Appendix D.2: WRSE Research to Test Customer Preferences for Best Value Outcomes

Standard Gate two submission for London Water Recycling SRO

Notice – Position Statement

This document has been produced as the part of the process set out by RAPID for the development of the Strategic Resource Options (SROs). This is a regulatory gated process allowing there to be control and appropriate scrutiny on the activities that are undertaken by the water companies to investigate and develop efficient solutions on behalf of customers to meet future drought resilience challenges.

This report forms part of suite of documents that make up the 'Gate 2 submission.' That submission details all the work undertaken by Thames Water in the ongoing development of the proposed SRO. The intention at this stage is to provide RAPID with an update on the concept design, feasibility, cost estimates and programme for the schemes, allowing decisions to be made on their progress.

Should a scheme be selected and confirmed in the Thames Water final Water Resources Management Plan (WRMP), in most cases it would need to enter a separate process to gain permission to build and run the final solution. That could be through either the Town and Country Planning Act 1990 or the Planning Act 2008 development consent order process. Both options require the designs to be fully appraised and, in most cases, an environmental statement to be produced. Where required that statement sets out the likely environmental impacts and what mitigation is required.

Community and stakeholder engagement is crucial to the development of the SROs. Some high-level activity has been undertaken to date. Much more detailed community engagement and formal consultation is required on all the schemes at the appropriate point. Before applying for permission Thames Water will need to demonstrate that they have presented information about the proposals to the community, gathered feedback and considered the views of stakeholders. We will have regard to that feedback and, where possible, make changes to the designs as a result.

The SROs are at a very early stage of development, despite some options having been considered for several years. The details set out in the Gate 2 documents are still at a formative stage.

Disclaimer

This document has been written in line with the requirements of the RAPID Gate 2 Guidance and to comply with the regulatory process pursuant to Thames Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solutions presented in this document be taken forward, Thames Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

Best Value Criteria – Customer Research

Final Report

Water Resources South East

May 2021

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Document evolution

Final Report	28/05/21	

Summary

Introduction

The WRSE regional plan will set out the actions and investments – including measures to reduce leaks, help households and businesses save water, and increase the amount of water available for supply - that are needed from 2025 to 2100, to ensure there is a secure water supply system for all customers in the South East of England. The plan will take into account expected population growth, changes in climate, and extreme events such as sustained periods of drought, and will form the basis of the six WRSE companies individual water resource management plans (WRMP).

In developing the regional plan, WRSE needs to find the right balance across a combination of regulatory requirements – including reducing the risk emergency drought measures to 1-in-500 for any one year and taking less water from sensitive river habitats – and discretionary enhancements relating to the extent to which the plan builds in 'insurance' and flexibility to cope with disruption and extreme weather events and how much it aims to further reduce water use by households and businesses. One way in which WRSE will assess these choices and associated trade-offs in terms of outcomes for customers and the environment is by comparing the performance of alternative candidate plans against a set of 'best value criteria' (Table S.1), which follow recent UKWIR guidance[1]. The criteria reflect a range of outcomes and benefits associated with an enhanced plan over the least cost approach to delivering the minimum planning requirements (the 'least cost plan'), including resilience, environmental impacts, biodiversity, and wider socio-economic and customer benefits.

The objective of this study was to conduct quantitative research to provide customer preference weights for the WRSE best value criteria. The research was implemented through a representative online survey of household customers in the South East, with 309 respondents representing all six WRSE companies completing the survey. A choice modelling approach was used to estimate the preference weights for the best value criteria.

Table S.1: WRSE best value planning criteria

Outcome	Value criteria	Metric
Deliver a secure supply of water to customers and other sectors to 2100	Meet the supply demand balance	Public Water Supply - supply demand balance profile (Ml/day)
		Provides additional water needed by other sectors (Ml/day)
	Leakage	50% reduction in leakage by each company by 2050 from 2017/18 baseline (%)
		% leakage reduction above 50%

[1] UKWIR (2020) Deriving a Best Value Water Resources Management Plan.

Outcome	Value criteria	Metric
	Water consumption	Distribution input per head of population (Litres/person)
	Customer preference	Customer preference for option type (score)
Deliver environmental improvement and benefits to society	Strategic Environmental Assessment (SEA)	Programme benefit (score max)
		Programme disbenefit (score min)
	Natural capital	Enhancement of Natural Capital Value (£m)
	Abstraction reduction	Reduction in the volume of water abstracted at identified sites (Ml/day) and by when (date)
	Biodiversity	Net-gain score (%)
	Carbon	Cost of carbon offsetting (£m)
Increase the resilience of the region's water systems	Drought resilience	Achieve 1 in 500-year drought resilience (date achieved)
	Resilience assessment - reliability	Programme reliability score
	Resilience assessment - adaptability	Programme adaptability score
	Resilience assessment - evolvability	Programme evolvability score
Delivered at a cost that is acceptable to customers	Programme cost	Net Present Value (NPV) using the Social Time Preference Rate (£m)
	Intergenerational equity	Health rate (THDR 1%)

Source: WRSE (2021) Developing our 'Best Value' multi-sector regional resilience plan, A consultation on our objectives, value criteria and metrics, February 2021.

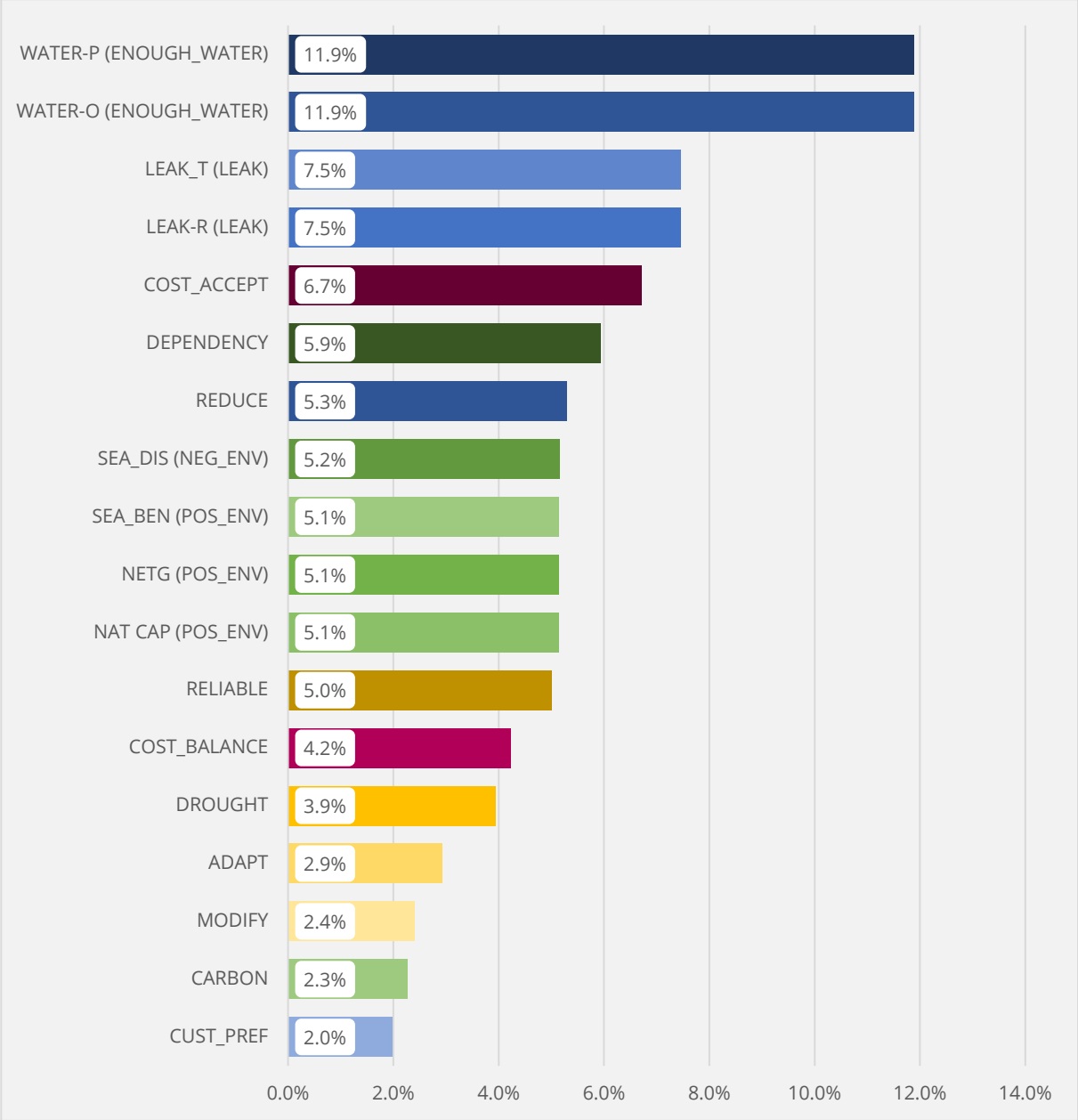
Results

The main results are reported in Figure S.1. They indicate the following "tiering" of customers' priorities for the regional plan outcomes:

- **Top priorities**: foremost to ensure the long-term security of supply in the region, both for public supply purposes and other sectors. Ranking just below this are the key considerations for improving the efficiency of the water supply system in terms of reducing leakage and reducing its dependency on sensitive habitats and groundwater sources, along with the cost and customer affordability constraints for the plan.
- **Mid-tier priorities**: feature several dimensions of the performance of the plan relating to wider environmental impacts, reducing demand for water, and improving resilience to extreme events.
- **Lower priorities**: include wider aspects of the resilience of the water supply system, including minimising the risk of emergency drought restrictions, along with balancing the carbon impact and the mix of options used.

Overall respondent feedback on the survey was positive, indicating that there was a good level of understanding of the best value criteria and the choice task exercise. Overall, the study results are judged to be robust and fit-for-purpose for use in WRSE's investment modelling process.

