WRSE Customer Research – Regional Plan Preferences

Technical Report

Water Resource South East (WRSE)

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Disclaimer

Document evolution

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Executive summary

Introductions

WRSE is developing the regional water resource plan for the South East. The aim is to ensure that water supplies are managed and secured over the long term, meeting the needs of households and businesses now and in the future. The plan will address future challenges including changing climate, changing weather patterns, environmental protection and population growth. The regional long-term water resources plan will need to balance reducing demand for water, developing new schemes, environmental and resilience improvements, and bill impact.

This report summarises the approach, method, analysis, and findings from quantitative research that examined customers' preferences for alternative regional plans.

Approach

The quantitative research used a stated preference methodology and involved the design, testing, implementation, and analysis of a customer survey. The core component of the survey was two choice tasks – with and without a bill impact - in which customers selected their preferred scenarios ("profiles") for the regional plan (Table A1).

Table A1: Regional plan profiles featured in the customer survey

Label in survey (plan profile*)	**Features**
Mix of schemes (Least Cost)	Base plan: balance of transfers, strategic schemes, local schemes, and demand management.
More resilient (Best Value)	Draft plan (consultation): more emphasis on demand management and strategic schemes over transfers and local schemes, resulting in higher resilience plan.
More transfers, fewer reservoirs (More transfers, fewer reservoirs)	Reliance on transfers and local schemes, with specific exclusion of the largest strategic resource option (the South East Strategic Reservoir Option / SESRO), resulting in a lower resilience plan.
More demand management (Accelerated demand management (Gov C))	Balanced plan plus highest level of ambition for demand management requiring Government-led intervention, giving a lower carbon intense plan.
Less Government intervention (Exclude Government led demand management (Gov H))	Lowest level of ambition for demand management with absence of Government-led intervention, giving a more carbon intense plan impact.

Note: *"Plan profile" refers to WRSE investment modelling outputs.

The scenarios were described in terms of the key regional planning considerations:

- Where will the water come from?
- What are the main supply schemes?
- What does the plan mean for customers' water use?
- What are the wider impacts of the plan?

The main results provide a basis for estimating the level of customer support for alternative scenarios for the regional plan.

The survey was implemented with representative samples of household (n = 1,409) and non-household customers (n = 319). A good geographic spread of respondents was achieved across the WRSE region overall and for each company area.

The overall survey results, respondent feedback, and findings from the survey testing stage indicate that customers engaged well with the survey content, understood the choice task exercise, and provided considered responses.

Key Findings

Overall, no single plan stood out with a majority share of customer support and preferences varied according to aspects including bill impact, location, and customer characteristics. The main tendency, though, was for customers to prefer plans that offered a balanced approach to securing future water supplies in the region. Key findings in this regard were:

1. Customers' overall preference is for a balanced regional plan.

The three most-preferred plan profiles for both household and non-household respondents tended to be the Least Cost, Best Value and Gov C plans. These all featured a mix of strategic resource schemes (e.g. South East Strategic Reservoir Option/SESRO), supporting transfers (e.g. Grand Union Canal transfer), local schemes (e.g. Teddington water recycling) and higher levels of demand management ambition. The plans profiles with more extreme variations in schemes and options – such as More transfers, fewer reservoirs (fewer strategic resources schemes; more reliance on inter-region transfers) and Gov H (lower Government intervention) – tended to be less preferred in aggregate compared to the Least Cost, Best Value and Gov C plans.

2. The greater weight of customer preference was for self-sufficiency within the WRSE region.

Transfers from outside of the region featured within the mix of schemes that most customers tended to prefer. But the overall pattern of preferences suggests that large-scale transfers were not viewed as the *primary* solution for the regional plan. Indeed, the majority of respondents wanted new transfers to be in place alongside efforts to reduce customers' water use,

suggesting that they saw transfers as a complementary part of the regional. Moreover, the strength of preference observed for the Gov C plan indicates that a sizeable proportion of customers tended to view demand reduction as of equal importance to large-scale transfers for ensuring a "balanced" regional plan to secure water supplies.

3. Customers value the aspects offered by the Best Value and Gov C plan.

At higher given bill amounts for the regional plan – for example above £100 per year – the Best Value and Gov C plans tended to be the most preferred alternatives (28% and 31% respectively, versus 9% - 17% for the remaining three plans - Section 4.2.3). This suggests that customers tended to see these plans as better value for money over the alternative plan profiles at higher bill levels. For the Best Value plan, at least, this indicates that the higher level of resilience offered does has some appeal, albeit, though this is only apparent in cases where there is a sizable impact on customer bills – i.e. the plan was less differentiated and stood out less in comparison to others at more modest levels of bill impact.

4. Customers recognise the need to reduce demand and see this as an integral part of the regional plan, but it must be supported by Government intervention.

Given the choice between the Gov C (introduction of product standards and new building regulations) and Gov H (lowest level of ambition for demand management) plan, there was a stronger preference for Gov C, indicating that customers preferred options with more demand management measures and higher levels of government intervention. This is consistent with wider findings that showed that respondents recognised that reductions in demand were integral to the regional plan and future challenges could not be solved by strategic schemes and further resource development alone.

5. Varying levels of preferences for the alternative plan profiles were attributable to customer location, socio-economic and demographic characteristics.

The variation in customers' preferred plans was explained by observable factors and this help to explain why no single plan stood out overall. For example, respondents in higher SEGs tended to have a stronger preference for the Best Value plan, whilst older respondents (55+) tended to have a stronger preference for the Least Cost plan. Respondents living in Lower Thames tended to have a stronger preference for Least Cost plan, compared to the Best Value and Gov C plan, while respondents based in the Central and South WRSE regions tended to have a stronger preference for the Best Value plan profile compared to the Least Cost plan. Overall, these findings support a direction forward around a balanced plan and the flexibility to adapt the plan in the future.

Conclusion

This research complements consultation feedback from regulators, stakeholders and other interested groups on the regional plan, along with the WRSE companies' own customer research.

The results and findings are most informative on customers' views on the balance and emphasis of the regional plan, rather than representing a detailed assessment of customer support for any specific scheme or water resource planning option. The adaptive planning approach that underpins the regional plan will be updated every five years. This provides future opportunities to engage with customers on the balance of the plan moving forward. This is particularly important for the medium to longer term view of the plan beyond 2035 and how future uncertainty is addressed through different pathways and the combination and balance of schemes expected to be needed under each scenario.

Contents

1. Introduction

1.1 Background

Water Resources South East (WRSE) is an alliance of the six water companies that supply drinking water across South East England – Affinity Water, Portsmouth Water, SES Water, Southern Water, South East Water and Thames Water. In collaboration with Government, regulators and stakeholders, WRSE is developing the long-term plan for water resources for the region. The overall aim is to outline the strategic approach to make water supplies in the South East more resilient and address the projected future shortfall in water resources due to climate change, population growth and increased protection for the environment. The plan will be implemented and delivered through the individual Water Resource Management Plans (WRMPs) of the six WRSE companies.

WRSE consulted on the draft regional plan in early 2023. The plan is based around a series of future scenarios and understanding the amount of additional water that may be needed to secure water supplies over the period 2025 - 2100. The basic legal and regulatory requirements and policy expectations for the plan include:

- **Resilience**: Increase the resilience of the region's water supplies to reduce the risk of emergency restrictions such as standpipes to no more than once every 500 years on average by 2040
- **Environment**: Leave more water in the environment to deliver long-term environmental improvements
- **Leakage**: Reduce leakage by at least 50% by 2050
- **Demand**: Support the national ambition to reduce household water use to 110 litres per person per day by 2050

The plan identifies the priority investments needed for the period 2025 – 2035 that will enable adaptation in the longer term to different future scenarios to manage uncertainty and invest appropriately. Here a series of choices remain, including:

- The scale of development of shared resources that can supply customers in multiple company areas versus greater emphasis on "local" schemes;
- How much reliance should be placed on the transfer of water to the South East from other regions versus self-sufficiency within the region; and
- The overall ambition for reducing demand and the set of measures and support from Government that will be needed to bring down per capita consumption.

1.2 Wider research context

The customer research for WRSE was carried out through March to May 2023 against the backdrop of continuing pressure on households' budgets from rapidly rising food and energy prices (the "cost of living crisis"). There was also a continued focus on the environmental performance of water companies following the high-profile political scrutiny and media coverage of wastewater management and storm discharges. Prior to this, the prolonged dry weather throughout 2022 - which included several heat wave events - raised

the profile of drought resilience and water availability in both national and local media, with a drought declared across the South East in August 2022.

1.3 Objectives

The purpose of the customer research for WRSE was to examine customer preferences in relation to:

1. The **balance of the regional plan,** by offering customers the choice between alternative plan profiles, based around the mix of schemes, inter-region transfers, the intensity of demand management measures and wider outcomes including resilience to drought and unexpected events, carbon emissions, and impact on customers' water use; and

2. The **bill impact of the regional plan,** by testing whether the level of support for the alternative plan profiles changed at varying levels of (average) bill impact.

The research used a stated preference approach and was implemented as an online survey with a representative sample of household and non-household customers in the South East, with coverage of all six WRSE companies. The practical methodology involved: (i) the design and testing of the survey and the stated preference choice tasks; (ii) the main survey implementation (fieldwork); and (iii) analysis of the dataset to quantify customers' preferences. The results and findings from the research sit alongside the consultation feedback to WRSE from regulators, stakeholders and other interested groups. Along with these responses the view from customers will help inform the finalisation of the regional plan in early Summer 2023.

1.4 Report structure

The remainder of this report is structured as follows:

- **Section 2** details the methodological approach and implementation of the online survey;
- **Section 3** summarises the respondent profile, which includes the sample representativeness and customer views and attitudes on reductions in water use;
- **Section 4** presents the choice task analysis and validity testing assessments; and
- **Section 5** summarises the main findings and conclusions from the research.

The main report content is supported by the following appendices:

- **Appendix 1** summarises the approach to the survey development and testing;
- **Appendix 2** provides the survey scripts for households and non-households;
- **Appendix 3** provides the onscreen layout of the survey to respondents;
- **Appendix 4** reports summary statistics for both the household and non-household samples; and
- **Appendix 5** reports the choice model estimations.

2. Research approach

Section 2 summarises the method and approach of the study:

Survey versions – Household and non-household versions of the survey were produced. Both followed a similar overall structure, with small differences to adapt to the corresponding customer type.

Survey development and testing – the survey was tested and piloted prior to full implementation. Extensive development work took place with participation from a panel of customers to help "co-design" elements of the survey that explained and presented the regional plan.

Survey structure and content – The survey consisted of five sections: (A) Respondent screening and quotas; (B1) Introduction to long-term planning for water resources; (B2) The regional plan; (C) Customer preferences and preferred plan profile; and (D) respondent profile.

Choice exercises – Respondents were presented with two choice tasks concerning their preferred profile for the regional plan: (i) an "unconstrained" choice without bill impact; and (ii) a "constrained" choice with an (average) annual bill impact over from 2025 onwards (to 2100).

Sampling approach - The overall target sample size for the main survey implementation was 1,400 household and 300 non-household customers. Household sampling quotas were specified in terms of socio-economic group, gender, age and water service provider, while non-household quotas were specified in terms of sector and water supplier.

2.1 Survey structure and content

The customer research was implemented as an online survey. The survey structure was consistent with the typical approach for a stated preference survey (

Table 2.1) and in line with good practice guidelines[1].

The survey content was developed with support from WRSE, who provided tailored introductory content (Section B1), including short videos explaining the background to the regional plan, key drivers (drought resilience, climate, population growth, and environmental protection), and key requirements (e.g. the amount additional of water required over time) and options (resources, transfers, demand management).

The design and level of detail provided in the storyboard and "information share" (Section B2) was informed by a co-design exercise that was carried out with a panel of customers via an online bulletin board. The purpose of the co-design exercise was to explore how the regional plan could be presented and explained to customers in an online survey setting, including presenting the strategic context and spatial and temporal aspects of the plan showing major supply options and transfers. A summary of the overall survey development and testing process is provided in Appendix 1. The complete scripts for household and non-household versions are provided in Appendix 2 for reference, whilst Appendix 3 presents the onscreen

[1] Johnston, Robert J., et al. "Contemporary guidance for stated preference studies." Journal of the Association of Environmental and Resource Economists 4.2 (2017): 319-405.

layout of the survey.

Table 2.1: Survey content

Section	Content	
	Household survey (online)	**Non-household survey (online)**
Section A Respondent screening and quotas	Introduction to the survey topic, WRSE, and aims to understand customer views.	
	Gender, age, socio-economic group and water supplier	Sector and water supplier
Section B1 Introduction to long-term planning	Video introducing the long-term plan for water supply in the South East of England	
	Customer awareness of the four main pressures on the water supply system (population growth, climate change, drought resilience and protecting the environment)	
Section B2: Regional plan	Descriptive information ('**Story Board**') on the regional plan under the following sections: • Where will the water come from? • What are the main supply schemes? • What does the plan mean for customers' water use? • What else has been considered in the plan?	
	Customer preferences for plans for demand and supply measures	
	Customer preferences for the size of schemes	
	Customers views towards circumstances in which they would find it acceptable to reduce water in the future	
Section C Customer preference – preferred plan profile	Overview of the minimum requirements of the long-term plan and introduction to the choice tasks	
	Choice tasks: Two sequential choice exercises using a preference ordering ("full ranking") format – (i) "unconstrained" without the bill impact and (ii) "constrained" with the bill impact	
	Motivations and reasons for choices	
	Feedback for the choice exercise (ease/difficulty)	
Section D Respondent profile	Household size, disability, employment, education, income	Number of sites, size of organisation, organisation turnover, bill
	Feedback on the survey	

2.1.1 Customer preferences – choice tasks

Customer preferences for alternative plan profiles were elicited via stated preference choice tasks (discrete choice), that used a progressive choice task format. This is an approach for quantifying customer preferences between alternative options, such as different profiles for the regional plan. The progressive choice format gives a full ranking of plans and hence a richer set of data on customer preferences. The resulting data can be analysed in terms of customers "most preferred" plan only (their top choice from the alternative shown), or the full preference ordering (their top choice, their second choice, and so on). This gives more flexibility to gauge how strong customer preference is for each plan. For example, whether one plan stands out from all others, or whether there are subsets of plans that have a similar level of preference from customers.

The survey featured two choice tasks, asked in sequence:

1. **Preference over alternative plan profiles <u>without</u> bill impact**: this provided an "unconstrained" view of customer preferences based on the profile of each plan (i.e. the mix of schemes and impacts).
2. **Preference over alternative plan profiles <u>with</u> (randomised) bill impact**: this provided a "constrained" view on customer preferences reflecting trade-offs between higher/lower bill amounts and the profile of each plan.

In each choice task, respondents were asked to consider five alternative plan profiles that represented difference balances of the regional plan (see below). The progressive choice format required that respondents select their most preferred profile out of the five shown, then of the remaining four plans select the most preferred plan, and so on. Respondents made a total of eight "most preferred" choices: one set of 4 for the "unconstrained" exercise and another set of four for the "constrained" exercise.

Figure 2.1 shows the onscreen appearance of the "unconstrained" choice task exercise. The order of the plans (left to right) was randomised for each respondent. The layout and appearance of the choice tasks was developed and refined during the pre-testing stage (see Appendix 2).

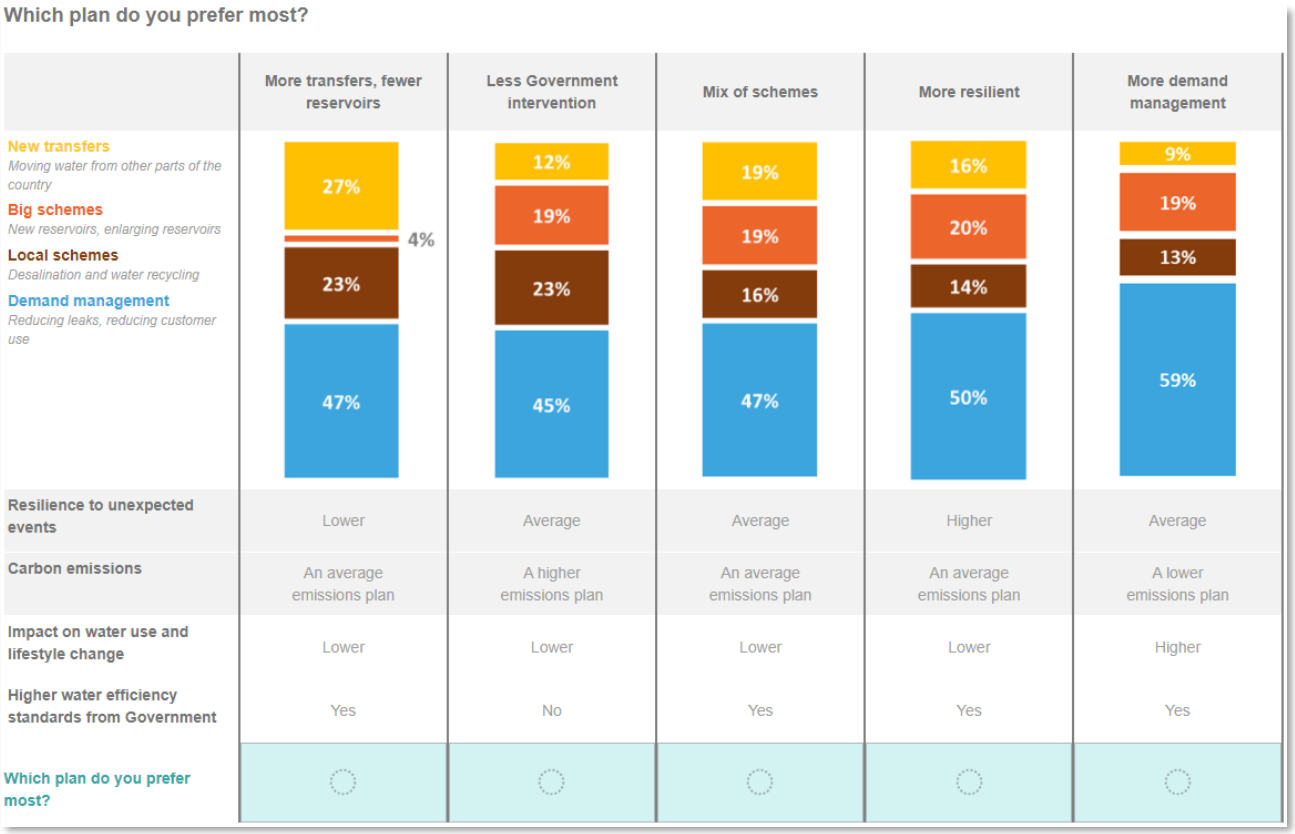


Figure 2.1: Onscreen appearance and layout of choice task ("unconstrained", without the bill impact)

The profiles of five alternative plan profiles shown to respondents were specified according to outputs from WRSE's extensive investment modelling that was undertaken in 2022. The alternative profiles characterised the high-level choices and trade-offs for the balance of the regional plan based around sources of water (supply schemes, inter-region transfers and demand management) and selected impacts. The characterisation mirrored the information respondents were provided with in Section B2 of the survey (see Appendix 3), which was presented under the following headings:

- Where will the water come from?
- What are the main supply schemes?
- What does the plan mean for customers' water use?
- What else has been considered in the plan?

The five plans included in the survey were selected from a longer candidate list which was narrowed down based on analysis and pre-testing with customers to determine the subset that presented sufficient trade-offs and meaningful differences for respondents to choose between. Table 2.2 outlines the five alternative plan profiles featured in the choice tasks, detailing the key features for each plan. Appendix 3 provides for more information on the chosen five plans.

Table 2.2: Regional plan options

Label in survey (plan profile*)	**Features**
Mix of schemes (Least Cost)	Base plan: balance of transfers, strategic schemes, local schemes, and demand management.
More resilient (Best Value)	Draft plan (consultation): more emphasis on demand management and strategic schemes over transfers and local schemes, resulting in higher resilience plan.
More transfers, fewer reservoirs (More transfers, fewer reservoirs)	Reliance on transfers and local schemes, with specific exclusion of the largest strategic resource option (the South East Strategic Reservoir Option / SESRO), resulting in a lower resilience plan.
More demand management (Accelerated demand management (Gov C))	Balanced plan plus highest level of ambition for demand management requiring Government-led intervention, giving a lower carbon intense plan.
Less Government intervention (Exclude Government led demand management (Gov H))	Lowest level of ambition for demand management with absence of Government-led intervention, giving a more carbon intense plan impact.

Note: *"Plan profile" refers to WRSE investment modelling outputs.

The "constrained" choice exercise included a bill impact as a trade-off against each alternative plan profile. The bill impact was defined as the average annual bill impact over the whole planning period (2025 – 2100). Respondents were told that the stated amount was for the cost of investments for regional plan only. The total amount paid for water and wastewater services over the planning period would depend on other investments. Respondents were also told that the bill impact did not include an estimate of the effect of inflation. Household respondents were presented bill impacts in terms of annual pound increases, while non-household were presented bill impacts in terms of the annual percentage increase from their current water bill (see Table 2.3). The bill impact was randomised across the plans for all respondents.

Table 2.3: Bill impact levels for the "constrained" choice task (average annual bill impact from 2025 to 2100)

Bill impact	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9
Households	£5	£10	£20	£30	£50	£75	£100	£150	£200	£250
Non-households	1%	2%	5%	7%	11%	17%	23%	34%	46%	57%

2.2 Sampling approach

The overall (minimum) target sample size for the main survey implementation was 1,400 household and 300 non-household customers. For the household sample, the quotas were specified in terms of socio-economic group, age, gender and water supplier to ensure representativeness across household characteristics and geography (Table 2.4). The sample was also monitored to identify for customers who were in potentially vulnerable circumstances and to ensure their inclusion in the research.

