Customer preferences on added value for large resource schemes

Final Report

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Executive Summary

PJM Economics and Accent were commissioned by a club of water companies to obtain primary evidence on customer preferences for 'added value' elements to inform the development of 11 strategic resource options (SROs). This evidence will be used as part of the RAPID Gate 2 submissions for the SROs.

The objectives of the research were to understand:

- what added value customers perceive is important as part of infrastructure development, to understand preferences for the added value (and if those preferences change depending on the geographical location/type of scheme/type of customer)
- how much are customers prepared to pay
- what language should *be* use*d* to explain the added value.

The research started with a review of the literature on public value, included in an appendix to this report. There is a large set of guidance documents and frameworks on 'added value' in the water sector, but the concept is still not fully and universally embedded in the water companies' culture. The review found little empirical evidence on perceptions and preferences regarding public value in the UK water sector. Strategic Resource Options Gate One submissions have also included little information on initiatives to deliver public value.

The quantitative stage of research has focused on estimating customer willingness-to-pay (WTP) valuations of 26 possible project additions at SRO sites via a stated preference survey. The survey included a pairwise choice exercise to obtain willingness-to-pay values for each of 26 project additions (economic, social, or environment).

It also included a contingent valuation exercise providing a measure of maximum WTP for project additions in total. The distance from the participants' location to the SRO sites was a part of the scenarios shown and was specified as either local (5 miles) or far away (50 miles).

The survey was implemented via online and face-to-face interviews and achieved a sample of 5,902 households and 553 non-household customers. The data were weighted to UK census data (households) and UK business population estimates (non-households) to be reflective of the population.

The main findings of the study are:

- The highest valuations for household customers were: 'Specialist habitats created for wildlife' (£3.87 annually); 'New wetland area' (£3.24 annually); 'Space provided for sustainable agriculture' (£2.61 annually). Households' average valuation was considerably higher in the environmental area (£3.05), compared to the economic area (£1.19) and the social area (£1.16). The combined annual valuation of all

project additions was around £36. (NB these values are all independent of the size of the intervention.)

- The highest valuations for non-Household customers were: 'Beach area' (0.98% of the water only bill, annually); 'Sensory garden for those with learning difficulties' (0.93% of the water only bill, annually); 'Specialist habitats created for wildlife' (0.73% of the water only bill, annually). The combined annual valuation of all project additions was 11.83% of the water only bill

- The estimates of non-household WTP values were substantially less precise than for households

- There is considerable variation in WTP for project additions across types of sites, (project additions being most highly valued at Water treatment works) and by distance of the site

- The WTP for a 'package' of project additions was lower than the sum over individual project additions.

There are several indications that the stated preference exercises worked well and produced valid findings, such as positive participant feedback, reasonable differences across segments, and consistency between the valuations and the answers to other survey questions and the results of a previous qualitative study.

The study also demonstrates, using data from three SROs, how the results are intended to be used within SRO Gate 2 submissions, aggregating the valuations of individual project additions by type of site, company, and distance, to the respective population.

1 Introduction

1.1 Background and Objectives

PJM Economics and Accent were commissioned by a club of water companies to conduct a multi-stage programme of research to obtain primary evidence on customer preferences for 'added value' elements to inform the development of 11 strategic resource options (SROs). This evidence will be used as part of the RAPID Gate 2 submissions for the SROs.

The objectives of the research were:

- To understand what added value customers perceive is important as part of infrastructure development
- To understand preferences for the added value – what should be the balance between options such as economy, jobs, apprenticeships, leisure, education and carbon sequestration etc
- To understand if the preferences change depending on the geographical location/type of scheme or other factors
- To estimate how much are customers prepared to pay
- To understand what language should be used to explain the added value.

These objectives were addressed via a study involving:

- A literature review
- Qualitative customer research
- Quantitative customer research.

This report focusses on the findings of the quantitative customer research. Findings from the literature review and qualitative research can be found in the appendices.

1.2 Contents

Section 2 sets out the study methodology, including survey design and implementation; Section 3 presents findings, integrating the qualitative and quantitative elements of the research; and Section 4 summarises and concludes.

Appendices to the document include:

- Appendix A: the full literature review
- Appendix B: the main survey questionnaire

- Appendix C: Phase 1 qualitative findings
- Appendix D: Phase 2 qualitative findings
- Appendix E: summary of participants' open responses to feedback questions
- Appendix F: details regarding the econometric modelling
- Appendix G: tables of aggregate valuations.

2 Methodology

2.1 Introduction

The quantitative stage of research has focused on estimating customer willingness-to-pay (WTP) valuations of 26 project additions at SRO sites via a stated preference (SP) survey.

This section of the report provides the following details:

- SP design (2.2)
- Survey administration (2.3)
- Sample characteristics and the weighting used (2.4)
- Participant feedback (2.5).

2.2 Stated Preference Design

Overview

Stated preference (SP) methods involve asking survey participants a series of carefully designed questions to explore their preferences in relation to the object of the study. When used for valuation purposes, such methods invariably involve participants having to make a trade-off between having more or less of the good or service in question and having to make, or receive, a higher or lower payment. It is the trade-off between money and the provision of the good or service that defines the value measure.

The most common SP methods include the following:

- **Contingent valuation**
  A question, or series of questions, aimed at obtaining a value estimate for a specific improvement or initiative. Typically, these questions involve a choice of whether to have the improvement in question and agree to a payment such as a bill increase, or not to have the good or service improvement but also not to make the payment

- **Discrete choice experiments (aka choice-based conjoint)**
  A series of questions asking for the preferred choice from two or more options where each is characterised by a number of attributes (typically 3-6). Econometric analysis of the data allows for valuation of each of the attributes individually

- **Best-worst scaling (includes MaxDiff)**
  A series of questions asking for the most and least preferred alternative from a set of 4-6 options, or for the most and least important item from a list of 4-6 options. Econometric analysis of the data allows for an importance or priority index of options to be estimated

- **Contingent ranking**
  Questions asking participants to rank a list of options. Like best-worst scaling / MaxDiff, econometric analysis of the data allows for an importance or priority index of options to be estimated

- **Menu-based / slider**
  Participants construct their own package of service levels from a menu where each level of service improvement has an associated cost impact. As customers select higher levels of service, the bill rises accordingly, and respondents are updated in real-time as regards the total bill impact of their choices.

For the present study, based on the nature of the goods to be valued, it was decided to structure the survey questionnaire to include:

- A discrete choice experiment (DCE), structured as a pairwise choice exercise, to obtain willingness-to-pay (WTP) values for each of 26 project additions

- A contingent valuation (CV) exercise providing a measure of maximum WTP for project additions in total.

On its own, the pairwise choice exercise could potentially lead to WTP estimates that support project additions across the full set of SROs that imply larger bill increases than customers are willing to pay for in total. This is due to the so-called 'package effect', which occurs when the sum of valuations obtained for a series of small goods exceeds the valuation as a combined package. The contingent valuation sets an upper bound on how much customers of each company are willing to pay in total for added value elements.

SP1 Pairwise Choice Exercise

The pairwise choice exercise covered a set of 26 project additions in the economic, social, and environmental domains. The project additions included in the choice exercise are shown in Table 1 below.

Table 1: Project additions covered in the pairwise choice exercise

	ID	Project addition	Full description shown in the survey questionnaire (where different)
Economic	Att1	One in every 50 jobs will be an apprenticeship	One in every 50 jobs created to develop the site will be an apprenticeship
	Att2	A quarter of all employees are local	A quarter of all employees working to develop the site will be recruited from the local area
	Att3	Increased visitor numbers, with economic benefits	Increased visitor numbers, with economic benefits to the surrounding area
	Att4	Links to heritage and local history, through signs	Links to heritage and local history, through signs put up at the site.
	Att5	Space provided for sustainable agriculture	Space provided for sustainable agriculture, including regenerative farming and re-wilding
	Att6	Irrigation reservoirs to improve local farmland	
	Att7	Café with locally sourced food	
	Att8	Fish ponds created, with public access	
Social	Att9	Visitor centre	
	Att10	Shop selling sustainable products	Shop selling sustainable products and gardening materials
	Att11	Outdoor BBQ/picnic facilities	
	Att12	Water sports facilities, e.g. sailing, paddleboarding	
	Att13	Land-based recreation/amenities	Land-based recreation/amenities, e.g. Go Ape, Segway hire, cycle hire
	Att14	Restaurant/café/welfare facilities	
	Att15	Wildlife viewing platform, Bird watching facilities	
	Att16	Children's playground	
	Att17	Sensory garden for those with learning difficulties	Sensory garden/space for those with learning difficulties
	Att18	Walking paths, Boardwalk, Bridleway, Cycle trail	
	Att19	Beach area	
	Att20	Campsite	
	Att21	Conference centre	
	Att22	Education/training/research facility	
	Att23	Links to bus and rail stations	
Environmental	Att24	Reduced flood risk to surrounding area	
	Att25	New wetland area	New wetland area, with benefits for flood risk, wildlife habitats and carbon capture
	Att26	Specialist habitats created for wildlife	Specialist habitats created for wildlife, including butterfly bank, wildlife refuge, ponded areas, reed beds, new woodland and meadow, and creation of landscape scale habitat corridors

Each of the two options in the pairwise choice exercise included up to three project additions. Additionally, the format included both the type of site, and its distance from the participant, as scenario-level features, as well as including the bill impact of each option.

The following types of site were covered in the exercise:

- Reservoir
- Canal to transfer water from one area to another
- Pipeline to transfer water from one area to another
- Water treatment works (WTW)

The distance levels were agreed to be local (5 miles) and far away (50 miles).

The bill impacts were shown in pounds for households and as a percentage of the annual water only bill for non-households and were drawn from the sets shown in Table 2.

Table 2: Bill impacts in the pairwise choice exercise

	Household	Non-household
1	Same as now	Same as now
2	£0.5 more than now	0.125% more than now
3	£1 more than now	0.25% more than now
4	£2 more than now	0.5% more than now
5	£3 more than now	0.75% more than now
6	£5 more than now	1.25% more than now

The project additions, types of sites, distances, and bill impacts were combined in an experimental design that was created to obtain the sequences of choices that were actually faced by participants in the survey. In each question, participants were shown two scenarios, and they were asked to indicate which one they would choose.

- Figure 1 shows the introductory screen.

- Figure 2 shows an example of a choice card from the survey, which illustrates the nature of the questions asked.

Participants each saw ten questions such as the one shown in Figure 2.

Figure 1: SP1 introductory screen

As you've just seen one of the impacts relates to the change in your water bill. In some options there will be no increase to your bill while in others there will be an increase.

If an increase is shown, your annual bill would increase by that amount in one year, and would then remain at that level on a permanent basis. The increase would not be applied year on year, nor would it be reversed the following year.

When choosing which option you prefer in each case, please consider:

- Whether the impacts shown are important to you; and
- Your household overall income and expenses, remembering that:
- Any money you pay for these improvements will not be available for you to spend elsewhere
- Other bills may go up or down affecting the amount of money you have to spend in general

Your household bills will also be affected by the rate of inflation each year.

Figure 2: Pairwise choice exercise: example choice card

Type of site	Reservoir
Distance from your home	5 miles

Which option would you choose for this site?

	Option A	Option B
Project additions	Links to heritage and local history, through signs put up at the site. New wetland area, with benefits for flood risk, wildlife habitats and carbon capture Irrigation reservoirs to improve local farmland	Walking paths, Boardwalk, Bridleway and Cycle trail Restaurant/café/welfare facilities Specialist habitats created for wildlife, including butterfly bank, wildlife refuge, ponded areas, reed beds, new woodland and meadow, and creation of landscape scale habitat corridors
Your annual water bill	Same as now	£2 more than now

The design comprised 20 blocks of 10 questions each (each participant being randomly allocated to one of the blocks) and was restricted as follows.

- Some project additions were only available at 'Reservoir' sites[1].
- A set of project additions always appeared in conjunction with 'Walking paths, Boardwalk, Bridleway and Cycle trail'[2].

[1] Shop selling sustainable products and gardening materials; Outdoor BBQ/picnic facilities; Water sports facilities, e.g. sailing, paddleboarding; Land-based recreation/amenities; Children's playground; Sensory garden/space for those with learning difficulties; Beach area; Campsite.

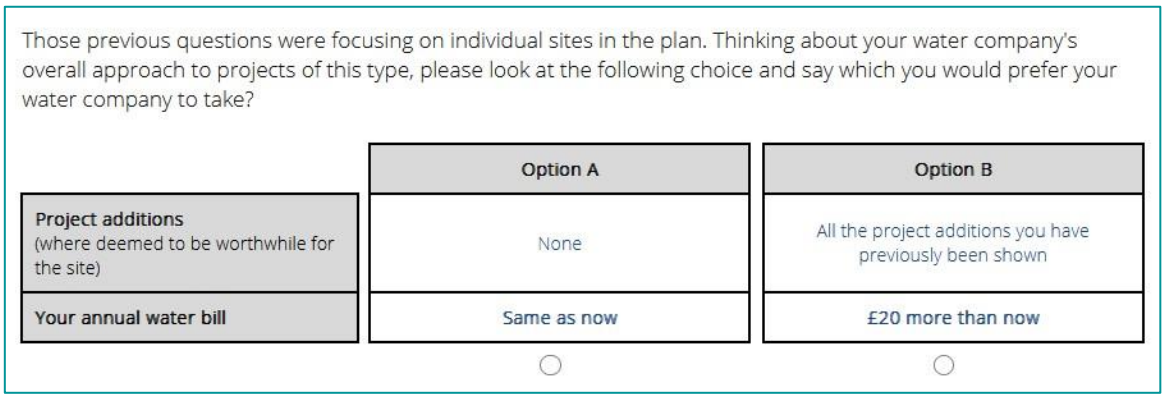
[2] Increased visitor numbers, with economic benefits; Outdoor BBQ/picnic facilities; Water sports facilities, e.g. sailing, paddleboarding; Land-based recreation/amenities; Restaurant/café/welfare facilities; Children's playground; Sensory garden/space for those with learning difficulties; Campsite; Links to bus and rail stations.

SP2 Contingent Valuation Exercise

The exercise was designed to value a 'package' of project additions. The bill impacts for an initial question in each case were varied across the sample, and the bill increase was halved or doubled in a follow-up question, depending on the response to the first question. This is the so-called 'double-bounded contingent valuation' method.

Figure 3 shows an example of a choice card from the survey.

Figure 3: Contingent valuation exercise: example choice card



The bill increases for the first question were randomly chosen from the set {£5, £10, £20, £30, £50} for households, and from {1.25%, 2.5%, 5%, 7.5%, 12.5%} for non-households, where the percentages refer to the annual water only bill[3].

2.3 Survey Administration

A mixed-mode quantitative methodology was followed to ensure that we engaged with a range of different customer types. This included:

- **Online interviews** among domestic customers from all six water companies using Accents panel partners and from client sample provided for Cambridge Water only. Non-household customers and some customers in vulnerable circumstances were also identified using this approach

- **Face to face interviews** were conducted to ensure coverage amongst hard to reach, vulnerable and digitally disengaged customers. Interviews were conducted where customers felt most comfortable – in garden or in home.

A total of 5,902 interviews were conducted with household customers and 553 interviews with non-household customers. Table 3 details the number of interviews conducted by each water company.

[3] The analysis datasets used for the present report include the pilot data because the pilot analysis did not identify any substantial problems requiring major amendments. For the pilot survey, the bill increases were drawn from {£4, £8, £16, £24, £40} and {2%, 4%, 8%,12%, 20%} for households and non-households, respectively.

Table 3: Total number of interviews by water company

	Household	Non-household
Affinity Water	763	80
Anglian Water	989	146
Cambridge Water	73	8
Severn Trent Water	1,682	71
Southern Water	513	38
Thames Water	1,882	210
Total	5,902	533

2.4 Survey Weighting

The survey data were weighted to be reflective of the population. Separate sets of weights were generated for households and non-households for each of the six companies involved in the study.

The sample household data were weighted at the company level by age, gender, and social grade. We used data from the 2011 and 2021 population census at the output area level. The borders of output areas were overlaid with the company borders in a geographic information system (GIS). The population of each output area was then assigned to the company area that contains it. At the time of calculation, a first release of Census 2021 data had been made available by the Office for National Statistics. This included population totals by age and gender, but not by social grade. Although the social grade distribution is likely to have evolved since the previous census in 2011, the decision was taken to use Census 2011 data on social grade rather than restrict the post-stratification weighting only to age and gender. In addition, the Census 2021 data was only available at the Local Authority area level. We calculated a 2011-to-2021 growth rate to population at the Local Authority level and applied that to Census 2011 data at the Output Area level.

The same procedure was applied for non-households, weighting by number of employees. We used 2021 business population estimates (from the Department for Business, Energy and Industrial Strategy) at the regional (NUTS 1) level. The regional borders were then overlaid with the company borders. The population of each region was assigned to company areas. In cases of border overlaps, the business population was assigned to all companies whose borders it intersects, proportionately to the area of the intersection.

In both cases, we used a raking procedure (also known as iterative proportional fitting), following Kott (2006) [4] and Särndal (2007)[5]. In a given iteration, a weight is calculated such that the total sample size of a given group, scaled to the population, and adjusted by the weight, equals the known population totals for that group. The weight is estimated as the ratio of the known population totals to the estimated totals. In the next iteration, a weight is calculated in the same way, for another group. The procedure

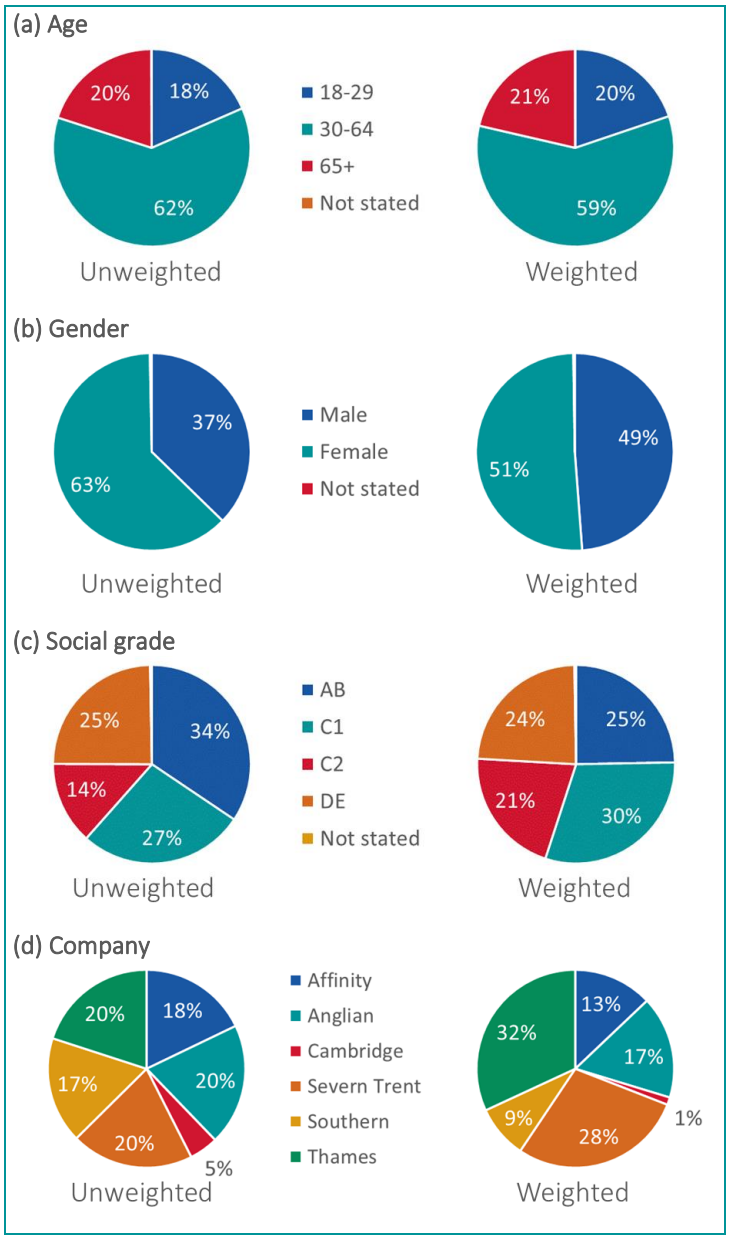
[4] Kott, P S. (2006) Using calibration weighting to adjust for nonresponse and coverage errors. Survey Methodology 32, 133-142.
[5] Särndal, C-E. (2007) The calibration approach in survey theory and practice. Survey Methodology 33, 99-119.

continues for all groups until convergence is attained, i.e. the weighted totals of all groups are approximately equal to the respective population totals and the weights do not change much in each iteration. The weights were trimmed to the interval [0.25-4] to ensure that they were not excessively small or large for any of the participants, following Théberge (2000)[6].

The weights were applied throughout the analysis except where otherwise stated.

Figure 4 and Figure 5 show the distributions of the weighting variables for households and non-households, respectively.

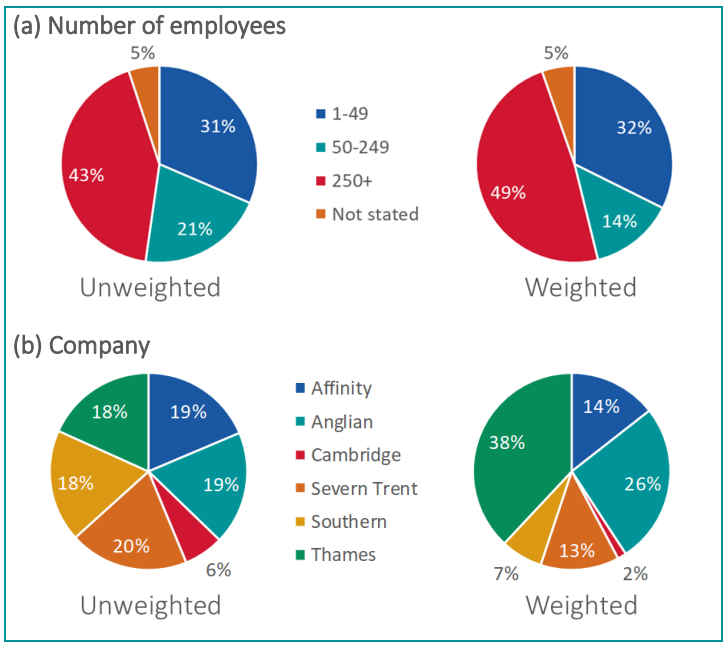
Figure 4: Household sample characteristics



Base: 5,902 household participants

[6] Théberge, A. (2000) Calibration and restricted weights. Survey Methodology 26, 99-107

Figure 5: Non-household sample characteristics



Base: 553 household participants

2.5 Feedback and Diagnostics

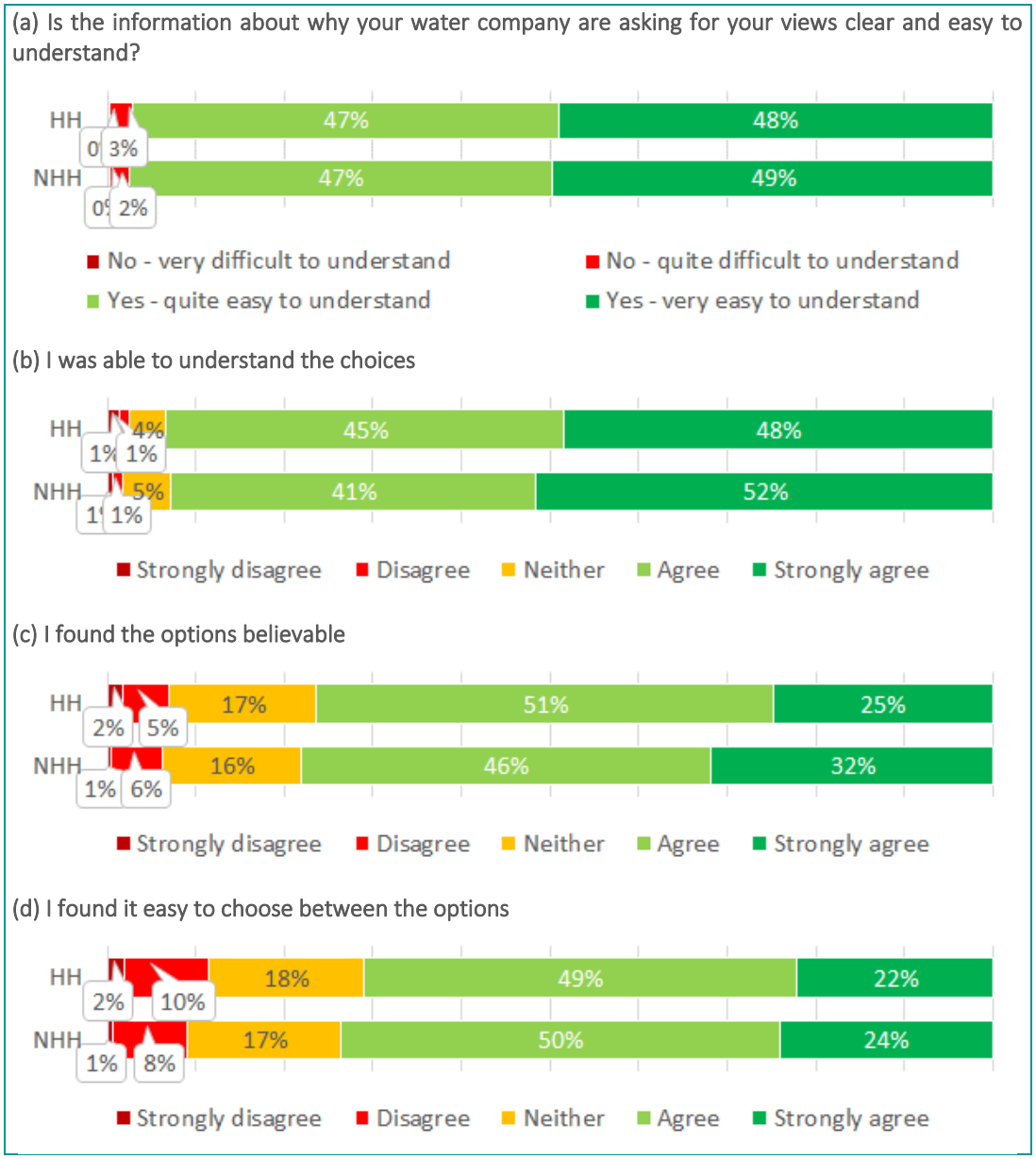
Participant Feedback

The responses to feedback questions are summarised in Figure 6.

Prior to engaging in the pairwise exercise, a vast majority of participants indicated that the information about why their water company were asking for their views was 'very easy' or 'quite easy' to understand (panel (a)).

Following the exercise, only relatively small proportions of participants disagreed a) that they were able to understand the choices, b) that they found the options believable, and c) that they found it easy to choose between the options.

Figure 6: Participant feedback



Base: HH = 5,902; NHH = 553 (unweighted)

The open responses to follow-up questions asked of those who (strongly) disagreed with any of the feedback statements in panels (b) to (d) of Figure 6 are summarised in Appendix E. The reasons given by some of those who disagreed that they were able to understand the choices suggest that, in fact, they did not disagree at all. The most frequent responses were 'Did understand' and 'Clear/well explained – simple/concise'.

Some of the most frequent reasons given by those who did not find it easy to choose between the options, were 'Difficult to decide – weigh up benefits'; 'Both options have benefits'; 'Options are similar'; 'Both are good – would choose both'; 'Don't like either/any option'. While these difficulties are inherent in such choice exercises and do not automatically imply that the responses are invalid, we check the robustness of key findings to the exclusion of participants who gave negative feedback from the estimation samples.

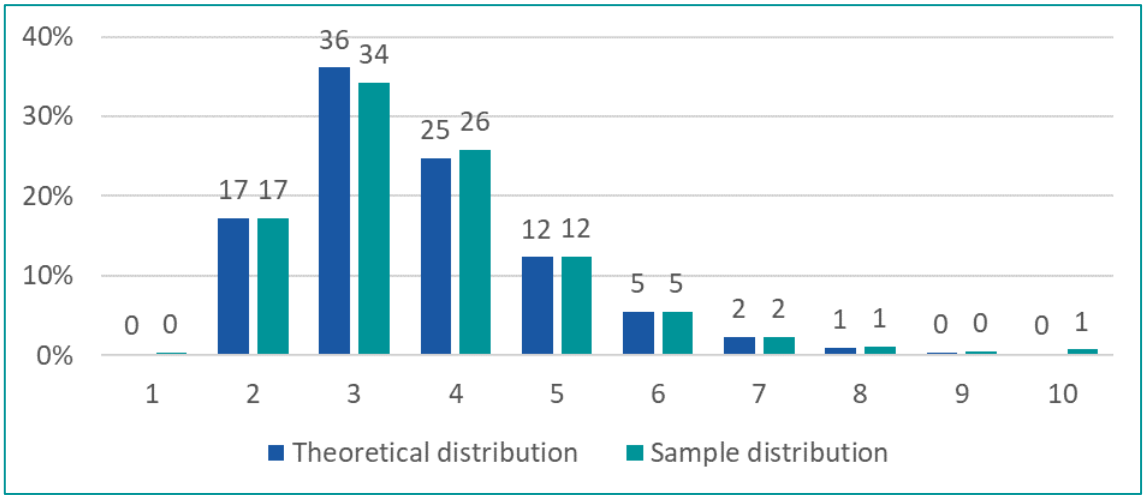
Diagnostics

Making the same choices repeatedly (e.g., Option A chosen nine times in a row) can be indicative of not engaging with the survey. A large number of non-traders implies a poor-quality dataset for analysis.

Figure 7 compares the sample distribution of the maximum length of runs of identical choices against the theoretical distribution that is obtained assuming equal choice probabilities for Option A and Option B in each question.This figure shows, for example, that 26% of participants made a sequence of choices in which Option A or B appeared at most four times in a row (e.g., {A,B,B,B,**A,A,A,A**,B,A} or {A,**B,B,B,B**,A,A,B,B,B}).

The theoretical and sample distributions are nearly identical which confirms that non-trading is not a cause for concern. Only a tiny proportion (0.7%) chose the same option across all 10 choice occasions.

Figure 7: Distribution of the maximum length of runs of identical choices (SP1)



Base: 6,455 participants (combined household and non-household sample)

Overall, the feedback and choice diagnostics are supportive of the construct validity of the choice exercise.

3 Findings

3.1 Introduction

Section 3.2 includes descriptive statistics on customer satisfaction; views regarding the most important aspects relating to customers' local environment; recreation activities; views about project additions in the context of large-scale projects and about water companies' general approach to planning.

Section 3.3 presents WTP value estimates for each of the project additions explored in the survey, including sensitivity, segmentation, and validity analyses as well as valuations by type of site and by distance. These estimates are based on an econometric analysis of responses to the SP1 pairwise choice exercise, details of which are included in Appendix F.

Section 3.4 presents valuations for a 'package' of project additions, which are based on an analysis of responses to the SP2 contingent valuation questions and are intended as a cap on the total cost of project additions across SROs at the company level.

Finally, Section 3.5 describes the aggregation of the valuations of individual project additions by type of site, company, and distance, to the respective population for three SROs.

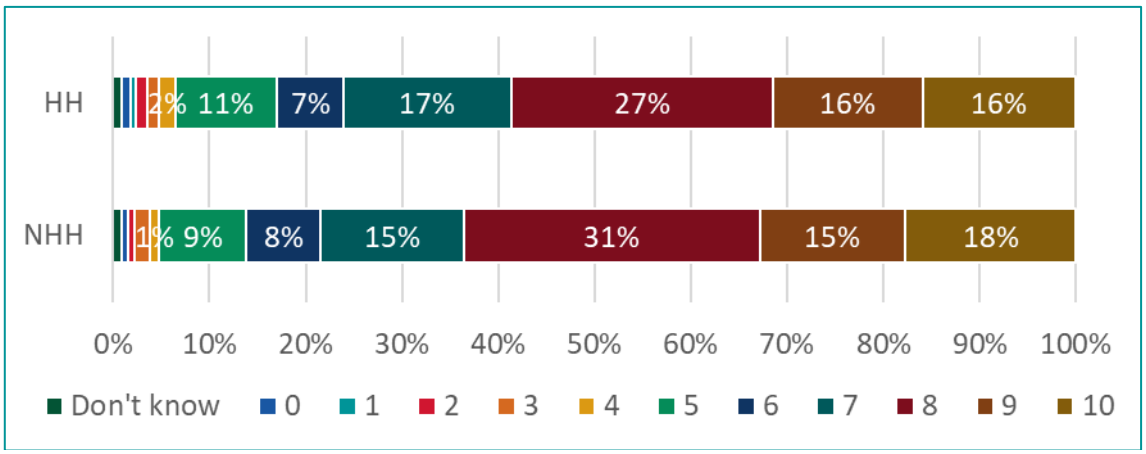
3.2 Descriptive Findings

Customer Satisfaction

Customers were asked about their overall satisfaction with the service provided by the water company and how much they trusted the water company. These questions were intentionally worded in a generic way to capture high-level attitudes rather than focusing on specific areas of customer experience.

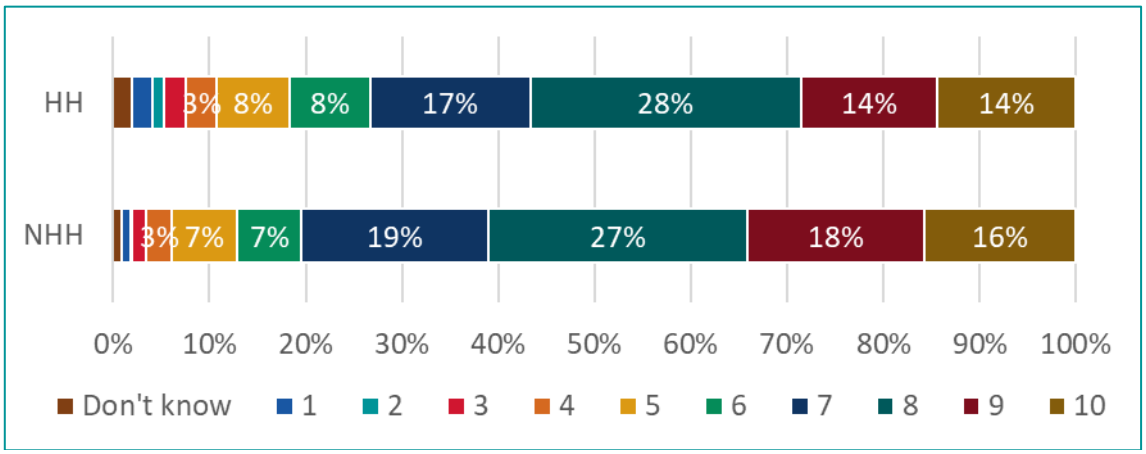
Nearly 60% of households and over 60% of non-households gave a satisfaction rating of between 8 and 10 (on a 0-10 scale). Customer satisfaction was quite similar among household and non-household customers (Figure 8). Trust ratings were quite similar to satisfaction ratings and did not differ much between household and non-household customers (Figure 9).

Figure 8: Overall customer satisfaction



Base: Household = 5,902; Non-household = 553. Q21. How satisfied would you say you are with the overall service provided by your water company? 0 = Extremely dissatisfied. 10 = Extremely satisfied. The overall percentages rating satisfaction 0 to 3 were 3.9% among households and 2.9% among non-households.

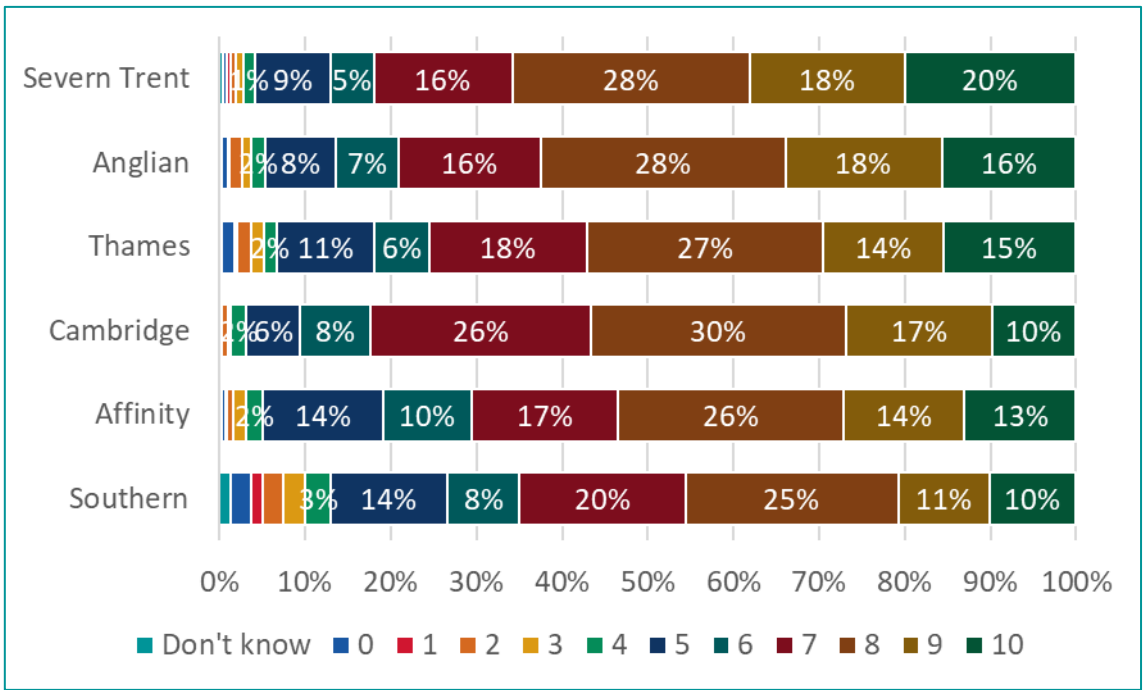
Figure 9: Trust in the water company



Base: Household = 5,902; Non-household = 553. Q22. How much do you trust your water company? 1 = I don't trust them at all. 10 = I trust them completely. The overall percentages rating trust 1 to 3 were around 6% among households and 2.5% among non-households.