Figure S.1: Customer preference weights for best value criteria



Label	Metric	Criteria
CUST_PREF	Customer preference for option type	Customer preference
CARBON	Cost of carbon offsetting	Carbon
MODIFY	Programme evolvability score	Resilience assessment - evolvability
ADAPT	Programme adaptability score	Resilience assessment - adaptability
DROUGHT	1 in 500-year drought resilience	Drought resilience
COST_BALANCE	Health rate (THDR 1%)	Intergenerational equity
RELIABLE	Programme reliability score	Resilience assessment - reliability
NAT CAP (POS_ENV)	Enhancement of natural capital value	Natural capital
NETG (POS_ENV)	Net-gain score	Biodiversity
SEA_BEN (POS_ENV)	Programme benefit (score max)	Strategic environmental assessment
SEA_DIS (NEG_ENV)	Programme disbenefit (score min)	
REDUCE	Distribution input per head of population	Water consumption
DEPENDENCY	Reduction in the volume of water abstracted at identified sites	Abstraction reduction
COST_ACCEPT	Net present value using the social time preference rate	Programme cost
LEAK-R (LEAK)	Percentage leakage reduction above 50%	Leakage
LEAK_T (LEAK)	50% reduction in leakage by 2050	
WATER-O (ENOUGH_WATER)	Provides additional water needed by other sectors	Meet the supply demand balance
WATER-P (ENOUGH_WATER)	Public water supply - supply demand balance profile	

Contents

1. Introduction

1.1 Background

Water Resources South East (WRSE) is an alliance of the six water companies that supply the South East region of England. In collaboration with other stakeholders, WRSE is developing the South East's regional resilience plan. The multi-sector plan will cover water resource planning needs for public water supply and other users for the period 2025-2100 with the aim to deliver "*the best value to customers, society and the environment… to secure long-term resilience*"[2].

The regional plan will set out the actions and investments – such as measures to reduce leaks, help households and businesses save water, and increase the amount of water available for supply - that are needed from 2025 to 2100, to ensure there is a secure water supply system for all customers in the region. The plan will take into account expected population growth, changes in climate, and extreme events such as sustained periods of drought, and will form the basis of each company's own individual water resource management plan (WRMP). It also provides the wider planning context in which large-scale integrated solutions are being developed as Strategic Resource Options (SROs) by collaborative groups of companies and stakeholders.

As a minimum, the plan will aim to deliver on the objectives set out in the National Framework for Water Resources[3]. This includes: reducing the risk emergency drought measures to 1-in-500 for any one year; taking less water from sensitive river habitats; reducing leakage by 50% of current levels by 2050; measures to help customers save water; and working with manufacturers and builders on water efficiency standards. Beyond the minimum requirements several areas for discretionary enhancements to the plan are being considered by WRSE. This includes: the extent to which it is adaptable and builds in 'insurance' and flexibility to cope with disruption and unexpected events (e.g. flooding); whether it seeks to further reduce the dependency of the water system of the environment beyond statutory requirements; and how much it aims to further reduce water use (e.g. in line with proposed targets for per capita consumption).

WRSE needs to find the 'right' balance across these discretionary choices as part of the process of determining the best value plan for the region. One way in which WRSE will assess these choices and associated trade-offs in terms of outcomes for customers and the environment is by comparing the performance of alternative candidate plans against a set of 'best value criteria', which follow recent UKWIR guidance[4]. The criteria reflect a range of outcomes and benefits associated with an enhanced plan over the least cost approach to delivering the minimum planning requirements (the 'least cost plan'), including resilience, environmental impacts, biodiversity, and wider socio-economic and customer benefits. Within this, there is a role for customer research to understand the weight and priority to place on the outcomes represented by the best value criteria, which in turn will influence the balance of the regional plan.

[2] WRSE (2020) Future water resource requirements for South East England. March.
[3] Environment Agency (2020). Meeting our future water needs: a national framework for water resources.
[4] UKWIR (2020) Deriving a Best Value Water Resources Management Plan.

1.2 Research aim

The objective of this study was to conduct quantitative customer research to provide customer preference weights for the WRSE best value criteria (BVC) (Table 1.1). The results – the quantified customer preference weights - are an input to the WRSE investment modelling process.

The BVC represent the range of factors – beyond just financial cost – that are being taken into account in the investment modelling process that will determine the preferred plan for the South East. The approach is essentially a form of multi-criteria decision analysis (MCDA) that tests the performance of candidate plans across a set of monetised and non-monetised impacts - as represented by the BVC - as part of the process of identifying the preferred plan.

Table 1.1: WRSE best value planning criteria

Outcome	Value criteria	Metric
Deliver a secure supply of water to customers and other sectors to 2100	Meet the supply demand balance	Public Water Supply - supply demand balance profile (Ml/day)
		Provides additional water needed by other sectors (Ml/day)
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	Water consumption	Distribution input per head of population (Litres/person)
	Customer preference	Customer preference for option type (score)
Deliver environmental improvement and benefits to society	Strategic Environmental Assessment (SEA)	Programme benefit (score max)
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Increase the resilience of the region's water systems	Drought resilience	Achieve 1 in 500-year drought resilience (date achieved)
	Resilience assessment - reliability	Programme reliability score
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Delivered at a cost that is acceptable to customers	Programme cost	Net Present Value (NPV) using the Social Time Preference Rate (£m)
	Intergenerational equity	Health rate (THDR 1%)

Source: WRSE (2021) Developing our 'Best Value' multi-sector regional resilience plan, A consultation on our objectives, value criteria and metrics, February 2021.

The customer research was implemented as an online survey with a representative sample of customers in the South East, with coverage of all six WRSE companies. A choice modelling approach was used to quantify the relative importance (weight and priority) customers place on the BVC.

1.3 Report structure

The remainder of this report is structured as follows:

- **Section 2** outlines the research methodology, including the survey design, content and sampling approach;
- **Section 3** presents the main results, covering the sample profile, customer preference weights, and respondent feedback; and
- **Section 4** summarises key findings.

The main report content is supported by three appendices:

- Appendix A: Customer survey
- Appendix B: Best value criteria mapping to choice task attributes
- Appendix C: Customer preference weights for best value criteria

2. Methodology

2.1 Survey design and testing

The initial content and material for the online survey was developed from the preceding quantitative customer research for WRSE carried out in October – November 2020[5]. This previous research included the design, testing and implementation of a survey that provided customer preference weights for supply and demand options for the regional plan. Relevant content from the previous survey was retained - including the "scene-setting" explanatory information for respondents, along with screening / quotas question, household profile questions, and appropriate respondent feedback questions – allowing the upfront survey development and testing work to focus on respondent understanding of the best value criteria (BVC) and the specification of the customer preference exercise.

Design and testing

The content and materials for the survey were tested via an online bulletin board exercise with a group of household customers recruited from across the WRSE region (13 participants in total). The group featured a good mix of customers from differing demographic and socio-economic backgrounds. Exercises included asking participants to comment on the clarity and ease of understanding of BVC and the subsequent descriptions that were developed, along with ranking the BVC from "most important" to "least important" in terms of the outcomes the plan should achieve. Example materials are shown in Figure 2.1.

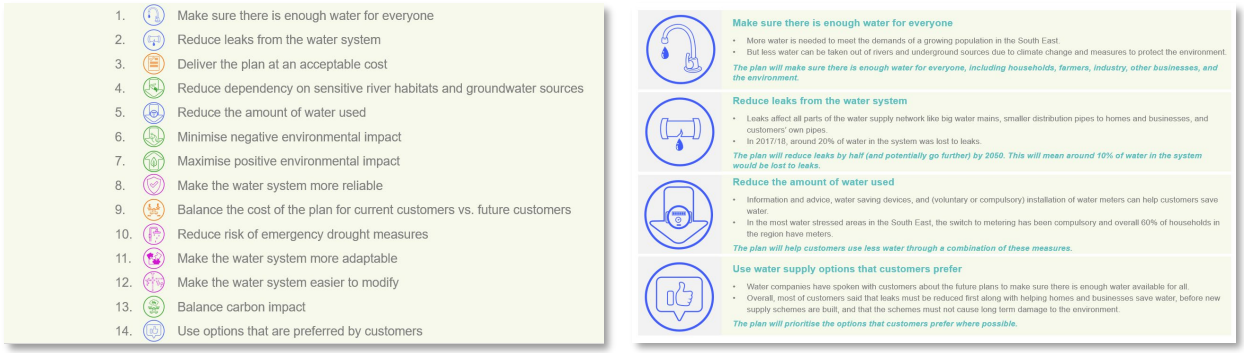


Figure 2.1: Example materials from customer testing

Participants generally found the BVC clear and easy to understand, which provided a clear starting point for further developing their descriptions in the survey materials. In terms of the ranking exercise, the two most important outcomes / constraints were "make sure there is enough water for everyone" and "reduce leaks from the water system". Conversely, the lowest priority outcomes / constraints were "net zero carbon impact" and "use water supply options that customers prefer".

Following the participant feedback, improvements to the survey materials included refining BVC definitions and designing the format and layout of the survey showcards to have headline information on the front of the card with a "rollover" on the flipside with more information (Figure 2.2).

[5] eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part C Customer Survey, Report for Water Resources South East (WRSE), March 2021.

Figure 2.2: Final choice cards in the survey format (left is front of the card, right flipside)

The survey content was also reviewed by the WRSE ECB. This is included the descriptions for the best value criteria and wider elements of the survey including the visual presentation and supporting explanation of the WRSE regional plan. Representatives from the companies' Customer Challenge Group (CCG) were also engaged as part of the survey design and reporting phases.

Pilot survey

The survey was pilot tested with an online "soft launch" with 46 respondents to check length and time to complete and ensure that the routing of the survey and data collection were functioning correctly. No amendments to the survey were made following the soft launch.

2.2 Survey structure and content

Survey outline

The structure of the customer survey is set out in Table 2.1. Appendix A provides the full survey script and showcards for reference.