Respondents were identified as being in potentially vulnerable circumstance if they fit two of the following criteria:

- Annual household income under £18,000k
- Unemployed, full-time carer, retired, or casual worker
- Struggles to pays bills at least some of the time
- Aged 75 or over
- Registered/eligible for Priority Services Register
- Long term medical condition or disability (collect only if the person is unidentifiable)
- Children in household under 5 years

To ensure regional representativeness of non-household customers, sampling quotas were specified in terms of sector and water service provider (Table 2.5)

Table 2.4: Sampling quotas for household customers

Socio-economic group	Quota (n)	Quota (%)
SEG AB	406	29%
SEG C1	448	32%
SEG C2	252	18%
SEG DE	294	21%
Total	**1,400**	**100%**
Gender	**Quota (n)**	**Quota (%)**
Female	700	50%
Male	700	50%
Total	**1,400**	**100%**
Age	**Quota (n)**	**Quota (%)**
16 – 18	56	4%
19 – 24	126	9%
25 – 30	154	11%
31 – 44	364	26%
45 – 54	238	17%
55 – 64	196	14%
65+	266	19%
Total	**1,400**	**100%**
Water Company	**Quota (n)**	**Quota (%)**
Affinity Water	210	15%
South East Water	210	15%
Southern Water	210	15%
Thames Water – London	224	16%
Thames Water – Outside London	224	16%
SES	154	11%
Portsmouth Water	168	12%
Total	**1,400**	**100%**

Source: ONS (2019) Census data

Table 2.5: Sampling quotas for non-household customers

Sector	Quota (n)	Quota (%)
Primary	3	1%
Secondary	51	17%
Tertiary	246	82%
Total	**300**	**100%**
Water company	**Quota (n)**	**Quota (%)**
Affinity Water	64	21%
South East Water	24	8%
Southern Water	24	8%
Thames Water – London	81	27%
Thames Water – Outside London	81	27%
SES	12	4%
Portsmouth Water	14	4%
Total	**300**	**100%**

Source: ONS (2019) Business activity data
Source: ONS (2022) UK Business: activity, size and location

3. Respondent profile and attitudes

Section 3 reports the sample profile, along with results for respondent perceptions and attitudes towards the regional plan. Full summary statistics are provided in Appendix 4.

Household sample – The sample consisted of 1,409 respondents. The sample profile was largely in line with the specified target quotas. Sample weights were applied in the analysis to account for over/under-representation of specific groups.

Non-household sample – The sample consisted of 319 respondents. The non-household sample was in line with the specified target quota for operating sector but there was under-representation of non-household Thames Water customers. Sampling weights were applied in the analysis to account for this.

Geographic distribution of respondents – The sampling achieved a good distribution of respondents across the WRSE region, for both household and non-household customers.

Awareness and attitudes – Both household and non-household respondents were generally aware of future pressures facing water supplies. Preferences on the emphasis of future planning varied. Approximately half of the household and non-household respondents preferred stronger emphasis on demand management measures, while just under half preferred transfers to be the emphasis. Most respondents stated they were happy to reduce their water use if water companies reduce leaks to meet targets by 20250, and if government introduced new legislation to promote efficient water use.

3.1 Geographic distribution and water company

A total of 1,409 household respondents and 319 non-household respondents completed the survey. Overall, there was a good spread of both household and non-household respondents across the WRSE operating area (Figure 3.1). The household sample featured respondents from each of the 31 individual water resource zones (WRZs) in the region and the non-household sample had coverage of 30 of the 31 WRZs in the region.

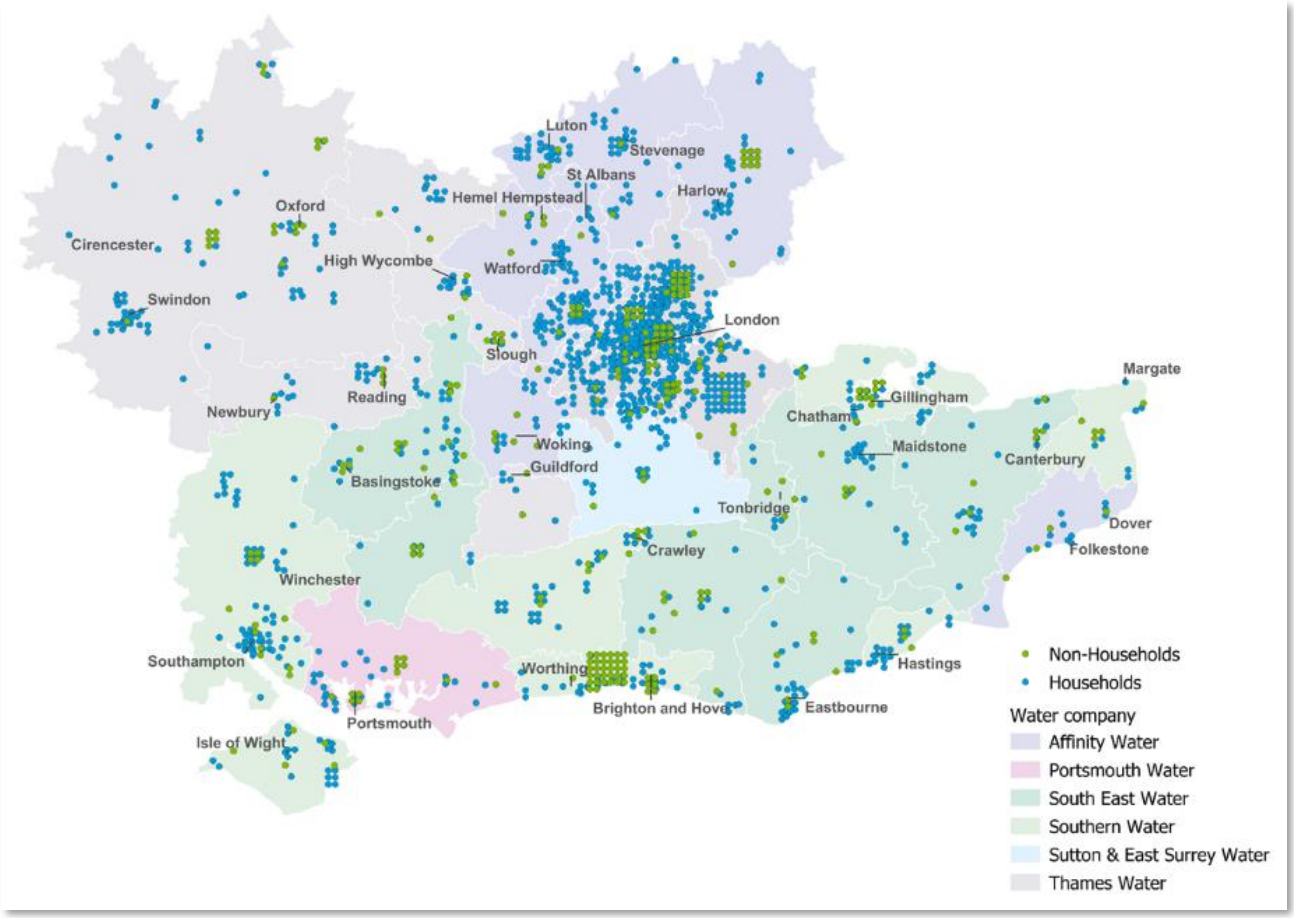


Figure 3.1: Geographic representation of the sample (HH n = 1409, NHH n = 319)

Figure 3.2 and Figure 3.3 provide a breakdown of the number of respondents by water company, relative to the sampling quotas. Overall, the sample was well aligned to the profile of the WRSE region, with household water supplier profile being within +/-6 percentage points of the specified quotas. The non-household sample was generally less representative with respect to water suppliers, with the profile being within 21 percentage points of the specified quotas. To correct for the deviation from the sampling quotas, weights were applied to the analysis to account for over/under-representation of specific company customers.

Water supplier		n	%
Affinity Water		296	21%
	Quota		19%
Portsmouth Water		57	4%
	Quota		4%
SES Water		65	5%
	Quota		4%
Southern Water		217	15%
	Quota		14%
South East Water		181	13%
	Quota		13%
Thames Water		593	42%
	Quota		48%
Total		**1409**	

Figure 3.2: Household respondents by water company (HH n = 1409)

Water suppllier		n	%
Affinity Water		92	29%
	Quota		17%
Portsmouth Water		14	4%
	Quota		4%
Sutton and East Surrey Water		22	7%
	Quota		3%
Southern Water		44	14%
	Quota		13%
South East Water		55	17%
	Quota		13%
Thames Water		92	29%
	Quota		50%
Total		**319**	

Figure 3.3: Non-household respondents by water company (n = 319)

3.2 Household sample

The household sample profile by age was fairly consistent with the target quotas (Figure 3.4). The main deviation was for respondents aged 31-44 who were 10 percentage points off the specified target quotas. The sample according to socio-economic profile over-represented higher SEG groups, with SEG AB 14 percentage points above the target quota (Figure 3.5). The gender profile was, though, more consistent with only minor variation from the quotas (+/- 2 percentage points) (Figure 3.5). Sample weights were applied in the analysis to account for over/under-representation of specific groups.

Age		n	%
16-18		10	1%
	Quota		4%
19-24		92	7%
	Quota		9%
25-30		185	13%
	Quota		11%
31-44		510	36%
	Quota		26%
45-54		196	14%
	Quota		17%
55-64		228	16%
	Quota		14%
65+		188	13%
	Quota		19%
Total		**1409**	

Figure 3.4: Household sample profile - age (n = 1409)

SEG		n	%
AB		610	43%
	Quota		29%
C1C2		589	42%
	Quota		50%
DE		210	15%
	Quota		21%
Total		**1409**	

Figure 3.5: Household sample profile – SEG (n = 1409)

Gender		n	%
Female		673	48%
	Quota		50%
Male		733	52%
	Quota		50%
Total		**1406**	

Figure 3.6: Household sample profile – Gender (n = 1409)

The average household income of the sample was around £50,000, while the median income was just under £48,002 (Figure 3.7). This is higher than median income in the South East which is around £36,000[3], and is likely explained by the oversampling of the SEG AB respondents.

[2] The income of the sample was capped at £150,000

[3] 2022 median income by region, available at: https://commonslibrary.parliament.uk/research-briefings/cbp-8456/

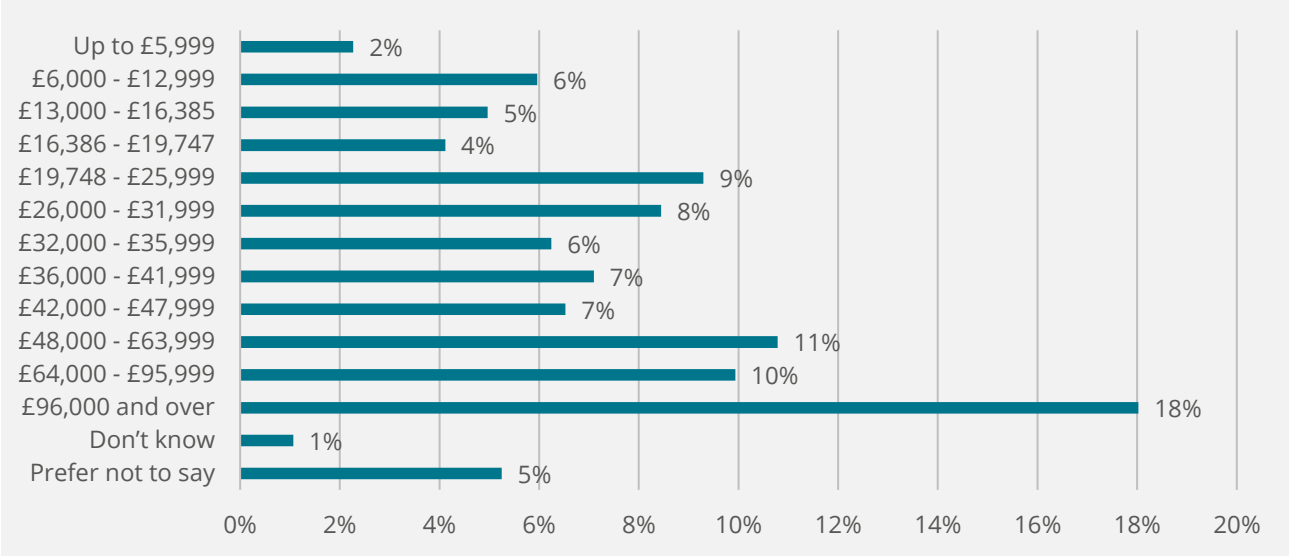


Figure 3.7: Household income (n = 1409)

The majority of household respondents had a current combined bill for water and wastewater services above £300 per year. Approximately 20% stated that their annual bull was £501 or higher Figure 3.8).

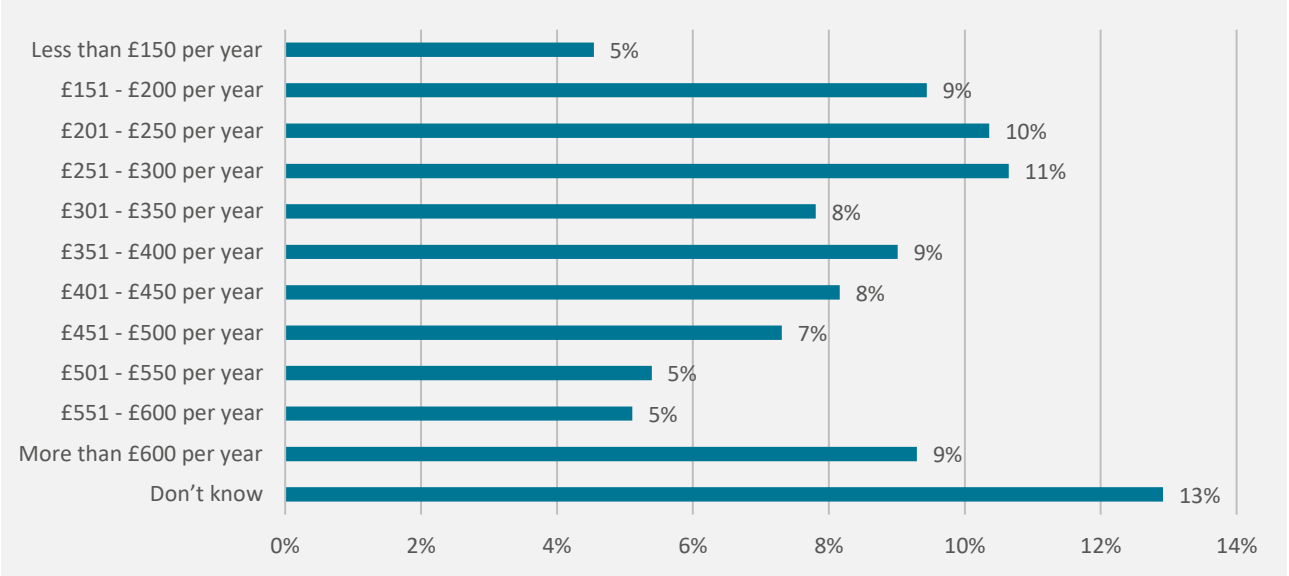


Figure 3.8: Household customer water and wastewater bill (n = 1409)

3.3 Non-household sample

The non-household sample aligned relatively well to the quotas specified for sector, with the majority of respondents operating in the tertiary sector (82%) (Figure 3.9). Just over a third of respondents stated their organisation's turnover was under £1,000,000, whilst 48% had a turnover between £1,000,000 and £10,000,000. Around one-fifth reported turnover over £10,000,000 (Figure 3.10).

Sector	n	%
Primary	19	6%
Quota		1%
Secondary	90	28%
Quota		17%
Tertiary	210	66%
Quota		82%
Total	**319**	

Figure 3.9: Non-household sample profile – Sector (n = 319)

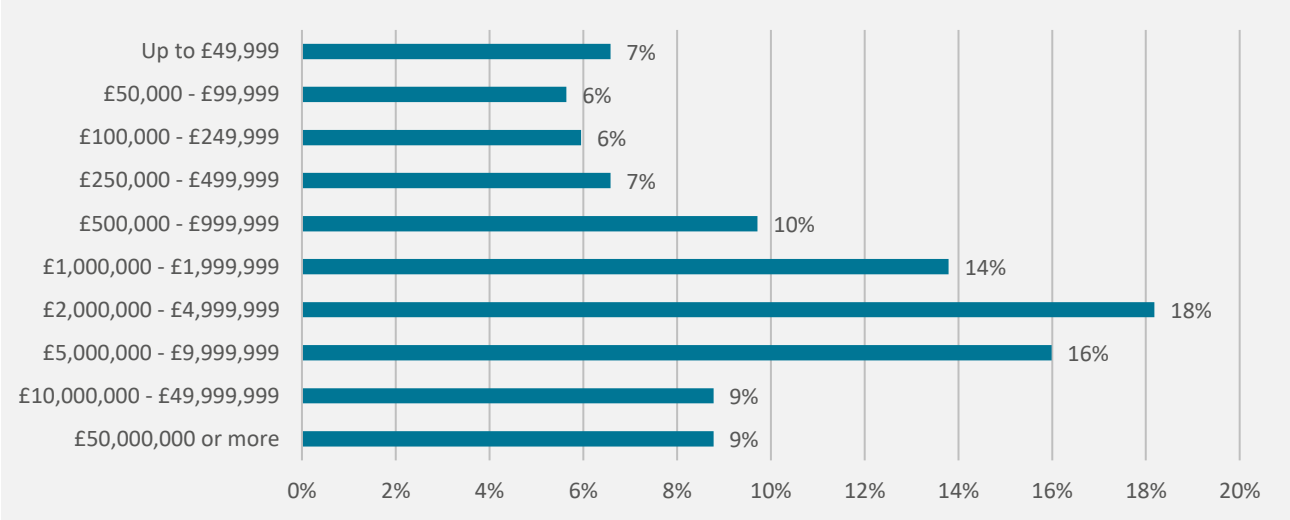


Figure 3.10: Organisation turnover (n = 319)

Around 30% of organisations operated on one site, 61% operated on between two and ten sites, and a tenth of organisations operated on 10 sites or more (Figure 3.11). Half of the organisations paid up to £1,400 for water and wastewater services, 41% paid between £1,400 and £25,000, while the rest (9%) paid over £25,000) (Figure 3.12).

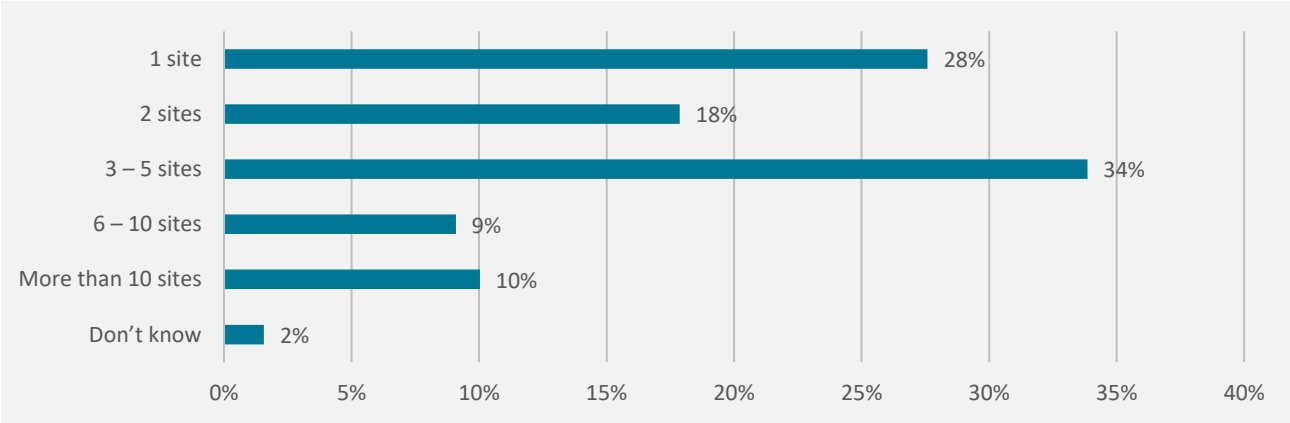


Figure 3.11: Organisation size (n = 319)

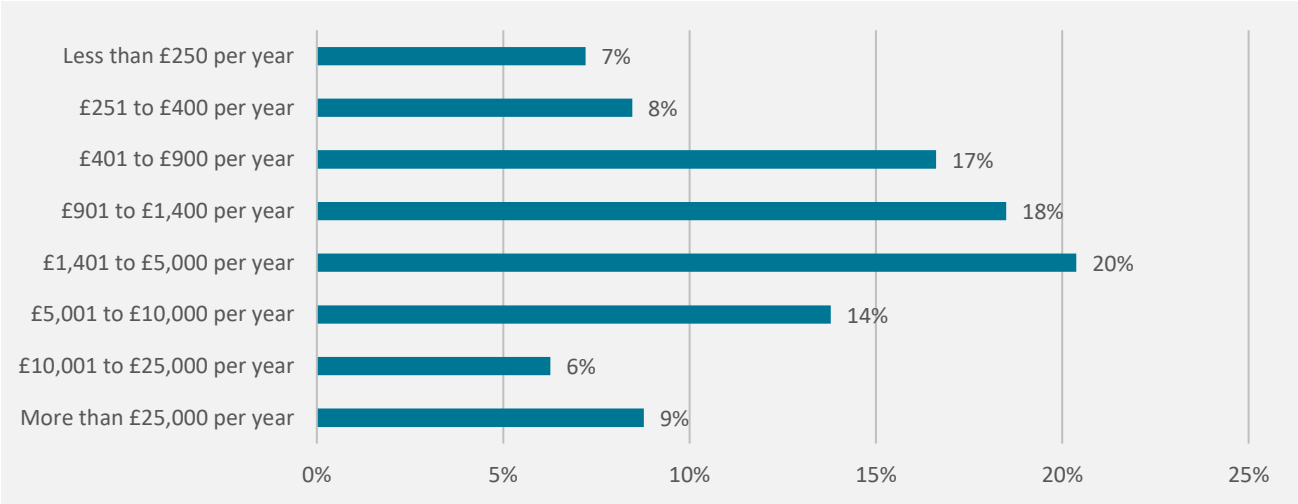


Figure 3.12: Non-household water and wastewater bill (n = 319)

3.4 Awareness and attitudes

3.4.1 Awareness of future pressures

Respondents were generally aware of the main pressures facing water resources and the long-term security of water supply. For both household and non-household respondents, the highest level of awareness was for climate change, with around 92% of household and 93% of organisations reporting that they were "very" or "somewhat aware" Figure 3.13). Both sets of respondents were also highly aware ("very aware" / "somewhat aware") of population growth (HH 92%, NHH 95%) and protecting the environment (HH 88%, NHH 87%). While general awareness was still high overall, the pressure with highest incidence of respondents who were "not aware at all" was drought resilience (HH 16%, NHH 12%).