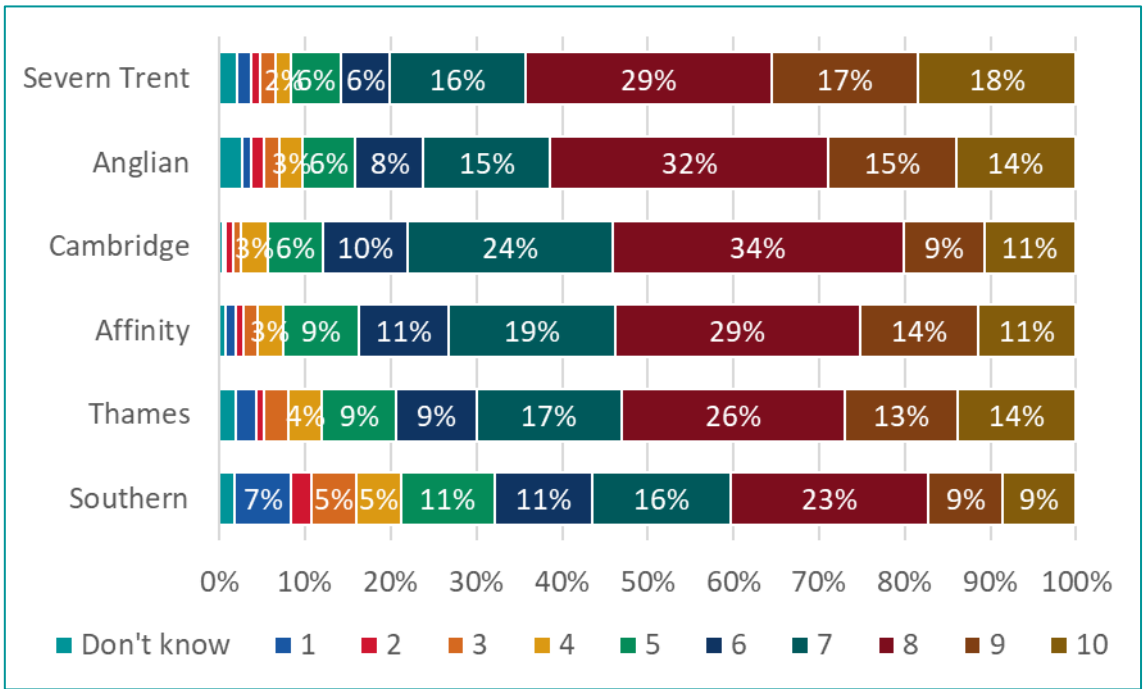
There was considerable variation in overall satisfaction and trust ratings across companies, as shown in Figure 10. Severn Trent leads the ranking with around 66% rating satisfaction between 8 to 10, while only 46% of Southern customers are found in that category. The picture is very similar for trust in the water company (Figure 11). The gap in terms of the share of customers rating trust at 8, 9 or 10 between Severn Trent and Southern increases to around 24 percentage points.

Figure 10: Overall customer satisfaction by company (households)



Base: Affinity = 1,055. Anglian = 1,175. Cambridge = 280. Severn Trent = 1,184. Southern = 1,027. Thames = 1,181. Q21. How satisfied would you say you are with the overall service provided by your water company? 0 = Extremely dissatisfied. 10 = Extremely satisfied.

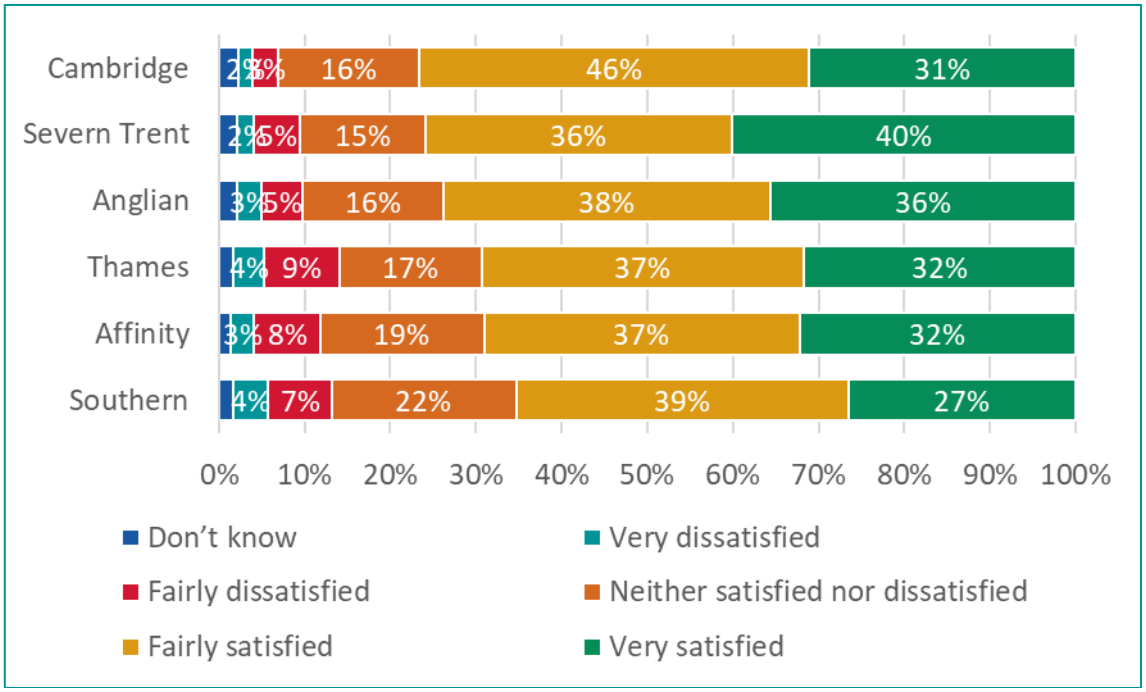
Figure 11: Trust in the water company by company (households)



Base: Affinity = 1,055. Anglian = 1,175. Cambridge = 280. Severn Trent = 1,184. Southern = 1,027. Thames = 1,181. Q22. How much do you trust your water company? 1 = I don't trust them at all. 10 = I trust them completely.

Finally, Figure 12 shows the level of satisfaction with value for money by company. While Southern ranks worst also in terms of number of customers who are fairly or very satisfied with value for money, the percentage-gap between top and bottom ranked companies is notably smaller than for trust and overall satisfaction.

Figure 12: Satisfaction with value for money by company (households)



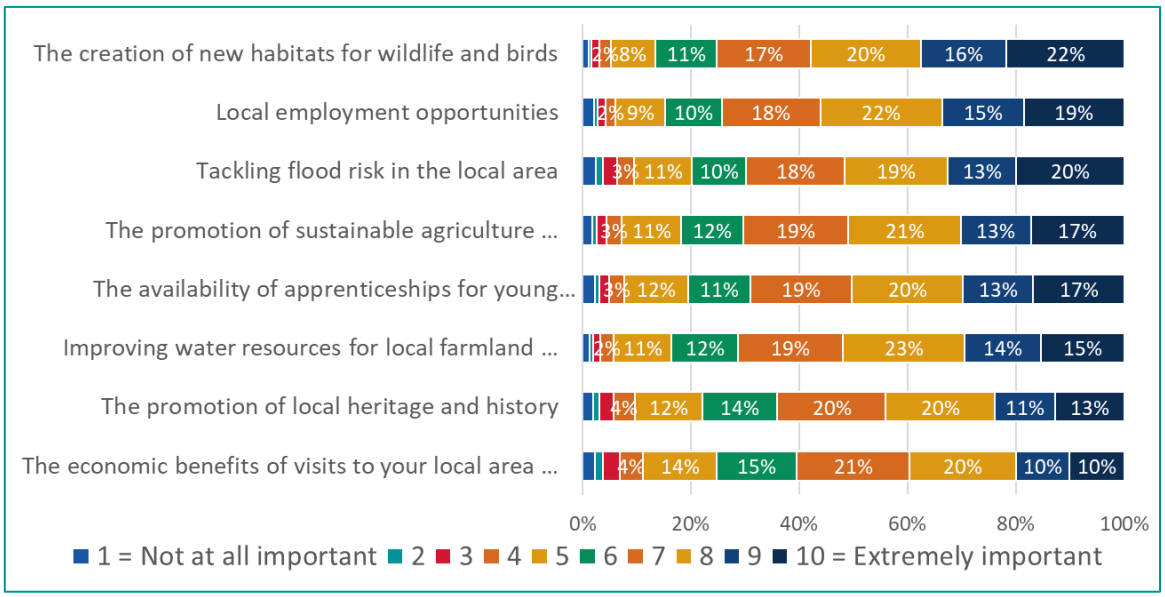
Base: Affinity = 985. Anglian = 1,107. Cambridge = 198. Severn Trent = 1,115. Southern = 970. Thames = 1,114 (online panel only). Q26. How satisfied are you with the value for money of the clean water services you receive?

Attitudes

Households and non-households held similar views regarding the most important aspects relating to their local environment. 'The creation of new habitats for wildlife', 'Local employment opportunities' and 'Tackling flood risk in the local area' had the highest percentages in the top two importance scores, while 'The promotion of local heritage' and 'The economic benefits of visits to your local area' ranked at the bottom.

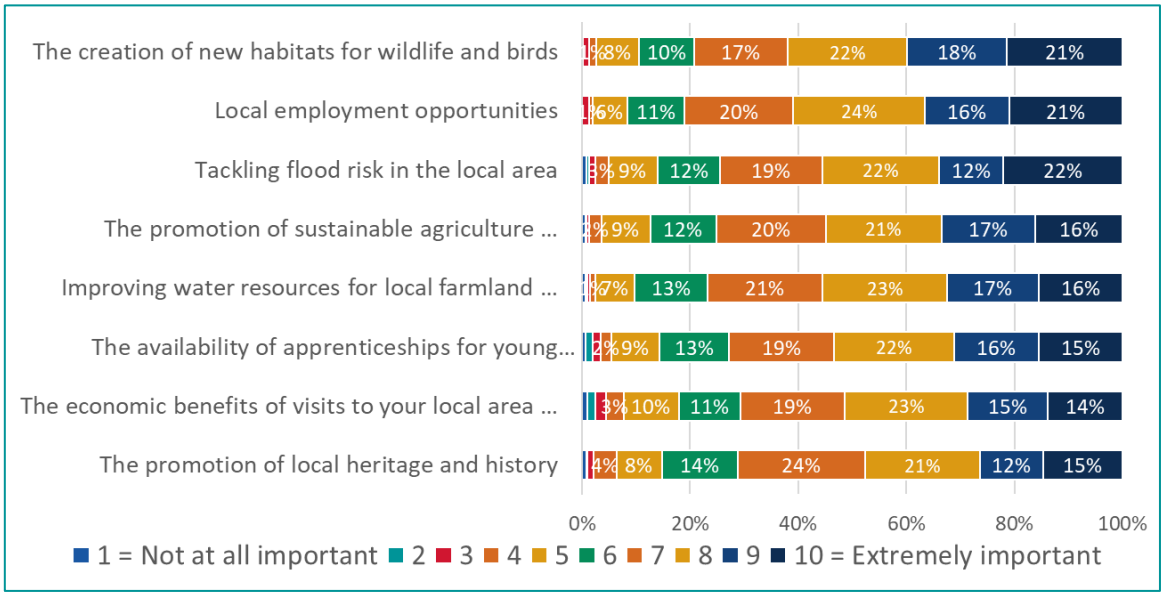
These aspects closely match a subset of the project additions included in the pairwise choice exercise, and, hence, the comparison between attitudes and valuations offers a powerful means of testing the internal validity of the valuations derived from the choice exercise.

Figure 13: Households' views about various aspects relating to their local area



Base: 5,902 participants. Q27. How important to you are each of the following?

Figure 14: Non-households' views about various aspects relating to their local area

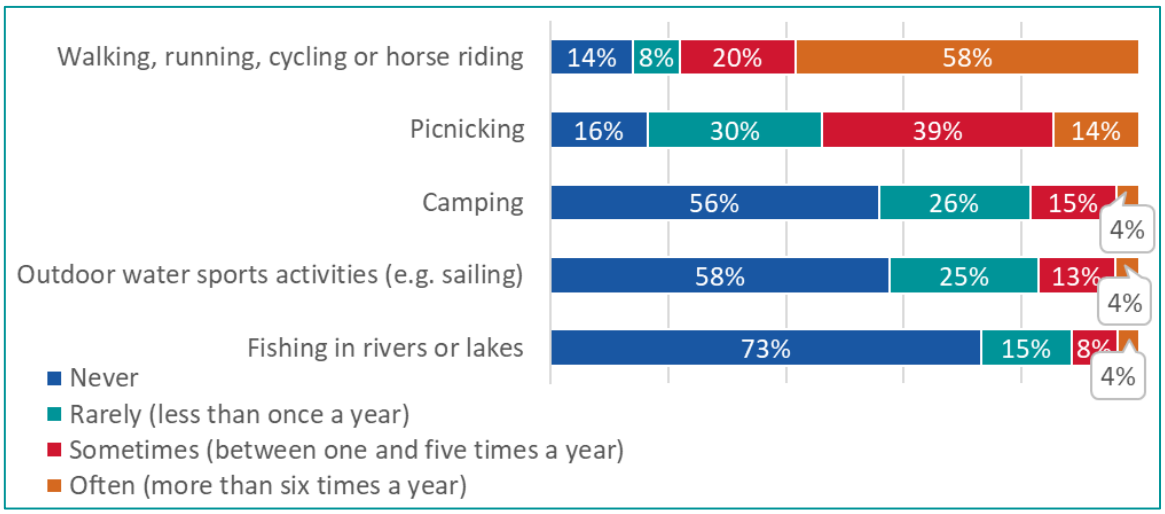


Base: 553 participants. Q27. How important to you are each of the following?

Recreation

Nearly 60% of household participants go walking, running, etc. at least six times a year. These were the most popular outdoor activities, followed by picnicking, 53% having a picnic at least once a year. The proportions of those who regularly go camping, sailing, fishing etc. are considerably smaller. Hence, project additions such as 'Campsite', 'Water sports facilities' and 'Fish ponds' are likely to appeal to a small fraction of the customer base only-, although it is possible that improved availability of such facilities could boost engagement in these outdoor recreation activities.

Figure 15: Household participants' engagement in outdoor recreation activities



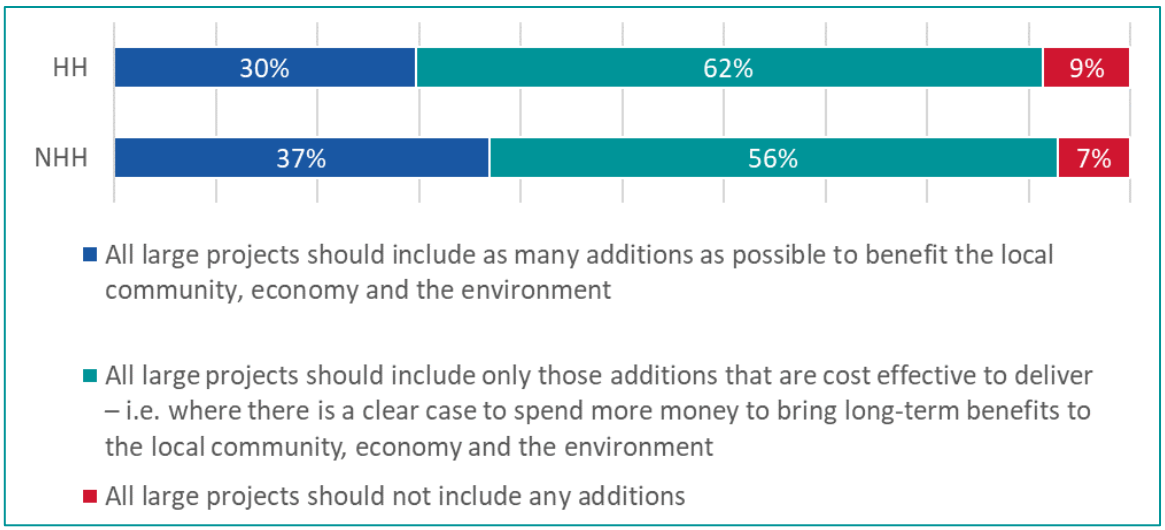
Base: 5,901 participants. Q28. How often do you, or does anyone in your household, do the following recreation activities?

Planning for the Future

Following the SP exercises, participants were asked to express their views about project additions in the context of large-scale projects as well as their reaction to some key trade-offs in terms of the water companies' general approach to planning and where they stood stand on each.

The vast majority of both household and non-household participants were in favour of project additions provided the wider benefit exceeded the cost as shown in Figure 16. A relatively large fraction supported the idea of including as many additions as possible, while only a small minority were categorically opposed to project additions in the context of large-scale projects.

Figure 16: Participants' general view about project additions

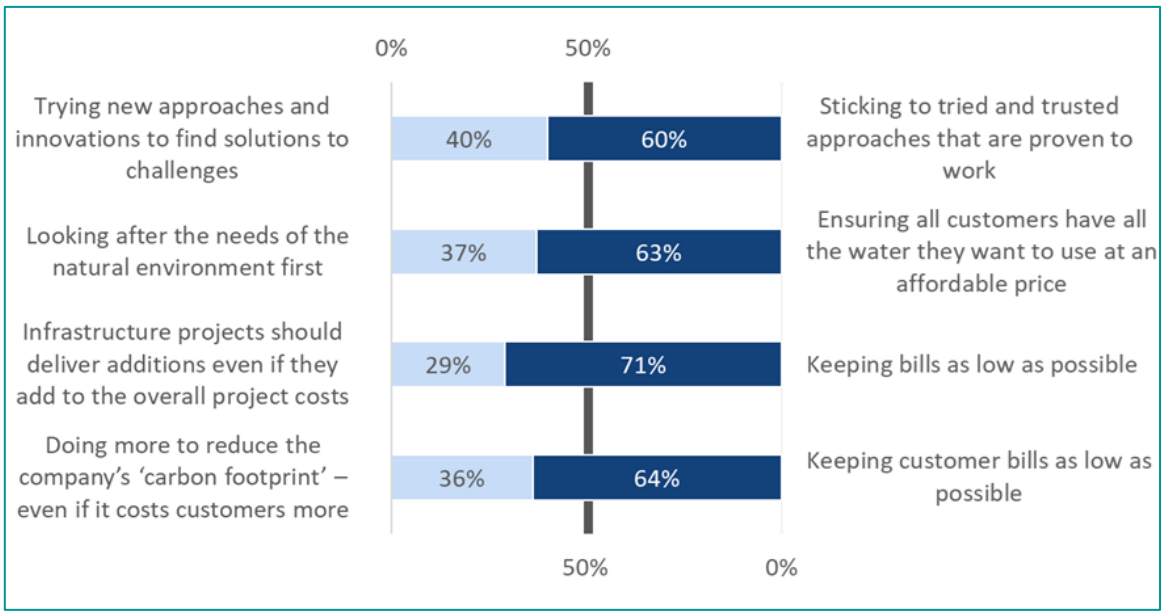


Base: Household = 5,818; Non-household = 535. Q47B. Which of the following best describes how you feel about project additions when large infrastructure projects are being undertaken (such as building a new reservoir, water treatment works, etc).

Regarding some major trade-offs involved in planning for the future, both household and non-household participants tended to prefer the preservation of the 'status quo' positioning themselves closer to the 'conservative' end of the spectrum, preferring 'tried and trusted approaches' to 'trying new approaches' and 'keeping bills as low as possible' over new spending for project additions and for measures to reduce the companies' carbon footprint (see Figure 17). The overall pattern of responses is very similar between households and non-households.

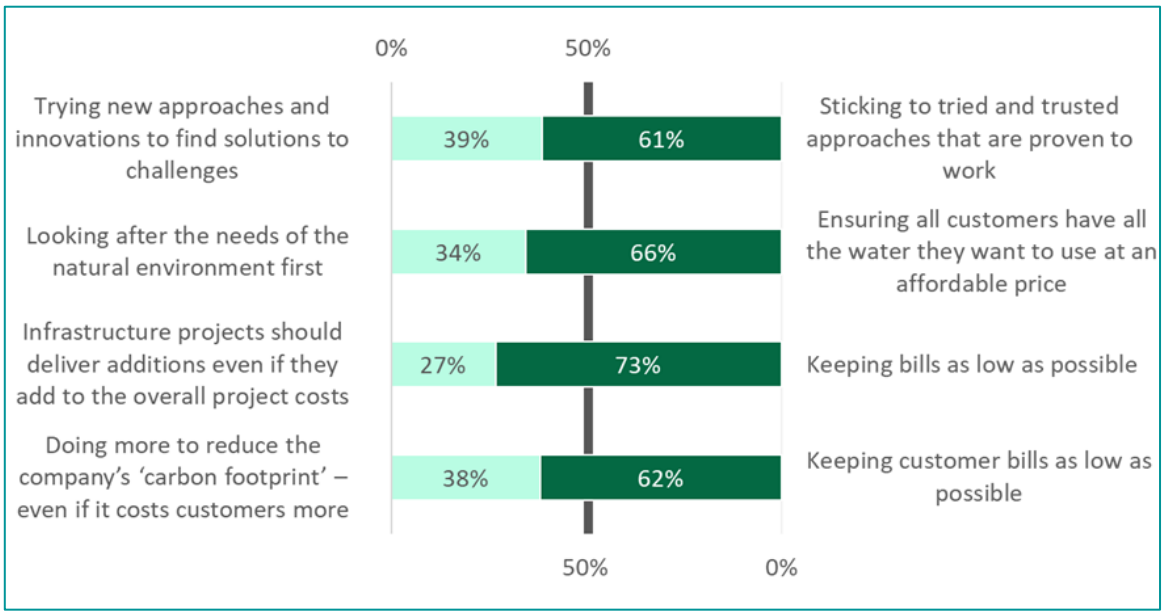
Over 70% of household participants preferred keeping bills as low as possible to seeing project additions add to the cost of infrastructure projects (Figure 17), while, in the preceding question, only around 10% of household participants were against all project additions, regardless of any cost-benefit considerations (Figure 16). This apparent contradiction may indicate that customers consider that cost-benefit considerations should play a major role in future planning.

Figure 17: Households' views in relation to major trade-offs involved in planning for the future



Base: 5,818 (question not included in the pilot survey).
Figure based on responses toQ47C. 'We'd like to understand your reaction to some key trade-offs in terms of the companies general approach to planning and where you stand on each. Please indicate the point on the scale that most closely reflects how you feel.'. The figure shows the proportions of participants positioning the slider closer to the left and right ends of the spectrum.

Figure 18: Non-households' views in relation to major trade-offs involved in planning for the future



Base: 535 (question not included in the pilot survey).
Figure based on responses to Q47C. 'We'd like to understand your reaction to some key trade-offs in terms of the companies general approach to planning and where you stand on each. Please indicate the point on the scale that most closely reflects how you feel.'. The figure shows the proportions of participants positioning the slider closer to the left and right ends of the spectrum.

3.3 Valuations of Individual Project Additions

Introduction

This section presents WTP value estimates for each of the project additions explored in the survey. The next subsection contains our main WTP estimates for household and non-household customers. This is followed by a presentation of sensitivity, segmentation, and validity analysis.

The last two subsections present WTP estimates by type of site (reservoir, canal, water treatment works, pipeline) and by distance from customers' homes/premises.

Valuations of Project Additions Nearby

The valuations presented here were derived via an econometric analysis of the SP1 pairwise choice data, details of which are given in Appendix F. The modelling approach can be characterised as stepwise, general-to-specific modelling. The initial general model for households allows for differences in WTP:

- across companies via bill × company interactions
- by type of site via bill × site interactions and project-addition-specific terms
- by distance via bill × distance × site interactions and project-addition-specific terms.

The general model was reduced by excluding insignificant coefficients in a stepwise procedure to obtain more precise value estimates. The same approach was followed for non-households but using a simpler specification for the initial model.

Figure 19 shows household customers' WTP for project additions at sites 5 miles from home, calculated as a population-weighted average across companies and types of sites. While WTP was positive for most project additions, it was not statistically different from zero for 'Children's playground', 'Campsite', 'Links to heritage and history', and 'Increased visitor numbers'. The highest-valued project additions were:

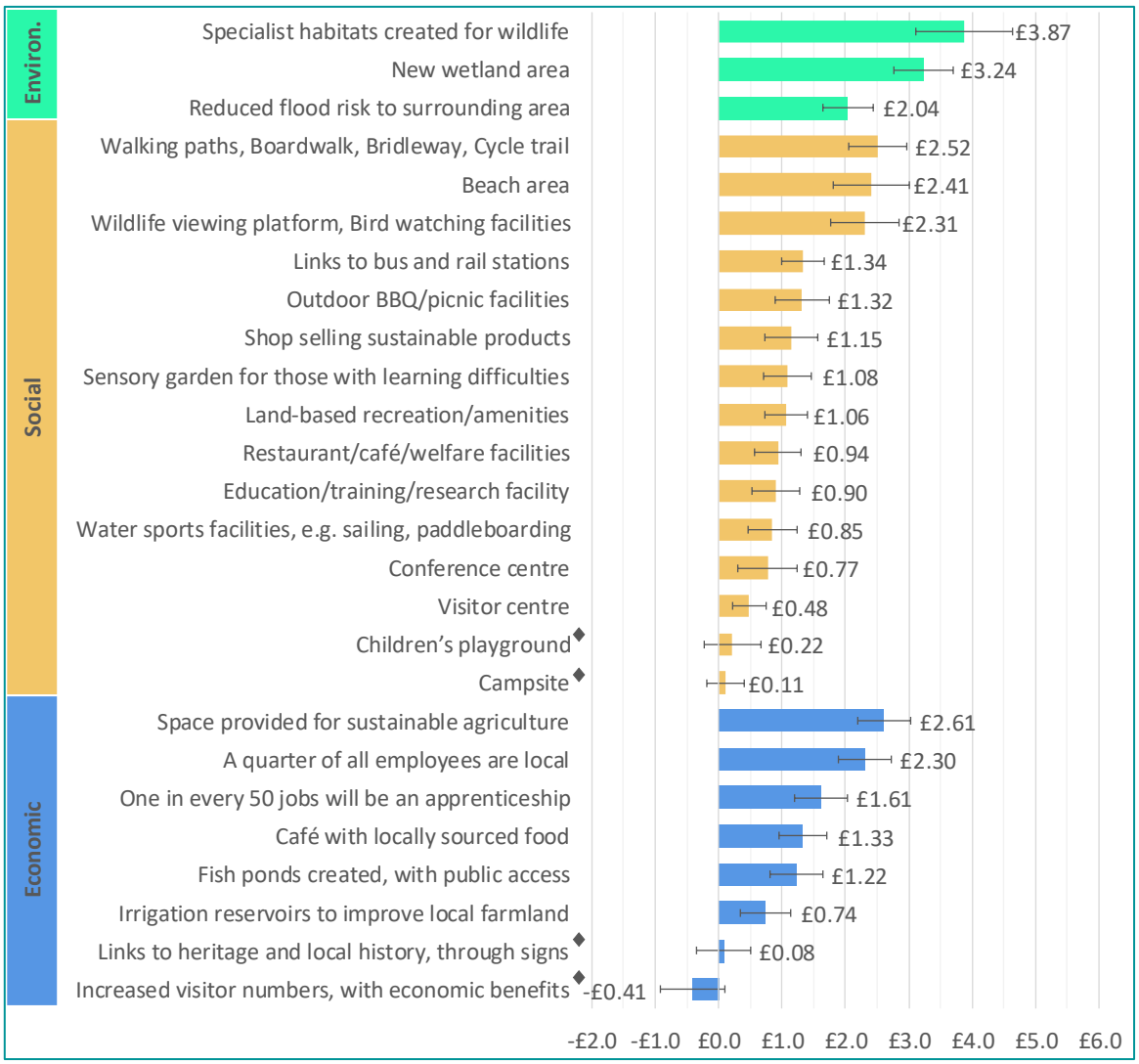
- Specialist habitats created for wildlife (£3.87 annually)
- New wetland area (£3.24 annually)
- Space provided for sustainable agriculture (£2.61 annually)

The average valuation of any project addition was considerably higher in the environmental area (£3.05), compared to the economic area (£1.19) and the social area (£1.16). The combined valuation of all project additions was £36.12.

The high WTP values for environmental project additions are consistent with the qualitative research findings. The narrative of supporting wildlife/new wetlands/habitats was found to resonate strongly with customers across water companies. The relatively high WTP for 'Space for sustainable agriculture' among the group of project additions in the economic area appears to be linked to the high valuations of project additions in the environmental area[7]. The full description as seen by participants—'Space provided for sustainable agriculture, including regenerative farming and re-wilding'—is centred on environmental themes, and many of the reasons given by participants for choosing an option that included 'Space for sustainable agriculture' suggest that environmental concerns were a key driver of participants' choices (see Table 4).

[7] Note, however, that the WTP for 'Space for sustainable agriculture' is not statistically different from the WTP for 'A quarter of all employees are local'.

Figure 19: Average valuations of project additions nearby: households



Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at sites 5 miles from home. Population-weighted average across companies and types of sites. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

Table 4: Selected reasons for choosing options that included 'Space for sustainable agriculture'

Open response
It appeared to be more natural and less disruptive of nature
more natural and enjoyable
We badly need sustainable farming, conference centres are ten a penny!
Because I feel that sustainable farming will be more beneficial to the environment than tourist attractions
Because it had greater beneficial environmental impact
I think we have done enormous damage t the environment in recent years and this would be an opportunity to regenerate some of what we have lost
Wildlife is important
Better for the environment
It was cheaper and seemed better for the local environment. Increased visitors on the other option means more issues .
I prefer it because it seems more friendly to the environment, not only about attracting more people, but also cheaper
More eco friendly And sustainable
it is important to support nature and provide the habitats required
Had a better impact in the environment
Picked it for the rewilding. Essentially was a choice between that and the reduced flood risk - both of those are more important than the other aspects. The difference in price is negligible

Note: Selected reasons for choosing options that included 'Space for sustainable agriculture' in the first SP1 choice question.

More generally, project additions that were seen as more relevant/more important in the qualitative stage, rank in the top third in terms of WTP, while the less relevant/less important project additions rank in the bottom two-thirds, the only exception being 'Beach area'. This indicates a high degree of consistency between qualitative and quantitative findings[8].

Figure 20 shows non-household customers' average WTP across types of sites for project additions 5 miles from their organisation's premises. WTP estimates are substantially less precise than for households, as shown by relatively wider confidence intervals than for households. This reflects both a considerably smaller sample and a worse fit to the data of the non-household model compared to the household model (see Appendix F). While WTP was positive for most project additions, it was not statistically significant for 8 out of 26 project additions.

The most highly valued project additions were:

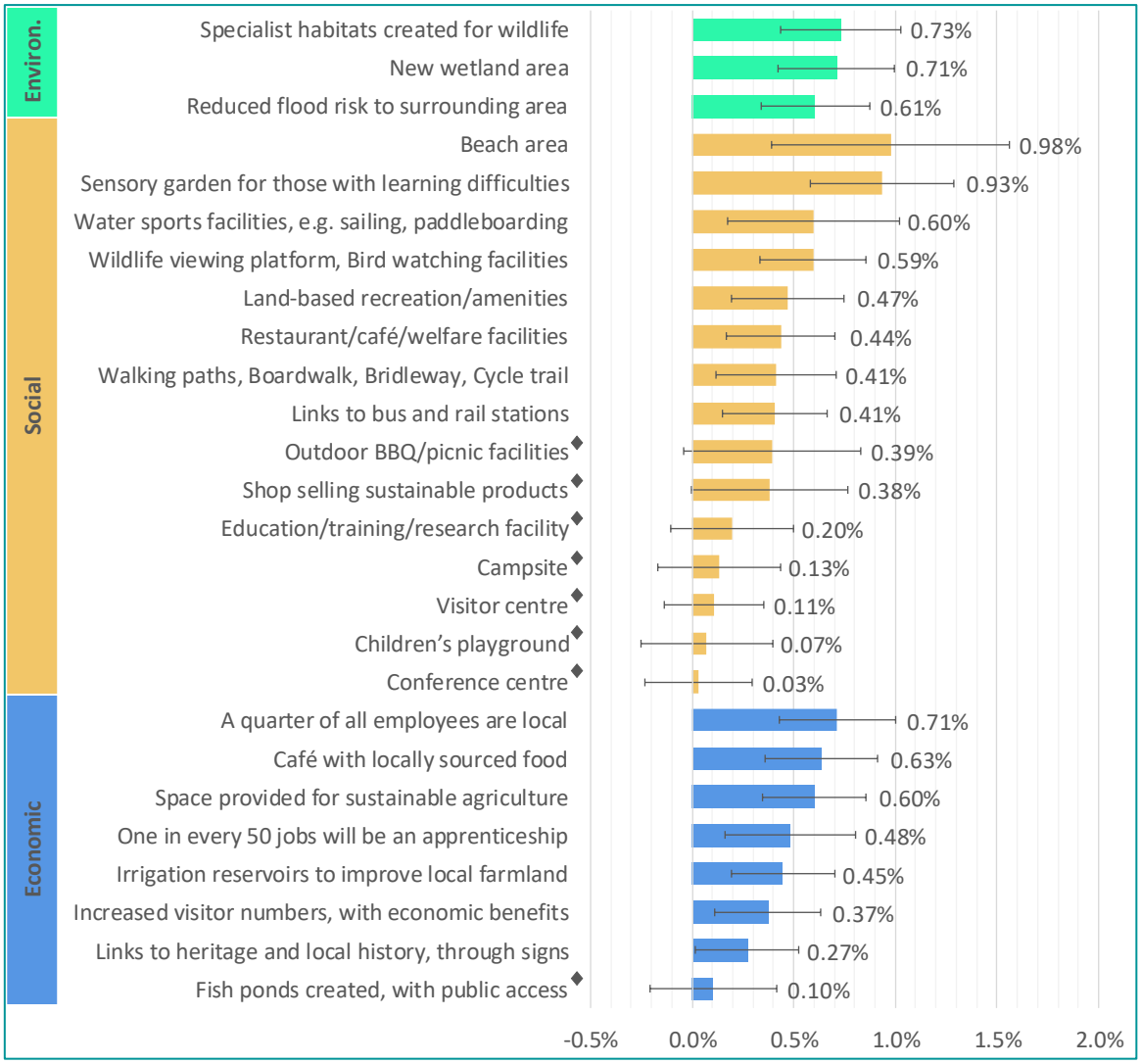
- Beach area (0.98% of the annual water only bill)
- Sensory garden for those with learning difficulties (0.93% of the annual water only bill)
- Specialist habitats created for wildlife (0.73% of the annual water only bill)

As for households, the average valuation of any project addition was substantially higher in the environmental area (0.68% of the bill), compared to the economic area

[8] The low *average* valuation of 'Water sports facilities' is explained by the fact that while those who regularly engage in outdoor water sports activities have a relatively high WTP, they make up a small proportion of the customer base (see Table 7 and Figure 15).

(0.45%) and the social area (0.41%). The combined valuation of all project additions was 11.83% of the annual water only bill.

Figure 20: Average valuations of project additions nearby: non-households



Base: 553 participants. Average annual WTP, across types of sites, for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

The relative WTP values of non-household customers may seem surprising in some cases such as 'Beach area' and 'Sensory garden' being the most highly valued project additions. However, the estimates are subject to a relatively wide margin of error. For example, the difference in WTP between 'Beach area' and 'Increased visitor numbers' is not quite statistically significant at the 5% level.

Moreover, many project additions appear to be specifically targeted at and relevant to households only, and, therefore, the stated preferences are likely to be a combination of household and non-household preferences, as well as reflecting the preferences of organisations that are very heterogeneous in terms of sector of activity.

Sensitivity analysis

While the proportion of participants who stated that they were not able to understand the choices was negligible, somewhat larger proportions did not find the options believable or did not find it easy to choose between the options (see Figure 6). It would not be appropriate, in our view, to exclude such participants from the estimation sample as their responses are still potentially valid. For example, many of those who stated that they did not find it 'easy to choose between the options' indicated that both options had benefits, that both were good, or that there were pros and cons to both.

These difficulties are inherent in such choice exercises and do not automatically imply that the responses are invalid. Therefore, we followed best practice recommendations in the environmental valuation literature[9] by testing the sensitivity of our WTP estimates to reasonable sample exclusions focussing on nearby project additions (5 miles from home/premises).

We compared the valuations of those who (strongly) agreed that they were able to understand the choices, that the options were believable, and that it was easy to choose between the options, representing 59% and 60% of the household and non-household samples, respectively, against the valuations of those who did not[10]. For both households and non-households, we found that those who gave positive feedback to the pairwise choice exercise had a higher WTP for most project additions[11] than those who gave negative feedback on at least one follow-up question. However, the difference was statistically significant for three project additions only. We retain the full sample for our analyses because the evidence is weak, overall, that WTP differs substantially between the two groups of participants and because the full sample generally yields more conservative estimates.

Segmentation analysis

A segmentation analysis is useful to explore how preferences vary across the population. Table 5 shows what customer segments were covered in the analysis, providing full definitions where appropriate. The table also includes the household segments covered in the expectation-based validity analysis which is presented in the next subsection. Each segment's WTP was compared against the WTP of the complement segment 'Other' (for example, social grades A/B vs C1/C2/D/E combined) testing for statistically significant differences. The valuations were derived by re-estimating the main household model (see Appendix F) allowing each coefficient to differ between any segment and the complement segment.

[9] For example, Johnstone, R. J. et al (2017) Contemporary Guidance for Stated Preference Studies, *Journal of the Association of Environmental and Resource Economists*, 4(2), 319-405.

[10] These valuations were derived by re-estimating the household/non-household model allowing each coefficient to differ between those who gave positive feedback to the choice exercise and those who did not.

[11] Households: 23 project additions (out of 26). Non-households: 20 project additions.