Table 2.1: Survey structure

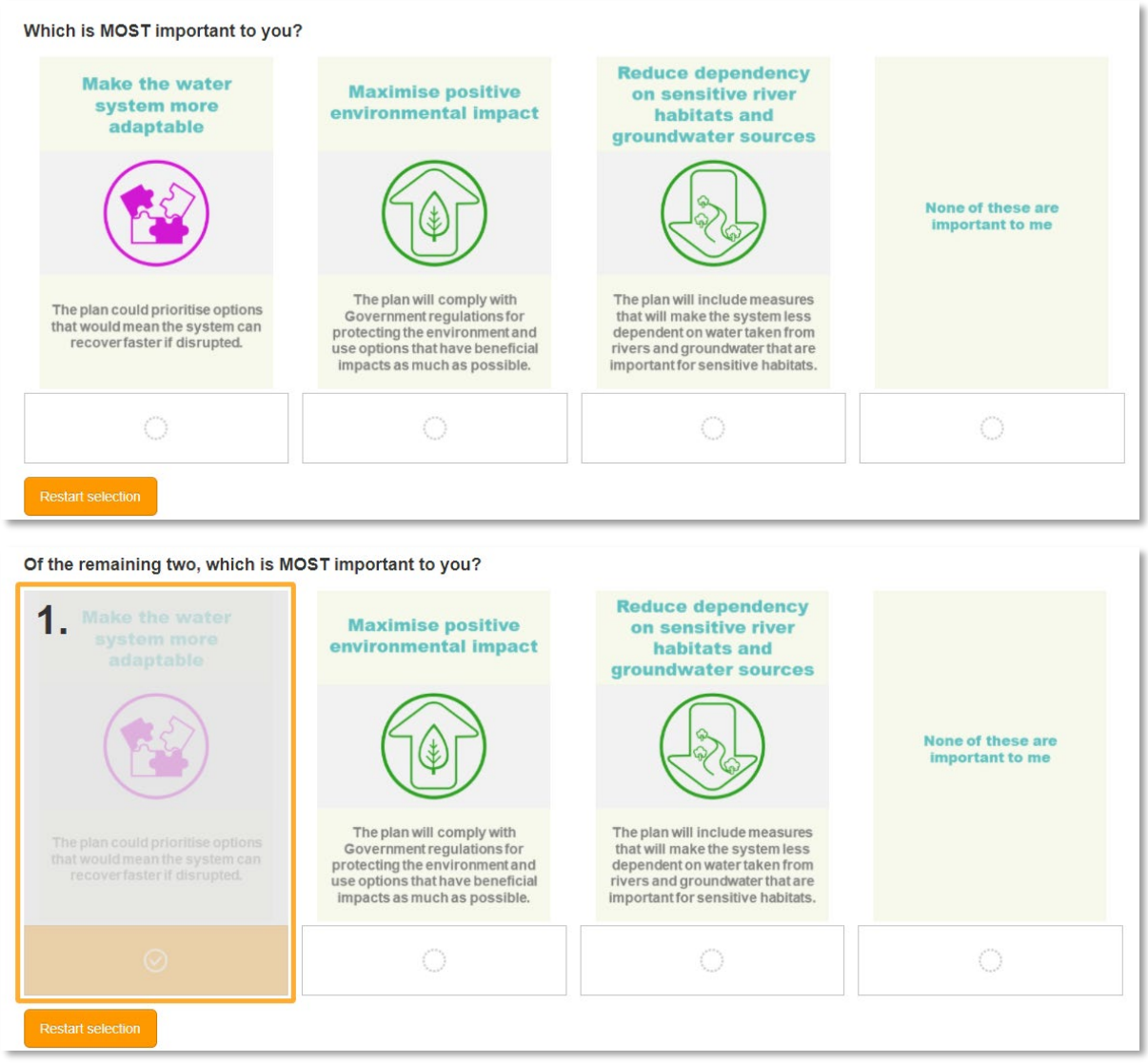
Section	Content
Introduction	• Introduction to WRSE and purpose of survey
Section A: Respondent screening and quotas	• Respondent screening: location
	• Respondent quotas: age, gender, socio-economic group, water company
Section B: Value criteria	• Explanatory information about the WRSE regional plan • Value criteria • Choice task exercise (best-worst scaling with progressive choice format), including instructions • Initial follow-up questions on ease/difficulty of choices and most/least important factors (value criteria)
Section C: Follow-ups	• Attitudes to long-term planning issues
Section D: Respondent profile	• Socio-economic and demographic profile (household size, employment, education etc.) Disability, Priority Services Register (PSR)
Survey close	• Survey feedback • Link to additional information on PSR
	• Thank and close

Customer preference exercise

Customer preferences for the WRSE best value criteria were elicited via a best-worst scaling (BWS) choice task[6]. This is a stated preference method that is a suitable format for producing customer preference weights that can be used in investment modelling – such as the process underpinning the development of the regional plan by WRSE.

In the choice task, respondents were asked to consider different combinations of the "factors" (the value criteria) that WRSE are balancing in producing the regional plan. In each case respondents were presented with three of the best value criteria and asked to select which factor was most important – i.e. the priority for the regional plan – and then of the remaining two, which factor was most important. Respondents answered 14 choice questions in total. A statistical experimental design was used to determine the combinations of the factors respondents saw in each choice, with the design ensuring that across the sequence of repeated choices each respondent saw each value criteria at least once. Figure 2.1 shows the onscreen appearance of the choice task exercise.

Figure 2.3: Customer preference exercise layout – progressive choice format



[6] See Louviere, J.J., Flynn, T.N. and Marley, A.A.J (2015) *Best-Worst Scaling: Theory, Methods and Applications*, Cambridge University Press.

The layout and appearance were developed and refined in the survey design and testing phase. Respondents were presented with the "label" for the factor, an accompanying icon, and short description of the factor – appearing onscreen as a card. As per Figure 2.2, additional information on the factor was provided via a rollover function, which flipped the card over. Prior to starting the choice task, respondents were provided with a set of instructions in the form of an animated gif that explained: (i) the key information shown on screen for each choice; (ii) how to display the additional information for each factor; and (iii) how to select the most important factor, and then the most important factor from the remaining two.

The choice task used a progressive choice format, asking for: (a) most important from the three factors; and then (b) most important from the two remaining factors[7]. This provides a full preference ranking for each combination of factors and across the full sample a rich dataset on the relative importance of the value criteria to support the estimation of customer preference weights.

Choice task attributes (best value criteria)

The WRSE best value criteria (Table 1.1) were formulated into 14 "attributes" for the choice task (the factors for balancing the plan as described above). The main focus was to prepare non-technical descriptions of the criteria that were clear and understandable for respondents, in terms of the objective for the regional plan – whether this was an outcome (e.g. reduce risk of emergency drought restrictions) or a constraint (e.g. affordability). Some best value criteria were merged where there was considerable overlap from a customer understanding perspective – namely strategic environmental assessment (max. score and min. score) and natural capital value, which was reduce to two attributes labelled as "maximise positive environmental impact" and "minimise negative environmental impact".

Table 2.2 presents the non-technical descriptions of the best value criteria presented in the choice tasks, detailing the: (i) attribute labels; (ii) a short description of the factor; and (iii) additional information shown on the flip side of the attribute card. The full mapping between the WRSE BVC (Table 1.1) and the choice tasks attributes (Table 2.2) is provided in Appendix B for reference.

[7] An alternative approach would be to use the conventional best-worst response format, asking respondents of the three factors shown, which was most important, and which was least important – this is also the basis of a max-diff type exercise which can also be used in quantitative research with customers. The progressive choice format was used, however, as this was judged to be easier for respondents complete, requiring them to pick the most important factor only in a given choice, rather than also requiring them to explicitly think about what was least important.

Table 2.2: Choice task attribute descriptions

Attribute label and description	Additional information
Make sure there is enough water for everyone The plan will make sure there is enough water for everyone, including households, farmers, industry, other businesses, and the environment.	• More water is needed to meet the demands of a growing population in the South East. • But less water can be taken out of rivers and underground sources due to climate change and measures to protect the environment.
Reduce leaks from the water system The plan will reduce leaks by half (and potentially go further) by 2050. This will mean around 10% of water in the system would be lost to leaks.	• Leaks affect all parts of the water supply network like big water mains, smaller distribution pipes to homes and businesses, and customers' own pipes. • In 2017/18, around 20% of water in the system was lost to leaks.
Reduce the amount of water used The plan will help customers use less water through a combination of measures.	• Information and advice, water saving devices, and (voluntary or compulsory) installation of water meters can help customers save water. • In the most water stressed areas in the South East, the switch to metering has been compulsory and overall 60% of households in the region have meters.
Use water supply options that customers prefer The plan will prioritise the options that customers prefer where possible.	• Water companies have spoken with customers about the future plans to make sure there is enough water available for all. • Overall, most of customers said that leaks must be reduced first along with helping homes and businesses save water, before new supply schemes are built, and that the schemes must not cause long term damage to the environment.
Maximise positive environmental impact The plan will comply with Government regulations for protecting the environment and use options that have beneficial impacts, as much as possible.	• Some options that save or supply water can have positive environmental impacts. • This includes helping to protect wildlife and creating new habitats, improving river quality, reducing risk of flooding and air pollution, and providing wider benefits for local communities (e.g. recreation sites).
Minimise negative environmental impact The plan will comply with Government regulations for protecting the environment and avoid or minimise negative impacts, where possible.	• The different options to supply water can have negative environmental impacts. • This includes loss of habitats, landscape and visual impacts from construction, new buildings and infrastructure, and emissions from operation of sites.
Reduce dependency on sensitive river habitats and groundwater sources The plan will include measures that will make the system less dependent on water taken from rivers and groundwater that are important for sensitive habitats.	• Some rivers and groundwater sources in the South East are important for protecting habitats for wildlife and plants that are sensitive to drought. The habitats can be badly damaged if too much water is taken out for homes and businesses. • Government regulation is reducing the amount of water that can be taken from these sources to protect sensitive habitats and help them cope better with the effects of climate change.
Net zero carbon impact from the plan The plan will ensure that the carbon impact is neutral by balancing the unavoidable emissions with savings elsewhere.	• The water industry has committed to achieving net-zero carbon by 2030. • Low carbon approaches can be used to minimise the amount of carbon emitted by the plan and unavoidable emissions can be "offset" by buying carbon credits created by carbon saving projects outside the water sector.

Attribute label and description	Additional information
Reduce the need for emergency drought measures The plan will reduce the likelihood of needing emergency drought measures, from currently 1 in 200 in any one year (about 40% chance over a person's lifetime) to 1 in 500 (about 16% chance in a lifetime).	• Consecutive years with drier than usual weather could lead to an extreme period of drought. If this happens, emergency measures would be needed to maintain the essential supply of water in the region (e.g. washing, toilet flushing and drinking). • These measures would be very disruptive for households and some businesses as water would be available only a few hours a day or would need to be collected from standpipes or tanks.
Make the water system more reliable The plan could prioritise options that would make the system more reliable and less likely to be disrupted by extreme events.	• The water supply system can be disrupted by events like heatwaves, extreme cold snaps, and floods which put pressure on supplies and can result in water shortages. • Some water supply options would ensure there is a "buffer" in the system so that events like this have less chance of causing water shortages.
Make the water system more adaptable The plan could prioritise options that would mean the system can recover faster if disrupted.	• The water supply system can be disrupted by events like heatwaves, extreme cold snaps, and floods which put pressure on supplies and can result in water shortages. • Some options would ensure that the system can recover faster from these events - for example by connecting different areas together so that water can be moved around the system more easily.
Make the water system easier to modify The plan could prioritise options that would make it easier for the system to cope with future changes.	• Future needs for water cannot be predicted fully because of uncertainty about population growth and the impacts of changing climate. • Some options will make it easier to increase the water supply gradually over time, for example by allowing extra supply to be added only when needed.
Deliver the plan at an acceptable cost The plan will look at different combinations of investment options to see what can be delivered for different levels of change in customer bills.	• A large part of the plan will be paid for by customers through their water bills. • The investment is needed for new water supply schemes, measures to save water, fix leaks, and protect the environment.
Balance the cost of the plan for current customers vs. future customers The plan will look to balance the cost of the plan across current and future customers (i.e. how much to spend now and how much to spend later).	• The plan will impact customer bills from 2025 to 2100 and beyond. The investment paid for by current customers will provide benefits for a long time. • There are different ways that the plan can be funded to spread the cost over time.