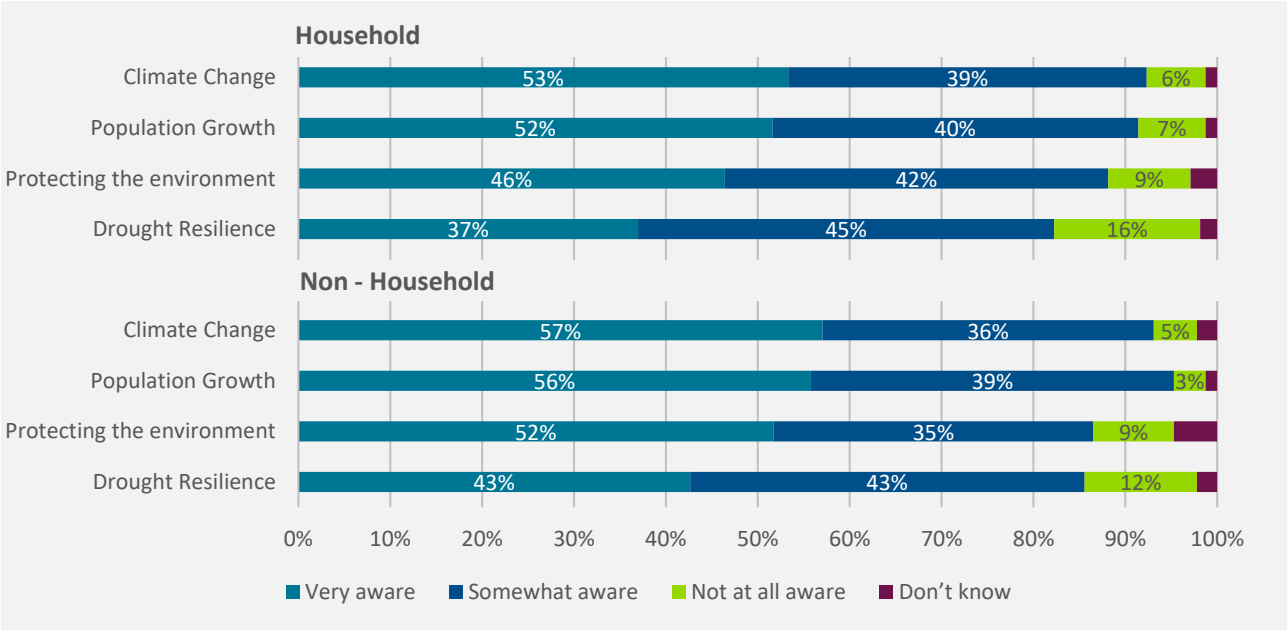


Figure 3.13: Customer awareness of future pressures (HH n = 1409, NHH n = 319)

3.4.2 Views on sources of water and scheme types

Following the introduction to the regional plan (Sections B1 and B2) respondents were asked some preliminary questions concerning some basic aspects of the balance between supply-side and demand management options. In relation to an emphasis on demand reduction versus reliance on transfers, there was a fairly split view, with the greater proportion of respondents marginally preferring the former (demand management, HH 53%, NHH 50%; new transfers, HH 41%, NHH 47%) (Figure 3.14).

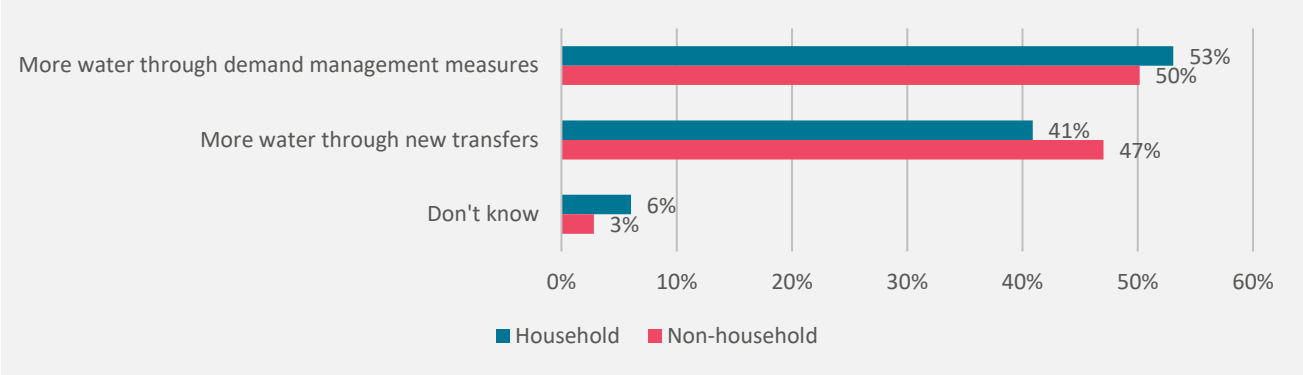


Figure 3.14: Preference between emphasis on demand management versus new transfers (HH n = 1409, NHH n = 319)
Sample weighted results.

A similar split view was evident for resource development options. Almost equal proportions of household respondents favoured an emphasis on larger strategic schemes (47%) to more local schemes (46%) (Figure 3.15). For non-household respondents there was a clearer a distinction between the two alternatives, although the difference was still relatively minor with a greater proportion favouring local schemes (53%) over larger schemes (47%).

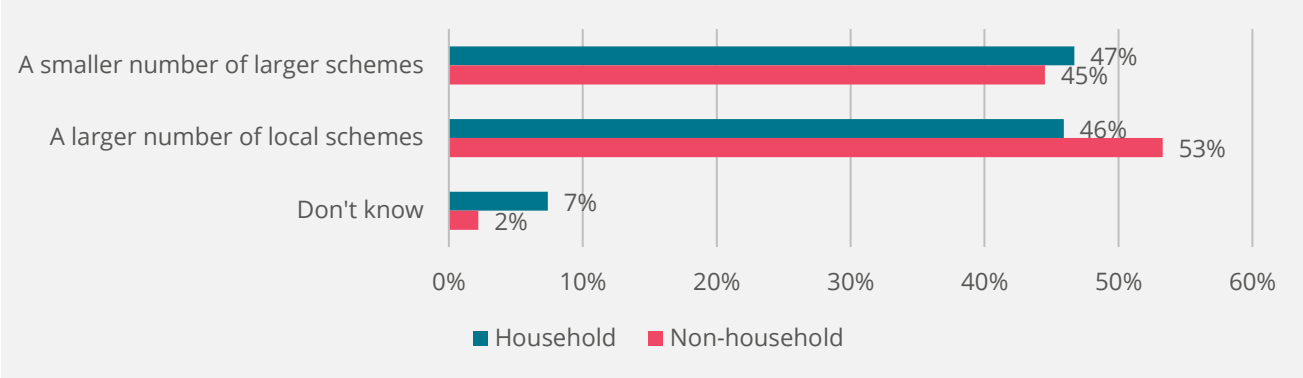


Figure 3.15: Preference between emphasis on a smaller number of larger schemes and a larger number of local schemes (HH n = 1409, NHH n = 319)
Sample weighted results.

3.4.3 Views on reducing water use

Respondents were asked a set of questions about the circumstances in which they would be willing to reduce their water use. Most respondents indicated they would be happy to try to reduce their water use if water companies reduce leaks to meet their stated targets by 2050 (HH 95%, NHH 94%) and if government introduces new legislation to promote efficient use of water (HH 88%, NHH 88%) (Figure 3.16). The majority of household respondents (79%) and non-household respondents (87%) also felt that new transfers should

be in place alongside efforts to reduce their own water use, suggesting that they saw transfers as a complementary part of the regional plan (rather than being an outright solution and alternative to measures to reduce demand).

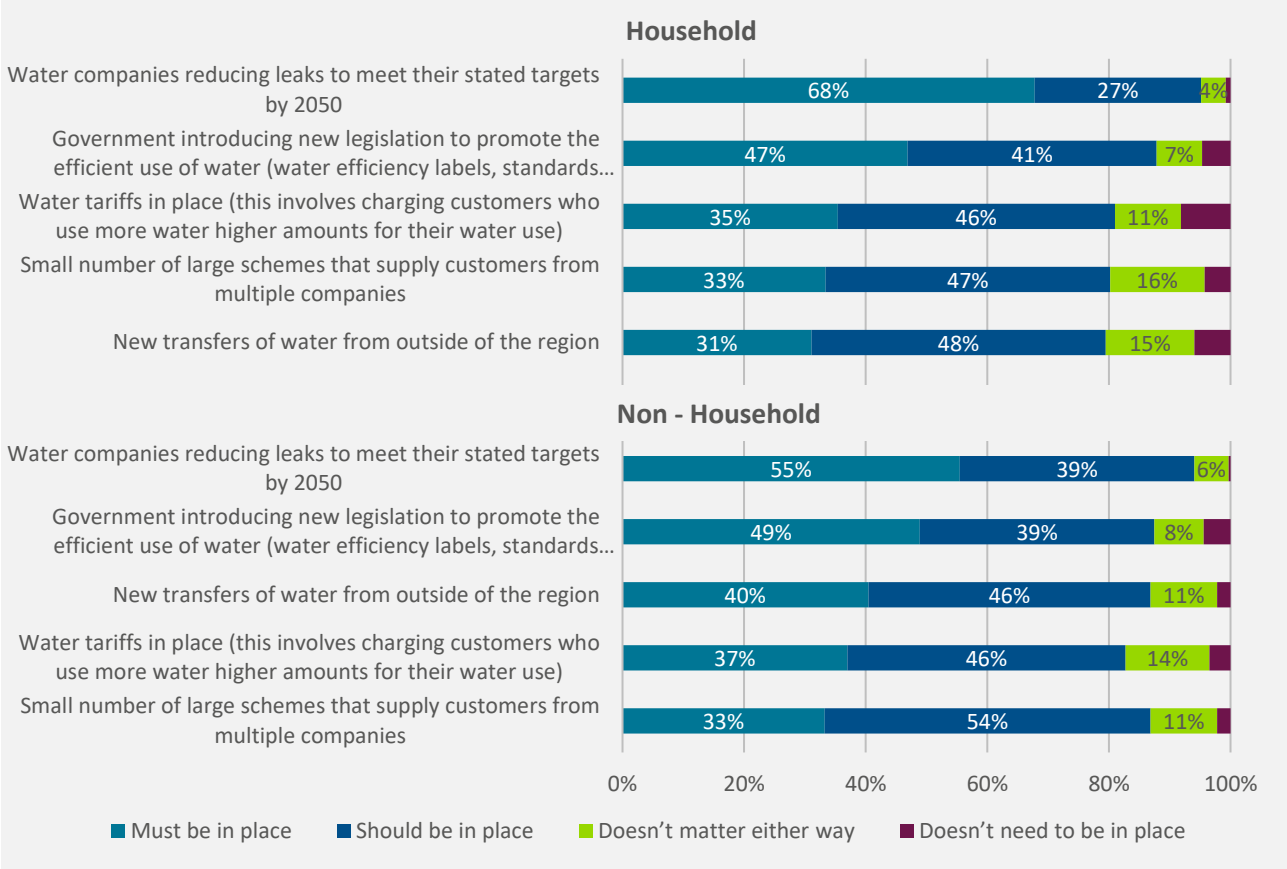


Figure 3.16: Circumstances under which customers would find it acceptable to reduce water use (HH n = 1409, NHH n = 319)
Sample weighted results.

4. Preferences for the regional plan

This section reports the analysis and results from the choice tasks on customer preferences for the regional plan:

Analysis - the choice task data was analysed using a series of econometric models to estimate and explain customer preferences for the regional plan. The main results are presented as respondents most preferred plan ("unconstrained" without a bill impact, and "constrained" with a bill impact) and the sensitivity to the bill impact (household only).

Validity - overall, the choice model estimations are robust with a reasonable fit to the data and the pattern of results is generally consistent with expectations. The choice task results, responses to follow-up questions, and overall feedback indicated that respondents were engaged, understood the survey and gave considered answers.

Results - overall, no single plan stood out with a majority share of customer support. In the main, the preference was for a balanced regional plan, with an emphasis on self-sufficiency within the WRSE region rather the reliance on inter-region transfers. The added resilience offered by the Best Value plan compared favourably to alternative plan profiles at higher levels of bill impact. A lower bill impact levels the Best Value plan did not stand out from the Least Cost and Gov C plan profiles. Customers recognised the need to reduce demand and see this as an integral part of the regional plan, but it must be supported by Government intervention.

4.1 Analysis

The main results for the customer preferences concerning the preferred plan profiles are derived from econometric analysis of respondent's choice task responses. As described in Section 2.1, respondents completed two choice tasks (unconstrained preference and constrained preference) using a progressive choice format and in each case were asked to select their most preferred profile for the regional plan from five options shown, and then their preferred profile from the remaining four and so on. This format allows for both the analysis of the preferred option in each choice and additionally analysis of the full preference ordering across the five options shown as well as understanding the sensitivity to the bill impact.

Two basic model specifications were used to analyse the choice task responses:

1. Multinomial logit model (MNL) to examine:
    - The choice of a preferred plan profile without bill impact (households and non-households). This is the "pure" unconstrained preference, reflecting the choice based on the alternative plan profiles (mix of schemes, the intensity of demand management, and wider outcomes including resilience to drought and unexpected events, carbon emissions, and impact on customers' water use) from set of five alternative. Results are reported in Section 4.2 for the overall WRSE customer base.
    - The choice of a preferred plan profile when set against a bill impact (households and non-household). This is the constrained choice, reflecting the trade-off between the preference for an

alternative plan profile and the impact on the customer bill. Results are reported in Section 4.2 for the overall WRSE customer base and for demographic, socio-economic and geographic segments.

2. Logistic regression model to examine:
   - Sensitivity to bill impact (households only). These results show the level of customer support for each plan at varying levels of bill impact. Results are reported in Section 4.2 for the overall WRSE customer base for each individual plan. Due to sample size limitations only household customer results are reported.

The estimated models control for a range of customer demographic, socio-economic, and geographic factors. The models explain customer preferences based on the alternative plan profiles, the wider explanatory factors, and bill impact[4]. Supporting sensitivity analysis examined respondents' full ranking (preference ordering) of the five alternative plans including bill impact using a mixed logit model. These results help validate the main findings (see Section 4.4).

Two main insights can be drawn from the choice model analysis to understand customer preferences for the alternative plans: (a) the main model estimation results that demonstrates robustness of response data and consistency in explaining customer preferences (i.e. primarily shows validity of research results); and (b) predicted shares that are estimated from the models which provide a basis for quantifying customer support for each alternative plan profile. Section 4.2 focuses on reporting the main model estimation. Predicted share results are provided in the accompanying Summary Report[5].

4.2 Main model estimations

The analysis of household customer preferences for the *most preferred* plan profile for both the "unconstrained" (without bill impact) and "constrained" (with bill impact) choice exercises controlled for the following factors as explanatory variables:

- Bill impact (for the "constrained" choice task);
- Geographic region (Upper Thames, Lower Thames, Central, West, South, East);
- Age (18 – 24, 25 – 54 and 55+);
- Socio-economic group (SEG AB, C1C2DE);
- Customer in potentially vulnerable circumstances (based on the criteria set out in Section 2.2)
- Preference for demand management / reliance on transfers and strategic / local schemes (Section 3.4.2); and
- Overall plan preference (via the constant term in the estimated models).

[4] The two models used analyse the data from different perspectives. The MNL specification looks at the overall preference amongst alternative plan profiles to explain strength of preference for each plan, while the logistic regression looks at the preference for each individual plan to examine sensitivity to bill impact, independent of preference for the alternative plans. Note also that the analysis overall examines the strength of preference – i.e. what was most liked by respondents. It does not test whether any plans were expressly disliked, just whether they less favoured.

[5] See: eftec (2023) WRSE Customer Research Regional Plan Preferences Summary Report

The analysis of non-household customer preference for the most preferred plan profile for both the "unconstrained" (without bill impact) and "constrained" (with bill impact) choice exercise controlled for the following factors as explanatory variables:

- Bill impact (for the "constrained" choice task);
- Geographic region (Upper Thames, Lower Thames, Central, West, South, East);
- Company turnover (Turnover over £250,000 per year);
- Number of sites (Companies with more than 6 sites);
- Preference for demand management / reliance on transfers and strategic / local schemes (Section 3.4.2); and
- Overall plan preference (via the constant term in the estimated models).

4.2.1 Households – most preferred plan - unconstrained preference

The main observations are:

- **Age:** Older household respondents (aged 55+) were less likely to choose the Best Value and Gov H plan profiles compared to the Least Cost plan (as shown by the negative coefficients which are statistically significant at the 1% level). Household respondents aged 25-54 were also less likely to choose the Gov H plan compared to the Least Cost plan.
- **Geographic region:** The coefficient estimates for household respondents living in Lower Thames are negative and statistically significant at the 5% to 10% level for the Best Value and Gov C plan, indicating that these respondents preferred the Least Cost plan, compared to the Best Value and Gov C plan.
- **Vulnerable customers:** None of the coefficients for vulnerable customers were statistically significant, indicating this was not a relevant factor in explaining the choice of preferred plan.
- **Prefer demand management:** As expected, household respondents who preferred more emphasis on demand management measures were more likely to prefer the Gov C plan (a plan with more management plan included) compared to the Least Cost plan (the coefficient is positive and statistically significant at the 1% level).
- **Prefer strategic schemes:** Also, as expected, household respondents who preferred strategic schemes were less likely to pick the More transfers, fewer reservoirs plan profile (a plan excluding schemes like SESRO) compared to the Least Cost plan (the coefficient is negative and statistically significant at the 5% level).

Table 4.1 reports the main MNL model estimation results for household respondents' most preferred plan for the "unconstrained" choice (without bill impact). The primary interpretation of the model results is based on: (a) the sign (positive/ negative) of the estimate coefficients for each explanatory variable; and (b) its statistical significance. The coefficient estimates should be interpreted relative to the least cost plan, which is specified as the base case.

The main observations are:

- **Age:** Older household respondents (aged 55+) were less likely to choose the Best Value and Gov H plan profiles compared to the Least Cost plan (as shown by the negative coefficients which are statistically significant at the 1% level). Household respondents aged 25-54 were also less likely to choose the Gov H plan compared to the Least Cost plan.
- **Geographic region:** The coefficient estimates for household respondents living in Lower Thames are negative and statistically significant at the 5% to 10% level for the Best Value and Gov C plan, indicating that these respondents preferred the Least Cost plan, compared to the Best Value and Gov C plan.
- **Vulnerable customers:** None of the coefficients for vulnerable customers were statistically significant, indicating this was not a relevant factor in explaining the choice of preferred plan.
- **Prefer demand management:** As expected, household respondents who preferred more emphasis on demand management measures were more likely to prefer the Gov C plan (a plan with more management plan included) compared to the Least Cost plan (the coefficient is positive and statistically significant at the 1% level).
- **Prefer strategic schemes:** Also, as expected, household respondents who preferred strategic schemes were less likely to pick the More transfers, fewer reservoirs plan profile (a plan excluding schemes like SESRO) compared to the Least Cost plan (the coefficient is negative and statistically significant at the 5% level).

Table 4.1: Multinomial logit model (MNL) – most preferred plan – unconstrained preference - household (n = 1,409)

	Least Cost	Best Value	Gov C	More transfers, fewer res.	Gov H
Age	Base				
25-54		-0.20	0.31	0.37	-0.50**
55+		-0.94***	0.15	-0.10	-1.15***
Geographic region					
Lower Thames		-0.41*	-0.61**	-0.17	-0.29
Central		0.58	-0.08	0.45	0.14
West		0.09	-0.50	-0.64	-0.27
South		0.08	-0.01	0.46	0.37
East		-0.56	-0.51	0.00	-0.14
Vulnerable circumstances		0.13	-0.14	-0.04	-0.37
Prefer demand management		0.24	0.75***	-0.20	-0.10
Prefer strategic schemes		0.22	0.14	-0.40**	-0.34*
SEG AB		0.34	-0.06	0.68**	0.28
Constant		0.49	-0.10	-0.37	0.46
Model fit					
Number of observations		1,408			
LR chi2 (44)		151.72			
Prob > chi2		0			
Log likelihood		-2203.24			
Pseudo R2		0.0			

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

- **Socio-economic group:** The coefficient for household respondents in higher socio-economic groups for the More transfers, fewer reservoirs plan is positive and statistically significant at the 5% level. This indicates that these respondents tended to prefer the More transfers, fewer reservoirs plan profile compared to the Least Cost plan.
- **Overall plan preference (constant)**: All else equal, there is no strongly preferred plan over the base case (coefficients are not statistically significant).

