



Revised Draft Water Resources Management Plan 2019

Technical Report - Customer and stakeholder engagement



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1. Introduction

We believe that effective engagement with customers, stakeholders and regulators is critical to the development of a successful Water Resources Management Plan. Regulators and government also emphasise this. The Defra *Guiding principles for water resources planning* (2016) ('guiding principles') state that "we want to see you collaborate with customers, partners and regulators to develop a strong understanding of future needs, explore every option, and build consensus on delivery plans." They also state that any options being promoted must have "customer support, with evidence about preferences and willingness to pay" and are supported by "discussions with stakeholders and regulators". Such statements are complemented in the Environment Agency and Natural Resources Wales *Water Resources Planning Guideline* (2018) ('planning guidelines').

Therefore, in developing our Water Resources Management Plan 2019 (WRMP19), we have set out to conduct a large and varied set of customer and stakeholder engagement, and actively engage with regulators. We started these activities much earlier in the planning process than in previous planning rounds to maximise the benefit of this dialogue and to ensure we were able to take customer, stakeholder and regulator feedback fully on-board in developing the plan. For example, we commenced our stakeholder pre-consultation process in autumn 2016. By commencing our research activities earlier, it helped ensure that we were engaging early, engaging widely and using different or innovative approaches to prioritise the major issues affecting customers and stakeholders within the North West when developing the plan.

This technical report summarises the aims, methodologies and outcomes of research conducted as part of the Water Resources Management Plan 2019 preparation. This version of the report also includes appropriate changes following consultation on our draft Water Resources Management Plan, which took place in spring 2018. As part of building our plan, we sought to engage widely on potential solutions and options. This ensures our options are as broad as possible and includes liaison with third party suppliers. Further information on our interactions with third party water suppliers can be found in the *Revised Draft WRMP19 Technical Report - Options identification*.

An aim of the Water Resources Management Plan was for less reliance from water companies on traditional methods of surveying or capturing willingness to pay. We have therefore employed a number of different and innovative approaches to engage with customers and stakeholders, as outlined in Figure 1, ensuring that we are not reliant on any single method of data capture, which might bias results¹. As leakage is a particular area of focus in our Water Resources Management Plan, we have done additional work in this area, along with water trading as a key national theme. Resilience is also a key theme for this planning round, as highlighted in the guiding principles, so we have explored views on water resources drought severity risk, as well as conducting wider innovative research on water supply resilience.

Figure 1 shows an overview of the customer and stakeholder engagement process associated with the Water Resources Management Plan, which has been completed in combination with our wider company Business Planning process.

¹ In our plan we have also used business as usual data sources as part of collecting evidence to support plan development. Despite this, given the inherent nature of water resources and water supply resilience considerations typically covering low likelihood yet potentially high consequence events, there is a need to conduct specific surveys and other experiments as a major component of our engagement activity.

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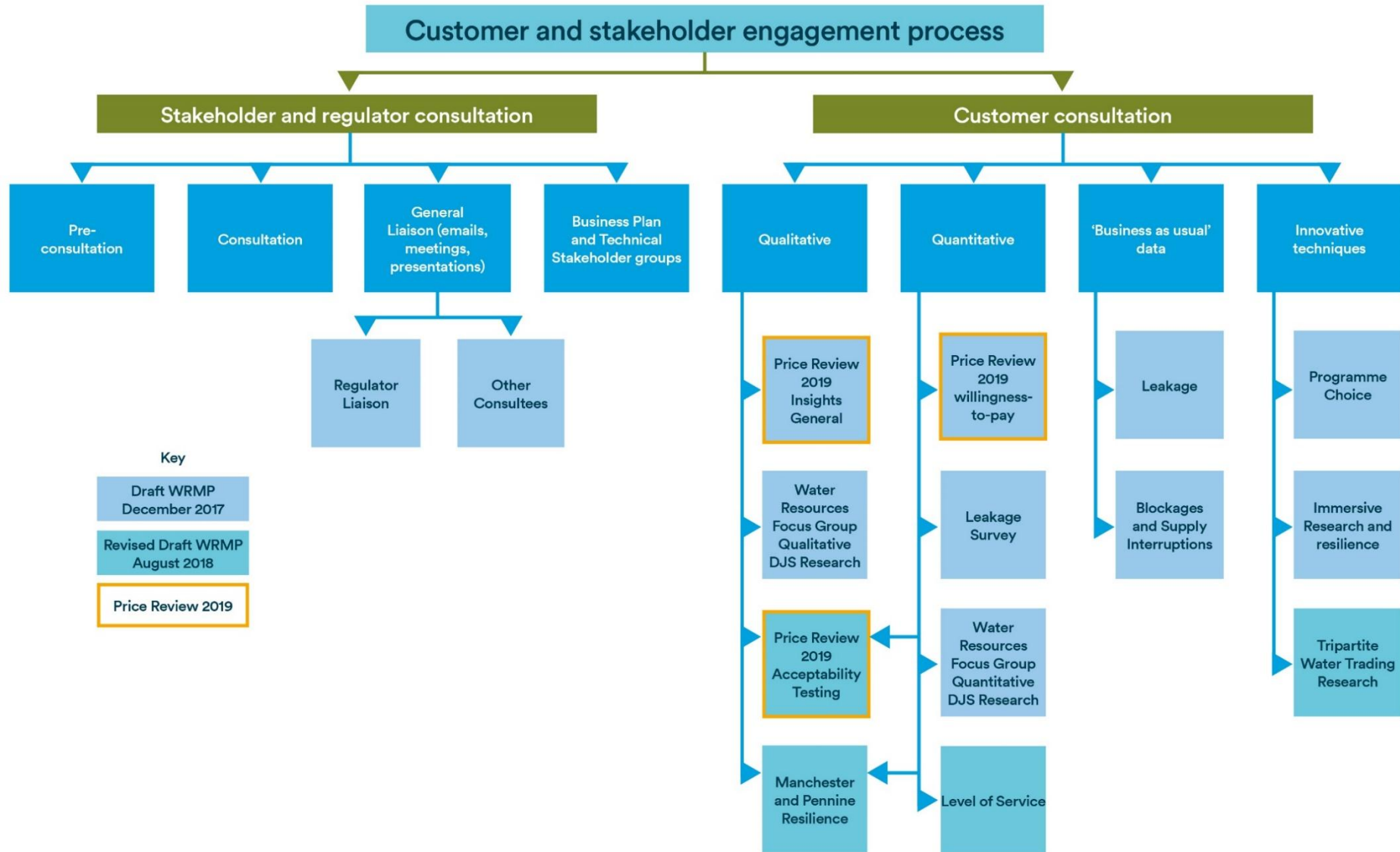


Figure 1 Structure of research and engagement activities supporting Water Resources Management Plan 2019 development

1.1 Changes from draft to revised draft WRMP

Change	Reason	Update(s)	Relevant section(s)
New section on consultation	Summary of the approach taken to our draft WRMP19 consultation	Additional Section 3	Section 3
Expanded YourVoice (Customer Challenge Group, CCG) section	Provide more detail of engagement and influence on the plans development of the YourVoice (CGG) group	Added to text of Section 4.1.1	Section 4.1.1
Level of service research	Further exploration of customer views on levels of service (with and without comparison to other companies)	Summary of new research Section 4.3.6	Section 4.3.6
Programme choice experiment update	Further research carried out using programme choice method	Summary of new research in Section 4.3.8.2	Section 4.3.8.2
Acceptability testing (customer research)	Further research carried out relating to programme and bill impacts	Summary of new research Section 4.3.9	Section 4.3.9
Water trading customer research	Further research carried out, including bill impacts	Summary of new research Section 4.3.10	Section 4.3.10
Manchester and Pennine Resilience customer research	Further research carried out, including bill impacts of alternative solutions	Summary of new research Section 5.2	Section 5.2

2. Stakeholder and regulator engagement

2.1 Regulator liaison

We have sought frequent engagement with our regulators throughout the plan development process. This has included targeted Water Resources Management Plan engagement activities, but also updates within general liaison forums where appropriate. These are in addition to our extensive pre-consultation process in autumn 2016, which is summarised in Section 2.2.

In summary, we have:

- Engaged on a bi-monthly basis with the Environment Agency in specific WRMP19 liaison meetings, which started in May 2015. This has been supported by key 'special interest sessions', for example on options identification, water trading and water resources modelling and hydrology;
- Included Natural Resources Wales and Natural England in updates and/or key meetings, where appropriate. All three environmental regulators were included as part of scoping our Strategic Environmental Assessment and Habitats Regulations Assessment processes;
- Completed two engagement meetings with Ofwat on the development of our plan, once prior to our own pre-consultation, in September 2016, and with a follow-up session in July 2017 as part of Ofwat's own pre-consultation programme with water companies;
- Updated the Drinking Water Inspectorate on plan development and our approach to protecting water quality as part of our plans in company liaison meetings during 2017;
- Fully participated in an Environment Agency WRMP19 Technical Advisory Group, whereby companies and regulators discussed the development of latest planning guidelines;
- Shared copies of detailed internal work stream methodologies with the Environment Agency well in advance of plan development and pre-consultation, during spring and summer 2016. This was supported by submission of an overarching method statement at pre-consultation in autumn 2016 (to Ofwat, the Environment Agency and Natural Resources Wales);
- Worked collaboratively with stakeholders, particularly Natural Resources Wales, and other companies/organisations as part of the River Dee Technical Group on our climate change assessments;

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- Natural Resources Wales assessed climate change impacts for the 2080s (aligning to our selected approach) for the River Dee catchment model;
- This provided a water resources modelling input for our climate change assessments for the Strategic Resource Zone, which were subsequently shared with the group. This collaboration ensured a comprehensive review of the impacts of climate change across both the River Dee system and our Strategic Resource Zone; and
- Numerous other abstractors rely on the River Dee as a source, as well as ourselves, and the coherence of the climate change assessment has proven to be of significant value.
- Shared customer engagement material with the Environment Agency for comment prior to completed surveys or research; and
- As part of consultation on our draft Water Resources Management Plan, we held a meeting with our environmental consultants Wood, the Environment Agency and Natural Resources Wales to discuss the environmental impacts of our plan options.

2.2 Pre-consultation

2.2.1 Summary of pre-consultation

Pre-consultation is a requirement of all water companies for their Water Resources Management Plans, although the approach individual companies take can vary widely. The pre-consultation allows regulators and stakeholders to comment on how we should develop our plan and the priorities we should tackle. As part of our pre-consultation process we contacted both statutory and non-statutory stakeholders as recommended in Section 2.3 of the planning guidelines. We also sought to engage as early as possible in the process, beginning pre-consultation in autumn 2016², and with new ways of engaging compared to previous planning rounds.

2.2.2 Approach to pre-consultation

Using previous customer and stakeholder feedback, national studies and policy work, we identified six main themes as being the most pertinent and pressing matters to affect the North West region over the next 25 years. We did this to support and target dialogue on the development of the draft plan, as well as requesting any general feedback through the process. The key themes we identified are shown in Figure 2.

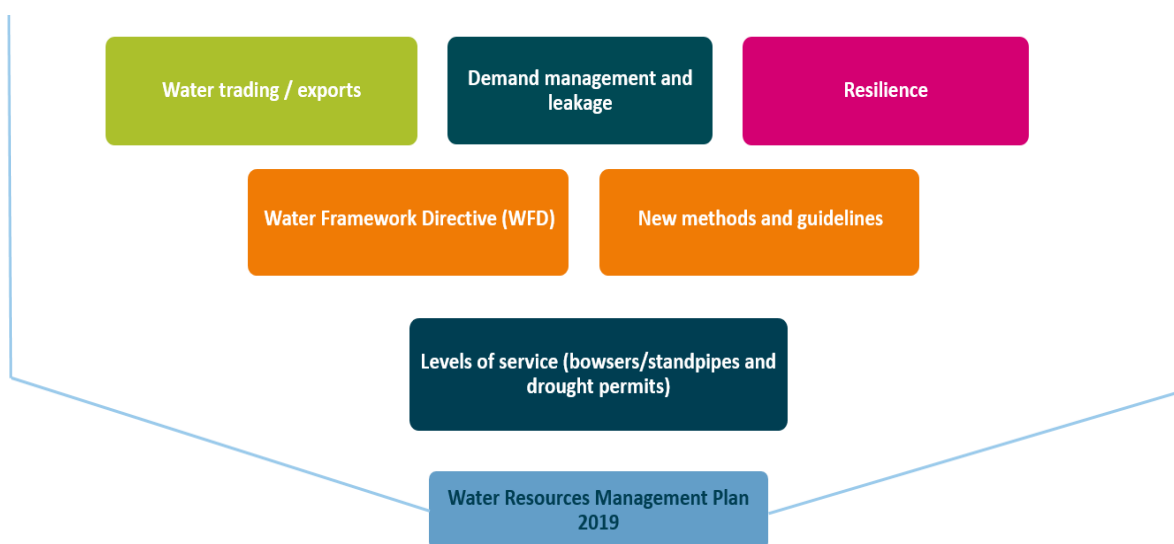


Figure 2 Main themes of our Water Resources Management Plan 2019

Letters and accompanying briefing notes were sent to statutory and non-statutory consultees and all known stakeholders. This included stakeholders from our previous Water Resources Management Plans and Drought Plans,

² Around the same time, we also initiated market engagement activities on potential third party options, including a market engagement event. This is detailed further in *Revised Draft WRMP19 technical report – Options identification*.

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such as environmental groups, local authorities, business groups, and regulators. The briefing notes were Crystal Mark³ accredited and focused on the Defra guiding principles and the main themes of our plan (as outlined in Figure 2 above). Ofwat, the Environment Agency and Natural Resources Wales all received a more detailed methodology statement as required by the planning guidelines; this included cumulated feedback from previous discussions on our approach. We then held four events across the region in combination with our Drought Plan consultation.

As part of the pre-consultation, we asked a number of questions to promote and facilitate discussion with our stakeholders. The questions linked to the main themes set out in Figure 2 and are detailed in the box below.

1. *Do you consider the current 1 in 20 year (5% annual average risk) level of service to be appropriate for:*
 - a. *temporary water use restrictions (commonly referred to as 'hosepipe bans')*
 - b. *implementation of drought permits (powers to take more water from the environment during times of drought)*
2. *We would welcome views on the level of drought severity we plan for in the Water Resources Management Plan?*
3. *What are your views on how we should integrate water supply resilience planning and the Water Resources Management Plan?*
4. *Do you have any suggestions for options to improve the supply-demand balance, either new sources of water or options to reduce the demand for water?*
5. *What are your views on the potential for us to export water from the North West to other areas of the country when they are at risk of drought? Are there particular aspects of water trading that you would like us to consider in our plan?*
6. *Looking at our current published plan, are there any other specific areas that you consider should be a priority for improvement?*
7. *Are there any specific ways in which you prefer to be engaged or contacted as we develop the plan, including any ideas for collaboration that we could consider?*

Consultees were invited to respond to these questions within an eight-week period over October and November 2016. We received 17 responses from regulators and stakeholders with an interest in water resources within the North West. All responses were analysed and, where needed based on the feedback, changes to the planning approach determined. A full list of respondents and our responses can be found in Appendix A.

2.2.3 Outcome of pre-consultation

Table 1 outlines the responses we received to the pre-consultation from statutory and non-statutory consultees and details how we addressed them in our draft Water Resources Management Plan. The information has not been revised for this latest version of the plan, and therefore the references refer to the relevant section of the *Draft WRMP19* main report unless otherwise stated.

³ The briefing notes were 'Crystal Mark' accredited by the Plain English Campaign as part of making our material as accessible to stakeholders as possible.

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Table 1 Pre-consultation responses and our response

Key points raised by Environment Agency	United Utilities response
Consider all relevant guidance including Defra Guiding Principles and the final water resources planning guidelines for all aspects of the Water Resource Management Plan.	We have followed all relevant guidance in developing our plan and completed assurance in support of this process. Compliance mapping against the guidance checklist is presented in the <i>Draft WRMP19 Technical Report - Assurance and governance</i> .
Levels of service must be clear and transparent to customers.	We have presented level of service as “1 in x years” and “% annual risk” to make it more understandable to customers in customer research to support development of the plan. We have also engaged extensively with YourVoice (our Customer Challenge Group) to ensure our approach to engagement is as effective as possible. See Section 1.4 of the plan for more information on current Levels of Service and Section 6 covers our future strategic choices in this area.
Explore implementation of a full temporary use ban (TUB) prior to making drought permit/order applications to us/Defra.	Choices on levels of service has been a key area of investigation in our plans. As part of this we have also considered this specific feedback and how the plan choices, if adopted, would inform future Drought Plan revisions. Our proposals for improving level of service would allow temporary use bans to be in place at or prior to the point of drought permit or order applications. This differs from the current Drought Plan position where applications would be expected around the same time for both drought interventions. This would be facilitated by enhanced leakage reduction hence would be from 2025 onwards and be updated in a future Drought Plan revision. See Section 6.3 of the plan for more details.
Explore the operation of pumped sources of water such as Windermere, Ullswater and the West East Link Main in order to provide as little recourse for implementing drought powers as reasonably possible at Haweswater Reservoir.	This feedback was provided both as part of Drought Plan consultation and pre-consultation on this Water Resources Management Plan. The operation of pumped sources was explored in our recent Drought Plan in which we made a commitment to pump from Windermere and/or Ullswater when Haweswater is below a specified level subject to a number of conditions. This Water Resources Management Plan follows and aligns to this commitment. In the Drought Plan we also agreed to regular liaison with the Windermere stakeholders to discuss our operations. See Sections 3.4 and 3.6 of the plan, and the Drought Plan for more information.
Explore the costs and benefits of moving to different levels of service and improving resilience for customers.	<p>This has been investigated as part of the Water Resources Management Plan, and has informed our strategic choices within the plan. The outcomes of these investigations are summarised in the strategic choices section of the main report (Section 6.3 – covering levels of service and drought resilience), with further detail included within our <i>Draft WRMP19 Technical Report - Options appraisal</i>. Our consideration of choices in this area has also taken account of customer affordability and relative investment priorities.</p> <p>Specifically with regards our assessment of water supply resilience (to non-drought hazards) in the plan, we present five different plans with differing costs and benefits in Section 6.4 and are continuing to explore this area in conjunction with our Business Plan to inform the revised draft plan.</p>

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<p>Justify that everything reasonably possible has been considered before implementing drought permits/order. Set out how resources will be managed during a drought, including stating where and under what conditions drought permits/orders to take more water will be sought.</p>	<p>This is detailed fully within our Drought Plan, which defines what interventions would be expected to manage a drought, and indicatively when these would be expected for implementation. As described above, as part of our Drought Plan, we reviewed the operation of our strategic pumped sources to help ensure we have done everything reasonably possible before implementing drought permits. This Water Resources Management Plan is consistent with the Drought Plan.</p> <p>The Water Resources Management Plan details our assessment of testing the future supply system under a range of drought events and the benefits of drought interventions. Specifically, the new “Drought links” process has been used for this assessment which is documented in Section 17 of the <i>Draft WRMP19 Technical Report - Supply forecasting</i> (and summarised in the main report). Rather than duplicate or detail the contents of the Drought Plan in its entirety, this provides an overview of the drought plan interventions tested and when drought permits/orders would expect to be implemented.</p> <p>Our current stated level of service for drought permits and orders for implementation is no more than 1 in 20 years on average (5% annual risk). We consider a robust appraisal of level of service for drought permits as the most appropriate way of defining “reasonable” in this context. We have also explored the possibility of applying for drought permits and orders only once temporary use bans have been implemented (we currently implement them around the same point; Drought trigger 4 as per WRMP15 and our Drought Plan). As a result we have included a strategic choice in the draft plan (Section 6.3) to halve the frequency of implementing drought permits and orders by 2025. This would be facilitated by another strategic choice to enhance leakage reduction.</p>
<p>Investigate resilience to a range of droughts of varying severity, duration, frequency and spatial extent. The expectation is that the design drought is worse than or equal to the worst historic drought.</p>	<p>We have developed new synthetic or stochastic (a method to create alternative weather patterns that are realistic, but have not been recorded historically) hydrological datasets covering a period of 17,400 years from which to test a range of drought events and better describe drought risk (Section 4.4.8). We’ve also included drought risk as a key component of our options appraisal (Section 5). We detail the approach to populating new “drought links” table in Section 17 of the <i>Draft WRMP19 Technical Report - Supply forecasting</i>. The design drought for our plan remains the worst historic drought, taking account of the additional impacts of climate change through the process.</p>
<p>Consult with customers about the severity of drought to plan for.</p>	<p>This has been explored through our customer (and stakeholder) engagement activity and is detailed within <i>Draft WRMP19 Technical Report - Customer and stakeholder engagement</i>. The choices made using this research are summarised in Section 6.3 of the main plan.</p>
<p>Improve the overall resilience of your assets to drought and non-drought hazards.</p>	<p>In the plan we have fully explained the company assessments of resilience and how we plan to increase this in future in conjunction with our Business Planning process. Extreme droughts assessments are summarised in Sections 4.4.8 and 6.3, and our resilience to other hazards is covered in Sections 4.7 and 6.4. We are consulting upon the most salient risk area as part of the plan as a strategic choice (Section 6.4). Our resilience assessments and contingency plans are informed by previous events and incidents, and include the impact of flooding on our assets.</p>
<p>Choose demand-side options as part of the preferred program wherever it is reasonably likely that the benefits will outweigh the costs.</p>	<p>We have used the Average Incremental Social Cost (AISC) to compare the relative unit costs of the various options. We have identified a number of options with negative AISC for this plan, all of which are related to leakage reduction. All of these options have been considered for inclusion in our proposed programme. Further information is in Sections 5.4 and 7 of the plan.</p>

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<p>Focus on options for managing demand, for example reducing leakage, helping customers to further reduce per capita consumption and increasing customer metering.</p>	<p>Section 4.2 of our plan, supported by the <i>Draft WRMP19 Technical Report - Customer and stakeholder engagement</i>, documents our baseline approach to water efficiency and increasing customer metering. We will continue to update on our work in this area as part of the Annual WRMP process (e.g. the outcome of ongoing trials). Beyond this, we have explored a wide range of demand management options in the plan (Section 5), including those provided by third parties, and our preferred plan (Section 7) has a significant focus on demand management included within the selected portfolio. In line with customer and stakeholder feedback, leakage reductions make up a significant proportion of the options in the preferred plan.</p>
<p>Focus on ensuring appropriate maintenance of its raw water assets to ensure they are fully available when needed.</p>	<p>We recognise the importance of raw water assets and ensuring that sufficient water can be collected and transported across our distribution networks. We are working to maintain an optimum balance of maintenance and investment across all of our assets to ensure the long term provision of reliable drinking water supplies. The developing PR19 Business Plan programme will deliver services to customers as efficiently as possible into the future. Ongoing delivery of our maintenance activities underpins the forecasts and assessments included in the Water Resources Management Plan.</p>
<p>Hold detailed local discussion with our teams about WRMP options.</p>	<p>As part of the process the Environment Agency (as well as other environmental regulators such as Natural England and Natural Resources Wales) have been engaged on options as far as practicable following this request. This has included routine updates in bi-monthly liaison meetings, supported by specific workshops on options, scoping of the SEA/HRA process and provision of options lists following the screening stages. We would welcome and wish to continue dialogue now that a preferred portfolio of options has been selected in this draft plan as part of consultation.</p>
<p>Options appraisals should take into account environmental and social costs as well as economic costs.</p>	<p>We have used the Average Incremental Social Cost (AISC) to compare the relative unit costs of the various options. The AISC includes environmental and social costs as well as the whole life cost. Further information is in section 5.4.</p>
<p>Fully explore resource sharing during WRMP19 and beyond. Any options to export water from the North West must be done in a way that does not pose additional risks to water supply or the environment. It must also be done in a way that ensures compliance with Water Framework Directive actions and objectives.</p>	<p>We have assessed water trading as a key part of the plan. Based on feedback received, we have done this so as to protect drinking water quality, resilience, the environment and our stated level of service. At this stage we do not have the full picture of how water trading will progress in the future, and so have included this in a plan pathway and propose as part of the preferred plan to continue work in future towards WRMP24. Our plan accepts that significant future work will be required to build on the strategic assessment in this plan. This is a key topic for consultation. See Section 6.5 for more information.</p>
<p>Any raw water transfers should be assessed for their potential to spread Invasive Non-Native Species (INNS). Any identified risks and mitigation measures should be discussed with the Environment Agency and Natural England.</p>	<p>We have considered the risk of transferring invasive non-native species from one area to another as part of the options process and have endeavoured to provide innovative options e.g. new water treatment solutions to prevent the transfer of invasive non-native species (Section 5.1). The risk of transfers downstream of Vyrnwy in the Severn and Thames catchments will be assessed by Thames Water in its WRMP (see Section 7.6 for more information).</p>
<p>Clear links between WRMP and Drought Plan.</p>	<p>The WRMP is consistent with operational interventions in the Drought Plan (see Section 4.4.8 for more information). We consider use of the Drought Links table as instrumental in supporting the narrative around this aspect.</p>
<p>Demonstrate how the Strategic Environmental Assessment has informed development of WRMP throughout the process.</p>	<p>Information on the Strategic Environmental Assessment and how it has been used to assess options is in Section 5.4.2. The preferred plan has been subject to a final environmental appraisal as outlined in Section 7.7. This is also detailed further within the supporting Technical Reports.</p>

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<p>Look to improve on Sustainable Economic Level of Leakage, engaging with stakeholders (particularly those in Cumbria) and on your choice of using 1995 as the basis for your dry year demand forecast.</p>	<p>This comment relates to EA advice items for WRMP19 provided in the last planning round and we have been fully cognisant of these throughout development of this plan.</p> <p>As detailed in <i>Draft WRMP19 Technical Report - Demand for water</i>, we have improved our Sustainable Economic Level of Leakage approach from the last planning round in line with the EA industry recommendations in this area. In addition, and linked to Annual WRMP feedback, we have completed industry benchmarking and explored fully in this plan reducing leakage in future in Section 6 of the main WRMP document. We've also engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7).</p> <p>We have undertaken significant stakeholder engagement in Cumbria as part of an enhanced Water Resources Management Plan pre-consultation exercise and around our Drought Plan, supported by additional activities associated with business planning, environmental assessments and review of our operations. In combination, the output and feedback from this process has informed development of this plan.</p> <p>We are now using the 95th percentile as the basis for the dry year demand forecast, as discussed in our liaison meetings and detailed in <i>Draft WRMP19 Technical Report - Demand for water</i>.</p>
<p>Include realistic forecasts for customer metering in this next plan with clear actions to ensure you achieve those forecasts.</p>	<p>We have used an updated metering forecasts model for this plan which has been developed with Artesia Consulting a leading expert in this field. Section 4.2.4 contains our approach to customer metering.</p>
<p>Continue to consider the contingency plan for West Cumbria supplies in case the Thirlmere transfer should become undeliverable.</p>	<p>We will continue to review the contingency plan on an annual basis and update on this Annual WRMP review. This plan covers the period 2020-2045 so has been developed around the future supply system following completion of the Thirlmere project by 2022. However, we have also included a specific <i>Draft WRMP19 Technical Report - West Cumbria legacy</i> document to update on activities in this area.</p>
<p>Consider the impact of any reservoir-related flood alleviation schemes on the supply-demand balance and WFD objectives.</p>	<p>In this plan we have accounted for future infrastructure changes at Thirlmere to enable greater flood drawdown release rates in future within our supply forecasting. These proposals are subject to ongoing separate detailed environmental assessments as part of our West Cumbria supplies project. This work is being completed in two phases and the Keswick Flood Action Group are being engaged as part of this work.</p> <p>We are working with Defra, EA, Ofwat and another water company to determine what opportunities may exist for future use of reservoirs for flood mitigation. There are a number of potentially conflicting issues which must be considered regarding reservoir use in such circumstances, including impacts on the supply-demand balance and WFD implications. Any potential flood mitigation projects will only progress if all our statutory obligations can be met fully.</p>
<p>Clearly demonstrate commitment to protect and improve the environment.</p>	<p>The environment has been a core theme throughout development of our plan and our supply forecasts include delivery of enhancements under the Water Industry National Environment Programme (WINEP).</p> <p>The development of options in the plan (Section 5) has been subject to the screening taking account of environmental factors. Our options appraisal process also ensures that our plans avoid any negative impacts to customers or the environment (Section 7), and we have worked closely with the Environment Agency to ensure that our preferred plan does not link to deterioration under the Water Framework Directive. Our plans also include proposals for less frequent drought permits and orders in future (Section 6.3) and promote additional demand management.</p>

