

Climate Change, Water and Scotland's Future

**Deliberative research undertaken for
Consumer Scotland by Ipsos**

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Executive summary

Context and research objectives

Consumer Scotland is a Non-Ministerial Office that came into existence in April 2022 following passage of the Consumer Scotland Act 2020. It exists to advocate on behalf of all consumers in Scotland and to represent consumers' interests. It receives specific levy funding to advocate for consumers in the water sector in Scotland as part of this. How water and wastewater services can contribute to a just transition to net zero, and how these services should be adapted to mitigate the impacts of climate change, are key issues that Consumer Scotland is focusing on.

In 2023 Consumer Scotland commissioned Ipsos to deliver a major programme of deliberative research to provide insight into how domestic consumers can and should be part of Scotland's transition to a more resilient and sustainable water sector. The research focused on three key areas: household water use and disposal; water sector wastewater management (as it relates to the water environment); and surface (rain) water management.

The research sought to:

1. Find out the extent to which consumers are aware of climate change impacts in the Scottish water sector and whether they understand the need for adaptation;
2. Consider what information is needed and in what format to support informed consumer decisions;
3. Understand consumers' views on a range of policy options and solutions relating to water resources and services, sewerage and drainage;
4. Explore consumers' views on where responsibility should lie for tackling the impacts of climate change on water in Scotland, how urgently this needs to be done and what considerations should be taken into account;
5. Seek to understand the motivations, the opportunities and the support required by consumers to change their water behaviours to be more sustainable;
6. Use a deliberative approach to allow consumers to be presented with information and options and to consider their responses.

Research approach

A deliberative approach was chosen for this research due to the complex and multi-faceted nature of the topic. The specific methodology used was a public dialogue, whereby members of the public interact with specialists, stakeholders and policy makers to deliberate on issues relevant to future policy decisions.

Forty-one people from across Scotland took part over five three-hour online workshops between October and November 2023, to answer the following question: "How should we deal with the impacts that climate change is having - and will have - on water in Scotland?" Discussions were facilitated by moderators from Ipsos, and a range of specialists from across the Scottish water sector presented information at the meetings to inform participants' deliberation. Between sessions, participants also engaged in an online community, which provided activities, information, an artist's summary of the previous workshop discussions, and a forum for further discussion.

Key points: cross-cutting themes

- Most participants felt they knew little or nothing about the impacts of climate change on water or wastewater services prior to taking part in the research, although there was more awareness of issues with drainage and surface water flooding. When consumers learnt more about climate change impacts they were alarmed by the scale of the challenges.
- On learning more, participants saw a clear and urgent need for climate adaptation in the water sector. They expressed a desire for the sector to put long-term solutions in place and invest in innovative approaches.
- Affordability was a key theme raised by participants throughout. While there was acknowledgement that price rises to pay for improving Scotland's water or wastewater infrastructure are likely to be inevitable, participants wanted reassurance that any investments would be 'future-proof' and provide value for money in the long term. A strong theme was that any negative impacts of this on consumers who can least afford to pay should be avoided.
- Aside from investing in infrastructure, there was a widespread belief that behaviour change from consumers and businesses would be an important factor in tackling the impacts of climate change on Scotland's water resources, sewerage and drainage systems. It was felt there would be a broad openness among the public to doing things differently with appropriate support. However, participants also recognised change is likely to be challenging, as some consumers may be less willing or able to change.
- By the end of the dialogue, participants felt that everyone has a role in tackling the impacts of climate change on Scotland's water sector: Scottish Government, Scottish Water, businesses, local authorities, people and communities. Education and raising awareness were consistently highlighted as important factors in empowering all consumers to do things differently.

Key points: water services and resources

- At the beginning of the dialogue, participants had limited knowledge of how water services worked in Scotland, but generally had positive associations. Participants were alarmed to learn about the potential water deficit that Scotland would face by 2050 and the risk to customers of a water shortfall.
- Participants' reactions to the five Scottish Government policy ideas presented to them were underpinned by a strong sense of urgency, and they expressed a sense of frustration that these were not already in place. These policy ideas to help tackle the challenges ahead included a new Water Efficiency Strategy, national water resource planning and more stringent standards for water saving.
- There was an expectation that dealing with the impacts of climate change on water would require both action to reduce household and business water use and additional investment in building and upgrading infrastructure. However, participants felt that behaviour change would be able to happen more quickly, while infrastructure investment would take longer to be put in place.
- Participants felt that there would need to be guidance and support to help individuals make changes to their water behaviours, including education and awareness-raising about the need to reduce water usage, guidance to help people make the necessary changes and harnessing technology to improve monitoring. There were mixed views on the potential for water meters being installed and concerns about this being linked to billing.