4.2.2 Households – most preferred plan - constrained preference

The main MNL model estimation results for household respondents' most preferred plan for the "constrained" choice (with bill impact) are reported in Table 4.2. The main observations are:

- **Bill impact**: Respondents were more likely to select the Best Value, Gov C or More transfers, fewer reservoirs plan profiles compared to the Least Cost plan as the bill impact increases (coefficients estimates are positive and statistically significant).
- **Age:** Respondent aged 25 – 54 were more likely to choose Gov C plan over the Least Cost plan (coefficient is positive and statistically significant at the 5% level), while respondents aged over 55 were less likely to choose the Gov H plan compared to the Least Cost plan (coefficient is negative and statistically significant at the 10% level).
- **Geographic region:** the coefficient estimates for respondents based in the Central and South WRSE regions are positive and statistically significant at the 5% level. This indicates that these respondents are more likely to prefer the Best Value plan profile compared to the Least Cost plan.
- **Prefer demand management:** As with the "unconstrained" choice task, respondents who preferred an emphasis on demand management measures were more likely to choose the Gov C compared to the Least Cost plan (the coefficient is positive and statistically significant at the 1% level).
- **Prefer strategic schemes:** Respondents who preferred strategic schemes were less likely to choose the Gov H plan profile compared to the Least Cost plan (the coefficient is negative and statistically significant at the 1% level).
- **Socio-economic group:** Respondents in higher socio-economic groups tended to prefer the Best Value, Gov C and Gov H plan profiles compared to the Least Cost plan (the coefficients are positive and statistically significant at the 1% to 5% level).
- **Overall plan preference**: the coefficients for the constants for the Best Value, Gov C and More transfers, fewer reservoirs plan are negative and statistically significant (between the 5% - 10% levels). This indicates that respondents were less likely to choose these plans over the Least Cost plan. Further sensitivity testing examines this preference using the full preference ranking responses via an MXL model (see Section 4.3).

Table 4.2: Multinomial logit model (MNL) – most preferred plan – constrained preference - household (n = 1409)

	Least Cost	Best Value	Gov C	More transfers, fewer res.	Gov H
Bill impact	Base	0.003**	0.004***	0.003*	0.0002
Age					
25-54		0.01	0.44**	0.43	0.28
55+		-0.18	0.29	-0.02	-0.56*
Geographic region					
Lower Thames		0.37	-0.09	-0.04	-0.49*
Central		0.88**	0.10	0.37	0.12
West		0.61*	0.04	-0.06	-0.10
South		0.81**	0.03	0.03	0.37
East		0.32	-0.34	0.19	-0.44
Vulnerable circumstances		0.21	0.01	0.31	0.05
Prefer demand management		0.25	0.72***	0.02	-0.14
Prefer strategic schemes		0.16	0.06	-0.23	-0.72***
SEG AB		0.66**	0.41	0.66**	0.56*
Constant		-0.81**	-0.78**	-0.68*	0.16
Model fit					
Number of observations		1,408			
LR chi2 (44)		139.3			
Prob > chi2		0			
Log likelihood		-2240.5931			
Pseudo R2		0.03			

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

4.2.3 Households – sensitivity to bill impact

The main logistic model estimation results for household respondents' sensitivity to the bill impact are reported in Table 4.3. Note that preferences for each plan was analysed separately (unlike the MNL models outlined above). The primary interpretation of the results for the model estimation is in relation to the coefficient estimate for the bill impact parameter, which in the main is expected to have negative sign, which would include a declining level of support for the plan – all else equal – as the bill impact increases. The other parameter estimates control for the socio-economic, demographic, geographic and attitudinal factors detailed above.

Table 4.3: Logistic regression model - sensitivity to bill – constrained preference – household (n = 1409)

	Least Cost	Best Value	Gov C	More transfers, fewer res.	Gov H
Bill impact	-0.003**	-0.003***	-0.003***	0.00	-0.003***
Age					
25-54	-0.28	-0.21*	0.27**	0.25	0.07
55+	0.06	-0.38***	0.42***	0.03	-0.58***
Geographic region					
Lower Thames	0.03	0.14	-0.18	-0.01	-0.53***
Central	-0.38	0.46***	-0.28	0.08	-0.20
West	-0.15	0.39**	-0.21	-0.21	-0.24
South	-0.32	0.24	-0.18	-0.26	0.14
East	0.06	0.02	-0.27	0.30	-0.47
Vulnerable customers	-0.14	0.15	-0.10	0.25	-0.07
Prefers demand management	-0.28**	0.03	0.54***	-0.23	-0.41***
Prefers larger schemes	0.11	0.22***	0.12	-0.17	-0.73***
SEG AB	-0.57**	0.15	-0.17	0.23	-0.11
Constant	-0.81***	-2.98***	-3.30***	-1.67***	-0.7***
Model fit					
Number of observations	14,080	14,080	14,080	14,080	14,080
LR chi2 (13)	61.53	61.53	84.22	42.17	50.31
Prob>chi2	0	0	0	0	0
Log likelihood	-2799.71	-2799.71	-2872.16	-1947.99	-565.07
Pseudo R2	0.01	0.01	0.01	0.01	0.04

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

Overall, as expected the coefficient for the bill impact is negative and statistically significant (at 1% - 5% level) in all cases with one exception in relation to the More transfers, fewer reservoirs plan. This signifies that for the most part customer choices were constrained by the cost of each plan. In general, this is a key validity test meaning that there is a decreasing level of customer support for each plan as the bill impact increases (all else equal). The exception for the More transfers, fewer reservoirs plan profile suggests that in aggregate there are "fixed" views on this plan – i.e. some customers would not select it at any cost. Indeed, the coefficient estimates for the wider control variables are also insignificant at conventional levels for this model.

Table 4.4 illustrates the bill sensitivity across the five plans. It shows the likelihood of the average respondent (weighted sample averages) choosing each plan at a given bill impact. Across all the plans (except for More transfers, fewer reservoirs), the likelihood of support for a plan decreases as the bill impact increases. At higher bill amounts, a higher proportion of respondents selected the Best Value and Gov C plan profiles (28% and 31% respectively, versus 9% - 17% for the remaining three plans).

Table 4.4: Level of support for the plans by bill impact (likelihood of choosing a plan)

Bill impact (£/year)	Best Value	Least Cost	Gov C	More transfers, fewer res.	Gov H
0	55%	22%	51%	17%	14%
50	46%	20%	45%	17%	13%
100	39%	18%	40%	17%	11%
150	33%	16%	35%	17%	10%
200	28%	14%	31%	17%	9%

Further analysis – per sensitivity testing (see Section 4.3) – showed a level of preference heterogeneity suggesting potentially a highly split view across the sample, with a smaller proportion of respondents strongly favouring the plan versus a larger proportion who did not.

4.2.4 Non-households – most preferred plan - unconstrained preference

Table 4.5 reports the main MNL model estimation results for non-household respondents' most preferred plan for the "unconstrained" choice (without bill impact). As for households, the primary interpretation of the model results is based on: (a) the sign (positive/ negative) of the estimate coefficients for each explanatory variable; and (b) its statistical significance. The model estimates should be interpreted relative to the least cost plan (base plan). The main observations are:

- **Company turnover**: Non-household respondents with a higher turner over were less likely to prefer the Gov C plan profile compared to the Least Cost plan (negative and statistically significant (10% level) coefficient).
- **Number of sites**: Respondents who had more than six sites were more likely to prefer the More transfers, fewer reservoirs plan profile compared to the Least Cost plan (coefficient is positive and statistically significant at the 5% level).

Table 4.5: Multinomial logit model (MNL) – most preferred plan – unconstrained preference - non-household (n = 319)

	Least Cost	Best Value	Gov C	More transfers, fewer reservoirs	Gov H
Turnover over £250,000 per year	Base	0.38	-0.94*	-0.65	-0.54
More than 6 sites		-0.69	-0.12	0.92**	0.13
Geographic region					
Lower Thames		0.88*	1.36***	1.15**	0.20
Central		0.99	0.48	0.66	0.00
West		0.21	1.28**	0.26	0.12
South		-0.46	-0.06	-0.29	0.21
East		-0.93	-0.40	-0.26	0.49
Prefer demand management		0.17	0.92**	-0.26	0.07
Prefer strategic schemes		-0.20	-0.02	-0.29	-0.74*
Constant		-0.13	-0.72	-0.35	-0.11
Model fit					
Number of observations		319			
LR chi2 (44)		79.74			
Prob > chi2		0			
Log likelihood		-483.51			
Pseudo R2		0.07			

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

- **Geographic regions**: Respondents based in the Lower Thames were more likely to prefer the Best Value, Gov C and More transfers, fewer reservoirs plan profiles compared to the Least Cost plan (the coefficients are positive and statistically significant between the 1% - 10% level). Respondents who have organisations in the West of the WRSE region were more likely to prefer the Gov C plan compared to the Least Cost plan.
- **Prefer demand management**: Similar to the household results, non-household respondents who preferred an emphasis on demand management measures were more likely to prefer the Gov C plan profile over the Least Cost plan (positive coefficient and statistically significant at the 5% level).
- **Prefer strategic schemes**: The coefficient estimate for respondents who preferred and emphasis on strategic schemes is negative and statistically significant at the 10% level for the Gov H plan profile. This indicates that these respondents prefer the Least Cost plan compared to the Gov H plan.

- **Overall plan preference**: All else equal, there is no strongly preferred plan over the base case (coefficients are not statistically significant).

4.2.5 Non-households – most preferred plan - constrained preference

reports the main MNL model estimation results for non-household respondents' most preferred plan for the "constrained" choice (with bill impact). The main observations are:

- **Bill impact**: Respondents were more likely to select the Gov C and More transfers, fewer reservoirs plan profiles compared to the Least Cost plan as the bill impact increases (coefficients estimates are positive and statistically significant between the 5% and 10% level).
- **Company turnover**: Respondents who have companies with a turnover of over £250,000 were more likely to prefer the More transfers, fewer reservoirs plan profiles compared to the Least Cost plan (positive coefficient, statistically significant at the 10% level).
- **Number of sites**: Respondents who have companies with more than 6 sites were more likely to prefer the More transfers, fewer reservoirs and Gov H plan profiles compared to the Least Cost plan (positive coefficient, statistically significant at the 5% - 10% level).
- **Geographic regions**: Respondents based in the Lower Thames were less likely to prefer the More transfers, fewer reservoirs plan profile and more likely to prefer the Gov H plan. Respondents who live in the East are more likely to support the Gov H plan compared to the Least Cost plan.
- **Prefer demand management**: As before, respondents who preferred an emphasis on demand management measures were more likely to prefer the Gov C plan profile over the Least Cost plan.
- **Prefer strategic schemes**: None of the coefficients for the preference of Strategic schemes were statistically significant.
- **Overall plan preference**: Overall, respondents were less likely to prefer the Gov H plan compared to the Least Cost plan.

Table 4.6: Multinomial logit model (MNL) – most preferred plan – constrained preference - non-household (n = 319)

	Least Cost	Best Value	Gov C	More transfers, fewer reservoirs	Gov H
Bill Impact	Base	0.02	0.02*	0.03**	0.002
Turnover over £250,000 per year		0.24	-0.49	-1.00*	-0.37
More than 6 sites		-0.14	0.28	1.42***	0.93**
Geographic region					
Lower Thames		-0.51	0.14	-0.92*	1.28*
Central		-0.01	0.32	-1.22	-0.23
West		0.08	1.04	0.68	1.46
South		-0.21	-0.26	-1.13	0.97
East		-1.07	0.24	-0.91	1.54*
Prefers demand management		0.51	0.69***	0.38	0.53
Prefers larger schemes		-0.48	-0.03	-0.50	-0.36
Constant		-0.01	-0.58	-0.05	-1.56**
Model fit					
Number of observations		319			
LR chi2 (44)		69.71			
Prob > chi2		0.0025			
Log likelihood		-489.65764			
Pseudo R2		0.0664			

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

4.3 Validity testing

The two main aspects for assessing the validity stated preference studies and their results are:

- **Content validity** – This aspect of validity is primarily addressed in the survey design and testing phase. It concerns respondent understanding and perceptions of the credibility of choice tasks, and the potential for biases (systematic effects) in survey results due to these considerations.
- **Construct validity** – This aspect of validity is addressed in the analysis phase. It tests if respondents' preferences align with reasonable expectations based on: (i) underlying economic theory; (ii) findings from similar/previous studies using comparable methods (if available); and (iii) the consistency of responses to different aspects of the survey.

4.3.1 Content validity

The assessment of content validity is primarily a qualitative exercise which draws on both the survey design and testing process, including follow-up questions concerning the survey. The survey was pre-tested in cognitive interviews. Overall, respondents understood the survey and the description of the regional plan was understood by respondents. The mix of videos, graphics, and "flip cards" was well received, helping to retain attention and make the information provision more engaging. See Appendix 1 for more information on the survey testing.

The follow-up questions in the survey included provide a further basis for judging it validity in terms of respondent understanding and the stated motivations for the choices made.

Motivations for choice task responses

After completing each choice exercise, respondents were asked to rank each aspect of the plan profiles by order of importance to their choice. Overall, it was observed that no single consideration dominated respondents' selection of plan preference, indicating that all aspects of the alternative plan profiles were being weighed up. For the "unconstrained" choice task, the mix of schemes was the most important aspect overall (HH 35%, NHH 38%), followed by the impact on water use and customer lifestyle (HH 19%, NHH 20%). Higher water efficiency standards from the government were generally of lower-level importance to both household and non-household respondents (Figure 4.1).

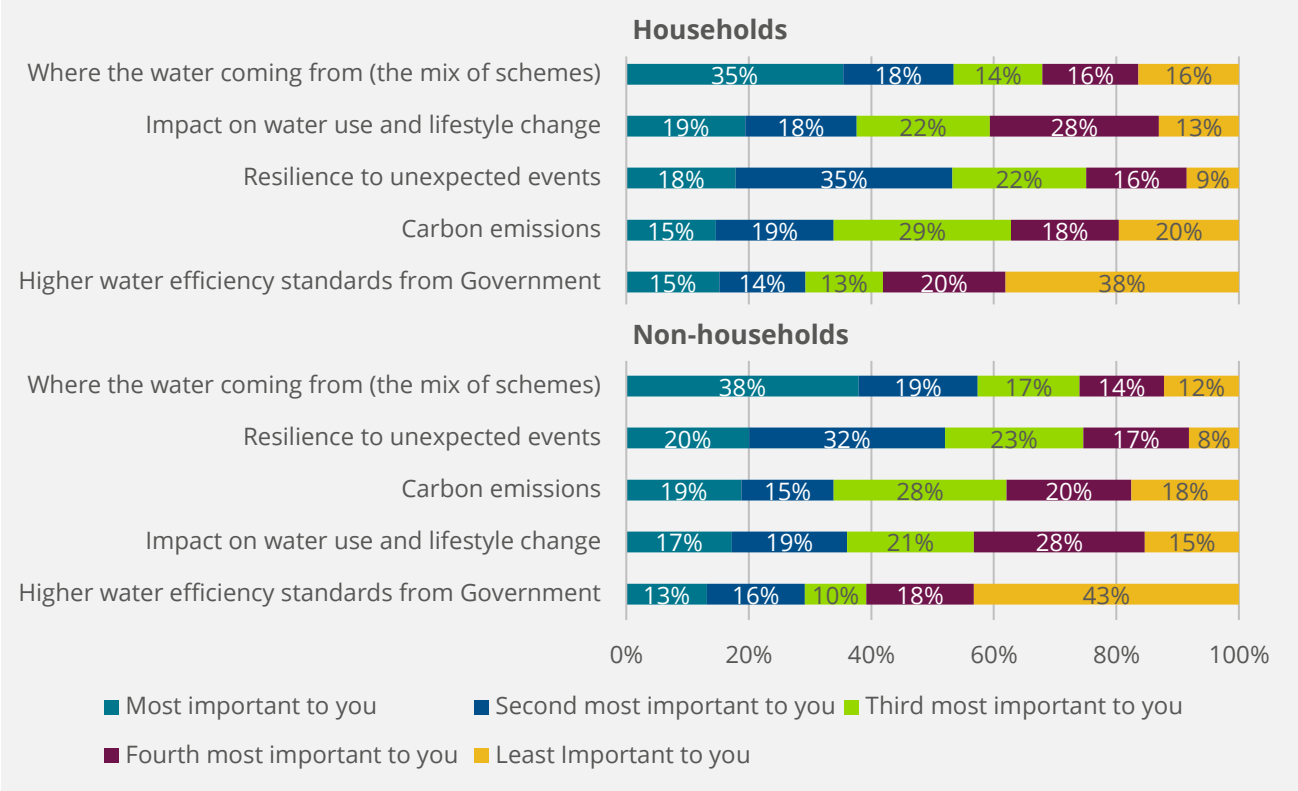


Figure 4.1: Importance of different aspects of the plan profiles – "unconstrained" choice (HH n = 1409, NHH n = 319)

A similar pattern of responses was observed for the follow-up question to the "constrained" choice task. Moreover, in line with expectations, the impact on customer bills featured prominently with 28% of households and 19% of non-households respondents stating that this was the most important aspect of the plan profiles when making their choices (Figure 4.2).

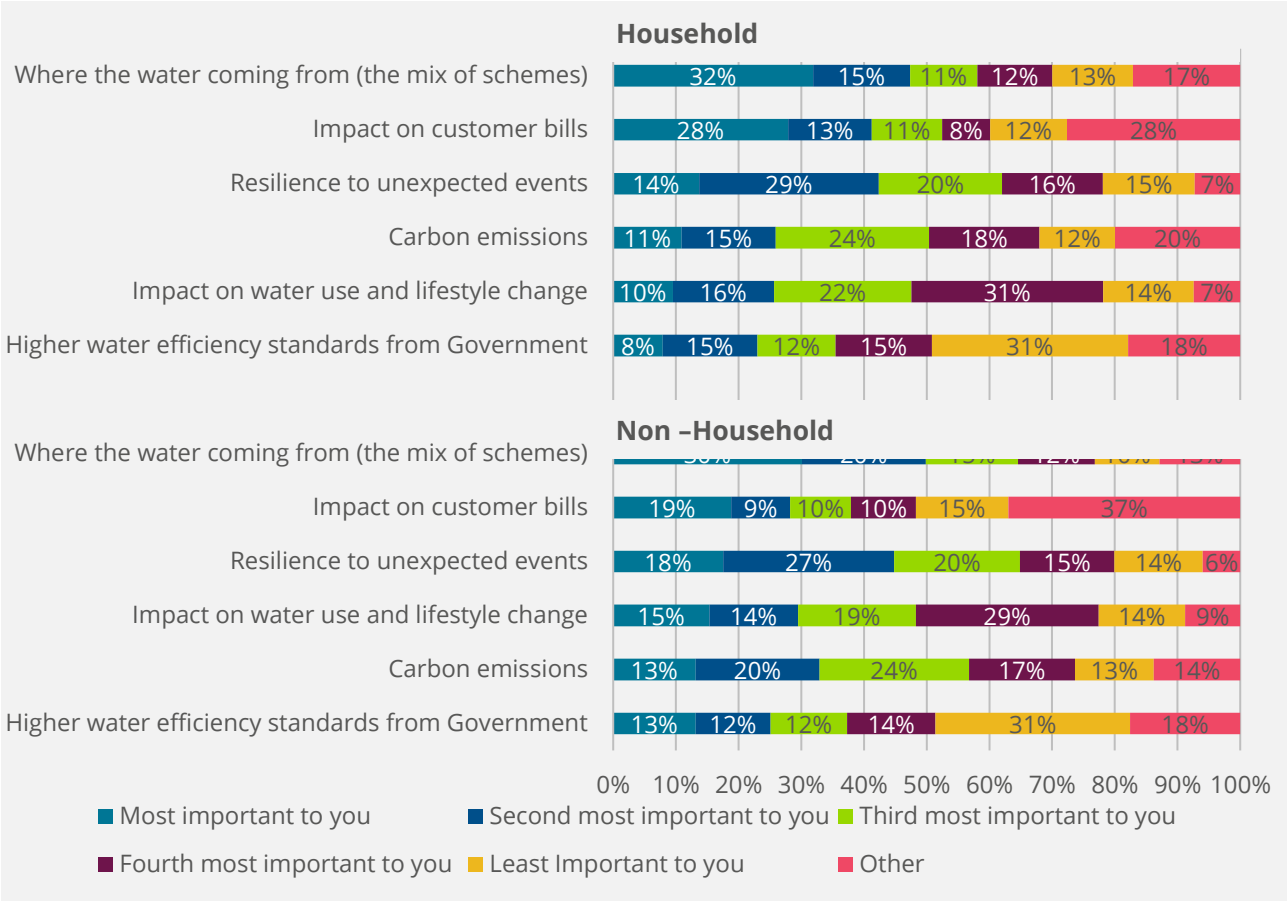


Figure 4.2: Importance of different aspects of the plan profiles – "constrained" choice (HH n = 1409, NHH n = 319)

Ease/difficulty of choice tasks

Generally, respondents stated that they found the choice tasks easy to complete, with 59% of households and 72% of non-households reporting that they were either "very easy" or "fairly easy" (Figure 4.2). This suggests that a good level of confidence can be placed in the model estimations and results. Moreover, whilst 20% of household and 13% of non-household respondents felt that the choice tasks were difficult ("very difficult" / fairly difficult"), this was because it was hard to decide which aspect of the plan profiles mattered most when picking their preferred options (HH 80%, NHH 95%) (Figure 4.4). Very few respondents reported that there was insufficient information to make their choices, or that the instructions were not clear (HH: 54 out of 1,409 respondents (4%), NHH: 8 out of 319 respondents (3%)).