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<p>Extend the use of innovative techniques such as new information and operational technologies (such as pressure management systems for leakage management and automation of abstraction assets) to help deliver catchment-based outcomes.</p>	<p>In this plan we have explored a range of options including a number of leakage reduction scenarios, and have put forward proposals to significantly reduce leakage in Section 6. We've also engaged with third parties to explore innovative demand management options (Section 5 of our <i>Draft WRMP19 Technical Report - Options identification</i>) and fully explored demand management options as part of building our preferred plan (Section 7).</p>
<p>Key points raised by Ofwat</p>	<p>United Utilities Response</p>
<p>Pre-consultation engagement should focus on:</p> <ul style="list-style-type: none"> evidence of customer requirements and outcomes (e.g. level of supply resilience); the risks in delivering these outcomes and the options for managing those risks; the range of options assessed to deliver the outcomes including involving other water companies (water trading as both a supplier and purchaser), other sectors (third party options) and demand management. 	<p>Note: Since this response Ofwat have conducted a specific industry pre-consultation process on WRMP19 and wrote to companies outlining that process. We met with Ofwat in July 2017 and to some extent those activities supersede this initial response received in our own pre-consultation process.</p> <p>As discussed at the time, and detailed in this technical report, we have carried out engagement with customers and stakeholders to inform development of this plan. We have also explored a wide range of options, including those from third parties and other companies, as summarised in Section 5 of the plan.</p>
<p>Interested to understand how you are integrating the Water Resources Management Plan 2019 process into the development of your business plan.</p>	<p>These two plans are being developed in close conjunction with each other, as we detailed in our July 2017 meeting. This is particularly important in this planning round in particular given the expanded remit of WRMP19 to include water supply system resilience.</p>
<p>Key points raised by Natural England</p>	<p>United Utilities Response</p>
<p>Understand the desire to offer customers a 20 year level of service for temporary use bans but wonder whether there might be situations in which a lower level of service might be appropriate in order to reduce the probability of needing a drought permit, where this might cause damage to a European Site. Clearly the place where this is most relevant is West Cumbria, and particularly Ennerdale where it cannot be shown that exercise of a drought permit would not have an adverse effect on the integrity of the River Ehen Special Area of Conservation.</p>	<p>As this plan covers the period 2020-2045 it has been developed around the future supply system following completion of the Thirlmere project by 2022 so West Cumbria is now included as part of the larger Strategic Resource Zone. The timing of drought interventions was covered within our recent Drought Plan update.</p> <p>We have explored alternative levels of service for temporary use bans fully in this plan, including consideration through customer research and as a potential option in the options identification process.</p>
<p>Agree that it is prudent to plan for a greater level of drought severity and enhanced water supply resilience. Planning for more severe drought events than previously will raise questions about more severe environmental impacts than have been planned for historically, and this may necessitate revisiting environmental assessments and Habitats Regulations Assessments of potential drought options.</p>	<p>The WRMP process has shown that our system is relatively resilient to an extreme drought. The environmental impact of our current drought options are identified in the environmental assessments which are refreshed on a regular basis with the latest data and information.</p> <p>As part of our environmental assessment for this WRMP we have conducted a full Strategic Environmental Assessment and Habitat Regulations Risk Assessment to ensure all potential risks are mitigated against or managed.</p>
<p>As regards resilience more generally, with the West Cumbria supply largely dependent on one surface water supply from 2022, need to be certain there is no possible risk to supply from storm events and other potential hazards.</p>	<p>We have considered resilience to non-drought hazards in Section 6.4. This includes flooding as well as a range of other hazards.</p>
<p>Expect to see all options for reducing demand explored before new water sources were considered. These would include further improvements to leakage detection and control, and improved management of consumer demand. Would like to see some exploration of the potential for the use of smart metering and variable tariffs to enhance demand management according to water availability in different seasons and times of water shortage.</p>	<p>We have explored a range of leakage reduction scenarios, and put forward proposals to significantly reduce leakage in Section 6. Our plan also outlines our approach to managing the future demand for water, and we are currently conducting trials to promote meter uptake. We have considered a wide range of demand management options as part of the options identification process (Section 5), and engaged with third parties to explore innovative demand management options (Section 5). Our preferred plan includes a significant contribution from demand side options (Section 7).</p> <p>Our <i>Draft WRMP19 Technical Report - Demand for water</i> technical report provides additional detail, including reference to ongoing work to explore some of these areas such as connected homes / smart meters. It is also worth noting that our policy is that, where possible, new meters installed will be Automated Meter Reading (AMR) enabled and the majority of these have the potential to upgrade to smart meter capabilities in future.</p>

<p>The current supply-demand balance of water does not appear to provide a significant surplus of water for export to other parts of the country. Clearly this is an extremely important element that the Strategic Environmental Assessment and the Habitats Regulations Assessment shall need to address and influence in the development of proposals for the draft and final Water Resources Management Plan. If new surface and groundwater sources need to be developed to provide additional supply, then there will be a challenge to develop sources that do not have significant environmental impacts. Furthermore, water transfers that rely on using rivers and other watercourses to move water rather than simply pipelines bring with them the risk of transferring invasive non-native species from one area to another, and this should be fully considered during the development of any transfer options.</p> <p>Interested to see how water transfer proposals develop in the emerging plan, and shall seek to help this process to develop sustainable and environmentally positive solutions through contribution to the work on SEA and HRA.</p>	<p>The development of options in the plan (Section 5) has been subject to the screening taking account of environmental factors. Our options appraisal process looks beyond the supply-demand balance to ensure that our plans avoid any negative impacts to customers or the environment (Section 7), and we have worked closely with the Environment Agency to ensure that our preferred plan does not link to deterioration under the Water Framework Directive. Our plans also include proposals for less frequent drought permits and orders in future Section 7.3.</p> <p>We have considered the risk of transferring invasive non-native species from one area to another as part of the options process and have endeavoured to provide innovative options e.g. new water treatment solutions to prevent the transfer of invasive non-native species (Section 5.1). The risk of transfers downstream of Vyrnwy in the Severn and Thames catchments will be assessed by Thames Water in its WRMP (see Section 7.6 for more information).</p> <p>We recognise that further investigation and assessment will be needed ultimately to facilitate any future water trade and, depending on the outcome of this plan, this would progress to inform WRMP24.</p>
<p>Key points raised by Natural Resources Wales</p>	<p>United Utilities Response</p>
<p>Continue to comply with the Dee General Directions and to consult Natural Resources Wales on all issues which involve Wales. Consider the requirements of the Well-being of Future Generations (Wales) Act 2015 and the Environment Act (Wales) 2016 for any options in the plan that are located in or affect Wales (e.g. River Dee and Lake Vyrnwy).</p>	<p>We have included the latest Dee General Directions in our water resources modelling. Throughout the development of this draft plan we have engaged with you as part of our activities. This has included pre-consultation, liaison meetings, the SEA/HRA and options process, and specific work on the River Dee where we have collaborated on our assessments of climate change. We welcome this active dialogue and wish to continue with this through the consultation period.</p> <p>Specifically with regards to the legislation, we have assessed the potential for Lake Vyrnwy to be part of a potential future water trade or export in the plan. We have discussed this with you previously, including in a specific special interest session on water trading. At this stage, we are exploring this potential future pathway in the plan, and this would result in further more detailed work towards WRMP24. Given this, and other sources located in Wales, we are carefully considering the priorities of Welsh Government, in particular focusing on the Well-being of Future Generations Act. We will continue to explore this if these plans are progressed and any potential trades become more defined, supported by stakeholder engagement and research.</p> <p>The risk of transfers downstream of Vyrnwy in the Severn catchment will be assessed by Thames Water in its WRMP (see Section 7.6 for more information), however, as studies progress we will continue to input to this process and as part of the River Severn Working Group.</p>
<p>In principle no objection to water trading provided that it is done in an environmentally sustainable manner and does not have an adverse impact on their own resources. The impact should be investigated to ensure that the source remains sustainable and no deterioration of the water body occurs.</p>	<p>As described in responses above, our plan ensures that the environment is protected as part of the water trading proposal assessed, and this would be subject to further detailed investigation should these proposals be progressed. The risk of transfers downstream of Vyrnwy in the Severn and Thames catchments is being led by Thames Water as part of its WRMP19 process.</p>
<p>Key points raised by the Consumer Council for Water</p>	<p>United Utilities Response</p>

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<p>Expect the WRMP to:</p> <ul style="list-style-type: none"> • address issues relating to the long-term resilience of water supplies • demonstrate an understanding of customers’ priorities and preferences • have a comprehensive demand management strategy • explain the approach to household metering • explain the approach to leakage 	<p>We have carried out significant engagement with customers in order to understand their priorities and fully incorporated these into our proposed plans. We have engaged with YourVoice (our Customer Challenge Group, which has two representatives from CCW), on our customer engagement activities and welcome this input. More information on this included in <i>Draft WRMP19 Technical Report - Customer and stakeholder engagement</i>.</p> <p>We have explored a wide range of options in order to identify ones which will deliver the outcomes desired by customers as indicated by our research. More information on options is in Section 5. Demand management is a key component of our plans. Our approach to water efficiency is defined in Section 4.2 of the plan, and we outline proposals to reduce leakage further in Section 6.2. Demand management forms a major component of our preferred plan in Section 7.</p>
<p>Agree that plans should be tested against more extreme scenarios than those which are a matter of historical record.</p>	<p>We have developed new synthetic or stochastic (a method to create alternative weather patterns that are realistic, but have not been recorded historically) hydrological datasets covering a period of 17,400 years from which to test a range of drought events and better describe drought risk (Section 4.4.8). We’ve also included drought risk as a key component of our options appraisal (Section 7).</p>
<p>It is essential to ensure that water trading can be achieved in a way which does not impact negatively on customers, in terms of cost or service, or on the region’s environment.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service. Our new sophisticated planning techniques have enabled us to do this as effectively as possible.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required in future to build on the strategic assessment in this plan. This is a key topic for consultation. See Section 7.5 for more information.</p>

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Key points raised by Lake District National Park Authority (LDNPA)	United Utilities Response
<p>Very keen to work with you on a Natural Capital approach to water resources, and other areas of work.</p>	<p>We note and welcome this intent for further collaboration in future. The Lake District National Park Authority is included on the engagement list for our wider Business Planning activities in addition to those for Water Resources Management and Drought Plans. The Lake District National Park Authority is now involved with the Petteril project, part of the Natural Course Project on Natural Capital and we hope to continue this relationship in the future.</p> <p>We provide specific update on our review of natural capital approaches in Section 5.4.1 of the plan.</p> <p>Whilst our plan development includes environmental and social costing, which includes many aspects of environmental 'value', we have not sought to adopt a full natural capital/ecosystem services for the WRMP19 planning round. The reasons are detailed in the report, but in part link to data constraints, the volume of feasible options newly identified in this planning round and challenges applying such new approaches that are still in development in our large Strategic Resource Zone. That said, we are keen to build capability in this area towards the next planning round (noting that our exploration of options to facilitate water trading will continue beyond WRMP19) and are actively completing work in this area. As you are aware, we are currently trialing a Natural Capital Approach in the River Petteril catchment in Cumbria to appraise options at a catchment level from a Water Framework Directive (WFD) perspective, specifically related to nitrates, phosphates, bacterial load, flooding and operational carbon footprint.</p> <p>More generally, we own 8% of the land and water comprising the Lake District National Park, and collaboration is a key part of our work. We are a partner on the Lake District National Park Partnership and therefore a key contributor in the development and delivery of the National Park Plan. Like all such overarching plans there are numerous working groups and action groups leading on specific plan topics, e.g. Forestry and Farming, Natural environment and peat soils to name a few where our Catchment team are represented and can contribute to shaping the park. In addition we are represented on the Land Owners forum which meets from for updates on private park land management and our particular business interests. At an operational level we have been long term supporters of 'fix the fells', which is a National Park and National Trust led initiative to repair upland paths. We contribute by providing materials and other aids such as Helicopter take off and storage sites for the projects. We support the rural apprenticeship scheme to ensure young people are coming through to be trained countryside workers. We invested in the largest Archaeological study in the park by working with the LDNPA archaeologist and Oxford University to have all UU land surveyed. We have an ongoing close working relationship with the LDNPA rangers and field staff sharing best practice on public access and recreation including rights of way maintenance. We look forward to ongoing collaboration in future.</p>
<p>Continue to explore further the potential to reduce the frequency of drought permits.</p>	<p>In Section 7.3 we outline our proposal to improve levels of service for drought permits by 2025 following delivery of our first tranche of leakage reduction activities.</p>
<p>Maintain downward pressure on leakage rates. Support ongoing commitment to driving water efficiency.</p>	<p>This plan goes further than in the last planning round. We have explored a range of leakage reduction scenarios, and put forward proposals to significantly reduce leakage in Section 6. We've also engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7).</p>

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<p>Want any benefits accrued from trading to be re-invested in increasing our region's water supply resilience to hazards.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required in future to build on the strategic assessment in this plan, and this includes how such proposals would be funded and benefits shared. This is a key topic for consultation. See Section 6.5 and 7.6 for more information.</p>
<p>Work with us and other stakeholders to ensure that the future decommissioning of water resource infrastructure creates positive enhancements to the National Park.</p>	<p>As this plan covers the period 2020-2045, it has been developed around the future supply system following completion of the Thirlmere project by 2022. Based on this feedback, we have therefore covered the future of West Cumbria as part of a new and specific technical appendix focused on the future of decommissioned infrastructure associated with our plans.</p>
<p>Believe that "1 in 20 years" is difficult to understand and could be misleading. It would be better to use the percentage probability in any one year.</p>	<p>We have referred to both "1 in x years" and as % annual occurrence. When we discussed this at events during pre-consultation feedback, such as this, we thought to initiate a full change to % annual occurrence throughout the document, but subsequent feedback and experience during customer research has resulted in some opposing views. We have therefore chosen to present both in this draft plan.</p>
<p>Key points raised by South Lakeland District Council</p>	<p>United Utilities Response</p>
<p>Local organisations are concerned that leakage is very high with consequential impacts on the South Lakeland economy and environment.</p>	<p>This plan goes further than in the last planning round. We have explored a range of leakage reduction scenarios, and put forward proposal to significantly reduce leakage in Section 6. We've also engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7). We have carefully balanced our aspirations to reduce leakage with the affordability to customers and to ensure a cost-effective delivery of reductions over time. These changes also unlock supplementary benefits in terms of improved drought resilience and a lower stated frequency of drought permits or orders to augment supply.</p>
<p>Support the Windermere stakeholders request for a review of the Water Order.</p>	<p>We have commissioned a study to assess the impact of our abstraction licence in relation to recreational users, commercial interests and the environment. This study will assess a range of scenarios and the implications of each on UU's abstraction, lake users and the environment.</p>
<p>Key points raised by Windermere stakeholders (Windermere Lake User Forum, Windermere Lake Cruises, Holker Estates)</p>	<p>United Utilities Response</p>
<p>Should review the existing options for supply and improvements in service to ensure that a drought permit scenario 2 at Windermere is not part of the WRMP or Drought Plan.</p>	<p>We reviewed the operation of abstraction from Windermere in the Drought Plan 2017 where we have made a commitment regarding future pumping. This Water Resources Management Plan also outlines proposals to reduce leakage further, which will bring some supplementary benefit of lower frequency of drought permits in future and greater drought resilience.</p> <p>In addition, we have commissioned a study to investigate the feasibility of mitigation measures for a scenario 2 lake drawdown drought permit. We will continue to work with stakeholders to better understand the mitigation required and from this the implications for inclusion in future plans.</p>
<p>Recommend that a review of the Water Order is carried out and suggest that the hands-off flow is increased to 500 MI/d all year round.</p>	<p>We have commissioned a study working with the EA, Lake Users and other interested parties, to assess the impact of our abstraction licence in relation to recreational users, commercial interests and the environment. This study will assess a range of scenarios and the implications of each on UU's abstraction, lake users and the environment. Any implications of this review on the Water Resources Management Plan process will be considered when we have the results of the study.</p>

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<p>Do not feel that sufficient financial resource is allocated to leakage reduction; further investment into reducing leakage is needed.</p>	<p>This plan goes further than in the last planning round. We have explored a range of leakage reduction scenarios, and put forward proposal to significantly reduce leakage in Section 6. We've also engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7). We put forward leakage reductions and the level of investment for these reductions has been balanced carefully with affordability for customers. We have also balanced investment in this area against other business needs.</p>
<p>Endorse the suggestion to assess to a 0.5% probability (1 in 200 year event) and a 0.2% probability (1 in 500 year event) so that meaningful sensitivity analysis can be conducted. Data are based on historic weather patterns. The frequency of serious flood events in recent years may raise questions over the validity of this data.</p>	<p>We have developed new synthetic or stochastic (a method to create alternative weather patterns that are realistic, but have not been recorded historically) hydrological datasets covering a period of 17,400 years from which to test a range of drought events and better describe drought risk (Section 4.4.8). We've also included drought risk as a key component of our options appraisal (Section 7).</p>
<p>Should consider innovative solutions that may help mitigate both flood and drought impacts. For example, the replacement of the fixed Newby Bridge weir with a tilting weir may give greater control of lower lake levels and improve ability to abstract under drought conditions.</p>	<p>As described above, we are completing a review to assess the impact of our abstraction license in relation to recreational users, commercial interests and the environment. At this stage, a tilting weir has not been considered as an option in the WRMP, but could be considered in the future. As discussed, in our recent liaison meeting, the weir is owned by the Environment Agency. If it is considered an appropriate option in the future, we will work with the Environment Agency and other interested parties to assess the feasibility of such a weir and the impact it would have on the abstraction and the local environment.</p>
<p>Propose that any export of water should be developed with plans for an import of water in the form of a national water grid. This will ensure that resilience is on a national and balanced basis. No water should be exported until there is a greater predicted surplus.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service. Our plan outlines the proposed options to facilitate a future water trade for consultation. Our assessment of water exports does not rely upon use of the existing surplus, but instead is driven by the strategy to achieve the above objectives. A surplus is maintained as part of our plans, and actually increases as a result of our proposed leakage reductions from the baseline position.</p> <p>Our approach to develop the plan has been designed to assess all options equitably to ensure we can select the most cost-effective, sustainable long-term solution. As part of this, we have included a third party import option in our preferred plan.</p> <p>We note that in pre-consultation responses that there is specific support for a Kielder import. However, this has not been selected as part of the preferred plan (this option was discounted as part of our secondary screening process). However, the plan has proposed the most appropriate supply-demand options to facilitate a water trade which ensure there is sufficient resources to meet the needs of the North West in future.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required in future to build on the strategic assessment in this plan if there is support to explore this further following consultation. See Section 6.5 for more information.</p>
<p>Key points raised by Friends of the Lake District</p>	<p>United Utilities Response</p>
<p>There needs to be a clear understanding of the impacts and of any compensating benefits should any surplus in the North West be redeployed to meet the demands of the South East.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service. Our new sophisticated planning techniques have enabled us to do this.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required to build on the strategic assessment in this plan if there is support to explore this further following consultation. See Section 6.5 for more information.</p>

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<p>A risk based approach (stochastic modelling and synthetic hydrology) is a positive development and may help to clarify the impacts of any reduction in surplus between supply and deployable output.</p>	<p>We have developed new synthetic or stochastic (a method to create alternative weather patterns that are realistic, but have not been recorded historically) hydrological datasets covering a period of 17,400 years from which to test a range of drought events and better describe drought risk (Section 4.4.8). We've also included drought risk as a key component of our options appraisal (Section 7).</p>
<p>Would like the following to be covered:</p> <ul style="list-style-type: none"> • disposal of redundant assets; • future plans for Crummock and Ennerdale post 2022; and • options for sites which will become redundant. 	<p>As this plan covers the period 2020-2045, it has been developed around the future supply system following completion of the Thirlmere project by 2022. Based on this feedback, we have therefore covered the future of West Cumbria as part of a new and specific technical appendix. Redundant and unused sources/assets have also been considered as part of the options identification process.</p>
<p>When will compulsory metering happen and other more imaginative demand management solutions.</p>	<p>Currently there is no mechanism for compulsory metering in our area and this would be driven by government policy. We have engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7).</p>
<p>Innovative catchment management on a bigger scale.</p>	<p>Through the delivery of the ground breaking 'Sustainable Catchment Management Programme' (SCaMP), we are recognised within the UK water industry as being at the forefront of catchment management, which aims at securing multiple benefits at a landscape scale. We own 56,385 hectares of land in North West England, which is held to protect the quality of water entering the reservoirs, and we work with partners and third parties to encourage the principles of SCaMP to be adopted on the remaining 720,000 hectares of catchment land not in our ownership, and as part of wider catchment initiatives to improve the water quality of downstream rivers and bathing waters impacted by our wastewater discharges.</p>
<p>Key points raised by Windermere Town Council</p>	<p>United Utilities Response</p>
<p>Support water trading if it's feasible without water imports and if residents of South Lakeland benefit from any financial rewards. Will only support if level of Windermere can be guaranteed for environmental and amenity use.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service.</p> <p>With regards specifically the options to facilitate a future water trade, our proposed portfolio options at this draft plan stage are outlined in Section 7.</p> <p>Financial rewards in terms of a relative reduction in customer bills will apply equally to those in South Lakeland as it will to all customers in the North West. Our plan also proposes reductions in leakage and associated improvements to our stated levels of service (to reduce the frequency of drought permits) that is consistent with feedback from stakeholders in the Windermere and South Lakeland area.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required in future to build on the strategic assessment in this plan. This is a key topic for consultation. See Section 6.5 for more information.</p> <p>It is also worth noting that we have commissioned a study to assess the impact of our abstraction licence at Windermere in relation to recreational users, commercial interests and the environment. This study will assess a range of scenarios and the implications of each on UU's abstraction, lake users and the environment.</p>

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Key points raised by River Eden and District Fisheries Association (REDFA)	United Utilities Response
Interested to see how environmental considerations are defined and valued in measuring best-value.	The development of options in the plan (Section 5) has been subject to the screening taking account of environmental factors. Our options appraisal process also ensures that our plans avoid any negative impacts to customers or the environment (Section 7), and we have worked closely with the Environment Agency to ensure that our preferred plan does not link to deterioration under the Water Framework Directive. Our plans also include proposals for less frequent drought permits and orders in future Section 7.3. Using this process we have defined what we believe to be the most cost-effective and sustainable long-term plan, and are seeking views on this through consultation.
Major concerns over how options will impact on already vulnerable waterbodies and fish stocks in the north west.	As part of the options appraisal process we have considered the environmental impact of our options. See Section 5 for more information. Our preferred plan has also been tested for any potential in-combination impacts as part of the options appraisal process, as defined in Section 7.
Key points raised by West Cumbria Rivers Trust	United Utilities Response
Support 1 in 30 year level of service for temporary use restrictions and 1 in 200 year event for resilience.	<p>Our customer research showed there is little support for an improvement to the level of service for temporary use restrictions so this remains at 1 in 20 years (5% annual average). In Section 7.3 we outline our proposal to improve levels of service for drought permits to no more than 1 in 40 years on average (2.5% annual average risk) by 2025 following delivery of our first tranche of leakage reduction activities.</p> <p>We have developed new synthetic or stochastic (a method to create alternative weather patterns that are realistic, but have not been recorded historically) hydrological datasets covering a period of 17,400 years from which to test a range of drought events and better describe drought risk (Section 5.4.8). We've also included drought risk as a key component of our options appraisal (Section 7). These assessments have shown drought resilience to be in excess of the Defra reference level of service of 1 in 200 years (0.5% annual average risk) for emergency drought orders (rota cuts and standpipes).</p>
Suggested options include increasing supply from groundwater, new reservoirs, compulsory metering, artificial aquifer recharge, active support for improved land management practices.	We have explored a wide range of options including the impact on the environment and their resilience and reliability. See Section 5 of our Water Resources Management Plan for more information. Please note also our responses above to Friends of the Lake District with regards common points on compulsory metering and catchment/land management.
Deep rooted concerns about water trading. Not only is the potential for some water companies to increase their profits but current resources are stretched during a drought. If trading was considered we would need to significantly increase the North West's resilience and resources.	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service. Our new sophisticated planning techniques have enabled us to do this.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant future work will be required in future to build on the strategic assessment in this plan. This is a key topic for consultation. See Section 6.5 for more information.</p>

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Key points raised by North Western Inshore Fisheries and Conservation Authority	United Utilities Response
<p>Seeks assurance that the WRMP is consistent with the WFD and the riverine, estuarine, coastal and marine environment is safe guarded.</p>	<p>The environment has been a core theme throughout development of our plan and our supply forecasts include delivery of enhancements under the Water Industry National Environment Programme (WINEP).</p> <p>The development of options in the plan (Section 5) has been subject to screening which has taken account of environmental factors. Our options appraisal process also ensures that our plans avoid any negative impacts to customers or the environment (Section 7), and we have worked closely with the Environment Agency to ensure that our preferred plan does not link to deterioration under the Water Framework Directive. Our plans also include proposals for less frequent drought permits and orders in future (Section 7.3).</p>
Key points raised by Lancashire Constabulary	United Utilities Response
<p>The terminology “1 in x years” confuses the public if an event occurs again the following year.</p>	<p>We have referred to both “1 in x years” and a % probability of the event occurring in a given year. During pre-consultation, based on such feedback, we had initially perceived a full change to % annual occurrence throughout the document, but subsequent feedback and experience during customer research has resulted in some opposing views. We have therefore chosen to present both in this draft plan.</p>
Key points raised by an individual respondent	United Utilities Response
<p>The price for export options should be based on value to other areas not just the resource cost of provision.</p>	<p>We have assessed water trading in the plan with a view to protecting water quality, resilience, the environment and our stated level of service. Our new sophisticated planning techniques have enabled us to do this.</p> <p>Any pricing of exports should be compliant with the relevant guidance from Ofwat, and this has been the basis for developing our plan.</p> <p>At this stage we do not have the full picture of how water trading will progress in the future. Our plan accepts that significant further work will be required in future to build on the strategic assessment in this plan. This is a key topic for consultation. See Section 7.5 for more information.</p>

As an output of pre-consultation we also requested volunteers for a Technical Stakeholder Group, essentially a small working group, to engage on plan development outside of the main consultation exercises. This is detailed further in Section 2.3.3 below.

2.3 Other stakeholder engagement activities

Pre-consultation is a formal part of the planning process, however, we have also undertaken other stakeholder engagement activities that are of relevance to the Water Resources Management Plan. These are detailed below.

2.3.1 Business Planning: Stakeholder events

As part of the business planning process, a number of stakeholder events were run across the North West in 2017 to gain an insight into the opinions of stakeholders within the region. Some of the themes that were raised by stakeholders at the events also related to the Water Resources Management Plan. These topics are outlined in Table 2.

Table 2 Summary of stakeholder views from business plan events

Topic	What stakeholders said
Drought	Cumbrian stakeholders stated a preference for the lake drawdown drought permit to be removed from the Drought Plan until suitable mitigation identified and delivered.
Flooding	Stakeholders thought there should be continuing and greater investment into natural flood management.
Water efficiency	More education of customers is needed. Smart metering roll-out.
Natural Capital	Stakeholders general support the work of Natural Capital and stressed the importance of recognising the economic value of the environment for the local economy.
Resilience	Stakeholders said they would like to see greater resilience measures on: <ul style="list-style-type: none"> • Flooding; • Drought; • Cost; • Climate change; • Population growth; • Environment; and • Supply.
Metering	Some stakeholders wanted mandatory metering to be introduced.
Leakage	Stakeholders supported continuing improvement to leakage detection and reducing leakage.
Water Trading	Water trading was only raised by Cumbrian stakeholders and they showed some support for water trading as long as UU customers were protected. They were also concerned on what impacts it might have on the resilience in Cumbria.
Windermere	Cumbrian stakeholders raised concerns that the drought permit at Windermere could have a seriously adverse impact on the economy of the Lake District.

2.3.2 Drought Plan activities

During 2016-2018 we have been working to update our Drought Plan from the previous version published in 2014. The plan outlines our approach in managing water supplies to make sure there is always enough water available for nearly seven million customers and 200,000 businesses across the North West, even during drought conditions.