2.3 Sampling approach

Sampling quotas for the online survey were specified based on criteria agreed with the WRSE ECB: (i) gender; (ii) age; and (iii) socio-economic group (SEG). The quota targets were specified according to ONS Census data for the South East of England (Table 2.3).

Table 2.3: Sampling quotas (household customers)

Quota		Percentage of respondents (%)
Gender*	Female	50%
	Male	50%
	Total	**100%**
Age*	16-18	4%
	19-24	9%
	25-30	11%
	31-44	26%
	45-54	17%
	55-64	14%
	65+	19%
	Total	**100%**
Socio-economic group (SEG) **	SEG AB	29%
	SEG C1	32%
	SEG C2	18%
	SEG DE	21%
	Total	**100%**

Source: * ONS Population estimates (mid-2019), ** ONS Census (2011).

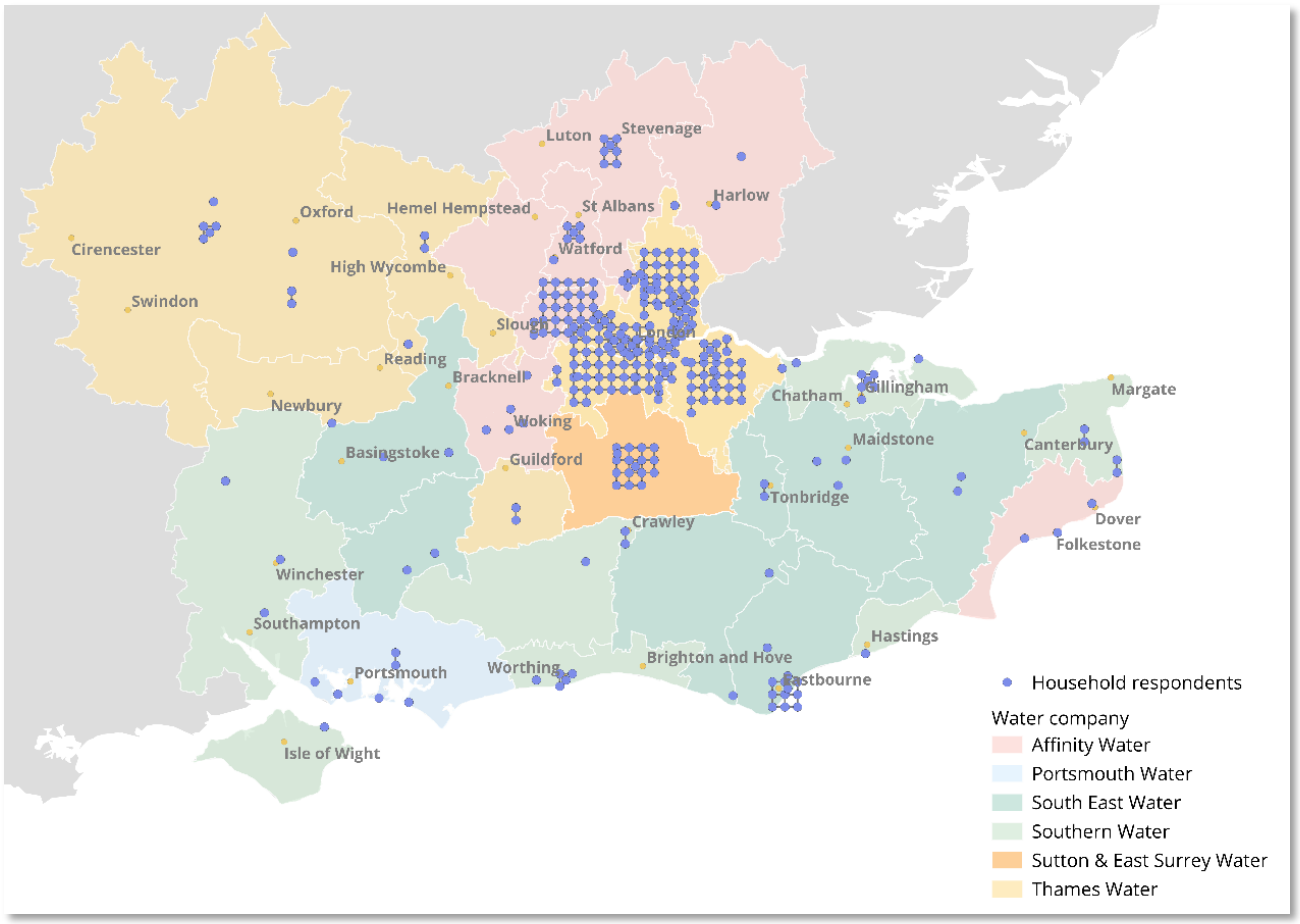
The target sample size was 300 respondents. This is sufficient to ensure robust results in terms of the precision of customer preference weight estimates (e.g. 95% confidence intervals). Respondents were recruited from online panel providers. The survey was completed online by the respondent immediately following recruitment.

3. Results

3.1 Sample profile

Overall, 309 household customers completed the survey online. The average survey completion time was approximately 15 minutes. Figure 3.1 shows the geographic distribution of respondents.

Figure 3.1: Distribution of survey respondents (n=309)



The survey collected respondent information on socio-economic and demographic characteristics. As detailed below, the sample was representative of households in the South East according to the sampling quotas for respondent gender, age and socio-economic group (SEG). The following summarises the sample according to geographic profile, demographic profile, socio-economic profile, and broad views on the development of the regional plan.

Geographic profile

Figure 3.2 highlights that the majority of the sample were Thames Water customers (58%). However, as shown in Figure 3.3, the geographic distribution of the sample covered all water resource zones (WRZ) in the South East region, with most respondents located in West London (24%), followed by North East London (17%) and South East London (13%).

Figure 3.2: Profile of sample by water services supplier (n=309)

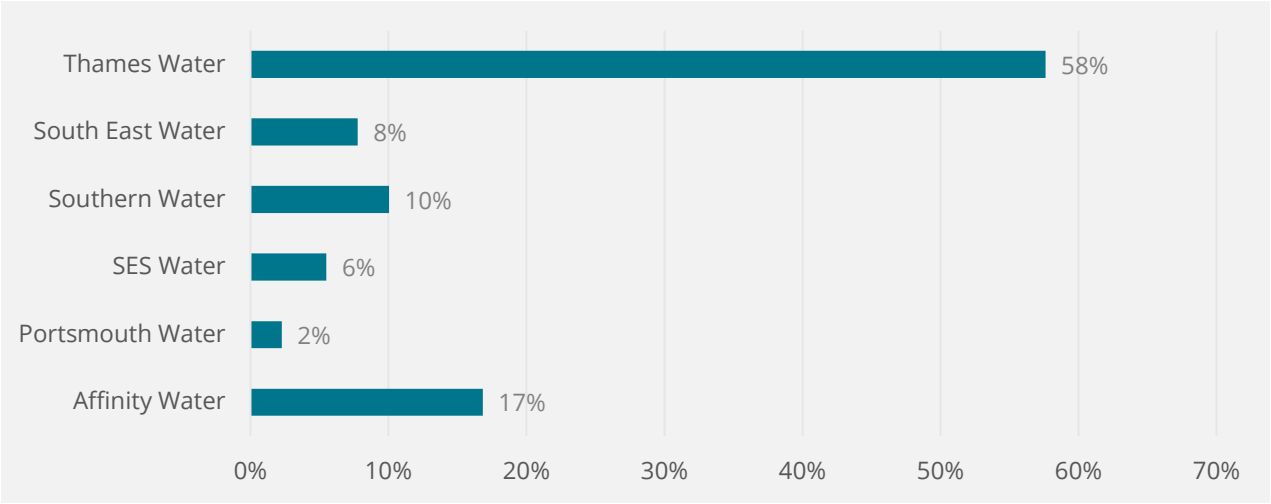
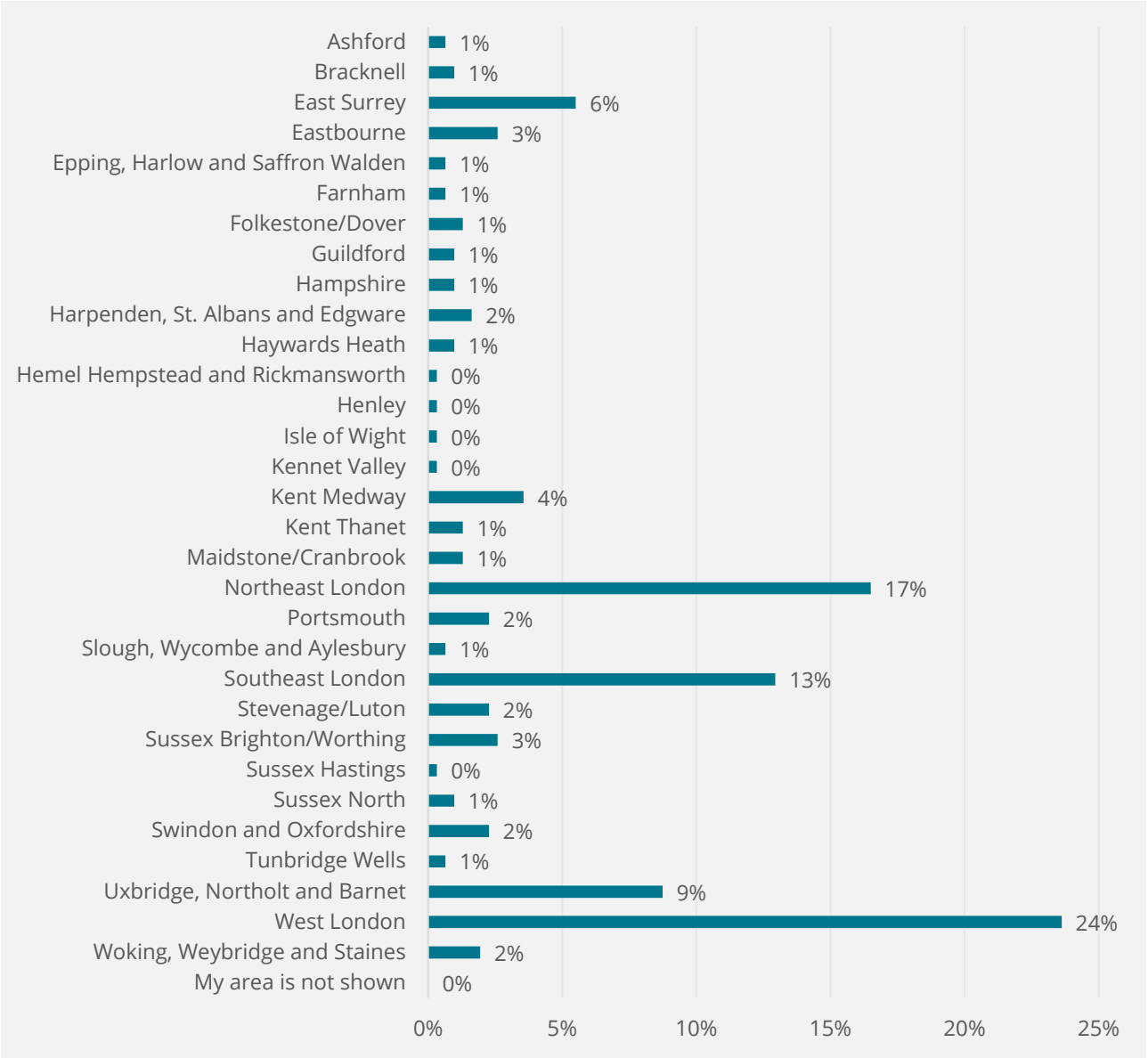
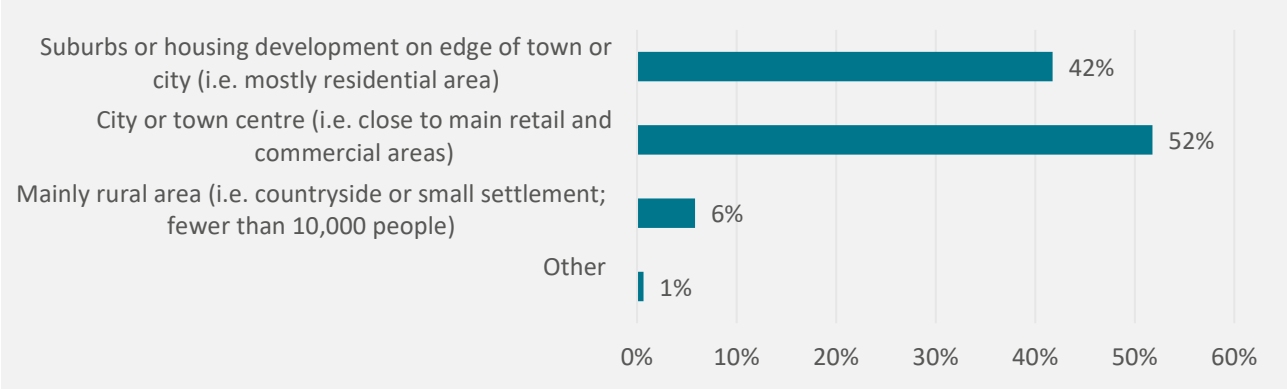