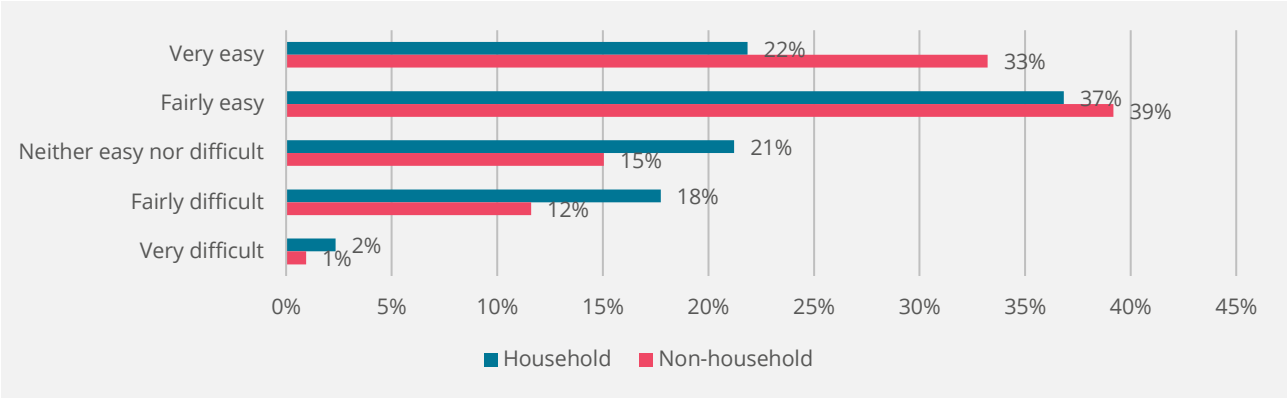


Figure 4.3: Reported ease/difficulty of the choice exercise (HH n = 1409, NHH n = 319)

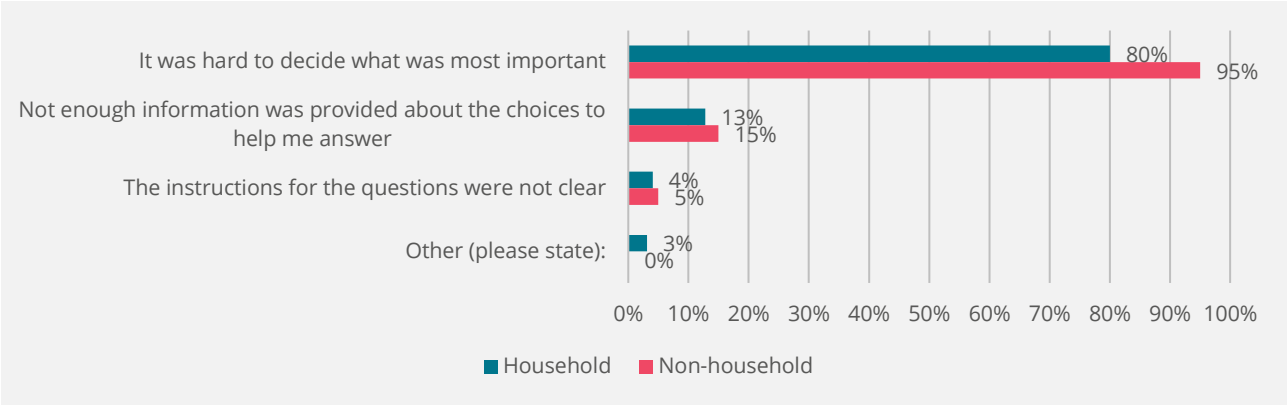


Figure 4.4: Reasons for difficulty (HH n =288, NHH = 40)

Feedback on the overall survey

Overall feedback suggests that respondents had a good understanding of the survey. The majority of respondents reported that the survey was easy to complete ("very easy" / "fairly easy") (HH 77%, NHH 75%) (Figure 4.5). The majority of respondents also provided positive feedback to the survey, such as finding it interesting (HH 53%, NHH 56%) and educational (HH 27%, NHH 27%), suggesting that for the most part it was sufficient engaging. Negative feedback on the survey was limited and most frequently due to the survey length (HH 10%, NHH 5%), rather than any inherent difficulty (HH 6%, NHH 5%, or issues with credibility ("unrealistic") (HH 2%, NHH 2%) (Figure 4.6).

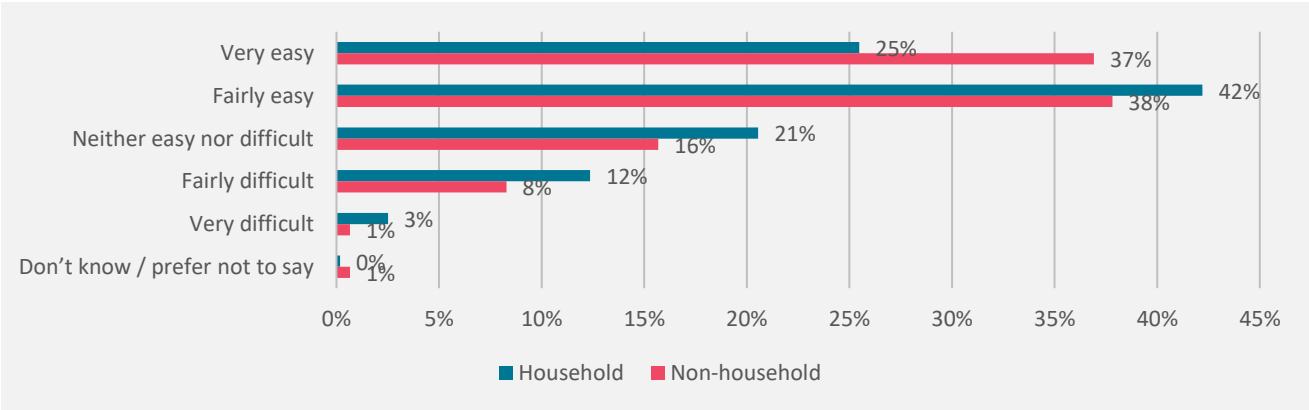


Figure 4.5: Reported ease/difficulty of the overall survey (HH n = 1409, NHH n = 319)

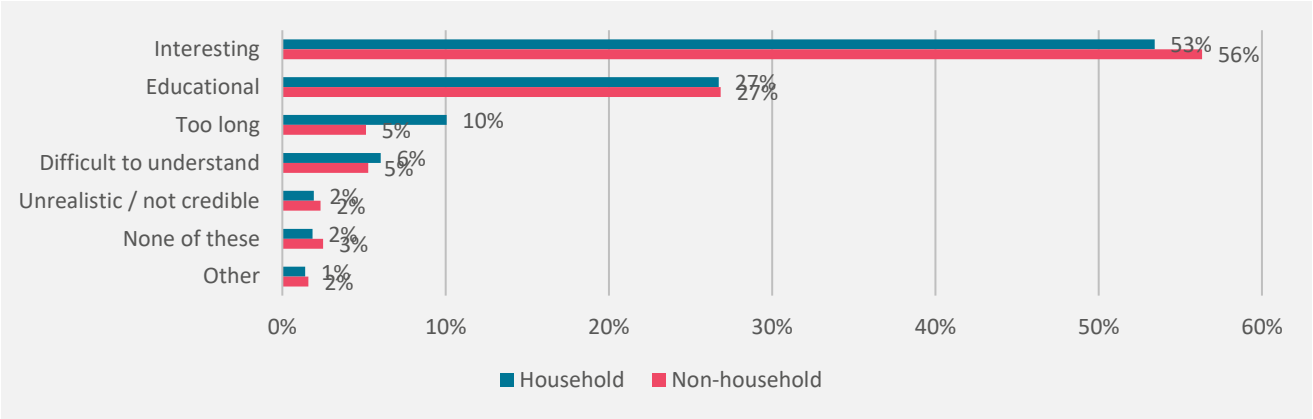


Figure 4.6: General feedback to the survey

4.3.2 Construct validity

The econometric analysis (choice model estimations) provides the main basis for the construct validity assessments of the study's results. This is supplemented by comparison of the main estimation results to results from supporting questions asked in the survey, such as consistency between attitudinal statements and preferred plan profiles.

Main model results

There are a number of initial observations in regard to the main model estimations. Firstly, they have relatively low goodness of fit scores by conventional measure (pseudo r2 – see Section 4.2), yet the tests of statistical validity (chi2) are all satisfied and demonstrate that the estimated models do explain the observed variation in data – i.e. they are valid representations of customer preferences.

In part, the low goodness of fit likely reflects the model specifications, where customer preferences are quantified relative to a base case (the Least Cost plan profile) and hence the models examine strength of preference over this reference point. Therefore, insignificance coefficient estimates are not immediately a signal of poor model performance. Rather, they signify that respondents felt similarly about various aspects of the plan profiles and hence there is limited differentiation in some cases. Notwithstanding, there are also consistent patterns in the model results, showing that preferences did vary according to observable customer characteristics. Hence< overall, the model estimations are judged to provide a reasonable account of customer preferences for the unconstrained and constrained choice exercises.

Added to this, it is also observed that customers' preference for their preferred plan was also constrained by the bill impact – i.e. respondents were "price" sensitive. This is the main *a priori* expectation for the "constrained" choice task, showing that as the bill impact of a given plan profile increased, respondents were less likely to choose it as their preferred plan profile and would opt for an alternative plan instead. Hence both household and non-household respondents were judging trade-offs between the cost of a plan and other features such as the mix of schemes, impact on water use, and wider impacts.

It is also evident that respondents were consistent when answering different questions within the survey. For instance, respondents who preferred more emphasis on demand management measures were more likely to prefer the Gov C plan (a plan with more management plan included) compared to the Least Cost plan. Respondents who preferred strategic resource schemes were less likely to pick the More transfers, fewer reservoirs plan profile (a plan excluding schemes like SESRO) compared to the Least Cost plan.

Sensitivity analysis

The sensitivity analysis conducted for households and non-households utilised respondents' full preference ordering for the alternative plan profiles which ranked them from 1st to 5th most preferred. The model results (Table 4.7) quantify the overall preferences of respondents, based on alternative plan profiles they could choose between, subject to the bill impact. The MXL specification also tests for potential preference heterogeneity via estimation of a standard deviation parameter for the explanatory variables, which measures the extent of variation in customer preference around the "average" result; i.e. whether most respondents felt fairly similarly about each plan profile, or whether there were diverging and potentially split views. As with the main model estimations, the results should be interpreted relative to the base case (Least Cost plan) and interpreted according to: (i) the sign (+/-) of the coefficient estimates; and (ii) their statistical significance.

The results confirm the conclusion as to price sensitivity of respondents and the constraint of bill impact on the choice of preferred plan (negative and statistically significant coefficient estimate). They also show that overall – as surmised above - there was limited differentiation between the Best Value and Gov C plan profiles compared to the Least Cost plan for household respondents. The coefficient estimates for these two plan profiles are not found to be statistically significant, hence on average, neither was preferred over and above the Least Cost plan. Largely this supports the interpretation that the main results provide a fair representation of strength of preference between the alternative plan profiles - in that there was no single "stand-out" most preferred plan profile and that overall there was a similar strength of preference for the Least Cost, Best Vale and Gov C plan profiles. Building on this, it is also observed that household respondents had a lower level of preference for the More transfer, fewer reservoirs and Gov H plan profiles, as signified by the negative and statistically significant coefficient estimates). The results further show that the Gov H plan was the least preferred for both household and non-household respondents.

For household respondents, there is significant variation customer preference around the "average" result for the Gov C and the Gov H plan (shown by the statistically significant standard errors). This indicates that there were diverging and potentially split views for these plans. For non-household respondents, there is significant variation in customer preferences for the Gov C and More transfer, fewer reservoirs plan (shown by the statistically significant standard errors).

Table 4.7: Mixed logit model (MXL) – ranked choice – constrained preference (HH: n = 1,409, NHH: n = 319)

Choice	Coefficient (household)	Coefficient (non-household)
Model estimates		
Bill	-0.01***	-0.01***
Least Cost	(Base)	
Best Value	0.03	0.07
Gov C	0.06	0.06
More transfer, fewer reservoirs	-0.17***	-0.05
Gov H	-0.44***	-0.32***
Standard deviation		
Best Value	-0.18	-0.13
Gov C	0.78***	0.86***
More transfer, fewer reservoirs	0.03	0.90***
Gov H	0.39***	0.17
Model fit		
Number of observations	19,712	4,466
LR chi2(4)	22.55	10.93
Prob > chi2	0.000	0.027

Notes: * denotes statistically significant at the 10% level; ** denotes statistically significant at the 5% level; *** denotes statistically significant at the 1% level.

Overall, the supplementary results from the sensitivity analysis help to confirm conclusions as to the strength of respondent preferences for the alternative plan profiles, providing reasonable validation of the main results and interpretation of customer preferences for the regional plan.

5. Conclusion

5.1 Summary

The results of this study support the planning approach that underpins the development of the WRSE regional plan. The customer preferences for the regional plan was examined via a stated preference approach with the research implemented through a representative online survey of household and non-household customers in the South East.

A comprehensive design and testing phase of work was undertaken which ensured customer understanding of the survey content, and the effectiveness of the choice exercises. This was achieved through an initial co-design phase and then an iterative testing process that included cognitive interviews and a pilot survey phase. Feedback from the testing was generally positive with high levels of customer engagement in the survey. Overall, the study results are judged to be valid and a fair representation of customers preferences for the regional plan.

The results and findings are most informative on customers' views on the balance and emphasis of the regional plan, rather than representing a detailed assessment of customer support for any specific scheme or water resource planning option. The adaptive planning approach that underpins the regional plan will be updated every five years. This provides future opportunities to engage with customers on the balance of the plan moving forward. This is particularly important for the medium to longer term view of the plan beyond 2035 and how future uncertainty is addressed through different pathways and the combination and balance of schemes expected to be needed under each scenario.

5.2 Interpretation results

The main observations and interpretation of study results from the perspective of the composition of the regional plan are outlined below. Further commentary is provided in the Summary Report, which draws some wider conclusions in relation to the predicted share results that quantify the level of customer support for each alternative plan profile.

Overall, no single plan stood out with a majority share of customer support. On balance, preferences varied according to aspects including bill impact, location, and customer characteristics. Further analysis, though, via the sensitivity testing confirmed that the weight of customer preference was towards the Best Value, Least Cost and Gov C plan profiles. More broadly, the research findings are conclusive in terms of the patterns of customer preferences:

1. Customers' overall preference is for a balanced regional plan.

The three most-preferred plan profiles for both household and non-household respondents tended to be the Least Cost, Best Value and Gov C plans. These all featured a mix of strategic resource schemes (e.g. SESRO), supporting transfers (e.g. GUC), local schemes (e.g. Teddington water recycling) and higher levels of demand management ambition. The plans profiles with more extreme variations in schemes and options – such as More transfers, fewer reservoirs (fewer strategic resources schemes; more reliance

on inter-region transfers) and Gov H (lower Government intervention) – tended to be less preferred in aggregate compared to the Least Cost, Best Value and Gov C plans.

2. The greater weight of customer preference was for self-sufficiency within the WRSE region.

Transfers from outside of the region featured within the mix of schemes that most customers tended to prefer. But the pattern of preferences as summarised in (1) above indicates that the large-scale transfers were not viewed as the *primary* solution for the regional plan. Indeed, the majority of respondents wanted new transfers to be in place alongside efforts to reduce their own water use, suggesting that they saw transfers as a complementary part of the regional (Section 3.4.3). Moreover, the strength of preference observed for the Gov C plan indicates that a sizeable proportion of customers tended to view demand reduction as of equal importance to large-scale transfers for ensuring a "balanced" regional plan to secure water supplies (Section 3.4.2).

3. Customers value the aspects offered by the Best Value and Gov C plan.

At higher given bill amounts for the regional plan – for example above £100 per year – the Best Value and Gov C plans tended to be the more preferred alternatives (28% and 31% respectively, versus 9% - 17% for the remaining three plans - Section 4.2.3). This indicates that customers found these plans to represent better value for money over the alternative plan profiles at higher bill levels. For the Best Value plan, at least, this suggests that the higher level of resilience offered does has some appeal, albeit, though this is only apparent in cases where there is a sizable impact on customer bills – i.e. the plan was less differentiated and stood out less in comparison to others at more modest levels of bill impact.

4. Customers recognise the need to reduce demand and see this as an integral part of the regional plan, but it must be supported by Government intervention.

When given the choice between the Gov C (introduction of product standards and new building regulations) and Gov H (lowest level of ambition for demand management) plan, there was a stronger preference for Gov C, indicating that customers preferred options with more demand management measures and higher levels of government intervention. This is consistent with wider findings that showed that respondents recognised that reductions in demand were integral to the regional plan and future challenges could not be solved by strategic schemes and further resource development only.

5. Varying levels of preferences for the alternative plan profiles were attributable to customer location, socio-economic and demographic characteristics.

The variation in customers' preferred plans was explained by observable factors and help to explain why no single plan stood out overall. For example, respondents in higher SEGs tended to have a stronger preference for the Best Value plan, whilst older respondents (55+) tended to have a stronger preference for the Least Cost plan. Respondents living in Lower Thames tended to have a stronger preference for Least Cost plan, compared to the Best Value and Gov C plan, while respondents based in the Central and South WRSE regions tended to have a stronger preference for the Best Value plan profile compared to the Least Cost plan. Overall, these findings support a direction forward around a balanced plan and the flexibility to adapt the plan in the future.

Appendix 1 Survey development and testing

This appendix describes the survey development and testing, structured as follows:

1. **Co-design sessions:** Initial design and testing was carried out in 2021, building on preceding customer research studies. The purpose was to explore how the regional plan could be presented and explained to customers in a survey setting, including presenting the strategic context and spatial and temporal aspects of the plan showing major supply options and transfer.
2. **Survey testing:** One-to-one interviews and pilot testing was carried out in February – March 2023 to improve survey content.

A1.1 Co-design sessions

This section summarises the "co-design" research undertaken with customers to support the development of "information share" in the WRSE customer research survey. The purpose of the "information share" is to provide an engaging format for presenting the key features of the plan to customers, in terms of the drought resilience outcomes and wider improvements to the water supply system, the investments that will be made (options and solutions), environmental objectives, and the impacts on customers (use of water and future bills).

The purpose of the co-design exercise was gain to customer insight to inform the design and testing of the "introduction to the regional plan" and the "information share" of the survey (Section *B1* and *B2* outlined in Section 2.1). The primary focus was the development of the tool interface – as it would be viewed and used by customers within the survey – and understanding the balance between the required detail and spread of information. For example, what aspects of the plan and if outcomes are more easily understood by customers versus the aspects need more explanation. The specific research questions for the co-design exercise were: (a) what types of information to show in the tool; and (b) how to show the information in the tool.

The co-design exercise was implemented via an online platform using a bulletin board approach. The overall scope and approach to the research was discussed and agreed with the WRSE Engagement & Communications Board (ECB) along with input and comment the WRSE companies' Customer Challenge Group (CCG) members on the project. WRSE, water company and CCG representatives were able to observe the bulletin board sessions with customers as they took place.

A1.1.1 Approach

Co-design exercise

Planning for the co-design exercise placed particular emphasis on ensuring it would provide robust insights from customers that can be used with confidence to help develop the "information share". The discussion material and content for the sessions were carefully structured to cover the research scope and to enable participants to build their understanding of the purpose of the tool and how it would support the online survey. This was important to ensure informed feedback was given on the questions posed in the sessions. The overall schedule with customers took the route outlined in Appendix Table 1 , with the opportunity for

discussing other relevant concerns as they arose.

The co-creation sessions were conducted online between April 2021 and June 2021. The research was implemented using the bulletin board function on the Visions Live platform (an online qualitative research host) (Appendix Figure 1). This provided a formal setting for interactions with participants and the creative functions available through the online platform were used to make the process more engaging.

A small group of customers were recruited to participate in the bulletin board. Inputs to the bulletin board were asynchronous, meaning they are not conducted in real time, so participants logged in and posted responses on topics and questions at times that were convenient to them. The co-creation and testing activity was observed by WRSE, water company and CCG representatives via a dedicated chat group on the platform.