As part of revising the Drought Plan we investigated drought management options which include:

- Operational actions;
- Communication actions;
- Demand side actions (water efficiency campaigns, campaign for voluntary water use restraint, temporary use ban, drought order to ban non-essential use);
- Leakage control actions;
- Supply side actions (non-commissioned sources; tankering); and
- Drought permit/order actions.

A number of points or suggestions were raised by stakeholders, particularly relating to temporary use bans, drought orders and drought permits, which are covered more extensively in our Final Drought Plan 2018⁴.

A number of responses from stakeholders received during the Drought Plan consultation were more specifically related to the Water Resources Management Plan. Where these correspond to similar points raised in the Water Resources Management Plan pre-consultation, our responses are provided in Table 1 above. Any responses not

⁴ Final Drought Plan 2018 available on our website: <https://www.unitedutilities.com/drought-plan>

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captured in this table are addressed in Table 3 below. The information has not been revised for this latest version of the plan, and therefore the references refer to the relevant section of the *Draft WRMP19* main report unless otherwise stated.

Table 3 Summary of stakeholder responses to the Drought Plan

<p>Response from Friends of the Lake District</p> <p>Temporary use bans should be brought in at Trigger 3 to send messages to consumers that there is a potential issue, although we accept they save relatively little water.</p>	<p>United Utilities response</p> <p>Our drought plan includes a campaign for voluntary water use restraint at trigger 3 with a temporary use ban at trigger 4. This approach will give the message that there is a potential issue before the temporary use ban comes into force.</p> <p>One of the strategic choices in this plan is to improve the level of service for drought permits. In Section 7.3 we outline our proposal to improve levels of service for drought permits to no more than 1 in 40 years on average (2.5% annual average risk) by 2025 following delivery of our first tranche of leakage reduction activities. This would ensure that temporary use bans are in place for longer prior to implementation of drought permits.</p>
<p>Response from West Cumbria Rivers Trust</p> <p>United Utilities should provide increased advice and financial support to industry e.g. promotion of best practices, grants etc.</p>	<p>United Utilities response</p> <p>Water retailers now also have the duty to work with non-household businesses to encourage efficient use of water. We will continue to work with retailers to share our experience in this area.</p> <p>This plan has ensured we can continue to meet future demand as set by economic growth aspirations from government. We have explored non-domestic demand by sectors in conjunction with Experian, an expert in this field.</p>
<p>Response from Windermere Lake Cruises</p> <p>Welcome voluntary demand restrictions after crossing Trigger 3 but question their effectiveness. While such a proposal can only be beneficial, we wonder what research has been undertaken to ascertain whether there are more effective ways of managing demand, such as metering.</p>	<p>United Utilities response</p> <p>Currently there is no mechanism for compulsory metering in our area and this would be driven by government policy. We have engaged with third parties to explore innovative demand management options (Section 5) and fully explored demand management options as part of building our preferred plan (Section 7).</p>
<p>Response from Windermere Lake User Forum</p> <p>Concerned that customers in the Integrated Resource Zone are not fully informed or aware of the implications of drawing water from Windermere at times of drought. Believe that the research questions used to establish what water users are willing to pay for their water are insufficient to fully inform those who are taking part. Is the true cost of supply and risk being explained and fully taken into account in this process? We recommend that research into pricing of water and charges to customers should ensure that consultees are fully informed and can demonstrate that they are aware of the social, economic and environmental impact of any proposed water resource management schemes before questions of charges are included into the consultation mechanism. Customers should understand both cost, impact and the wider value of what is being proposed across the network of catchment, collection, processing and delivery, otherwise it is like the phrase "asking Turkeys to vote for Christmas" which has no value in terms of data on which to base serious decisions.</p>	<p>United Utilities response</p> <p>During the development of this WRMP we have conducted new innovative research techniques such as the Programme Choice experiment and Immersive experience. These techniques look to better immerse customers in potential situations so that they can make fuller and more informed decisions on topics like drought resilience, levels of service and flooding.</p>
<p>Response from Lake District National Park</p> <p>Education of the public about where their water comes from and the impacts of using it on the landscape and environment of the Lake District National Park needs to be a key theme of the next Water Resources Management Plan.</p>	<p>United Utilities response</p> <p>We run an education programme aimed at primary and secondary school children to reach pupils at a young age to retain a lifelong appreciation that water is a precious resource which should be conserved, not wasted.</p> <p>We have held a number of consultation events for the WRMP and PR19 to inform customers and stakeholders about their water supply.</p>

2.3.3 Technical Stakeholder Group

Two sessions were conducted in March and July 2017, with representatives from a number of key external technical stakeholder groups, in order to support the pre-consultation and consultation processes. These sessions included

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workshops conducted by DJS Research to engage representatives in the key themes to be addressed in our Water Resources Management Plan, as well as updates on plan development to raise awareness of the process.

The workshops included exercises to determine stakeholders' opinions on the following:

- Understanding opinions on what we do as a company;
- Stakeholder acceptability of levels of service on a range of water use restrictions; and
- Preferences for 14 water resource planning options to address both changes to levels in service and the supply-demand balance.

The stakeholders that were invited to attend the events that originally volunteered were: Allerdale Borough Council, River Eden and District Fisheries Association, Friends of the Lake District, The Rivers Trust, National Farmers' Union, YourVoice (our Customer Challenge Group), Confederation of British Industry, Environment Agency and the Federation of Small Businesses. Not all stakeholders attended both events.

2.3.3.1 March 2017 event

The first Technical Stakeholder Group event was held at our offices on 20 March 2017. The day began with a general question and answer session covering our approach to plan development. This included describing our approach to plan development and the key themes and influences on the plan.

The second half of the day included two interactive sessions. The first session was on option preferences and the second on metrics/measures for 'extended methods'.

'There is a deficit in the integrated zone and there is a need to make up a material or sizeable deficit. With the information provided (from customer focus group sessions), without cost information presented (as accounted for separately in options appraisal), what are the gross preferences?'

In the option preferences session, representatives were given the following scenario:

Top Ranked Options

1. Reduce leakage further
2. Further promote & support water efficiency
3. Encouraging customers to have a meter
4. Recycle or re-use water directly
5. Recycle or re-use water indirectly
6. Transfer more water within the North West region
7. Increase the size of existing reservoirs
8. Store more water in a new reservoir
9. Transfer water from other regions
10. Take more water from under the ground
11. Take more water from rivers
12. More frequent temporary use bans (hosepipe bans)
13. More frequent Drought Permits
14. Take sea water via desalination

Bottom Ranked Options



Figure 3 Ranked options in the March Stakeholder event

They were then asked to rank the 14 possible options for this scenario from best to worst (Figure 3).

In the metrics/measures for ‘extended methods’ session the representatives were asked to rank the metrics in the same way, however, they found this more difficult. Although stakeholders did not disagree with the metrics, they found it hard to rank them in order of priority and in some cases raised the importance of more accessible naming and explanation. Interactive exercises showed this type of approach was valuable for the next meeting and discussion.

How does the March event relate to the Water Resources Management Plan 2019?

Similar to the pre-consultation, reducing leakage and further promoting water efficiency was a top priority for stakeholders. Stakeholders in this exercise were also wary about water trading, demonstrating a consistent theme to pre-consultation to be addressed in the plan.

Stakeholders were not keen to increase the frequency of any type of water use bans or drought permits as part of the options exercise. Taking water from the sea (desalination) was also adversely viewed.

2.3.3.2 July 2017 event

The second Technical Stakeholder Group event was held in the Rheged Centre in Penrith on 31 July 2017. The day was split into further exploration of preferences and views in detail in the morning (through sessions run by DJS Research) and in the afternoon we provided an update on the main themes of the plan via a presentation.

In this second event, we invited DJS Research to carry out a focus group style interactive session, based on the experience of the previous meeting. The main objectives of this task were to gain views on the following:

- What we do as a company – member’s priorities of service;
- Currents levels of service for temporary use bans, non-essential use bans and drought permits;
- Acceptability of a number of levels of service for temporary use bans, non-essential use bans, drought permits and extreme droughts;
- Acceptability of choices for different demand management policies (i.e. various levels of leakage reduction over 25 years); and
- Preferences across the 14 water resources options.

The session was split into four main parts based on the research objectives outlined in Table 4, in order to engage the stakeholders with each area under consideration. The results are outlined in Table 4 below.

Table 4 Summary of stakeholder quantitative research

Research objective	Stakeholders preferences
United Utilities role	The top four options chosen by stakeholders as areas they think we should be prioritising for improvement are: <ul style="list-style-type: none"> • Offering a reliable water service; • Protecting various water bodies; • Providing clean and safe drinking water; and • Providing a reliable wastewater service.
Leakage reduction	<ul style="list-style-type: none"> • The scale of leakage reduction was considered more important than the pace of leakage reduction; • Indicative bill impacts for an 18% leakage reduction (the highest from the choices offered) was considered acceptable by stakeholders, but we would need to communicate why there was an increase to the bill, stipulate it was not adding to profits and for environmental benefit; and • More generally needs to be done to encourage households to save water.
Acceptance of restrictions	<ul style="list-style-type: none"> • Temporary use bans of no more than 1 in 20 years (5% annual average risk) and 1 in 40 years (2.5% annual average risk) on average was considered most acceptable. The work showed a drop in the acceptance once the frequency of temporary restrictions reduces beyond this due to stakeholders considering it important to keep water in the environment; • Non-essential use bans of no more than 1 in 20 years (5% annual average risk) and 1 in 35 years (2.8% annual average risk) on average was considered the most acceptable, so very similar to temporary use bans as seen in customer research. Stakeholders saw more frequent (1 in 5 years (20% annual average risk)

Research objective	Stakeholders preferences
	<p>and 1 in 10 years (10% annual average risk)) non-essential use bans as much less acceptable and less frequent bans (1 in 60 years (1.7% annual average risk) and less) reasonably acceptable;</p> <ul style="list-style-type: none"> • Stakeholders found more frequent (1 in 5 years (20% annual average risk) and 1 in 10 years (10% annual average risk)) drought permits unacceptable, but anything less than 1 in 20 years (5% annual average risk) was considered generally acceptable; and • The majority of extreme drought interventions were considered acceptable (similar to customer research, there was little distinction between different risk levels). However, less than 1 in 100 years (1% annual average risk) would not be acceptable and it was stipulated that these events should last for weeks not months.
Water resources options	<ul style="list-style-type: none"> • Reducing demand for water was generally preferred over new sources; • Stakeholders most favoured money being spent on reducing leakage further, encouraging customers to use meters and further promotion and support of water efficiency; and • Stakeholders least favoured money being spent on taking more water from rivers, desalination, storing water in new reservoirs, increasing existing reservoirs, transferring water from other regions and more frequent drought permits.

Following this exercise, we engaged with members of the Technical Stakeholder Group to gain feedback on our draft Water Resources Management Plan through the consultation period, building on their more detailed insight into development of the plan covered to date. Following the meeting we also circulated the customer programme choice experiment to all stakeholders in the technical group.

How does this July event relate to the Water Resources Management Plan 2019?

There was perhaps a better understanding of the effect of water restriction bans on the environment and the potential economic as well as environmental problems this might cause, than there necessarily is among customers. However, the stakeholders generally accepted the same or similar frequency of drought interventions as those chosen during our customers' research.

2.3.4 Engagement with local authorities and non-household retailers

We conducted individual meetings with 24 councils and local authorities between October 2016 and September 2017. Each meeting included a presentation by ourselves on what the Water Resources Management Plan is and the potential impact on that individual council/local authority. A full list of the councils and local authorities can be found in Appendix B. The local authorities and councils also provided us with information on the forecasted property predictions in their area. This information was used to model future water resource scenarios. We have also sought engagement with non-household retailers in line with the planning guidelines. Further information on this can be found in our *Revised Draft WRMP19 Technical Report - Demand for water*.

2.3.4.1 Engagement with other water companies or suppliers

We have engaged with a wide range of water companies or licensed water suppliers, not just those neighbouring our region. In addition to discussing transfer solutions and existing bulk supply contracts, we have been actively involved in a number of companies' stakeholder engagement programmes. This is explained further in our *Revised Draft WRMP19 Technical Report - Options identification*.

We also informed Water Resources South East (WRSE) and Water Resources East (WRE) of our overarching approach to Water Resources Management Plan development as part of stakeholder communications at pre-consultation, and were an active participant in the Water UK long-term water resources planning study that has been very influential to our plan development. We are actively working as part of the River Severn Working Group and are also a key participant in the recently inaugurated Water Resources North group.

3. Consultation

3.1 Summary of consultation

Following the good practice laid out in the planning guidelines, we made copies of our draft Water Resources Management submission available to both statutory and non-statutory consultees. This was in addition to our own distribution list from previous Water Resources Management Plan and Drought Plan engagement, including those organisations involved in pre-consultation discussions. We offered to explain the plan to any interested parties at scheduled consultation events and by Webinar, further to our wider business plan roadshows. We published a customer friendly summary alongside our Water Resources Management Plan and used social media to highlight our consultation and associated events with customers and stakeholders. A full response to feedback received has been covered in the Statement of Response accompanying the revised draft plan.

3.2 Approach to consultation

Consultation on our draft Water Resources Management Plan took place for 12 weeks, from 2 March to 25 May 2018. The plan was published on our company website and was available in hard copy at our Head Office at Lingley Mere, Warrington. We publicised our consultation by email communications to around 700 statutory and non-statutory stakeholders, as well as on our website, with our Water Resources webpage receiving over 2000 visitors since January 2018. We also used social media platforms such as Twitter and LinkedIn, reaching an audience of over 68,000 with 900 likes, clicks or shares of the post. We also produced a customer-friendly video online about the Water Resources Management Plan, which was hosted on social media and received over 5000 views. We also raised awareness of our consultation at a series of customer roadshows associated with our wider business plan and through business as usual stakeholder engagement routes. We ensured that all consultee groups were covered by our engagement activities, in line with the Water Resources Planning Guideline.

During the consultation period, we held three public consultation events across our region, in Knutsford, Bolton and Penrith, in order to discuss the plan directly with interested parties. These events were attended by 26 delegates from 20 different organisations including the Environment Agency, local authorities and councils, conservation and wildlife trusts, recreational bodies, public service organisations and local businesses, as well as members of YourVoice, our Customer Challenge Group. We also offered a webinar for those unable to attend a consultation event, however only one participant, Lake District National Park Authority, was interested in this method of consultation so we arranged to meet them directly instead.

Our approach to the events and specific consultation questions were reviewed by YourVoice, our Customer Challenge Group. Taking their recommendations on board, we altered our approach to the consultation events to be more effective, such as the use of voting buttons to enable direct input and on-the-day informal feedback from attendees to be collated⁵. YourVoice also submitted feedback regarding the plan itself, which we have taken on board for our revised draft Water Resources Management Plan.

The main themes covered during the events were around the strategic choices (and associated preferred plan proposals) that we highlighted in our draft Water Resources Management Plan: enhanced leakage reduction, less frequent drought permits, national water trading and improved supply system resilience, with a key focus on the Manchester and Pennine Resilience scheme high-level solutions.

The sessions had three aims:

- To provide clarity on the WRMP19 submission;
- To prompt and aid dialogue around the plan, and;
- To provide initial informal feedback on the plan choices.

⁵ All feedback taken from our consultation meetings is treated as informal; no individuals or organisations have been explicitly or implicitly identified as associated with any of this feedback.

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During the sessions, delegates were asked a number of strategic questions around key plan choice areas, the results of which are summarised below⁶:

- **AMP7 leakage reductions:** The vast majority supported leakage reductions, with **15%** supporting our proposed draft Water Resources Management Plan leakage reduction of 7%, **38%** voting in favour of a 10% reduction and **46%** supporting the Ofwat recommendation of 15% (or beyond).
- **Manchester and Pennine Resilience:** Most people voted either for solution D or solution E, in line with customer research. **67%** voted in favour of rebuilding all tunnel sections of the aqueduct (solution D), with **32%** voting in favour of rebuilding all tunnel sections and providing additional water sources (solution E).
- **Alternative and preferred plans:** When asked which suite of alternative plans they preferred (comprising of the individual strategic choices in the draft Water Resources Management Plan), **84%** supported our preferred plan of leakage reductions, increased levels of service, addressing water supply resilience risks and continued exploration of water trading.

3.3 Outcome of consultation

We received 25 formal consultation responses on our draft Water Resources Management Plan. Several respondents commented on more than one issue, or on different aspects of a single issue. As a result, the 25 responses gave rise to nearly 250 detailed comments.

The feedback we received generally covered the following key areas:

- Leakage and demand management;
- Resilience to drought and other hazards;
- Abstraction and impacts on the Lake District;
- Non-drought resilience (Manchester and Pennine Resilience);
- Water trading;
- Preferred plan;
- Environmental appraisals, natural capital and catchment management; and
- Consultation, plan development and future collaboration.

We have carefully considered all the responses received and have taken account of these in our revised draft Water Resources Management Plan submission. Full details of all consultation feedback and our response to all feedback received is provided in our *Draft WRMP19 Consultation Statement of Response*.

⁶ All feedback taken from our consultation meetings is treated as informal; no individuals or organisations have been explicitly or implicitly identified as associated with any of this feedback.

4. Customer engagement

4.1 How we conduct customer research

During AMP6 (the 2015-2020 investment period), we have conducted a wide range of customer research, which has included surveys, focus groups, face-to-face interviews, an online interactive tool and immersive resilience research. This breadth of customer research ensures we do not rely on single surveys or traditional stated preference willingness to pay research, and instead we have enhanced our approach with new innovative techniques such as the Programme Choice tool we have developed. We have also established an online community panel, known as “WaterTalk”, recruiting 7,300 customers from our region to take part. These customers, reflecting the regional demographics, are an important voice in our decision making. This online panel will become a more informed community over time, and will be able to provide a more educated input on customer concerns and priorities.

This section provides a summary of all water resources relevant research.

4.1.1 YourVoice

In September 2015, we established a new panel of representatives, which succeeded the former Customer Challenge Group, to provide independent assurance and advice on our customer engagement strategy and research, and its impact on our business plan proposals. This new panel is known as ‘YourVoice Customer and Stakeholder panel’. The YourVoice panel comprises an independent body of individuals from different sectors, backgrounds and with different areas of expertise. This helps us to ensure that customers are at the heart of our business planning engagement.

The expertise embodied in the panel ranges from Citizen’s Advice to the Confederation of British Industry, and from environmental organisations to public health. YourVoice has an integral role in the monitoring, assuring and reporting on the delivery of our commitments to customers and other stakeholders. It also looks at the quality of our research aimed at capturing the views of customers, ensuring that customer views influence the shaping of our plans.

A key objective of the YourVoice panel is to help us reflect on what type of consumer representation is needed and how this relates to our existing governance arrangement. To this end, we have involved YourVoice in our engagement approach to the Water Resources Management Plan, which has proven useful to refine our approach. Additionally, engagement on customer research (e.g. to gain feedback on draft surveys) is also supported by providing copies of that same draft material to the Environment Agency.

The YourVoice panel influenced the development of the Water Resources Management Plan both directly and through influencing our wider business plans. Engagement with YourVoice was through established environment and customer engagement sub-groups, as well as the main panel.

Service aspects and associated issues that we have engaged with the main YourVoice panel are as follows:

- Supply and demand;
- Leakage;
- Customer Research including Manchester and Pennine Resilience; and
- The establishment of our Technical Stakeholder Group.

YourVoice sub-groups engagement and feedback

The customer engagement (CESG) and environmental (ESG) sub groups have been involved in the development of both the Water Resources Management Plan and the wider PR19 Business Plan for the period 2020-2025.

The CESG was asked to review the approach to and involved with the development of:

- PR19 development of consultation material, programme and customer research strategy;
- Developing performance commitments, measures and targets;
- Acceptability testing;

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- Manchester and Pennines resilience research; and
- WRMP consultation questions.

The ESG provided feedback on and was involved with the development of our approach to:

- Outcome Delivery Incentives (ODIs) including leakage, per capita consumption (PCC), drought risk resilience;
- Resilience;
- Supply and demand;
- Leakage;
- Water trading;
- Manchester and Pennine Resilience;
- Water Resources Management Plan customer research plan; and
- Water Industry National Environment Programme (WINEP).

The YourVoice panel and subgroups were kept well informed of the delivery of the draft Water Resources Management Plan. At the last ESG meeting prior to the submission of our draft plan, the ESG highlighted how well the development of the plan had been communicated and commended us on our success and efforts to keep relevant stakeholders up to date.

As well as the broad coverage and outcome of discussion highlighted above, some key specific examples are provided below where the YourVoice group has influenced the plan process:

- Our approach to specific pieces of customer research, such as:
 - Feedback resulting in improvements to survey and ‘showcard’ material for qualitative and quantitative water resources research, and demand forecasting surveys; and
 - Determining the most appropriate presentation of risk to customers in quantitative research exploring extreme drought.
- We worked closely with the YourVoice panel to engage effectively with customers regarding Manchester & Pennines Resilience, more detail can be found in Section 5.2, which details the Manchester and Pennine Resilience customer research:
 - YourVoice recognised it was especially important that customers fully understand the risks and that engagement was designed in a way to avoid biasing the results;
 - YourVoice appointed independent experts from the Centre for Regional Social and Economic Research at Sheffield Hallam University to review the research and interpretation of the results; and
 - On the feedback from YourVoice and appointed experts, we undertook additional statistical analysis of the preferences of lower income customers and re-assessed the business results with weightings so small businesses were represented in line with the regional spread.
- The YourVoice panel also influenced our approach to our draft WRMP consultation by reviewing our detailed stakeholder consultation questions included the submission. This helped us to shape our presentation material in a more accessible way during our consultation events and ensure the specific questions were put into context with the overall process; and
- Members of YourVoice also took part in our consultation and submitted formal responses, these can be seen alongside all of our representations and responses in our Statement of Response and specifically in Appendix A.
- They challenged us over the relatively poor attendance at regional stakeholder events to consider the draft WRMP held in April 2018, and urged that more be done to encourage attendance at future events of this nature and/or explore alternative ways of securing stakeholder views on plan proposals.

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- Supported the development of innovative, behavioural economics-based approaches to exploring customer attitudes and developing new ways of tackling water efficiency in homes.
- Emphasised the need for Water Trading to work to the benefit of customers in the North West, leading to the water companies concerned commissioning a joint research project to explore household and non-household customer attitudes towards water trading, this is detailed in Section 4.3.10.
- Specifically relating to leakage, the YourVoice panel stated “We wanted the company to go further to reduce leakage than proposed in the draft WRMP, by adopting the more challenging 15% Ofwat target for the 2020-25 period.”

4.1.2 Customer Panels

Verve, a company offering community panel expertise, was commissioned to build an online customer community for discussing various business topics to help develop our understanding of customer beliefs, opinions and behaviours towards us and our operations. This online platform has been called the United Utilities WaterTalk panel and has recruited 7,300 members to date. It allows us to approach a broad range of individuals and groups of customers from across our region and invite them to participate in a range of qualitative and quantitative studies through surveys, interviews, pop-up communities and workshops to gain an insight into customers’ opinions and needs. The online platform interface means that customers can respond to questions at a time that suits them and allows multiple studies to be conducted at the same time in more up-to-date and modern formats. This approach is designed to supplement, rather than replace, other forms of customer engagement or survey methods.

4.1.3 Innovation

Throughout this Water Resources Management Plan, we have tried to engage customers in a more innovative manner than in previous planning rounds, pledging to move away from industry reliance on traditional willingness-to-pay surveys. We have done this through the quantitative work we have carried out with customers to engage them on drought risk (Section 4.3.6 and 4.3.7) and using alternative methods to test acceptability (Section 4.3.5). On top of this, we have also created two new techniques in order to reach out and involve customers: our interactive Programme Choice tool and Immersive Resilience research. These are outlined further in Sections 4.3.7 and 4.3.8.

4.2 Previous work in Water Resources Management Plan 2015

Engagement in the previous Water Resources Management Plan 2015 both sets the scene and context for the development of the Water Resources Management Plan 2019, whilst also allowing us to understand where there are continuing consistent, or changing themes to account for in developing the latest plan. Table 5 summarises the work that was carried out as part of the Water Resources Management Plan 2015 customer research.

Table 5 Water Resource Management Plan 2015

Date of research	Research carried out	Outcomes of research
2012/2013	Customer preference survey	Preferred option for customers included reducing leakage and increasing water efficiency. When financial and environmental costs were considered, the majority of customers wanted to keep their bills the same or reduce them by accepting more frequent water use restrictions.
January 2013	Willingness-to-pay survey: stage 1	Customers were asked how they feel about the current level of water use restrictions. Customers do not value fewer water use restrictions and were not willing to pay higher bills for the frequency of water use restrictions to be reduced. They also do not want to see a deterioration in level of service i.e. more frequent water use restrictions.
August 2013	Willingness-to-pay survey: stage 2	This survey asked customers to consider environmental, recreational and economic impacts of drought permits and non-essential use bans. It was concluded from both the stage 1 and stage 2 studies that customers support maintaining the existing hosepipe ban frequency of no more than 1 in 20 years (5% annual average risk), however, they would be more willing to pay for a reduction in the frequency of drought permits.
June to August 2013	Acceptability testing	Customers were asked to consider the overall acceptability of the package of service levels and the bills that they will pay. This helps inform our business plan. The research included the proposals to maintain the supply-demand balance in West Cumbria and the proposed approach to leakage control (maintain target level only). These proposals were acceptable to 75% of the customers asked. It found affordability was a very significant factor in determining whether proposals were acceptable to customers.
August 2013	Customer focus groups	Focus groups were commissioned in West Cumbria to gather views from customers on the alternatives for their future water supply (as the central question in the last planning round). Six focus groups were held covering the different socio-economic groups of domestic customers and two focus groups were held with business customers. The customers generally agreed that the freshwater mussels in Ennerdale should be protected and that alternative water sources should be found. Some are not so concerned about the mussels and questions whether we need to stop taking water from Ennerdale at all. The groups were then presented with the three alternative options to supply West Cumbria once abstraction from Ennerdale ceases. The most popular option was the building of a new pipeline from Thirlmere reservoir.

4.3 What customer research have we conducted?

4.3.1 Water efficiency: Customer behaviour change study – March 2016

We have carried out ongoing water efficiency studies in order to establish how customers value water efficiency measures and to inform our approach to this area of demand management. Of particular interest to the Water Resources Management Plan is the water efficiency behaviours and perceptions study carried out in March 2016 by Corporate Culture. This study was conducted with 1,300 customers and sought to better understand customer motivations and barriers to metering and water efficiency. The study highlighted a need for positive communications and a need to overcome a potential suspicion of the drivers for water companies in meter promotion. There was relatively low customer recollection of water efficiency campaigns or an awareness of free meters. Bill saving is still the primary motivator for water metering, but the research did show how different groups of customers (i.e. customers in Merseyside or different age groups) may respond to alternative messaging. There were recommendations to adopt a trial and feedback approach moving forward and a draft strategy has been developed using this.

4.3.2 Business Plan: Customer priorities research – June 2016

Research was conducted by Box Clever Consulting in June 2016 to support considerations for the five-year PR19 business planning period 2020-2025. The remit of this research was to:

“Explore customer priorities in relation to water service provision within the North West to identify a clear hierarchy of what is core and where energies and investment may be focused in future”.

A final report was received in November 2016. The research was conducted in two stages:

- Stage 1: qualitative exploration and understanding. This included face-to-face interviews and focus groups which included capturing vox pops (comments); and
- Stage 2: quantitative communications testing and channel evaluation. This included 3,340 online surveys.

Each stage in the research was concerned with establishing the overall priorities of customers, their willingness to pay, and highlighting any future challenges. Clear priorities identified during this research were:

- Safe, clean drinking water; and
- Reliable water supply.

Other key priorities were:

- Preventing homes from flooding;
- Preventing accidental pollution; and
- Reducing level of leakage and responding quickly to reported leaks.

A number of key future challenges were identified:

- Reducing water wastages and leaks;
- Ensuring appropriate plans are in place to service a growing population and cope with climate change; and
- Putting preventative measures in place that guard against water quality issues.

Furthermore, when presented with 10 future issues and challenges that we identified, water trading ranked nine out of 10 as something we should be focusing on, with only 45% of people rating this as an important issue. However, this may be expected to some degree, as customers are likely to prioritise direct elements of service or challenge to those that primarily support wider national need. This research also found that two-thirds of customers feel that the current bill amounts are reasonable. However, three in 10 customers feel the bill amount is unreasonable. Affordability was a key factor and there was little significant indicative willingness to pay for additional service.