Figure 3.3: Profile of sample by water resource zone (n=309)



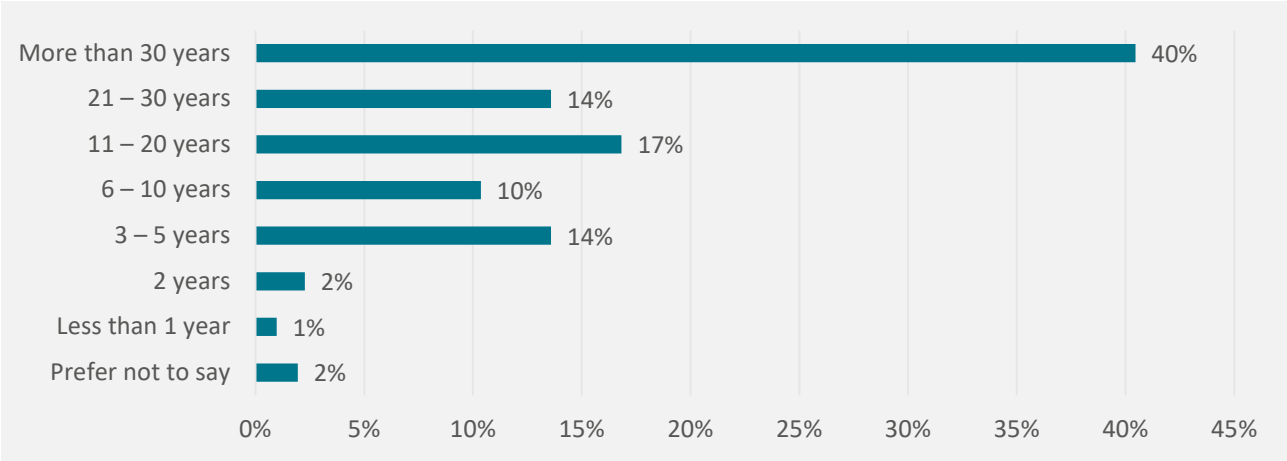
Most respondents indicated that they lived either in the suburbs or edge of town/city (42%), or in the city or town centre (52%), while a smaller share indicated living in a rural area (6%) (Figure 3.4).

Figure 3.4: Profile of sample by urban vs. rural location (n=309)



Respondents were also asked how long they had lived in the WRSE region (Figure 3.5). The majority had lived in the region for over 10 years, and within this group most for more than 30 years (40%), followed by between 11 and 20 years (17%), between 3 and 5 years (14%) and between 21 and 30 years (13%). A smaller proportion indicated they had been in the region between 6 and 10 years (10%), and a minority for less than 3 years, whether 2 years (2%) or less than 1 year (1%).

Figure 3.5: Time lived in WRSE region (n=309)



Demographic profile

The proportion of male/female respondents in the sample was just off the quota target (within +/- 2 percentage point difference) (Table 3.1).

Table 3.1: Respondent gender (n=308)

	n	%
Female	149	48%
Quota		50%
Male	159	52%
Quota		50%
Total	**308**	

Note: One respondent indicated "I prefer to identify another way".

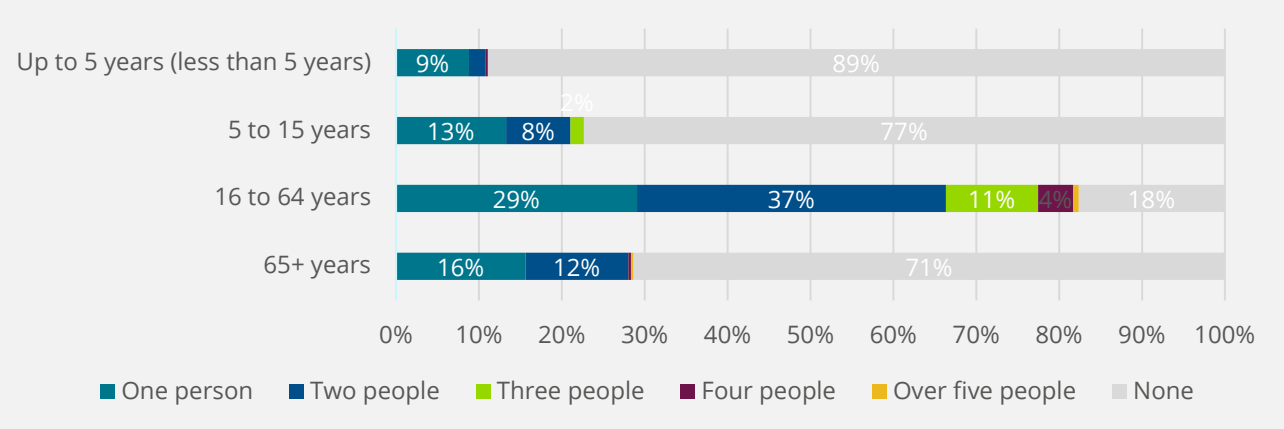
The sample profile by age also compared well with the quota targets (Table 3.2). Most age cohorts were within +/- 2 percentage points difference of the target, reflecting the difference between the profile of the WRSE bill payers and the population/consumer profile based on census data.

Table 3.2: Respondent age (n=309)

	n	%
18-24	28	9%
Quota		9%
25-30	31	10%
Quota		11%
31-44	83	27%
Quota		26%
45 - 54	58	19%
Quota		17%
55 - 64	46	15%
Quota		14%
65+	63	20%
Quota		19%
Total	**309**	

The household composition provided additional insights on the distribution in the age within respondents' households (Figure 3.6). Most household respondents (including themselves) had at least one member between 16 to 64 years (82%). A smaller share of respondents indicated living with someone over 65 years old (29%). An even smaller proportion indicated that their households also included children, whether under the age of 5 (11%) or between 5 to 15 years (23%).

Figure 3.6: Household composition (n=309)



Note: categories are not mutually exclusive, as respondents' households are likely to include more than one member.

Socio-economic characteristics

The sample profile was broadly aligned to the socio-economic group (SEG) quotas with each segment within +/- 5 percentage points difference of the regional profile (Table 3.4).

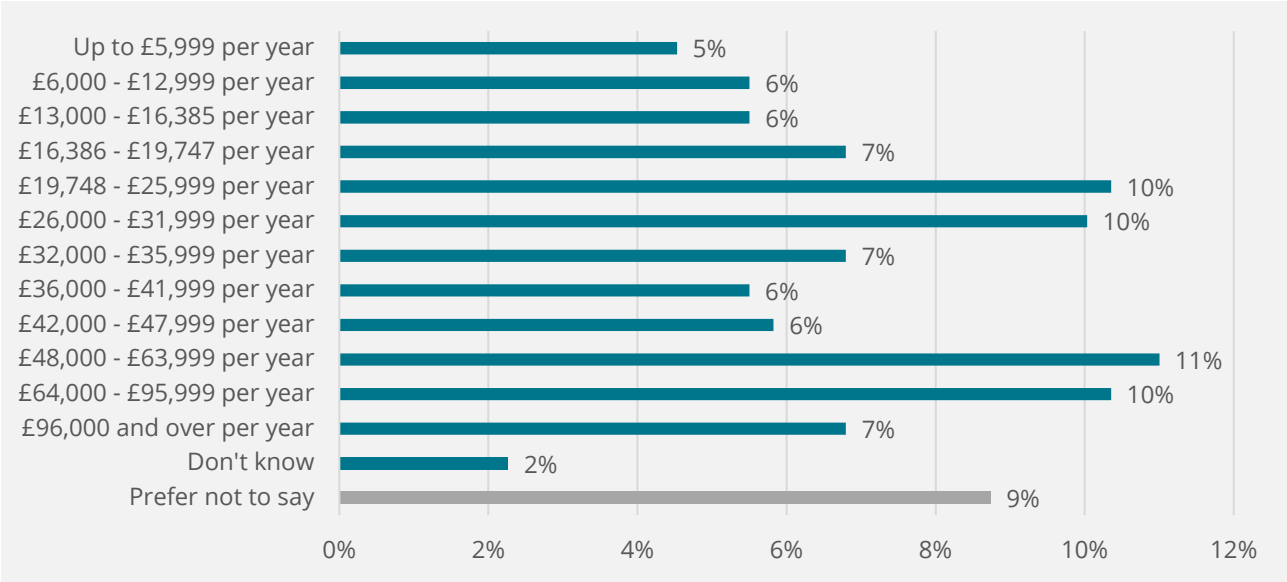
Table 3.3: Respondent socio-economic group (n=309)

		n	%
AB		104	34%
	Quota		29%
C1		93	30%
	Quota		32%
C2		52	17%
	Quota		18%
DE		60	19%
	Quota		21%
Total		**309**	

Note: Market Research Society definitions are: A = professionals, very senior managers, etc.; B = middle management in large organisations, top management or owners of small businesses, educational and service establishments; C1 = junior management, owners of small establishments, and all others in non-manual positions; C2= skilled manual labourers; D = semi-skilled and unskilled manual workers; E = state pensioners, casual and lowest grade workers, unemployed with state benefits only (NRS, 2008 http://www.nrs.co.uk/lifestyle-data/).