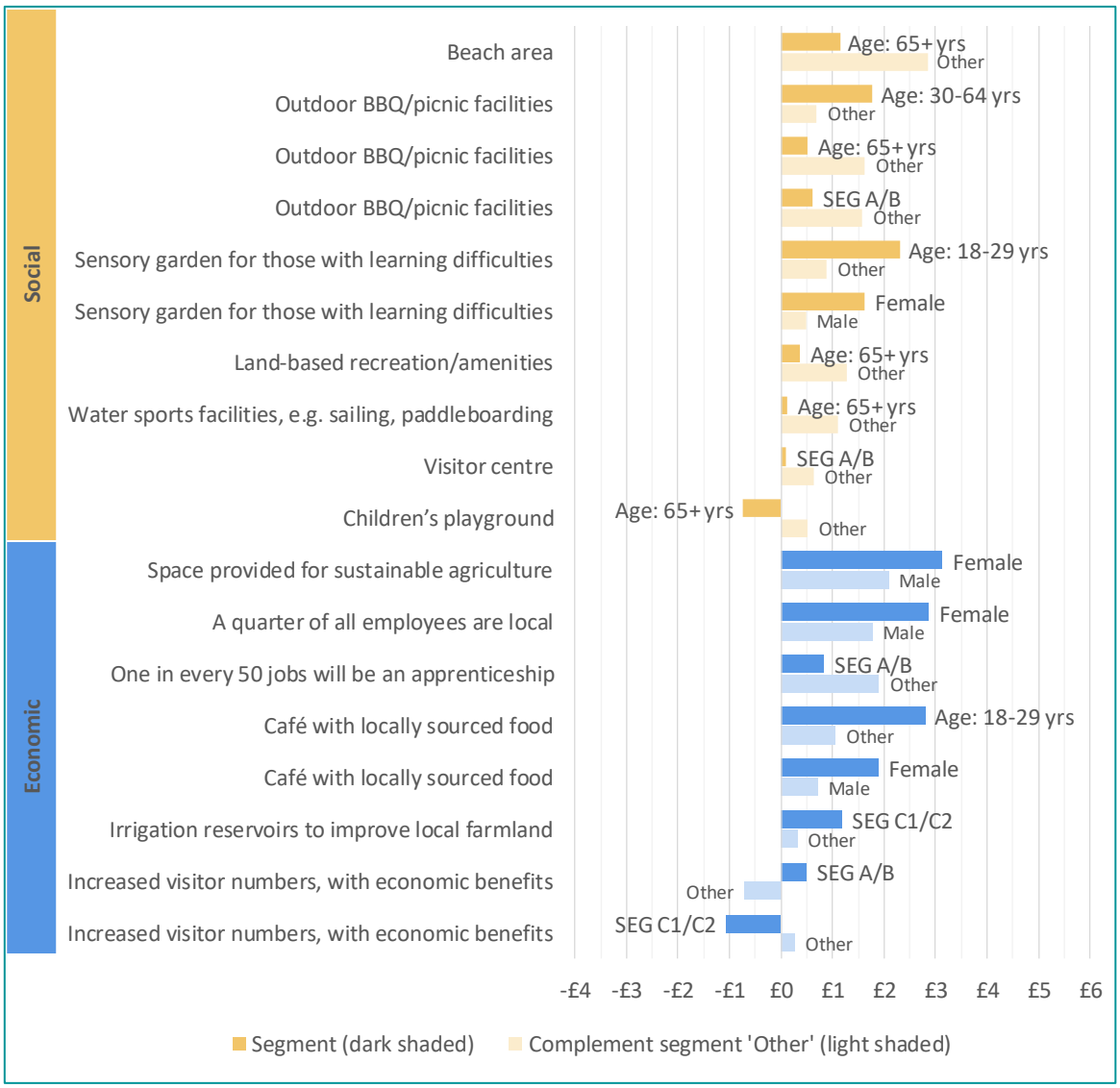
Table 5: Household customer segments

Segment	Definition
Age: 18-29 yrs	
Age: 30-64 yrs	
Age: 65+ yrs	
Male	
Female	
SEG A/B	Social grade A/B
SEG C1/C2	Social grade C1/C2
SEG D/E	Social grade D/E
Income up to £442 pw	Household income up to £442 per week
Income £443-£721 pw	Household income £443-£721 per week
Income £722+ pw	Household income £722+ per week
Water bill: always on time	'I always pay my water bill, and other household bills, on time'
Water bill: struggling	'I always pay my water bill on time, but sometimes struggle, or am late, paying other bills' or 'I sometimes pay my water bill late'
Water bill: in debt	'I often find it difficult to pay my water bill on time' or 'I am rarely, or never, able to pay my water bill on time'
Children aged 0-10 yrs	Household with children aged 0-10
Children aged 0-15 yrs	Household with children aged 0-15
Water sports	Outdoor water sports (anyone in household): at least once a year
Fishing	Fishing in rivers or lakes (anyone in household): at least once a year
Picnicking	Picnicking (anyone in household): at least once a year
Walking, running, …	Walking, running, cycling or horse riding (anyone in household): at least once a year
Camping	Camping (anyone in household): at least once a year
Additions: as many as possible	Large projects should include as many additions as possible
Additions: cost effective only	Large projects should include only additions that are cost effective
Additions: none	Large projects should not include any additions

Figure 21 focuses on significant differences in valuations across household segments defined based on age, gender, and social grade (at the 5% level). The figure shows the following findings:

- There were no significant differences in WTP for environmental project additions.
- Older customers had lower valuations than younger customers of the following project additions: 'Beach area', 'Outdoor BBQ/picnic facilities', 'Land-based recreation/ amenities', 'Water sports facilities', and 'Children's playground'. It seems plausible that these should be more appealing to younger customers.
- Conversely, younger customers had a higher WTP for 'Sensory garden for those with learning difficulties' and 'Café with locally sourced food'.
- Female customers were willing to pay more than male customers for some socially and environmentally beneficial additions such as 'Sensory garden for those with learning difficulties' and 'Space provided for sustainable agriculture'.

Figure 21: Significant differences in WTP across household segments

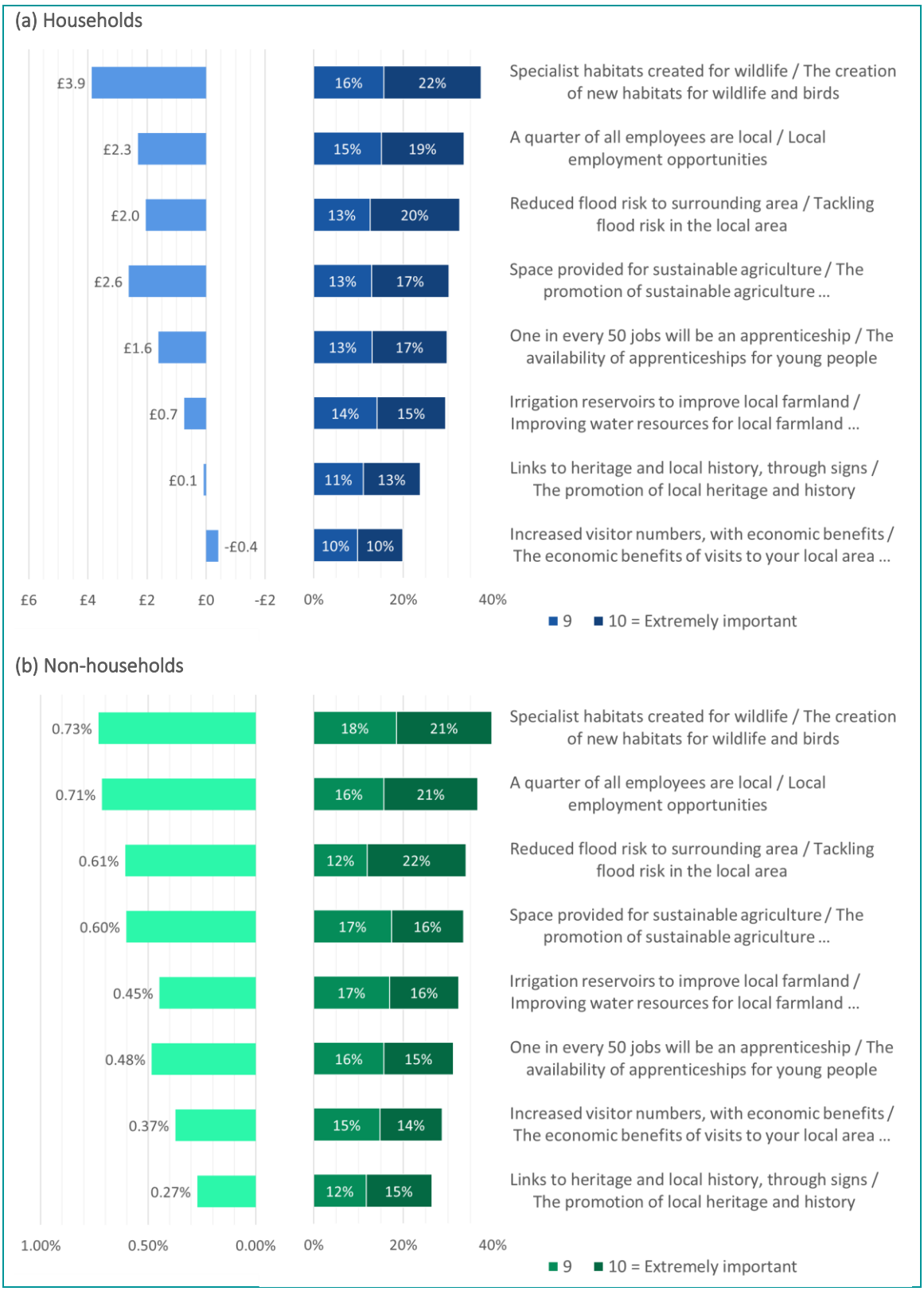


Expectation-based validity analysis

We tested the internal validity of our analysis by exploring the association between valuations and attitudes and by testing for differences in WTP between segments defined based on a) participants' opinions regarding project additions when large infrastructure projects are being undertaken (household and non-household); b) participants' outdoor recreation activities (household); c) household characteristics such as income, financial situation, and age composition (household); d) business sector (non-household); c) role of the participant in the organisation (non-household). The relevant non-household segments are shown in Table 9. (See Table 5 for the definitions of household segments.)

Figure 22 compares the valuations of a subset of project additions covered in the pairwise choice exercise against the stated importance of closely linked aspects of the local environment. The rank correlation between the two is very high for both households (0.93 on a 0-1 scale) and non-households (0.98), meaning that project additions related to aspects that are seen as highly important tend to be valued more highly and vice versa. The high degree of consistency between the valuations inferred from the participants' choices and their views about aspects of the local environment provides supports the validity of the valuation exercise.

Figure 22: Association between valuations and attitudes



Base: Households = 5902; Non-households = 553. Left panel: valuations of project additions. Right panel: percentage in the top two importance categories (9 and 10 on a 1-10 scale). Labels: description of project addition / topic description for attitude question 'How important to you are each of the following?'.

The following tables show significant differences in WTP, at the 5% level, between various household customer segments. Green (red) cells indicate that customers in the

relevant segment had a statistically higher (lower) WTP for a given project addition than customers in the corresponding complement segment 'Other'. For example, households with children aged 0-10 years had a considerably higher WTP for 'Children's playground' than households without any children or any children of that age. (See Table 5 for the exact definition of each segment.)

Table 6: Significant differences in valuations by view about project additions

Segment	Attribute	Segment WTP	WTP complement ('other')
Additions: as many as possible	Walking paths, Boardwalk, Bridleway, Cycle trail	£3.8	£2.2
	Beach area	£4.1	£2.0
	Space provided for sustainable agriculture	£3.5	£2.4
	Links to heritage and local history, through signs	£1.3	-£0.3
Additions: cost effective only	Land-based recreation/amenities	£1.4	£0.5
	Irrigation reservoirs to improve local farmland	£1.1	£0.2
	Links to heritage and local history, through signs	-£0.3	£0.7
Additions: none	Specialist habitats created for wildlife	£1.7	£4.2
	New wetland area	£1.5	£3.6
	Reduced flood risk to surrounding area	£1.0	£2.3
	Walking paths, Boardwalk, Bridleway, Cycle trail	£1.5	£2.8
	Wildlife viewing platform, Bird watching facilities	£1.2	£2.6
	Sensory garden for those with learning difficulties	-£0.1	£1.2
	Restaurant/café/welfare facilities	-£0.1	£1.1
	Water sports facilities, e.g. sailing, paddleboarding	£0.1	£1.1
	Visitor centre	£0.0	£0.6
	Space provided for sustainable agriculture	£1.2	£2.9
	A quarter of all employees are local	£0.8	£2.6
	Café with locally sourced food	£0.6	£1.5
	Irrigation reservoirs to improve local farmland	-£0.1	£0.9

Note: Green (red) cells indicate that customers in the relevant segment had a statistically higher (lower) WTP for a given project addition (at a 5-mile distance from home) than customers in the corresponding complement segment 'Other'.

Table 7: Significant differences in valuations by recreation activity

Segment	Attribute	Segment WTP	WTP complement ('other')
Walking, running, …	Walking paths, Boardwalk, Bridleway, Cycle trail	£2.8	£1.8
Picnicking	New wetland area	£3.8	£2.8
	Outdoor BBQ/picnic facilities	£1.8	£0.9
	Restaurant/café/welfare facilities	£1.4	£0.5
	Education/training/research facility	£1.3	£0.5
	Children's playground	£0.9	-£0.4
	A quarter of all employees are local	£2.8	£1.8
	Café with locally sourced food	£1.9	£0.8
Water sports	Water sports facilities, e.g. sailing, paddleboarding	£2.6	£0.6
	Campsite	-£1.2	£0.3
Fishing	Outdoor BBQ/picnic facilities	£3.8	£1.1

Note: Green (red) cells indicate that customers in the relevant segment had a statistically higher (lower) WTP for a given project addition (at a 5-mile distance from home) than customers in the corresponding complement segment 'Other'.

Table 8: Significant differences in valuations by household characteristic

Segment	Attribute	Segment WTP	WTP complement ('other')
Income up to £442 pw	New wetland area	£2.5	£3.8
	Sensory garden for those with learning difficulties	£0.6	£1.4
	Land-based recreation/amenities	£0.5	£1.5
	A quarter of all employees are local	£1.3	£2.8
	Links to heritage and local history, through signs	-£0.6	£0.5
Income £443-£721 pw	Sensory garden for those with learning difficulties	£1.8	£0.9
	Links to heritage and local history, through signs	£1.1	-£0.2
Income £722+ pw	Land-based recreation/amenities	£1.8	£0.7
	A quarter of all employees are local	£3.0	£1.8
Water bill: in debt	Specialist habitats created for wildlife	£2.1	£3.9
	New wetland area	£1.7	£3.3
	Walking paths, Boardwalk, Bridleway, Cycle trail	£0.4	£2.6
	Space provided for sustainable agriculture	£0.9	£2.7
	Increased visitor numbers, with economic benefits	£1.1	-£0.4
Children aged 0-10 yrs	Beach area	£3.9	£2.1
	Outdoor BBQ/picnic facilities	£2.7	£1.1
	Water sports facilities, e.g. sailing, paddleboarding	£2.1	£0.6
	Children's playground	£2.0	-£0.2
Children aged 0-15 yrs	Outdoor BBQ/picnic facilities	£2.3	£1.1
	Water sports facilities, e.g. sailing, paddleboarding	£1.8	£0.5
	Children's playground	£1.8	-£0.3

Note: Green (red) cells indicate that customers in the relevant segment had a statistically higher (lower) WTP for a given project addition (at a 5-mile distance from home) than customers in the corresponding complement segment 'Other'.

The pattern of differences in valuations across household segments is strongly supportive of the validity of the WTP values derived from the pairwise choice exercise. In the vast majority of cases, statistically significant differences in WTP between segments meet *a priori* expectations regarding the sign of the difference.

- Those who would like to see as many project additions as possible being delivered had a substantially higher WTP for a number of additions than those who only want cost-effective additions being delivered or those who believe large projects should not include any additions, including for 'Links to heritage and local history', which was of very limited appeal to the wider customer base

- Those who engage in outdoor recreation activities at least once a year tended to have a higher WTP for project additions related to their outdoor activities:

- Those who go walking, running, cycling or horse riding had a higher WTP for 'Walking paths, Boardwalk, Bridleway, Cycle trail'.

- Those who enjoy picnicking had a higher WTP for 'Outdoor BBQ/picnic facilities', 'Children's playground', 'Café with locally sourced food'.

- Those who engage in water sports had a higher WTP for 'Water sports facilities, e.g. sailing, paddleboarding'.

- Low-income households had a lower WTP for all project additions compared to higher-income households, the difference being statistically significant for several project additions. Similarly, those who were finding it difficult to pay their water bill on time had a lower WTP for a number of project additions compared to those who were not (except as regards 'Increased visitor numbers, with economic benefits')

- Finally, households with young children valued the following more highly, as expected: 'Beach area', 'Outdoor BBQ/picnic facilities', 'Water sports facilities, e.g. sailing, paddleboarding', and 'Children's playground'.

A similar analysis was performed for non-households covering the segments shown in Table 9. Given the considerably smaller sample size and the relatively large number of variables included in the model, we decided to set the level of significance at 10%.

Table 9: Non-household customer segments

Segment	Definition
Sector: educ., health, etc	Business sector: Education (including schools, universities); Health and social work (including hospitals, doctors, dentists. charities, nursing care)
Sector: retail, hotel, etc	Business sector: Retail (NOT hairdressing), Wholesale, Motor Trades including vehicle repair; Hotel, catering, Camp sites, restaurants, cafes, accommodation, pubs; Arts, Recreation, Entertainment (including Libraries, theatres, museums, zoos, sport centres, fitness);
Role: general management	The participant works in general management (eg CEO, MD, General Manager)
Role: some high-level role	The participant's role coded based on the job title (open responses): e.g., CEO, partner, CFO, director-level roles
Additions: as many as possible	Large projects should include as many additions as possible
Additions: cost effective only	Large projects should include only additions that are cost effective
Additions: none	Large projects should not include any additions

Significant differences in valuations across non-household segments are shown in Table 10. These tend do make intuitive sense, although *a priori* expectations are harder to formulate for non-household customers because many project additions appear to be specifically targeted at and relevant to households only.

Table 10: Significant differences in valuations across non-household segments

Segment	Attribute	Segment WTP	WTP complement ('other')
Sector: Educ., health, etc	Outdoor BBQ/picnic facilities	1.31%	0.13%
Sector: Educ., health, etc	Water sports facilities, e.g. sailing, paddleboarding	1.26%	0.38%
Sector: Educ., health, etc	Children's playground	0.52%	-0.05%
Role: some high-level role	Shop selling sustainable products	-0.46%	0.65%
Role: some high-level role	Education/training/research facility	-0.25%	0.35%
Role: some high-level role	Space provided for sustainable agriculture	0.16%	0.73%
Additions: as many as possible	Beach area	2.10%	0.61%
Additions: as many as possible	Sensory garden for those with learning difficulties	1.68%	0.71%
Additions: cost effective only	Beach area	0.46%	1.92%

Note: Green (red) cells indicate that customers in the relevant segment had a statistically higher (lower) WTP for a given project addition (at a 5-mile distance from the organisation's premises) than customers in the corresponding complement segment 'Other'.

- Participants working in education, health, and social work, had a higher WTP for 'Outdoor BBQ/picnic facilities', 'Water sports facilities, e.g. sailing, paddleboarding', 'Children's playground'. These might be attractive features in the context of school trips, for example.

- Those holding high-level roles in their organisation expressed a lower WTP for most project additions compared to participants in lower-level roles but the differences in WTP were statistically significant for three project additions only.

- Those who would like to see as many project additions as possible being delivered had a substantially higher WTP for 'Beach area' and 'Sensory garden for those with learning difficulties'. The choices made by these participants appear to explain the surprisingly high valuations for these project additions in the overall sample.

In summary, we found a high degree of consistency between the valuations inferred from the participants' choices and their views about relevant aspects of the local environment. Differences in valuations across customer segments tend to be consistent with *a priori* expectations, where held, or at least make intuitive sense. These findings suggest that the pairwise choice exercise worked well and produced valid estimates of WTP.

Valuations by Type of Site

Table 11 shows household customers' WTP estimates for project additions by type of site—reservoir, canal, water treatment works (WTW), pipeline—at sites 5 miles from home, calculated as a population-weighted average across companies. For reservoirs, valuations are shown for the full set of project additions explored in the survey, while for canals, WTWs, and pipelines, WTP values are shown for a subset of all project additions, reflecting restrictions in the experimental design, as set out in Section 2.2.

- The valuations of project additions are relatively similar between Reservoir and Canal sites.
- WTP values for project additions at WTWs are substantially higher than for Reservoirs and Canals.
- Project additions along Pipelines are valued less than project additions for Reservoirs and Canals.

Table 11: Average household valuations of project additions nearby by type of site

Project addition	Reservoir	Canal	Water treatment works	Pipeline
Environmental area				
New wetland area	£3.06	£2.88	£4.72	£2.29
Specialist habitats created for wildlife	£2.56	£2.96	£8.29	£1.67
Reduced flood risk to surrounding area	£1.84	£1.84	£2.64	£1.84
Social area				
Beach area	£2.41			
Walking paths, Boardwalk, Bridleway, Cycle trail	£2.27	£2.27	£3.25	£2.27
Wildlife viewing platform, Bird watching facilities	£2.20	£1.40	£3.32	£2.32
Outdoor BBQ/picnic facilities	£1.32			
Restaurant/café/welfare facilities	£1.23	£1.38	£0.79♦	£0.35♦
Links to bus and rail stations	£1.21	£1.21	£1.73	£1.21
Shop selling sustainable products	£1.15			
Sensory garden for those with learning difficulties	£1.08			
Land-based recreation/amenities	£1.06			
Water sports facilities, e.g. sailing, paddleboarding	£0.85			
Education/training/research facility	£0.82	£0.82	£1.17	£0.82
Visitor centre	£0.44	£0.44	£0.62	£0.44
Children's playground	£0.22♦			
Campsite	£0.11♦			
Conference centre	-£0.56	£0.44♦	£3.24	-£0.02♦
Economic area				
A quarter of all employees are local	£2.79	£2.76	£1.36	£2.30
Space provided for sustainable agriculture	£2.36	£2.36	£3.38	£2.36
One in every 50 jobs will be an apprenticeship	£1.48	£1.71	£2.58	£0.68
Fish ponds created, with public access	£1.43	£1.34	£2.37	-£0.25♦
Irrigation reservoirs to improve local farmland	£0.85	£1.30	£1.48	-£0.65
Café with locally sourced food	£0.83	£1.70	£2.24	£0.54
Links to heritage and local history, through signs	£0.11♦	£1.00	-£0.52♦	-£0.26♦
Increased visitor numbers, with economic benefits	-£0.37♦	£0.42♦	-£2.00	£0.30♦

Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions 5 miles from home. Population-weighted average across companies. Diamonds indicate not statistically significant values (at the 5% level).

Differences in WTP across sites are summarised in Table 11.

Table 12: Total valuation of a common set of project additions, by type of site

Site	Total valuation
Water treatment works	£40.66
Canal	£28.23
Reservoir	£24.55
Pipeline	£18.22

Note: The total annual valuation refers to the set of project additions shown in Figure 24 to Figure 26, i.e., those that are potentially available for all types of site.

While the qualitative findings suggest that support for delivering project additions is strongest for Reservoirs, followed by Canals, Water treatment works and Pipelines, the overall valuation is highest for Water treatment works. Four project additions account for around 75% (over 95%) of the difference in total valuations between Water treatment works and Reservoirs (Canals):

- Specialist habitats created for wildlife
- Conference centre
- New wetland area
- Wildlife viewing platform, Bird watching facilities

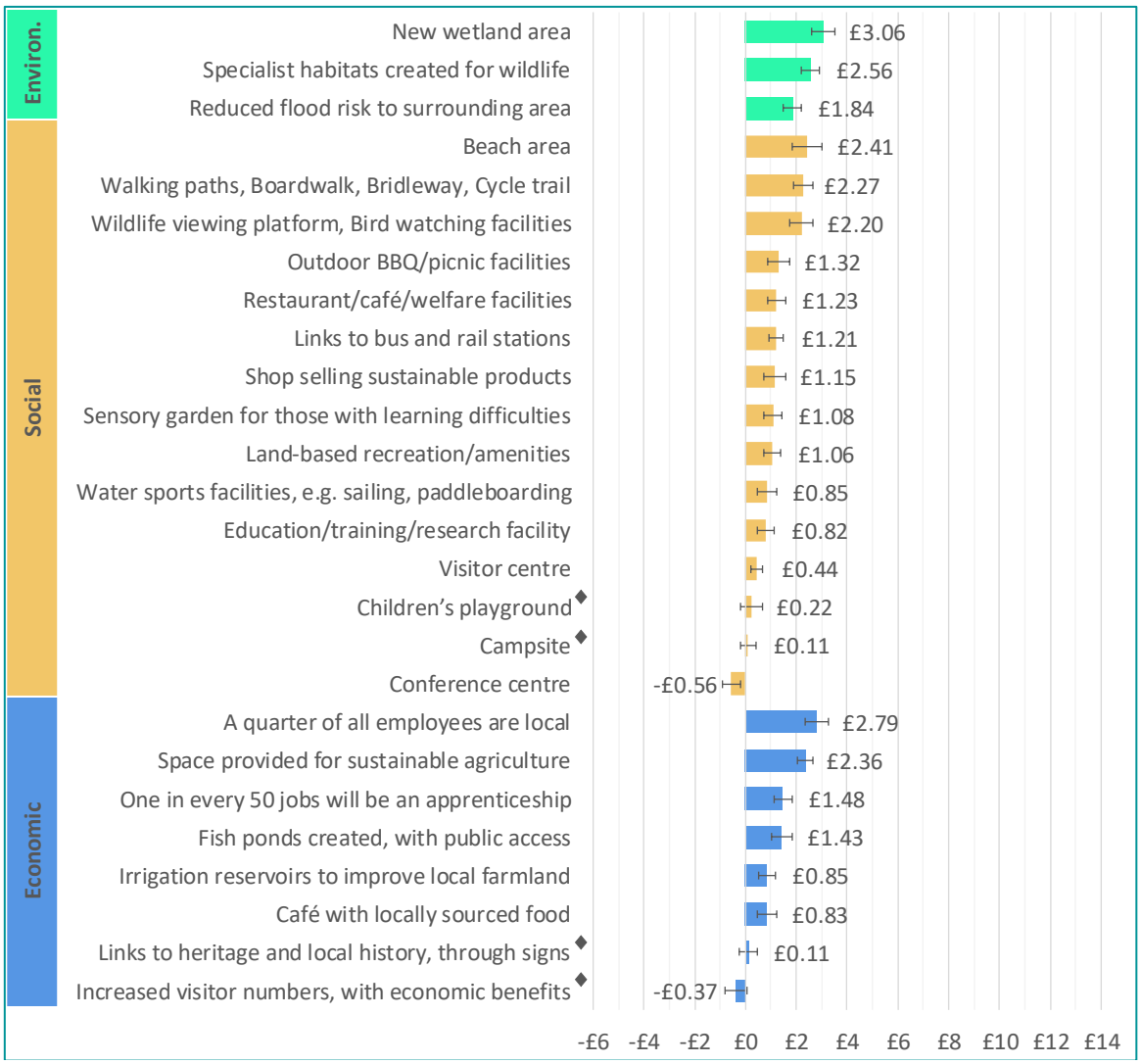
The higher WTPs for the above project additions in the context of Water treatment works compared to Reservoirs and Canals could be indicative of a greater need, in the eyes of the customers, to offset the disruption/negative impacts caused by the construction and operation of a Water treatment works compared to a Reservoir, Canal, or Pipeline. For example, one (future) customer stated that

I feel a lot of those environmental ones go in the top corner – there's a lot of construction with projects so there will be a negative impact. You should offset and add back – not just plant some trees

Relatedly, it is possible that the weaker support for project additions at Water treatment works compared to Reservoirs and Canals found in the qualitative work may to some extent be confounded by a lower support for Water treatment works compared to Reservoirs/Canals.

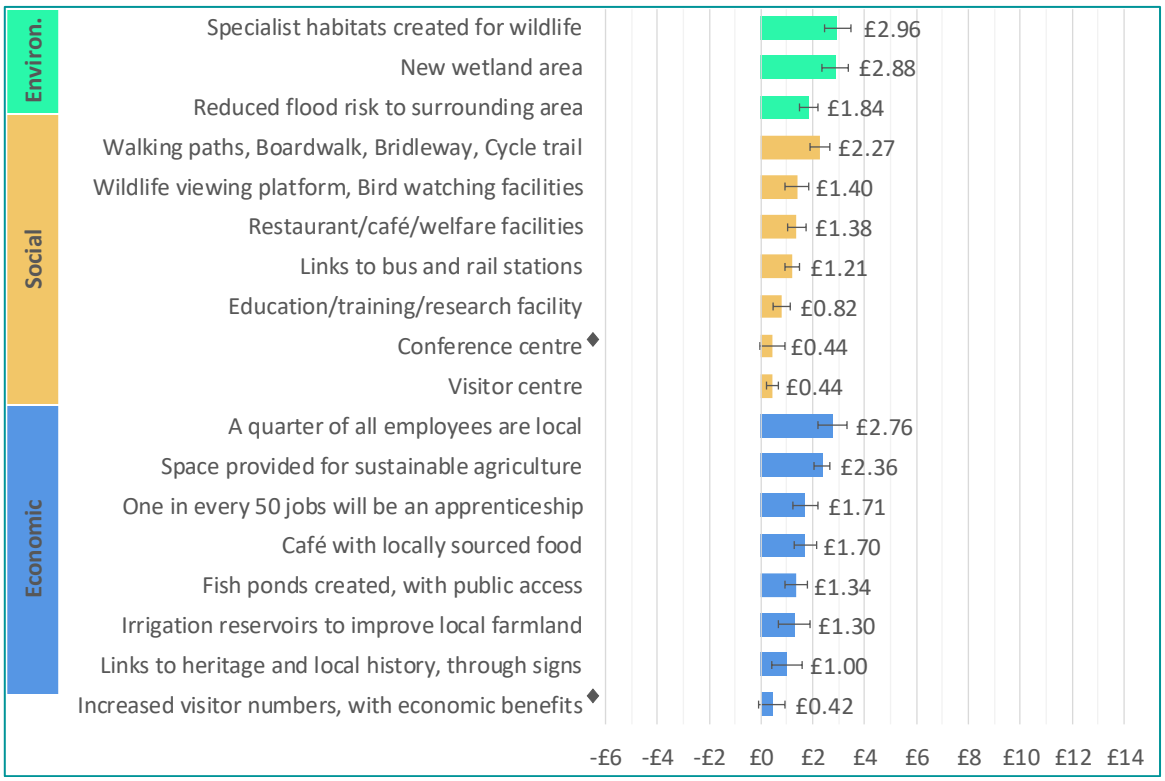
Figure 23 to Figure 26 offer a visual representation of the WTP values shown in Table 11 as well as of the precision of the estimates.

Figure 23: Average household valuations of project additions nearby: reservoir



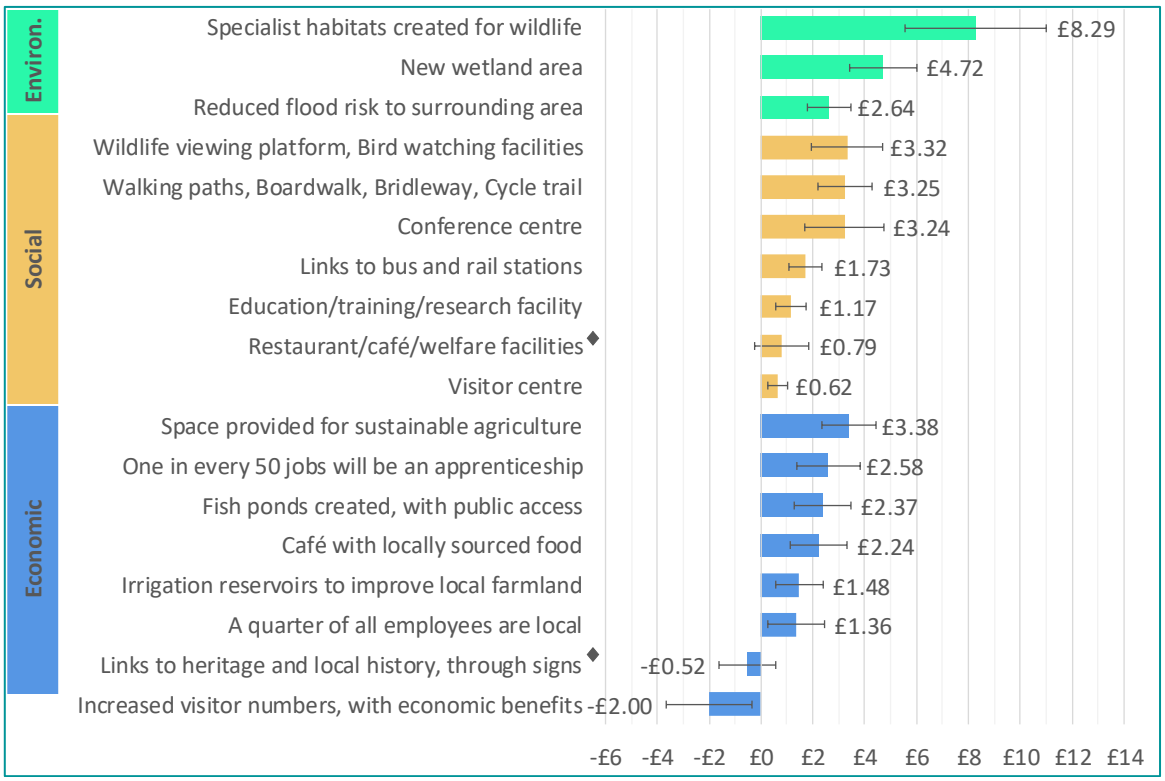
Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at a reservoirs 5 miles from home. Population-weighted average across companies. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

Figure 24: Average household valuations of project additions nearby: canal



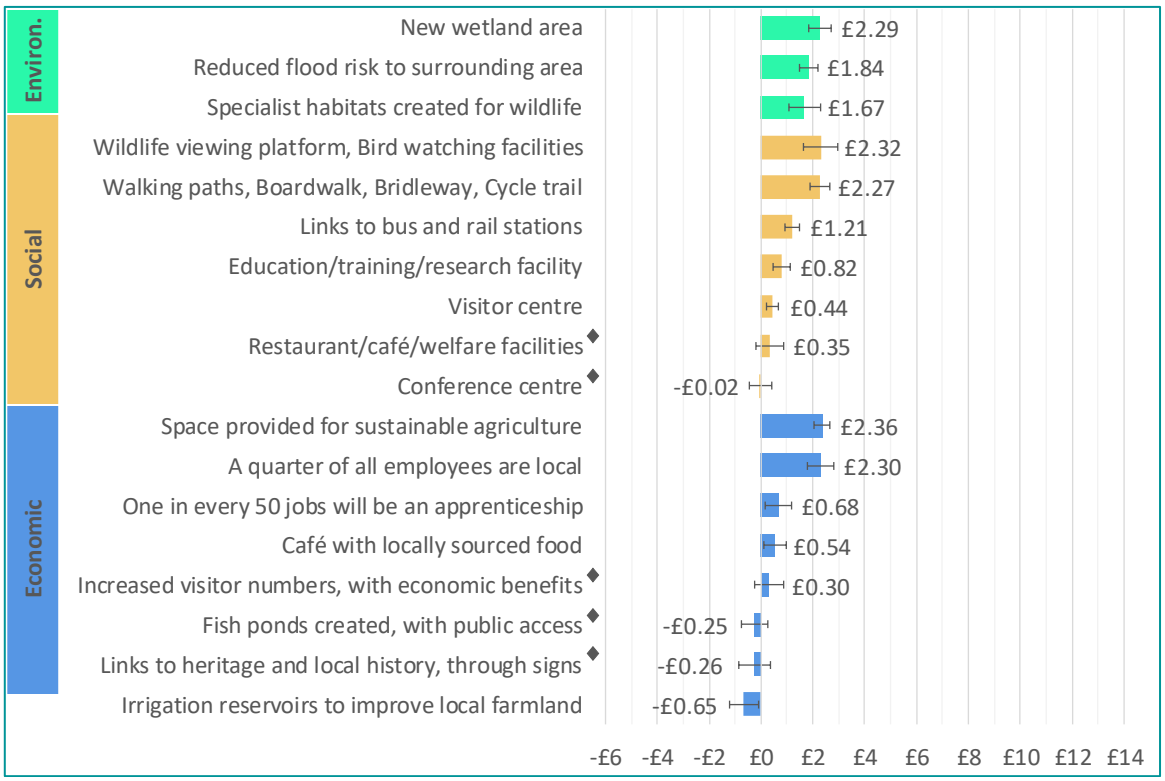
Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at a canal 5 miles from home. Population-weighted average across companies. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

Figure 25: Average household valuations of project additions nearby: water treatment works



Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at a water treatment works 5 miles from home. Population-weighted average across companies. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

Figure 26: Average household valuations of project additions nearby: pipeline



Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at a pipeline 5 miles from home. Population-weighted average across companies. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level.

Table 11 shows non-household valuations of project additions by type of site at sites 5 miles away from the organisation's premises[12]. For reservoirs, valuations are shown for the full set of project additions explored in the survey, while for canals, WTWs, and pipelines, WTP values are shown for a subset of all project additions, reflecting restrictions in the experimental design, as set out in Section 2.2.

[12] Unlike for households, the WTP values are not averaged across companies, because the non-household model does not include any company interaction terms.

Table 13: Average non-household valuations of project additions nearby by type of site

Project addition	Reservoir	Canal	Water treatment works	Pipeline
Environmental area				
New wetland area	0.71%	0.71%	0.71%	0.71%
Specialist habitats created for wildlife	0.66%	0.11%	1.31%	0.84%
Reduced flood risk to surrounding area	0.61%	0.61%	0.61%	0.61%
Social area				
Beach area	0.98%			
Sensory garden for those with learning difficulties	0.93%			
Water sports facilities, e.g. sailing, paddleboarding	0.60%			
Wildlife viewing platform, Bird watching facilities	0.59%	0.59%	0.59%	0.59%
Land-based recreation/amenities	0.47%			
Walking paths, Boardwalk, Bridleway, Cycle trail	0.47%	0.01%♦	0.71%	0.46%
Restaurant/café/welfare facilities	0.44%	0.44%	0.44%	0.44%
Links to bus and rail stations	0.41%	0.41%	0.41%	0.41%
Outdoor BBQ/picnic facilities	0.39%♦			
Shop selling sustainable products	0.38%♦			
Education/training/research facility	0.20%♦	0.20%♦	0.20%♦	0.20%♦
Campsite	0.13%♦			
Visitor centre	0.11%♦	0.11%♦	0.11%♦	0.11%♦
Children's playground	0.07%♦			
Conference centre	-0.16%♦	-0.39%	0.48%♦	0.19%♦
Economic area				
A quarter of all employees are local	0.71%	0.71%	0.71%	0.71%
Café with locally sourced food	0.63%	0.63%	0.63%	0.63%
Space provided for sustainable agriculture	0.60%	0.60%	0.60%	0.60%
Increased visitor numbers, with economic benefits	0.54%	0.48%♦	-0.26%♦	0.74%
Irrigation reservoirs to improve local farmland	0.45%	0.45%	0.45%	0.45%
Fish ponds created, with public access	0.43%	-0.32%♦	0.37%♦	-0.06%♦
Links to heritage and local history, through signs	0.27%	0.27%	0.27%	0.27%
One in every 50 jobs will be an apprenticeship	0.21%♦	0.05%♦	0.98%	0.69%

Base: 553 participants. Average annual WTP for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. Diamonds indicate not statistically significant values (at the 5% level).

Table 13 shows the total valuation of the subset of project additions available at all sites, by type of site. As for households, we find that project additions at Water treatment works are valued most highly, while project additions at Canals, which are second-most valued by households, are least valued by non-households.