How does this Business Planning research relate to the Water Resources Management Plan 2019?

The plan is concerned with providing reliable sources of water and therefore understanding that this is particularly important to customers in the wider sense as well as during our more detailed research is useful.

It was also important for us to see that leakage reductions are also seen as a relative priority.

4.3.3 WRMP19 customer preferences

4.3.3.1 Phase 1 qualitative focus groups – September 2016

We worked with DJS Research to carry out both qualitative and quantitative research into customers' thoughts on the forthcoming Water Resources Management Plan. This section describes Phase 1, to conduct qualitative focus group research. Phase 2 was a quantitative stage of research, which included a contingent valuation willingness to pay assessment. The quantitative research provides a more statistically robust report of household and non-household customers across Cumbria and the Integrated Resource Zone and this is further detailed in Section 4.3.4. However, initial focus group research allows for a broader coverage of issues, and may also be used to inform later phases of work.

This research was conducted in September 2016, and included seven focus groups with domestic customers and 15 face-to-face in-depth interviews (five vulnerable customers and 10 non-household customers). For the focus groups a mixture of socio-economic-geographic, age and metered/unmetered customers were included. A summary of the results is in Table 6.

Table 6 Summary of the qualitative research carried out by DJS Research

Research objective	Household customers	Non-household customers
The role of United Utilities and priorities towards water management	<p>In general, customers had a good understanding of the role we have and the list below summarises the main activities customers believe we carry out:</p> <ul style="list-style-type: none"> • Maintenance of water utilities; • Providing clean water; and • Removal of waste water. <p>However, customers did think that further education is required for customers to understand what they are getting for their money.</p>	
Attitudes towards water saving and customer metering	<ul style="list-style-type: none"> • Attitudes in domestic groups differed across a number of different areas: age, family and affordability (cost consciousness); and • Large differences in attitude between metered and un-metered customers. 	<ul style="list-style-type: none"> • Non-household customers' attitudes differed depending on their type of business; and • Potential future actions: incentive tariffs, bonus monetary reductions if there is a reduction in use, one-off financial saving if households agree to have a water saving kit or meter fitted.
Interruptions to supply and service expectations	<ul style="list-style-type: none"> • Shorter more frequent interruptions to level of service were favoured over longer, lengthier ones by all types of customers; • Few issues with restrictions applying to temporary use bans, many favoured an increase in frequency if it resulted in a lower water bill. Temporary use bans apply to domestic (household) customers only; • Non-essential use bans were seen in a similar view to temporary use bans by both domestic and non-household customers; and • Drought permits were again viewed in a similar vein to temporary use bans and non-essential use bans, i.e. if the intervention is justified. However, some expressed a concern that it was an extreme measure and should be used only after water use restrictions. 	
Water supply-demand management options	<ul style="list-style-type: none"> • Initially participants favoured: desalination, reservoir storage, leakage reductions and water efficiency products; • After cost, environmental impact and reliability were accounted for, they favoured: leakage reductions, water efficiency measures, reservoir storage and groundwater abstraction; and • Whilst the reliability criteria are quite subjective, and thus this wasn't included in latter areas of research, the exercise did show reliability to the dominant attribute in options choice based on the alteration of choices during the exercise. 	
Water trading	<ul style="list-style-type: none"> • The main concerns raised when asked about water trading were that the North West should not suffer as a consequence of it and safeguards should be put in place; • Water quality should not suffer in the North West; and • There were some concerns over the potential costs and environmental impact. 	

How does this Phase 1 research relate to the Water Resources Management Plan 2019?

The qualitative stage of research is used to inform the direction in which to focus the quantitative research. This research showed that customers generally had a good sense of what role we fulfil for them. This research highlighted that cost of services was important to customers, something that was not necessarily as important to stakeholders. The reliability of services was also a key concern for customers, above cost and the environment.

4.3.3.2 Quantitative leakage survey – June 2017

In June 2017, Verve carried out a quantitative WaterTalk research report to find out whether customers are willing to pay to help reduce water leakage.

As part of the planning process for the Water Resources Management Plan and Business Plan, a survey was conducted to collect feedback from our customer panel on opinions about leakage, in order to ensure that these are taken account of when decisions are made. The survey was conducted with 3,261 WaterTalk members from 2-9 June 2017. The collected data was weighted by age, gender and region to be demographically representative of the customer base.

The research set out to answer the following points:

- Whether customers think that leakage reduction is an important issue;
- Whether customers are willing to pay extra to support the reduction of leakages, and if so, how much; and
- The impact that addressing leakage has on perceptions of our brand.

It was found that customers believe leakage reduction is important, ranking 4th out of eight priorities, behind 'providing safe, clean drinking water', 'providing a reliable water service' and 'providing a reliable wastewater service'. Nine out of 10 participants, and particularly older participants, believe that it is important for us to work to reduce leaks. Many see that reducing leakage will not only prevent water wastage, but also contribute to lower water bills (although in reality this may not be the case).

Many respondents (80%) would pay an extra 20p on top of their annual bill to help us meet leakage targets, of reducing leakage by 40 million litres by 2030, whilst 61% would be willing to pay an extra £1 per year. Reducing leakage by 80 million litres by 2040, a greater reduction target, is supported by 68% of people surveyed, saying they would be willing to pay £1.80 to support this goal. Both these bill increases are supported more by females, under 35's and higher earners.

The more customers know about leakage and how we are working to improve it, the more our brand perception improves. Further promotion of our efforts in this area, particularly on preventing water wastage and the ensuing environmental benefits would have a positive brand impact.

How does this leakage survey relate to the Water Resources Management Plan 2019?

Customers believe leakage to be an important priority for us and are willing to pay more to reduce leakage further. We have considered several leakage reduction options in this plan and considered the outcomes from this research alongside our other engagement in our preferred plan.

4.3.4 Business Plan: Quantitative service valuation (willingness to pay survey) – June 2017

As part of the five-yearly business planning process, a quantitative service valuation (willingness to pay survey) is conducted with customers to gauge their opinions on how they value different elements of service. By understanding how customers value services and how much they are willing to pay, we can ensure that we are tailoring our plan to best fulfil these views and needs.

This survey also assesses the importance customers place on different aspects of our service, what they might be willing to see decrease or increase, and how much they would be willing to see their bill increase for this to happen. However, the survey conducted on behalf of business planning does not include several aspects that are key to the Water Resources Management Plan, such as questions on level of service, water trading and supply-demand balance options. This is due to time limitations on the survey length, which resulted in us not being able to go into specific sub-topics in detail. Therefore, we also conducted a Water Resource specific willingness to pay survey which is outlined below in Section 4.3.5.

The overall outcomes of the business plan service valuation survey were:

- On average, household customers were willing to see their annual bill increase by 6.2%;
- However, vulnerable household customers were only willing to see a 0.3% increase;
- Annual bill level was the largest driver for household choices of how we might alter our service;

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- Safe clean drinking water, cleanliness of our rivers and lakes, and cleanliness of the sea and lakes for swimming were the top three service attributes that drove household customer choices; and
- Customers highly valued supply resilience based on short-term supply interruptions.

These outcomes have been used to inform our business plan and are therefore still subject to acceptability testing with customers in winter 2017. These tests will inform the Water Resource Management Plan, including a component on leakage management, and are outlined in Section 4.3.9. This research only assessed customers' opinions on shorter-term supply interruptions; for information on customers' valuation of long-term interruptions see Section 4.3.7 on immersive research.

How does this Business Plan quantitative survey relate to the Water Resources Management Plan 2019?

The business plan is a much broader look at customer preferences for the future. However, there are certain aspects that also relate to the Water Resources Management Plan such as resilience work.

4.3.5 WRMP19 customer preferences: Phase 2 quantitative research – June 2017

The aim of this research was to measure customers' preferences for water resources, levels of service, and the options or plans that we might create to address any changes to levels in service or to address a supply-demand deficit.

Willingness to pay exercises were included in this quantitative research, but it also used a Gabor Granger⁷ acceptability exercise to compare results and gain a greater understanding. Furthermore, it tested views on severe and extreme drought resilience for the first time.

This research was conducted with 595 face-to-face interviews, 302 business interviews, 266 online panel surveys and 36 face-to-face computer-assisted interviews (in Cumbria). It was ensured that a mixture of socio-economic, geographic, age and metered/unmetered household customers were approached. It was also ensured that a range of businesses in different sectors with different needs, water consumptions, geographic regions and water uses were all targeted.

The research was split into four sections: Measuring attitudes towards the environment, Levels of Service – Acceptability, Levels of Service – Willingness to Pay, and Priorities for Future Investment. The results for each section are outlined below.

4.3.5.1 *Measuring attitudes towards the environment*

The results below show the top three priorities of household customers in their attitudes towards water saving:

- 92% of customers prioritised protecting lakes, rivers, reservoirs, fish and other aquatic plants and wildlife;
- 81% thought that they make a conscious effort to save water; and
- 75% say they are happy to restrict their water usage to protect species.

Whilst for non-household customers, the following summarises their attitudes towards water saving:

- 66% think that their business makes a conscious effort to save water;
- 65% believe that if we did not issue hosepipe bans when water supplies are low, we could end up with no water coming out of our taps; and
- 58% think that protecting lakes, rivers, reservoirs, fish and other aquatic plants and wildlife is really important to their business.

4.3.5.2 *Levels of service – acceptability*

A Gabor Granger exercise was used to assess customers' attitudes towards level of service. The Gabor Granger exercise allows customers to express their views about the frequency that they might experience water supply restrictions and how acceptable they find these restrictions.

Figure 4 shows the household views from the Gabor Granger exercise towards levels of service and Figure 5 shows the household views to extreme events. In Figure 4, there is little distinction between the temporary use ban and

⁷ This has been completed using a technique called 'Gabor Granger' analysis.

non-essential use ban curve showing a very similar level of acceptability amongst household customers. Drought permits have a lower acceptance and have a much higher level of reaction to change in frequency which shows a higher level of elasticity.

There are no significant differences between the metered and unmetered households.

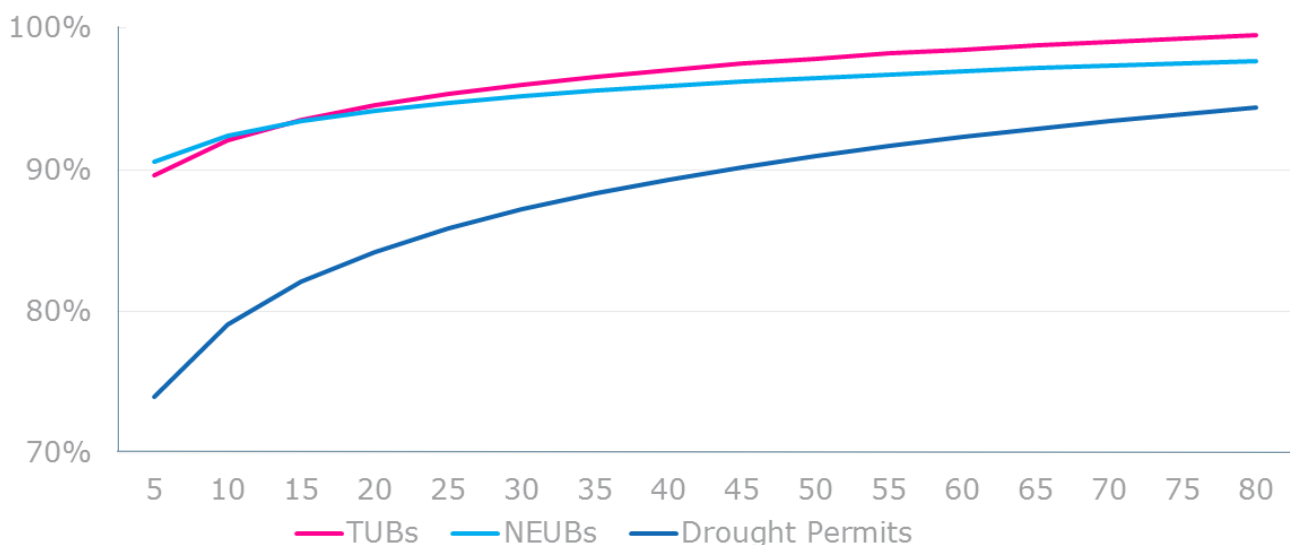


Figure 4 Gabor Granger exercise: Household views of level of service

Household views to extreme events change very little throughout the various risk levels. It may be that due to the very small chance of it actually happening in a lifetime, respondents felt they could not judge the subtle differences between the various risk levels.

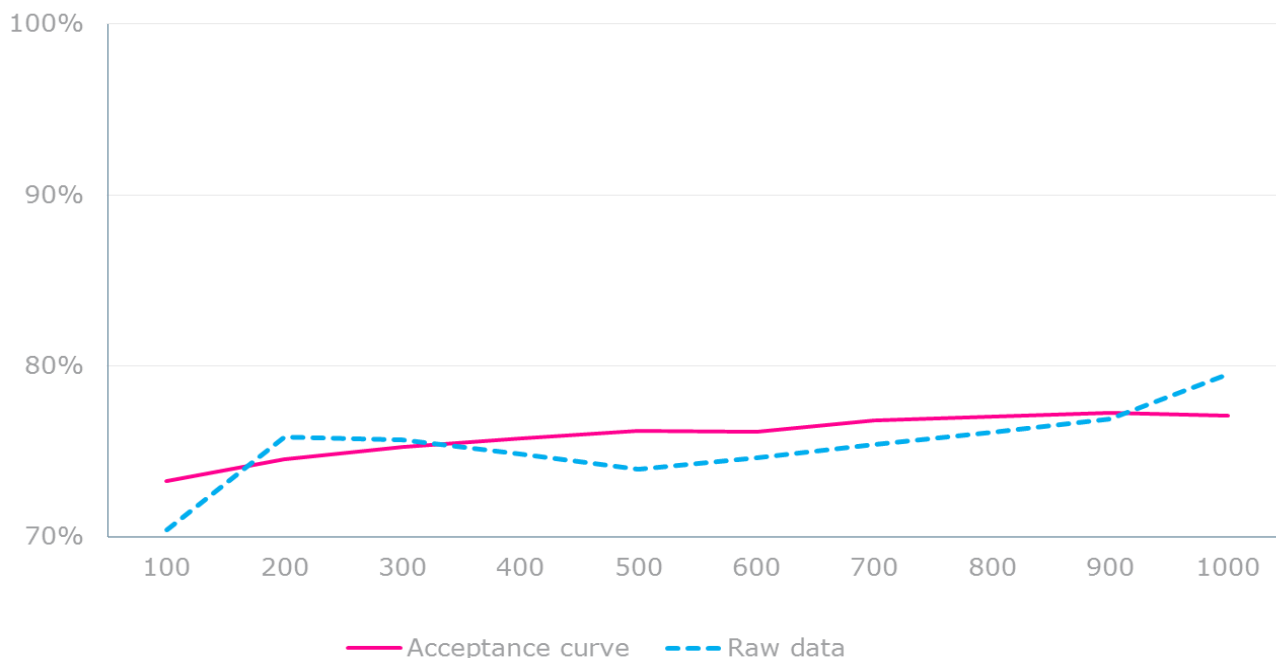


Figure 5 Gabor Granger exercise: Household views to extreme events

Figure 6 and Figure 7 show the Gabor Granger curves for business customers. Figure 6 shows that there is little change in acceptance of the various levels of risk for temporary use bans and non-essential use bans. Figure 7 shows that there is less acceptance of drought permits, particularly in higher risk scenarios (between 1 in 5 years or 20% annual average risk to 1 in 25 years or 4% annual average risk).

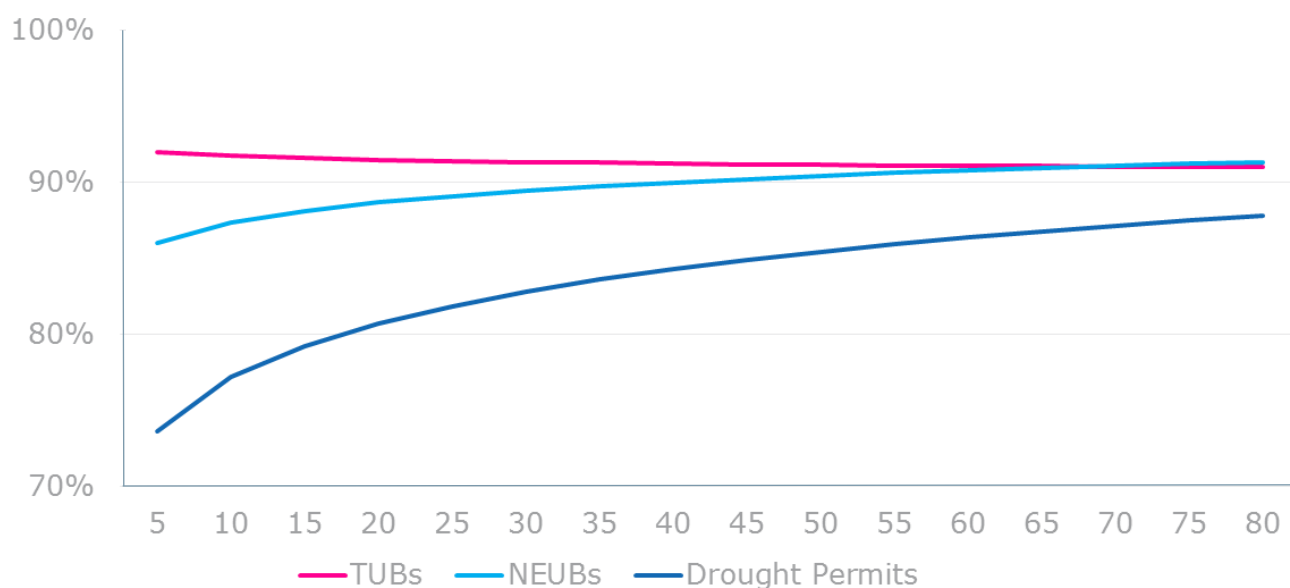


Figure 6 Gabor Granger exercise: Business customers' views

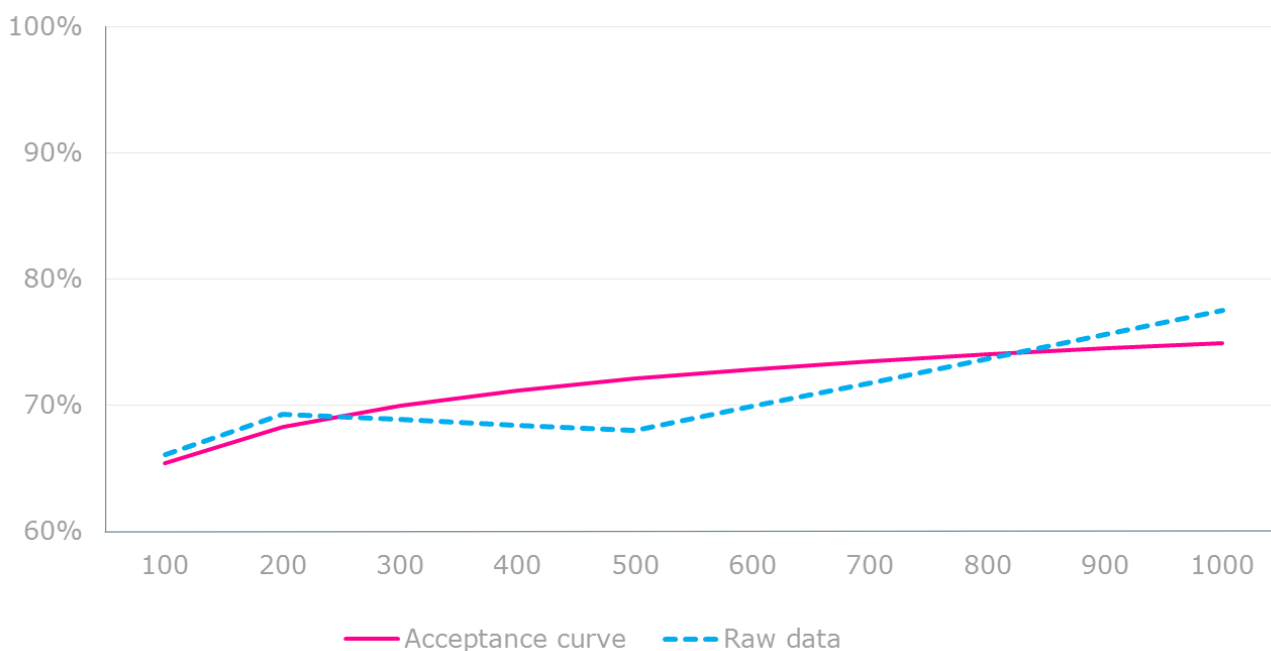


Figure 7 Gabor Granger exercise: Business customers' views on extreme events

In an extreme drought scenario, 43% of household customers and 23% of business customers believed they could not tolerate an extreme drought scenario for more than one week. Tolerance of customers to extreme droughts decreased for the longer time periods, with only 12% of household customers and 13% of business customers saying they could tolerate an extreme drought scenario for three months.

4.3.5.3 Levels of Service – willingness to pay

Generally, household customers were willing to pay for the following:

- The willingness to pay estimate for temporary use bans is £4.26; this increases to £7.39 for those who expressed a desire for service improvement;
- The willingness to pay estimate for drought permits is £4.35; this increases to £8.57 for those who expressed a desire for service improvement;
- The willingness to accept (to avoid deterioration) estimate for temporary use bans is £6.22; this increases to £6.98 for those who expressed a desire for decrease in service; and
- The willingness to accept estimate for drought permits is £6.78; this increases to £8.31 for those who expressed a desire for decrease in service.

Whilst business customers expressed a willingness to pay for the following:

- The willingness to pay estimate for temporary use bans is 2.7%; this increases to 4.2% for those who expressed a desire for service improvement;
- The willingness to pay estimate for drought permits is 2.8%; this increases to 4.6% for those who expressed a desire for service improvement;
- The willingness to accept (to avoid deterioration) estimate for temporary use bans is 2.9%; this increases to 3.8% for those who expressed a desire for a decrease in service; and
- The willingness to accept estimate for drought permits is 2.8%; this increases to 3.2% for those who expressed a desire for decrease in service.

It should be noted that the valuations provided here are only one element of work to capture customer willingness to pay. Section 4.3.8 describes our programme choice experiment, which we subsequently have used as the primary method for customer valuations, and which has also been combined with this more traditional willingness to pay research as described in Section 4.4.

4.3.5.4 Priorities for investment – water supply options

The last part of the quantitative research looked to the future and what customers wanted to see us invest in. It should be noted that the preferences given by customers did not take account of cost per unit saving in the exercise, but rather sought to understand ‘raw’ views on the type of option (recognising that the link between cost and option size is often not linear even within an option type). This is consistent with our approach in the last plan, and also recognised that cost would explicitly be tested in the programme choice experiment, allowing a comparison of views.

The top three things household customers wanted to see investment in are:

- Reducing leakage further;
- Further promoting and supporting water efficiency; and
- Taking sea water via “desalination”.

Whilst the top three things business customers wanted to see investment in are:

- Reducing leakage further;
- Taking sea water via “desalination”; and
- Encouraging customers to use meters.

Whilst customer support for demand management is consistent with views of stakeholders, it is noteworthy that desalination results in opposing views.

4.3.5.5 Overview

Table 7 below summarises the support shown by both household and non-household customers for different improvement options. The support is shown as odds ratios, odds ratios show the relative preference for each improvement where 1 is showing normal support. Leakage has the highest preference at over 10 for household and over 5.5 for non-household.

Table 7 Summary of customer preferences for options

Improvement	Household	Non-Household
BASE CASE TUBs	1.000	1.000
1. River abstraction	1.000	2.726
2. Desalination	4.163	4.645
3. New reservoir	3.259	2.048
4. Increase existing reservoirs	2.654	2.303
5. Transfer (outside North West)	1.000	1.000
6. Transfer (within North West)	1.719	1.000
7. Metering	3.070	3.282
8. Efficiency	5.180	2.675
9. Recycle direct	2.173	1.863
10. Recycle indirect	1.443	1.960
11. Leakage	10.115	5.692
12. Underground	1.495	1.000
14. Drought Permits	0.446	0.600

Generally leakage and water efficiency options were supported over other options. This is reflected further in our *Revised Draft WRMP19 Technical Report - Options appraisal*.

How does this Phase 2 research relate to the Water Resources Management Plan 2019?

The Gabor Granger work on level of service shows that customers are happy with the level of service for water use restrictions and would generally support a decrease to this service. Part of this Water Resources Management Plan is looking to move from a level of service of no more than once every 20 years on average (5% annual average risk), to a 1 in 40 year on average service (2.5% annual average risk). This research suggests that this would be supported by most customers.

Similar to previous customer research, customers wanted to see a reduction in leakage and promoting water efficiency as priorities for future investment. Several options relating to these issues were included within our options appraisal. Non-household customers also showed a preference for taking water via ‘desalination’ as a potential future option, this is the opposite view to that expressed by stakeholders.

4.3.6 Level of service (further research) – 2018

For our revised draft Water Resources Management Plan, we worked with DJS Research to build upon the research previously carried out for the draft plan, outlined in Section 4.3.5 above. The research was based on the same question set previously used, but focused specifically on levels of service and the impact of our position relative to other companies (this followed a recommendation by Ofwat in their consultation response on the draft plan).

Whilst initially we had planned our research to use exactly the same question set as in 2017, there were concerns that the summer 2018 dry weather and media attention had the potential to affect the results in terms of exploring the relative impact of presenting our level of service position relative to other companies. Therefore, we decided to use a slightly different approach, targeted at household customers.

600 household customers were split into two groups: the first 300 were not presented with any additional context on our levels of service relative to other companies (our uninformed group), and the second 300 were presented with this additional context (our informed group). As both groups were aware of the heightened media attention, this approach meant that any differences between the two groups’ responses could be attributed to the influence of the additional context of our relative position. We are confident that our approach to undertaking this research has thus still produced meaningful results, as we can isolate the effect that knowledge of other companies’ levels of service has on customer views.

Noting this, whilst due to chance timing this research was being carried out during a dry weather event, during which the levels of service in question were particularly at the forefront of customers minds, this provides additional

insight into whether customer views changed when interventions such as temporary use bans are a more evident risk than in a 'typical' year. This is useful because the levels of service being engaged upon are by their nature observed at relatively low frequency compared to other service aspects. Also, as the events of summer 2018 will likely remain in public memory into the near future, it is likely that delaying the research temporarily would still have resulted in any such research being influenced in the near future.

The net acceptance of our current levels is slightly higher for the uninformed groups for temporary use bans, non-essential use bans and extreme events. There was no difference between the two groups for acceptance of drought permits. Overall, across a range of levels of service, acceptance was very similar for both temporary use bans and non-essential use bans, with a lower acceptance for drought permits and extreme events. Acceptance varied much less across the full range of possible levels of service for extreme events compared to the other restrictions. The informed group had a slightly greater acceptance of drought permits as the frequency of these occurring decreases, however, none of these differences meet a level of statistical significance. The conclusion was that our drought resilience levels, when compared to other water companies, has little impact on customers' overall acceptance of these service levels.

The research was also compared with the 2017 research, to compare a normal year of activity with a period of dry weather and large media attention. As shown in Figure 8, for all types of water restriction, the 2017 acceptance was marginally higher than the acceptance in 2018. Non-essential use bans and drought permits had the greatest difference between the 2017 and 2018 research. There were significant differences in acceptance at the current level of service, as well as significant differences in acceptance at other levels of frequency. The only restriction that had no significant difference was for extreme events, which may be due to these events being extremely rare. The difference in net acceptance between the 2017 and 2018 responses justified the decision to conduct a split sample survey for 2018, where both groups would have been equally influenced by the dry weather.