- There was initial surprise at the age of Scotland's water infrastructure. Participants were not typically in favour of new infrastructure-heavy solutions to tackle Scotland's water shortfall, such as new dams or pipelines, due to concerns about costs and negative environmental impacts. Instead, there was a preference for updating existing infrastructure and more localised solutions, such as mechanisms to increase rainfall capture and utilise greywater.
- Participants generally felt that there should be a shared responsibility for tackling the impacts of climate change on water in Scotland, including Scottish Government, Scottish Water, businesses, local authorities, communities and individuals. Scottish Government was seen to have a particularly important role to play, by taking the lead and coordinating initiatives, setting strategy and targets, ensuring regulation and incentivising different actors to make changes.

Key points: wastewater services

- Participants had typically not thought about the sewerage system previously, although those who had experienced using a septic tank were familiar with how this worked. Upon learning more from the expert presentations, there was surprise that rainwater goes into the same place as sewage. There was concern about the impact of overflows (CSOs) into the sea, and the effect that increased rainfall will have on this.
- While participants acknowledged that changing the entire wastewater system may not be practical, they generally felt that more should be done to improve the system and reduce the likelihood of CSOs. Participants also thought there should be a robust long-term strategy from Scottish Government on sewerage and drainage (see below for key points on drainage), as there would be for water supply.
- There was no consensus on how best to manage CSOs, with participants expressing mixed opinions. Some saw Scotland's current approach, where monitoring and upgrading is done for sewers identified as priorities, as acceptable, more cost-effective and a better use of available resources. Others believed that all sewers should be monitored, due to concerns around the environmental impact of overflows, transparency and accountability.
- Everybody was thought to have some responsibility for reducing strain on the sewerage system, including government, businesses and individuals. Manufacturers were seen to have a particular responsibility to ensure products that are not flushable are accurately labelled.

Key points: drainage systems

- Participants were aware of surface water flooding (particularly in the context of Storm Babet in October 2023 that occurred during the research fieldwork period) across Scotland and in their local areas. However, upon hearing more information about the water resilience challenges Scotland faces participants were again struck by the scale of the potential impacts of climate change on drainage systems.
- Again, there was a widespread view that everyone has some responsibility for reducing surface water flooding. Local authorities were seen to have a particularly important role, given their responsibility for maintaining local roads and drains. Participants also noted that local authorities' role in deciding local planning permission and enforcing planning regulations means that they are in a position to ensure more Sustainable Urban Drainage Systems (SuDS) are integrated into new developments.

- Participants were generally positive about the potential for using blue-green infrastructure solutions to improve surface water drainage. The multiple community benefits of this approach stood out, as well as the opportunity to involve communities more in the design process. However, there were some concerns around the practicality and effectiveness of implementing blue-green infrastructure across different areas. While participants acknowledged that in certain cases, 'hard engineering' solutions might be the most practical option, there were also concerns around expense and disruption.
- Overall, participants acknowledged that a mixture of both blue-green infrastructure and hard engineering solutions would be needed to tackle surface water flooding in Scotland. There was a call for a more pro-active approach, with more investment, partnership working and use of local knowledge.

Key points: awareness-raising, communication and engagement

- Throughout the dialogue, participants highlighted the importance of raising awareness about the current and future impacts of climate change on Scotland's water. Regarding how to raise awareness, participants felt that education in schools would be key, along with widespread and effective communications campaigns including targeted communications to reach specific groups within the population, such as homeowners and tenants.
- Participants felt that better informing the public about the need for reducing water usage – and adapting water supply and waste water services - to help tackle the impacts of climate change could help the Scottish Government and Scottish Water to build support for future decisions. They identified information needs around what the necessary water-related behaviour changes are, how behaviours can be changed, and the positive impacts of doing so.
- There was a strong view that the way in which people consume media and advertising has changed, for example it was thought that people engage less with television advertising and more with social media. Participants felt that communications strategies must reflect this. However, participants thought that multiple mediums would be needed and advocated targeting and tailoring communications to specific groups.
- There was a desire for community-level awareness-raising and engagement. It was thought that local knowledge is valuable and should inform plans to adapt or improve water and wastewater services in local communities. Participants also suggested that this should go further than simply consulting communities, for example that there should be a way for individuals to initiate changes that they want to see in their local community (such as suggesting changes to the streetscape to allow for more planting) in regard to water or wastewater issues.