Appendix Table 1 Schedule for co-design sessions

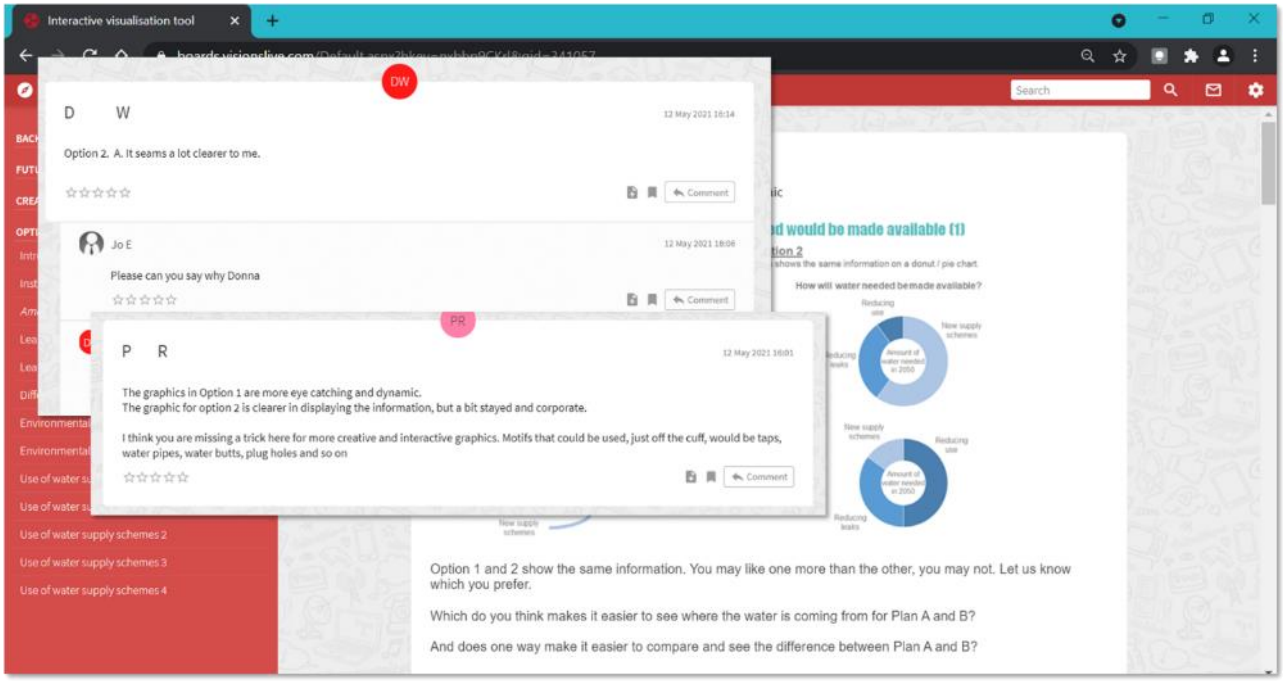
Topic	Objective(s)	Activities
Session 1 *(29th April to 14th May 2021)*		
1A. WRSE best value criteria (BVC)	Scene-setting - introduce WRSE and long-term planning needs for the South East	• Scene setting: introduce WRSE plan, overall planning context. • Read/comment: Best value criteria descriptions (attribute descriptions). • Follow-up: Discuss criteria and importance of each. • **Format:** Prompted responses; follow-up probes on specific issues
1B. Format for plan support question	Develop format and structure of "preference / choice" question(s) that will be used to measure customer preference for candidate plans – i.e. most preferred plan	• Prompt material: outline plans from Phase 1 customer research. • Facilitated discussion: which plans are preferred; any information or plans missing (e.g. low carbon; do-minimum); no. of plans that are manageable to compare. • Test: Ease of filtering +5 plans down to 2 – 3 "possible", then selecting most preferred plan. • **Format:** Semi-structured discussion
1C. Plan information	Confirm information on candidate plans to feature in the "information share" (i.e. what to show)	• Prompt material: types of information that would be useful in comparing alternative plans and selecting most preferred plan. • **Format:** Prompted responses

1D. Tool interface/ "dashboard" design	Feedback on options for presenting different aspects of plan information (i.e. how to show)	• Prompt material: informed by (1C) based around:
		  ○ Supply options – mapped/location
		  ○ Transfers – mapped
		  ○ Leak reduction – icon
		  ○ Amount of water from difference sources - graph
		  ○ Environmental performance – RAG
		• **Format:** Prompted responses

Session 2 *(5th May to 2nd June 2021)*		
2A. Test best value criteria (BVC) ranking	Feedback on online survey results of BVC ranking	• Prompt material: BVC ranking. • Facilitated discussion: what do you think about this ranking, do you agree with the ranking. • **Format**: Prompted responses

Topic	Objective(s)	Activities
2B. Test minimum requirements, user interface and dashboard components	Test user interface instructions, and understanding of presentation of plan information, including layout and format; update materials based on feedback	• Prompt material: draft layout of plan - draft text and graphics: ○ Minimum requirement "badges" ○ User interface instructions ○ "Topline" description for each candidate plan ○ Dashboard components (based on 1D) ○ Onscreen layout options • **Format:** Prompted responses
2C. Test consumer preferences on aspects of the plan	Understand the acceptability of each aspect within the plan.	• Prompt material: draft layout of plan • Ask participants to rate each aspect of the plan out of 10. • **Format**: Prompted response
2D. Choice exercises	Understand the acceptability of the plan as a whole.	• Prompt material: Choice cards • Facilitated discussion: clear instructions, level of information about each plan on the choice cards • **Format**: Prompted responses
Session 3 *(14th June to 20th June 2021)*		
3A. Test WRSE videos	Feedback on WRSE videos explaining overall planning context and key requirements	• Prompt material: Three WRSE videos. • Facilitated discussion: how well videos help explain regional plan, its purpose and aims; how well this "sets scene" for customer survey on plan preference based around the "information share". • **Format**: Prompted responses
3B. Test updated dashboard components and choice card layouts.	Test user interface instructions, and understanding of presentation of plan information, including layout and format; update materials based on feedback	• Prompt material: updated draft layout of tool • **Format:** Prompted responses
3C. Test WRSE video and interactive map	Feedback on WRSE video and test out a working version of the map component of the tool.	• Prompt material: One WRSE video and map component of tool • Follow-up: how well videos help explain of different supply schemes, ease of use of map, understanding of interface the map • **Format:** Prompted responses

Note: * Part A survey refers to the customer survey to assess the priorities that customers place on the best value criteria. The 'weights' from the survey will be an input into the regional investment model.



Appendix Figure 1 Screen capture of Visions Live platform

Recruitment

Recruitment of the co-design exercise participants was undertaken by Feedback Market Research. Given that Covid-19 restrictions were still in place, all recruitment was carried out by telephone. A recruitment questionnaire with relevant scoping criteria was used to identify 15 people to participate in the Bulletin Board. The criteria included the following:

- Water company;
- Age;
- Gender;
- Socio-economic group (SEG);
- Whether metered or not;
- Long term health issues;
- Number of people in the household; and
- Ethnicity.

At recruitment, participants were advised that there would be multiple sessions of activities which would require their involvement, and as thank you for their time, they would each receive £120. Once all the participants were recruited, they were invited to take part in a Zoom video call where the bulletin board process was explained more fully. In particular, it was explained that each of the session would last 1-2 weeks, with around two weeks between each session, to allow for relevant materials to be produced. It also gave the participants an opportunity to meet the moderator and clarify anything they did not understand or were not clear about.

Of the initial 15 recruits, two dropped out in the first week of activities. The remaining 13 actively contributed on all three of the sessions.

Participants

Appendix Table 2 provides an overview of the 13 full-participants based on the criteria outlined above. Of the two who dropped out, one was from Southern Water and one was from Affinity Water. One of the people who reported personal health issues was also on a company social tariff.

Appendix Table 2 Summary of participants

Criteria	Participant's profile
Water company	Thames Water (5); South East Water (2); Portsmouth Water (2); Affinity Water (2); Southern Water (1); SES Water (1)
Gender	Male (5); Female (8)
Age	18-30 (2); 31-45 (6); 46-65 (3); 66+(2)
Socio-economic group (SEG)	AB (2); C1 (5); C2 (3); DE (3)
Whether metered or not	Yes (6); No (7)
Long term health issues	Yes (5); No (8)
Number of people in the household	1 person (3); 2 people (3); 3 people (3); 4 people (3); 6 people (1)
Ethnicity	White British (9); Black British (2); Indian British (1); Hispanic (1)

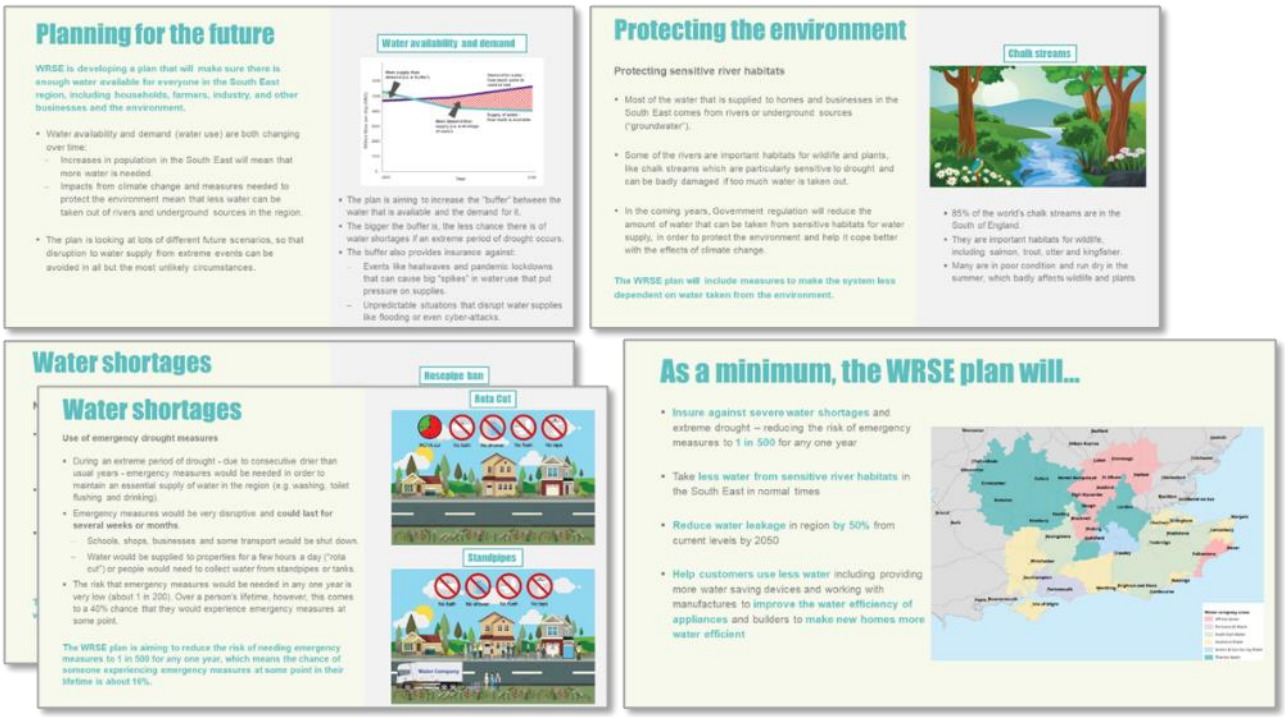
A1.1.2 WRSE planning context

This section summarises the research findings in relation to materials introducing WRSE plan and the overall planning context. To help participants appreciate the wider context for resilience planning, the sessions started with participants' understanding of the long-term plan for water supplies. The participants were then shown the descriptions of the WRSE best value criteria and as a "warm-up" activity were asked to rank the best value criteria.

Long-term plan for water resources

Participants were shown materials on the long-term plan for water resources, which help set the scene for the development of the "information share". Materials were adapted from the research carried out with customers in 2020[6]. **Appendix Figure 2** provides an example of some of the materials shown (information was also shown on drought measures, reducing water leakage, using less water, increasing the amount of water available, cost of the plan). Participants' understanding of these concepts helped to gauge what the pieces of information about the plan were important to participants, which in turn informed the specification for the video content that will be included in the survey/tool.

[6] eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part A Evidence Review, Final Report for Water Resources South East, February 2021



Appendix Figure 2 Examples of information shown to participants on the long-term plan for water supplies

Participants were engaged with the materials on the long-term plan for water supplies and showed a good level of understanding of the issues related to water resource planning. Participants generally found the information on the long-term plan for water supplies in the South East interesting, clear and easy to understand.

> *Posted by PR on 05 May 2021 12:22*
> This is very clear, water security and a "buffer" are obviously very important to all of us.

> *Posted by JD on 03 May 2021 11:53*
> Clear and easy to understand. Protecting wildlife habitats is important and we should do as much as possible even if there is an expense to households

> *Posted by MC on 04 May 2021 18:52*
> I had no idea 85% of the worlds chalk streams were in the South of England, that is great to add that stat, conveys importance of this protection.

Participants understood the minimum plan requirements and thought the four topics were important issues. Participants found the information on the minimum requirements (insure against severe water shortages, take less water from sensitive river habitats, reduce water leakage, help customers use less water) clear and a useful starting point for explain the plan.

> *Posted by DW on 02 May 2021 10:50*
> The information is clear and isn't difficult to understand
> Well at least it's a stating point and hopeful can be improved on.

Posted by TM on 04 May 2021 10:36

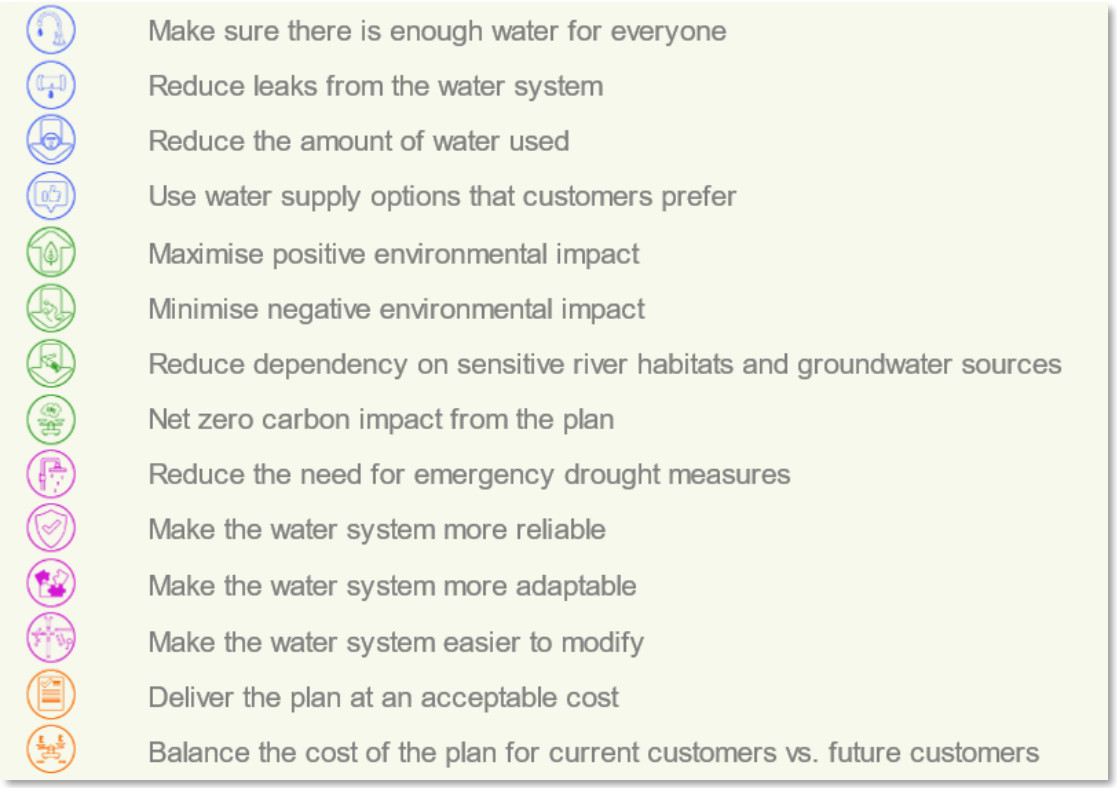
This plan is easy to understand and although they are saying the "minimum" plan it's a plan that will resonate with a lot of people. Some good ideas here to begin with. I'm keen to hear about "more water saving devices"

Posted by CJ on 05 May 2021 14:49

The 4 points deliver on the issues which are important. Looking at reducing the risk for emergency measures, reducing water leaks is really important as it's the cause of 1/5 of water use, environmental impact is taken into account, and water saving measures for costumers. His could really help as many people will implement if it reduce the increase in cost t themselves.

Best value criteria descriptions

Participants were given a list of 14 different factors WRSE are looking to balance in producing the plan (**Appendix Figure 3**) and asked to comment on the clarity and ease of understanding of these factors. As well demonstrating the range of considerations being taken into account by WRSE in developing the plan, this helped inform how the information on a plan could be presented to customers in the tool. It also provided an opportunity to test survey content that would be used in a parallel customer research exercise for WRSE[7].



Appendix Figure 3 Best value criteria (translation for customers from technical definitions)

Participants generally found the different factors clear and easy to understand, providing a useful starting point for further developing material that will explain the plan outcomes and constraints to customers. Participants were engaged in the exercise and were interested in how WRSE plans to meet

[7] See eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part A Evidence Review, Final Report for Water Resources South East, February 2021.

the objectives set out.

> *Posted by DW on 19 April 2021 21:39*
> All of the factors are clear and together with the symbols make the goals understandable

> *Posted by DW on 19 April 2021 21:47*
> All 14 factors where very clear and easy to understand, and a challenge.

> *Posted by SP on 01 May 2021 10:11*
> All easy to understand but missing the key details on the HOWS…

Participants were then shown more detail on the 14 best value criteria, grouped into four categories (**Appendix Figure 4**).

Appendix Figure 4 Descriptions of best value criteria

Overall, participants found the descriptions easy to understand across all four categories, easy to distinguish between the different factors and found the accompanying icons intuitive. A selection of participants' responses is provided below under each of the four categories.

Deliver a secure supply of water to customers and other sectors to 2100

> *Posted by LC on 29 April 2021 17:45*
> It is easy to understand the four factors.
> I feel factor four is very important as it covers most of the above factors as well as options that customers prefer.

> *Posted by TM on 30 April 2021 14:56*
> Completely understandable with plain English terminology at all times. No jargon which is a must for me,

Posted by LM on 30 April 2021 15:22

Easy to understand. I would say they are fairly easy to distinguish as neither one repeats any of the others.

Deliver environmental improvement and benefits to society

Posted by CJ on 29 April 2021 21:14

Clear to me. The symbols by each factor are easy to follow, once having read the factors. The use of colour differential is clear too

Posted by CJ on 29 April 2021 21:14

Clear to me. The symbols by each factor are easy to follow, once having read the factors. The use of colour differential is clear too

Improve the resilience of the region's water systems

Posted by Ben B on 30 Apr 2021 06:38

I found the information quite clear and easy to distinguish between the different factors

Posted by CJ on 05 May 2021 12:45

This is clear to understand. There are good ideas to provide reillience to the water supply for the future.

Deliver at a cost that is acceptable to customers

Posted by LM on 30 April 2021 15:29

Easy to understand and easy to distinguish. However both points are a little vague in what they actually plan to do. However, im sure that can't be helped

Posted by LC on 04 May 2021 16:03

I find it easy to understand.
It is very important to balance the plan for current customers as well as future customers.
A very good point , the different combinations of investment options.

Ranking of best value criteria

To further gauge what could be the most relevant and material aspects of the plan to share with customers, participants were asked to rank the best value criteria from "most important" to "least important" in terms of the outcomes the plan should achieve. As part of this exercise participant were also shown the ranking produced from the Part A research[8] with customers and asked to comment on the similarities and differences.

Appendix Table 3 sets out co-design participants ranking of the best value criteria along with the ranking from the Part A research. 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". When asked to comment on the ranking from the online survey, some noted the top six priorities

[8] See eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part A Evidence Review, Final Report for Water Resources South East, February 2021.

relate to broader aspects of the plan, while the bottom five are more concerned with the finer details of the plan.

Appendix Table 3 Ranking of best value criteria

Ranking from co-creation		Ranking from online survey[1]	
#	Attribute	#	Attribute
1	Make sure there is enough water for everyone	1	Make sure there is enough water for everyone
2	Reduce leaks from the water system	2	Reduce leaks from the water system
10	Make the water system more reliable	13	Deliver the plan at an acceptable cost
13	Deliver the plan at an acceptable cost	7	Reduce dependency on sensitive river habitats and groundwater sources
3	Reduce the amount of water used	3	Reduce the amount of water used
6	Minimise negative environmental impact	6	Minimise negative environmental impact
9	Reduce the need for emergency drought measures	5	Maximise positive environmental impact
5	Maximise positive environmental impact	10	Make the water system more reliable
11	Make the water system more adaptable	14	Balance the cost of the plan for current customers vs. future customers
7	Reduce dependency on sensitive river habitats and groundwater sources	9	Reduce the need for emergency drought measures
12	Make the water system easier to modify	11	Make the water system more adaptable
14	Balance the cost of the plan for current customers vs. future customers	12	Make the water system easier to modify
4	Use water supply options that customers prefer	8	Net zero carbon impact from the plan
8	Net zero carbon impact from the plan	4	Use water supply options that customers prefer

[1] eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part A Evidence Review, Final Report for Water Resources South East, February 2021.

A1.1.3 Introduction to the plan and tool

This section summarises the co-creation findings in relation to the introduction to the tool and instructions for using the tool.

WRSE videos

WRSE have developed videos to explain to stakeholders and customers the purpose of the regional plan and overall planning process. The intention is that content from the videos, either in full or in part, will be included in the tool to introduce the plan and its purpose, before showing details of the of plan to survey respondents. The co-design participants were asked to view the videos and give feedback on how clear the explanations of WRSE are and what they are doing is, along with whether there are any parts that need more or less explanation.

Participant's feedback helped identify key video content for tool – from the WRSE background to the regional plan and why the plan is needed. Participants generally found the information clear and easy to understand.

Posted by MC on 14 June 2021 22:19

...It explains it well, describing region, goals, and purpose. It also describes the current boundaries, and future uniting of the boundaries and collective of systems…
…The colours, music and voice were all very pleasant, and well chosen.

Posted by DW on 15 Jun 2021 22:39

…I found it very clear to understand the goals and what WRSE do…
…perhaps mention the role customers will have in reducing water usage, so they engage with it…

Nevertheless, there were some aspects of the videos participants found confusing and the explanations in the videos were too fast.

Posted by DW on 15 June 2021 22:50

… I found the 'Preferred regional Plan' page complex and confusing. Had to pause a couple of times to read the flow chart. The way it went across the page - left to right didn't make it very quick to read…

Participant's feedback helped recognise that some of the videos could be split into shorter *'tell me more'* videos to avoid any video being too long and overloading users with information. Participant's thought some of the videos were too long and some information was repeated across the videos shown.