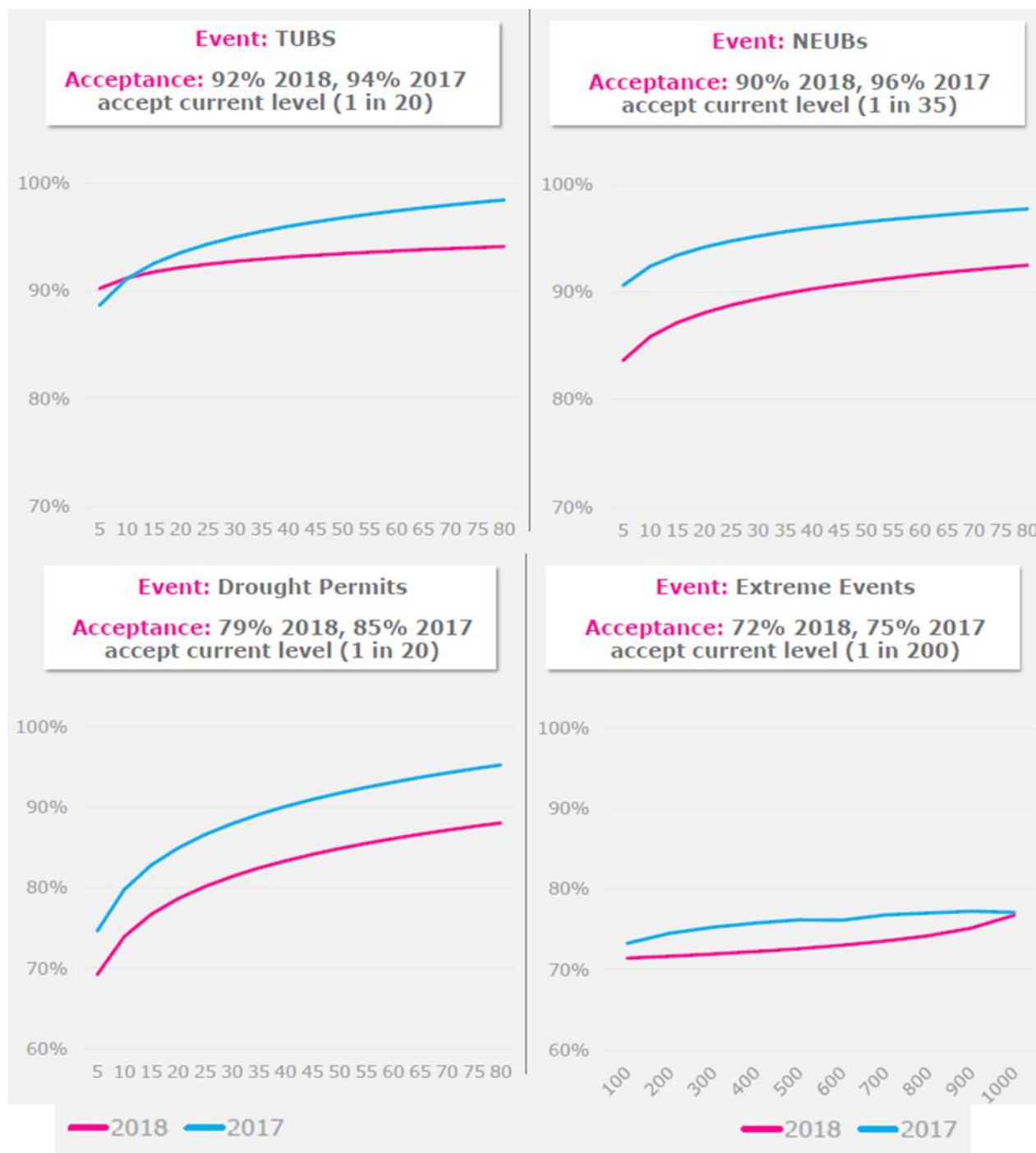


Figure 8 Customer views on levels of service from 2017 to 2018

4.3.7 Immersive experience – July 2017

One of the problems that we have encountered when trying to understand customers’ attitudes to loss of service is that customers have very little experience of low likelihood, high consequence events, such as having no water, and therefore find it hard to make economic decisions about such events. In order to overcome this issue, we employed the research company Frontier Economics to create an immersive experience for customers; the first research in the water industry to roleplay with customers the consequence of a service failure. This immersive experience was designed to specifically target the idea of resilience amongst customers, a key theme for the Water Resources Management Plan. The workshop was carried out on 18 and 19 July 2017.

This immersive experience was split into two separate workshops that were run concurrently:

- Long-term supply interruptions – resilience; and
- Ecosystem services – River Irwell, a case study.

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These topics were thought to best encompass all aspects of the questions we were looking to ask our customers. Each workshop was an hour and a half long and we recruited 100 participants for each one. Figure 9 shows how each workshop was set up.

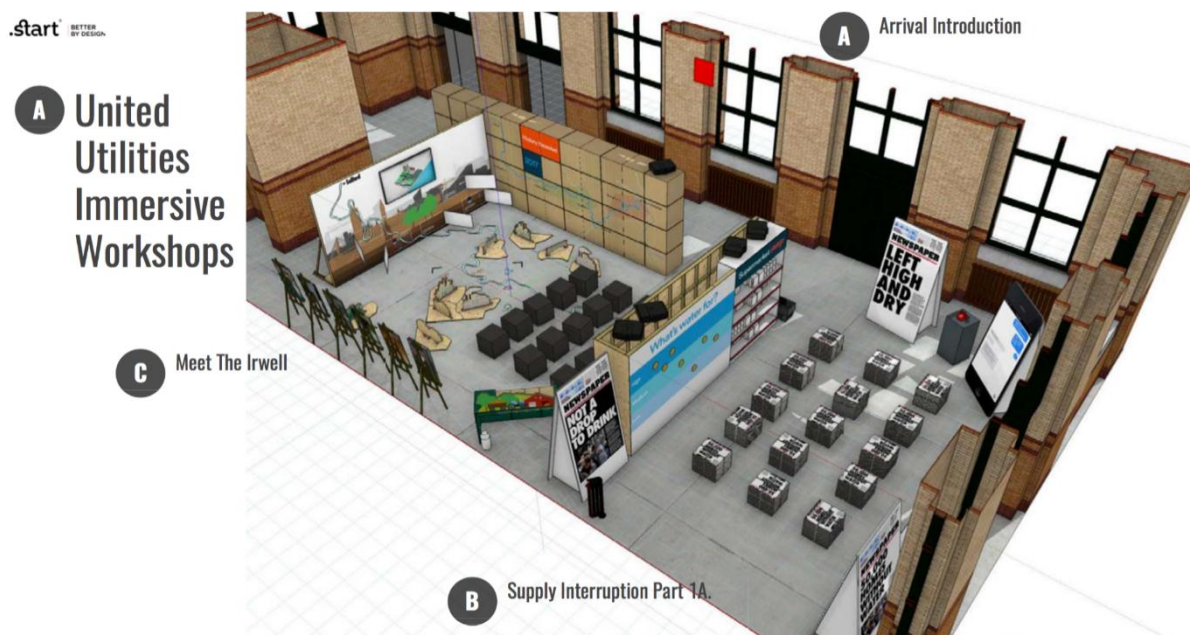


Figure 9 A schematic diagram of the immersive workshop set up

4.3.7.1 Long-term supply interruptions

In the first workshop, we were interested in collecting customer valuations on long-term supply interruptions including compensation and willingness to pay, and test the impact of cause of interruption on willingness to pay. This exercise is useful to understand resilience value irrespective of the cause.

The first exercise in this workshop was a customer experience, which explored the following questions:

- What would it feel like if you had a long term supply interruption?;
- What would happen?; and
- What would you do?

Participants were asked to keep a record of their feelings and valuations in an 'emoji diary' throughout the workshop.

More than half of participants were prepared to pay something to improve service on interruptions. Table 8 below summarises the amount customers were willing to pay to reduce the risk of a supply interruption.

Table 8 Amount customers were willing to pay to reduce the risk of supply interruption. Table taken from Frontier Economics report

Service level	Willingness to pay (per household per year)
Reducing the risk of a 3 day supply interruption to a negligible level for 1 m people	£3.00
Reducing the risk of a 3 day supply interruption to a negligible level for 2 m people	£3.21
Reducing the risk of a 3 day supply interruption to a negligible level for 2.1 m people	£3.76

Figure 10 shows the breakdown of how long participants said they would be able to manage without water.

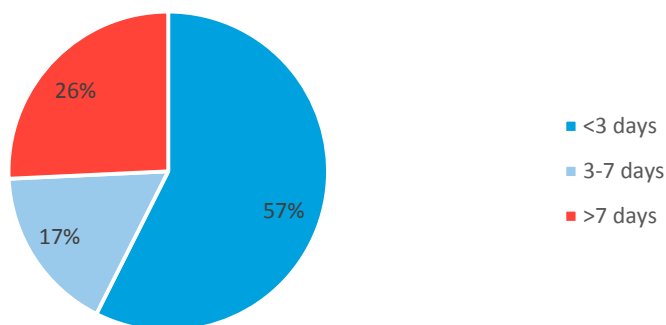


Figure 10 How long customers believe they can last without water

Before the immersive experience, participants ranked supply interruptions as the 5th most important service out of seven, and then 4th average out of seven after the event (summarised in Table 9 below).

Table 9 Table taken from Frontier Economics Immersive Research report

Service attribute	Pre-immersion average ranking	Post-immersion average ranking	Rank change
Safe, clean drinking water	2.07	2.02	-0.04
Avoid bad taste / smell in water	3.35	3.32	-0.02
Avoid discoloured water	3.93	3.88	-0.05
Avoid supply interruptions of longer than one day	5.02	3.96	-1.06
Avoid sewer flooding (people's homes)	3.68	4.07	0.39
Avoid sewer flooding (people's gardens)	4.82	5.28	0.47
Clean sea and lakes for swimming	5.14	5.47	0.33

Before the immersive experience, participants on average thought they used around 60 litres per day of water, and after the workshop, they thought they used around 130 litres per day.

4.3.7.2 Ecosystem services

In the second workshop, we were interested in collecting customer valuations on five ecosystem services. This is used to inform our wider business planning process, but interfaces with relevant themes in the Water Resources Management Plan. Table 10 summarises customer ecosystem improvement preferences.

Table 10 Summary of customer ecosystem preferences

Ecosystem service	Service level	Willingness to pay (per household per year)
Green spaces for recreation	40 projects, including 13 big sites	£0.17
A healthy river to support wildlife	228 km more of improved rivers	£1.83
Visual appearance of rivers	200 km more of improved rivers	£1.20
Safety of river for recreational use	62 km more of improved rivers	£0.11
Biodiversity	41 projects on UU land and 25 other projects	£0.12

86% of participants opted to buy at least one service improvement, 55% bought three or more service improvements, and 20% bought service improvements on all five ecosystem services. Mean spend across all five ecosystem services was £3.43 per household per year. Green spaces for recreation and a healthy river to support

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wildlife were the most popular services. Some ecosystem services were ranked more highly after the workshop than before, while others were ranked lower after the workshops.

Further research has been carried out as part of business as usual data mining, however, the leakage and supply interruptions data were considered the most relevant to the Water Resources Management Plan.

How does immersive research relate to the Water Resources Management Plan 2019?

One of the aims of this planning round was to use methods other than traditional willingness to pay surveys. Therefore, this immersive research is part of our research that we have conducted to branch out from the traditional surveys and incorporate more customer facing research into the plan. It clearly indicates the tangible value that customers place on avoiding long-term supply interruptions and protecting the environment.

4.3.8 Programme Choice Experiment

4.3.8.1 Programme Choice – September 2017

In order to engage with customers to ensure our investments and activities reflect customer priorities, an innovative interactive tool was designed. This tool was released to our customer panel in September 2017 as a first phase, and data gathered from users' choices was then analysed. A summary of this analysis is presented Table 11. The results are based on 866 replies, as received by 12 September 2017.

Table 11 Summary of results as of 12/09/2017

Theme	Outcome
Leakage	<ul style="list-style-type: none"> Willingness to pay for leakage reduction of 44 MI/d (9%) on average (based on preference over supply schemes); and No preference for reducing visible leakage over non-visible.
Level of service: temporary use bans (hosepipe bans) and drought permits	<ul style="list-style-type: none"> Only 14% of customers wanted less frequent temporary use (hosepipe) bans; Average choice 1 in 13 years (7.7% annual average risk) on average for temporary use bans; and Slight preference for less frequent drought permits (1 in 24 years on average (4.2% annual average risk)).
Water efficiency	<ul style="list-style-type: none"> Most customers chose some water efficiency measures; and No expensive schemes included so not possible to say whether it would be chosen over schemes to increase supply capacity.
Metering	<ul style="list-style-type: none"> 75% metering chosen on average; and 14% of customers chose no increase.
Supply options	<ul style="list-style-type: none"> Customers chose more water from reservoirs and boreholes and less from rivers, despite higher costs.

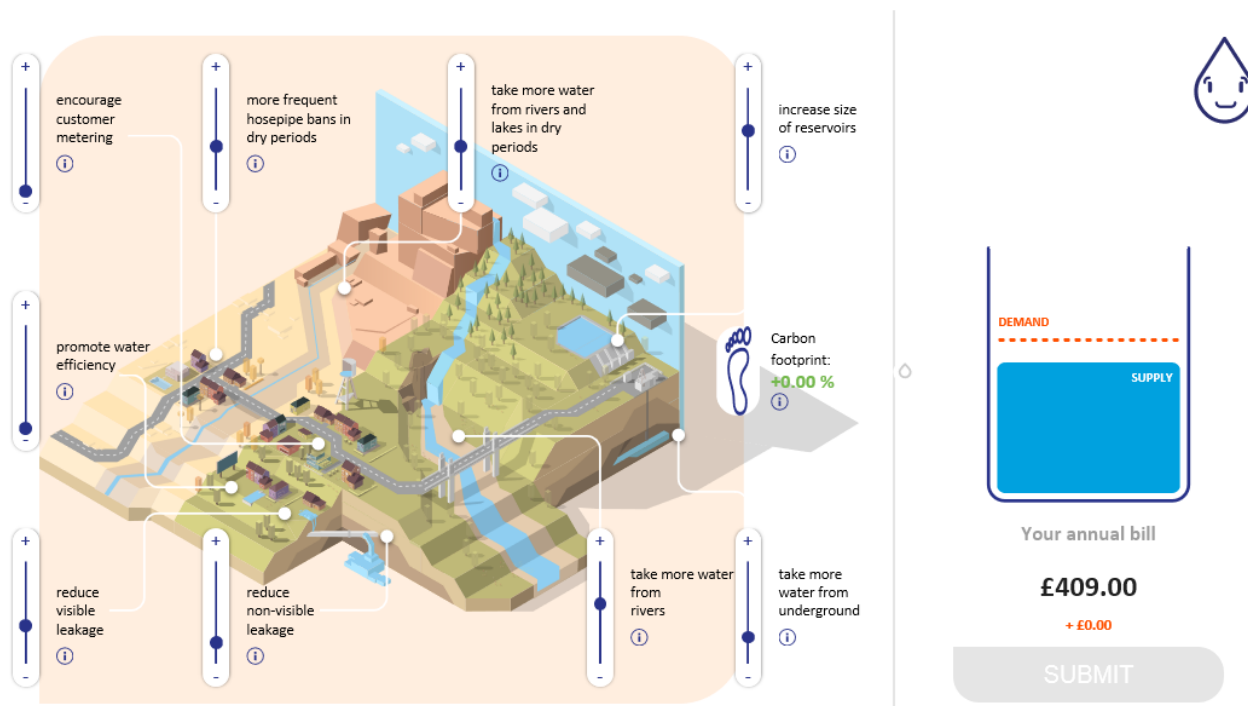
A summary of the answers to the introductory screens of this tool are in Table 12. The range was from -50 to +50.

Table 12 Summary of results from introductory slides

	Bill vs environment	Reduce leakage despite costs vs no change in leakage	Hosepipe bans vs environment	Less water vs enough for what I want to use
Average scores	+1.6 (protect environment)	-21.3 (reduce leakage)	-22.8 (protect environment)	-23.7 (use less water)
Median score	+2	-23	-28	-28

Figure 11 shows a screenshot of the interactive slider screen used by users of the Programme Choice interactive tool to decide how to balance their water supply-demand balance. Each slider represents a different input or output that must be accounted for in this balance and describes to the users the amount of change they would see when they adjust the slider.

Figure 11 Screenshot of slider screen used in Programme Choice Experiment



4.3.8.2 Programme Choice – June 2018

To build upon the success of our 2017 Programme Choice research and to use the latest options costs subsequently available⁸, we undertook a second round of research using the same format and tool as our previous experiment.

We received 702 responses as of June 2018; these results are presented in Table 13 below. Overall, the results were similar to the previous programme choice research, with the most notable changes being an increased support for leakage and 50% of customers choosing near universal metering.

Table 13 Summary of results as of 17/07/2018

Theme	Outcome
Leakage	<ul style="list-style-type: none"> Willingness to pay for leakage reduction of 51 Ml/d (12%) on average (based on preference over supply schemes of around 43p per cubic metre, similar to previous results); and As previously, no preference for reducing visible leakage over non-visible.
Level of service: temporary use bans (hosepipe bans) and drought permits	<ul style="list-style-type: none"> Only 16% of customers wanted less frequent temporary use (hosepipe) bans; Average choice 1 in 13 years (7.7% annual average risk) on average for temporary use bans, same as previous; and Slight preference for less frequent drought permits (1 in 24 years on average (4.2% annual average risk)), same as previous.
Water efficiency	<ul style="list-style-type: none"> 88% of customers chose some water efficiency measures; and Willing to pay more than schemes to increase supply capacity.
Metering	<ul style="list-style-type: none"> 81% metering chosen on average; and 13% of customers chose no increase. 50% chose near universal metering (90%+)
Supply options	<ul style="list-style-type: none"> Customers chose more water from reservoirs and boreholes and less from rivers, despite higher costs.

Table 14 below shows a summary of the answers to the introductory screens of this tool. The results were very similar to the previous research with the only notable increase being slightly increased support for protecting the environment.

⁸ The previous choice experiment used Water Resources Management Plan 2015 options costs to ensure we could get timely feedback for the draft Water Resources Management Plan 2019. The latest update uses options costs developed as part of the draft Water Resources Management Plan 2019 submission. This is informative in the context of the results, as it clearly shows the importance of option cost to reduce leakage to the saving levels chosen; if costs subsequently reduce, the associated absolute level of saving would increase. This has informed our thinking for future leakage reductions presented in the revised draft plan.

Table 14 Summary of results from introductory slides

	Bill vs environment	Reduce leakage despite costs vs no change in leakage	Hosepipe bans vs environment	Less water vs enough for what I want to use
Average scores	+3 (protect environment)	-22 (reduce leakage)	-21 (protect environment)	-24 (use less water)
Median score	+5	-25	-26	-28

In comparison to the results from 2017, a greater support for metering was seen, rising from 75% to 81%. There was also a slight increase in support for water efficiency measures, with customers willing to pay more than for supply increase schemes. Support for leakage rose 3% from a 44 MI/d to a 51 MI/d reduction, with willingness to pay preference over supply schemes for leakage remaining similar to the previous results of around 43p per cubic metre. This indicates that the increased support for leakage is due to the cost reduction of our leakage options, rather than an overall change in support for leakage preference over other options. It also suggests that customers will support a relatively fixed level of spending on leakage, with potentially increasing or decreasing support for leakage reduction depending upon associated costs.

As our plan has progressed and our leakage options have continued to be developed, our leakage options have had further material changes reducing their associated costs since this customer research was commissioned. Although further customer research within the timescale of this plan is not able to occur, we would expect that the trend of customer support for leakage, as seen in the programme choice experiments, would continue, resulting in a customer support for leakage beyond 12%. The implications of customer support beyond 12% and the use of this information alongside our other research is discussed in section 4.4

How does the Programme Choice research relate to the Water Resources Management Plan 2019?

One of the aims of this planning round was to use methods other than traditional willingness to pay surveys. Therefore this Programme Choice experiment is part of our research that we have conducted to branch out from the traditional surveys and incorporate more customer facing research into the plan.

The research shows that customers are willing to pay for a leakage reduction, but that there is no strong opinion to invest to alter the current level of service. Many customers chose an increase in metering and some water efficiency schemes as well. Reservoirs and boreholes are preferred supply schemes over river abstraction, despite higher costs.

4.3.9 Programme acceptability testing research

This section explains acceptability testing of the potential programme as part of the Business Plan process. The research was designed to test programme choices for future investment across all water and wastewater services, to enable water resources investments to be compared against other service areas such as water quality, reducing pollution incidents and reducing sewer flooding. Leakage reductions are a particularly important component of the work from a Water Resources Management Plan perspective, although the supply interruptions component also interfaces onto resilience considerations in the plan.

Customer acceptability research was completed by Box Clever Consulting in December 2017, to assess customers' views on which elements of our wider business plans they found the most acceptable and to test affordability with customers. This research was conducted too late in the process to influence our draft Water Resources Management Plan, but the methodology and results of the acceptability testing were discussed with our Customer Challenge Group, YourVoice, and subsequently have informed our revised draft plan.

This research included aspects that directly related to our Water Resources Management Plan, in particular reducing leakage. It involved over 2,000 customers from our WaterTalk panel, via our customer accounts database, and from a commercially available panel of respondents, including both household and non-household customers.

The research was split up into a qualitative section, which involved hour-long in-depth interviews to greater understand the rationales and motivations that underpin reactions to proposed service area investments, and a quantitative section that involved a creative and intuitive research approach incorporating sliders.

Out of all service areas considered, reducing supply interruptions had the lowest amount of support⁹, with 76% of customers favouring a level of service below current planned levels and 53% favouring our current level of service of an average customer supply interruption of 11 minutes. The overall sentiment of customers was that minutes of interruption seem irrelevant. Also, despite previous research showing clear preferences for protecting and improving the environment, this research showed no clear preferred preference to improving water quality in rivers, though an increased support for improvement was seen in the 18-34 demographic and from customers in Cumbria.

The results found that there is an overall support for leakage reduction from current levels. Figure 12 shows an overview of the results of customer support for leakage reduction, in total and across each region. These results show that only 24% of customers support a 15% leakage reduction or above, but 67% support the draft Water Resources Management Plan target of 7% reduction. This 7% planned level of improvement had a cost of 33.5p per cubic metre based on the options costs available at that time. Since further work and ongoing exploration of leakage innovation has informed the development of our revised draft Water Resources Management Plan, our new preferred plan of 15% leakage reduction has an estimated cost of 29p per cubic metre. This new cost is lower than our research previously showed customers would be willing to pay, and we can now provide greater leakage reduction for this cost.

Customer support for overall bill impact showed that 67% of customers supported a bill impact of £1 or greater, and 44% supported a bill impact of £2 or more. This results in a median level of acceptability of £1.74, which is slightly higher than our AMP7 (2020-2025 investment period) average impact of £1.56. Together these show that the proposed 15% leakage reduction is well within the range supported by customers.

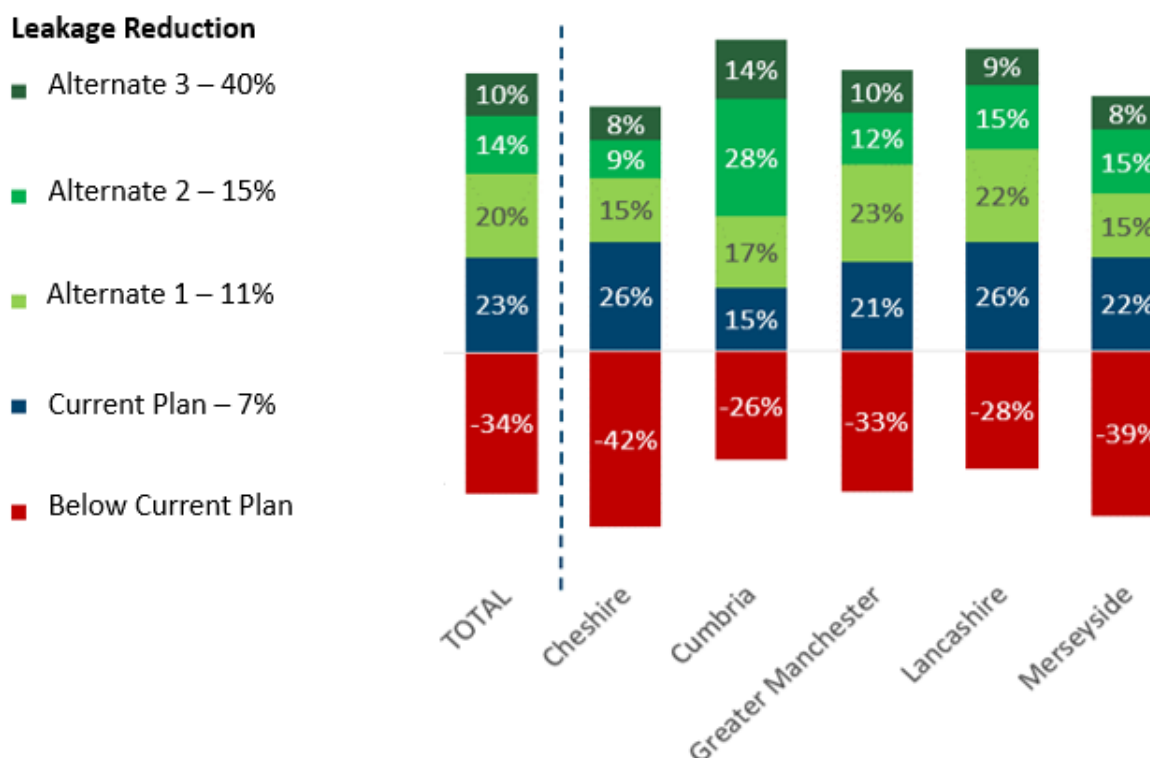


Figure 12 Customer support for leakage reduction based on option costs presented (see supporting narrative)

⁹ It should be noted that this research is generally focussed on shorter-term interruptions, so is distinct from the specific research on high consequence and duration events such as covered in the Manchester and Pennines resilience research.

4.3.10 Water trading research

Working together to assess water trading and transfers, United Utilities, Seven Trent and Thames Water commissioned market research company Verve to evaluate customer views. The research was carried out from March to May 2018. This involved a multi-stage approach combining qualitative and quantitative phases. There were qualitative surveys of 173 households and 49 non-households and a quantitative online survey of 1,505 households. The survey covered customers of potential importing and exporting companies as well as customers in Wales as potential transfers include the use of reservoirs and rivers in Wales. At each stage approximately one quarter of the sample was from United Utilities customers.

Verve has provided a summary statement for the three companies to consistently report the findings of the research. We have included this in Section 6.5 of our *Revised Draft WRMP19* main report which expands on the themes below. In addition, in light of the national importance of the potential transfer, we have published the Verve report in full on our website¹⁰.

The insight gathered is based on an informed customer view. Throughout the research process, participants were provided with increasing levels of information on the issue and possible solutions. Figure 13 shows what information was provided and the questions asked at each stage.

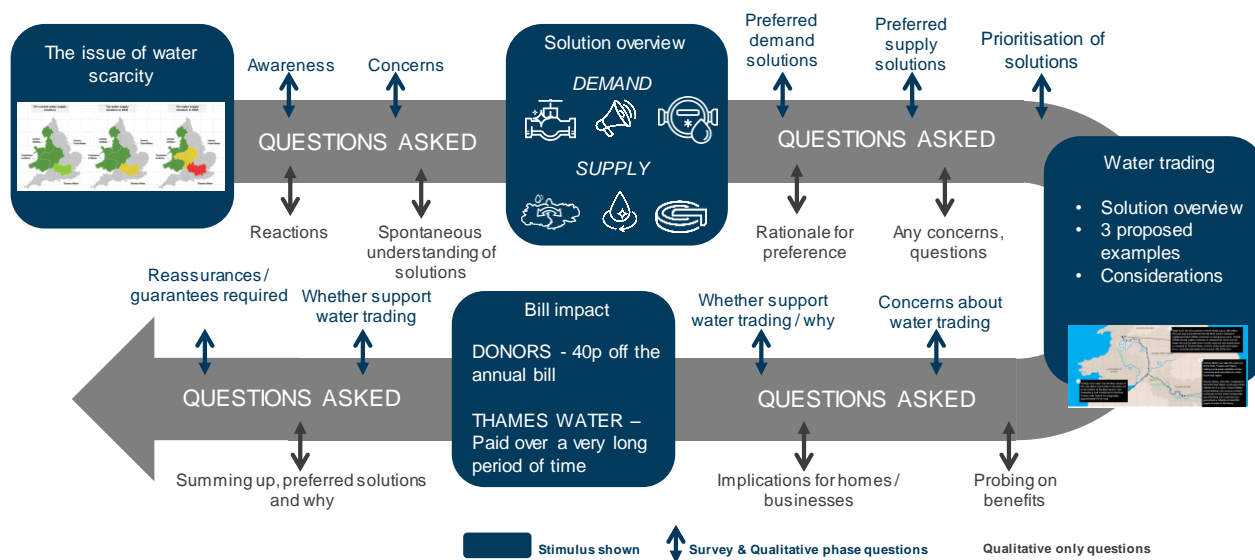


Figure 13 Questioning and stimulus journey for the water trading research

¹⁰ This is included in the "Supporting information" section of the website accompanying this submission at <https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/developing-our-water-resources-management-plan/>

4.3.10.1 Water scarcity

“Customers have limited knowledge about the water scarcity issue, but quickly recognise the need for long term sustainable solutions.”