Value of taking a deliberative research approach

- In total, 41 participants took part in 15 hours of deliberation across 5 dialogues. The deliberative approach gave participants the time and opportunity to learn about complex and often unfamiliar issues, before working together to develop thoughtful conclusions for the future of Scotland's water resources and sewerage and drainage systems.

- It was striking that following the extent of their deliberation, and the scale of the challenges facing Scotland's water due to climate change, participants were not defeatist. Rather, they expressed their desire for Scotland's water sector to look to the future and put solutions in place rapidly to adapt to the impacts of climate change on water, sewerage and drainage, including innovative approaches. The research findings indicate that, given the time and space to consider the issues, consumers are clear that they themselves can and should be part of Scotland's transition to a more resilient and sustainable water sector.

1 Context, aims and methodology

Background to the research

Consumer Scotland is a Non-Ministerial Office that came into existence in April 2022 following passage of the Consumer Scotland Act 2020. It exists to advocate on behalf of all consumers in Scotland and to represent consumers' interests. It receives specific levy funding to advocate for consumers in the water sector in Scotland as part of this.

The climate crisis is inextricably linked to water. Climate change is increasing variability in the water cycle, thus inducing extreme weather events, increased flooding, reducing the predictability of water availability, decreasing water quality, and threatening biodiversity. How water and wastewater services can contribute to a just transition to net zero, and how these services should be adapted to mitigate the impacts of climate change, are key issues that Consumer Scotland is focusing on. As set out in its Strategic Plan 2023-27, Consumer Scotland recognises consumers' choices will be key both in achieving net zero and in adapting to the impacts of climate change.

To tackle climate change, Scotland has an ambitious target of reaching net zero by 2045¹. Rapid progress in the coming years will be essential if Scotland is to achieve its climate targets. Alongside actions to reduce emissions, the Scottish Government has set out its commitment to adapting and building resilience to climate change and the far reaching impacts it will have on society, the economy and the environment. The second Scottish Climate Change Adaptation Programme² (SCCAP2) set out over 170 policies and proposals to respond over the period 2019 to 2024 to the risks for Scotland identified in the 2017 UK Climate Change Risk Assessment (CCRA2). At the time of writing, the Scottish Government are consulting on their third Scottish National Adaptation Plan³ (SNAP3) which reflects the updated UK assessment of the 2017 UK plan in 2022. Scottish Water has also published its own Climate Change Adaptation Plan 2024⁴.

In November 2023 the UK independent Climate Change Committee's (CCC) second independent assessment of progress in adapting to climate change in Scotland⁵ concluded that overall progress on adapting to climate change in Scotland remains slow, particularly on delivery and implementation. The CCC set out 51 recommendations to Government, including: setting out targets and supporting measures for reducing water use by business; that the consultation on water sector policies planned for 2023 should include proposals for setting clear drought resilience standards under a changing climate; and other recommendations relating to flood risk and resilience and to Sustainable Drainage Systems (SuDS) and blue-green infrastructure.

¹ [Climate Change \(Emissions Reductions Targets\) \(Scotland\) Act 2019](#)

² [Climate change adaptation programme: progress report 2023 - gov.scot \(www.gov.scot\)](#)

³ [Climate change - draft Scottish National Adaptation Plan 3: consultation - Scottish Government consultations - Citizen Space](#)

⁴ [Climate Change Adaptation - Scottish Water](#)

⁵ [Adapting to climate change - Progress in Scotland - Climate Change Committee \(theccc.org.uk\)](#)

Water and wastewater policy and management have a fundamental part to play in tackling climate change in Scotland. Managing water resources is essential to ensuring the resilience of Scotland's communities, businesses and ecosystems against the effects of climate change. Scottish Water has recently called on consumers to use water as efficiently as possible in homes and gardens to help protect and maintain our water supply. This drive for water efficiency is also supported by Scotland's National Water Scarcity Plan⁶ which sets out how the water sector will manage water resources in periods of low rainfall, and the roles and responsibilities of the key industry stakeholders.

