbleball Resource Zone

Figure 14: BVI outputs for Wimbleball dWRMP





The Wimbleball best value plan is close to an overall high best value. It performs highest on Resilience (1.0) and equally weighted between Environment (0.634) and Society (0.64).

6 Conclusions and recommendations

This report has presented the purpose, development and implementation of the best value framework used by SWW to support the development of its dWRMP.

This framework is based on 16 metrics that span the three pillars of Environment, Resilience and Society. These metrics allow the breadth of the best value planning objectives to be captured.

The objectives of the framework are summarised as:

- Alignment with Water Resource Planning guidance and expectations
- Align where appropriate with customer priorities and preferences
- Allow the identification of a best value plan
- Demonstrate the trade-offs between different candidate plans
- Able to be populated from current SWW tools (e.g. S-EBSD) and data availability

The resulting methodology has been designed to be flexible to the incorporation of additional metrics in the future and we recommend that, ahead of the final WRMP, the set of best value metrics is kept under review.

The methodology has also successfully used the outputs of the new S-EBSD water resource planning tool at SWW. This tool and the data it provided has allowed the development of a best value planning methodology that meets the above objectives. We would also recommend further review of the business processes used to develop the data inputs for the best value assessments. This is especially applicable where data and assessments external to the S-EBSD tool are required.

Finally, we have highlighted several approaches to the determination of the weightings used in the BVI calculation methodology. The current approach has used a combination of customer evidence and expert judgements. We recommend consideration is given to extending the use of customer evidence in the setting of these weightings ahead of the final WRMP.