Informed reaction to water scarcity

The engagement started with the issue of water scarcity. At the start there is little awareness that water scarcity presents a real threat to future UK water supplies. Once informed, the emotional reaction is one of surprise and disbelief due to the wet climate. Seven in every ten customers are concerned about water scarcity, particularly those in the Thames Water catchment area. Those in ‘donor’ regions are significantly more likely to feel disbelief due to the wet climate. Thames customers tended to feel more confident that a solution will be found. Customers recognise that water scarcity is a long term issue requiring immediate nationally co-ordinated action.

In response, customers call for widespread education on the issue. They assume that fixing leaks will be the major priority for water companies – the preferred demand management solution for all customers irrespective of region.

“There needs to be a national solution which means that water "sharing" and co-operation becomes the norm in the future”
Household, United Utilities (vulnerable customer)

Preference for supply solutions

Water reuse is the most preferred supply solution across all water company regions, closely followed by building new reservoirs. Whilst regional transfer is the least preferred of the three solutions, 62% rank it as their first or second choice. Whilst water re-use and new reservoirs are ranked equally for first choice by Thames Water customers, the proportion who choose transfer first is higher than in donor regions (Figure 14). The preference for regional transfers is generally higher when customers are asked to think about their region or the wider UK than when thinking about their home.

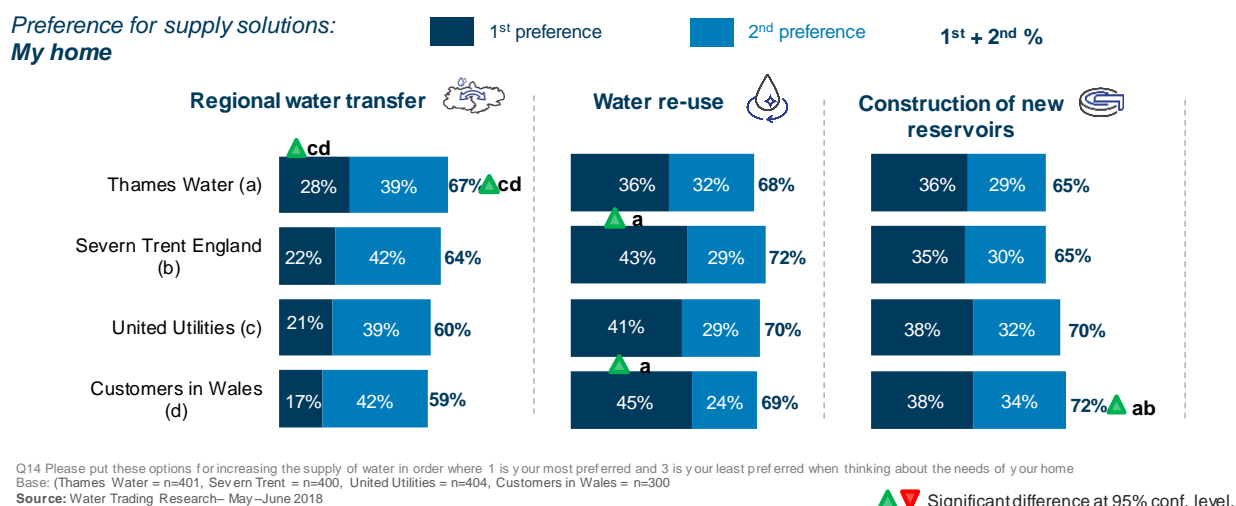


Figure 14 Preferences for different supply options when thinking about the customers’ home

Customers recognise that all three types of supply option are viable. They see sustainability (ability to provide water for the long term), environmental impact and the volume of water produced as the key evaluation criteria when choosing solutions to put in place.

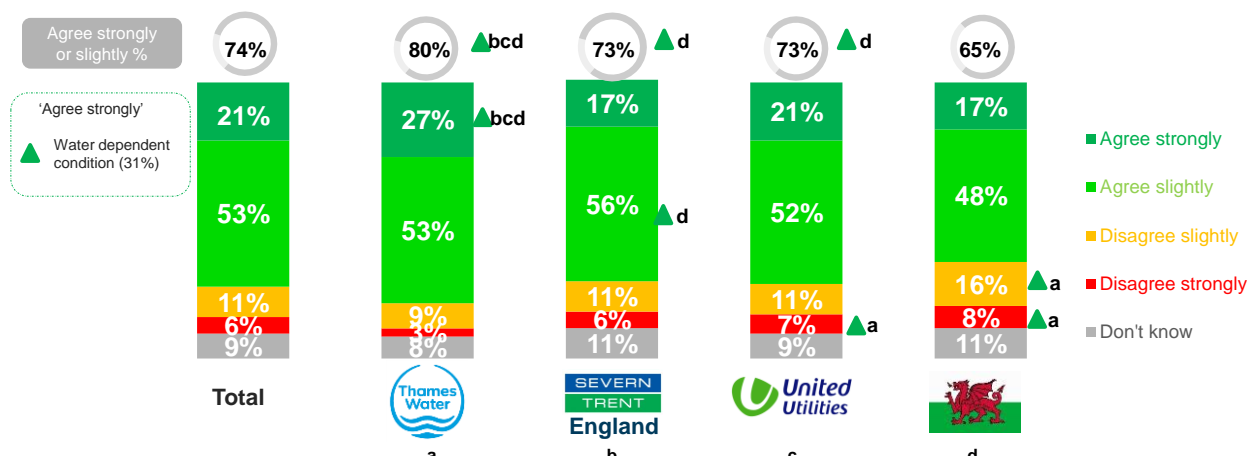
“Water trading, delivered cost effectively with assurances, works for customers.”

Level of support for water trading

Customers raise multiple concerns about water trading: the security of supply, environmental and financial impacts. Potential ‘donor’ customers are concerned as to the impact on their own supply, whilst Thames Water customers ask whether water will be available when needed.

“I think the most important consideration would be the possible shortfall to my area. It may not affect me personally, in my lifetime, but over the longer term taking a precious water resource away just seems a bit like “robbing Peter to pay Paul”
Household, United Utilities

Despite concerns, 74% of all customers agree they support water trading as part of the solution – it’s logical to share. Thames Water customers are more likely to ‘agree strongly’ (Figure 15), as are those with water dependent medical conditions. 9% of customers say they ‘don’t know’ due to the complexity of the decision and information still required to make an informed choice.



Q19. PRE BILL INFORMATION: Water trading is just one of the possible solutions to provide more water to areas that have less water than needed. To what extent do you agree with the following statement? I support the use of water trading as part of the solution to address water scarcity in the UK
 Base: All respondents (n= 1505) (Thames Water = n=401, Severn Trent = n=400, United Utilities = n=404, Customers in Wales = n=300)
 Source: Water Trading Research– May–June 2018

▲ ▼ Significant difference at 95% conf. level.

Figure 15 Customer support water trading as part of the solution to address water scarcity, following exploration of their concerns

Support declines for a proportion of Thames Water customers (from 80% to 70%) on being told the cost will be paid back through the bill over a long period of time – they are unable to assess fully without a figure. In donor regions, the potential 40p bill reduction from trading is seen as better reinvested into future water resource management.

Key assurances required

By analysing the rich set of information gathered in the customer research, Verve developed eight assurance statements to help mitigate core areas of concern with water trading. These are:

1. Companies selling the water only do so if they can ensure they have a reliable source in the future;
2. Water will only be taken when it is needed by Thames Water and the wider South-East region;
3. There are plans in place to maintain new pipework;
4. The 40p per donor customer is used for the improvement and upgrade of water services, with no impact on bills;
5. Impact on bills for recipient regions will be kept to a minimum by spreading the cost over a long period;
6. The regulator ensures water is traded at a fair price, and any cost to customers fairly reflects the level of investment made;

7. External bodies will be involved in monitoring processes which could pose a risk to the environment; and
8. Water companies will be regulated on environmental impacts and must conduct due diligence checks.

Assurances are also required about the continued improvement of demand management.

The Welsh perspective

Customers in Wales, whilst still concerned, have lower levels of support for water trading than observed in other potential donor regions. Their preference for demand and supply solutions is consistent with other water company regions – reducing leakage, water reuse and building new reservoirs are most preferred. Wariness remains about supply side solutions given the history of issues such as the Tryweryn Reservoir. They are the most concerned to know that there is enough water left within ‘donor’ region post transfer (61% raise this as a concern compared with 54% of all customers).

Whilst 65% support water trading as part of the solution, those in Wales have the lowest levels of support (65% agree they support water trading compared with 73% for Severn Trent England and United Utilities).

4.3.11 Business as usual data sources – data mining

Continuously throughout the year, we are collecting, collating and analysing existing customer data, to investigate customer views and strength of opinion in certain areas. In some cases, this has shown that outside of drought, some water resources issues such as water use restrictions feature little in customer interactions (by their inherent nature, these occur less frequently than other areas of customer contact), demonstrating the need for specific customer engagement in this area as part of developing the plan.

As part of this analysis we collected primary customer contact data from inbound calls, Live Chat conversations, Member of Parliament (MP) enquiries, Twitter and written complaints, and secondary customer contact data from customer satisfaction surveys (CSAT), Rant & Rave and service incentive mechanism (SIM) surveys to understand how customers rate our performance.

The data analysed was collected from April 2014 to January 2017, except hosepipe ban data which relates solely to 2010. Collection of this data provides us with a holistic understanding of trends in customer contact volumes and reasons for contact.

This data has been analysed and the most pertinent data to the Water Resources Management Plan relates to leakage, supply interruptions and the 2010 hosepipe ban. Table 15 summarises the number of customer contacts for each data type.

Table 15 Summary of customer contacts

Data type	Number of customer contacts
2010 hosepipe ban	4,130
Leakage	141,570
Supply interruptions	219,667

To date, no data on customer responses pertaining to hosepipe bans (apart from the 2010 ban) and droughts has been collected or found. Some data relating to this from pre-2010 was collected previously, however the lack of recent data highlights the challenge in engaging on low likelihood events that occur infrequently. We are currently collecting data relating to the dry weather of summer 2018, while our further level of service research outlined in Section 4.3.6 indicates no significant change in customer views regarding the level of acceptance of hosepipe bans, the data we collect once the dry weather event is over will give us further data to consider in future.

4.3.11.1 2010 hosepipe ban

On the 9 July 2010, we imposed a ban on the use of hosepipes across a large section of the North West. The ban was in place until the 19 August 2010, 42 days after it was initially implemented. The ban applied to the majority of residents and business in the legacy Integrated Zone. The Integrated Zone included Cheshire, Greater Manchester, Lancashire, Merseyside and a third of Cumbria. Of the 4,130 inbound contacts received, 9% were received before the ban was implemented, 83% during the ban and 8% after the ban was lifted. 96% percent of the calls were from

customers living in the legacy Integrated Resource Zone, where the ban was imposed. 1.3% came from customers living in West Cumbria, North Eden and Carlisle areas.

4.3.11.2 Leakage

Customers contacted us to report a variety of leaks and problems associated with defective fittings and meters. The summary of these contacts is in Figure 16. The majority of all contacts relating to leakage were from the Greater Manchester area (generally around 40%) which is where the greatest population concentration within our boundaries is located.

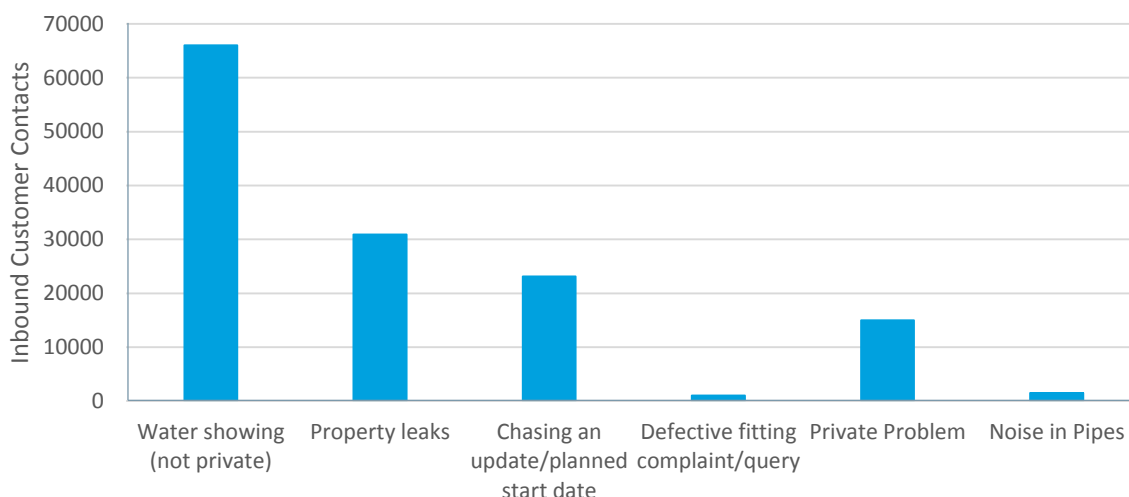


Figure 16 Summary of types of customer contact relating to leakage

4.3.11.3 Supply interruptions

Figure 17 summarises the main reasons for customer contacts due to supply interruptions from 2014 to 2017. There was a total of 219,667 primary inbound customer contacts relating to water supply between 01 April 2014 and 01 January 2017. Unplanned water supply interruptions were the main reasons customers contacted us about water supply issues, accounting for 38% (82,658) of all customer contact in the period. Customer contacts about low water pressure (standard and urgent) accounted for 22% (48,817) and providing information and communication responses accounted for 13% (28,556). The top five reasons for contacting us during the period being analysed was the same across each county in our boundary. These reasons included: investigate low water pressure, chasing an update/planned start date, no supply (unplanned), private problems and providing information and communication response.

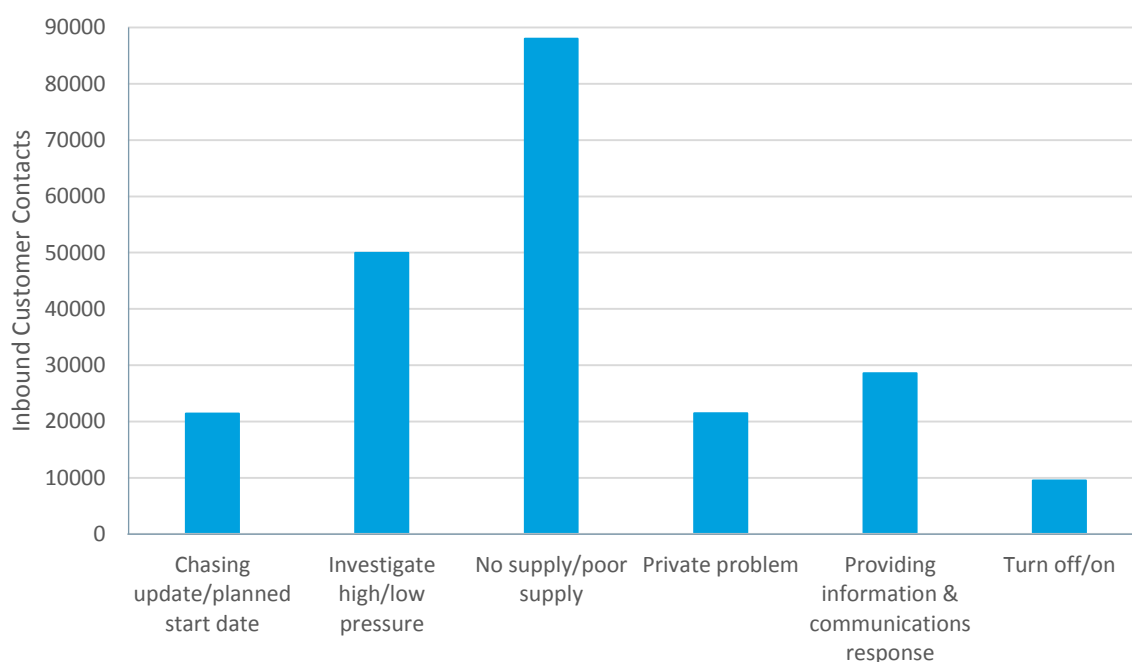


Figure 17 Summary of main reasons for customer contacts due to supply interruptions

How does this business as usual data relate to the Water Resources Management Plan 2019?

Business as usual data shows us what customers are contacting us about with respect to leakage, supply interruptions and temporary use bans. There are a variety of reasons customers contacted us relating to leakage and supply interruptions. Some of these will be addressed by our leakage strategy and level of service update in the Water Resources Management Plan. Others are more fundamental problems that we are trying to address on a larger scale as a business.

4.4 Summary of valuations for water resources

This section summarises the outcomes for customer research surveys we have conducted which relate to supply-demand balance choices:

- Leakage customer panel survey; (Section 4.3.3.2)
- WRMP19 customer preferences: Phase 2 quantitative study; (Section 4.3.5)
- Programme Choice experiment; (Section 4.3.8)
- Acceptability testing; (Section 4.3.9)

This section explains how the different customer views and thus valuations compare across different research, and draws overall conclusions.

The programme choice experiment used an interactive digitally-based tool to allow customers to explore the choices and trade-offs in balancing supply and demand. These answers showed a strong tendency to support protection of the environment, in particular leakage reduction. For acceptability testing of our initial proposals for our plan we set out a range of options for some key service measures, including leakage. This was then used in a public consultation, and in research with a representative sample of customers.

Overall, the greater context provided by the Programme Choice research and acceptability testing means that more weight should be put on this research than the other two studies. Willingness to pay is often higher for single issues than where customers are presented with choices between improvements for different aspects of service, and the Programme Choice research tests multiple aspects in a single activity.

All the research shows a preference for demand management options (i.e. metering) over supply capacity options (i.e. increasing reservoir size), with customers willing to pay more for demand management and leakage reduction.

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For hosepipe bans (temporary use restrictions) the evidence was contradictory, with the Leakage survey as shown in Section 4.3.3.2, and WRMP19 customer preferences: Phase 2 quantitative study, detailed in Section 4.3.5 showing a willingness to pay for less frequent bans, but the Programme Choice research suggested customers were not willing to pay for this (which generally complements qualitative insights).

For drought permit frequency, all three studies showed some willingness to pay for reducing frequency, but the willingness to pay value was much higher in the Leakage survey and WRMP19 customer preferences: Phase 2 quantitative study.

Our overall valuation for leakage reduction is shown in the table below:

Table 16 The value customers placed on different activities

Activity	Value per cu m
Sliders – programme choice experiment (median)	44p
Sliders – programme choice experiment (average choice)	44p
Sliders – programme choice experiment (mean willingness to pay)	66p
Testing our plan – acceptability testing (median)	82p
Testing our plan – acceptability testing (mean)	82p
Overall value used: 60% weight to acceptability, 40% weight to sliders research intermediate value (55p)	71p

The median willingness to pay for leakage reduction in acceptability testing was £1.74, which is very similar to the average bill impact of our proposals to reduce leakage by 15% in AMP7. Since the AIC of our proposals is well within the valuation per cubic metre shown above and the overall bill impact is in line with our proposals, we consider that the customer research supports the proposed 15% bill reduction.

5. Water supply resilience research

5.1 Overview of research on water supply resilience

Providing a reliable, high quality water supply is central to our business, but unfortunately sometimes things go wrong and we let our customers down. We are striving to reduce the risk of service failures and have extensively engaged with our customers and stakeholders to understand their priorities and appetite for reducing the risk of failures to provide an even better service.

The research has helped us to understand the typical customer behaviour and expectations regarding the risk of water service failures. We have developed the model in Figure 18 from our research. This clearly doesn't represent every customer as some have more specific needs; our response and recovery strategies are tailored for these customers.

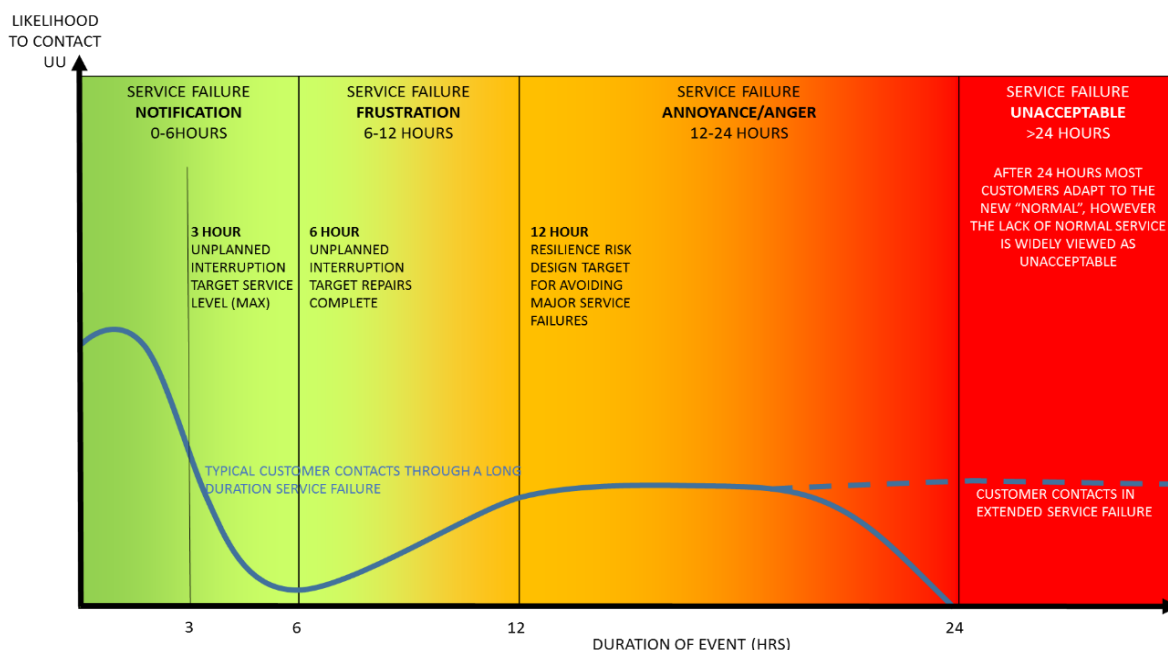


Figure 18 Typical customer behaviour following a water service failure

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The key elements of customer research that we have used to inform our approach to managing our overall water service resilience are summarised in Figure 19.

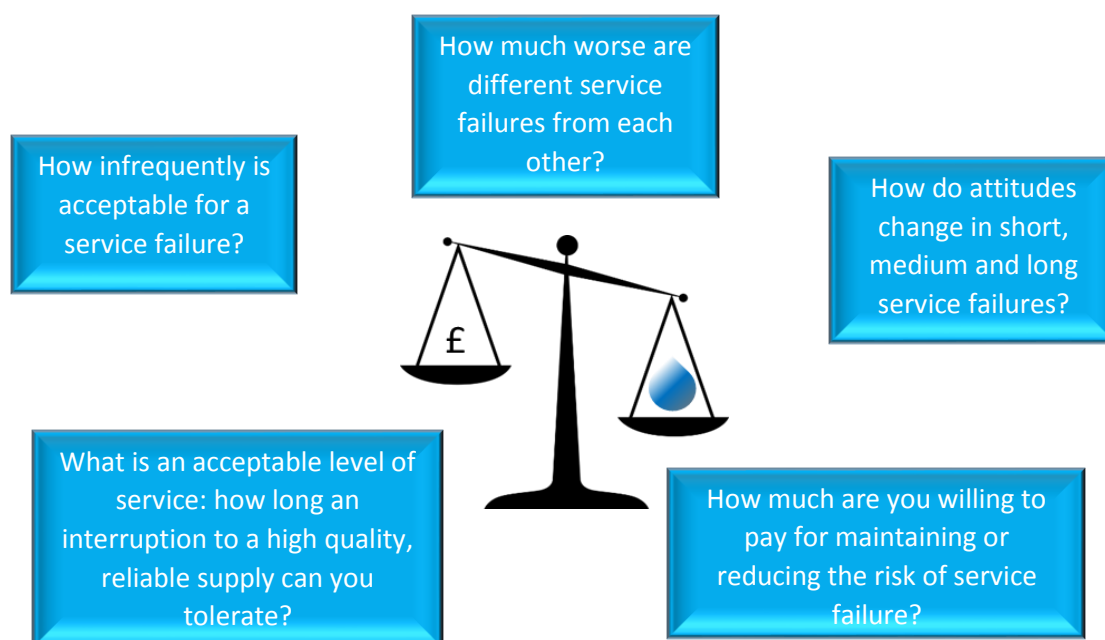


Figure 19 Questions that we have asked customers and attempted to discern from customers

5.1.1 Customer research techniques

We have used a wide range of techniques to understand our customers' stated and revealed preferences for how we should manage their water service resilience risk. The immersive research we conducted looks more specifically at this (Section 4.3.7). We have used our findings to develop and prioritise appropriate interventions to manage the risk with limited investment at an acceptable and affordable pace.

Table 17 Customer research techniques

Question?	Technique	Approach
How do attitudes change in short, medium and long service failures?	Business as usual data	Review of customer telephone contacts for change in rate of contacts as incident progresses. Review of customer responses to major incidents.
	Online customer panel surveys	Survey regarding duration to "intolerable" service failure.
	Immersive experience	Customers exposed to immersive experience of a long duration service failure, coming face-to-face with the real issues and constraints of no usable water followed by questionnaire.
How much worse are different service failures from each other?	Business as usual data	Comparison of contact rates for sewer flooding and water supply interruptions. Review of customer responses to major incidents.
	Online customer panel surveys	Survey ranking and valuing different types of water service failures (low pressure, no water etc.).
	Stakeholder events	Ranking of different investment drivers.
How infrequently is acceptable for a service failure?	Immersive experience	Customers exposed to immersive experience of a long duration service failure, coming face-to-face with the real issues and constraints of no usable water followed by questionnaire.
How much are you willing to pay for maintaining or reducing the risk of service failure?	Immersive experience	Customers exposed to immersive experience of a long duration service failure, coming face-to-face with the real issues and constraints of no usable water followed by questionnaire.
	Willingness to pay and affordability survey	Traditional stated preference willingness to pay survey.
	Business as usual data	Comparison of contact rates for sewer flooding and water supply interruptions

Question?	Technique	Approach
What is an acceptable level of service: how long an interruption to a high quality, reliable supply can you tolerate?	Business as usual data	Review of customer telephone contacts for change in rate of contacts as incident progresses.
	Immersive experience	Customers exposed to immersive experience of a long duration service failure, coming face-to-face with the real issues and constraints of no usable water followed by questionnaire.

5.1.2 Service interruption triangulation results

The following approach indicates how we have used our customer research to understand the value to customers of reducing interruptions.

Our approach uses a range of techniques and a range of different research studies to produce our results. Table 18 below summarises our assessment of how well each study meets Ofwat criteria for customer research, with the darker colour meaning the research is stronger.

Table 18 Customer research and Ofwat criteria

Study	Q1 – observed or response	Q2 – actual or hypothetical	Q3 – all benefits included	Q5 – level of information	Q6 - context	Q7 – representative
Immersive experience						
Willingness to pay and affordability						
Online customer Panel - acceptability						
Online customer Panel – willingness to pay						
Operational “revealed preference”				n/a	n/a	

The research studies and data used in this analysis are:

- Customer priorities research - Stakeholder events (YourChoice, June 2016);
- Immersive experience (August 2017);
- WRMP19 customer preferences: Phase 2 Quantitative research (June 2017);
- Online customer panel – interruptions to supply (August 2017); and
- Analysis of customer contact data – Operational Revealed Preference (August 2017).

The results from each study are shown in Table 19 below.

Table 19 Customer valuation of avoiding supply interruptions

	6 hours	1 day	3 days	14 days
Immersive – compensation		£27.30	£105	£497.10
Immersive – WTP			£609	
WTP – median	£337			
WTP – low incomes	£212			
Panel – acceptability	Very inconvenient	Unacceptable		
Panel – WTP (reducing number of interruptions)	£101			
Customer contact data	£20 to £170			

The general principles we have used in identifying a central estimate of customer value:

- There should be a rising rate per day, reflecting the immersive, customer contact and panel results of rising inconvenience over time;
- Greatest weight should be put on the immersive research, as this provided the most information on experience of interruption and therefore is the most informed choice; and
- The value for short-term interruptions should be within the range of results from the research.