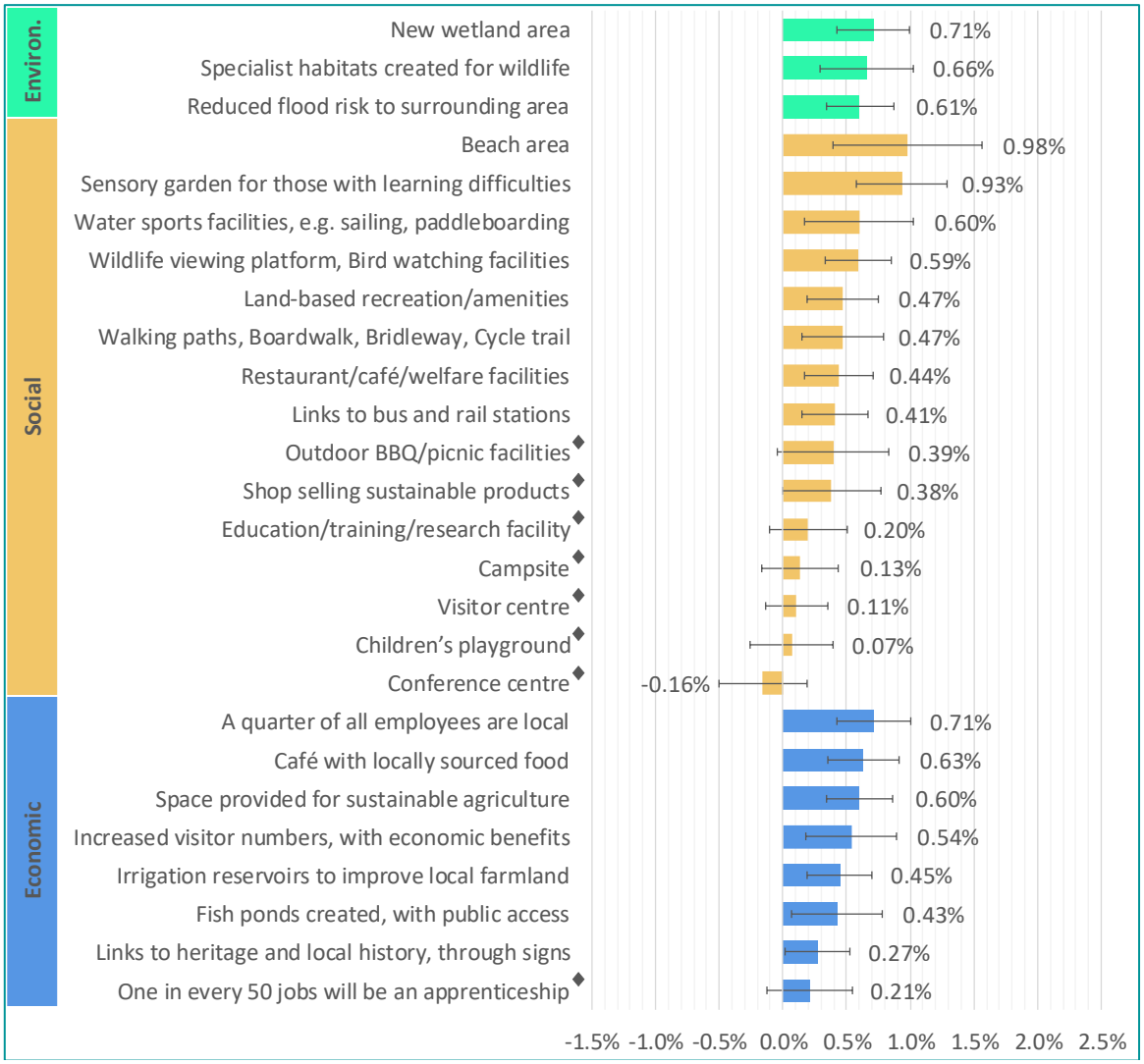
Table 14: Total valuation of a common set of project additions, by type of site

Site	Total valuation
Water treatment works	%9.32
Pipeline	%8.60
Reservoir	%7.89
Canal	%5.67

Note: The total annual valuation, as a percentage of the water only bill, refers to the set of project additions shown in Figure 28 to Figure 30, i.e., those that are potentially available for all types of site.

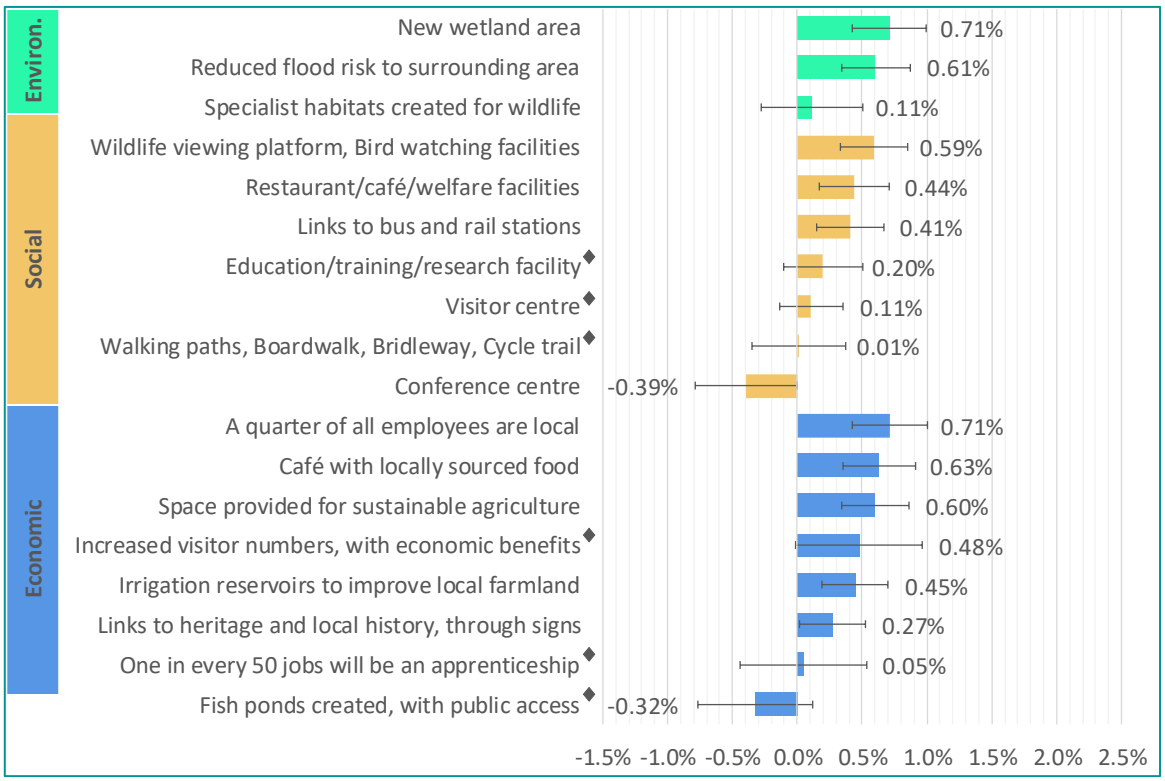
Figure 27 to Figure 30 offer a visual representation of the WTP values shown in Table 11 as well as of the precision of the estimates.

Figure 27: Average non-household valuations of project additions nearby: reservoir



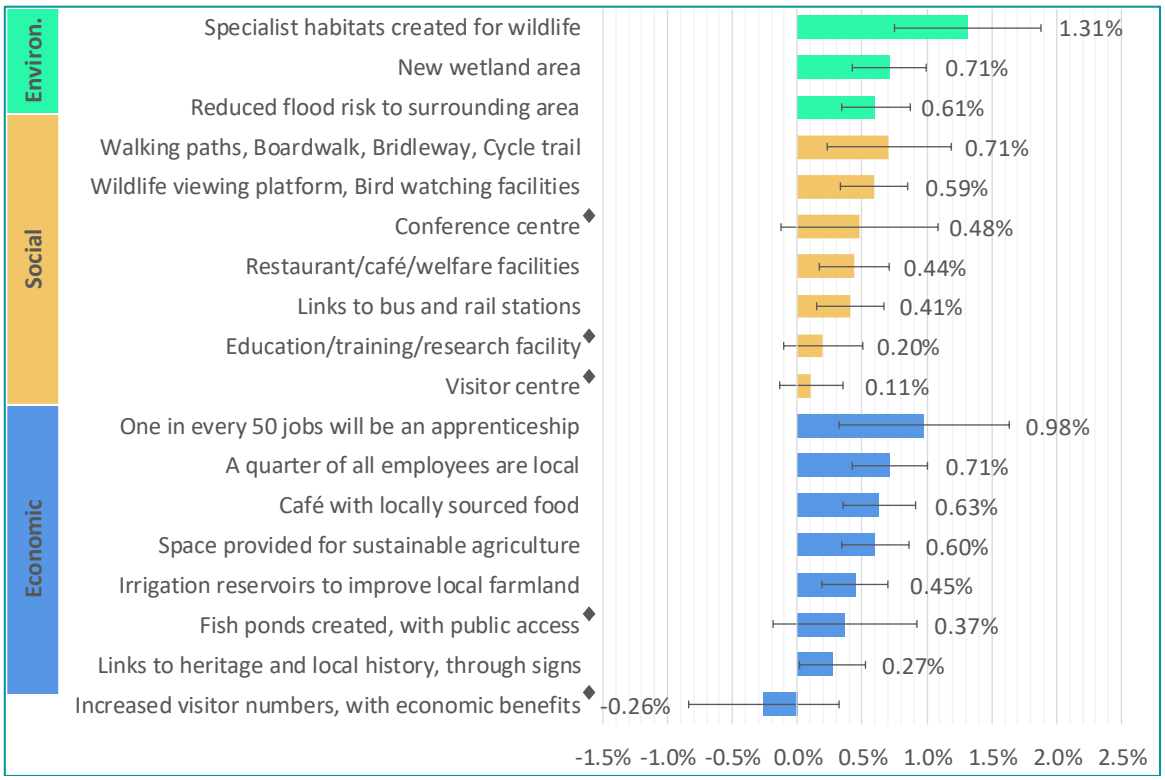
Base: 553 participants. Average annual WTP for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level

Figure 28: Average non-household valuations of project additions nearby: canal



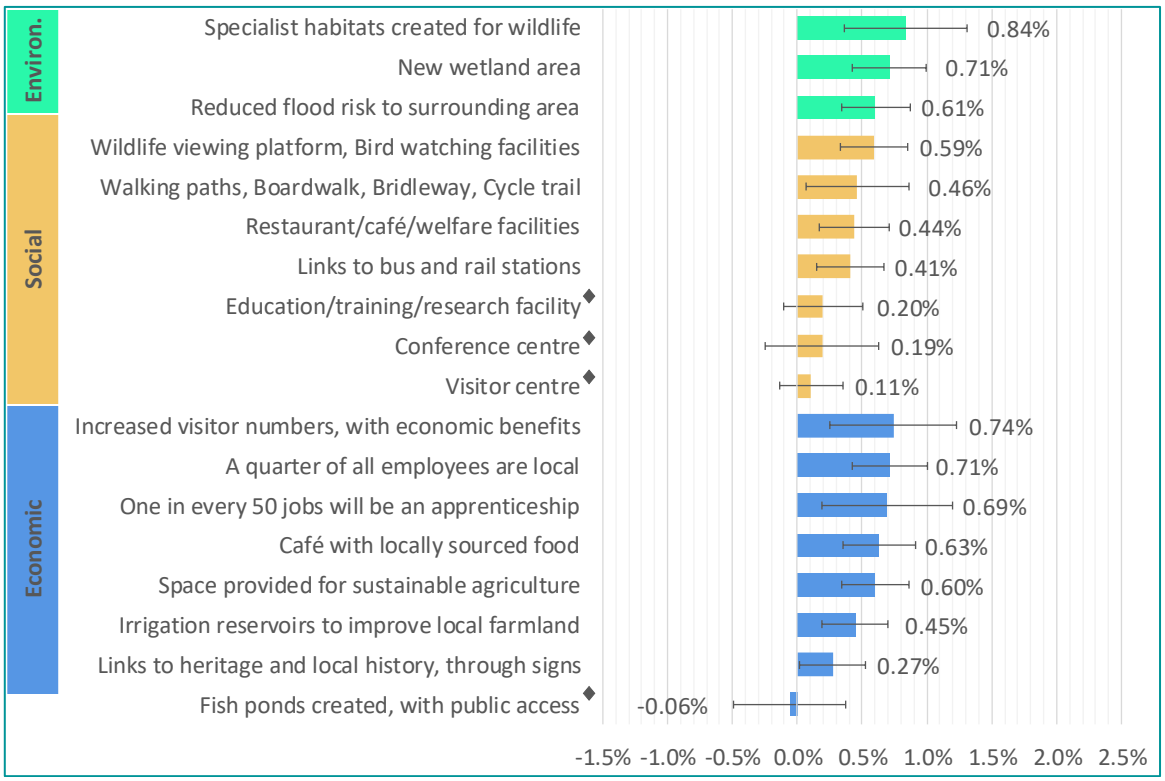
Base: 553 participants. Average annual WTP for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level

Figure 29: Average non-household valuations of project additions nearby: water treatment works



Base: 553 participants. Average annual WTP for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level

Figure 30: Average non-household valuations of project additions nearby: pipeline



Base: 553 participants. Average annual WTP for project additions at sites 5 miles from the organisation's premises expressed as a percentage of the annual water only bill. The error bars show 95% confidence intervals calculated using the delta method. Diamonds indicate valuations that are not statistically different from zero at the 5% level

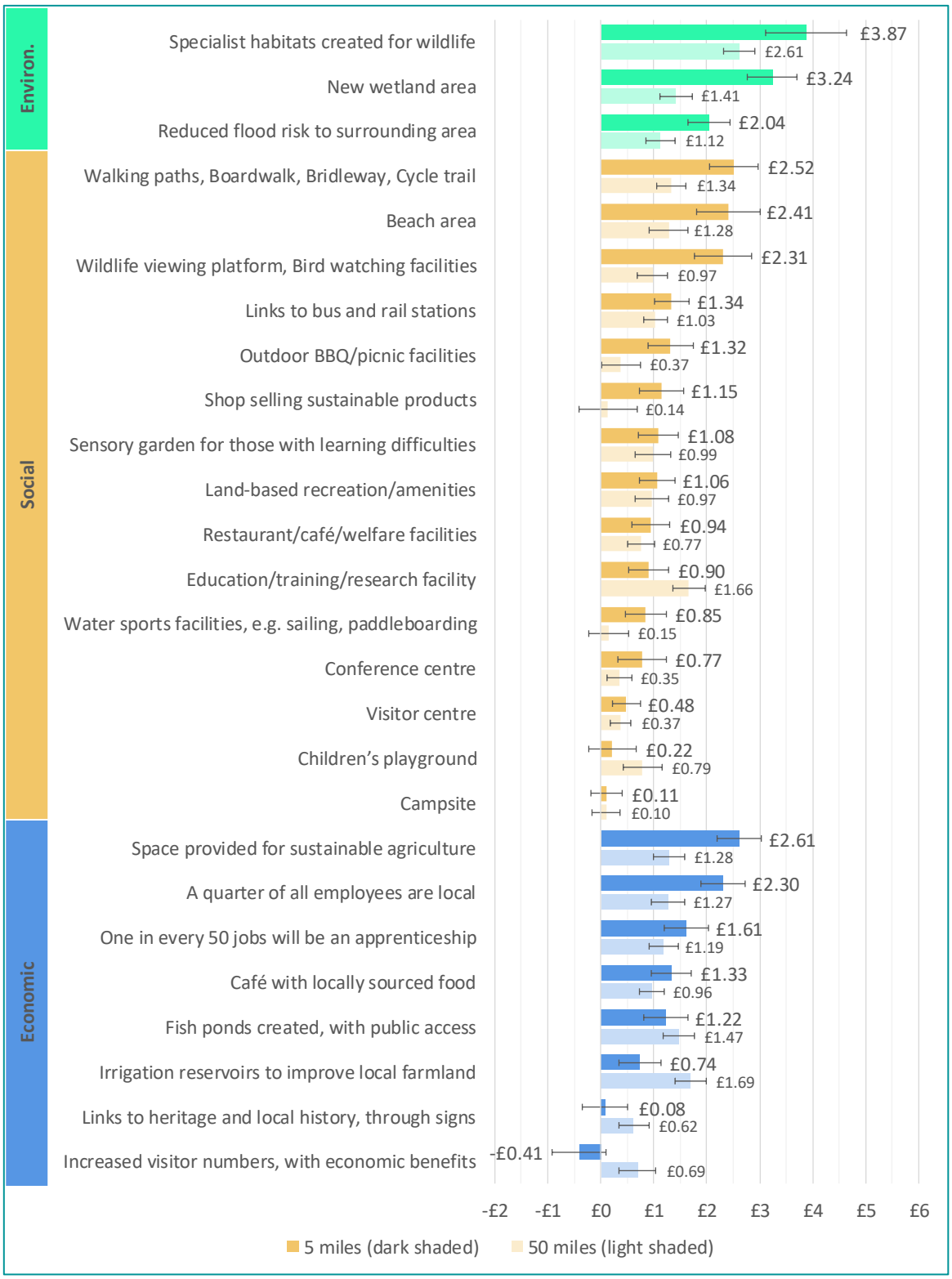
Valuations by Distance

The figure below offers a comparison between household customers' WTP for project additions at sites 5 miles versus at 50 miles from home, calculated as a population-weighted average across companies and types of sites. In most cases, WTP is higher for project additions nearby, as expected. The value estimate of a 'package' including all project additions falls from £36.1 for projects 5 miles from home to £25.6 for projects 50 miles from home. In those cases in which WTP at 5 miles is lower than at 50 miles, the difference is statistically significant at the 5% level, except for 'Fish ponds created, with public access'.

A lower WTP for projects nearby may be due to concerns about long term traffic/congestion caused by the project in the case of 'Education/training/research facility' and 'Increased visitor numbers, with economic benefits', while 'Links to heritage and local history, through signs' may be more valuable outside one's own local area.

The lower WTP for 'Children's playground' nearby compared to far away remains counterintuitive.

Figure 31: Average household valuations of project additions by distance



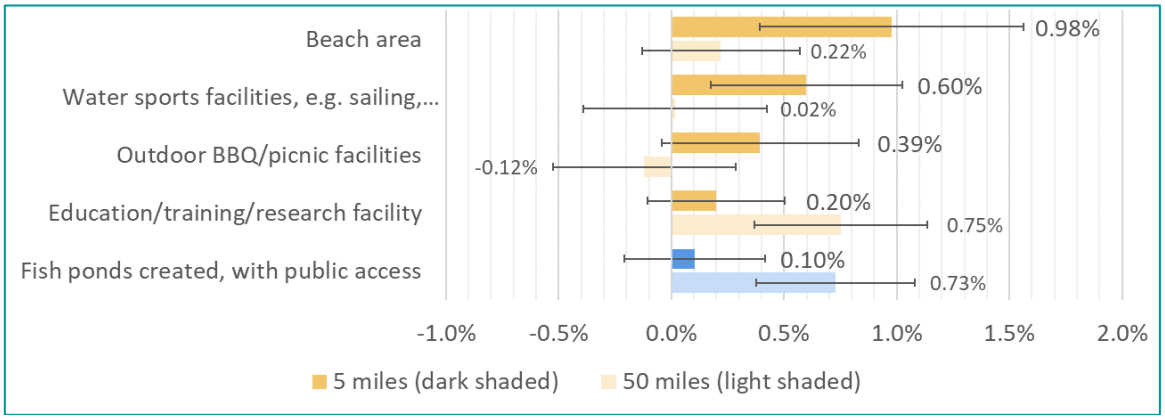
Base: 5,902 participants. Annual WTP in terms of a higher water bill for project additions at sites 5 miles from home. Population-weighted average across companies and sites. The error bars show 95% confidence intervals calculated using the delta method.

Figure 32 compares non-household customers' WTP for project additions at sites 5 miles and 50 miles from the organisation's premises, averaged across types of sites. For most project additions, our econometric model yields WTP estimates that are not dependent on distance. Where there are differences in WTP by distance of the site, the

sign of the difference is as expected for three project additions, WTP for project additions nearby being higher.

We find a higher WTP for 'Education/training/research facility' and 'Fish ponds created, with public access' at sites located 50 miles away from the organisations premises. The former could be explained based on concerns around traffic/congestion caused by the facility, while in the case of fish ponds the sign of the difference in WTP remains somewhat counterintuitive.

Figure 32: Average non-household valuations of project additions by distance



Base: 553 participants. Average annual WTP, across types of sites, for project additions as a percentage of the annual water only bill. Only project additions shown for which the WTP estimate differs between sites at 5 and 50 miles from the organisation's premises. The error bars show 95% confidence intervals calculated using the delta method.

3.4 Package Contingent Valuations

In the package contingent valuation question participants were asked if they would prefer to have all the project additions, where deemed to be worthwhile for each site, at a given bill increase, varied across the sample; or, whether they would prefer no project additions and no bill increase. The bill increases were halved or doubled in a follow-up question depending on the answer to the first question.

Figure 33 and Figure 34 show the proportions choosing 'All project additions' for households and non-households, respectively[13]. Both figures show the required downward slope indicating that participants were more likely to choose the option with all project additions when it was cheaper than when it is more expensive.

[13] The proportion estimates were obtained from the *icenReg* package for the R environment (R Core Team 2021). See Anderson-Bergman (2017). icenReg: Regression Models for Interval Censored Data in R. *Journal of Statistical Software*, 81(12), 1-23. The main advantage of the non-parametric approach over parametric estimates is that NPML estimation avoids a-priori specification of a functional form for the 'demand' function.

Figure 33: Household willingness to pay for all project additions

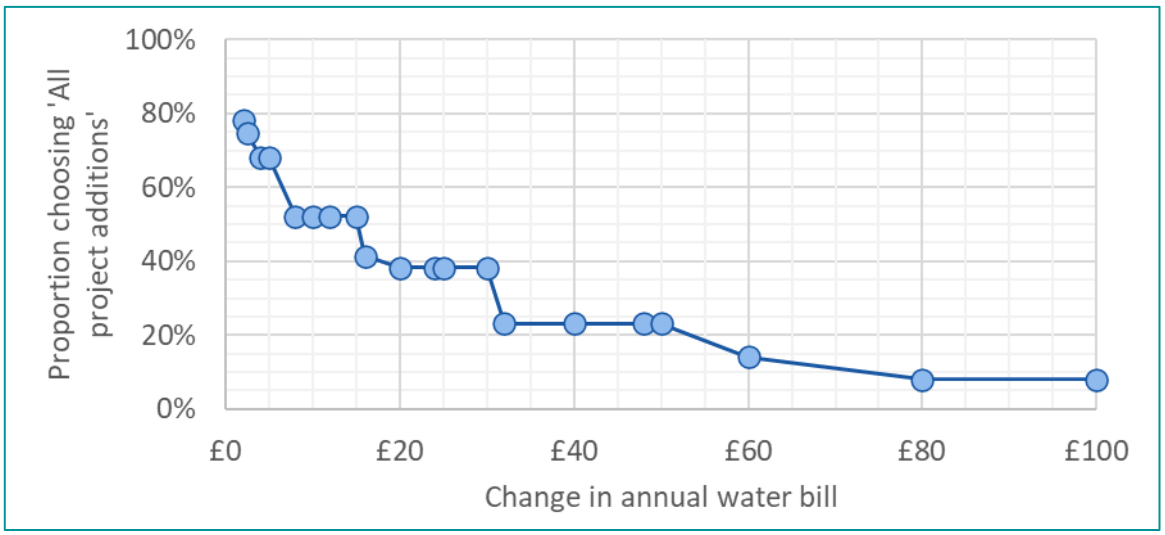
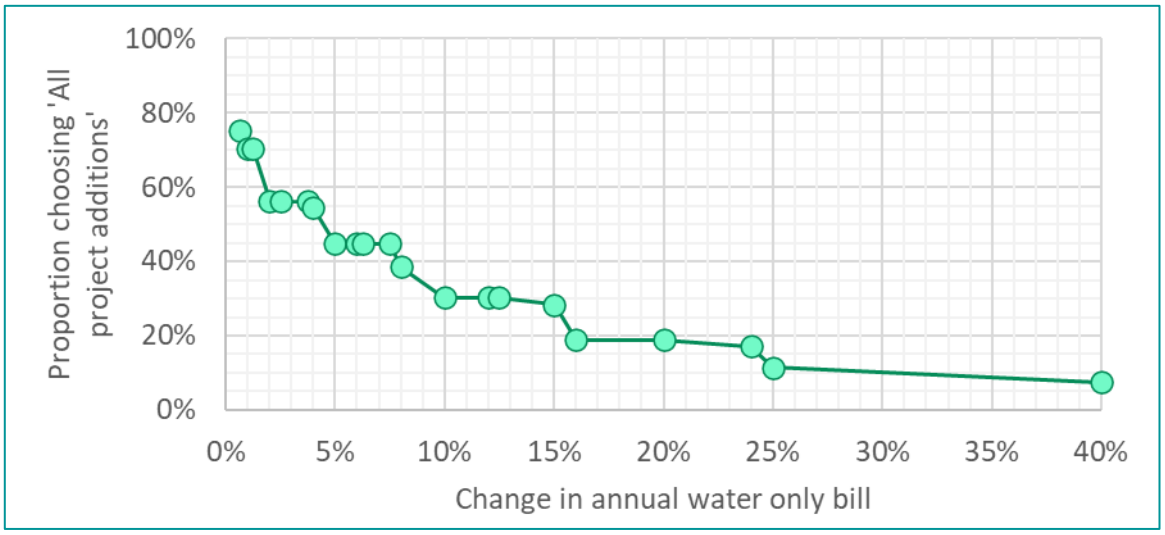


Figure 34: Non-household willingness to pay for all project additions



Based on the curve in Figure 33, we estimate that just over 50% of household customers are willing to pay at least £15 for a package of project additions, while close to 70% are willing to pay at least £5 for the package.

Table 13 presents estimates of mean and median valuations of the 'full package' of project additions. To estimate the implied mean valuation, we used the Turnbull-Kaplan-Meier approach, which calculates the lower-bound of the mean valuation and represents a conservative estimate of the true mean. It is a conservative estimate as it assumes that the WTP of those who say 'Yes' to a £5 bill increase, but 'No' to an £8 bill increase (for example) is £5 and no more. This approach effectively treats the piecewise linear curves shown in Figure 33 and Figure 34 as 'step functions'.

Table 15: Willingness to pay for all project additions

	Household	Non-household
Mean	£23.9 annually	9.16% of the annual water only bill
Mean conf. interval	(£22.5, £24.8)	(7.60%, 11.48%)
Median	£15.2	4.46% of the annual water only bill

Note: The mean is a lower bound Turnbull-Kaplan-Meier estimate, as explained in the text. 95% bootstrap confidence intervals based on 5,000 replications. The median was estimated by interpolating between the relevant probability estimates.

Households' mean valuation of a 'full package' of project additions was around £24, while non-households' mean valuation was around 9% of the annual water only bill. These values are lower than the sum of values from the pairwise choice exercise: £36 (5 miles distance) and around £26 (50 miles distance) for households and between 11% and 12% of the annual water only bill for non-households, depending on the distance of the site. This suggests capping may be needed for individual project additions to ensure that total WTP is not exceeded.

The SP2 choice data were also analysed using interval regression models, which are shown in Table 14 and Table 15 for households and non-households, respectively. The package WTP estimates are given by the coefficient on each company variable. These estimates are broadly consistent with the Turnbull-Kaplan-Meier estimates, based on non-parametric estimation, shown in Table 13. Household annual mean WTP is between £22.5 and £25.4 (depending on company). Affinity Water customers had a statistically lower WTP than customers of the other companies (except Cambridge Water). For non-households, the mean valuations lie between 6.0% (Cambridge) and 8.4% (Severn Trent) of the annual water only bill, but the differences are not statistically significant.

Table 16: Interval regression model of contingent valuation choices: households

	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Affinity	22.51	0.82	27.56	0.00	20.91	24.12
Anglian	25.83	0.90	28.64	0.00	24.06	27.59
Cambridge	25.17	1.77	14.21	0.00	21.70	28.65
Severn Trent	25.72	0.87	29.54	0.00	24.01	27.42
Southern	24.98	0.97	25.84	0.00	23.09	26.88
Thames	25.37	0.93	27.34	0.00	23.55	27.19
ln σ	3.24	0.02	159.43	0.00	3.20	3.28
σ	25.45	0.52			24.46	26.49
No. observations	5,902					

Note: Model estimated on the combined sample. Company-specific intercepts shown. Valuations in £/household/year.

Table 17: Interval regression model of contingent valuation choices: non-households

	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Affinity	0.0740	0.0078	9.51	0.00	0.0587	0.0892
Anglian	0.0839	0.0101	8.29	0.00	0.0641	0.1037
Cambridge	0.0598	0.0102	5.85	0.00	0.0398	0.0798
Severn Trent	0.0845	0.0098	8.59	0.00	0.0652	0.1038
Southern	0.0706	0.0071	9.90	0.00	0.0566	0.0846
Thames	0.0779	0.0097	8.03	0.00	0.0589	0.0969
ln σ	-2.5237	0.0704	-35.83	0.00	-2.6617	-2.3857
σ	0.0802	0.0056			0.0698	0.0920
No. observations	553					

Note: Model estimated on the combined sample. Company-specific intercepts shown. Valuations as a percentage of the annual water only bill (e.g., 0.074 indicates a WTP of 7.4% of the annual water only bill)

3.5 Aggregate Valuations

It is possible to aggregate the valuations of individual project additions by type of site, company, and distance, to the respective population (see results in Appendix G). This section describes this aggregation for three SROs:

- The Fens Reservoir
- South Lincolnshire Reservoir
- Grand Union Canal.

These SROs were able to provide details of the location of the schemes in a form that could be used within a GIS analysis to match to local population densities.

The model provides valuations for individuals living at 5 and 50 miles from the SRO. We then calculated valuations for individuals living at distances between 5 and 50 miles (in 5km intervals), by interpolating the values for 5 and 50 miles.

We were provided the location of the Grand Union Canal and the approximate location of the Fens Reservoir and the South Lincolnshire Reservoir (i.e. the central points of a 10km circle where these SROs might be located). We then estimated, using GIS, the population served by each water company at several distances from the SRO. The population data was extracted from the 2011 Population Census at the level of the census output area. This was corrected using recently released data from the 2021 Population Census at the local authority level.

For each of the three SROs, we then combined the valuations by type of site (reservoir or canal), attribute, company, and distance, with the population served by that company and living at that distance from the SRO. Appendix G shows the results.

The values can be used within SRO Gate 2 submissions as estimates of the total benefit of the project addition, disaggregated by distance and company.

4 Summary and Conclusions

PJM economics and Accent were commissioned by a club of water companies to conduct a programme of research to obtain primary evidence on customer preferences to inform the development of 11 strategic resource options (SRO).

The quantitative stage of research has focused on estimating customer willingness-to-pay (WTP) valuations of 26 project additions at SRO sites via a stated preference survey. The key findings presented in the report are based on an analysis of the responses given by a sample of 5,902 household participants and 553 non-household participants.

The findings support the following conclusions:

- Household customers valued the following project additions most highly: 'Specialist habitats created for wildlife' (£3.87 annually); 'New wetland area' (£3.24 annually); 'Space provided for sustainable agriculture' (£2.61 annually)

- Households' average valuation of any project addition was considerably higher in the environmental area (£3.05), compared to the economic area (£1.19) and the social area (£1.16). The combined annual valuation of all project additions was around £36

- Non-Household customers valued the following project additions most highly: 'Beach area' (0.98% of the water only bill, annually); 'Sensory garden for those with learning difficulties' (0.93% of the water only bill, annually); 'Specialist habitats created for wildlife' (0.73% of the water only bill, annually). The combined annual valuation of all project additions was 11.83% of the water only bill

- The estimates of non-household WTP values were substantially less precise than for households. Moreover, many project additions appear to be specifically targeted at and relevant to households only, and, therefore, the stated preferences are likely to be a combination of household and non-household preferences, as well as reflecting the preferences of organisations that are very heterogeneous in terms of sector of activity. This calls for caution in interpreting any findings for non-households

- There is considerable variation in WTP for project additions across types of sites, project additions being most highly valued at Water treatment works, in general, and by distance of the site

- The WTP for a 'package' of project additions was lower than the sum over individual project additions, indicating that capping may be needed for individual project additions to ensure that total WTP is not exceeded.

There are several indications that the stated preference exercises worked well and produced valid findings:

- Participant feedback was positive
- The econometric models were well estimated
- The rank correlation between the valuations of a subset of project additions and the stated importance of some closely linked aspects of the local environment was very high, for both households and non-households
- The valuations of project additions varied in a plausible fashion across customer segments defined based on demographics, views about project additions, outdoor recreation activities, and various household characteristics
- There is a high degree of consistency between the valuations of individual project additions, as estimated in the quantitative stage, and a classification of project additions in terms of relevance and importance based on qualitative research.

Appendix A

Literature Review

Contents

Executive Summary

Introduction

Public value (also known as social value, societal value, or added value) is the set of benefits that a (public or private) organisation or project creates for society. Attention to public value has been growing in the water sector and elsewhere. Considerations of public value are crucial in the case of Strategic Resource Options, which should benefit customers, the wider society, and the environment. This document is a review of the literature on public value, with a focus on the water sector, and infrastructure more generally. The document helps to lay the groundwork for a broader research project to understand public preferences regarding public value.

Guidance

The first part of the review focuses on guidance and recommendations on public value from governmental organisations, companies, and other stakeholders, in the water sector and beyond.

There is a large set of guidance documents on public value in the water sector, including regarding the development of best-value water resources management plans, and other general guidance issued by the regulator and other stakeholders. Other sectors (e.g. energy, construction, rail travel) have also developed frameworks for public value measurement. There is also increased interest in public value at the national level, as shown in the Social Value Act and in frameworks developed to apply the principles set in that legislation. Nevertheless, currently, public value is not fully and universally embedded in the water companies' culture and public value reporting is uneven. In other sectors, public value thinking is still limited mostly to the procurement and construction stages.

Ofwat's public value guidance includes the key principles that:

- Opportunities for public value should be explored; and
- Customer willingness to pay needs to be demonstrated.

The RAPID guidance on Strategic Resource Options in the water sector is brief, but is clear that there needs to be a consistency between Gate Two submissions and water resources management plans in terms of best value and solution benefits.

Most guidance documents list the high-level types of public value that companies should deliver, usually split into three groups: economic, social, and environmental.

Engagement with customers, citizens, and stakeholders is emphasized in many documents. In addition, the public value sought by companies should reflect what society wants (and is prepared to give up something in return for it). However, delivering public value cannot compensate for shortcomings in the delivery of the core services provided by the water companies.

Guidance documents emphasize the need for robust evidence on the effects of all options and recommend monetizing (expected) public value where possible. The development of multi-criteria decision analysis is recommended. Companies should also provide a balanced view of the public's priorities. Customer valuations are recommended. Databooks such as those included in the ENCA (Enabling Natural Capital Approach) framework can also be used. The Water Companies' regional plans already include a series of metrics. Other possible metrics can be found in more general guidance (e.g. National TOMs).

Perceptions and preferences

The second part of the review looks at case studies on perceptions and preferences regarding public value in the UK water sector. The review found little evidence on this topic. The existing evidence suggests that customers welcome the idea of a best value plan, with some caveats: the priority should be to the core services provided by water companies. There is some evidence on public concern about environmental issues in relation to water.

Strategic Resource Option schemes: Gate One submissions

The third part reviews the Gate One submissions for the 11 specific Strategic Resource Option schemes listed in the brief, listing the scope for public value.

Strategic Resource Options Gate One submissions consider a variety of economic, social, environmental wider benefits. Most of the high-level types of public value mentioned are consistent with those mentioned in guidance documents. A few elements are not mentioned in guidance, e.g. land reinstatement and access and connectivity. There is little information on detailed initiatives to deliver public value. These detailed initiatives are provided mostly for recreational public value, biodiversity/habitats, and landscape. So far, customer engagement has provided few insights on perceptions and preferences for public value.

A1. Introduction

Public value (also known as social value, societal value, or added value) is the set of benefits that a (public or private) organisation or a project creates for society (Moore 1995). Attention to public value has been growing in the water sector. Guidelines emphasise the need to develop a 'best value' water resources management plan, rather than simply a least cost plan, considering factors alongside economic cost and seeking an outcome that increases the overall benefit to customers, the wider environment, and society. Ofwat's strategy paper '*Time to Act, Together*' included as one of its three goals (Ofwat 2019) "*for water companies to provide greater public value, delivering more for customers, society and the environment*'.

Looking beyond water, the UK government has embedded public value as an objective within public sector procurement as part of the Public Service (Social Value) Act 2012 (UK Parliament 2012). A national framework for value measurement and quantification has been developed to support this via the Social Value Model (GCF 2020a, 2020b) and the National TOMs (NSVT 2019).

Considerations of public value are crucial in the case of Strategic Resource Options (SRO). Funding is available to water companies for the development of these options, subject to a "gated" process. At each of four "gates" during 2020-25, regulators review progress and decide how and if the options should proceed further. RAPID (The Regulator's Alliance for Progressing Infrastructure Development) supports and assesses option development at each gate and provides recommendations to enable Ofwat to make decisions regarding continuation of funding. Guidance emphasizes that Strategic Resource Options should benefit customers, the wider society, and the environment. Water companies are currently preparing Gate Two submissions.

These developments provide the motivation for the present study, which focuses on the preferences customers have regarding public value for the Strategic Water Resource options that are being considered as part of the RAPID process. The study aims to understand:

- What types of public value customers perceive are important and preferences among those types (and if the preferences change depending on the geographical location/type of scheme or other factors)
- How much are customers prepared to pay
- What language should be used to explain public value

This document forms the first part of the study. It is a review of the literature on public value, with a focus on the water sector, and infrastructure more generally. The document helps to lay the groundwork for developing customer research in the other stages of this research.

The rest of the report is structured as follows.

- Chapter 2 reviews guidance and recommendations on public value from governmental organisations, companies, and other stakeholders, with a focus on the water industry, but also looking at general guidance.
- Chapter 3 reviews case studies on perceptions and preferences regarding public value in the UK water sector.
- Chapter 4 reviews the Gate One submissions for the 11 specific Strategic Resource Option schemes listed in the brief, listing the scope for public value
- Chapter 5 synthesises lessons learnt and the implications for the following stages of the research.

A2. Guidance

A2.1 Introduction

This chapter synthesises and compares guidance and recommendations on public value, issued by governmental organisations, water companies, and other stakeholders. It looks at key documents related to public value in the water industry. The review synthesises the main points of these documents, across three themes:

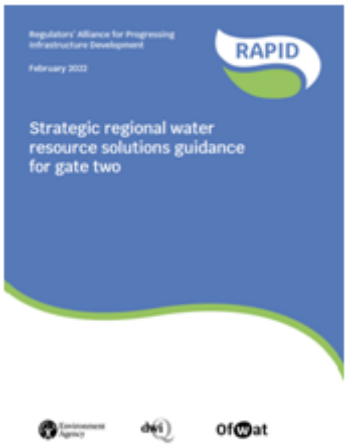
- What is included in public value?
- How should it be delivered?
- How should it be measured?