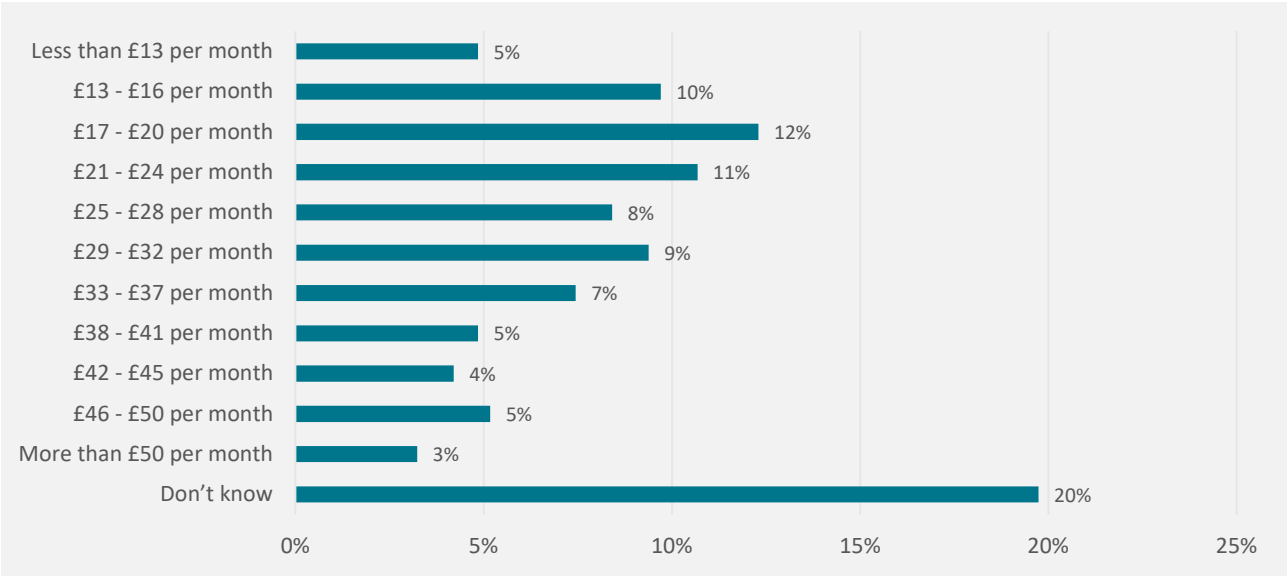
The sample captured the full range of household circumstances in terms of gross annual income. Median household income was in the range £32,000 - £35,999 per year. Approximately one-tenth of respondents (11%) reported household income as £12,999 per year or less.

Figure 3.7: Gross annual household income (n=309)



The median household water services bill for the sample was £29 - £32 per month. This is just below the average combined (water and wastewater) bill in England and Wales of £34 per month[8]. A sizeable proportion (20%) indicated that they did not know what they paid for water and sewerage services (Figure 3.8).

Figure 3.8: Household water and sewerage services bill (n=309)

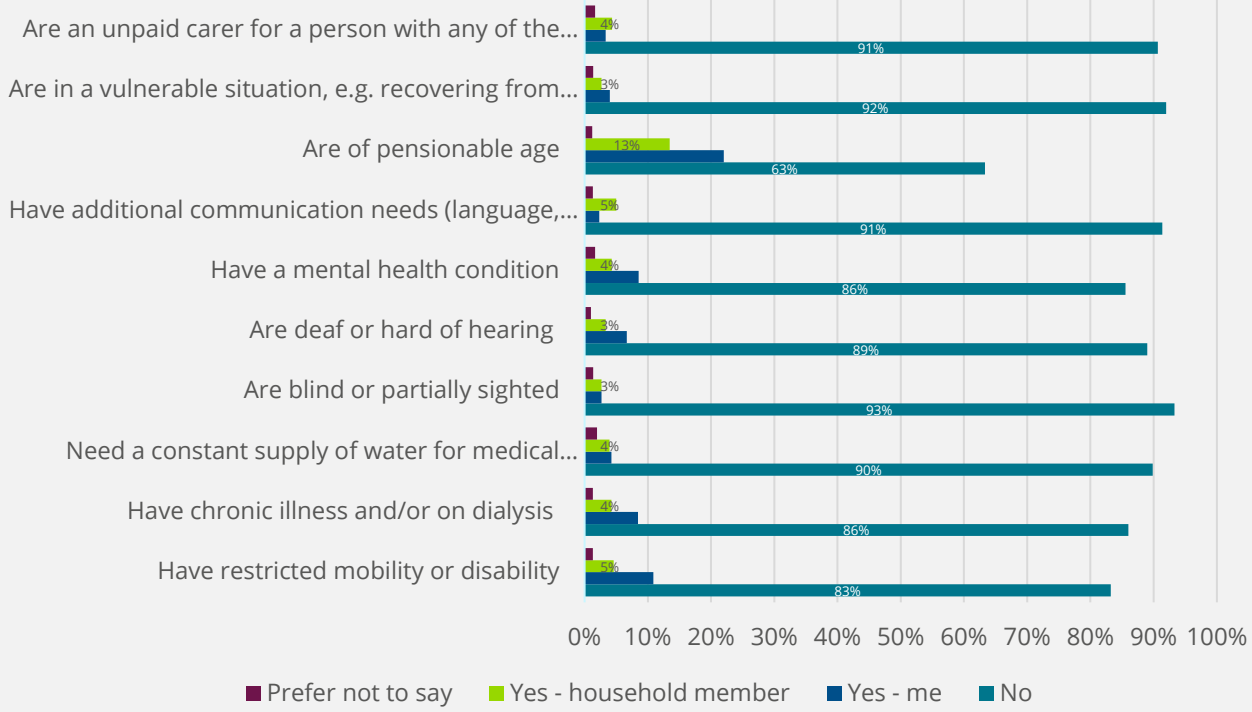


Household circumstances

The survey included a set of questions to identify respondents in potentially vulnerable circumstances (Figure 3.9). Relatively few respondents reported that either they or a household member had certain medical conditions (on average >15%) or was an unpaid carer (11%). A larger proportion of respondent household included at least one member of pensionable age (35%).

[8] From Discover Water data reported by water companies in 2020/21.

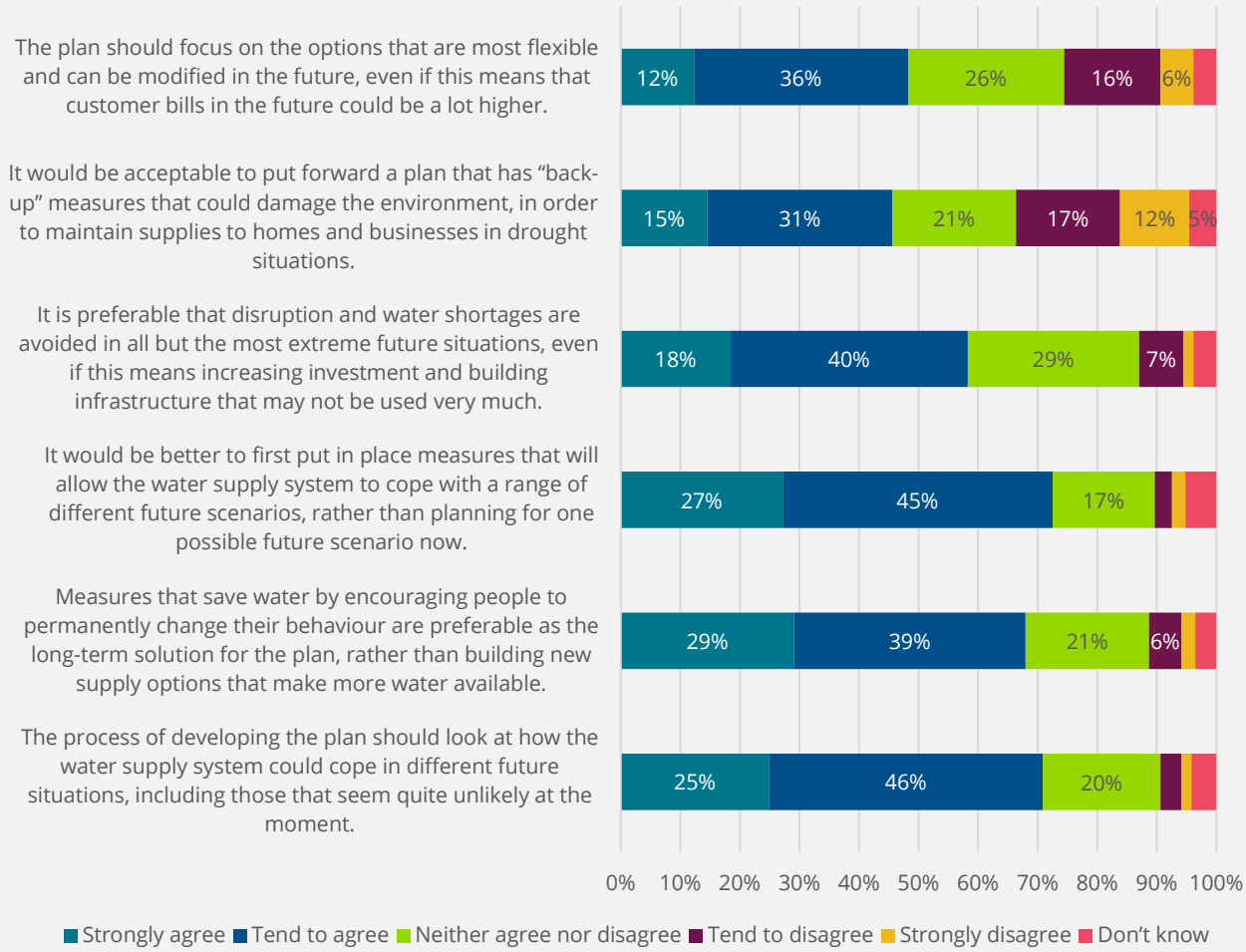
Figure 3.9: Respondent household circumstances (n = 309)



Respondent views on the development of the regional plan

A series of follow up questions asked respondents to express their views and opinions on aspects of WRSE's approach to developing the regional plan (Figure 3.10). Results show that the majority of respondents agreed (45%) or strongly agreed (27%) that it would be better to first put in place measures that will allow the water supply system to cope with a range of different future scenarios, rather than planning for one possible future scenario now. A majority of respondents (71%) also agreed or strongly agreed that the process of developing the plan should look at how the water supply system could cope in different future situations, including those that seem quite unlikely at the moment. Although by a slightly slimmer majority (68%), most respondents felt that measures that save water by encouraging people to permanently change their behaviour are preferable as the long-term solution for the plan, rather than building new supply options that make more water available.