Posted by PR on 14 June 2021 15:16

I think it depends on the context of the videos and how they are used. Is the plan to use them to drive interest in interaction with the tool ? In this context video 1 is needed for an overview and video 2 a later addition as part of the tool itself maybe.

Posted by BB on 14 June 2021 17:31

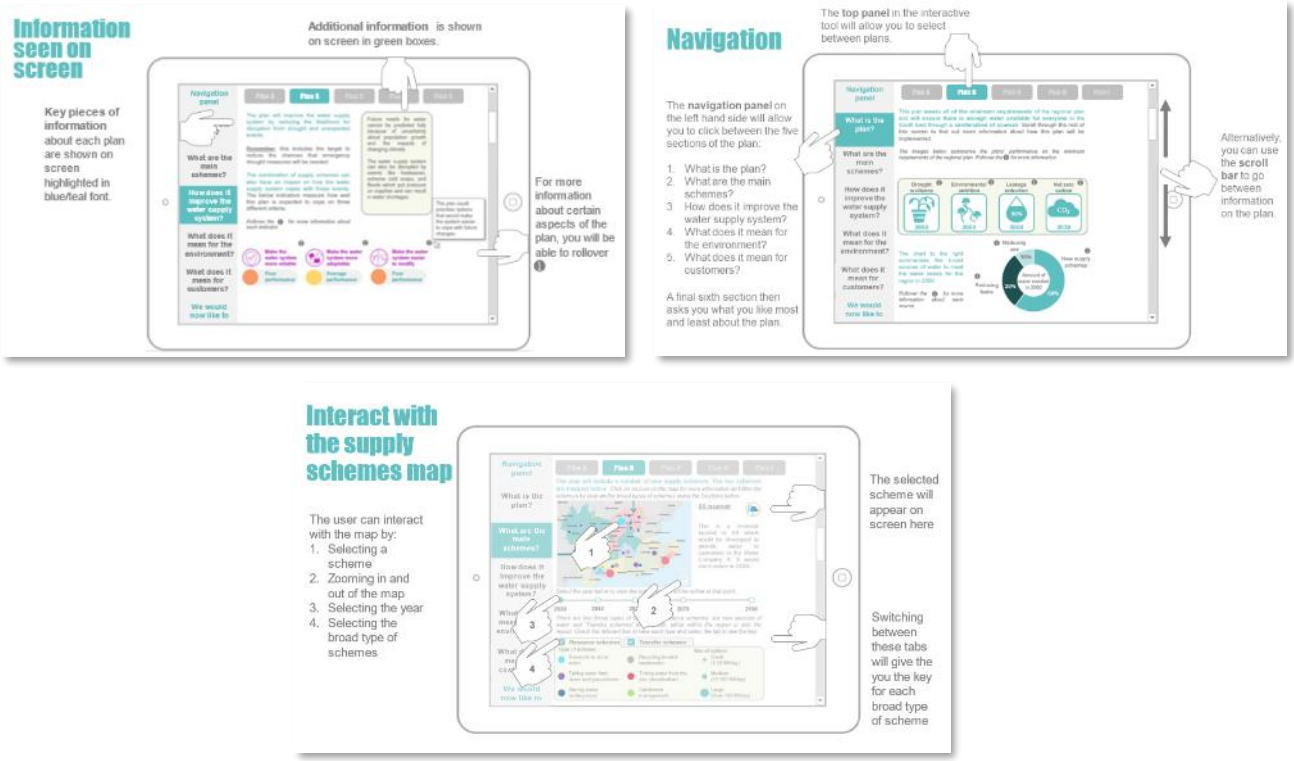
… Way too long. Slightly repetitive…

Posted by DW on 14 June 2021 15:29

…I wouldn't like it to be any longer…

Instructions

To test the design concept for the user interface and the gauge what level of instructions could be needed, participants were presented with a set of slides to illustrate what the tool could look like onscreen and how it would be used. This included how users could: (i) navigate through the tool; (ii) see information onscreen; and (iii) interact with a map showing potential new supply schemes (**Appendix Figure 5**).



Appendix Figure 5 User interface of the tool

Partiipants' feeback helped to understand that the content on the screen should be kept to a minimum and designed to allow users to access additional information sequentially, rather than it being shown all at once. Participants seemed confident that the tool could be intuitive and users would not need too much steer on how to navigate, but there should be less clutter to make the tool useable.

> *Posted by JD on 26 May 2021 17:52*
>
> I think they layout looks good. It looks like there's a lot going on but I don't think it could be condensed down without losing a lot of information thus comprising understanding…

> *Posted by BB on 27 May 2021 11:56*
>
> My initial reaction is that the page is very busy and perhaps overload for a first page… Try and declutter if possible but again this may not be an issue live…

> *Posted by CJ on 26 May 2021 22:46*
>
> I would expect the users to click on each target and drill down for more information on how the main aim is achieved. This would give additional information, above what the headline would be. This would enable to user to understand more of what the water companies would like to achieve…

A1.1.4 "Information share" layout and content

Building on the scene-setting and understanding of WRSE plan aims participants had formed through the co-creation exercise, participants were asked **what** types of information they would like to see in the "information share" and **how** they would like to see this information – if they were in the situation of being asked their views on the plan in an online customer survey. This included participants listing the top 10 pieces of information that would help them determine their level of support for a plan and/or compare between alternative candidate plans.

All the possible information that could be displayed on a candidate plan is contained in an underlying database – e.g. an excel document that is population from the WRSE modelling outputs; and translates the modelling outputs to the information shown on the dashboard. This information was shown to users based on the WRSE's long term planning themes and on the WRSE best value criteria – supply and demand, environment, resilience and cost (Appendix Table 4). Information on the minimum plan outcomes were also presented to help decide whether the tool should initially display this plan or if the preferred plan should show how it compares to the minimum plan outcomes. The initial list of information shown builds on the earlier phase of customer research for WRSE[9] and the previous co-creation exercises.

Appendix Table 4 High-level outcome preference

Best value criteria	Label
-	Minimum plan outcomes
Deliver a secure and wholesome supply of water to customers and other users to 2100	Supply schemes
	Sources of water
Deliver long-term environmental improvement and social benefits	Environmental impact
Increase the resilience of the region's water systems	Resilience
Be deliverable at a cost that is acceptable to customers	Impact on customers

Types of information and presentation of information

Minimum plan outcomes

Participants were keen to see the minimum plan outcomes highlighted. Participants understood the minimum requirements of the plan and thought they were important issues, which should be presented as a "given" for the plan. This would ensure there is a distinction between the outcomes that the plan is required to deliver and those that are more discretionary in nature.

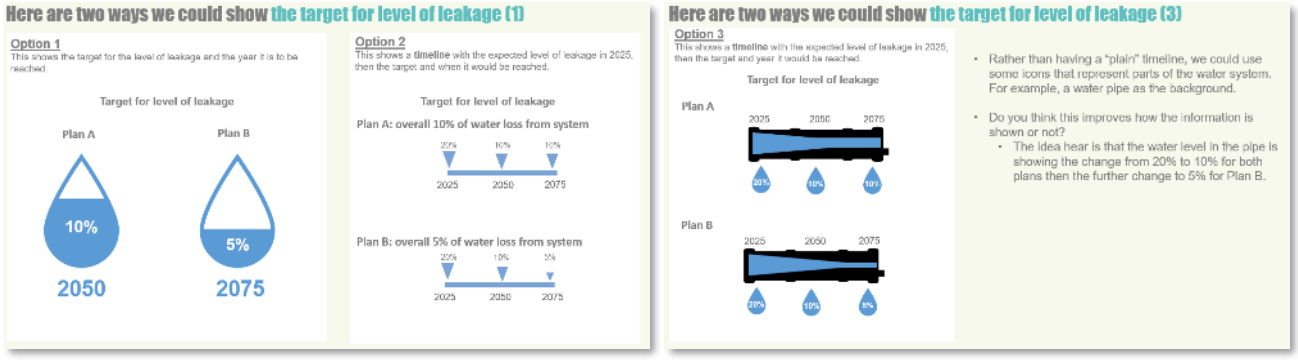
> *Posted by CJ on 05 May 2021 14:49*
> The 4 points deliver on the issues which are important. Looking at reducing the risk for emergency measures, Reducing wafer leaks is really important as it's the cause of 1/5 of water use, environment impact is taken into account, and water saving measures for costumers. This could really help as many people will implement if I reduce the increase in cost to themselves.

> *Posted by BB on 04 May 2021 08:07*
> The minimum plan is a good start.
> The four areas to appear to be clear and sensible.
> I would like to see a greater emphasis/target on reducing leaks.

Participants were given three options of how a plan target related the minimum requirement for the plan could be presented – using the example of leakage reduction. The options differed as follows: (i) showing the target for the level of leakage and the year it is to be reached; (ii) showing a timeline with the expected

[9] eftec and ICS Consulting (2021) Customer Preferences to Inform Long-term Water Resource Planning - Part A Evidence Review, Final Report for Water Resources South East, February 2021

level of leakage in 2025, then the target and when it would be reached; and (iii) a timeline using some icons that represent parts of the water system, e.g. a water pipe (**Appendix Figure 6**



Appendix Figure 6 Options for presenting information on the minimum requirements

The plan targets should be shown as an icon with the year the target will be achieved. The majority of participants preferred a simpler representation displaying the target level of leakage and year it will be achieved as an icon because it was clear, easy to understand and visually eye catching. Whilst some other participants preferred the timeline approach because more information was be displayed (e.g. current level of water loss from system) while still being cohesive.

> *Posted by SP on 12 May 2021 20:52*
>
> Option 1 is simpler and easier to understand – creative too
> Option 2 takes some time to process – theres a lot of numbers!! Les is more..

> *Posted by TM on 13 May 2021 11:27*
>
> I like option 1 as the graphic is really clear without having to read too much but of course Option 2 is more detailed. I guess it depends on whether one is "wordy" or "visual" on this item. .

> *Posted by PR on 12 May 2021 15:16*
>
> I like the motif in the previous depiction – the softer graphic of a tear drop or water droplet. On balance though, finding leakage and replacing pipes is very much a industrial/construction enterprise and these graphics win there.

Plan "balance"

Appendix Figure 7 presents the types of information participants were shown as part of a plan "balance".

The type of information that could be shown	What it would tell you about a plan
How much leaks from the water supply system would be reduced	• The target for the amount of water saved by reducing leaks • The year the target would be achieved
How much of the water overall would come from • New supply schemes, • Reducing leaks, and • Measures to save water / reduce use	• The "balance" of the plan between new supplies and water saving measures • The "balance" over time

Appendix Figure 7 Options for the types of information that could be shown under 'What is the plan?'

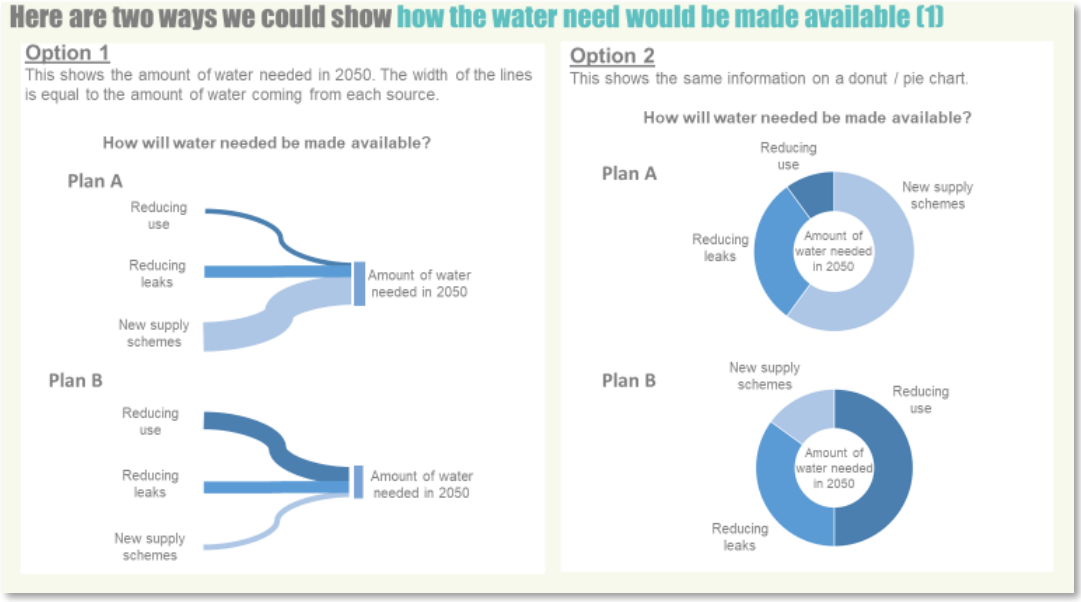
Information on how much of the water overall would come from the difference sources should be

included in the tool. Participants wanted to see information on where the water would come from. When asked to rank the pieces of information, the majority of respondents put how much of the water overall would come from reducing leaks water in their top five.

> *Posted by CJ on 10 May 2021 14:55*
> It all seems clear. I must admit that I am more interested in the leaks, water saving, and impact on wildlife

> *Posted by DW on 06 May 2021 22:03*
> I think all of this information is important, but the last point "How much of the water overall come from…." seems to cover the most range of details in this category

Participants were given two options of how they would like to see information on sources of water presented in the tool – one showing the amount of water needed in 2050, with the width of the lines equally the amount of water coming from each source and the other showing the same information on a pie chart (Appendix Figure 8).



Appendix Figure 8 Options for presenting information that could be shown under 'What is the plan?'

Information on how much of the water overall would come from the difference sources should be presented in the tool as a pie chart. Overall, participants preferred this information to be shown on a pie chart. Participants stated information presented in a pie chart was clearer, easier to understand and was easier to allow comparisons between the plans. Some participants thought the Sankey diagram was more eye catching, dynamic and visually more relatable to pipelines/flows of water. However, found it harder to understand the differences between the plans.

> *Posted by LM on 12 May 2021 16:22*
> Option 2. Clearer overall option 2 makes if easier to compare just due to how its presented visually

Posted by MC on 12 May 2021 17:16

Definitely option 2, it is logical and graphically easy at first glance for anyone to understand as pie charts have been used since early school years.

Both options make it easy to see where the water is coming from, option one has thickness of lines to convey amount of water, but the pie charts/graphs is a quick view percentage wise.

It is easier to compare in option 2, unless you have looked at option1 for a while then it's just focusing on line thickness.

Posted by RS on 13 May 2021 10:52

I really prefer option 2 as a way of showcasing. It is easier to see and the differences between a and b
Option 1- is very hard to understand the differences but the visuals of this is better.

Supply schemes

Appendix Figure 9 presents the types of information participants were shown under options for each plan.

The type of information that could be shown	What it would tell you about a plan
The new water supply schemes that would be built	• The types of schemes that would be used – e.g. reservoir, water recycling, desalination plant • How much water each scheme would provide • Where each scheme would be located in the region • The year the each scheme would come "online" • The potential impacts/benefits of the scheme (e.g. wildlife, recreation opportunities, local disruption, etc.)
"Transfers" of water • Between different locations in the South East, and/or • Into the South East from other parts of the country	• How much water would be moved around the South East, or how much extra water would be brought into the South East • Where the transfer would come from and go to • How the water would be transferred (e.g. by new pipes, using existing rivers or canals) • The year the transfer would come "online"

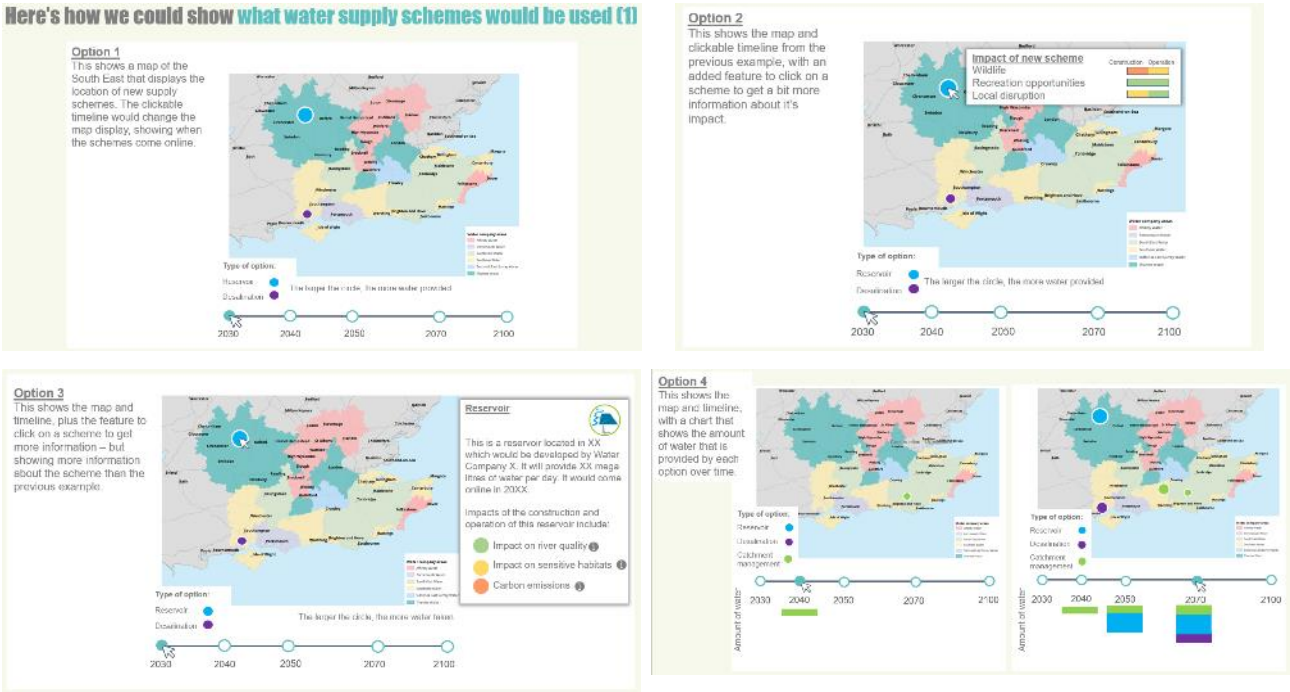
Appendix Figure 9 Options for the types of information that could be shown under options for each plan

Information on location of schemes and timings of new schemes should be included in the tool. When asked to rank the pieces of information, the majority of respondents listed the new water supply schemes that would be built in their top pieces of information they'd like to see included in the tool. Most participants wanted to see information on the impacts/benefits of the schemes used and what type of schemes would be used.

Posted by LM on 14 May 2021 16:12

The types of schemes that would be used – e.g. reservoir, water recycling, desalination plant. How much water each scheme would provide a year.

Appendix Figure 10 presents the four options participants were given to show the main supply schemes. Each option had varying levels of information, including the information about the schemes and the amount of water that is provided by each option over time.



Appendix Figure 10 Options for presenting information that could be shown under options for each plan

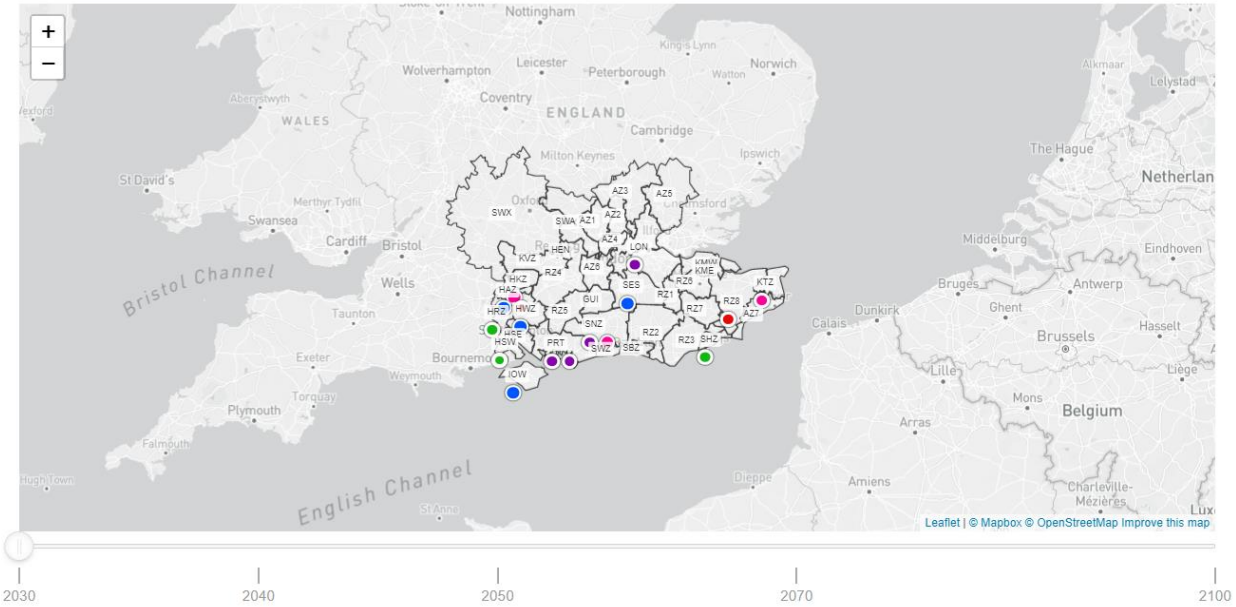
The map should include rollovers with more information on each scheme. Participants wanted rollovers with more information on each scheme, rather than displaying the information on the main scheme. Most participants liked the 'clickable' timeline that would change the map display, showing when the schemes come online. The majority of participants preferred the options where users of the tool would be given the choice to click each scheme to get more information. Most participants were concerned with finding a balance between too much or too little information - the optional pop ups could resolve the information fatigue. Most respondents preferred dots, rather than icons, to show locations/types of schemes.