A2.2 Guidance for Strategic Resource Options Gate Two

RAPID

RAPID has recently issued guidance for the Strategic Resource Options Gate Two submissions (RAPID 2022) (Figure 35).

Figure 35: RAPID guidance for Gate Two (RAPID 2022)



The guidance mentions that Gate Two submissions should include a summary of the best value considerations for each solution:

"*The RAPID process draws on the assessments in the regional and company plans regarding best value, including financial costs and how each solution increases the overall benefit to customers and the wider environment and society*" (RAPID 2022, p.27).

The guidance then points to Ofwat's public value principles (Ofwat 2021, reviewed in Section 2.3 of this document) and the Water Resources Planning Guideline on guidance for compiling a best value plan (EA, NRW, and Ofwat 2021, reviewed in Section 2.4).

It is also mentioned that companies should consider "*a wide range of metrics, risks and values, which should be supported by robust data, analysis and customer and stakeholder support*" (RAPID 2022, p.27). The submissions should identify the metrics that have been applied to each solution within regional and company-level water resource plans and the metric evaluation outcomes.

In addition, the submissions should report results of customer engagement:

"*The gate two submission should include (…) details of customer preference studies including how they have been reflected in the work undertaken, and conclusions reached.*" (RAPID 2022, p. 28).

All-Company Working Group

The RAPID guidance is supported by a document issued by the All Company Working Group (*Design Principles, Process and Gate Two Interim Guidance*) (ACWG 2021), which details principles, targets, and indicators.

The ACWG principles for Gate Two submissions were derived from the National Infrastructure Commission Design Principles (NIC n.d.):

- Climate ("Mitigate greenhouse gas emissions and adapt to climate change"), People ("Reflect what society wants and share benefits widely")
- Place ("Provide a sense of identity and improve our environment")
- Value ("Achieve multiple benefits and solve problems well").

Public value considerations are explicit, for example, under the **Climate** principle, which mentions that "*projects must be developed to work across companies and/or legislative boundaries to develop sustainable solutions and environmental enhancement for the wider benefit of society*" (ACWG 2021, p.9).

Under the **People** principle, the public value aspect that is emphasised is recreation: is suggested projects should "*maximise opportunities to support active travel and improve recreational access to waterside and green spaces that can improve outcomes for wellbeing, health, local economy, social inclusion and education*" (ACWG 2021, p.10).

Under the **Place** principle, the document mentions several social and environmental aspects (ACWG 2021, p.11):

- "..develop (…) landscape, cultural heritage, health and sustainability"
- "approaches that support and deliver biodiversity net gain"
- "(infrastructure) provide visual delight"

The indicators for these three principles are not metrics to assess the compatibility of the solutions with those principles, but requirements for the submissions themselves, such as evidence of working with stakeholders, and development of specific plans.

The **Value** principle then includes more general considerations on public value:"*Identify opportunities to contribute wider regional benefits outside of the project scope. In particular (…) support the delivery and enjoyment of a healthy water environment"* (ACWG 2021, p.12). It also makes recommendations on how to include public value in the submissions: *"Capture and measure embedded and additional value (…) Quantify these benefits so they can be considered meaningfully in conversations on value, financing and risk"* (ACWG 2021, p.12). This includes details of the best-value metrics used in Regional Plans and Water Resources Management Plans.

A2.3 Ofwat Guidance

Public value in Ofwat's strategy

Ofwat's strategy paper '*Time to Act, Together*' emphasizes the importance of public value in the water industry, identifying as one of three goals of the industry "*for water companies to provide greater public value, delivering more for customers, society and the environment.*" (Ofwat 2019, p.11). In addition, "*companies will need to be run with a clear purpose, adding wider public value for customers and communities as well as for shareholders*" (p.12).

The main type of public value mentioned in the document is environmental. It is stressed that water companies should consider the environment as an "*integral part of their business, inseparable from the services they provide*" (p.32). Examples mentioned include nature-based solutions rather than hard infrastructure where possible. A social aspect is also mentioned as example: locating training facilities in deprived communities (p.37).

Ofwat's strategy paper also identifies the reason why water companies are in a good position to (and why they should) deliver public value: because of their clear geographical and environmental footprint. It also points out that providing public value benefits the companies themselves, because in the long term, it builds legitimacy in the eyes of the public, helping staff motivation, access to finance, and establishment of partnerships (p.36). However, the paper alerts that delivering public value cannot compensate for shortcomings in the delivery of the core water/wastewater services.

Public value discussion paper and responses

Ofwat's ideas on public value were further developed in a December 2020 discussion paper, following engagement with stakeholders (Ofwat 2020). The document identified four enablers of public value, as recognised by water companies:

- *Governance and leadership* – development of 'social contracts', be open to scrutiny, change committee structure
- *Decision-making tools and frameworks* – "multiple capitals" approaches, include social/environmental value in cost-benefit analysis
- *Customer, community and stakeholder engagement* – draw on views of multiple stakeholders, distinguishing views as customers and citizens

- *Reporting tools and frameworks* - demand from investors for track record of environmental/social performance

Ofwat's view on public value can be synthesized as below. A change in the companies' culture is needed to achieve outcomes (which should be informed by the needs of the public). Public value should be authentic (has to resonate with the community) and delivering it should be a transparent process. It should not shift focus from the companies' core activities and does not necessarily imply increasing costs.

Figure 36: OfWat public value approach

The discussion paper was accompanied by a report commissioned to Purpose Union and Impact Institute, which details companies' practices related to public value and develops a framework to assess public value. (Purpose Union and Impact Institute 2020). According to this document, the approach of water companies to public value, and the way the companies report how they create public value, are uneven. Gaps and problems include:

- Much of reporting is anecdotal, failing to establish a framework that helps to track the companies' culture change
- More attention/rigour to environmental than social themes
- Not enough system-wide thinking in how social/environmental challenges are tackled. Most companies focus on mitigating social and environmental problems, rather than collaborating to address the factors that underpin those problems
- Not enough detail on the social/environmental issues that matter to companies, how those issues relate to each other, and the priority accorded to them
- Not enough communications on public value

Following the stakeholders' responses to the 2020 discussion paper, Ofwat released a document laying out a vision and a supporting set of principles to guide companies in the development of plans that potentially have impacts on public value (Ofwat 2021 - Figure 37). As mentioned before, these principles support the RAPID guidance for Gate Two submissions. Table 16 lists the seven principles.

Figure 37: OfWat public value guidance (Ofwat 2021)

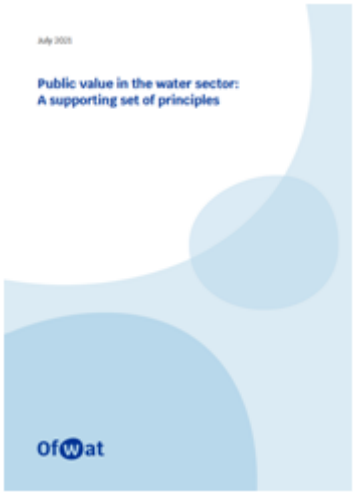


Table 18: Ofwat's Principles for Public Value

		Principle
SCOPE OF PUBLIC VALUE	1	Companies should seek to create further social and environmental value in the course of delivering their core services, beyond the minimum required to meet statutory obligations
DRIVERS FOR DECISION-MAKING AND TRANSPARENCY	2	The mechanisms used to guide activity and drive decision-making should facilitate the delivery of social and environmental benefits that are measurable, lasting and important to customers and communities.
	3	Companies should be open with information and insights on operations and performance.
	4	Delivery of public value outcomes should not come at greater cost to customers without customer support
COLLABORATION AND SYSTEMS THINKING	5	Companies should consider where and how they can collaborate with others to optimise solutions and maximise benefits, seeking to align stakeholder interests where possible, and leveraging a fair share of third-party contributions where needed.
	6	Companies' public value activities should not displace other organisations that are better placed to act.
MATURITY AND FOCUS	7	A company should take account of its capability and circumstances in scoping the delivery of greater public value.

Principles 1, 2, and 4 are relevant for the present study:

- Principle 1 emphasizes that public value should be related to the core services provided by the water companies, focusing on social and environmental value. This is consistent with the strategic priorities and objectives set by the UK and Welsh Governments for Ofwat (DEFRA 2017, Welsh Government 2017)
- Principle 2 suggests companies should define measurable outcomes for options and use tools to understand the costs and benefits of different options (including social and environmental ones). The tools provide a balanced view of competing priorities and allow the prioritisation of options.
- Principle 4 emphasizes the need of robust evidence base for options, especially when these involve greater cost.

The document also reported the main themes from the responses to the discussion paper from water companies. While in many cases, the responses were aligned with Ofwat's views, several concerns were also noted (p.5):

- Different interests groups may prioritise different public value outcomes, which requires companies to make trade-offs. This calls for a full understanding and weighing the views of customers and other stakeholders.
- There is a risk that bills could be used as the vehicle for collecting revenue for investment in creating public value that should otherwise be delivered through taxation or other government actions.

The general view was that the best measures of progress on public value were the level of customer, stakeholder, and community satisfaction (p.7). However, there was also consensus that Ofwat should not use standardised reporting or a pre-determined set of outcomes for public value – this could create a "box-ticking" mind-set (p.8). A more flexible approach is preferred, so that companies can deliver the outcomes that are more relevant to their stakeholders. The principles listed above are an example of this flexible approach.

A2.4 Water Resources Planning Guideline

Guideline

The Water Resources Planning Guideline (EA, NRW, and Ofwat 2021) is a document issued by the Environment Agency, Natural Resources Wales, and Ofwat. It determines that Water Resources Management Plans must be produced by individual water companies every 5 years. The plans should detail how water companies plan to achieve a secure water supply at an affordable cost and protecting and enhancing the environment.

Furthermore, the plans are "best value plans", i.e. they should consider "*factors alongside economic cost and seeks to achieve an outcome that increases the overall benefit to customers, the wider environment and overall society*" (EA, NRW, and Ofwat 2021, Section 9.1). The document lists the factors that should be considered in the best value plan. Table 17 shows the public value aspects included in that list, and classifies them into three groups (economic, social, and environmental). It should be clear in the plan that the wider benefits could not be delivered more efficiently through other means (Section 9.2).

Table 19: Public value benefits listed in the Water Resources Planning Guideline

Economic	Social	Environmental
■ Affordability ■ Distributional impacts ■ Local regeneration ■ Economic growth	■ Public health ■ Well-being ■ Recreation ■ How the benefits above are distributed spatially and over time	■ [unspecified] environmental improvements ■ Natural capital ■ Biodiversity ■ Achieving net zero [carbon emissions] and [addressing] the climate emergency

The guideline encourages companies to use a wide range of metrics, but identifying where there is potential risk of double counting of benefits. In addition, weightings to the metrics should be justified (Section 10.3).

Supplementary guidance then explains how the benefits can be considered in decision-making (in England) (EA 2021). Three types of assessment are considered:

- Strategic environmental assessment (including: biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, and cultural heritage)
- Natural capital assessment (as a minimum, it should include: biodiversity and habitat, climate regulation, natural hazard regulation, water purification, water regulation)
- Biodiversity net gain assessment

This supplementary guidance also recommends companies to look for opportunities to deliver multiple benefits, including improvements to water quality, flood risk reduction, reduction in greenhouse gases, and carbon sequestration. In addition, regional groups should look for benefits across different sectors.

A UK Water Industry Research report (UKWIR 2020) provides more details on how best value should be defined and implemented within the context of water resources planning. The report recommends multi-criteria decision analysis as an appropriate tool for delivering a best value plan. In addition, it recommends consultation with customers and other stakeholders, to ensure that impact metrics are broad-ranging and appropriately defined and measured. The following outputs should be sought:

- Qualitative insight to support development of metrics
- Quantitative measures of customer preference across value criteria, e.g. via discrete choice experiments
- Quantitative acceptability testing of the plan

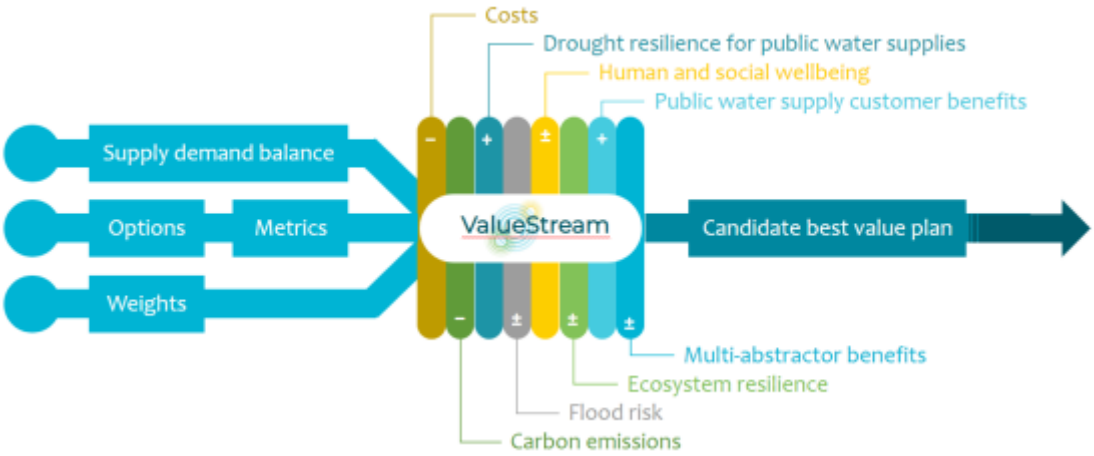
Regional Water Resources Management Plans

Water companies work together in five regional groups to find options to secure long-term water supply and that have wide shared benefits. The regional groups in England produce a water resources plan. According to the (England) National Framework for Water Resources (EA 2020), the plans must "*identify a set of options that provide the best value to customers, society and the environment rather than simply the least cost*". In addition, regional water resources groups should work across companies and sectors to create public value beyond the standards set by the regulator.

The Water Resources West Emerging Regional Plan (released for consultation in January 2022) is consistent with these principles. One of its objectives is to "*deliver positive environmental outcomes, avoid deterioration, increase environmental resilience and promote wellbeing in our communities*" (WRW 2022, p.4). Options that yield the best value are chosen according to a range of metrics of the option's costs and impacts. A

multi-criteria analysis tool (ValueStream) has been developed (Figure 38). The tool operates at the option selection and scheduling level, and includes metric weights directly based on customer stated preference research.

Figure 38: Water Resources West Regional Plan: ValueStream tool



Source: WRW (2022, p.52)

Table 18 shows the eight metrics integrated in the tool. The positive effects (benefits) and negative effects (dis-benefits) are captured in separate metrics to avoid the netting off of such effects. The tool will be used to explore trade-offs between options.

Table 20: Water Resources West Regional Plan: metrics

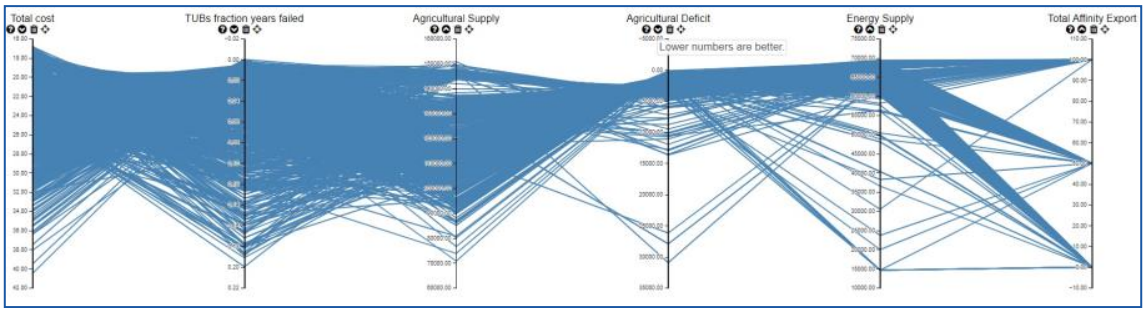
Metric	Definition
Cost	Total net present value
Carbon cost	Total net present value of monetised carbon cost
Public water supply drought resilience	Supply-demand balance charge at 1 in 500 level
Flood risk	Qualitative assessment from Strategic Environment Assessment/Natural Capital Assessment, converted to a linear scale
Human and social wellbeing	Human health, social and economic wellbeing, cultural heritage, and air quality assessments from Strategic Environment Assessment/Natural Capital Assessment, converted to a linear scale
Ecosystem resilience	Biodiversity, habitats, and sustainable natural resource assessments from Strategic Environment Assessment/Natural Capital Assessment
Public water supply customer supply resilience	Customer valuations (willingness to pay) net present value, including supply interruptions and water quality
Multi-abstractor benefits	Water quality and quantity, and water resources from Strategic Environment Assessment/Natural Capital Assessment, converted to a linear scale

The Emerging Water Resources East Regional Plan (for consultation) (WRE 2022) is also consistent with the best value plan approach. The *PolyVis* tool is a decision-support search tool created for stakeholders to provide input into their preferred solutions. The tool includes Pareto-optimal portfolios of (unscheduled) options, assessed on a number of metrics. Some metrics are used to find optimal solutions. Other metrics are tracked by the tool but not used to find optimal solutions (Table 19). Figure 39 shows an example of a tool output, with the performance of the various options assessed against various metrics.

Table 21: Water Resources East Regional Plan: metrics

Key performance metrics (optimised)
■ Supply and supply deficits for energy and agricultural abstraction licence holders
■ Export capacity to Water Resources South East region
■ Capital and operating cost of supply options
■ Levels of service and reliability of public water supply
Other metrics (tracked but not optimised)
■ Capital and operating carbon footprint of supply options
■ Environmental flow indicators at a catchment level
■ Environmental effects of construction and operation of the strategic supply options – positive and negative scores against strategic environmental assessment objectives
■ Natural environment derived services and benefits (Natural Capital approach)
■ Biodiversity units requiring replacement (through Biodiversity Net Gain)

Figure 39: PolyVis tool



Source: WRE (2022, p.53)

The Water Resources South East Emerging Regional Plan (for consultation) (WRSE 2022a) identifies four main areas in which water companies in the region can contribute to create public value:

- Investment in infrastructure to deliver safe and resilient water supplies, contributing to economic growth, jobs, and skills and "*a range of wider benefits for people, communities and the environment*" (p.36)
- Regeneration of the Grand Union Canal, enhancing biodiversity and creating recreational opportunities (cycling, walking, canoeing, and paddle boarding)
- Using water more efficiently, saving energy (as less water needs to be abstracted, treated, moved, and heated), contributing to affordability of water and energy bills,

increasing the security of both water and energy services, and reducing carbon emissions
- Reducing damaging abstraction and promoting nature-based solutions, providing benefits for the environmental and people

The plan will use a visualisation tool that incorporates customer preferences via direct option preference score and metric importance scores. Table 20 is a list of the best value criteria to be used, which are related to the objectives of the plan. Some criteria are constraints within the plan (so the plan must deliver them). This includes meeting the supply-demand balance, reducing leakage by 50% by 2050, achieving levels of abstraction reduction, and increasing resilience to a one in 500-year drought event (WRSE 2022b).

Table 22: Water Resources South East Regional Plan: criteria (WRSE 2022a)

Objective	Criteria
Deliver a secure and wholesome supply of water	■ Meet the supply demand balance ■ Reduce leakage by 50% by 2050 ■ Distribution input per person ■ Customer preference score
Deliver environmental improvement and social benefit	■ Abstraction reduction ■ Environmental disbenefits (Strategic Environment Assessment) ■ Environmental benefits (Strategic Environment Assessment) ■ Enhancement of natural capital value ■ Biodiversity net-gain score ■ Cost of carbon offsetting
Increase the resilience of the region's water systems	■ Resilience to 1 in 500-year drought event (date achieved) ■ Reliability (how well the system can cope with short-term shocks without changing how it performs) ■ Adaptability (how well the system can adapt so it can accommodate short-term shocks) ■ Evolvability (how well the system can be modified to cope with long term trends)
Deliver at a cost that is acceptable to customers	■ Cost ■ Spread of the cost across present and future generations

A2.5 National-level Strategy Documents

The water resources long-term planning framework (Water UK 2016) provides some information on how to value the wider societal effects of droughts (public health and civil unrest). The NetZero 3030 Routemap, a document by Water UK, emphasize environmental aspects and the role of the water industry in achieving net-zero carbon

emissions (Water UK 2020). This includes several objectives such as reducing operational emissions, using renewable energy generation and bioresources, and sequestration through interventions such as peatland and grassland restoration and tree planting.

The Water Strategy for Wales (Welsh Government 2015) sets out the Welsh Government's strategy for the management of water resources and achievement of wider benefits. These include direct support for jobs and green growth, tourism and recreational opportunities (and related well-being and good physical and mental health benefits) in both urban and rural areas, use of water features for educational purposes and improving public appreciation of the need for well-managed water resources. It is also mentioned that community benefits should seek to directly benefit low-income households or people at risk of poverty.

A2.6 Other Water Industry Documents

Ofwat's Future Ideas Lab

Ofwat has set up the Future Ideas Lab, accepting submissions on how the price review system can evolve to meet the challenges faced by the water sector. Some of the submissions suggested ideas related to the creation of public value.

A submission by SIA Partners reviews the state of the art in the water industry around defining, delivering, measuring, and embedding public value, finding an uneven situation (Figure 40). The area with most gaps is measurement. Only three companies reported quantitative metrics of public value delivered from its activities and they do this retrospectively (after delivery), without forecasting or monitoring performance (SIA Partners 2021).

Figure 40: State of the art on public value reporting by water companies

Yorkshire Water's submission addresses the question raised by Ofwat on what could be the role of the price review in encouraging or incentivising companies to better deliver public value. It proposes a notion of public value grounded on the concept of multiple capitals (Figure 41). Customer valuations are needed to estimate the value of some components of social capital. Wider valuations (e.g. from the literature) estimate the value of human capital and other components of social capital. The submission also proposes incentive rates to create wider value, while ensuring a minimum level of service in key areas (Yorkshire Water 2021).

Figure 41: Value estimation and capital

In another submission, United Utilities and The Rivers Trust (2021) proposed nature-based solutions as key to derive wider (environmental) benefits in the sector, giving as examples biodiversity, tee plantation, reduced flood risk, and carbon reduction.

A2.7 Government Guidance on Public Value

Social Value Act

The UK government has embedded public value as an objective within public sector procurement as part of the Public Service (Social Value) Act 2012 (UK Parliament 2012, Cabinet Office 2012)), applicable in England and Wales. This legislation recommends commissioners to think not in terms of "lowest cost" but in terms of "value for money", considering how alternative proposals improve "*the economic, social and environmental well-being of the relevant area*" The Procurement Reform (Scotland) Act has similar recommendations (Scottish Parliament 2014).

In a survey implemented as a part of a review of the Social Value Act (Cabinet Office 2015), the majority of respondents thought that the Act brought wider benefits to their local area, such as local employment (83%), use of local businesses in the supply chain (70%), financial investment (66%), and environmental improvements (66%). However, it also found that measurement of public value was not sufficiently developed (in terms of consistency and rigour). As such, it is difficult for organizations to compare public value provided by two alternatives.

The Social Value Model sets out then government's public value priorities for procurement (GCF 2020a, 2020b), according to five themes and eight related policy outcomes. A number of metrics is also recommended (Table 21).

Table 23: Social Value Model: themes, policy outcomes, and metrics

Themes	Policy outcomes	Metrics
COVID-19 recovery	Help local communities to manage and recover from the impact of COVID-19	■ Number of full-time equivalent employment opportunities created for those who were made redundant due to COVID-19. ■ Number of people-hours spent supporting local community integration, such as volunteering and other community-led initiatives related to COVID-19 ■ Number/% of companies in the supply chain to have implemented the six standards in the Mental Health at Work commitment.
Tackling economic inequality	Create new businesses, new jobs and new skills	■ Number of full-time equivalent employment opportunities created ■ Number of apprenticeship/training opportunities created or retained ■ Number of people-hours of learning interventions delivered
	Increase supply chain resilience and capacity	■ For start-ups, SMEs, VCSEs; and mutuals: number/value of contract opportunities awarded; total spend under the contract, as % of the overall contract spend. ■ Number/% of companies in the supply chain with Cyber Essentials/ Cyber Essentials+ certification/have adopted the National Cyber Security Centre's 10 steps [where relevant]
Fighting climate change	Effective stewardship of the environment	■ Number of people-hours spent protecting and improving the environment under the ■ Number of green spaces created ■ Annual reduction in emissions of greenhouse gases (metric tonnes carbon dioxide equivalent) ■ Annual reduction in water use (litres) ■ Annual reduction in waste to landfill (metric tonnes)
Equal opportunity	Reduce the disability employment gap	■ Number/% of disabled people employed ■ Number/% of disabled people on apprenticeship schemes ■ Number/% of disabled people on other training schemes
	Tackle workforce inequality	■ Number/% of people from groups under-represented in the workforce employed ■ Number/% of people from groups under-represented in the workforce on apprenticeship schemes ■ Number/% of people from groups under-represented in the workforce on other training schemes
Wellbeing	Improve health and wellbeing	■ Number/% of all companies in the supply chain to have implemented measures to improve the physical and mental health and wellbeing of employees. ■ Number/% of all companies in the supply chain to have implemented the six standards in the Mental Health at

		Work commitment ■ Number/% of all companies in the supply chain to have implemented the mental health enhanced standards, for companies with more than 500 employees, in Thriving at Work.
	Improve community cohesion	■ Number of people-hours spent supporting local community integration, such as volunteering and other community-led initiatives

The National TOMs (Themes, Outcomes and Measures) is a framework developed by the Social Value Taskforce for measuring and reporting public value according to the Public Service (Social Value) Act 2012 (NSVT 2019, SVP 2021). It defines standards for measuring public value, referring to a set of 5 themes, 18 related policy outcomes, and 35 measures (each with a financial proxy) (Table 22). The proxies were developed from adaptations of cost benefit analysis and appraisal techniques as outlined in public-sector guidelines. The degree of robustness of the proxies is indicated in the guidance documents.

Table 24: National TOMs (SVP 2021)

Themes	Outcomes	Measures
Jobs: promote local skills and employment	More local people in employment	■ No. of local direct employees hired or retained ■ % of local employees
	More opportunities for disadvantaged people	■ No. of employees who are long term unemployed ■ No. of employees who are Not in Employment, Education, or Training ■ No. of employees who are rehabilitating or ex offenders as a result of a recruitment programme ■ No. of disabled employees ■ No. of hours of support into work provided to. unemployed people through career mentoring
	Improved skills for local people	■ No. of staff hours spent on local school and college visits ■ No. of weeks of training opportunities ■ No. of weeks of apprenticeships
	Improved employability of young people	■ No. of hours of support into work provided to unemployed people through career mentoring ■ No. of weeks spent on meaningful work placements or pre-employment course; student placements ■ Meaningful work placements that pay Minimum or National Living wage according to eligibility (internships)
Growth: supporting growth of responsible regional business	More opportunities for local MSMEs and VCSEs	■ Total amount (£) spent with VCSEs within the supply chain ■ Provision of expert business advice to VCSEs and MSMEs ■ Equipment or resources donated to VCSEs (£ equivalent value) ■ Number of voluntary hours donated to support VCSEs ■ Total amount (£) spent in local supply chain

		■ Total amount (£) spent through contract with local micro, small and medium enterprises
	Improving staff wellbeing and mental health	■ No. of employees that have been provided access for at least 12 months to comprehensive and multidimensional wellbeing programmes ■ Mental Health campaigns for staff on the contract to create community of acceptance, remove stigma around mental health ■ Equality, diversity and inclusion training provided both for staff and supply chain staff
	Reducing inequalities	■ Number and type of initiatives to be put in place to reduce the gender pay gap for staff employed ■ % of staff on contract that is paid at least the relevant Real Living wage ■ % of contractors in the supply chain to pay at least Real Living wage
	Ethical procurement is promoted	■ % of procurement contracts that include commitments to ethical employment practices in the local and global supply chain. ■ Initiatives taken throughout the local and global supply chain to strengthen the identification, monitoring and reduction of risks of modern slavery and unethical work practices
	Social Value embedded in the supply chain	■ % of contracts with the supply chain on which Social Value commitments, measurement and monitoring are required
Social: healthier, safer and more resilient communities	Creating a healthier community	■ Initiatives taken or supported to engage people in health interventions or wellbeing initiatives in the community
	Vulnerable people are helped to live independently	■ Initiatives to be taken to support older, disabled and vulnerable people to build stronger community networks
	More working with the community	■ Donations or in-kind contributions to local community projects ■ No. of hours volunteering time provided to support local community projects
Environment: protecting and improving our environment	Climate impacts are reduced	■ Savings in CO2 emissions achieved through de-carbonisation ■ Existence of a policy and programme to achieve net zero carbon ■ Carbon Certification achieved
	Air pollution is reduced	Corporate travel schemes available to employees
	Safeguarding the natural environment	Donations or investments towards expert designed sustainable reforestation or afforestation initiatives

	Sustainable procurement is promoted	■ % of procurement contracts that include sustainable procurement commitments or other relevant requirements and certifications ■ Supply Chain Carbon Certification achieved ■ Requirements for suppliers to demonstrate climate change and carbon reduction training for all staff
Innovation: promoting social innovation	Social innovation to create local skills and employment	■ Innovative measures to promote local skills and employment
	Social innovation to create local skills and employment	■ Innovative measures to promote and support responsible business
	Social innovation to enable healthier safer and more resilient communities	■ Innovative measures to enable healthier, safer and more resilient communities
	Social innovation to safeguard the environment and respond to the climate emergency	■ Innovative measures to safeguard the environment and respond to the climate emergency

Appraisal guidance

The Green Book is HM Treasury's general framework for appraisal of policies, programmes, and projects (HMT 2022). It includes recommendations on how to assess some aspects of public value (e.g. public goods, positive or negative externalities). The most recent version of the Green Book states, as a principle of appraisal, that "s*ocial or public value […] includes all significant costs and benefits that affect the welfare and wellbeing of the population, not just market effects. For example, environmental, cultural, health, social care, justice and security effects are included*" (p.5). Furthermore, these wider costs and benefits can be monetisable, quantifiable but not monetisable, or qualitative unquantifiable (p.41).

The Green Book suggests using valuation methods such as revealed preference, stated preference, and wellbeing approaches (p.59) where market prices are not available. Specific approaches and values are recommended for some types of benefits (Appendix A1). Of relevance to this review are:

- Recreational value of the natural environment - It is recommended to use the ORVal Tool (http://leep.exeter.ac.uk/orval) to model the visitation rates and recreational welfare benefits provided by creating or altering accessible green space. Additional values are provided by ENCA (Enabling Natural Capital Approach) documentation (see below)

- Local amenity, and physical and mental health benefits of green space - Values are provided by the ENCA documentation
- Nature-based carbon reduction - Values are provided by the ENCA documentation
- Biodiversity - Valuation guidance is still in development. However, the Green Book recommends that, to avoid double counting, biodiversity should only be valued where it directly affects human wellbeing and where it is additional to other benefits (e.g. recreation, amenity).

The ENCA documentation mentioned above is supplementary guidance to the Green Book, detailing how to incorporate natural capital into appraisal, considering the value for people and the economy (DEFRA 2021). Two databooks (ENCA Services and Assets Databooks) collage data sources, tools, and economic valuation studies.

Other documents

The Infrastructure and Projects Authority "*Roadmap to 2030*" paper (IPA 2021) sets out a vision for infrastructure delivery emphasising wider benefits for people and nature. Focus area 1 of this roadmap is delivering infrastructure to drive improved outcomes for people and nature. According to the document, the starting point for interventions in the built environment is "*defining and incorporating strategic outcomes (that address a range of societal challenges*" (p.13). However, the document does not specify elements of public value or metrics to assess them.

A2.8 Guidance from Professional Associations and Think-tanks

In recent years, several professional associations and think-tanks have produced papers and frameworks for measuring and maximising public value in infrastructure projects. Others have produced decision-support tools and databases.

Papers

The UK Green Building Council has released a paper (UKGBC 2021) arguing that the definition of public value should refer to an identified group of people impacted and a set of agreed outcomes that would improve their quality of life (Figure 42).

Figure 42: Outcomes associated with public value (UKGBC 2021)

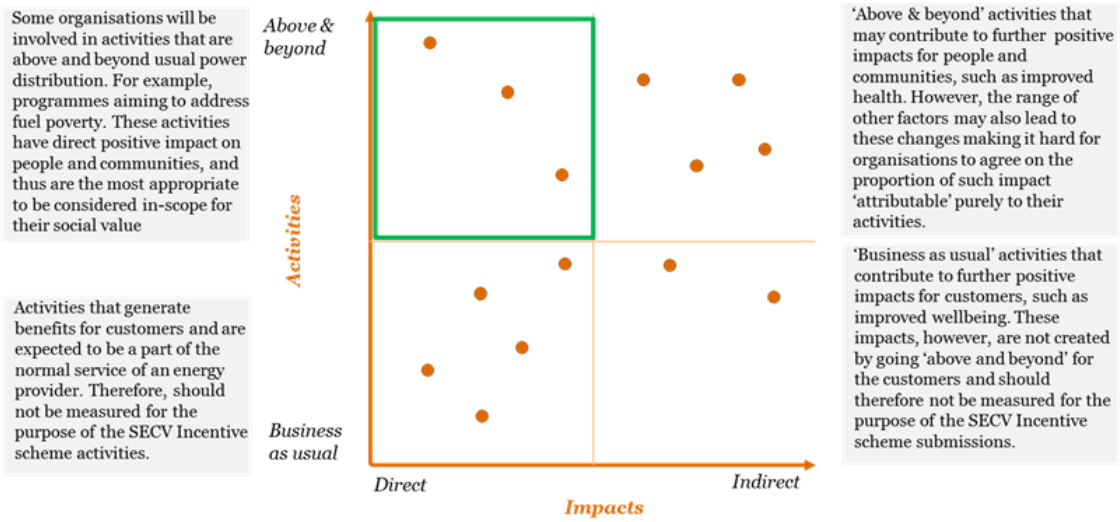
Social	Economic	Environmental
Community networks	Employment	Sustainable transport options
Community engagement	Skills	Green spaces
Local identity	Small businesses	Air quality
Diversity of building uses	Affordable housing	Resource use and waste
Security and safety	Physical resilience	Biodiversity & urban greenery
Public spaces	Accessibility	Warm, damp-free housing

A PwC study for Western Power Distribution (PwC 2017) reviewed best practice and presented qualitative evidence (from interviews to key institutions) to drawn out principles for public value measurement. The elements of public value are related to three types of impact from organisation's activities:

- Social impact: health, education, community cohesion
- Environmental impact: use of natural resources and emissions to air, land and water
- Economic impact: economic growth (output or value added), associated changes in employment, contribution to public finances (taxes on profits, people, production, property and environmental impact)

According to this report, public value can be defined as the activities outside the usual remit of an organisation that generate direct benefits on people and communities (green box in Figure 43). Some activities outside the usual remit generate benefits but it is difficult to isolate the part of those benefits directly affected by the company's activities.

Figure 43: Potential scope of public value (PwC 2017)



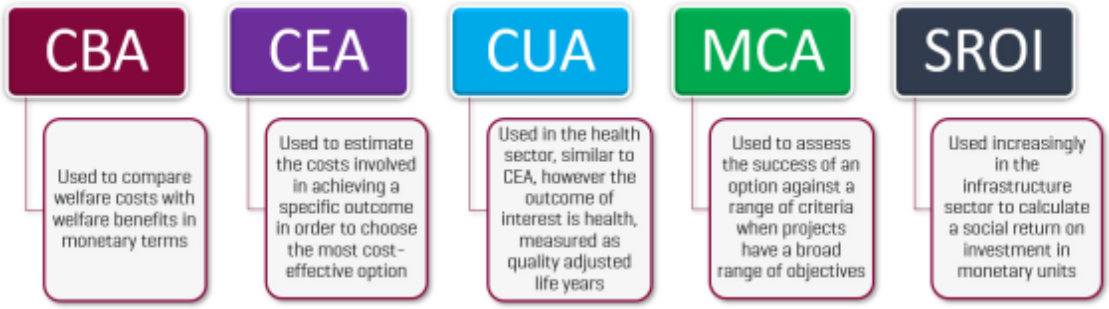
A paper by the Institute for Civil Engineers (ICE 2020), based on quantitative and qualitative research, argues that public value should go "*beyond just delivering employment, apprenticeships and SME involvement during construction*" to encompass other ways in which infrastructure can "*improve the lives of local people and deliver multiple benefits*" (p.vi). For example, "*infrastructure projects can create jobs for previously unemployed people, nurture specialist supply chains, improve local air quality and the urban environment, remove barriers to social inclusion, and ultimately increase the well-being of individuals and communities*" (p.3). The paper states that, currently, public value is mainly considered during the procurement and construction stages, missing opportunities at the strategic brief and design stage. One of the main barriers to deliver public value is the inconsistency of definition and measurement methods.

Finally, a paper by the Royal Institution for Chartered Surveyors (RICS 2020) identifies elements of public value associated with infrastructure projects (Figure 44). The paper also reviews five main approaches to measure public value (Figure 45): Cost-Benefit Analysis (CBA), cost-effectiveness analysis (CEA), cost-utility analysis (CUA), multi-criteria analysis (MCA), and social return on investment (SROI).

Figure 44: Elements of public value (RICS 2020)

Wider societal	Environmental
• Improved mental and physical health	• Reduced carbon emissions
• Improved local environment	• Improved air quality
• Reduced crime	• Reduced noise pollution
• Reduced congestion	• Increased biodiversity
• Improved social relations	• Wildlife protection
• Enhanced skills and knowledge	• Increased renewable energy
• Sustained employment	• Reduced energy use
• Better workplace safety	• Reduced waste
• Fairer distribution of benefits	• Reduced water use

Figure 45: Approaches to measure public value (RICS 2020)



Frameworks

Social Return on Investment is a framework to value the wider benefits generated by an organization or project. In 2012, the SROI Network (now Social Value UK) issued a step-by-step guide to this method (SROI 2012). The stages of the method are:

- Establishing scope and identifying stakeholders
- Mapping outcomes (how the business activities use inputs to deliver outputs which result in outcomes for stakeholders)
- Evidencing and valuing outcomes (finding data to show whether outcomes have happened and then valuing them)
- Establishing impact (assessing whether the outcomes result from the business activities)
- Calculating the Social Return on Investment (comparing net benefits with investment)
- Reporting, using, and embedding

Despite the growing popularity of Social Return on Investment, according to RICS (2020) and Fujiwara (2015), this framework does not define public value in a consistently measurable way, such as impacts on people's wellbeing or quality of life.