Figure 3.10: Views on WRSE planning approach (n=309)



3.2 Customer preferences for best value criteria

Customer preferences for the WRSE regional plan BVC were elicited via the best-worst scaling (BWS) choice exercise described in Section 2.2. The main results are preference weights that quantify customer priorities, which can be interpreted as the level of importance placed on different outcomes and constraints for the regional plan. As such, the weights measure the relative importance of the BVC and are an input to the WRSE investment modelling that will compare the performance of alternative candidate long-term plans for the region.

Choice task results

The BWS response data was analysed using conventional choice model estimations to quantify the preference weights for the 14 BVC attributes[9] (Box 3.1).

[9] The full model results are provided Appendix F.

Box 3.1: BVC attribute labels

Label	BVC attribute*
ADAPT	Make the water system more adaptable
CARBON	Net zero carbon impact from the plan
COST_ACCEPT	Deliver the plan at an acceptable cost
COST_BALANCE	Balance of cost the plan for current customers vs. future customers
CUST_PREF	Use water supply options that customers prefer
DEPENDENCY	Reduce dependency on sensitive river habitats and groundwater sources
DROUGHT	Reduce the need for emergency drought measures
ENOUGH_WATER	Make sure there is enough water for everyone
LEAK	Reduce leaks from the water system
MODIFY	Make the water system easier to modify
NEG_ENV	Minimise negative environmental impact
POS_ENV	Maximise positive environmental impact
REDUCE	Reduce the amount of water used
RELIABLE	Make the water system more reliable

*See Table 2.3 for full description provided to respondents.

Table 3.4 reports the main results with the preference weights reported as odds ratios (OR). The preference weights are measured relative to the base case "Use water supply options that customers prefer" (CUST_PREF) (OR = 1.0). If a BVC attribute has a weight greater than one, it is (on average) viewed by customers to be a higher-level priority than CUST_PREF; a weight below one would signify a lower-level priority (on average). If a weight is not statistically different to 1.0 (e.g. at the 95% level of significance), it is not possible to conclude that the level of priority is different from the base case. Overall, the results can be interpreted as the both the priority ordering for the value criteria and the strength of preference.

The main observations from the choice model estimation are:

- The highest priority for respondents was "make sure there is enough water for everyone" (ENOUGH WATER = 6.0), reflecting the importance of maintaining the supply-demand balance, not only for household use but other sectors too.
- The second tier of priorities features the some of the key constraints for the regional plan covering efficiency, affordability and sustainability - namely "reduce leaks" (LEAK = 3.8), "deliver the plan at an acceptable cost" (COST_ACCEPT = 3.4), and "reduce dependency on sensitive river habitats and groundwater sources (DEPENDENCY = 3.0).
- Below this is a cluster of factors relating to demand reductions (REDUCE = 2.7), environmental performance (POS_ENV = 2.6; NEG_ENV = 2.6), and the resilience of the water supply system to extreme events (RELIABLE = 2.5). An interesting result is that respondents did not place greater weight on positive environmental impacts over negative environmental impacts (or vice versa), but instead viewed these as equivalent.

Table 3.4: Customer preference weights for BVC attributes

BVC attribute		Coef.	s.e	OR
ENOUGH_WATER	Make sure there is enough water for everyone	1.790	1.257	6.0
LEAK	Reduce leaks from the water system	1.325	1.082	3.8 G
COST_ACCEPT	Deliver the plan at an acceptable cost	1.219	1.534	3.4 FG
DEPENDENCY	Reduce dependency on sensitive river habitats and groundwater sources	1.097	1.085	3.0 EFG
REDUCE	Reduce the amount of water used	0.983	1.020	2.7 DEF
POS_ENV	Maximise positive environmental impact	0.952	1.451	2.6 DE
NEG_ENV	Minimise negative environmental impact	0.957	1.259	2.6 CDEF
RELIABLE	Make water system more reliable	0.927	0.704	2.5 CDEF
COST_BALANCE	Balance of cost the plan for current customers vs. future customers	0.757	1.190	2.1 CD
DROUGHT	Reduce risk of emergency drought measures	0.687	0.637	2.0 C
ADAPT	Make water system more adaptable	0.388	0.610	1.5 B
CARBON	Balance carbon impact	0.138	1.581	1.1 AB
MODIFY	Make water system easier to modify	0.192	0.928	1.2 AB
CUST_PREF	Use options that are preferred by customers	(base)	(base)	1.0 A
Model fit				
No. respondents		309		
No. observations		4223		
Log-likelihood		-6,235.42		

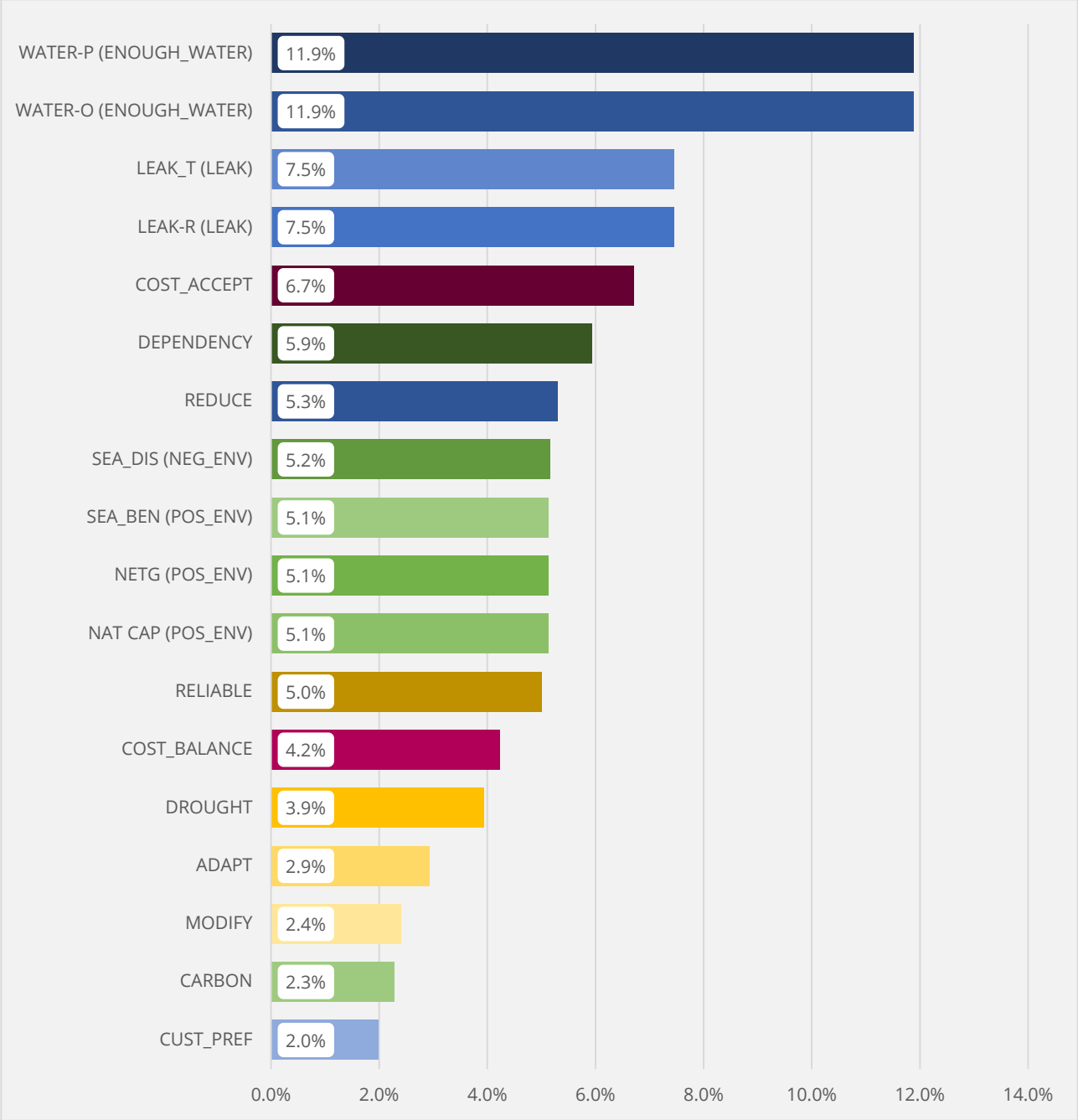
Notes: Rank ordered mixed logit model estimation. [1] Coefficient estimates are significant at the 1% level except MODIFY and CARBON; [2] OR's sharing a letter (A, B, C, D, E, F, G) are not significantly different at the 5% level.

- Lower rated priorities include "Balance of cost the plan for current customers vs. future customers" (COST_BALANCE = 2.1) and "Reduce risk of emergency drought measures" (DROUGHT = 2.0). The relatively lower level of importance placed on reducing the likelihood of severe drought restrictions likely reflects a degree of insensitivity from respondents to the change in risk from 1-in-200 to 1-in-500.
- The final tier includes the further resilience metrics of "Make water system more adaptable" (ADAPT = 1.5) and "Make water system easier to modify" (MODIFY = 1.2) along with "Balance carbon impact" (CARBON = 1.1). The latter preference weights are not found to be statistically different from the base case "Use water supply options that customers prefer".

Mapping to best value criteria

Figure 3.11 presents the customer preference weights from the choice task results mapped to the full set of best value criteria (as detailed in Table 1.1).