Our overall results are shown in Table 20.

Table 20 Overall customer valuation results of supply interruptions

	6 hours	1 day	3 days	14 days
Customer value/day	£199	£227	£289	£293

We propose to use a figure of £290 per day as an overall figure for an interruption of between three and 14 days.

For the purposes of assessing resilience risk, we propose to use a benchmark of risk of a 12-hour interruption. This was the point at which a clear majority of customers regarded an interruption as being unacceptable.

5.1.3 Water supply resilience research outcomes

5.1.3.1 How do attitudes change in short, medium and long service failures?

Our customers have a complex reaction to a long duration water service failure. Most of the data that we have analysed directly relates to water supply interruptions rather than water quality failures, although the major water quality incidents during the 2015-2020 investment period have provided a clear insight into our customers' responses to these types of incidents. We have identified four discrete stages of customer response to water service failures, as outlined in Table 21.

Table 21 Customer attitudes to service failures

Time	Classification
0-6hrs	Notification – during this phase customers are generally tolerant of the service failure and are focused on ensuring that we are aware of the issue and are actively working to return the service to them. Expectation management is key at this stage as if water quality failure is anticipated, there will be a minimum duration to the service failure related to the water quality sample turnaround time.
6-12hrs	Frustration – during this phase the inconvenience that customers experience from not having a normal water service is likely to start to affect their daily routines. The expectation of the service being restored is growing and when it isn't frustration grows; this may be evidenced by calling us to get an update on the expected return to service.
12-24hrs	Annoyance/Anger – during this phase customers are starting to have to change their routines significantly. There are now more repeat calls and trust in service restoration is reducing. As in previous stages our response and recovery actions can have a positive impact, if we are visible and clearly helping to reduce the inconvenience.
>24hrs	Unacceptable (resignation) – during this phase, customers have largely become adjusted to the new normal of living with the service failure. This is widely considered to be an unacceptable service failure and company plans should aim to avoid this level except on very rare occasions.

5.1.3.2 How much worse are different service failures from each other?

There are generally accepted “least unwelcome” service failures. One of the most significant issues our customers is associated with the worry that the water is unsafe to drink or use. The research that we have carried out indicates the sequence and relative values stated in Table 22.

Table 22 Summary of service failure relative valuations

Service failure	Relative Value
No water	1.0
Boiled water notice	0.35
Do not drink notice	0.8
Do not use notice	1.0
Discoloured/Taste or Odour	0.6

5.1.3.3 How infrequently is acceptable for a service failure?

Customer research regarding the acceptable occurrence of long duration service failures is extremely difficult because fortunately most customers haven't experienced a major service failure. Our immersive research into long duration failures has indicated that a service level similar to the likelihood of a drought leading to severe water use restrictions would be an acceptable planning target. However, it should be noted that likelihood estimates for very infrequent events are notoriously difficult to evaluate accurately.

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5.1.3.4 *How much are you willing to pay for maintaining or reducing the risk of service failure?*

Customer valuations for a change in risk of service failure have been assessed through a number of different mechanisms. The overall customer valuation including domestic and retail customers for reducing the risk of a multi-day service interruption is approximately £290 per day.

5.1.3.5 *What is an acceptable level of service: how long an interruption to a high quality, reliable supply can you tolerate?*

There is very clearly a transition for many customers where a water service failure becomes a major inconvenience; this most typically seems to occur between six and 18 hours into an incident, as indicated in the historic operational data. Further research is being carried out to confirm this conclusion. This has helped to inform the service level target for planning purposes of a return to service in 12 hours. Clearly, in the case of water quality, the service level target would be further extended due to the water quality sampling and analysis period.

5.2 Manchester and Pennine Resilience customer engagement

5.2.1 Approach to customer engagement

From our customer priorities research, 78% of customers placed provision of safe clean drinking water as their joint first priority alongside proving a reliable, continuous supply of water. We also know that 92% of customers drink tap water, and when asked, they ranked safe drinking water, water that tastes and smells good, and is not discoloured, in their top three priorities consistently in numerous research pieces. A continued focus on drinking water quality is therefore fundamental to everything we do. However in addition to this engagement, we sought to explore specific customer views on the resilience of water supplies to Manchester and the Pennines, and the options to mitigate risks.

We have worked closely with YourVoice, our Customer Challenge Group, to engage effectively with customers. Due to the scale and complexity, it was recognised that it was especially important that customers fully understood the risks and that the engagement was designed in a way to avoid biasing the results. YourVoice appointed independent experts from the Centre for Regional Social and Economic Research at Sheffield Hallam University to review the reasonableness of the research and interpretation of the results. We addressed all of their feedback before the research was formally launched.

We engaged a specialist supplier, DJS Research, to create the qualitative and quantitative research materials, undertake the research, and analyse and report on the findings. Throughout the process, we worked closely with YourVoice so that the information presented was fairly and robustly articulated to customers in terms of the impact on service.

The objectives of the research were to:

- Explore whether customers have a preference for full prevention or small fixes;
- Measure how customers perceive the varying levels of risk associated with the potential options;
- Provide customer valuations with regards to alternative methods of delivering resilience; and
- Support the decision of which potential options will maximise benefit to customers, balanced against cost expectations and impact on customer bills.

Figure 20 below illustrates the breadth and depth of the qualitative and quantitative research conducted.

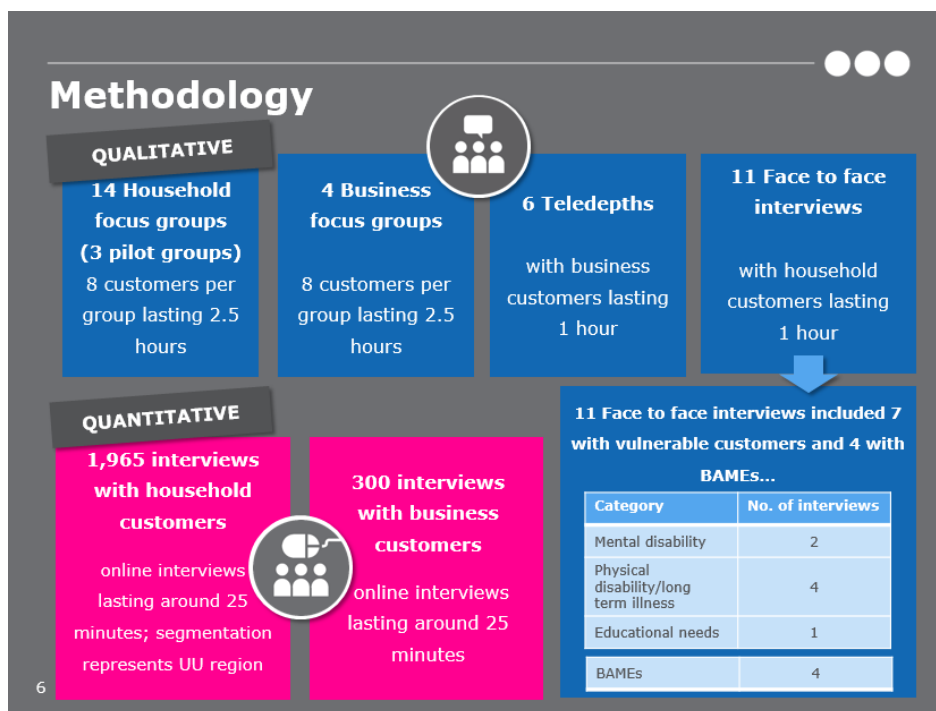


Figure 20 Customer engagement methodology for Manchester and Pennine Resilience research

We engaged over 2,300 household and non-household customers specifically on the risk on service if no options to mitigate the risks were taken forward.

During this research, we discussed the current situation regarding the assets that supply our areas and then presented customers with a number of solutions that could be adopted going forward. We outlined the residual risk of each solution in respect of water quality, risk of supply interruption and possible number of affected properties, as well as the impact that each could have on customer bills.

We presented five solutions to customers, with each solution offering a degree of risk reduction and associated bill impact. The solutions ranged from repairing sections of existing asset infrastructure that are in the worst condition to longer term solutions that included rebuilding assets and providing additional water sources with increased resilience. With each of the five solutions, transparency was given to potential pros and cons as well as the impact on risk to water quality and supply interruption (as presented in Section 6.4.4 of the Revised Draft WRMP19 main report).

5.2.2 Results of the customer engagement

Through the customer engagement we found significant support for the need to address the risk. A clear majority of customers (70%) in the survey said they had a high level of concern for the risk. A very high proportion (88%) chose an option to reduce risk over and above maintaining the status quo. This shows very clear support for the need to address the risk. Furthermore, Sheffield Hallam University validated that the research showed that both household and business customers had a strong preference for acting upon the current situation.

There is strong evidence from this research for us to act upon the current situation. There is support from both the qualitative and quantitative stages of customer research that action is essential. Additionally, the type of action was important to customers too. They expressed a clear preference for a robust long term solution and did not just want a ‘sticking plaster’, as evidenced by analysis of supporting comments for option preferences.

Open responses from the qualitative surveys are shown in Figure 21 below.

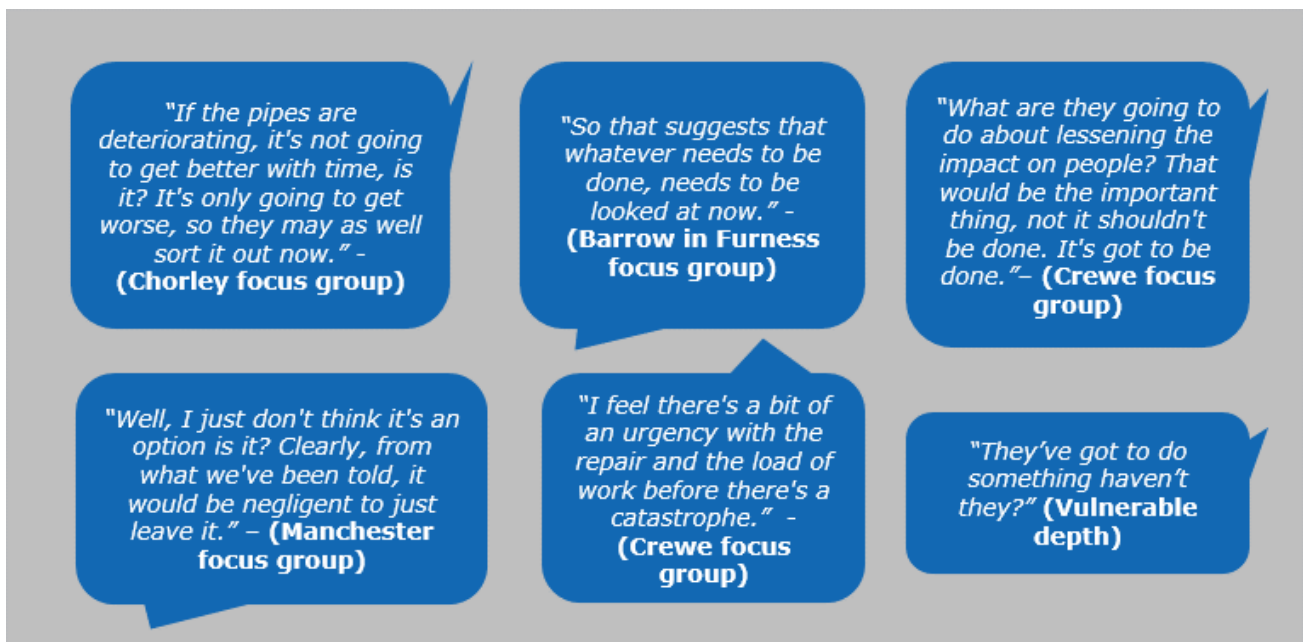


Figure 21 Open responses from qualitative customer focus groups that support the need to act on the risk (DJS Research, Manchester and Pennines resilience, February 2018)

Through the research exercise, we established that in addition to the support for the need:

1. Customers have a preference for durable, longer-term solutions that leave relatively low residual risk
2. Most customers are not willing to pay for temporary fixes that only partially reduce the risk
3. Customers support solutions to resolve the underlying issue of the deteriorating tunnel and conduit sections
4. Customers showed a clear preference for the solution that reduced risk to relatively low levels and a bill impact of £11 (2.6% for businesses): Solution D. The relative preference for this solution was eight times higher than for the 'status quo'. Overall both household and business customers have a statistically significant preference for this solution or a more expensive one with a greater risk reduction.

We varied the information presented to customers in order to understand the basis of their choices and to test the impact of context on their decision-making as follows:

- We measured the influence of the risk values by halving the values with selected focus groups, and by creating appropriate test cells in the online sample to test the same effect in the quantitative survey.
- We tested the influence of the option descriptions by removing description to just focus on risk and bill impacts in selective focus group discussions, and the addition of test cells with and without option descriptions in the online sample for the same purpose.

We shared the results with YourVoice and Sheffield Hallam University, and responded to their challenges to ensure that the conclusions were robust and defensible. We acted on their feedback by undertaking additional statistical analysis of the preferences expressed by lower-income customers. We also re-assessed the business results with weightings so that small businesses are represented in line with the regional spread. Both assessments corroborated the overall customer views. Sheffield Hallam University concluded: "the research has been conducted in a rigorous manner; the results capture customers' preferences and are robust; the findings provide a sound basis for the recommendations made."

Customer responses from the quantitative research showing relative preferences for the five options from Figures 32 and 33 of the WRMP document, relative to "do nothing" are shown in Figure 22.

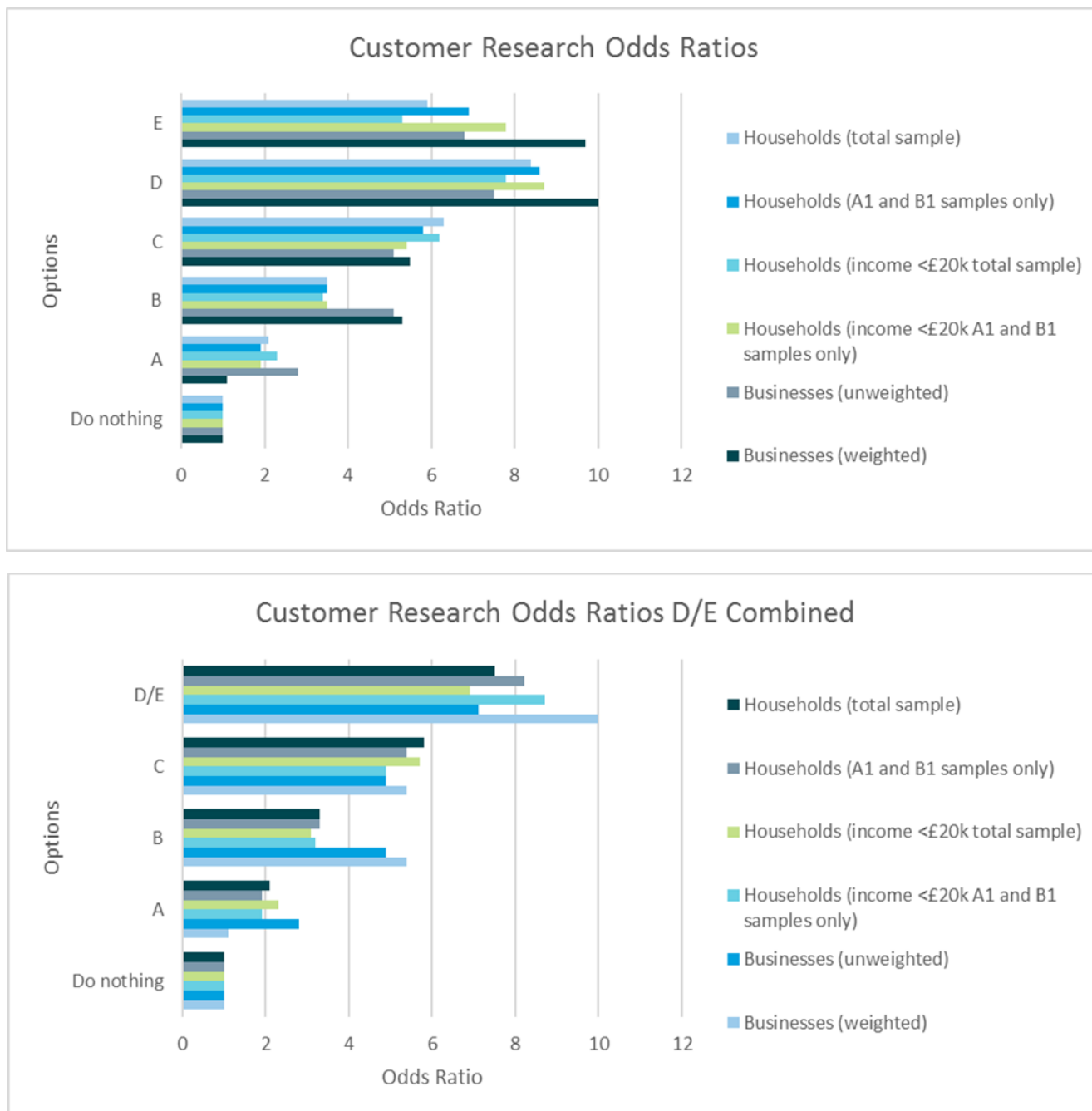


Figure 22 Customers’ relative preferences for the 5 Options or maintaining the status quo

The features of the charts above, which show total sample and statistically significant responses, are explained as follows:

- Odds ratios:** Odds ratios show the relative preference for each option. Option D, or Option D/E when combined, has the highest preference. There is a clear preference that action is required to avoid the ‘do nothing’ scenario.
- Do nothing option:** We presented to customers the ‘do nothing’ option as the scenario for maintaining the current risk. As described in section 4.7.3 of the WRMP, the ‘current risk’ is defined as the risk over the coming ten years, taking into account the risk reduction from proactive activities and the increasing risks associated with future deterioration.
- Option D/E combined:** A pair-wise choice experiment was used to look at the order of preference for each of the options using a customer utility preference score allowing a majority preference analysis to be undertaken. This showed that when tied preferences were included, the majority of household participants chose option D in their top two choices (62%), and the majority of household respondents (including ties)

also chose Option E (59.3%). When tied preferences were excluded from the analysis, Options D and E were again the top two choices (50% and 48% respectively). There was a high degree of cross over between people who select option D or E in their top two choices, and this indicated that combining options D and E is valid when comparing to preferences for the other options. This approach was validated by researchers at Sheffield Hallam University (independent experts appointed by YourVoice).

- For transparency, we illustrate above the customer responses with D and E separated, as well as D/E combined.
- **A1 and B1 samples:** Household samples were split into four sample groups: A1, B1, A2 and B2. Businesses were split into two sample groups: A1 and B1. (Note that these are not socio-economic designations; they are the sample grouping designations reported by the research company.) Information on risk and options was varied across the segments: sample A saw risk figures as per Section 6.4.4 of the *Revised Draft WRMP19* main report; sample B saw lower risk figures (approximately halved); sample 1 saw options descriptions as per Figure 32 of the WRMP document; sample 2 did not see option descriptions, only risk reduction and bill impact. A statistical analysis of confidence intervals showed that the combined samples A1 and B1 reported clearer preferences based on a better level of information provided which was needed in order to make a more informed choice. This conclusion was validated by the independent experts at Sheffield Hallam University, who deemed this to be an innovative approach.
- **Businesses (weighted and unweighted):** The business sample was weighted to make it representative of the distribution of businesses by size of employer across our region. Odds ratios for business customers shows that option D/E was also the favoured option for both the weighted and unweighted samples. The confidence for intervals for option D/E overlapped slightly with those for Option B and Option C for the unweighted sample; however, when the sample was weighted to be representative of the profile of businesses in our area the preference for option D/E was statistically significant.

Customers told us they want a long-term solution to the problem that reduces the risk to minimal levels. Open responses from customers in the qualitative survey are shown below for the five options they discussed.

Figure 23 The following three pages gives a comparison of customer opinions on the solutions they were presented during the customer research focus group. (DJS Research, Manchester and Pennines resilience, February 2018)

Option A - Target repairs of the two tunnel sections that are in the worst condition

Summary

- Respondents felt that the **cost** of this option was the only merit, with many **not willing to pay** for this option at all.
- For a large majority it is seen to be a **waste of money**.
- When asked the downsides were said to be obvious...
 - The **problem won't go away** as it is not addressing the issue,

Seen to be **"sticking a plaster"** on the problem.



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Comments

"No, because A and B are just temporary fixes aren't they? They're just doing little bits. Well eventually they're going to have to do another little bit, then another little bit, then another little bit and each time the price is going to go up and make more disruption and more service. So I'd like to get it done in one hit." - (Lancaster focus group)

"Sounds like taking a plaster and broken bone. You know it's kind of a temporary short term fix that's just gonna add more cost in the future isn't it?" - (Manchester focus group)

"It's a bit of a "nothing" one, isn't it?" - (Chorley focus group)

"Yeah, that looks like a patch up job, rather than doing the job once and for all." - (Preston focus group)

"It's like when I still have the car that I never got serviced because it seemed like 'I'm not gonna spend 80 quid on that every year', whatever. And then it just got written off. I took it to this dodgy place where they said they would give anyone an MOT, and they said don't drive this car home." - (Manchester focus group)

Option B - Rebuild the tunnel section that is in the worst condition and provide targeted treatment for water quality

Summary

- Respondents felt that there **weren't any positives** to this option, although it is an improvement on the first.
- A small proportion stated that they would pay for this option if they had to, but **wouldn't be happy** in doing it.
- Many **didn't feel this was worth considering**, as it was still not addressing the problem properly; they felt that United Utilities need to do a **"proper job"** in order to fix this issue.

Comments

"Still doesn't achieve very much more than option A does really, does it?" - (Manchester focus group)

"But again, it still doesn't get away from the fact that the tunnel is ageing and you just are not fixing the problem at the root essentially. You know you can keep on treating the dirty water as it deteriorates and deteriorates and treat it more and more, but eventually that tunnel is just gonna go isn't it... It's a losing battle I think." - (Manchester focus group)

"Doesn't seem much better than the first one." - (Chorley focus group)



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Option C - Build 5 new water treatment works

Summary

- Respondents felt this option was **better than options A and B** at first based on the risk reduction. However, when introducing what the option is, it quickly dropped in their estimations.
- Respondents felt option C **didn't solve the issues** raised with deterioration within the Haweswater Aqueduct.
- Due to **not tackling the potential risk to water supply**, a large majority said they would be **unwilling to pay** for this option.

Comments

"It's like the elephant in the room isn't it; that you can't get away from this deteriorating tunnel... You can just keep doing these fixes, but the bottom line is the tunnel is broken whilst you're building these things." – (Manchester focus group)

"This is my least favourite. When you look at that, you have the same potential negative consequences as A, but for twice the cost. Exactly the same cons, nearly double the cost." – (Crewe focus group)

"Well Option C we're getting nothing. We're not getting anything really. We're already treating the water." – (Lancaster focus group)

"... it doesn't address the issues of deterioration of pipes. It means if you get water it's clean, but you might not get it." – (Chorley focus group)

"I can't see the point of doing it whatsoever." – (Crewe focus group)

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Option D - Rebuild all tunnel sections

Summary

- Respondents felt this was a more **long term option** and **"makes more sense"**.
- They understood it was a **big operation** to implement, however the general feeling was that they would get their **"money's worth"**.
- The bill impact was seen to be **worthwhile**; a small price to pay for a **big enough outcome**.
- Most respondents said they would be **happy to pay for this**. They felt that spread over a year the impact would be **"mere pennies"**.

Comments

"Actually D is merely a pound a month, and I felt that that was a small enough impact on the bill for a big enough kind of outcome." – (Manchester focus group)

"It addresses the pipe deterioration and any water quality issues and there's only a small risk there, isn't there, to service failures to non-tunnelled sections? So it's not even like there's a high risk there. It's still small. There's not a lot you can do about those anyway." – (Chorley focus group)

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Option E - Rebuild all tunnel sections and provide additional water sources

Summary


- Respondents felt overall that this was the **best option**, with the idea of the alternative water supply tunnel being well-liked.
- The bill impact was **readily accepted by a majority** as this option was seen to be more **cost effective** and thinking **more into the future**.
- Again most respondents said they felt that spread over a year the **impact would be minimal**.
- This option was **most preferred** with some adding the caveat that if implemented they would **expect United Utilities** to undertake more **regular maintenance** in order to avoid this situation again in the future.

Comments

"15 pounds is three pints of beer in a sitting. So put that into context there, for 15 pounds over the year, [it's] pretty much eliminated the risk to my water supply... And I know for some people it is a lot, but luckily I'm in a position where I look at 15 pounds - I think that's just insignificant to know that I'm getting for a fact running water, [that is] clean..." - **(Barrow focus group)**

"It does seem stupid to replace all of these tunnels and not be able to look at the future maintenance of them whereas for a bit extra spent in billing, you can maintain and do everything else. So, I would feel that's the most sensible one if it was affordable." - **(Manchester focus group)**

"Surely option E is the best one because everything breaks. It's going to need replacing at some point." - **(Kendal focus group)**



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Vulnerable respondents

Summary

- When speaking to vulnerable respondents the **same themes, worries and concerns** were also apparent as those in other households.
- However, depending upon their personal situation, there were **clear differences** in how a water supply interruption would **affect their quality of life**.
- Thoughts on the bill impact and the options presented were **consistent with other groups** we spoke to, with most, if not all, taking the view that the **long term fix is their preferred plan of action**.

Comments

"It would probably cause meltdowns. If xxx couldn't brush her teeth or have a shower or wash her hair in the way it has to be done - just so, she has to feel it's right; if that couldn't be done she then wouldn't leave the house." - **(Vulnerable depth)**

"It would affect the toilet situation... I live upstairs normally and that is so I am close to the bathroom, because walking around hurts and stuff - I stay up there closer. By the time I get from here to the bathroom, sometimes it's too late..." - **(Vulnerable depth)**

"I'd be very cold. I'd have no heating and I do have arthritis, so I know if it was cold like this I would suffer a bit" - **(Vulnerable depth)**

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In summary, customers showed a clear preference for solution D which gave relatively low residual risk and a bill increase of £11 per year (for 25 years). This bill impact represents full repayment over a 25 year period. Following further work we now believe that the bill impact of this option is £8.18. The relative preference for this solution was eight times higher than for the status quo. Overall both household and business customers have a statistically significant preference for this solution or a more expensive one with a greater risk reduction. The solution preferred by customers involves replacing all single line sections of the aqueduct with new ones. The majority of household

participants chose this option, and business customers showed a preference for this option or this option with the addition of alternative water supplies.

5.2.3 Engagement with stakeholders

Following the completion of the customer research exercise where the communication tools were tried and tested to be understandable, engaging and assured by YourVoice, we took opportunities through business as usual partnering and collaboration to engage proactively with a diverse range of stakeholders on the topic of Manchester and Pennines resilience. We have informed and had feedback from a range of stakeholders with whom we maintain necessary business relationships, including: the Drinking Water Inspectorate; Greater Manchester Combined Authorities and their sub-groups including Greater Manchester Infrastructure Advisory Group and the Low Carbon Hub; Manchester Resilience Forum; Lancashire Resilience Forum; Public Health England and other public health organisations through our Public Health Liaison Group; Environment Agency; and Local Planning Authorities.