The Social and Human Capital Protocol (SHCC 2019) is a framework to identify, measure, and value direct and indirect impacts of businesses on social and human capital. The framework was developed based on input from businesses, experts, and public consultation. The protocol also includes a list of relevant social and human capital issues (Table 23). Other examples are provided in Figure 46. The protocol details a series of steps to integrate social and human capital considerations in business. The steps are similar to the Social Return on Investment steps. Of relevance to this report are the steps to:

- Define the pathway between the business activities and the impacts.
- Measure the changes in human and social capital
- Value the impacts (using qualitative, quantitative, or monetary valuation methods)

Figure 46: Examples of businesses' human and social capital impacts (SHCC 2019)

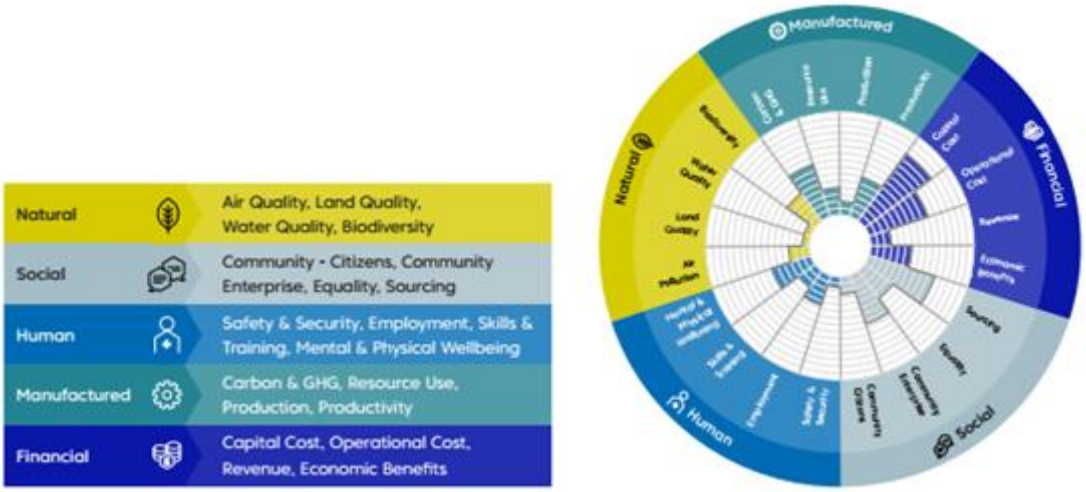
Table 25: Relevant social and human capital issues (SHCC 2019)

Employment and remuneration
Inclusion and diversity
Skills and knowledge
Health and safety
Labour relations
Value chain relationships
Access to essential services
Personal security in the workplace and the community
Privacy
Access to land and culture
Physical and economic freedom of movement
Law and order

Tools and databases

The Construction Innovation Hub developed a Value Toolkit, including decision-support tools to deliver measurable value improvement (CIH 2020). The rationale is that a broad range of metrics needs to be considered to account for economic, social, and environmental factors across an investment lifecycle. Some tools build a "value profile" for an investment, based on a set of metrics (Figure 47). Other tools measure performance through the investment lifecycle.

Figure 47: CIH Value toolkit: value profile (CIHT 2020)



The Rail Social Value Tool, provided by Rail Safety and Standards Board Limited and Loop (RSSB 2021) is a decision-support tool (and related guidance) to measure public

value in the rail industry. Twelve areas of impact were identified, (Table 24), along with 520 indicators, 239 of them monetised. The tool calculates Social Return on Investment.

Table 26: Impact areas defining public value (RSSB 2021)

Objective	
Employment, training, and skills	Apprenticeships created/retained; job creation; job loss; jobs safeguarded; local employment; local recruitment; graduates; internships; mentoring; in-work training; learning interventions; work experience sessions; work trials; kickstart
Educational attainment	Early engagement interventions; educational/curriculum support/ work experience placements/sessions
Supply chain resilience	Management of environmental and social risk; sustainability capability; cyber essentials; supply chain collaboration
Supply chain capacity	Inclusive procurement; local supply; SMEs; start-ups; VCSEs; mutuals; business development support
Rail accessibility	Diversity impact assessments; inclusive design features; staff disability awareness training; disabled passenger experience; stakeholder engagement in design of assets/services; support for people to travel; increased access
Workforce equality, diversity and inclusion	Employment and training of people with disabilities; Employment & training of other under-represented groups; diversity reporting; financial inclusion; employee satisfaction, participation & contribution; equal pay; modern slavery risk management; five foundational principles of good work
Community and charity	Charitable/community volunteering; participation in & access to heritage/art; community initiatives; community use of space/facilities; considerate construction and maintenance; experience of crime/vandalism; fundraising; in-kind donations; station adoption initiatives
Stakeholder engagement and customers	Commercial estate customer satisfaction; complaints management; stakeholder engagement and consultation
Safety, health and wellbeing	Community health and wellbeing; physical activity and active transport; rail safety engagement; secure station accreditation; infrastructure features to prevent harm; staff interventions to prevent harm; staff training to prevent harm; station improvements
Economic development	Townscapes; housing stock change; non-residential space; development impact; visitor spend; match funding
Climate and environment	Carbon; climate adaptation; biodiversity; air quality; noise; light; green and public spaces; waste; water; townscapes
Covid-19 recovery	-

Finally, the Housing Associations Charitable Trust (HACT) developed the UK Social Value Bank (https://hact.org.uk/tools-and-services/uk-social-value-bank), a set of tools to help social housing organisations to measure their social impact.

A2.9 Expert Views on Public Value

Public value has been a topic of general interest in recent years, and object of independent position papers by researchers and institutions. For example, there is increased interest among experts on the role of public value as one of the goals of private companies. Mayer (2018) argues that limiting negative impacts on society and the environment is not enough. Companies should proactively find opportunities to create positive impacts. Mazzucato and Ryan-Collins (2019) have a similar view for the public sector, rejecting a "market failure" framework and defining public value as something created by public and private sector actors co-shaping markets in line with public purpose.

Cave and Wright (2021) argue that public value is particularly relevant in the water industry because of the diversity of potential wider impacts (public health, environmental impacts, climate change and resilience, community impacts, distributional impacts) and because the regulator (Ofwat) has been "*a pathbreaker in requiring its regulatees to define their wider purposes and show that they are pursuing them*" (p.8). Cave and Wright (2021) also argues for a decentralized approach to public value, in which public value should be identified by companies in collaboration with the public, not by the regulator. The role of the regulator would be to support and incentivise the companies in pursuing public value. In addition, the authors argue that the diversity of public interests is not always represented by the "public as customers" and suggest the use of citizen juries.

Some of these ideas are also present in the report on the measurement, management and growth of public value published by Nesta, an innovation foundation (Mulgan et al 2019). The document stresses the need for more explicit measurement of value, using credible evidence and robust methods, complemented with deliberative methods such as citizen juries. Some principles are also proposed for measuring value, the two most relevant for this review are:

- "something should only be considered valuable if citizens - either individually or collectively - are willing to give up something in return for it" (p.37).
- Metrics of value should be comprehensible and plausible to the public, and not only to specialists - "if it doesn't help to educate the public about choices, and to enrich the democratic process, then it's likely at some point to be rendered irrelevant by raw politics" (p.38).

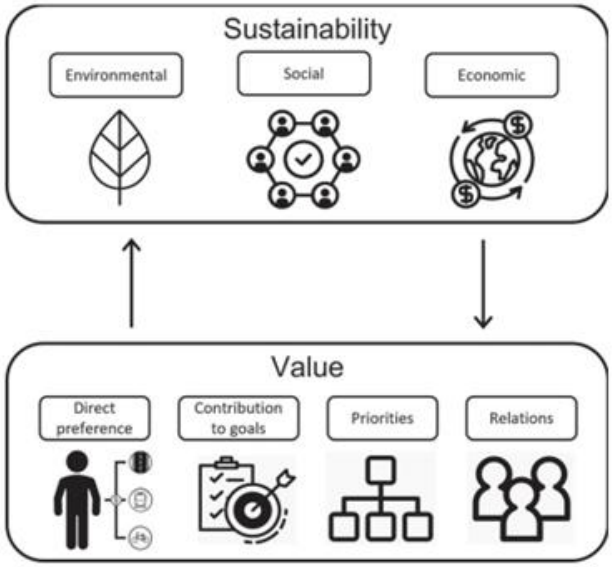
The importance of customer and citizen views is also emphasized by Sustainability First (2021). This is a discussion paper with general recommendations on how engagement can maximise public value in the water and energy sectors. It recommends that companies, regulators, and public interest groups should agree on 'social return on investment' metrics to identify public value and provide transparency about the trade-offs made in decision-making. In addition, there is a need to:

- engage people as citizens and not just as customers, especially in the case of assessment of preferences regarding flood resilience.
- embed the preferences of future consumers in decision-making

Zuluaga et al (2021) propose a framework for value in infrastructure that is related to (economic, social, and environmental) sustainability (Figure 48). The value can be conceptualised in four different ways (following Tadaki et al 2017):

- As a magnitude of preference that an individual or a group has for an alternative or attribute relative to others - this is the concept underlying the willingness-to-pay approach.
- As the contribution of an action or object to user-specified goals, objectives, or conditions - this assumes that the overall preference of a group may differ from the aggregation of individual preferences (the case, for example, of greenhouse gas emissions)
- As individual priorities or values (i.e. drivers behind individuals' actions and decisions). According to Zuluaga et al (2021) this is the concept closer to the notion of public value, i.e. "*the collective aspirations that should guide public decisions and operations*" (p.5).
- As relationships between communities or individuals with their environment (i.e. value does not arise from individuals, community, or the environment itself)

Figure 48: Conceptual framework of value and sustainability (Zuluaga et al 2021)



A2.10 Conclusions

General conclusions

The steer being given to water companies for the development of water resources options is that opportunities to achieve public value should be sought, that their value should be measured, and that options that maximise public value should be implemented, provided that customers are willing to pay any excess costs that the wider public value opportunities impose.

This is consistent with the increased attention to public value in the water sector, such as guidance regarding the development of best-value water resources management

plans, and other general guidance issue by the regulator and other institutions. Other sectors (e.g. energy, construction, rail travel) have also developed frameworks for public value measurement. There is also increased interest in public value at the national level, as shown in the Social Value Act and in frameworks developed to apply the principles set in that legislation.

Nevertheless, several documents mention that currently, public value is not fully embedded in the companies' culture, and public value reporting is uneven. In other sectors, public value thinking is still restricted mostly to the procurement and construction stages.

Ofwat public value guidance includes the key principles that 1) opportunities for public value should be explored, and 2) customer willingness to pay needs to be demonstrated. The RAPID guidance on Strategic Resource Options in the water sector is brief, but is clear that there needs to be a consistency between Gate Two submission and water resources management plans in terms of best value and solution benefits.

What is included in public value?

Most guidance documents lists the high-level types of public value that companies should deliver. These types are in most cases split into three main groups: economic, social, and environmental. Table 25 synthesizes the information reviewed in this chapter, listing the public value benefits mentioned in guidance documents that are most directly applicable to the case of Strategic Resource Options in the water sector. Environmental aspects are the ones mentioned more often in guidance documents.

Table 27: Public value benefits most applicable to Strategic Resource Options in the water sector

Economic	Social	Environmental
■ Economic growth ■ Jobs ■ Training	■ Human health ■ Well-being ■ Recreation ■ Cultural heritage ■ Community cohesion	■ Biodiversity ■ Carbon emission reductions ■ Flood risk ■ Air quality ■ Landscape ■ Green space

How should it be delivered?

Engagement with customers, citizens, and stakeholders is emphasized in all guidance documents. The public value sought by companies should reflect what society wants (and is prepared to give up something in return for it).

However, it is mentioned in several documents that delivering public value cannot compensate for shortcomings in the delivery of the core services provided by the water companies.

How should it be measured?

Guidance document emphasize the need for robust evidence on the effects of all options, and recommend monetizing (expected) public value where possible. The development of multi-criteria decision analysis is recommended. Companies should also provide a balanced view of the public's priorities. Customer valuations are recommended. Databooks such as those included in the ENCA (Enabling Natural Capital Approach) framework can also be used.

The Water Companies' regional plans already include a series of metrics. Other possible metrics can be found in more general guidance (e.g. National TOMs).

A3. Perceptions and Preferences

This chapter is a review of the literature on perceptions and preferences regarding public value in the UK water industry.

A3.1 General Views

Water Resources East has recently commissioned customer engagement work to understand perceptions and preferences regarding water resources management and delivering a best value plan (Blue Marble 2021). The research used qualitative methods and included households and non-household customers, and other stakeholders.

The principle of a best value plan was accepted by participants - it is necessary to consider wider environmental implications of business e.g. contribution to achieving net zero emissions. However, consumers do not necessarily agree with the idea of this plan affecting bills directly.

Participants also want companies to prioritise the core business activities (protection of environment, managing flood risk, drought resilience) over public value (local economy, consulting customers, public amenities). This is clear from Figure 49, which shows the participants preferred 'best value plan' objectives.

In addition, participants support restoring past environmental damage but not necessarily improving environments due to cost implications.

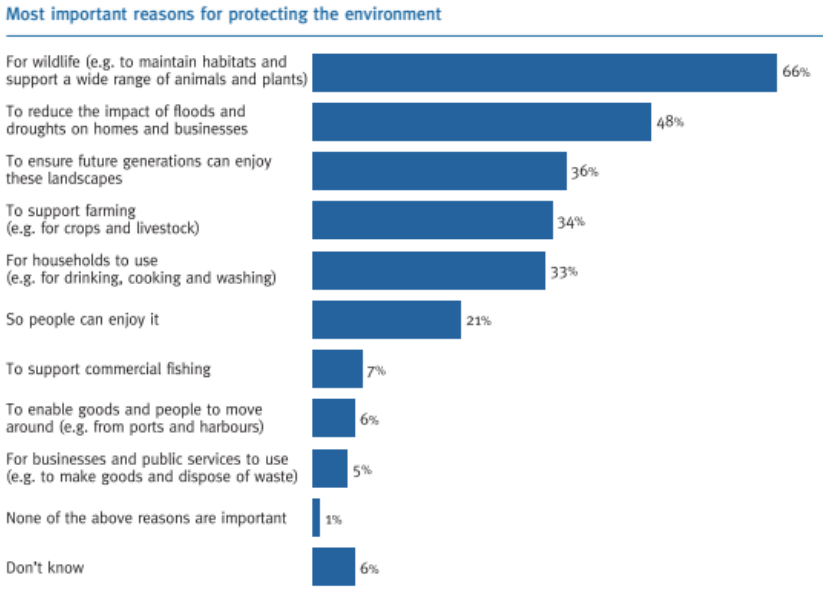
Figure 49: Preferred 'best value plan' objectives (Blue Marble 2021)

Objective	% of Top 4 Best Objectives
Affordable water bills over the long term	70%
The most from what we have (reducing leakage, encouraging customers to use less)	68%
A plan that that is adaptable in case of new/emerging conditions	65%
Ambitious targets to reduce carbon emissions and use renewable energy	49%
Better natural habitats: supporting wildlife & biodiversity	44%
A reduction in flood risk to communities	40%
Higher levels of resilience to drought (reducing the risk of emergency measures)	39%
Creating attractive water environments for recreation and wellbeing	17%
What regional organisations, businesses and consumers say they want	6%
Job creation and benefits to the local and regional economy	5%

In 2013, the Environment Agency initiated a public dialogue on Significant Water Management Issues to assess public views to be fed into the updated River Basin Management and other Water Framework Directive commitments. The initiative included seven public dialogue workshops involving 119 members of the public and a survey with 867 participants (EA 2014). The initiative produced some results on what people value and on what they perceive as societal benefits from the water environment.

Workshop participants generally identified the inter-relatedness of the benefits provided by water and "*there was some frustration about trying to separate the benefits from each other*" (EA 2014, p.19). In addition, the general view in scenario deliberations was that it was very difficult to balance the many different factors that must be taken into consideration. However, economic factors were considered important in decision-making. For example, wildlife and bathing water quality were considered important factors because of their impact on tourism, employment, and the local economy, rather than their intrinsic value. The survey showed that environmental aspects are also important: 84% consider protecting the environment to be important. The main reasons were to protect wildlife and to reduce the impact of floods and droughts (Figure 50).

Figure 50: Reasons for protecting the water environment (EA 2014)



A3.2 Specific Types of Schemes

A few studies have looked at perceptions and preferences about flood management schemes. D'Sousa et al. (2021) assessed public perceptions related to flood management schemes. The study involved participants sorting images of different types of schemes into three piles, representing the best, neutral, and the worst options for flood risk management, thinking about appearance, benefits to wildlife and effectiveness as a flood risk management scheme. The main result was that even though the public perceived natural flood management schemes to be less effective to mitigate flooding than natural flood management, it generally held favourable attitudes towards the latter because of its association with attractiveness and benefits to wildlife. The authors suggest that highlighting the attractiveness and wildlife benefits in public communications could improve the public acceptance of natural flood management schemes. However, the study found a high degree of heterogeneity among preferences of different individuals.

Williams et al. (2019) also found a preference for natural flood management options based on the expected benefits in terms of green space and wildlife habitat.

Lamond and Everett (2019) found that the inclusion of features targeted at leisure and recreation in natural flood management areas improved people's willingness to contribute to the maintenance of the areas.

A3.3 Conclusions

There is little evidence on public perceptions and preferences about public value in the water industry in the UK. There is also no evidence on customer willingness to pay for initiatives that add public value.

The existing evidence suggests that customers welcome the idea of a best value plan, with some caveats: the priority should be to prioritise the core services provided by water companies. There is some evidence on concern about environmental issues.

A4. SRO Gate One Submissions

A4.1 Introduction

This chapter focuses on the Gate One submissions for the eleven specific Strategic Resource Option schemes that are the focus of the present study, looking at the expected impacts each scheme will have, the options for public value, and relevant results on customer engagement in relation to public value.

A4.2 Strategic Resource Options

Table 26 shows the description of the eleven Strategic Resource Option schemes and the documents reviewed for each scheme.

Table 28: Strategic Resource Options (SRO)

Name and reference	Description	Gate One submission document (*): other documents reviewed
Minworth	A source of raw water flow augmentation to support the Severn to Thames Transfer SRO and/or the Grand Union Canal SRO, or a combination of the two	Affinity Water and Severn Trent (2021)
Grand Union Canal	Use existing canal infrastructure to transfer treated wastewater from Minworth in the Midlands to Affinity Water in Hertfordshire and North West London.	Affinity Water, Severn Trent, and Canal & River Trust (2021)
London Reuse	Four potential schemes. Abstracted effluent or sewage would be treated through an Advanced Water Recycling Plant, or a Tertiary Treatment Plant and discharged to the River Thames or the River Lee Diversion respectively where it can be abstracted as a raw water resource	Thames Water (2021)
South East Strategic Reservoir	Raw water reservoir in Oxfordshire providing storage and a resilient supply of raw water to the River Thames during periods of low flow, for release and subsequent re-abstraction in London or for transfer to other water companies in the south-east.	Affinity Water and Thames Water (2021) (*) Jacobs (2020)
Thames to Affinity Transfer	Raw water transfer. Three possible 'corridors': the fluvial Thames; West London Re-use; East London Re-use. All would include new treatment works and conveyance routes.	Thames Water and Affinity Water (2021a) (*) Thames Water and Affinity Water (2021b)
Southern Water Recycling	An alternative to Fawley desalination in Southern Water's Water Resources Management Plan, which could provide up to 61 million litres of water per day	Southern Water (2021)
Anglian to Affinity Transfer	Transfer of water from the Anglian Water region to supply Affinity Water customers. Options for source water are the proposed South Lincolnshire Reservoir, the proposed Fens Reservoir and the River Trent.	Anglian Water and Affinity Water (2021a)
South Lincolnshire	A regional water resource solution in the Anglian Water region to support supply to Anglian Water customers and	Anglian Water and Affinity Water (2021b)

Reservoir	Affinity Water customers via the associated Anglian to Affinity transfer solution.	(*) MottMacDonald (2021)
The Fens Reservoir	Solution in the Anglian Water region to support supply to Anglian Water and Cambridge Water, with a possibility to also support Affinity Water via the Anglian to Affinity transfer solution. Water would be abstracted from the Ouse catchment when river flows allow and transferred to a newly constructed reservoir in the Fens	Anglian Water and Cambridge Water (2021)
Thames to Southern Transfer	Water transfer from the Thames Water area to Southern Water's Hampshire area, improving resilience to the South East region through better connectivity. There is not currently surplus water in Thames Water resource zones and therefore a new source of water will need to be developed (the Severn Thames Transfer and/or South East Strategic Reservoir Option).	Thames Water and Southern Water (2021)
Severn Thames Transfer	A raw water transfer, up to 500Ml/d, from the River Severn into the River Thames to support the South East of England during drought events. The water would be provided from the River Severn itself, with additional sources of water provided by Severn Trent Water and United Utilities, if needed.	Severn Trent Water, Thames Water, and United Utilities (2021)

A4.3 Public Value References (High-level)

Table 27 shows all the references made to public value in the submission documents, split into three main groups: economic, social, and environment. The table shows only references to high-level types of public value. The numbers in bold are the sections of the submission document where the reference is made. As shown, most of the public value potential is environmental, with flood risk, biodiversity/habitats, and carbon reductions mentioned in several documents. Social aspects are mainly improved recreation potential. The main economic benefit is job creation.

Table 29: Strategic Resource Options: references to public value in Gate One submissions

	Public value		
	Economic	Social	Environmental
Minworth	"increased **employment** through construction and the operational phases of the project" **[5.24]**		"reducing the **flood risk** where construction intersects with current areas of known flood risk" **[5.24]**

Grand Union Canal	"Additional **employment** opportunities, particularly around the Minworth WwTW site and the abstraction points" [5.25] "**economic benefit** where the new works reduce the risk of flooding" [5.25]	"**Leisure boating** at specific locations, where an increase in water levels on the GUC may lead to less risk of unplanned canals closures during dry spells." "Wider **recreation** benefits arising from improved access and facilities" [5.25]	"interventions within the design and construction of the routes could reduce **flood risk**" [5.25] "Benefits associated with flow support into designated sites and areas of **wildlife habitat**" [5.25] "**biodiversity enhancements** associated with improvements to banks along the route, and measures included in the designs around lock upgrades or bank raising" [5.25] "**Thermal energy abstraction** associated with additional flows and potentially occurring all along the canal or pipeline route." [5.25]
London Reuse	"Creation of local **jobs** during construction and operation" [5.19]		"Potential for offsite **habitat enhancement** and resulting increase in NC and ecosystem service provision".[5.19] "Improved dissolved **oxygen concentration** in the upper tideway" [5.19]
South East Strategic Reservoir		"Visitor facilities for water and land based recreation and amenity, education facilities would contribute to improved **health and wellbeing** from recreation, access to new greenspace, as well as opportunities for community cohesion. [5.2] "The reservoir presents a significant asset in terms of **recreation**, water resource, attracting development and increasing tourism potential in the local and wider area" [5.2]	"**Biodiversity** (Major Beneficial) - Delivered through a commitment to Biodiversity Net Gain and the provision of habitat creation, including grassland and aquatic habitat of a higher nature conservation value than those lost." [5.2] "increase **resilience of the environment** by having capacity to release water into river during low flow and drought conditions and may indirectly help reduce abstraction in more vulnerable areas that would be exacerbated by drought conditions." [5.2] "**Landscape** (Moderate beneficial) - Landscape-led design and mitigation strategy ensure embedded mitigation, good environmental design integration, and an environmentally sustainable development that will contribute to an overall improvement in the landscape surrounding the reservoir." [5.2]

Thames to Affinity Transfer		"Providing programmes on water at local **educational** facilities" [2.13]	"**habitat compensation**, creation and/or species relocation schemes. (…) opportunities for **amenity and biodiversity improvement** through habitat creation, extensions or changes to public rights of way networks and improvements to existing habitats as part of reinstatement." [10.9]
Southern Water Recycling			"Contribution to net **biodiversity** gain" [5.1.3.1] "Wider environmental benefits of **restored habitat**, such as carbon sequestration, air and water purification" [5.1.3.1] "**carbon sequestration** effect of habitat re-creation" [5.1.3.1] "Habitat restoration within the near National Parks could create wider social benefits, such as improved **visual amenity**" [5.1.3.1]
Anglian to Affinity Transfer		"Opportunities for reinstating land to achieve potential positive community effects… for example, by improving access to **recreational and open space** and improving access to **community resources**." [4.6]	"Opportunities for compensatory **habitat** creation or habitat reinstatement should be explored, as well as opportunities to improve the existing habitats and provide offsetting planting of trees." [4.6]

South Lincolnshire Reservoir	"Increased access to water for **agriculture**" [5.7] "**Economic growth** enabled by increased water supply" [5.7] "**job** creation" [5.7]	"Potential **tourist and leisure** destination" [5.7] "Enhanced **access and connectivity** – recreational provision of footpaths, cycle paths and nature trails will provide positive opportunities for the local community and other visitors." [5.8] "Visitor centre/outdoor recreation hub – multi-use venue that can both serve on-site **recreational** activities, school visits, corporate workshops and serve as a **community** hub." [5.8]	"enhanced **biodiversity** in the region and habitat creation; **carbon sequestration**; and **navigation**." [5.7] "**habitat** compensation, creation and/or species relocation schemes" [5.7] "Wetland creation – creation helps promote **ecological benefits**, restore wetland landscapes and promote sustainable development" [5.8] "Floating island **ecosystems** – riparian ecosystems are critical for many species of fish and aquatic life which can provide a measurable increase towards Biodiversity Net Gain" [5.8] "Species-rich meadow creation and woodland enhancement -– wildflower measures offer a diverse and attractive **habitat** for invertebrates, birds and mammals. Native shrub and woodland planting will help link existing woodland links and enhance natural wildlife corridors" [5.8]
The Fens Reservoir		"Enhanced **access and connectivity** – recreational provision of footpaths, cycle paths and nature trails will provide positive opportunities for the local community and other visitors." [5.6] "Visitor centre/outdoor **recreation** hub – multi-use venue that can both serve on-site recreational activities, school visits, corporate workshops and serve as a community hub." [5.6]	"Wetland creation – creation helps promote **ecological benefits**, restore wetland landscapes and promote sustainable development" [5.6] "Floating island **ecosystems** – riparian ecosystems are critical for many species of fish and aquatic life which can provide a measurable increase towards Biodiversity Net Gain" [5.6] "Species-rich meadow creation and woodland enhancement -– wildflower measures offer a diverse and attractive **habitat** for invertebrates, birds and mammals. Native shrub and woodland planting will help link existing woodland links and enhance natural wildlife corridors" [5.6]

Thames to Southern Transfer	"there is the potential for enhancements to be applied during operation in relation to reinstating **land** to achieve potential positive effects and public value" **[5.18]**		"The transfer would provide significant **resilience** benefits to the South East Region, improving connectivity within the region and maintaining reliable supplies to customers in extreme drought events" **[2.16]**
Severn Thames Transfer	"Supporting **economic and population growth** by improving the reliability of regional water supplies" **[5.15]** "Creating **local economic and employment opportunities** during construction works" **[5.15]**	"**Recreational** and/or **educational** benefits" **[5.15]**	"Greater **resilience to climate change** and enhanced reliability of water supplies" **[5.15]** "Enhanced **biodiversity** value" **[5.15]** "**air quality** .(…) "natural hazard **(flood) regulation**, **climate regulation**, and **carbon sequestration**". **[5.39]**

Table 28 shows mentions of public value in customer engagement reported in scheme submission documents.

Only three documents mention public value. Amenity benefits of canals and reservoirs are mentioned as a type of public value welcomed by customers, in the context of the Grand Union Canal and South East Strategic Reservoir projects, respectively. Environmental protection is also given a high priority by customers, in the context of the South East Strategic Reservoir.

Public value is mentioned in the Thames to Southern Transfer submission document as a reason for customer preferences about types of schemes.

Table 30: Strategic Resource Options (SRO): mentions of public value in customer engagement

Name	Customer engagement: mentions of public value
Minworth	No information
Grand Union Canal	"Customers.. welcome the added **amenity value** that canals bring in terms of recreation and wellbeing" **[8.3]**
London Reuse	No information
South East Strategic Reservoir	"Customers place a high priority on **environmental protection**" **[8.2]** [Reservoirs] are also an asset for the local community with **wildlife and amenity benefits** alongside their functional purpose. **[8.2]**
Thames to Affinity Transfer	No information
Southern Water Recycling	No information
Anglian to Affinity Transfer	No information
South Lincolnshire Reservoir	No information
The Fens Reservoir	No information
Thames to Southern Transfer	"Transfers via river or canal are considered to be more appealing than pipeline options because they are perceived by customers to have wider benefits and fewer negative impacts over the functional aspect of simply transferring water between locations" **[8.17]**
Severn Thames Transfer	No information

A4.4 Public Value (Detailed Initiatives)

All the references to public value previously shown in Table 27 were for high-level types of public value. The South East Strategic Reservoir scheme Conservation, Access and Recreation Strategy (Jacobs 2020) includes detailed initiatives to deliver public value (Table 29).

Table 31: South East Strategic Reservoir scheme: possible initiatives to deliver public value

High-level type of public value	Detailed initiatives
Visitor centre	Conference centre Education/training facility Restaurant/café/welfare facilities Education and research Centre Viewing platform
Transport infrastructure	Integration with station Integration with cycle network New links
Landscaping	Viewing platforms Beach area Reservoir island Boardwalk
Farming	Space for agricultural activities Social farms Farm-to-table set up with café
Wetland centre	Meadow creation Creation of specialist habitats such heathlands, chalk grasslands, etc. Link in with flood alleviation areas Reptile hibernacula/log piles and brash piles Boardwalk adjacent to flood alleviation area Inclusion of fish farm/ponds
Butterfly bank	
Outdoor BBQ and picnic facilities	
Water-based recreation and amenities	Water sports provision and angling Partnering with local water sport clubs Recreation hub for equipment rental
Ornithology Infrastructure	
Bridleway, Cycle Trails and Walking Paths	Green trail Sculpture trail Cycle hire Secure cycle facilities
Car park	
Land based recreation and amenities	Sports and Recreation Facilities Natural Amphitheatre Land based informal outdoor sports such as: Kite Flying, Skate Park, Orienteering Partnership with local Equestrian Centres Children's Playground - nature-themed playground equipment, education about the site and how it works Outdoor Recreation Hub/storage facility
Partnerships	Partnered with ornithological society Partner with cycling and walking groups Partner with Education & Research Centres (University) Partner with Angling groups and other water sports clubs
Renewable energy	Renewable energy generation, hydro power or wind Floating Solar Panels Biomass on site Green roof on visitor centre

The South Lincolnshire Reservoir Strategic Environment Assessment also mentions some initiatives that can help to deliver landscape benefits (Mott MacDonald 2021 p.1):

- planting on embankments
- floating wetlands/ islands
- embankment structuring/ landscape
- contouring and building a visitor centre/ public art space
- creation of footpaths, cycle routes, nature trails and bridleways

A4.5 Other Relevant Information

Further information is available for the Thames to Affinity project (Thames Water and Affinity Water 2021b). Figure 51 shows the proposed wider benefits scope for the Gate Two submission. This includes types of public value, inputs, and metrics. In addition, a Six Capital approach was used to select the relevant capitals: social-relationship building and trust (social and relationships, public value, key stakeholder relationships and customer research/feedback), and natural capital (Figure 52).

Figure 51: Thames to Affinity project: wider benefits proposed scope for Gate Two submission

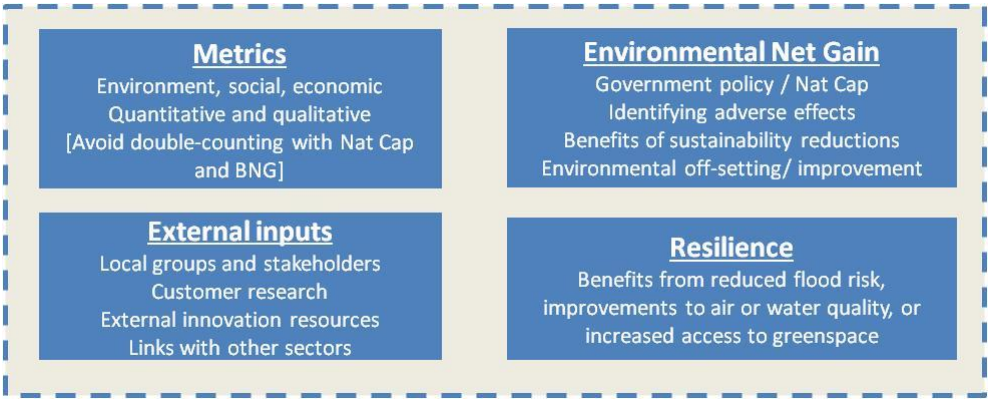


Figure 52: Thames to Affinity project: Six Capitals approach

Financial - financial health and efficiency	Not likely to be required as covered by existing methods to financially value the potential cost. Scope out.
Manufactured - assets (e.g. pipes, treatments, office etc)	Likely to not be required, but having ongoing conversations with those involved in water asset management to determine applicability to Gate 2 Wider Benefits. Scope out.
Intellectual - expert knowledge	Innovative solutions likely to be fed through the delivery of interventions covered by other capitals. Scope out.
Human - capabilities, health and well-being	As this relates to the Water Company's employees competencies, experiences and motivation, this is unlikely to be applicable/measurable at Gate 2. Scope out.
Social - relationship building and trust	**Relevant aspects likely to be covered included social and relationships, public value, key stakeholder relationships and customer research/feedback. Scope in.**
Natural - which are the assets we rely on	**All relevant aspects of Natural Capital from ENCA. Scope in.**

A4.6 Conclusions

Table 30 synthesizes the information of this chapter, showing the high-level types of public value mentioned in the Strategic Resource Option Gate One submissions and related documentation, and detailed initiatives to deliver public value, corresponding to each high-level type.

Most of the high-level types of public value mentioned are consistent with those mentioned in the guidance documents reviewed in Chapter 2. A few elements are not mentioned in the guidance, e.g. land reinstatement and access and connectivity. There is little information on detailed initiatives to deliver public value (all of it coming from a single document). These detailed initiatives are provided mostly for recreational public value, biodiversity/habitats and landscape.

So far, customer engagement has provided few insights on perceptions and preferences for public value.

Table 32: Public value elements mentioned in Strategic Resource Option documentation: high level and detailed initiatives

	High level	Detailed initiatives
Economic	Employment	
	Economic growth	
	Tourism development	
	Land reinstatement	
	Agriculture	Space for agricultural activities, Farm-to-table set up with café
	Job creation	
	Population growth	
Social	Recreation opportunities	Visitor centre, outdoor BBQ/picnic facilities, water-based recreation/amenities, land-based recreation/amenities, ornithology infrastructure , Restaurant/café/welfare facilities, viewing platform, children's playground
	Educational benefits	Conference centre, Education/training/research facility
	Community cohesion	
	Access and connectivity	Link to station, bridleway, cycle trail, walking paths, car parks, cycle hire facilities
Environment	Reduced flood risk	
	Biodiversity/habitats	Meadow creation, specialist habitats, link-in with flood alleviation areas, fish ponds, butterfly bank
	Air quality	
	Carbon sequestration	
	Landscape improvements	Viewing platform, beach area, reservoir island, boardwalk
	Resilience to climate change	

A5. Conclusions

There is increased attention to public value in the water sector, such as guidance regarding the development of best-value water resources management plans, and other general guidance issue by the regulator and other institutions. Other sectors (e.g. energy, construction, rail travel) have also developed frameworks for public value measurement. There is also increased interest in public value at the national level, as shown in the Social Value Act and in frameworks developed to apply the principles set in that legislation. Nevertheless, currently, public value is not fully embedded in the companies' culture and public value reporting is uneven. In other sectors, public value thinking is still restricted mostly to the procurement and construction stages.

Ofwat public value guidance includes the key principles that:

Opportunities for public value should be explored, and

Customer willingness to pay needs to be demonstrated.

The RAPID guidance on Strategic Resource Options in the water sector is brief, but is clear that there needs to be a consistency between Gate Two submission and water resources management plans in terms of best value and solution benefits.

Most guidance documents lists the high-level types of public value that companies should deliver, split into three main groups: economic, social, and environmental. Engagement with customers, citizens, and stakeholders is emphasized. In addition, the public value sought by companies should reflect what society wants (and is prepared to give up something in return for it). However, delivering public value cannot compensate for shortcomings in the delivery of the core services provided by the water companies.

Guidance document emphasize the need for robust evidence on the effects of all options, and recommend monetizing (expected) public value where possible. The development of multi-criteria decision analysis is recommended. Companies should also provide a balanced view of the public's priorities. Customer valuations are recommended. Databooks such as those included in the ENCA (Enabling Natural Capital Approach) framework can also be used. The water companies regional plans already include a series of metrics. Other possible metrics can be found in more general guidance (e.g. National TOMs).

There is little evidence on public perceptions and preferences about public value in the water industry in the UK. The existing evidence suggests that customers welcome the idea of a best value plan, with some caveats: the priority should be to prioritise the core services provided by water companies. There is some evidence on concern about environmental issues.

Strategic Resource Options Gate One submissions consider a variety of economic, social, environmental wider benefits. Most of the high-level types of public value mentioned are consistent with those mentioned in the guidance documents. A few

elements are not mentioned in the guidance, e.g. land reinstatement and access and connectivity. There is little information on detailed initiatives to deliver public value. These detailed initiatives are provided mostly for recreational public value and biodiversity/habitats, and landscape. So far, customer engagement has provided few insights on perceptions and preferences for public value.

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Appendix B

Quantitative Mainstage Questionnaire

3543 QUANT QST FINAL VERSION
SRO Value Added

COMPANY SAMPLE ONLINE AND FACE TO FACE: Thank you for agreeing to take part in this important study which is being conducted by Accent on behalf of a number of water companies.

They would like to hear from customers to understand your views on how they should plan to maintain future water supplies in your region over the next 25 years. There are lots of options the companies could look at and they are looking for your input to make sure customers' preferences are fully reflected in their plans.

We would really appreciate it if you could spare 15-20 minutes of your time to give your feedback - but it may take longer depending on the answers you give. The results will be used, alongside those of thousands of other customers across the region, to inform where water companies invest the money from bills.

Accent is a member of the Market Research Society and we operate in accordance with its Code of Conduct, which means the responses you give will be held securely and remain anonymous. There would be no follow-up contact resulting from doing this study unless you give permission to do so in your answers.

We appreciate the time you'll spend giving your feedback. As a thank you we'd like to provide you with £5, which you can accept either as a One4All voucher, or as a donation to charity. We'll ask you which is your preferred option at the end of the [ONLINE study/ F2F interview]. You must complete all the questions in this study to be eligible to receive the £5 offer.