Figure 3.11: Customer preference weights for WRSE regional plan best value criteria



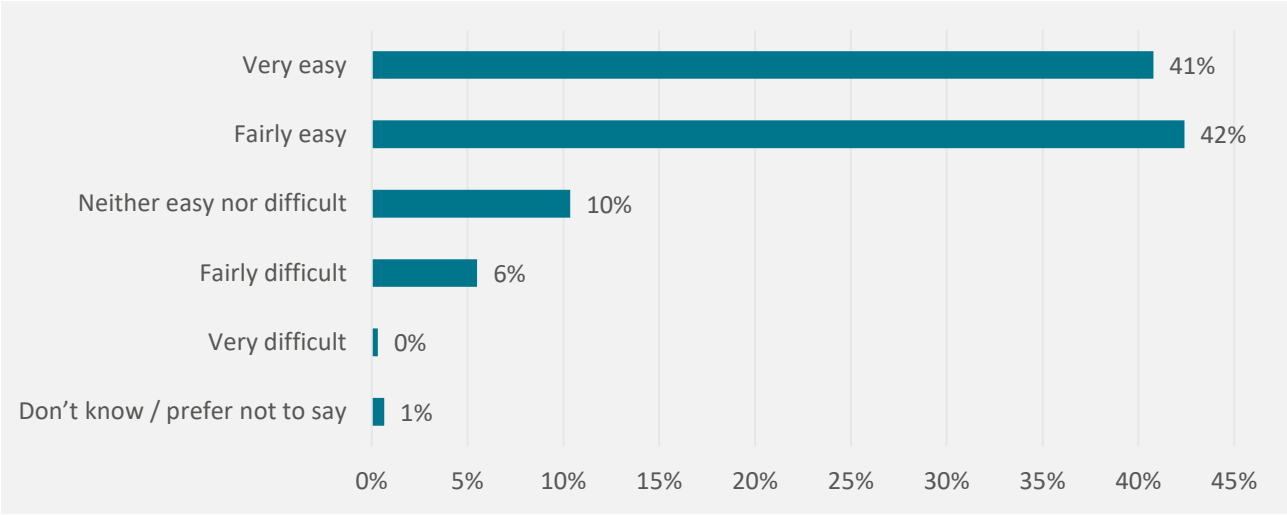
Notes: See Appendix C for the calculation of preference weights in percentage point terms.

In broad terms, the preference weights indicate the following a customer priority hierarchy for the top-level outcomes for the WRSE BVC: [1] Deliver a secure supply of water to customers and others > [2] Deliver the plan at a cost that is acceptable to customers > [3] Deliver environmental improvement and benefits to society > [4] Increase the resilience of the region's water supply systems.

3.3 Respondent feedback

Responses to follow-up questions indicate that respondents found the survey engaging and straightforward. In particular, the majority of respondents (83%) stated that the survey was easy to complete (either "very easy" or "fairly easy") (Figure 3.12).

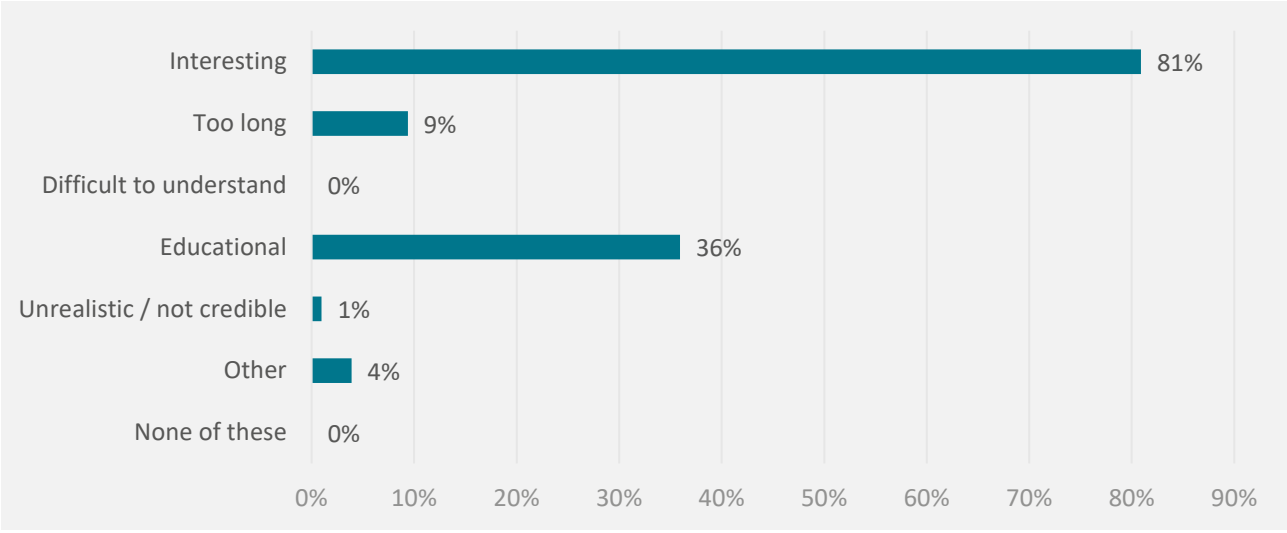
Figure 3.12: Ease of answering questions in the survey (n=309)



Sample size: Household – 309 respondents

Similarly, a large portion of respondents stated that they found the survey interesting (81%) or educational (36%) (Figure 3.13). Some respondents, however, did indicate that the survey was too long (9%). No respondents indicated that they found the survey difficult to understand.

Figure 3.13: Feedback on the survey (n=309)



4. Conclusions

4.1 Summary

The results of this study support the best value planning approach that underpins the development of the WRSE regional plan. The customer preference weights for the best value criteria were estimated using a choice modelling approach, with the research implemented through a representative online survey of household customers in the South East.

The main results indicate a tiering to customers' priorities for the regional plan outcomes:

- **Top priorities**: foremost to ensure the long-term security of supply in the region, both for public supply purposes and other sectors. Ranking just below this are the key considerations for improving the efficiency of the water supply system in terms of reducing leakage and reducing its dependency on sensitive habitats and groundwater sources, along with the cost and customer affordability constraints for the plan.

- **Mid-tier priorities**: feature several dimensions of the performance of the plan relating to wider environmental impacts, reducing demand for water, and improving resilience to extreme events.

- **Lower priorities**: include wider aspects of the resilience of the water supply system, including minimising the risk of emergency drought restrictions, along with balancing the carbon impact and the mix of options used.

Overall respondent feedback on the survey was positive, indicating that there was a good level of understanding of the best value criteria and the choice task exercise. Overall, the study results are judged to be robust and fit-for-purpose for use in WRSE's investment modelling process.

Appendix A: Customer survey

Survey script

Showcards

Appendix B: Best value criteria mapping to choice task attributes

Outcome	Value criteria	Metrics	Attribute	Notes
Deliver a secure supply of water to customers and other sectors to 2100	Meet the supply demand balance	Public Water Supply - supply demand balance profile (Ml/day)	Make sure there is enough water for everyone	-
		Provides additional water needed by other sectors (Ml/day)	Make sure there is enough water for everyone	Incl. with PWS. Upfront explanation to customers states that the purpose of the plan is make sure there is enough water available for all sectors.
	Leakage	50% reduction in leakage by each company by 2050 from 2017/18 baseline (%)	Reduce leaks from the water system	-
		% leakage reduction above 50%	Reduce leaks from the water system	-
	Water consumption	Distribution input per head of population (Litres/person)	Reduce the amount of water used	-
	Customer preference	Customer preference for option type (score)	Use options that are preferred by customers	-
Deliver environmental improvement and benefits to society	Strategic Environmental Assessment (SEA)	Programme benefit (score max)	Maximise positive environmental impact	-
		Programme disbenefit (score min)	Minimise negative environmental impact	-
	Natural capital	Enhancement of Natural Capital Value (£m)	Maximise positive environmental impact	Include in maximise positive environmental impact / minimise negative environmental impact due to degree of overlap in impacts covered

Outcome	Value criteria	Metrics	Attribute	Notes
	Abstraction reduction	Reduction in the volume of water abstracted at identified sites (Ml/day) and by when (date)	Reduce dependency on sensitive river habitats and groundwater sources	-
	Biodiversity	Net-gain score (%)	Maximise positive environmental impact	Include in maximise positive environmental impact
	Carbon	Cost of carbon offsetting (£m)	Balance carbon impact	-
Increase the resilience of the region's water systems	Drought resilience	Achieve 1 in 500-year drought resilience (date achieved)	Reduce risk of emergency drought measures	-
	Resilience assessment - Reliability	Programme reliability score	Make water system more reliable	-
	Resilience assessment - Adaptability	Programme adaptability score	Make water system more adaptable	-
	Resilience assessment - Evolvability	Programme evolvability score	Make water system easier to modify	-
Delivered at a cost that is acceptable to customers	Programme cost	Net Present Value (NPV) using the Social Time Preference Rate (£m)	Deliver the plan at an acceptable cost	-
	Intergenerational equity	Health rate (THDR 1%)	Balance of cost the plan for current customers vs. future customers	-

Appendix C: Customer preference weights for best value criteria

Criteria	Attribute	Odds ratio	Customer preference weight (%)
Public Water Supply - supply demand balance profile (Ml/day)	Make sure there is enough water for everyone	5.99	**11.9%**
Provides additional water needed by other sectors (Ml/day)	Make sure there is enough water for everyone	5.99	**11.9%**
50% reduction in leakage by each company by 2050 from 2017/18 baseline (%)	Reduce leaks from the water system	3.76	**7.5%**
% leakage reduction above 50%	Reduce leaks from the water system	3.76	**7.5%**
Distribution input per head of population (Litres/person)	Reduce the amount of water used	2.67	**5.3%**
Customer preference for option type (score)	Use options that are preferred by customers	1.00	**2.0%**
Programme benefit (score max)	Maximise positive environmental impact	2.59	**5.1%**
Programme disbenefit (score min)	Minimise negative environmental impact	2.60	**5.2%**
Enhancement of Natural Capital Value (£m)	Maximise positive environmental impact	2.59	**5.1%**
Reduction in the volume of water abstracted at identified sites (Ml/day)	Reduce dependency on sensitive river habitats and groundwater sources	3.00	**5.9%**
Net-gain score (%)	Maximise positive environmental impact	2.59	**5.1%**
Cost of carbon offsetting (£m)	Balance carbon impact	1.15	**2.3%**
Achieve 1 in 500-year drought resilience (date achieved)	Reduce risk of emergency drought measures	1.99	**3.9%**
Programme reliability score	Make water system more reliable	2.53	**5.0%**
Programme adaptability score	Make water system more adaptable	1.47	**2.9%**
Programme evolvability score	Make water system easier to modify	1.21	**2.4%**
Net Present Value (NPV) using the Social Time Preference Rate (£m)	Deliver the plan at an acceptable cost	3.39	**6.7%**
Health rate (THDR 1%)	Balance of cost the plan for current customers vs. future customers	2.13	**4.2%**
	Sum	50.41	**100%**

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