On 30 May 2018 the DWI issued a final decision letter of support which states, *“The Inspectorate has assessed the scheme proposed by United Utilities to undertake improvement work ... as part of its Manchester and Pennine Resilience Project. Based on the information submitted by the company, the Inspectorate commends for support the proposals to deliver improvements to mitigate residual risks to the wholesomeness of water supplied to consumers, and we agree that the proposals should be included by the company in its Final Business Plan. We consider that formal enforcement action and putting in place a legal instrument is inappropriate at this stage. We confirm that the proposed scheme is consistent with the requirements of Defra’s Strategic Policy Statement published in September 2017. We also confirm that the proposed scheme is consistent with the Inspectorate’s guidance on principles for the assessment of drinking water quality provisions within the PR19 process, as set out in DWI Information Letter 03/2017, published on 12 September 2017. In particular, we are satisfied that the proposed scheme adopts a sound risk based approach to management of water supplies from source to tap using a water safety plan approach.”*

In response to our Water Resources Management Plan consultation, the Environment Agency and Natural England provided feedback on the environmental aspects of the options. The Environment Agency express concerns about the options that involved new abstractions or changes to abstraction, particularly the River Ribble, the River Wyre and rivers in the Bowland area which form part of option E. Natural England said that *“the SEA does provide pointers to which of the solutions and their constituent options provide the greatest resilience benefit and which are most harmful to the environment. We note that the SEA concludes that Solutions C and E have the greatest range and magnitude of environmental effects (including new development in the Bowland AONB; B also would involve development in the Bowland AONB and Yorkshire Dales National Park), while D and E offer the greatest resilience benefit. That would appear to suggest that Solution D might be preferable in both greatest resilience and minimising environmental effects.”*

YourVoice also responded to our Water Resources Management Plan consultation and expressed the following view with regard to Manchester and Pennines Resilience: *“YourVoice shares UU’s view that the deterioration of the Aqueduct presents serious risks to both the safety and reliability of water supplies to a substantial part of the region, and that action is needed to manage and mitigate these risks. On this basis, YourVoice would support taking forward either Option D or E to address the resilience risks.”* YourVoice also said that *“Consideration will need to be given to whether the additional £4 annual bill impact associated with Option E compared with Option D is justified by the extra reduction in supply interruption risk that would follow.”* This question has been assessed through our cost benefit analysis and multi-criteria analysis (see Section 6.4.5 of the WRMP document).

Following our engagement with the Greater Manchester Infrastructure Advisory Group, it issued a letter to us. The Chair of the Greater Manchester Infrastructure Advisory Group, wrote *“On behalf of the group I welcome the priority given to the consideration of the long [term] resilience of the water supply to Greater Manchester and the inclusion of this issue in the draft Water Resource Investment Plan (2045) and prioritization for the investment period 2020-2025.”* Andy Burnham, the Mayor of Greater Manchester, used similar words in his letters.

We consulted with the Lancashire Resilience Forum (LRF) on the issue at their Local Authorities sub-group meeting in February 2018. The LRF sub-group is made up of representatives from 15 local authorities in Lancashire. The group issued a letter stating their support for the need for investment: *“Following a presentation by United Utilities and*

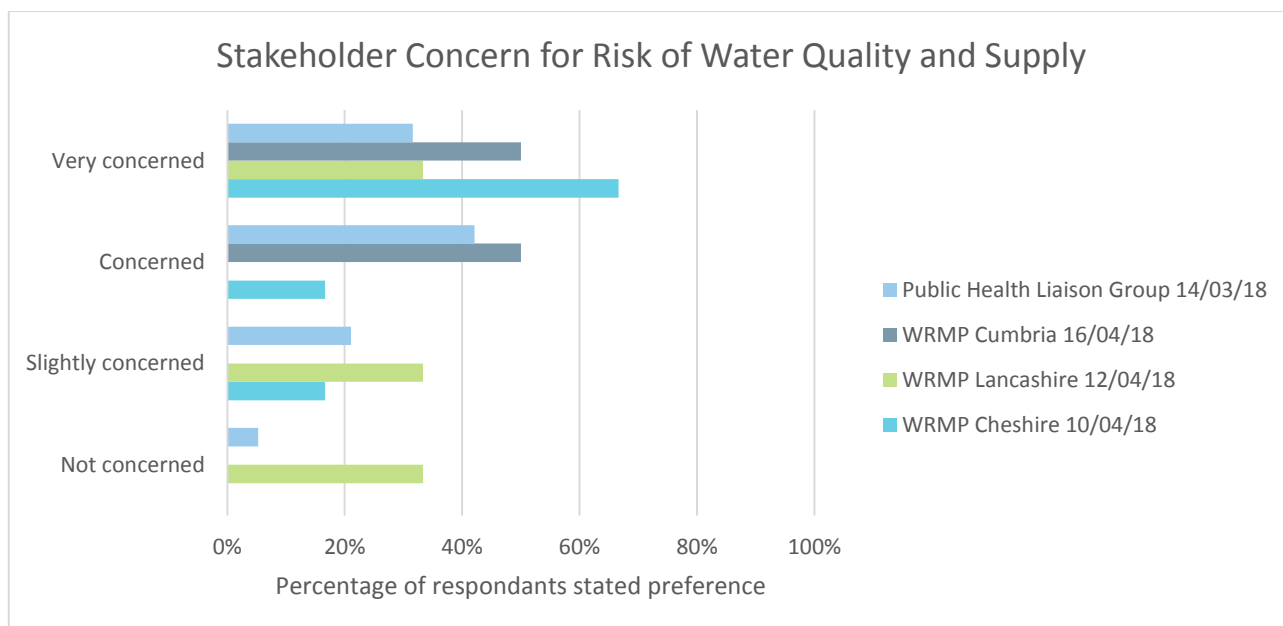
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consultation with all members of the LRF Local Authorities sub-group, we have considered the proposal to carry out maintenance and improvement works to the Aqueduct. Whilst United Utilities presented a balanced view of the risks and options, the group is concerned about the future risks to public water supplies in the absence of further investment. The group supports the need to undertake the project by United Utilities, and of the options presented the group's preferred option is D – rebuild all tunnel sections.”

We engaged with Public Health England through the United Utilities' Public Health Liaison Group which includes public health professionals from a number of organisations, and presented information on the HA risk and intervention options. We asked attendees to vote on the following questions: How concerned are you about the risk to both water quality and supply? How supportive are you of the need for United Utilities to address the risk? Answers to these questions are shown in Figure 24.

Following the publication of our draft Water Resources Management Plan, we held consultation events on our proposed plans in Cheshire, Lancashire and Cumbria. These sessions were attended by a range of stakeholders including the Environment Agency. We explained and gathered feedback on the four potential plans that we put forward. The session included a presentation and open discussion on Manchester & Pennines resilience, and we asked attendees to answer the same questions about their concern for the risk and support for the need to act. We asked the question, “How concerned are you about the risk to both water quality and supply?” early in the presentation after presenting high level information about the risk. We asked the question “How supportive are you of the need for United Utilities to address the risk?” at the end of the presentation after the options had been presented. The results of the voting are shown in Figure 24.

The level of concern for the risk varied, but most stakeholders expressed that they were concerned or very concerned with the risk on the basis of the information presented. When asked if they were supportive of the need to address the risk, stakeholders at these events expressed a high degree of support.



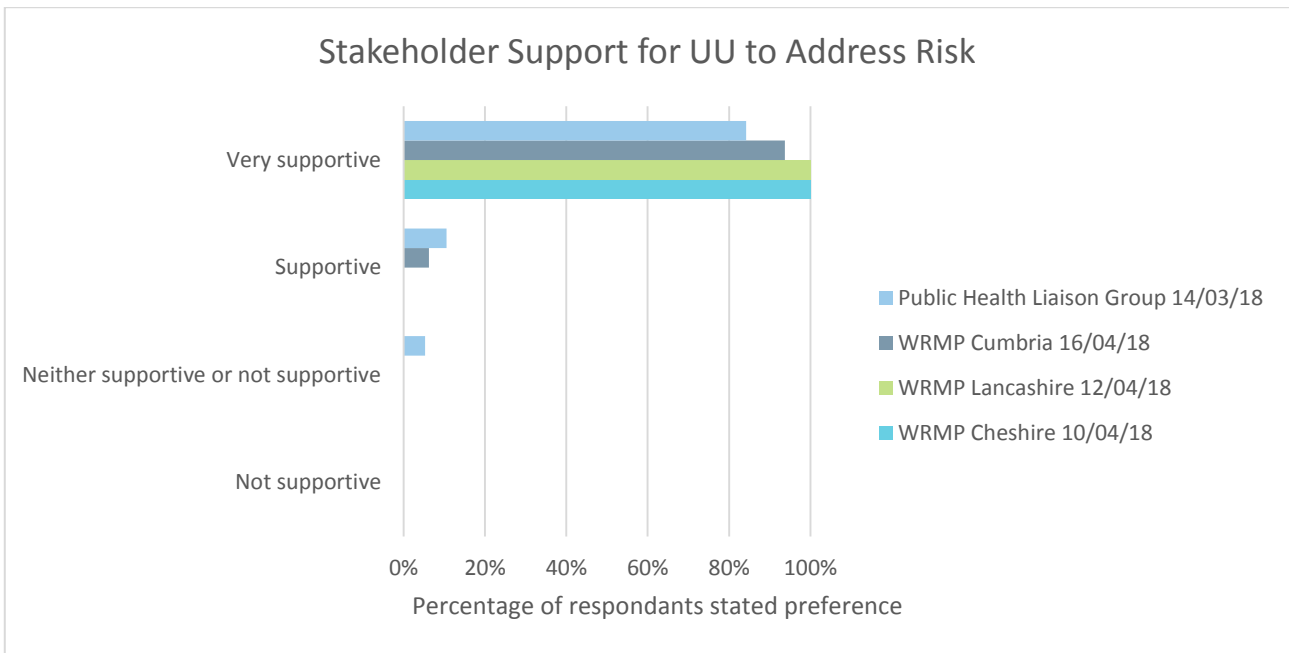


Figure 24 Stakeholder feedback on the need to act on the Manchester and Pennines resilience risk

At these events, we also took the opportunity to gather feedback on the preferred option of the stakeholders present. We tested the opinions of stakeholders in the region to inform our decision in the round on the best option for customers.

Results of the voting at the consultation events are shown in Figure 25. At the draft Water Resources Management Plan consultation events, we asked attendees to state their option preference immediately after being presented the options description, level of risk reduction and bill impact – the responses are shown in the graph below as Round 1. We asked the question again after they were presented with a summary of the customer research feedback and the Strategic Environmental Assessment, Water Framework Directive assessment and Habitats Regulation Assessment that was undertaken for each of the five options and published alongside our draft WRMP. The answers to the same question when asked again are presented as Round 2.

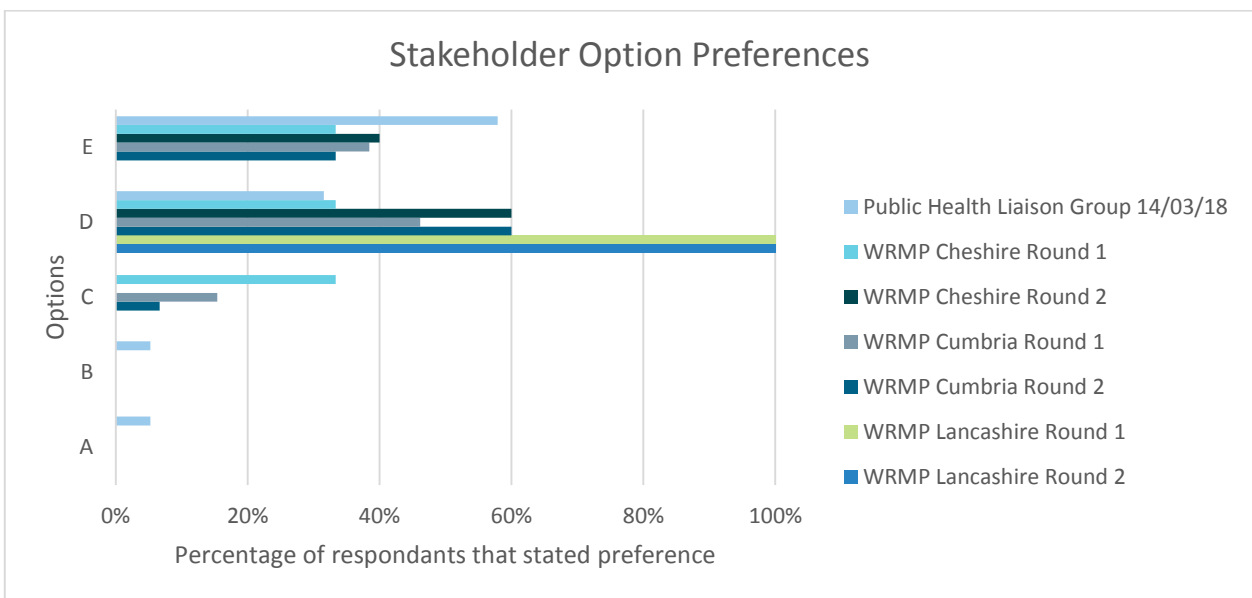


Figure 25. Results of feedback on preferred options gathered from Public Health Liaison Group and WRMP consultation events

In addition to the Public Health Liaison Group meeting and WRMP consultation events, we were present at the Greater Manchester Green Summit hosted by the Mayor of Greater Manchester, Andy Burnham. We took the opportunity to hold a market stall where we spoke to delegates about the Manchester and Pennines resilience risk

and asked them to vote on their preferred option. The results of the voting at these events are presented in Figure 26 below.

It is clear that the majority of people at these events supported the longer term solutions that bring the risk down to negligible levels. Options D and E were the most favoured. The development proposals and their geographical impacts will need to be the subject of future engagement activity (particularly at a local level) to both inform design and build support for the preferred solution.

In collaboration with the Greater Manchester Resilience Forum, we are working with Greater Manchester's chief resilience officer to inform Manchester's Resilience Strategy under the 100 Resilient Cities initiative. 100 Resilient Cities, pioneered by The Rockefeller Foundation, helps cities around the world become more resilient to social, economic, and physical challenges that are a growing part of the 21st century. Greater Manchester was selected to the 100-city global network in May 2016, gaining funding for a Chief Resilience Officer; resources to draft a Resilience Strategy; access to private sector, public sector, academic, and NGO resilience tools; and membership in a global network of peer cities to share best practices and challenges. The strategy plan incorporates water infrastructure among many other aspects of resilience and acknowledges the need for investment to secure resilience for the water supply through the Manchester and Pennines resilience scheme.

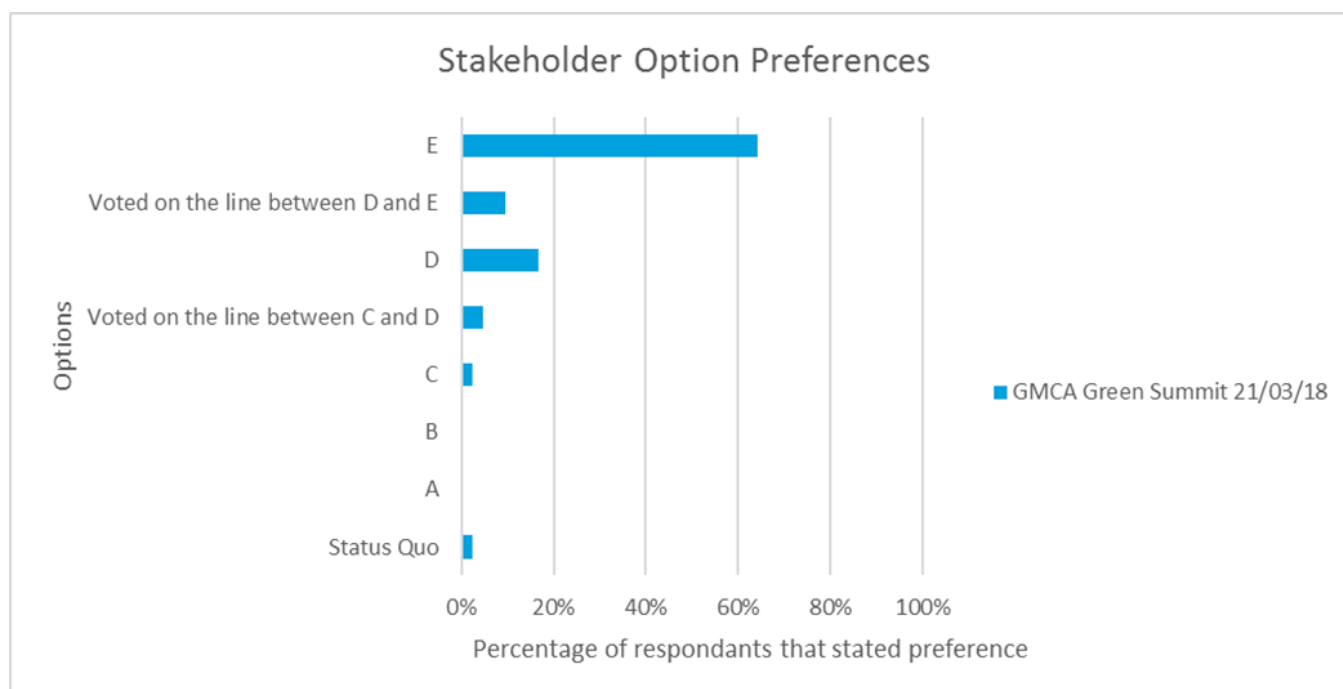


Figure 26 Results of feedback on preferred options gathered from the GMCA Green Summit

In March 2018, the Manchester & Pennines resilience options were evaluated with respect to city resilience in a workshop facilitated by the 100 Resilient Cities team in collaboration with Greater Manchester Combined Authority – this was the first time a utilities project was taken through this innovative process. Manchester & Pennines resilience was assessed using the 100 RC Scan tool that considers resilience with respect to projects in three fundamental ways:

- The extent to which the project contributes to the city's resilience, taking account of its direct impacts and impacts on aspects beyond the direct objectives of the project
- The extent to which the project is aware and prepared for shocks and stresses
- The extent to which the project itself demonstrates resilient qualities, so is better placed to manage external shocks and stresses

The five options put forward for customer research were evaluated with respect to seven resilience qualities: reflective, resourceful, robust, redundant, flexible, inclusive and integrated. The options were also considered with

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regard to their potential to impact shocks and stresses that would challenge a city's resilience. Examples of feedback from the 100 RC team are as follows:

"100 RC is delighted to contribute to UU's exploratory work. According to our experience internationally, it is unusual for utility providers to expand beyond their technical analysis and incorporate research and exploratory work to truly address the complexity of the challenge at hand. This approach is commendable and likely to create innovative and robust solutions that not only minimise negative impacts of the upgrading process but also captures potential opportunities."

"UU's approach to including multiple stakeholders in its process should be commended and in order to maximise the benefit of this approach it is suggested that inclusiveness is continued to be built throughout the process by maximising the communication with the communities potentially affected by disruption and construction works. Not only does delivering inclusivity require awareness, awareness also builds a shared knowledge that is required to safely implement significant pieces of critical infrastructure."

The Chair of the Greater Manchester Resilience Forum, also wrote to us with regard to the 100RC workshop *"The workshop prompted several interesting conversations and I think all involved found it a useful experience."* *"As Chair, I wanted to write to you, on behalf of the GMRF to advise you that we find the proposed options for repair/renewal reassuring. We support these improvements, whichever option is ultimately chosen, but would suggest an option that secures long term resilience. Clearly a lot of time has been invested in research and consultation to ensure that the approach taken to mitigating these risks fair is proportionate [sic]."* A preference for a long term sustainable solution was also expressed by the Greater Manchester Infrastructure Advisory group and by the Mayor of Greater Manchester. To follow up his letter of support in April 2018, Andy Burnham issued another letter in June 2018 with formal endorsement from the Greater Manchester Combined Authority.



Figure 27 100 RC, United Utilities and members of the Greater Manchester Resilience Forum engaged at the Manchester & Pennines resilience workshop

6. Conclusions

In summary:

- Compared with the 2015 Water Resources Management Plan, we have conducted a much broader and more varied volume of research and engagement for our 2019 Water Resources Management Plan. This approach means we have delved deeper into customers' views and opinions in order to tailor this plan towards them in every way possible;
- Alongside carrying out extensive customer research, we have ensured engagement with stakeholders and regulators throughout the Water Resources Management Plan process. This has involved formal actions such as pre-consultation, alongside additional activities such as liaison meetings and working groups;
- We have strived to move away from the reliance on willingness to pay surveys and instead have concentrated our efforts in creating new innovative techniques to get customers involved in the Water Resources Management Plan process. This has been particularly important as we explore risk and resilience to a greater extent with customers. This has included releasing an interactive tool to our customer panel and carrying out immersive research with customers to try and simulate 'real life' scenarios;
- We have ensured that we look at business as usual data to see what customers are saying all the time and not merely at specific events and surveys that we hold; and
- We have continued engagement further to consultation on our draft plan, particularly with regards to leakage reduction targets, water trading and the Manchester and Pennine Resilience scheme. All this research has included specific consideration of the bill impacts to customers and has informed our revised draft Water Resources Management Plan.

The conclusions of this research are as follows:

- Reliable supplies are typically ranked a top priority by customers, and having sufficient supply to meet demand ranks highly within that category;
- Leakage is a big issue for all parties and there is some willingness to pay in this area. There is strong support and preference for demand management options;
- Acceptability is generally high for levels of service, and willingness to pay valuations show a stronger desire to avoid deterioration than preference to improve service. There is marginally more distinction between service levels for drought permits over water use restrictions;
- There is some support for water trading, however, concern has been raised by both stakeholders and customers that any trading should not affect customers and the environment in the North West;
- There is little distinction between different levels of drought severity for planning;
- Customers place high valuations on avoiding supply interruptions including to hazards other than drought; and
- There is a high level of support to address the Manchester and Pennines resilience need, and research exploring the bill impacts of different solutions along with the residual risks has provided a clear preference to inform our preferred plan.

7. References

Department for Environment, Food and Rural Affairs, 2016. Guiding principles for water resources planning.

Environment Agency and Natural Resources Wales, 2017. Water Resources Planning Guideline: Interim update. April.

Appendix A – Full list of all responses received for pre-consultation

The following organisations were contacted for the pre-consultation:

ORGANISATION
Consumer Council for Water
Environment Agency
Friends of the Lake District
Holker Group
Individual Member of the Public
Lake District National Park Partnership
Lancashire Constabulary
Natural England
Natural Resources Wales
North Western Inshore Fisheries and Conservation Authority (NWIFCA)
Ofwat
River Eden & District Fisheries Association (REDFA)
South Lakeland District Council
West Cumbria Rivers Trust
Windermere Lake Cruises Ltd
Windermere Lake Users Forum
Windermere Town Council

Appendix B – Full list of all councils and local authorities contacted

The following councils/local authorities were contacted and engaged:

NAME OF COUNCIL/LOCAL AUTHORITY	
Allerdale Borough Council	Pendle Borough Council
Blackburn with Darwen Council	Salford City Council
Blackpool Council	Sefton Council
Bolton Council	South Ribble Borough Council
Burnley Borough Council	St Helens Council
Carlisle City Council	Tameside Metropolitan Borough Council
Copeland Borough Council	Trafford Council
Eden District Council	Warrington Borough Council
Fylde Borough Council	West Lancashire Borough Council
Knowsley Council	Wigan Council
Lancaster City Council	Wirral Council

Appendix C – Programme Choice experiment

Screenshots from the initial screens in the Programme Choice experiment prior to the main supply-demand screen depicted in the main body of this report.

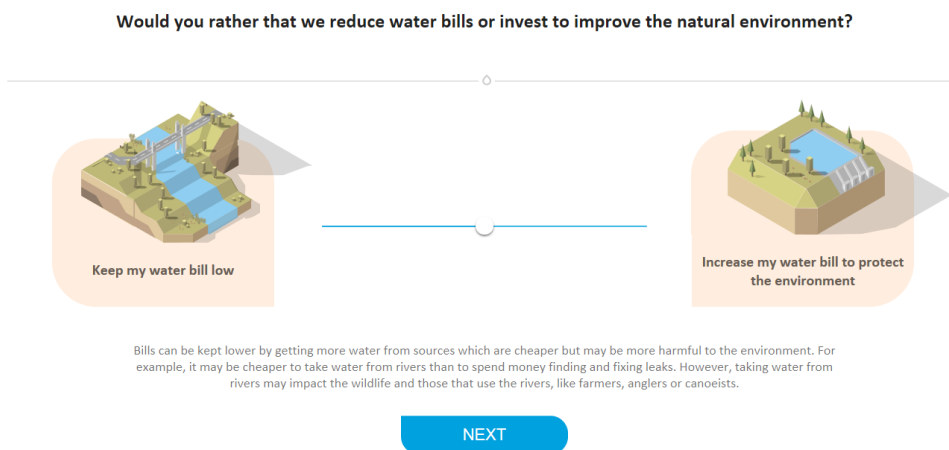


Figure 28 First screen from Programme Choice experiment

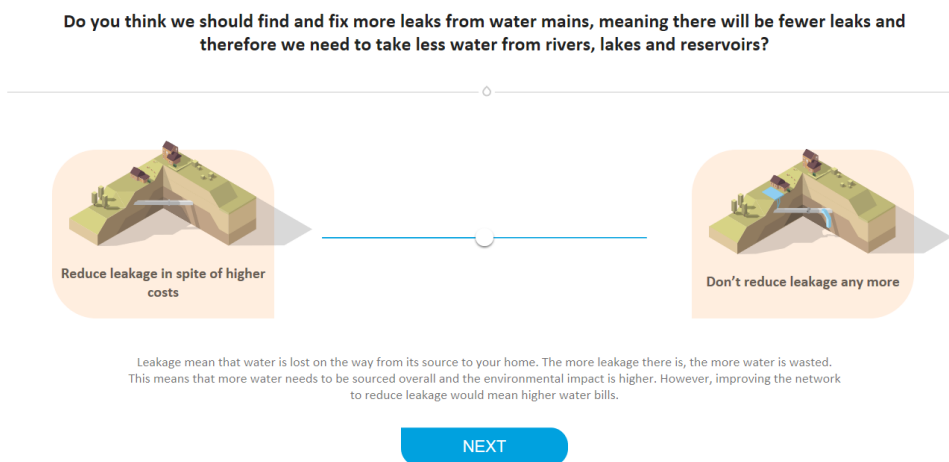


Figure 29 Second screen from Programme Choice experiment

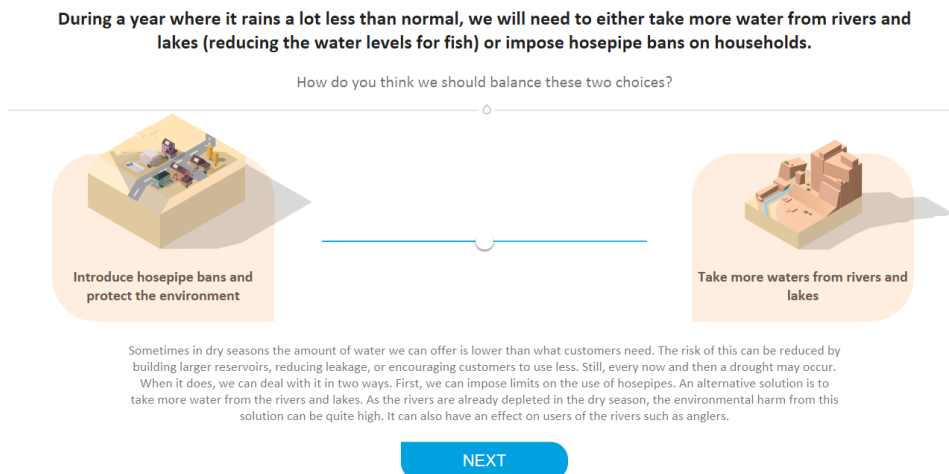


Figure 30 Third screen from Programme Choice experiment

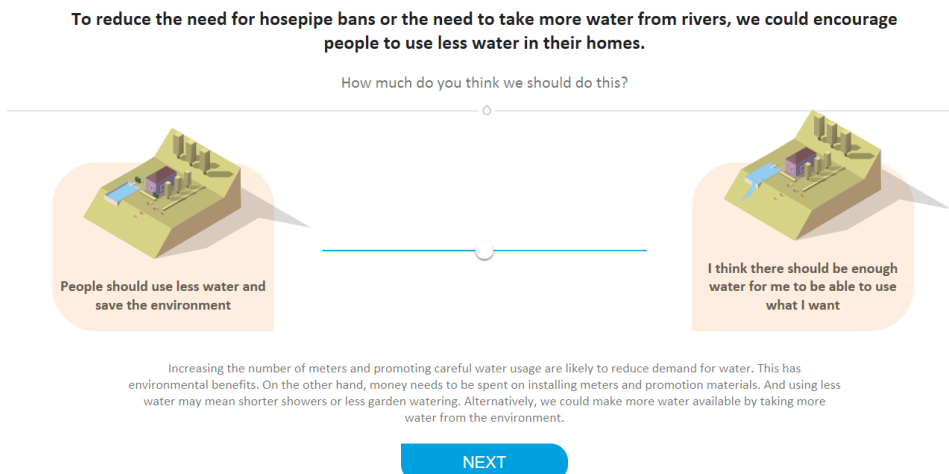


Figure 31 Fourth screen from Programme Choice experiment