COMMERCIAL PANEL: ENSURE NO COMPANY LOGO IS SHOWN: Thank you very much for agreeing to complete this on-line study which is being conducted by Accent, an independent research agency

We just need to ask a few questions to check that you're eligible to take part in this research.

SHOW ALL COMPLETING ONLINE: If completing this survey on a mobile, you may find it easier to view in landscape

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Q1. For the purposes of administering the study and for analysis, we may collect demographic information. You do not have to answer any questions that you do not wish to and if you do you can withdraw your consent for us to process this information at any time. Any personal data collected over the course of this [ONLINE study/ F2F interview] will be held securely and will not be shared with any third party unless you give permission (or unless we are legally required to do so). Our privacy statement is available at www.accent-mr.com/privacy/.

Do you agree to proceeding with the study/interview on this basis?

Yes
No **THANK AND CLOSE**

Q2. **ASK CAPI ONLY. OTHERS GO TO Q6:** In line with government guidelines we have a few questions to check your Covid-19 status. Are you or anyone you have been in close contact with currently experiencing any flu-like symptoms or other Covid-19 symptoms?

INTERVIEWER NOTE: THIS WOULD INCLUDE HIGH TEMPERATURE AND/OR LOSS OF SENSE OF TASTE OR SMELL

Yes **THANK AND CLOSE** On this occasion we will not be able to continue with the survey due to Covid-19 guidelines. Thank you for your time
No

Q3. Have you or anyone you have been in close contact with been diagnosed with Covid-19 within the past two weeks, and not subsequently tested negative?

Yes **THANK AND CLOSE** On this occasion we will not be able to continue with the survey due to Covid-19 guidelines. Thank you for your time
No

Q4. Are you someone who is defined as either Clinically Extremely Vulnerable or Clinically Vulnerable?
INTERVIEWER NOTE: THEY WILL HAVE BEEN INFORMED OF THIS STATUS EARLY ON IN LOCKDOWN

Yes **THANK AND CLOSE** On this occasion we will not be able to continue with the survey due to Covid-19 guidelines. Thank you for your time
No

Q5. Are you currently shielding to protect yourself from Covid-19 or caring for someone else who is especially vulnerable to Covid-19?

Yes **THANK AND CLOSE** On this occasion we will not be able to continue with the survey due to Covid-19 guidelines. Thank you for your time
No

Q6. Do you or any of your close family work in market research or for a water company? **SINGLE CODE**

Yes **THANK & CLOSE**
No

Q7. **ASK ALL**: Are you in paid employment?

Yes
No **GO TO Q12**

Q8. **ASK IF Q7 = 1** How much involvement, if any, do you have in managing the water bills for your business?

I solely or jointly manage the water bills **GO TO Q9**
I don't have any involvement in the water bills **GO TO Q12**
We do not have a mains water supply / do not receive a separate water bill as it is included with other bills **GO TO Q12**

Q9. Are you a sole trader working from home and with no separate business premises?

I am a sole trader and have no separate business premises **GO TO Q12**
I work in a separate business premises

Q10. How many sites does your organisation have in the UK; one or more than one?

One site
More than one site
Don't know

Q11. What is the first half of the postcode of **IF Q10=1 [**the site] **IF Q10=2-3** [the main site for which you are responsible for the water bill]?

INSERT LOOKUP TABLE TO ASSIGN POSTCODE TO WATER CO

Prefer not to answer **CODE AS HH AND GO TO Q12**

CHECK LOOKUP

IF ONE OF TARGET WATER COS SHOW FOLLOWING AND THEN GO TO Q20: Thank you, [F2F I/ONLINE we] can confirm that [water co] is responsible for the provision of water services in your organisation's area.

When thinking about your answers, please respond from the perspective of your organisation's preferences and needs, rather than as what is important to you when thinking about the supply of water to your home.

IF BUSINESS POSTCODE NOT IN TARGET COMPANY LIST

Your company address is not in one of the water company areas we are looking for, but your home address may be.

CODE AS HH AND GO TO Q12

Q12. What's the first half of your home postcode? We will only use this to check who provides your water**.**

INSERT LOOKUP TABLE TO ASSIGN POSTCODE TO WATER CO

IF ONE OF TARGET WATER COS SHOW FOLLOWING: Thank you, [F2F I/ONLINE we] can confirm that [water co] is responsible for the provision of water services for your home area.

Prefer not to answer **THANK & CLOSE**
Not in any target water company area **THANK & CLOSE**

Q13. Which of the following age groups do you fall into? Are you... **SINGLE CODE**

Under 18 **THANK AND CLOSE**
18 to 24
25 to 29
30 to 34
35 to 44
45 to 49
50 to 54
55 to 64
65 to 74
75 or over
Prefer not to say

Q14. Are you the person, or one of the people, in your household who pays the water bills? **SINGLE CODE**

I have complete responsibility for payment
I share responsibility for payment with others in my household
I have no responsibility, but I know it is paid by my landlord and included in my rent

I have no responsibility for payment and I don't know who pays the bills
Other - please tell us what
Don't know **THANK & CLOSE**

FUTURE CUSTOMER = (Q13=CODE 2) AND (Q14= CODES 3 OR 4 OR 5)

ALL OTHER Q14=3, 4 OR 5 THANK AND CLOSE

Q15. Which ONE of the following best describes the occupation of the main income earner in your household? If you or the main income earner are self-employed please tick the option that most relates to the type of work you/they do for the company(s) you/they work for.

- Higher managerial/ professional/ administrative (e.g. Doctor, Solicitor, Board Director in a large organisation 200+ employees, top level civil servant/public service employee etc.)
- Intermediate managerial/ professional/ administrative (e.g. Newly qualified (under 3 years) Doctor, Solicitor, Board Director of small organisation, middle manager in large organisation, principle officer in civil service/local government etc.)
- Supervisor; clerical; junior managerial administrative or professional (e.g. Office worker, Student Doctor, Foreman with 25+ employees, salesperson, etc.)
- Skilled manual worker (e.g. Bricklayer, Carpenter, Plumber, Painter, Bus/Ambulance Driver, HGV driver, pub/bar worker etc.)
- Semi or unskilled manual worker (e.g. Caretaker, Park keeper, non-HGV driver, shop assistant etc.)
- Student
- Unemployed or not working due to long-term sickness
- Casual worker – not in permanent employment
- Full-time carer of other household member
- Retired
- Rather not say **THANK AND CLOSE ONLY DYNATA**

Q16. **IF Q15=10 (RETIRED). OTHERS GO TO Q18**: Does the main income earner have a state pension, a private pension or both?

State only
Private only
Both

Q17. **IF Q16 = PRIVATE OR BOTH. OTHERS GO TO Q18:** How would you describe the main income earner's occupation before retirement?

- Senior managerial or professional (e.g. Doctor, Solicitor, Board Director in a large organisation 200+ employees, top level civil servant/public service employee etc.)
- Intermediate managerial, administrative or professional (e.g. Solicitor, Board Director of small organisation, middle manager in large organisation, principle officer in civil service / local government etc.)
- Supervisor; clerical; junior managerial administrative or professional (e.g. Office worker, Student Doctor, Foreman with 25+ employees, salesperson, etc.)
- Manual worker (with industry qualifications) (e.g. Bricklayer, Carpenter, Plumber, Painter, Bus/Ambulance Driver, HGV driver, pub / bar worker etc.)
- Manual worker (with no qualifications) (e.g. Caretaker, Park keeper, non-HGV driver, shop assistant etc.)
- None of these

Q18. **SEG: CODE AS FOLLOWS**:

IF Q15= 1 or 2; SEG = AB
IF Q15 = 3; SEG = C1
IF Q15 = 4; SEG = C2
IF Q15 = 5-9; SEG = DE

IF Q15 = 10 and **Q16**= State only; SEG = DE

IF Q15 = 10 and Q16 = Private only OR Both and Q17 = 1 or 2; SEG = AB
IF Q15 = 10 and Q16 = Private only OR Both and Q17 = 3; SEG = C1
IF Q15 = 10 and Q16 = Private only OR Both and Q17 = 4; SEG = C2
IF Q15 = 10 and Q16 = Private only OR Both and Q17 = 5; SEG = DE

Q19. Are you:

Male
Female
Prefer to self-identify
Prefer not to say

Q20. **ASK ALL:** Do you have a water meter at your [HH] home [NHH] organisation?

Yes – I/we asked to have one installed
Yes – it was already in the property when I/we moved in
Yes – I/we had to have it fitted, but I/we didn't really want it installed
No – and I/we not interested in getting one
No – but I/we are considering getting one
No – I/we had one, but decided to opt out
Don't Know

Thanks, you're good to go

This research study is being conducted for your water company.

COMPANY SAMPLE/ F2F ONLY: Remember, if you fully complete the survey, we'd like to provide you with £5 which you can accept either as a One4All voucher or as a donation to charity.

We would like start by asking you a few questions about your experiences of your water company.

Q21. [HH] How satisfied would you say you are with the **overall service** provided by your water company? When giving your answer, please think about all aspects of the service they provide, from the water supply itself to the bills you receive.

[NHH] How satisfied would you say you are with the overall service provided by your water company? This could include things like the reliability of the water supply, how quickly leaks in the public highway are fixed and the quality of the water supply itself.

1. Extremely dissatisfied
2.
3.
4.
5.
6. Neither satisfied nor dissatisfied
7.
8.
9.
10. Extremely satisfied

Q22. This time, using a 10-point scale, how much do you **trust** your water company?

1. I don't trust them at all
2.
3.
4.
5.
6.
7.
8.
9.
10. I trust them completely
11. Don't know

Q23. How much [HH] do you [NHH does your organisation] pay for your total water bill – that's the amount for your water and sewerage services? Please select "per month" or "per year" along with your amount.

Per month/Per year **GO TO Q25**
I'm not sure
I prefer not to say

Q24. HH: Which of the following bands do you estimate that your total bill for water and sewerage falls into? The month amounts assume that the bills are paid evenly over a 12-month period, but some customers pay over a different number of months.

SINGLE CODE

Monthly	Annual
Less than £13 per month	Less than £150 per year
£13 - £16 per month	£151 - £200 per year
£17 - £20 per month	£201 - £250 per year
£21 - £24 per month	£251 - £300 per year
£25 - £28 per month	£301 - £350 per year
£29 - £32 per month	£351 - £400 per year
£33 - £37 per month	£401 - £450 per year
£38 - £41 per month	£451 - £500 per year
£42 - £45 per month	£501 - £550 per year
£46 - £50 per month	£551 - £600 per year
£50 - £54 per month	£601 - £650 per year
£55 - £59 per month	£651 - £700 per year
£60 - £64 per month	£701 - £750 per year
£65 - £69 per month	£751 - £800 per year
Over £70 per month	Over £800 per year
I'm not sure	
Prefer not to say	

NHH: Approximately what is your business's average annual water and sewerage services bill?
SINGLE CODE

Less than £500 per year
£500 to £1,499 per year
£1,500 to £2,999 per year
£3,000 to £9,999 per year
£10,000 to £14,999 per year
£15,000 to 29,999 per year
£30,000 to £49,999 per year

£50,000 or more per year
Don't know

Q25. Bill calculation:

USE ANNUAL AMOUNT FROM Q23
USE MONTHLY AMOUNT X 12 FROM Q23
USE MID POINT OF RANGE ANNUAL AMOUNT FROM Q24
USE MID POINT OF RANGE MONTHLY AMOUNT X 12 FROM Q24
SHOW REGIONAL AVERAGE IF NONE OF THE ABOVE APPLIES: SSW: £332/CAM: £375

Q26. **ONLINE PANEL ONLY & HH ONLY, NHH GO TO Q27:** How satisfied are you with the **value for money** of the clean water services you receive?

DP ADD HORIZONTAL SCALE LIKE Q22
Very dissatisfied
Fairly dissatisfied
Neither satisfied nor dissatisfied
Fairly satisfied
Very satisfied
Don't know

Attitudes

We would like to now find out a bit more about your views about various aspects relating to your local area.

Q27. How important to you are each of the following? **[INCLUDE SCALE FROM 1='Not at all important' to 10='Extremely important' AND RANDOMISE ORDER]**

a. The availability of apprenticeships for young people
b. Local employment opportunities
c. The economic benefits of visits to your local area – i.e. tourism and leisure visits
d. The promotion of local heritage and history
e. The promotion of sustainable agriculture, including regenerative farming and re-wilding of areas of countryside to return them to their original state
f. Improving water resources for local farmland to make it more productive
g. Tackling flood risk in the local area
h. The creation of new habitats for wildlife and birds

Recreation

IF HH: The next questions are about a selection of activities you might do for recreation.

Q28. **HH ONLY:** How often do you, or does anyone in your household, do the following recreation activities?

	Often (more than six times a year)	**Sometimes** (between one and five times a year)	**Rarely** (less than once a year)	**Never**

Outdoor water sports activities (e.g. sailing, canoeing, rowing, rafting, paddleboarding, wild swimming)				
Fishing in rivers or lakes				
Picnicking				
Walking, running, cycling or horse riding				
Camping				

Planning for the Future

Please read the following information about water companies' plan for the future. There is a minimum time to view this to make sure all the information is seen, but there is no maximum time – please feel free to read it more than once if you need to.

To cope with the effects of population growth and climate change, water companies need to make a plan about how they can maintain future water supplies in your region in the next 25 years.

This plan may include sites like new reservoirs and water treatment works, and new pipelines and canals to transfer water from one area to another.

When deciding how to design these sites, water companies can create wider positive impacts to the local economy, environment and community; for example, by adding recreational elements like walking paths or campsites, or new habitats for wildlife.

But some of these things will have an impact on bills.

Water companies are therefore seeking customers' views on what additional benefits they should plan for, recognising that these will be paid for through customers' bills.

DP: ADD MIN TIME FOR THIS SCREEN TO BE VIEWED (20s)

Q29. Is the information about why your water company are asking for your views clear and easy to understand?

1. Yes – very easy to understand
2. Yes – quite easy to understand
3. No – quite difficult to understand
4. No – very difficult to understand
5. Don't know

Q30. **ASK IF CODE 3 OR 4 AT Q29. OTHERS SKIP**: What do you find difficult to understand? Please write in as much information as possible.

NEXT PAGE:

In the next exercise you'll be shown a series of 10 questions, each offering a pair of different possible options for a new site, such as a new reservoir, water treatment works, or pipeline or canal for transferring water, that could be in the water company's plan for maintaining water supplies. For each choice, the options have a different mix of project additions. We want to understand which option you would prefer.

An example is shown below:

DP: INSERT WALK THROUGH GIF. ADD MIN TIME TO MATCH LENGTH OF GIF (20S)

Please familiarise yourself with this and then press 'next' to read about the other options. There is a minimum time to view this to make sure all the information is seen, but there is no maximum time – please feel free to view it more than once if you need to.

NEW PAGE:

As you've just seen one of the impacts relates to the change in your water bill. In some options there will be no increase to your bill while in others there will be an increase.

[**IF NHH**] *Increases are shown as a percentage of your water bill. If you receive a combined water and wastewater bill, the increase would apply only to the water component of this.* **[BOTH HH AND NHH]** *If an increase is shown, your annual bill would increase by that amount in one year, and would then remain at that level on a permanent basis. The increase would not be applied year on year, nor would it be reversed the following year.*

When choosing which option you prefer in each case, please consider:

- Whether the impacts shown are important to [HH: you/NHH: your organisation]; and
- Your [HH: household/NHH: organisation] overall income and expenses, remembering that:
- Any money [HH: you pay/NHH: your organisation pays] for these improvements will not be available for [HH: you/NHH: your organisation] to spend elsewhere
- Other bills may go up or down affecting the amount of money [HH: you have/NHH: your organisation has] to spend in general

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Your [HH: household/NHH: organisation's] bills will also be affected by the rate of inflation [**DP: INSERT I BUTTON SHOWING THE FOLLOWING TEXT**: Inflation means that the general level of prices are going up. More money will need to be paid for goods (like a loaf of bread or petrol) and services (like getting a haircut at the hairdresser) each year.

Q31. Choice 1

Q32. Why did you select this option? Please write in as much information as possible. Please use the back button to remind yourself of the choice if needed.

Q33. Choice 2

Q34. Choice 3

Q35. Choice 4

Q36. Choice 5

Q37. Choice 6

Q38. Choice 7

Q39. Choice 8

Q40. Choice 9

Q41. Choice 10

Q42. We would now like to ask you a few questions about the choices you have just made. How strongly do you agree or disagree with the following statements about the choices you have just made?

	Strongly disagree	**Disagree**	**Neither**	**Agree**	**Strongly agree**
I was able to understand the choices					
I found the options believable					
I found it easy to choose between the options					

Q43. **ASK IF Q42.1 = 1 OR 2. OTHERS GO TO Q44:** Why were you unable to understand the choices?

Q44. **ASK IF Q42.2 = 1 OR 2. OTHERS GO TO Q45:** What was not believable about the options shown?

Q45. **ASK IF Q42.3 = 1 OR 2. OTHERS GO TO Q46:** Why was it difficult choosing between the options?

Those previous questions were focusing on individual sites in the plan. Thinking about your water company's overall approach to projects of this type, please look at the following choice and say which you would prefer your water company to take?

Q46. CV question 1

Q46B Why did you select this option? Please write in as much information as possible. Please use the back button to remind yourself of the choice if needed.

Q47. CV question 2

Q47B: Which of the following best describes how you feel about project additions when large infrastructure projects are being undertaken (such as building a new reservoir, water treatment works, etc). As a reminder you can see a summary of the potential additions by clicking the information button:

SINGLE CODE

1. All large projects should include as many additions as possible to benefit the local community, economy and the environment
2. All large projects should include only those additions that are cost effective to deliver – i.e. where there is a clear case to spend more money to bring long-term benefits to the local community, economy and the environment
3. All large projects should not include any additions

INFORMATION BUTTON: Show list of project additions from SP1

Q47C: In developing plans, water companies have to balance the needs of customers, stakeholders (like environmental groups and councils) and the water environment. We'd like to understand your reaction to some key trade-offs in terms of the companies general approach to planning and where you stand on each.

Please indicate the point on the scale that that most closely reflects how you feel:
ROTATE
7 POINT SLIDER SCALE

- Trying new approaches and innovations to find solutions to challenges/Sticking to tried and trusted approaches that are proven to work
- Looking after the needs of the natural environment first/Ensuring all customers have all the water they want to use at an affordable price
- Infrastructure projects should deliver additions even if they add to the overall project costs/Keeping bills as low as possible
- Doing more to reduce the company's 'carbon footprint' (the amount of carbon dioxide the company adds to the atmosphere through its operations) – even if it costs customers more/Keeping customer bills as low as possible

Finally, a bit more about you

Before we finish there are just a few more questions which will help us to understand different customers and what they want from its water services in the future. The answers you give will be kept confidential, unless you give permission to share them at the end of the survey.

Q48. **ASK HH ONLY**: Is anyone in your household registered on the Priority Service Register? The Priority Services Register is for water customers who may need extra support or additional services - e.g. braille bills, or bottled water deliveries in the event of the water supply being interrupted.

Yes
No
Prefer not to say
Don't know

Q49. **ASK HH ONLY**: A lot of people struggle to pay their household bills. Which of the following best describes how affordable you find your water and sewerage bill and other household bills? Please remember, this research is entirely confidential and that it is only by talking to people in debt, or struggling to pay their bills, that change can be influenced.
SINGLE CODE

1	I always pay my water bill, and other household bills, on time	
2	I always pay my water bill on time, but sometimes struggle, or am late, paying other bills	**STRUGGLING**
3	I sometimes pay my water bill late	**STRUGGLING**
4	I often find it difficult to pay my water bill on time	**IN DEBT**
5	I am rarely, or never, able to pay my water bill on time	**IN DEBT**
6	Prefer not to answer	

Q50. **ASK HH ONLY**: We want to take account of the views of people of all incomes. Which of the following annual income bands does your household fall into? Please take into account the income of all of those in the household before tax and national insurance and include pensions, benefits or extra earnings.

	Per Week	Per Year

A	Up to £315	Under £16,380
B1	£316-£442	£16,381 - £23,000
B2	£443-£721	£23,001 - £37,500
B3	£722-£1000	£37,501 - £52,000
C	£1001+	£52,001+
D	Prefer not to say	

Q51. **ASK HH ONLY:** Thinking about all the people in your household, including yourself, how many people live here permanently for each of these age groups? **IF THERE ARE NO PEOPLE IN YOUR HOUSEHOLD BELONGING TO A CERTAIN AGE GROUP, PLEASE SELECT 'ZERO' FOR IT.**

Up to 10 years .....0..... 1..... 2..... 3..... 4.....5+
11 to 15 years .....0..... 1..... 2..... 3..... 4.....5+
16 to 65 years .....0..... 1..... 2..... 3..... 4.....5+
Over 65 years .....0..... 1..... 2..... 3..... 4.....5+
Prefer not to say [exclusive]

Q52. **ASK HH ONLY**: Which of these ethnic groups do you consider you belong to?

WHITE
1. British
2. Irish
3. Any other White background

MIXED
4. White and Black Caribbean
5. White and Black African
6. White and Asian
7. Any other Mixed background

ASIAN OR ASIAN BRITISH
8. Indian
9. Pakistani
10. Bangladeshi
11. Any other Asian background

BLACK OR BLACK BRITISH
12. Caribbean
13. African
14. Any other Black background

CHINESE OR OTHER ETHNIC GROUP
15. Chinese
16. Any other ethnic group

17. Prefer not to say

Q53. **ASK NHH ONLY**: Could you please tell me how many employees your organisation has? If you have more than one office/site/staff working from home, please count all of them in your answer. **SINGLE CODE**

1 (Sole trader)
2 – 4
5 – 9
10 - 19
20 - 49
50 - 99

100 - 249
250 - 499
500 - 999
1,000 +
Don’t know

Q54. **ASK NHH ONLY:** What business sector best defines the main activity of your organisation?

- Agriculture, forestry and fishing
- Mining, quarrying
- Utilities and Energy (including electricity, gas, steam and air-conditioning supply)
- Water supply, sewerage and waste management, recycling
- Food, Drink and Tobacco Manufacturers and Other Manufacturing
- Construction (including plumbing, painting, electrical etc)
- Retail (NOT hairdressing), Wholesale, Motor Trades including vehicle repair
- Transport and Storage (including freight, taxis, airlines, bus, rail and warehousing, post offices)
- Hotel, catering, Camp sites, restaurants, cafes, accommodation, pubs
- Information, Telecommunications (including computer, newspaper, radio, TV, news agency, book publishing)
- Banking, Finance, Insurance
- Real estate and property activities
- Professional, scientific and technical activities
- Business Admin and support services (including cleaning, gardening, employment agencies, office services)
- Education (including schools, universities)
- Health and social work (including hospitals, doctors, dentists. charities, nursing care)
- Government and& Defence
- Arts, Recreation, Entertainment (including Libraries, theatres, museums, zoos, sport centres, fitness)
- Other service activities (including Trade Unions, Churches, Repair services, Funeral-related services, Hairdressers)
- Other, please specify
- Prefer not to answer

Q55. **ASK NHH ONLY**: Which of the following best describes your function at work?

General management (eg CEO, MD, General Manager)
IT & Technology
Financial
Marketing & Sales
Operational
Procurement
Administration
Other (specify)

Q56. **ASK NHH ONLY**: What is your job title?

Write in [open text box]

Q57. **ASK NHH ONLY:** How essential would you say the supply of water is to the day-to-day running of your business?

Not at all essential
Not essential
Neither not essential nor essential
Essential
Absolutely essential
Don’t know

Q57A F2F ONLY Have you used the Internet via a computer, tablet or smartphone in the last 3 months?

1	No	**DIGITALLY EXCLUDED**
2	Yes	
9	Prefer not to answer	

Q57B Which of the following best describes you?

SINGLE CODE

1	I feel very confident about using the internet	
2	I feel quite confident about using the internet	
3	I don't feel confident about using the internet	**DIGITALLY EXCLUDED**
4	I would rather not use the internet at all	**DIGITALLY EXCLUDED**
9	Prefer not to answer	

Q57C Which of these items do you have in your home and that are available for you to use?

1	Smartphone	
2	Tablet	
3	Laptop or desktop computer	
4	None of the above	**DIGITALLY EXCLUDED**

Q58. **COMPANY SAMPLE ONLY:** We really appreciate the time that you have given us today. Would you be willing to be contacted again by Accent to allow them to clarify any responses you have given today, or to be invited to take part in other related research?

Yes, for both clarification and further related research
Yes, for clarification only
Yes, for further related research only
No

Q59. **COMPANY SAMPLE ONLY:** Thank you for taking the time to give your feedback. Please select how you would like to receive your £5 thank you:

One4All gift voucher – accepted at over 60,000 retail outlets
Donation to Water Aid – a charity who works globally to ensure more people have access to clean water every day
Donation to The Trussell Trust – who run a nationwide network of food banks

This research was conducted under the terms of the UK Market Research Society code of conduct and is completely confidential.

Q1 SYSTEM INFORMATION
Q2 Time interview completed:

INTERNAL USE ONLY: Click here
Online only ☐
CATI only ☐ (DP: add QAX)
CAPI/Tablet ☒ (BCQs: Q13) QAZ2 Paper showcard? Y ☐ N ☐
CATI recruit for online/field ☐ (BCQs: Q19) QAZ3
Field recruit for online/CATI ☐ (BCQs: Q20) QAZ1
Recruit only (ie for qual) ☐

Grid style for mobiles: click here for example

GM 1 ☐ to force mobiles to show grid (for small grids)

GAR 1 ☐ to show vertical text for answer headings

GAR 2 ☐ to show vertical text for answer headings on mobile devices only

Questionnaire Style (default is 7): Click here for details

Choose base format:

Accis3 ☐

Accis4 ☐

Accis5 ☐

Accis6 ☐

Accis7 ☐

Accis8 ☐

Choose variations:

Question and answer fonts (full list: https://fonts.google.com/) ☐

Header font ☐

Tick box style (1-6) ☐

Next/previous button style (1-3) ☐

Font colour (use HEX code http://html-color-codes.info/#HTML_Color_Picker) # ☐

Other colours: Note that CLR1 and CLR6 change a number of different elements (to easily keep the colours consistent)

CLR1 # ☐ Progress bar border, progress colour, button colour

CLR2 # ☐ Progress bar background colour

CLR3 # ☐ Page background colour

CLR4 # ☐ Header background colour (if different from CLR1)

CLR5 # ☐ Header font colour

CLR6 # ☐ Border colour for selected checkbox and checkbox border colour when hovered over (if different from CLR1)

CLR7 # ☐ Background colour for selected checkbox (if different from CLR1)

CLR8 Tick/circle colour for selected checkbox

Appendix C

Phase 1: Qualitative Findings

Double click on image to open in Powerpoint:

Appendix D

Phase 2: Qualitative Insights

Double click on image to open in Powerpoint:

Appendix E

Phase 2: Participant Feedback: Open Responses

Appendix E Phase 2: Participant Feedback: Open Responses

The tables below summarise the open responses to follow-up questions asked of those who (strongly) disagreed with any of the feedback statements. Some of the participant responses were coded as falling into multiple response categories.

Table 33: Why were you unable to understand the choices?

Coded response	Frequency	Percent
Did understand	26	0.40%
Clear/well explained – simple/concise	20	0.31%
No reason given	20	0.31%
Some/all were similar/the same	12	0.19%
Costings – focus on profits/don't want to pay more	10	0.15%
Confusing	8	0.12%
Not clear/vague	7	0.11%
Did not understand (not specified)	7	0.11%
Not affected/lack of interest	7	0.11%
Not easy to choose	6	0.09%
Easy	6	0.09%
Difficult language/wording	5	0.08%
Amount of information - lack of/too much	5	0.08%
Too many options	5	0.08%
Nothing/none	5	0.08%
Complicated/difficult	4	0.06%
Not realistic	4	0.06%
Understood pricing	4	0.06%
Able to read – educated etc	4	0.06%
Unable to compare choices	3	0.05%
Location/distance	3	0.05%
Layout – difficult to read etc	3	0.05%
Other	7	0.11%
Not stated	0	0.00%
N/A	2	0.03%
Don't know	2	0.03%

Base: 6,455 participants (combined household and non-household sample)

Table 34: What was not believable about the options shown?

Coded response	Frequency	Percent
It won't happen	89	1.38%
Not realistic – too good to be true	79	1.22%
Cost	66	1.02%
Location/area not suitable	53	0.82%
Benefits – jobs etc	52	0.81%
Don't trust water companies – don't keep promises	48	0.74%
Customer should not have to pay/against bill increases	47	0.73%
Just not believable	37	0.57%
Focus is on profits	30	0.46%
Nothing – it is believable	25	0.39%
Past performance of company	20	0.31%
Investment needed	19	0.29%
Unnecessary	17	0.26%
Marketing stunt – greenwashing etc	15	0.23%

Coded response	Frequency	Percent
Company should protect environment – avoid dumping sewage	14	0.22%
Choice of options – inadequate/not a real choice	14	0.22%
Not responsibility of water company	12	0.19%
Distance from home – too far etc	11	0.17%
All/most of them	10	0.15%
Options already suggested/in place	10	0.15%
Should focus on primary requirements – supply/quality	10	0.15%
Need clarification/further explanation	8	0.12%
Better management of leaks required	6	0.09%
Projects should be self-financing	6	0.09%
Would not benefit area/environment	5	0.08%
Other	20	0.31%
Not stated	10	0.15%
N/A	2	0.03%
Don't know	4	0.06%

Base: 6,455 participants (combined household and non-household sample)

Table 35: Why was it difficult choosing between the options?

Coded response	Frequency	Percent
Difficult to decide – weigh up benefits	131	2.03%
Both options have benefits	127	1.97%
Options are similar	104	1.61%
Price difference	94	1.46%
Both are good – would choose both	79	1.22%
Don't like either/any option	65	1.01%
Don't want to pay more	57	0.88%
Some options had good/better benefits	51	0.79%
Depends on benefit to community/area	51	0.79%
Depends on personal benefit	38	0.59%
Pros and cons to both	34	0.53%
Some benefits had no merit/appeal	33	0.51%
Had to choose cheaper one	32	0.50%
Need clarification/further explanation	32	0.50%
Options are too dissimilar	25	0.39%
Depends on location	24	0.37%
Depends on benefit to environment/wildlife	17	0.26%
Too many choices	15	0.23%
Cost not a factor	15	0.23%
Not difficult/easy	14	0.22%
No reason/none	12	0.19%
Some options are not sensible/realistic	6	0.09%
Company should invest/focus less on profits	5	0.08%
Company should focus on core service	5	0.08%
Company should improve sewerage service – stop illegal dumping etc	4	0.06%
Other	25	0.39%
Not stated	7	0.11%
N/A	3	0.05%
Don't know	8	0.12%

Base: 6,455 participants (combined household and non-household sample)

Appendix F

Phase 2: SP1 Econometric Modelling

Appendix F Phase 2: SP1 Econometric Modelling Overview

The data consist of ten choices per participant, each between two options. Each option includes up to three project additions and a bill impact, while the type of site and its distance from the participant are scenario-level features that do not vary across options in any given choice occasion.

The choices made by each participant were analysed via econometric discrete choice models, with *choice* as the dependent variable, a {1,0} variable indicating whether any given option was preferred over the alternative option in any given choice occasion. Choices are interpreted as indicating that the 'utility' of the preferred option is greater than the utility of the option that was not chosen. This interpretation follows the principles of random utility theory[14].

The valuations of interest may potentially differ across project additions, by type of site (reservoir, canal, water treatment works, pipeline), by distance of the site from any participant's home/organisation (5 vs 50 miles), and across companies. This would lead to a fully flexible model specification that would allow for 960 distinct WTP values:

- (26 attributes) × (2 distances) × (6 companies) for 'Reservoir' and
- (18 attributes)[15] × (2 distances) × (6 companies) for each of 'Canal', 'Water treatment works' and 'Pipeline.

However, in order to obtain reasonably precise estimates of WTP from a fully flexible specification a much larger sample would be needed. Our approach was to specify a fairly flexible 'general' model that imposes some restrictions on WTP values while allowing for differences in WTP by type of site, distance, and company. The general model was reduced by excluding insignificant coefficients in a stepwise procedure to obtain more precise value estimates.

Model Development: Household

Table 34 shows the three stages of model development: (1) the general model; (2) an intermediate model obtained via stepwise elimination of insignificant coefficients; (3) the final model, from which our WTP estimates are derived. The initial, general model in column (1) allows for differences in valuations:

- across companies via bill × company interactions
- by type of site via bill × site interactions and project-addition-specific terms

[14] See, e.g., Kenneth Train, *Discrete Choice Methods with Simulation* (Cambridge University Press, 2003).

[15] The following project additions were only available at 'Reservoir' sites: Shop selling sustainable products and gardening materials; Outdoor BBQ/picnic facilities; Water sports facilities, e.g. sailing, paddleboarding; Land-based recreation/amenities; Children's playground; Sensory garden/space for those with learning difficulties; Beach area; Campsite.

- by distance via bill × distance × site interactions and project-addition-specific terms.

The sign of the bill impact is negative as expected (across companies, site types, and site distances), and the value of the pseudo-R^2 statistic indicates a relatively good fit. However, many coefficients are far from being statistically significant. To obtain more precise estimates we sequentially removed the least significant project-addition-specific distance effects and project-addition-specific site effects[16]. The reduced model is shown in column (2). The final model in column (3) excludes a number of bill × company, bill × site, and bill × distance × site interaction terms that were individually and jointly insignificant in the intermediate model.

The final model fits the data reasonably well. The bill impact is negative and highly statistically significant across all combinations of company, site type, and site distance. The model yields higher WTP values for Thames Water, Cambridge Water, and Severn Trent Water, all else equal, but differences across companies are relatively small. The final model yields substantially more precise estimates than the initial, unrestricted model, while retaining a sufficient number of project-addition-specific site and distance effects to allow for variation in valuations. The model appears to be well-suited for the derivation of WTP values.

The WTP for any project addition was calculated as the bill increment (or, in a few instances, bill decrease) that would just offset the (usually) positive utility-impact of the provision of that project addition, i.e., as the negative of the ratio between the (sum of the) relevant project-addition coefficient(s) to the (sum of the) relevant bill coefficient(s). For example, Thames Water customers' annual WTP for 'Walking paths, Boardwalk, Bridleway, Cycle trail' along canals 5 miles from home is calculated as follows

$$\mathrm{WTP}_{\mathrm{att18,\ Canal,\ 50\ mi,\ Tha}} = -\frac{att18 + att18\ \times Canal}{bill + bill \times Canal} = £2.36$$

Table 36: Model development stages: household

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
bill	-0.290 **	(0.018)	-0.300 **	(0.018)	-0.324 **	(0.013)
bill × Aff	-0.055 *	(0.022)	-0.055 *	(0.022)	-0.039 *	(0.019)
bill × Ang	-0.057 **	(0.021)	-0.058 **	(0.021)	-0.041 *	(0.018)
bill × Cam	-0.049	(0.032)	-0.049	(0.032)		
bill × Sev	-0.034	(0.021)	-0.034	(0.021)		
bill × Sou	-0.061 **	(0.022)	-0.061 **	(0.022)	-0.045 *	(0.019)
bill × Canal	-0.073 *	(0.031)	-0.047	(0.028)		
bill × Pipeline	-0.023	(0.036)	-0.008	(0.026)		
bill × WTW	0.124 *	(0.051)	0.091 **	(0.035)	0.102 **	(0.034)
bill × 50	-0.051 **	(0.017)	-0.043 **	(0.016)	-0.033 *	(0.014)
bill × 50 × Canal	0.073	(0.043)	0.054	(0.038)		
bill × 50 × Pipeline	0.012	(0.054)	0.013	(0.046)		
bill × 50 × WTW	-0.227 **	(0.064)	-0.214 **	(0.047)	-0.230 **	(0.046)
att1	0.558 **	(0.097)	0.501 **	(0.060)	0.502 **	(0.059)
att2	1.057 **	(0.123)	0.937 **	(0.079)	0.946 **	(0.078)

[16] We used joint significance tests for project-addition × site interactions, i.e., testing att5 x Canal = att5 x Pipeline = att5 x WTW = 0, for example.