> *Posted by PR on 13 May 2021 14:47*
>
> Makes sense, would be useful to know more detail on the particular "scheme". Also, I think generally people are most interested in what might impact them directly. So give the option to zoom to their particular area. More interactive…

> *Posted by MC on 13 May 2021 18:42*
>
> Maybe a tad too much info for a few users, but if "mousing over" or tapping the icon pops up the information box, it is a nice added touch in my opinion. The clean look would start to diminish on a mobile device but a desktop makes is still look great. There will be interest in the additional info.

> *Posted by DW on 13 May 2021 15:09*
>
> Im still happy with option 2, maybe many customers may feel they are being overloaded with too much information.

Participants also were asked to test a working version of the interactive map produced by SurveyEngine (**Appendix Figure 11**). This version allowed participants to zoom in/out and click each scheme to find out more about it.



Appendix Figure 11 Interactive map

The map should have more instructions in the tool. Participants generally found the interactive map easy to use and intuitive but clear instructions are needed for the map in the tool.

> *Posted by DW on 18 Jun 2021 15:46*
>
> I found it easy to use the map as I am used to looking at information like that. But I did have too go back into it again to move the bottom slider along the years. I didn't see that to begin with. I think there does need to be a basic box with instructions regarding zooming in/moving slider along the bottom to reveal further plans other wise people may miss that…The whole thing feels much more immersive now.

Resilience

Appendix Figure 12 presents the types of information participants were shown under the resilience performance indicator.

The type of information that could be shown	What it would tell you about a plan
The supply of water vs. the demand for water	• How the amount of water supplied would change over time • How the amount of water needed (demand) would change over time • The "gap" between supply and demand over time – i.e. how much surplus water would be in the system
How the reliability of the system would be improved	• The size of the "buffer" in the system to reduce the chance that extreme events have less chance of causing disruption and water shortages
How the adaptability of the system would be improved	• How well the system could recover faster from disruption caused by extreme events (e.g. flooding, heatwaves, severe cold snaps)
The potential for modifying the system in the future	• How easy it would be to increase the supply of water gradually over time as and when the extra water is needed

Appendix Figure 12 Options for the types of information that could be shown under the resilience performance indicator

Information on the reliability of the system, adaptability of the system and potential for modifying the system should be included in the tool. Participants found the information presented under the water supply system clear and useful to have in the tool. There was no clear preferred on what type of information is more important to shown under this category. However, when asked which are their five least important pieces of information from the 10, five participants said information on the supply of water vs. the demand for water.

> *Posted by CJ on 10 May 2021 14:57*
>
> All very clear and comprehensive
> Short, shar bites pf information are better suited to keep attention, with instructions to find out more if required

> *Posted by DW on 06 May 2021 17:04*
>
> I would have be happy to receive this kind of information in the past.
> With more information provided to customs I'm sure they would be a lot more careful with not wasting water.

> *Posted by MC on 06 May 2021 20:05*
>
> A simplified system showing water in a graphical system (similar to mobiles do for battery top up during charge would be great for this) like a small simplified moving graphical rep of the actual complex system.

> *Posted by LC on 06 May 2021 16:39*
>
> I think it is very clear. I would like to see how I would be easy to increase the supply of water gradually over time with what cost percentage?

Environmental impact

Appendix Figure 13 presents the types of information participants were shown under the environmental performance indicator.

Type of information for customers	What the tool would tell you about a plan
Overall impact	
Overall impact on the plan on the environment	• An assessment of whether the plan would have an overall positive or negative environmental impact, based on considerations like (a) protecting wildlife and creating new habitats, (b) effect on river quality, risk of flooding, and air pollution, and (c) impacts on local communities (e.g. disruption, recreation sites)
Positive/negative impact	
Positive environmental impacts	• An assessment of the positive environmental impacts of the plan based on considerations like (a) protecting wildlife and creating new habitats, (b) effect on river quality, risk of flooding, and air pollution, and (c) impacts on local communities (e.g. disruption, recreation sites)
Negative environmental impacts	• An assessment of negative environmental impacts of the plan based on based on considerations like (a) protecting wildlife and creating new habitats, (b) effect on river quality, risk of flooding, and air pollution, and (c) impacts on local communities (e.g. disruption, recreation sites)
Specific environmental impacts	
Improvement to sensitive river habitats	• Rivers and groundwater locations where less water will be taken to protect sensitive habitats to help them cope better with the effects of climate change • The year environmental target(s) for protecting sensitive habitats would be achieved
The chance that extra drought measures would be needed	• The expected frequency of "back-up" measures that allow more water to be taken out of rivers in a time of drought
Impact on river quality	• An assessment of the impact of the plan on all rivers in the region, based on their quality for fish and other wildlife
Biodiversity improvement	• The "net gain" in biodiversity from the plan due to offsetting negative impacts on habitats and wildlife through "biodiversity credits" bought in projects outside the water sector.
Carbon impact	• Amount of carbon the plan would emit / the amount of carbon that would be offset • The year net zero carbon would be achieved

Appendix Figure 13 Options for the types of information that could be shown under the environmental performance indicator

The tool should include positive and negative impacts on the environment. Participants were divided about the types of information they would like to see on the environmental implications. The majority of participants wanted to see the overall impact, while a few specified the separation of negative and positive impacts are important. When asked to rank the pieces of information, the majority of participants (over 8) stated the overall impact of the plan on the environment would be a in their top 10 pieces of information for the tool. Five respondents stated information on biodiversity improvement could be excluded from the tool.

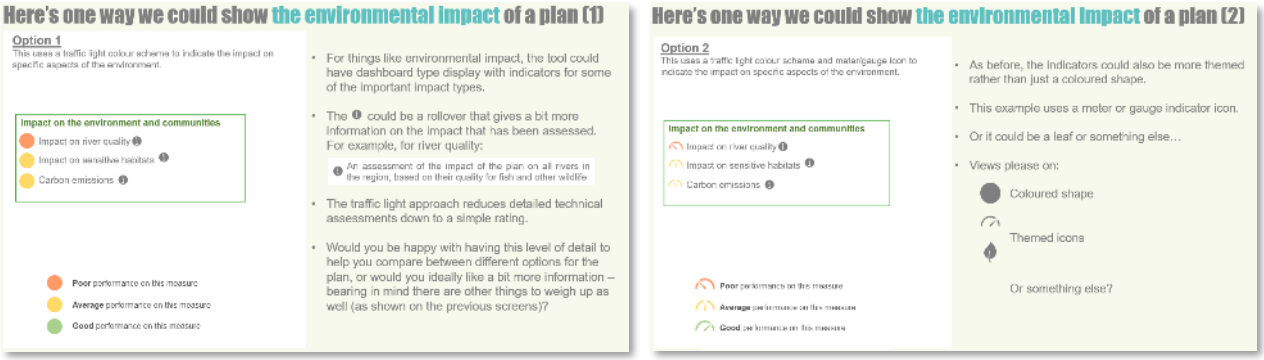
> *Posted by LC on 06 May 2021 16:47*
> It is important to look at both negative and positive impacts regarding environment.

> *Posted by LM on 10 May 2021 21:57*
> Understood. I think a more concise approach with this one is needed.

> *Posted by LC on 06 May 2021 16:51*
> the information for customers is good.
> Carbon impact is a must for customers to know. Extra drought measure would be needed. Id like to see how this would be done?

Posted by LM on 10 May 2021 22:00
Seems clear and concise. I'm sure some points can be grouped together infact

Participants were shown two ways the environmental impact of the plan could be shown in the tool (**Appendix Figure 14**). The first option uses a traffic light colour scheme to indicate the impact on specific aspects of the environment and the second also uses a traffic light colour scheme but uses meter/gauge icon to indicate the impact on specific aspects of the environment.



Appendix Figure 14 Options for presenting information that could be shown under the environmental performance indicator

The indicators for the environmental impact should use a traffic light system to rate the performance and use a coloured shape. Participants liked the option to get pop ups for more information on the impacts if needed. Most participants liked the traffic light approach and stated it was easy to understand.

Posted by CJ on 13 May 2021 12:30
I like the option to be able to rollover the info icon for further info
The impact on environment and communities is complex, so to make it straightforward and clear is useful

Posted by DW on 13 May 2021 21:15
I find the traffic light approach visually easier to understand. People all understand Red, Amber and Green. The "I symbol is a useful way of providing extra information if a person wants more clarity, without bombarding you with too much reading.

Posted by LM on 13 May 2021 23:08
I like this idea. Its simple enough to follow and it seems to have worked well on the food labels so far. I do think they could require a little more detail but the colour scheme is a great idea

Participants views were divided when asked what type of icon could be used to indicate the impact. Some were indifferent between the icons, others preferred the themed icons, while a few believed the themed icons didn't add anything to the message.

Posted by LM on 13 May 2021 23:09
I think the colour scheme is enough. Sometimes less is more.

Posted by LC on 13 May 2021 14:49
I do prefer the previous option. I don't like the idea of a gauge indicator. A leaf would look a lot better and its part of the environment.

Posted by SP on 13 May 2021 20:55
Oh yes I like this! Anything with more visuals for me will always get my vote! I like the idea of themed icons… maybe something more to do with the actual topic it is demonstrating.

Impact on customers

Appendix Figure 15 presents the types of information participants were shown to explain what the impact of the plan would be on customers.

The type of information that could be shown	What it would tell you about a plan
The chance that water use restrictions would be needed	• The expected frequency of restrictions like hosepipe bans
The chance that emergency drought measures would be needed	• The expected frequency of the severe restrictions on uses of water due to extreme drought and water shortages, including use of rota cuts and standpipes
The measures that would be used to save and reduce the amount of water used by customers	• How customers would be encouraged to save water – e.g. meters, water saving devices, increased recycling in homes • How day to day use of water could change in the future (e.g. change in customer behaviour, changes in use of water in homes).
The cost of the plan	• The impact on customers' bills from 2025 onwards

Appendix Figure 15 Options for the types information that could be shown for impact on customers

Information on the types of water saving measures and how much water customers will have to save should be included in the tool. Participants stated the measures that would be used to save and reduce the amount of water used by customers and the chance that water use restrictions would be needed would be key pieces of information for the tool. Some participants generally thought most users of the tool would find this the most interesting part of the tool. When asked to rank the 14 factors, the majority of participants (over 8) stated the cost of the plan, the measures that would be used to save and reduce the amount of water used by customers and the chance that water use restrictions would be needed would be a key piece of information for the tool.

Posted by MC on 06 May 2021 20:10
Visual charts and percentages are always loved by customers.

Posted by MC on 06 May 2021 20:10
Visual charts and percentages are always loved by customers.

A1.1.5 Layout of the tool

Based on the knowledge gained on what types of information participants would like to see and how they would like to see it, draft layouts of the plans were created and tested with customers to gauge how much information should be shown and how best to present this information through the tool. The draft layouts were shown to customers under five questions that align with the best value criteria (**Appendix**

Table 5). These questions were tested with customers when shown the draft plan layouts. Participants were asked to comment about what they like or dislike about the layout of each section of the plan.

Appendix Table 5 Sections of draft plan layouts shown to customers

Best value criteria labels	Section in draft plan layouts
Minimum plan outcomes Plan "balance"	What is the plan?
Supply schemes	What are the main schemes?
Resilience	How does it improve the water supply system?
Environmental impact	What does it mean for the environment?
Impact on customers	What does it mean for customers?

What is the plan?

Less information should be shown in the tool – additional information should be provided in rollovers. Participants generally thought the information on what the plan does was clear but the amount of information shown needed to be reduced.

> *Posted by LM on 06 May 2021 16:28*
> …It's incredibly hard to navigate this and ai have quite a large screen phone. Everything so congested and busy…

There needs to be clearer differentiation between the plans with emphasis on differences to be shown visually. Most participants thought the differences between the plans on the minimum outcomes were difficult to see. One participant mentioned the badges with the inverse colouring were useful to highlight the difference between the minimum plan and other plans.

> *Posted by SP on 01 Jun 2021 20:33*
> …It's really difficult to pick these apart enough to notice any differences – I cannot comment beyond the colour inversions on plan C…

What are the main schemes?

The map should only display information related to new supply schemes. Most respondents state the map has too much information with the arrows showing transfers and the number of schemes. One respondent though the size of the scheme was unnecessary and added to the information fatigue.

> *Posted by JD on 27 May 2021 18:31*
> …Seems like a good enough of schemes…Dots work best in terms of keeping screen clutter to a minimum…

> *Posted by PR on 28 May 2021 11:47*
> …This looks very busy with the arrows and it is not clear what they mean…

How does it improve the water supply system?

The tool should include more information about the indicators and performance rating in rollovers.

Most participants found the information clear. A few respondents found the 'poor performance' rating was not clear, with a few suggesting using percentages achieved/improved instead. Most respondents thought the reminder about the target was useful to see. A couple thought it was not necessary and thought it might distract from the more important pieces of information.

> *Posted by MC on 27 May 2021 20:47*
> …More information about the indicators and why the performance rating in detail…

> *Posted by CJ on 28 May 2021 20:01*
> …Information is clear although does the poor performance indicators mean the current measures are poor and this will improve with the measures?…

What does it mean for the environment?

The tool should include more information about the indicators and the performance rating in rollovers. Most participants thought the information presented was clear and thought the poor performance for negative environmental impact is unclear.

> *Posted by MC on 27 May 2021 20:47*
> …Clear for indicators, but this "poor performance for negative environment impact" I would see as a good thing seeing as it is negative impact…

> *Posted by CJ on 28 May 2021 20:01*
> …The info is clear and gives more clarity on the environmental ambition which I queried earlier…

What does it mean for customers?

The tool should include information on how customer customers will be asked to save water. Most participants found the level of information show was clear and interesting to read and liked the information on how they might be asked to save water. While a few were concerned they could not relate to the average household.

> *Posted by JD on 27 May 2021 18:31*
> …Really good, like this a lot. I think it's natural to want to know what it means to your person household…

> *Posted by TM on 27 May 2021 16:56*
> …This is so full of useful, relevant material that I fully enjoyed reading it. I would like to see more information for the activities of my household as there is never more than 2 in it…

A1.1.6 Conclusion

The co-creation sessions were one of three components helping to develop the "information share" in the survey. The primary research objective was to produce a tool with input from customers on key aspects of design and user interface. An online bulletin board with customers, featuring sequence of tasks and discussions to test various aspects of tool interface and material describing candidate plans. A total of 13 household participants of mixed SEG and age groups took part in the sessions between 29th April – 18th June 2021.

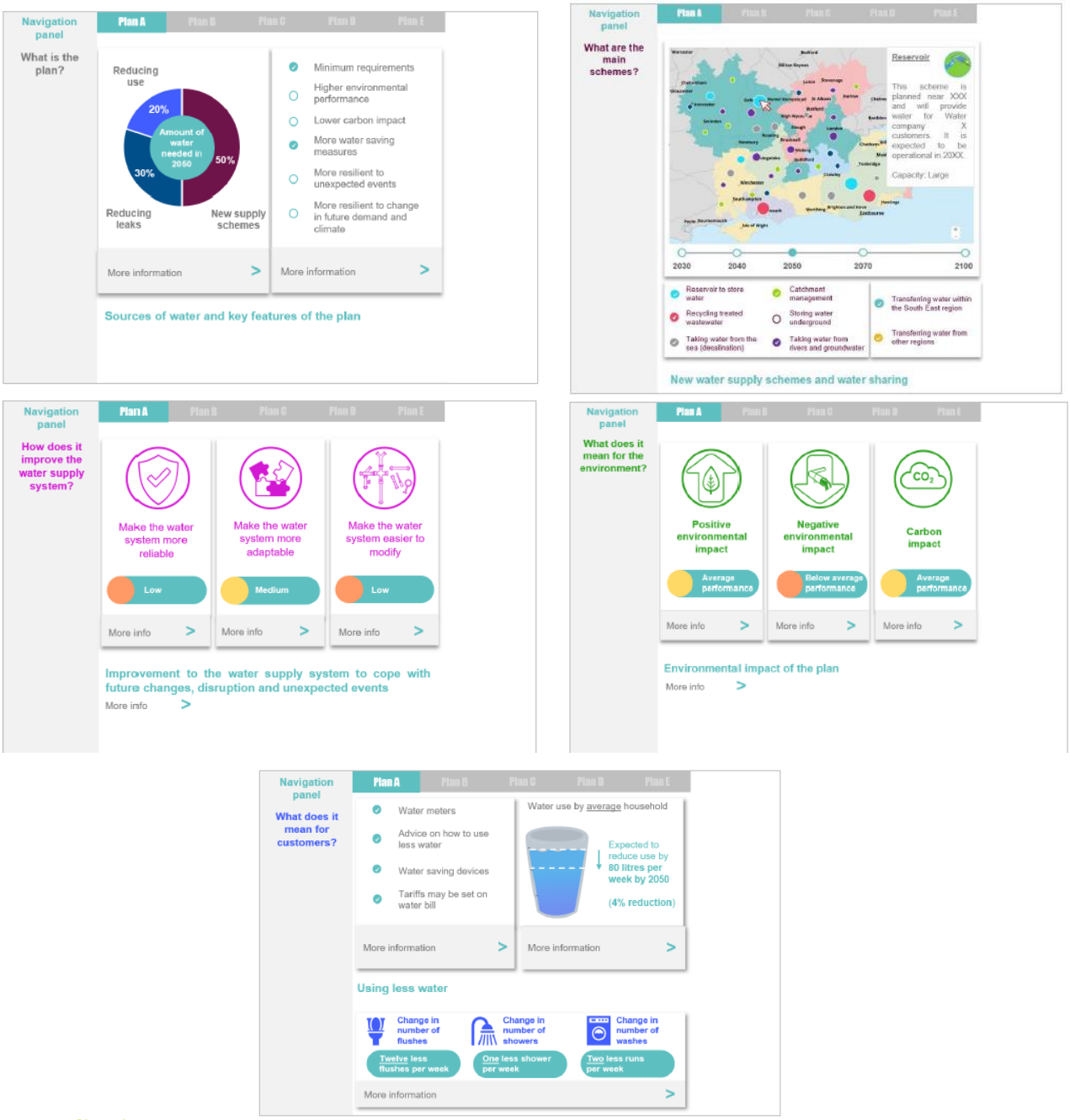
The co-creation session findings have helped identify what types of information should be included in the tool how the information in the tool should be presented. The types of information and presentation of information under each aspect of the plan should be as followed:

- What is the plan?
  - "Minimum plan outcomes": 1:500 drought resilience, environmental ambition, 50% leakage reduction, net-zero carbon, information on the minimum requirements shown as icons
  - Plan "balance": information on the amount of water provided by leakage reduction, water saving shown as pie chart
- What are the main supply schemes?
  - Supply schemes: information on the location and timing on schemes, with more information provided as a roll over
- How does it improve the water supply system?
  - Resilience: information on resilience scores, with performance rating
- What does the plan mean for the environment?
  - Environmental impact: information on indicator(s) of positive and negative impacts and carbon, with performance rating
- What does the plan mean for customers?
  - Impact on customers: information on use of water, change in bills

Participant feedback from the sessions has been used to inform how much information should be included in the tool and the layout of the tool. The layout of the tool should have:

- Clearer differentiation between the plans: emphasis on differences to be shown visually
- Less information on screen: rollovers and pop-ups

Appendix Figure 16 sets out the current draft layouts of the plan, based on the insights presented above. Each aspect of the plan will have rollovers with more information, these are set out in Appendix 2.



Appendix Figure 16 Current draft layout of plan

A1.2 Survey testing

The survey content and materials were iteratively tested in two phases. The first consisted of a small number of cognitive interviews, which were conducted one-to-one online in February 2023 (see Appendix 4). The main aim was to test the choice exercise, including ease/difficulty of the full ranking format, and obtain feedback to help refine the information provided about the regional plan (video / graphics / descriptions). The participants completed the survey during the interview and were then asked a series of follow-up and debriefing questions about their understanding of the survey content and choice tasks, motivations, and how the survey might be improved. The second testing phase included two pilot survey

waves for household and non-household respondents in March 2023, which included 311 and 124 respondents in total, respectively. Overall learnings from the testing phases and adjustments made to the survey are summarised in **Appendix Table 6** .

Appendix Table 6 Learnings from the testing

Testing phase		Findings	Adjustments made
Cognitive interviews – one-on-one online interviews (4 respondents)		• The overall description of the regional plan was understood by respondents. • The mix of videos, graphics, and "flip cards" was well received, helping to retain attention and make the information provision more engaging. • The choice exercises were easy to understand and the requirement to fully rank the alternative plans was not too onerous. • Respondents felt that difference between some plans was not that obvious, and it was difficult to decide which was more/less preferred.	Updates to the survey content were concerned with improving the presentation of the alternative plans in the choice exercise: • The graphic showing the profile of each plan (supply schemes, transfers and demand management) was changed from a pie to a bar charts to make the "read across" comparison easier. • The amount of text describing the impacts of each individual plan was reduced (e.g. changed 'high resilience to unexpected events' to just 'higher') and row headings were added to support the "read across". • Other superfluous text also removed to help focus respondent attention on the differences between the plans.
Pilot survey	Wave 1 (59 household respondents total)	The first wave showed improved fit and results in line with expectations (given the modest sample size).	None.
	Wave 2 (311 household respondents total)	Second wave carried out to check the survey was still working as expected. Results showed improved fit and results in line with expectations (given the modest sample size).	None.
	Wave 3 (124 non-households respondents total)	The first non-household wave (third wave overall) showed improved fit and results in line with expectations (given the modest sample size).	None.

Appendix 2 Survey script

Attached file

Appendix 3 Onscreen layout

Attached file

Appendix 4 Summary statistics

Attached file

Appendix 5 Choice model results

Attached file

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