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
att3	-0.106	(0.106)	-0.125	(0.072)	-0.125	(0.072)
att4	0.106	(0.087)	0.042	(0.063)	0.038	(0.063)
att5	0.806 **	(0.102)	0.783 **	(0.053)	0.799 **	(0.051)
att6	0.339 **	(0.084)	0.289 **	(0.058)	0.287 **	(0.058)
att7	0.370 **	(0.106)	0.286 **	(0.068)	0.281 **	(0.066)
att8	0.663 **	(0.099)	0.490 **	(0.066)	0.483 **	(0.066)
att9	0.125	(0.066)	0.146 **	(0.040)	0.148 **	(0.039)
att10	0.527 **	(0.113)	0.393 **	(0.071)	0.389 **	(0.071)
att11	0.405 **	(0.097)	0.441 **	(0.073)	0.446 **	(0.073)
att12	0.271 **	(0.099)	0.279 **	(0.067)	0.288 **	(0.067)
att13	0.144	(0.162)	0.354 **	(0.059)	0.361 **	(0.059)
att14	0.367 **	(0.095)	0.411 **	(0.060)	0.416 **	(0.060)
att15	0.789 **	(0.094)	0.750 **	(0.072)	0.746 **	(0.072)
att16	0.059	(0.101)	0.074	(0.076)	0.075	(0.076)
att17	0.369 **	(0.105)	0.359 **	(0.065)	0.367 **	(0.065)
att18	0.909 **	(0.095)	0.777 **	(0.059)	0.770 **	(0.059)
att19	0.898 **	(0.130)	0.814 **	(0.102)	0.818 **	(0.102)
att20	0.188	(0.102)	0.037	(0.052)	0.037	(0.051)
att21	-0.048	(0.107)	-0.191 **	(0.061)	-0.191 **	(0.060)
att22	0.353 **	(0.076)	0.275 **	(0.055)	0.277 **	(0.055)
att23	0.450 **	(0.088)	0.397 **	(0.048)	0.409 **	(0.046)
att24	0.697 **	(0.110)	0.632 **	(0.058)	0.624 **	(0.058)
att25	1.113 **	(0.104)	1.042 **	(0.073)	1.038 **	(0.072)
att26	0.852 **	(0.092)	0.865 **	(0.061)	0.868 **	(0.060)
att1 × 50	-0.046	(0.110)				
att2 × 50	-0.355 **	(0.129)	-0.263 **	(0.076)	-0.270 **	(0.076)
att3 × 50	0.388 **	(0.123)	0.332 **	(0.078)	0.336 **	(0.075)
att4 × 50	0.139	(0.110)	0.190 *	(0.075)	0.193 **	(0.074)
att5 × 50	-0.328 **	(0.112)	-0.269 **	(0.063)	-0.288 **	(0.062)
att6 × 50	0.346 **	(0.133)	0.449 **	(0.078)	0.469 **	(0.076)
att7 × 50	-0.067	(0.109)				
att8 × 50	0.126	(0.115)	0.241 **	(0.061)	0.247 **	(0.061)
att9 × 50	-0.006	(0.093)				
att10 × 50	-0.405 *	(0.175)	-0.337 **	(0.118)	-0.338 **	(0.116)
att11 × 50	-0.208	(0.127)	-0.307 **	(0.087)	-0.306 **	(0.087)
att12 × 50	-0.182	(0.123)	-0.225 **	(0.086)	-0.233 **	(0.087)
att13 × 50	0.267	(0.176)				
att14 × 50	0.142	(0.120)				
att15 × 50	-0.303 **	(0.108)	-0.307 **	(0.074)	-0.305 **	(0.073)
att16 × 50	0.229	(0.126)	0.220 *	(0.096)	0.220 *	(0.095)
att17 × 50	0.033	(0.147)				
att18 × 50	-0.392 **	(0.108)	-0.234 **	(0.062)	-0.237 **	(0.060)
att19 × 50	-0.433 **	(0.135)	-0.335 **	(0.108)	-0.340 **	(0.107)
att20 × 50	-0.183	(0.119)				
att21 × 50	-0.161	(0.115)				
att22 × 50	0.403 **	(0.105)	0.386 **	(0.077)	0.385 **	(0.077)
att23 × 50	0.021	(0.115)				
att24 × 50	-0.264 *	(0.122)	-0.189 **	(0.065)	-0.178 **	(0.063)
att25 × 50	-0.503 **	(0.110)	-0.408 **	(0.071)	-0.404 **	(0.070)
att26 × 50	0.021	(0.109)				
att1 × Canal	0.026	(0.157)	0.097	(0.089)	0.078	(0.085)
att2 × Canal	-0.123	(0.141)	-0.022	(0.089)	-0.011	(0.086)

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
att3 × Canal	0.265 *	(0.135)	0.276 **	(0.103)	0.268 **	(0.102)
att4 × Canal	0.218	(0.139)	0.287 **	(0.099)	0.302 **	(0.098)
att5 × Canal	0.010	(0.131)				
att6 × Canal	0.193	(0.155)	0.181	(0.112)	0.155	(0.105)
att7 × Canal	0.211	(0.128)	0.269 **	(0.091)	0.296 **	(0.088)
att8 × Canal	-0.146	(0.152)	-0.016	(0.085)	-0.029	(0.083)
att9 × Canal	0.002	(0.107)				
att14 × Canal	0.009	(0.113)	0.063	(0.082)	0.052	(0.079)
att15 × Canal	-0.329 **	(0.118)	-0.266 **	(0.083)	-0.271 **	(0.081)
att18 × Canal	-0.052	(0.154)				
att21 × Canal	0.334 *	(0.164)	0.366 **	(0.100)	0.340 **	(0.095)
att22 × Canal	-0.198	(0.140)				
att23 × Canal	-0.145	(0.147)				
att24 × Canal	-0.033	(0.127)				
att25 × Canal	-0.060	(0.126)	-0.053	(0.085)	-0.064	(0.083)
att26 × Canal	0.101	(0.149)	0.134	(0.094)	0.133	(0.092)
att1 × Pipeline	-0.480 **	(0.180)	-0.272 **	(0.102)	-0.272 **	(0.094)
att2 × Pipeline	-0.453 *	(0.191)	-0.166	(0.107)	-0.166	(0.106)
att3 × Pipeline	0.228	(0.213)	0.217	(0.130)	0.228 *	(0.108)
att4 × Pipeline	-0.276	(0.148)	-0.125	(0.106)	-0.126	(0.105)
att5 × Pipeline	-0.269	(0.179)				
att6 × Pipeline	-0.630 **	(0.137)	-0.492 **	(0.098)	-0.508 **	(0.095)
att7 × Pipeline	-0.287	(0.179)	-0.107	(0.097)	-0.097	(0.093)
att8 × Pipeline	-0.816 **	(0.154)	-0.570 **	(0.103)	-0.567 **	(0.094)
att9 × Pipeline	0.006	(0.147)				
att14 × Pipeline	-0.462 *	(0.207)	-0.302 **	(0.104)	-0.296 **	(0.099)
att15 × Pipeline	-0.340	(0.247)	0.047	(0.116)	0.039	(0.115)
att18 × Pipeline	-0.372	(0.190)				
att21 × Pipeline	-0.029	(0.145)	0.190 *	(0.086)	0.184 *	(0.085)
att22 × Pipeline	-0.182	(0.172)				
att23 × Pipeline	-0.315	(0.208)				
att24 × Pipeline	-0.334	(0.247)				
att25 × Pipeline	-0.537 **	(0.184)	-0.273 **	(0.092)	-0.263 **	(0.092)
att26 × Pipeline	-0.520 *	(0.217)	-0.289 *	(0.113)	-0.301 **	(0.113)
att1 × WTW	0.018	(0.233)	0.117	(0.144)	0.109	(0.142)
att2 × WTW	-0.678 **	(0.175)	-0.616 **	(0.135)	-0.625 **	(0.135)
att3 × WTW	-0.664 **	(0.195)	-0.347 *	(0.151)	-0.349 *	(0.152)
att4 × WTW	-0.123	(0.175)	-0.163	(0.132)	-0.161	(0.132)
att5 × WTW	0.000	(0.148)				
att6 × WTW	0.097	(0.150)	0.067	(0.102)	0.064	(0.101)
att7 × WTW	0.239	(0.185)	0.241 *	(0.117)	0.249 *	(0.116)
att8 × WTW	0.001	(0.140)	0.075	(0.104)	0.078	(0.105)
att9 × WTW	0.168	(0.142)				
att14 × WTW	-0.283	(0.186)	-0.224	(0.143)	-0.230	(0.143)
att15 × WTW	0.001	(0.158)	0.036	(0.093)	0.040	(0.093)
att18 × WTW	0.115	(0.150)				
att21 × WTW	0.979 **	(0.174)	0.940 **	(0.122)	0.957 **	(0.121)
att22 × WTW	0.107	(0.206)				
att23 × WTW	-0.218	(0.169)				
att24 × WTW	-0.222	(0.231)				
att25 × WTW	0.135	(0.154)	0.079	(0.111)	0.079	(0.111)

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
att26 × WTW	1.095 **	(0.184)	1.093 **	(0.118)	1.093 **	(0.118)
No. observations	118,040		118,040		118,040	
No. participants	5,902		5,902		5,902	
Pseudo R-squared	0.15		0.15		0.15	

Note: Conditional logit estimates on weighted data. Dependent variable: choice. Standard errors clustered by participant. ** $p < 0.01$, * $p < 0.05$. 'att1' to 'att26' are dummy variables marking project additions (see Table 1). 'bill' measures the bill impact. ' × ' denotes interaction terms. 'Aff', 'Ang', etc. are company dummies (base: Thames). '50' is a dummy variable indicating sites 50 miles away. 'Canal', 'Pipeline', and 'WTW' are dummy variables indicating the type of site.

Model Development: Non-Household

The modelling approach for non-households was largely the same as for households. Given that the non-household sample was relatively small, we chose not to include any bill × company and bill × distance × site interactions in the initial model. The same stepwise model reduction procedure was applied as for households. Unsurprisingly, given the considerably smaller sample size and poorer fit of the model, a greater number of project-addition-specific site and distance effects were excluded. In the final step, leading from the intermediate model in column (2) to the final model in column (3), all bill interaction terms, which were individually and jointly insignificant, were excluded.

The bill impact is negative and highly statistically significant in the final model, allowing estimation of WTP values. The final model also yields substantially more precise estimates than the initial, unrestricted model. However, as a consequence of a poorer fit to the data compared to the final household model and a smaller sample size, WTP estimates for project additions are less precise overall than for households.

Table 37: Model development stages: non-household

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
bill	-96.672 **	(13.882)	-93.059 **	(12.840)	-99.716 **	(9.052)
bill × Canal	-26.919	(28.956)	-24.195	(22.887)		
bill × Pipeline	10.621	(36.878)	-18.670	(21.443)		
bill × WTW	11.057	(35.619)	11.274	(21.139)		
bill × 50	-11.713	(15.501)	-3.479	(13.507)		
att1	0.584	(0.315)	0.196	(0.168)	0.212	(0.168)
att2	1.368 **	(0.432)	0.704 **	(0.141)	0.713 **	(0.138)
att3	0.738 *	(0.369)	0.509 **	(0.180)	0.538 **	(0.178)
att4	0.570	(0.309)	0.248	(0.128)	0.272 *	(0.127)
att5	1.006 **	(0.343)	0.556 **	(0.131)	0.600 **	(0.127)
att6	0.559 *	(0.277)	0.424 **	(0.124)	0.446 **	(0.121)
att7	0.830 *	(0.351)	0.615 **	(0.129)	0.633 **	(0.128)
att8	0.546	(0.312)	0.420 *	(0.178)	0.426 *	(0.181)
att9	0.288	(0.222)	0.091	(0.124)	0.108	(0.122)
att10	0.792	(0.421)	0.361	(0.195)	0.379	(0.195)
att11	0.677 *	(0.306)	0.384	(0.224)	0.393	(0.224)
att12	0.980 **	(0.344)	0.572 **	(0.210)	0.597 **	(0.211)
att13	0.953	(0.566)	0.461 **	(0.141)	0.470 **	(0.138)
att14	0.499	(0.293)	0.425 **	(0.133)	0.435 **	(0.132)

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
att15	0.889 **	(0.303)	0.578 **	(0.124)	0.593 **	(0.123)
att16	0.139	(0.326)	0.051	(0.165)	0.070	(0.165)
att17	1.092 **	(0.360)	0.910 **	(0.169)	0.932 **	(0.167)
att18	0.809 *	(0.317)	0.448 **	(0.155)	0.469 **	(0.154)
att19	1.334 **	(0.447)	0.956 **	(0.290)	0.975 **	(0.289)
att20	0.231	(0.356)	0.114	(0.156)	0.132	(0.154)
att21	0.117	(0.349)	-0.179	(0.173)	-0.156	(0.171)
att22	0.381	(0.249)	0.207	(0.155)	0.198	(0.153)
att23	0.689 *	(0.274)	0.386 **	(0.130)	0.406 **	(0.126)
att24	0.900 *	(0.369)	0.588 **	(0.127)	0.605 **	(0.126)
att25	0.807 *	(0.355)	0.690 **	(0.138)	0.708 **	(0.136)
att26	0.832 **	(0.301)	0.637 **	(0.184)	0.659 **	(0.183)
att1 × 50	-0.508	(0.357)				
att2 × 50	-0.564	(0.421)				
att3 × 50	-0.140	(0.396)				
att4 × 50	0.055	(0.385)				
att5 × 50	-0.513	(0.336)				
att6 × 50	-0.128	(0.417)				
att7 × 50	-0.064	(0.359)				
att8 × 50	0.429	(0.363)	0.626 **	(0.179)	0.621 **	(0.181)
att9 × 50	0.142	(0.314)				
att10 × 50	-0.999	(0.601)				
att11 × 50	-0.732	(0.396)	-0.508 *	(0.250)	-0.513 *	(0.249)
att12 × 50	-0.918 *	(0.412)	-0.569 *	(0.262)	-0.580 *	(0.262)
att13 × 50	-0.542	(0.638)				
att14 × 50	0.225	(0.376)				
att15 × 50	-0.261	(0.355)				
att16 × 50	0.095	(0.412)				
att17 × 50	-0.103	(0.474)				
att18 × 50	-0.533	(0.381)				
att19 × 50	-1.153 **	(0.427)	-0.750 **	(0.275)	-0.756 **	(0.276)
att20 × 50	0.128	(0.416)				
att21 × 50	-0.311	(0.357)				
att22 × 50	0.305	(0.365)	0.531 *	(0.212)	0.553 **	(0.210)
att23 × 50	-0.206	(0.359)				
att24 × 50	-0.596	(0.391)				
att25 × 50	0.020	(0.359)				
att26 × 50	-0.155	(0.341)				
att1 × Canal	-0.638	(0.536)	-0.166	(0.273)	-0.161	(0.269)
att2 × Canal	-0.741	(0.502)				
att3 × Canal	-0.116	(0.442)	-0.033	(0.262)	-0.063	(0.258)
att4 × Canal	-0.358	(0.462)				
att5 × Canal	-0.256	(0.462)				
att6 × Canal	0.260	(0.478)				
att7 × Canal	0.083	(0.416)				
att8 × Canal	-0.941	(0.501)	-0.775 **	(0.250)	-0.744 **	(0.248)
att9 × Canal	-0.353	(0.355)				
att14 × Canal	0.033	(0.369)				
att15 × Canal	-0.564	(0.391)				
att18 × Canal	-0.979	(0.524)	-0.506 **	(0.179)	-0.461 **	(0.176)
att21 × Canal	-0.291	(0.521)	-0.236	(0.241)	-0.238	(0.238)
att22 × Canal	-0.230	(0.470)				

	(1)		(2)		(3)	
	General model		Intermediate model		Final model	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
att23 × Canal	-0.145	(0.457)				
att24 × Canal	-0.149	(0.410)				
att25 × Canal	-0.196	(0.404)				
att26 × Canal	-0.621	(0.471)	-0.546 *	(0.247)	-0.544 *	(0.243)
att1 × Pipeline	-0.049	(0.568)	0.456	(0.262)	0.479	(0.258)
att2 × Pipeline	-0.894	(0.633)				
att3 × Pipeline	-0.263	(0.639)	0.280	(0.321)	0.200	(0.290)
att4 × Pipeline	-0.702	(0.465)				
att5 × Pipeline	-1.300 *	(0.580)				
att6 × Pipeline	-0.769	(0.425)				
att7 × Pipeline	-0.765	(0.559)				
att8 × Pipeline	-1.446 **	(0.454)	-0.525 *	(0.228)	-0.484 *	(0.224)
att9 × Pipeline	-0.818	(0.483)				
att14 × Pipeline	-0.302	(0.646)				
att15 × Pipeline	0.074	(0.816)				
att18 × Pipeline	-1.208 *	(0.603)	-0.011	(0.178)	-0.007	(0.178)
att21 × Pipeline	-0.548	(0.486)	0.370	(0.259)	0.346	(0.258)
att22 × Pipeline	-0.033	(0.508)				
att23 × Pipeline	-0.106	(0.678)				
att24 × Pipeline	-0.953	(0.776)				
att25 × Pipeline	-0.412	(0.562)				
att26 × Pipeline	-0.038	(0.721)	0.182	(0.278)	0.177	(0.271)
att1 × WTW	0.490	(0.694)	0.696 *	(0.321)	0.763 *	(0.319)
att2 × WTW	-0.719	(0.546)				
att3 × WTW	-1.750 **	(0.570)	-0.866 *	(0.349)	-0.799 *	(0.339)
att4 × WTW	-0.132	(0.568)				
att5 × WTW	-0.249	(0.458)				
att6 × WTW	0.045	(0.456)				
att7 × WTW	-0.435	(0.569)				
att8 × WTW	0.189	(0.465)	-0.066	(0.278)	-0.059	(0.282)
att9 × WTW	-0.034	(0.471)				
att14 × WTW	-0.655	(0.576)				
att15 × WTW	-0.025	(0.507)				
att18 × WTW	0.936	(0.501)	0.233	(0.219)	0.238	(0.221)
att21 × WTW	0.993 *	(0.486)	0.647 *	(0.320)	0.632	(0.324)
att22 × WTW	0.666	(0.698)				
att23 × WTW	-1.050 *	(0.432)				
att24 × WTW	-0.231	(0.697)				
att25 × WTW	0.185	(0.497)				
att26 × WTW	0.916	(0.498)	0.646 *	(0.270)	0.651 *	(0.271)
No. observations	11,060		11,060		11,060	
No. participants	553		553		553	
Pseudo R-squared	0.10		0.09		0.09	

Note: Conditional logit estimates on weighted data. Dependent variable: choice. Standard errors clustered by participant. ** $p < 0.01$, * $p < 0.05$. 'att1' to 'att26' are dummy variables marking project additions (see Table 1). 'bill' measures the bill impact. ' × ' denotes interaction terms. '50' is a dummy variable indicating sites 50 miles away. 'Canal', 'Pipeline', and 'WTW' are dummy variables indicating the type of site.

Appendix G

Aggregated Valuations

Appendix G Aggregated Valuations

The following tables show the value of each type of project addition (identified by attribute numbers 1-26), aggregated to the whole population that benefits from the project within each company area and distance band from its location.

For example, the first value in the first column of Table 38 (£10,876/year) is the total value of "One in every 50 jobs will be an apprenticeship" project addition for Fens Reservoir for the whole population living in the Affinity Water area and within 30-35 miles from the reservoir.

The values were calculated using the methods described in Section 3.5.

Table 38: Aggregated valuations (£/year): Fens Reservoir

Attribute	Distance from reservoir (miles)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Affinity Water										
1	-	-	-	-	-	-	10,876	32,596	45,480	88,211
2	-	-	-	-	-	-	16,719	48,088	64,216	118,855
3	-	-	-	-	-	-	1,998	8,501	15,440	37,028
4	-	-	-	-	-	-	3,529	12,025	18,841	40,626
5	-	-	-	-	-	-	13,277	37,636	49,440	89,813
6	-	-	-	-	-	-	12,781	41,820	63,350	132,769
7	-	-	-	-	-	-	6,080	18,224	25,428	49,318
8	-	-	-	-	-	-	13,930	43,601	63,468	128,313
9	-	-	-	-	-	-	3,201	9,594	13,387	25,964
10	-	-	-	-	-	-	3,687	8,516	8,275	8,910
11	-	-	-	-	-	-	5,360	13,770	15,947	24,463
12	-	-	-	-	-	-	2,970	7,157	7,504	9,643
13	-	-	-	-	-	-	7,812	23,415	32,670	63,366
14	-	-	-	-	-	-	9,013	27,013	37,690	73,101
15	-	-	-	-	-	-	11,899	33,381	43,326	77,604
16	-	-	-	-	-	-	4,690	15,703	24,250	51,669
17	-	-	-	-	-	-	7,945	23,812	33,224	64,441
18	-	-	-	-	-	-	13,345	38,218	50,791	93,499
19	-	-	-	-	-	-	12,950	36,270	46,982	83,954
20	-	-	-	-	-	-	807	2,418	3,374	6,544
21	-	-	-	-	-	-	- 4,142	-12,413	-17,320	-33,592
22	-	-	-	-	-	-	11,384	37,005	55,737	116,230
23	-	-	-	-	-	-	8,860	26,554	37,050	71,861
24	-	-	-	-	-	-	11,026	31,713	42,347	78,375
25	-	-	-	-	-	-	16,827	47,412	61,849	111,443
26	-	-	-	-	-	-	18,806	56,366	78,645	152,537
Anglian Water										
1	97,446	88,591	261,929	233,694	175,606	179,365	210,054	349,244	484,558	243,460
2	183,687	162,103	464,531	401,049	291,093	286,629	322,900	515,207	684,168	328,035
3	-24,226	- 15,941	-28,803	-9,031	5,981	19,404	38,602	91,106	164,515	102,196
4	7,332	10,173	40,645	45,872	41,830	50,390	68,165	128,855	200,749	112,127
5	155,122	135,805	385,787	329,893	236,935	230,594	256,419	403,220	526,734	247,880
6	55,646	59,092	200,327	202,026	169,652	191,863	246,881	448,103	674,980	366,439
7	54,481	49,531	146,443	130,657	98,181	100,282	117,440	195,261	270,914	136,117
8	93,807	89,761	278,879	261,085	205,586	219,772	269,062	467,171	676,226	354,142
9	28,682	26,076	77,097	68,786	51,688	52,795	61,828	102,797	142,626	71,661
10	75,510	62,515	166,351	131,615	86,028	74,464	71,196	91,226	88,148	24,590

Attribute	Distance from reservoir (miles)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
11	86,490	73,076	199,323	162,619	110,541	100,769	103,514	147,523	169,885	67,518
12	55,832	46,539	124,881	99,858	66,181	58,375	57,349	76,673	79,943	26,614
13	69,999	63,639	188,155	167,872	126,145	128,845	150,891	250,877	348,078	174,887
14	80,753	73,416	217,062	193,663	145,526	148,640	174,073	289,420	401,556	201,757
15	144,858	126,172	356,401	302,851	215,982	208,535	229,801	357,631	461,596	214,186
16	14,461	17,128	62,634	66,788	58,541	68,493	90,602	168,256	258,383	142,605
17	71,187	64,718	191,346	170,720	128,285	131,031	153,451	255,133	353,983	177,854
18	149,386	131,506	375,838	323,528	234,074	229,674	257,733	409,459	541,130	258,055
19	158,693	138,113	389,785	330,891	235,716	227,299	250,113	388,583	500,549	231,711
20	7,230	6,573	19,433	17,338	13,028	13,307	15,584	25,911	35,950	18,062
21	-37,109	-33,737	-99,747	-88,995	-66,874	-68,305	-79,993	-132,999	-184,529	-92,714
22	53,672	55,775	185,934	185,014	153,674	172,216	219,899	396,504	593,853	320,790
23	79,384	72,171	213,381	190,380	143,058	146,120	171,122	284,513	394,748	198,336
24	121,165	106,925	306,401	264,521	191,991	189,041	212,955	339,768	451,174	216,312
25	201,438	175,818	497,780	424,077	303,313	293,815	324,993	507,963	658,941	307,580
26	168,506	153,195	452,937	404,112	303,664	310,163	363,233	603,924	837,913	420,998
Severn Trent Water										
1	-	-	-	-	-	-	1.3	5,638	12,554	29,242
2	-	-	-	-	-	-	2.0	8,323	17,733	39,401
3	-	-	-	-	-	-	0.2	1,464	4,253	12,275
4	-	-	-	-	-	-	0.4	2,076	5,196	13,468
5	-	-	-	-	-	-	1.6	6,516	13,655	29,773
6	-	-	-	-	-	-	1.5	7,224	17,475	44,013
7	-	-	-	-	-	-	0.7	3,152	7,019	16,349
8	-	-	-	-	-	-	1.6	7,536	17,513	42,536
9	-	-	-	-	-	-	0.4	1,660	3,695	8,607
10	-	-	-	-	-	-	0.4	1,480	2,293	2,954
11	-	-	-	-	-	-	0.6	2,388	4,410	8,110
12	-	-	-	-	-	-	0.4	1,243	2,078	3,197
13	-	-	-	-	-	-	0.9	4,050	9,018	21,006
14	-	-	-	-	-	-	1.1	4,672	10,404	24,233
15	-	-	-	-	-	-	1.4	5,780	11,968	25,726
16	-	-	-	-	-	-	0.6	2,711	6,688	17,128
17	-	-	-	-	-	-	0.9	4,119	9,171	21,362
18	-	-	-	-	-	-	1.6	6,615	14,027	30,995
19	-	-	-	-	-	-	1.5	6,280	12,978	27,831
20	-	-	-	-	-	-	0.1	418	931	2,169
21	-	-	-	-	-	-	-0.5	-2,147	-4,781	-11,136
22	-	-	-	-	-	-	1.3	6,393	15,375	38,530
23	-	-	-	-	-	-	1.0	4,593	10,227	23,822
24	-	-	-	-	-	-	1.3	5,489	11,694	25,981
25	-	-	-	-	-	-	2.0	8,209	17,084	36,944
26	-	-	-	-	-	-	2.2	9,749	21,709	50,566
South Staffordshire										
1	38,675	54,358	42,754	187,215	76,853	35,778	34,409	4,310	14	-
2	72,903	99,461	75,820	321,265	127,386	57,170	52,891	6,358	20	-
3	-9,615	-9,778	-4,697	-7,211	2,628	3,876	6,328	1,125	5	-
4	2,910	6,244	6,637	36,762	18,313	10,054	11,169	1,591	6	-
5	61,566	83,325	62,967	264,260	103,684	45,992	42,000	4,976	15	-
6	22,085	36,262	32,704	161,877	74,262	38,278	40,448	5,531	19	-
7	21,623	30,391	23,903	104,671	42,968	20,003	19,238	2,410	8	-
8	37,231	55,078	45,523	209,174	89,981	43,842	44,078	5,766	19	-
9	11,384	16,000	12,584	55,105	22,621	10,531	10,128	1,269	4	-
10	29,969	38,355	27,149	105,414	37,639	14,848	11,658	1,125	3	-

Attribute	Distance from reservoir (miles)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
11	34,327	44,835	32,531	130,253	48,367	20,096	16,952	1,820	5	-
12	22,159	28,553	20,381	79,981	28,956	11,640	9,391	946	2	-
13	27,782	39,048	30,712	134,484	55,207	25,701	24,717	3,096	10	-
14	32,050	45,047	35,430	155,145	63,688	29,649	28,515	3,572	12	-
15	57,492	77,414	58,170	242,595	94,513	41,592	37,640	4,413	13	-
16	5,739	10,511	10,226	53,520	25,627	13,666	14,844	2,077	7	-
17	28,253	39,710	31,233	136,765	56,143	26,137	25,137	3,149	10	-
18	59,289	80,687	61,344	259,163	102,433	45,809	42,216	5,053	16	-
19	62,983	84,740	63,619	265,055	103,148	45,334	40,966	4,795	14	-
20	2,869	4,033	3,172	13,890	5,702	2,654	2,553	320	1	-
21	-14,728	-20,700	-16,281	-71,295	-29,267	-13,625	-13,104	-1,641	-5	-
22	21,302	34,226	30,354	148,243	67,267	34,358	36,027	4,894	17	-
23	31,507	44,283	34,830	152,515	62,609	29,147	28,031	3,511	11	-
24	48,089	65,605	50,010	211,897	84,018	37,705	34,882	4,193	13	-
25	79,948	107,875	81,246	339,703	132,730	58,601	53,232	6,269	19	-
26	66,878	93,997	73,931	323,737	132,896	61,868	59,501	7,453	24	-

Table 39: Aggregated valuations (£/year): South Lincolnshire Reservoir

Attribute	Distance from reservoir (miles)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Anglian Water										
1	19,196	49,369	33,463	153,990	95,063	96,681	152,123	117,449	139,562	151,260
2	36,184	90,334	59,347	264,266	157,581	154,498	233,846	173,261	197,053	203,806
3	-4,772	-8,884	-3,680	-5,951	3,238	10,459	27,956	30,639	47,384	63,494
4	1,444	5,669	5,193	30,227	22,644	27,161	49,365	43,333	57,820	69,664
5	30,557	75,679	49,287	217,379	128,263	124,294	185,700	135,601	151,709	154,006
6	10,962	32,930	25,593	133,122	91,840	103,418	178,793	150,694	194,407	227,667
7	10,732	27,602	18,709	86,095	53,149	54,054	85,051	65,665	78,028	84,569
8	18,479	50,021	35,629	172,039	111,292	118,461	194,856	157,107	194,766	220,026
9	5,650	14,531	9,850	45,326	27,981	28,457	44,776	34,570	41,079	44,522
10	14,875	34,837	21,252	86,726	46,570	40,137	51,561	30,679	25,388	15,278
11	17,038	40,723	25,465	107,156	59,841	54,316	74,965	49,611	48,930	41,949
12	10,998	25,934	15,954	65,800	35,826	31,465	41,532	25,785	23,025	16,535
13	13,789	35,464	24,038	110,617	68,288	69,450	109,276	84,368	100,253	108,657
14	15,908	40,912	27,731	127,612	78,779	80,120	126,065	97,330	115,656	125,350
15	28,535	70,311	45,532	199,560	116,921	112,404	166,423	120,269	132,948	133,072
16	2,849	9,545	8,002	44,009	31,691	36,919	65,614	56,583	74,419	88,600
17	14,023	36,065	24,446	112,494	69,446	70,628	111,130	85,800	101,954	110,500
18	29,427	73,284	48,016	213,184	126,714	123,798	186,652	137,699	155,856	160,328
19	31,261	76,966	49,798	218,037	127,603	122,518	181,133	130,678	144,168	143,961
20	1,424	3,663	2,483	11,425	7,053	7,173	11,286	8,714	10,354	11,222
21	-7,310	-18,801	-12,743	-58,642	-36,202	-36,818	-57,931	-44,727	-53,148	-57,603
22	10,573	31,081	23,754	121,912	83,190	92,828	159,252	133,342	171,041	199,305
23	15,638	40,218	27,261	125,448	77,444	78,761	123,927	95,680	113,695	123,225
24	23,868	59,585	39,145	174,303	103,933	101,896	154,223	114,262	129,947	134,393
25	39,681	97,977	63,594	279,440	164,196	158,372	235,361	170,825	189,787	191,098
26	33,194	85,370	57,866	266,284	164,386	167,184	263,055	203,096	241,335	261,564

Table 40: Aggregated valuations (£/year): Grand Union Canal

Attribute	Distance from canal (miles)									
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Affinity Water										

	Distance from canal (miles)									
Attribute	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
1	448,203	75,825	226,554	454,633	451,717	435,838	858,644	893,743	466,899	209,177
2	722,992	118,687	343,582	666,899	639,751	594,762	1,126,532	1,124,582	561,907	240,046
3	110,968	23,280	83,279	195,189	222,369	242,524	533,999	615,501	353,348	172,846
4	262,578	47,020	148,399	313,979	328,356	332,939	688,323	750,860	410,591	192,333
5	617,788	100,646	288,936	555,723	527,753	485,190	907,628	893,507	439,474	184,409
6	341,163	64,015	210,445	461,535	498,310	519,886	1,102,772	1,231,246	687,663	328,404
7	445,531	75,373	225,203	451,922	449,024	433,239	853,524	888,414	464,115	207,930
8	351,058	62,707	197,462	416,913	435,166	440,457	909,112	990,195	540,696	252,942
9	114,230	19,325	57,740	115,869	115,126	111,079	218,836	227,781	118,995	53,311
14	361,450	61,148	182,703	366,635	364,283	351,478	692,446	720,752	376,526	168,689
15	367,470	58,075	161,062	297,725	270,003	235,117	412,180	374,854	166,952	61,596
18	594,944	97,460	281,483	544,995	521,375	483,249	912,269	907,324	451,482	191,979
21	115,226	19,493	58,243	116,879	116,129	112,047	220,744	229,767	120,032	53,776
22	213,753	41,332	139,240	311,621	342,243	362,306	778,260	878,538	495,446	238,650
23	316,155	53,485	159,807	320,691	318,634	307,432	605,672	630,430	329,342	147,550
24	482,550	79,242	229,478	445,595	427,639	397,753	753,768	752,893	376,428	160,924
25	752,953	121,961	347,898	664,382	625,927	570,284	1,055,925	1,027,324	498,432	205,817
26	773,911	130,926	391,190	785,013	779,978	752,559	1,482,617	1,543,223	806,192	361,186
Anglian Water										
1	703,850	319,605	236,191	242,615	279,351	261,672	104,126	122,513	23,374	64,285
2	1,135,381	500,268	358,191	355,882	395,623	357,076	136,608	154,152	28,130	73,772
3	174,263	98,134	86,833	104,178	137,537	145,628	64,764	84,378	17,690	53,120
4	412,349	198,196	154,719	167,564	203,074	199,904	83,475	102,930	20,556	59,108
5	970,167	424,221	301,219	296,551	326,359	291,288	110,061	122,476	22,001	56,673
6	535,760	269,838	219,414	246,320	308,193	312,160	133,741	168,786	34,427	100,926
7	699,657	317,701	234,784	241,170	277,687	260,113	103,505	121,783	23,235	63,902
8	551,299	264,322	205,871	222,498	269,131	264,460	110,252	135,740	27,069	77,735
9	179,386	81,456	60,197	61,834	71,196	66,691	26,538	31,224	5,957	16,384
14	567,617	257,744	190,476	195,656	225,282	211,024	83,972	98,800	18,850	51,842
15	577,071	244,783	167,905	158,869	166,960	141,146	49,979	51,379	8,357	18,930
18	934,294	410,794	293,452	290,829	322,418	290,126	110,625	124,371	22,602	59,000
21	180,950	82,166	60,721	62,373	71,817	67,272	26,769	31,496	6,009	16,527
22	335,675	174,228	145,176	166,314	211,673	217,546	94,386	120,436	24,804	73,343
23	496,487	225,445	166,607	171,138	197,051	184,581	73,449	86,419	16,488	45,346
24	757,792	334,007	239,235	237,786	264,453	238,798	91,405	103,203	18,845	49,456
25	1,182,427	514,062	362,686	354,532	387,065	342,371	128,042	140,817	24,952	63,252
26	1,215,340	551,863	407,832	418,925	482,357	451,830	179,795	211,543	40,360	111,001
Severn Trent Water										
1	1,010,396	1,119,394	1,084,320	777,154	1,033,686	1,246,832	605,654	692,576	511,519	877,765
2	1,629,861	1,752,650	1,645,270	1,140,790	1,465,161	1,702,938	795,265	872,051	615,864	1,007,302
3	250,157	343,077	397,551	332,683	507,388	691,996	375,854	476,229	386,802	725,312
4	591,933	693,799	709,661	536,155	750,544	951,416	485,049	581,430	449,648	807,084
5	1,392,697	1,486,341	1,383,783	950,797	1,208,949	1,389,576	640,902	693,027	481,748	773,835
6	769,092	944,205	1,005,773	787,590	1,138,254	1,484,744	776,724	953,089	752,941	1,378,080
7	1,004,370	1,112,718	1,077,853	772,519	1,027,522	1,239,396	602,042	688,446	508,469	872,531
8	791,400	925,304	944,319	711,958	994,732	1,258,718	640,659	766,782	592,140	1,061,422
9	257,512	285,291	276,352	198,067	263,448	317,771	154,359	176,512	130,367	223,710
14	814,826	902,727	874,442	626,730	833,609	1,005,498	488,425	558,523	412,511	707,867
15	828,397	857,904	771,809	509,821	619,199	674,263	291,471	291,149	183,196	258,474
18	1,341,197	1,439,214	1,347,955	932,310	1,194,131	1,383,747	644,052	703,621	494,854	805,595
21	259,757	287,779	278,762	199,794	265,745	320,541	155,704	178,051	131,504	225,660
22	481,868	609,497	665,232	531,569	781,484	1,034,393	548,026	679,950	542,431	1,001,441
23	712,718	789,604	764,863	548,192	729,147	879,496	427,219	488,533	360,818	619,162
24	1,087,824	1,170,164	1,098,865	762,223	979,371	1,138,844	532,110	583,822	412,573	675,284

	Distance from canal (miles)									
Attribute	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
25	1,697,400	1,801,217	1,666,340	1,136,874	1,434,110	1,633,630	745,781	796,974	546,447	863,666
26	1,744,642	1,932,850	1,872,289	1,341,908	1,784,862	2,152,900	1,045,781	1,195,871	883,241	1,515,638
South Staffordshire Water										
1	47,659	213,099	153,092	671,980	544,193	357,050	80,063	32,194	37,803	57,482
2	76,879	333,549	232,158	985,636	770,641	487,191	105,030	40,505	45,493	65,965
3	11,800	65,441	56,295	288,617	267,998	198,753	49,806	22,176	28,613	47,499
4	27,921	132,154	100,291	464,149	395,638	272,793	64,190	27,050	33,246	52,854
5	65,692	282,844	195,230	821,303	635,708	397,422	84,618	32,181	35,580	50,676
6	36,277	179,930	142,235	682,341	600,471	426,002	102,846	44,357	55,682	90,246
7	47,375	211,829	152,180	667,974	540,949	354,922	79,585	32,002	37,578	57,140
8	37,329	176,245	133,448	616,310	524,330	360,886	84,779	35,672	43,781	69,509
9	12,147	54,311	39,018	171,263	138,695	90,999	20,405	8,205	9,635	14,650
14	38,434	171,852	123,460	541,913	438,860	287,941	64,566	25,962	30,486	46,356
15	39,075	163,203	108,819	439,960	325,187	192,553	38,420	13,499	13,515	16,927
18	63,263	273,892	190,197	805,462	628,040	395,842	85,053	32,680	36,553	52,756
21	12,252	54,785	39,358	172,756	139,904	91,792	20,583	8,277	9,719	14,778
22	22,729	116,179	94,113	460,728	412,427	296,890	72,584	31,651	40,118	65,581
23	33,618	150,318	107,989	474,006	383,867	251,859	56,475	22,709	26,666	40,547
24	51,311	222,696	155,058	658,562	515,132	325,814	70,276	27,118	30,477	44,222
25	80,064	342,743	235,066	981,868	753,943	467,109	98,441	37,000	40,353	56,559
26	82,293	367,958	264,344	1,160,305	939,656	616,518	138,244	55,589	65,275	99,255
Severn Trent Water										
1	-	7,208	162,489	44,496	61,423	268,440	365,641	1,097,650	2,935,558	2,916,565
2	-	11,286	246,549	65,316	87,062	366,639	480,112	1,382,095	3,534,384	3,346,980
3	-	2,209	59,574	19,048	30,150	148,985	226,908	754,765	2,219,815	2,410,005
4	-	4,468	106,345	30,697	44,599	204,838	292,831	921,497	2,580,483	2,681,709
5	-	9,571	207,364	54,438	71,838	299,173	386,921	1,098,365	2,764,704	2,571,233
6	-	6,080	150,718	45,093	67,637	319,662	468,918	1,510,531	4,321,053	4,578,967
7	-	7,165	161,520	44,230	61,057	266,839	363,461	1,091,105	2,918,054	2,899,174
8	-	5,958	141,509	40,763	59,109	270,999	386,774	1,215,257	3,398,230	3,526,803
9	-	1,837	41,412	11,340	15,655	68,415	93,188	279,750	748,166	743,325
14	-	5,813	131,038	35,883	49,535	216,482	294,869	885,192	2,367,359	2,352,042
15	-	5,524	115,658	29,190	36,794	145,167	175,965	461,436	1,051,341	858,834
18	-	9,268	201,995	53,379	70,957	297,918	388,823	1,115,155	2,839,917	2,676,764
21	-	1,853	41,773	11,439	15,791	69,012	94,001	282,189	754,688	749,805
22	-	3,925	99,687	30,435	46,437	222,703	330,850	1,077,639	3,112,958	3,327,503
23	-	5,085	114,617	31,387	43,327	189,354	257,918	774,265	2,070,697	2,057,299
24	-	7,535	164,668	43,641	58,196	245,191	321,242	925,287	2,367,715	2,243,777
25	-	11,599	249,706	65,092	85,217	351,717	450,238	1,263,108	3,136,006	2,869,716
26	-	12,446	280,568	76,831	106,060	463,515	631,352	1,895,311	5,068,828	5,036,035