At the time of writing the Scottish Government is undertaking a major review of water policy in Scotland, both to take account of the impacts and challenges of climate change and to ensure the current legislative landscape supports climate change ambitions. Its consultation on water, wastewater and drainage policy⁷ opened on 21st November 2023 and closed on 21st February 2024. Consumer Scotland's research will contribute towards a future water policy framework that places consumers at the heart of adaptation and resilience to climate change.

Research objectives

Against this backdrop, Consumer Scotland commissioned Ipsos to deliver a programme of deliberative research with the primary aim of helping to build its evidence base, providing insight into how domestic consumers can and should be part of Scotland's transition to a more resilient and sustainable water sector.

The research sought to explore consumer behaviours, perceptions, tolerances and priorities, and importantly, what support is required by consumers to evolve water behaviours so that they are more sustainable in future. It focused on three key areas: household water use and disposal; water sector wastewater management (as it relates to the water environment); and surface (rain) water management at community level and rainwater capturing / re-use at household level.

Specific objectives were to:

1. Find out the extent to which consumers are aware of climate change impacts in the Scottish water sector and whether they understand the need for adaptation;
2. Consider what information is needed and in what format to support informed consumer decisions;
3. Understand consumers' views on a range of policy options and solutions relating to water resources and services, sewerage and drainage;
4. Explore consumers' views on where responsibility should lie for tackling the impacts of climate change on water in Scotland, how urgently this needs to be done and what considerations should be taken into account;
5. Seek to understand the motivations, the opportunities and the support required by consumers to change their water behaviours to be more sustainable;
6. Use a deliberative approach to allow consumers to be presented with information and options and to consider their responses.

⁶ [Scotland's National Water Scarcity Plan \(sepa.org.uk\)](https://sepa.org.uk)

⁷ [Water, wastewater and drainage policy consultation - Scottish Government consultations - Citizen Space](#)

Methodology

A deliberative approach was chosen for this research due to the complex and multi-faceted nature of the topic. Deliberative engagement is about putting people – through informed discussions, involving diverse perspectives, and understanding lived experiences – at the heart of decision making. It differs from other forms of engagement in that it allows those involved to spend time considering and discussing an issue at length before they come to a considered view.

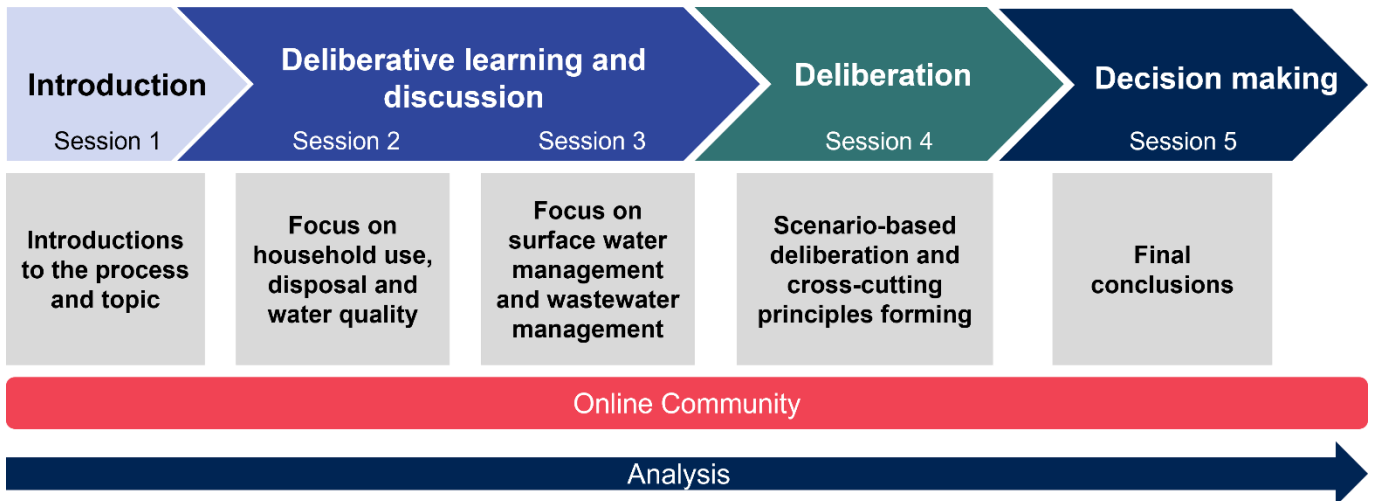
The specific methodology used is known as a [public dialogue](#). Public dialogue is a process during which members of the public interact with specialists, stakeholders and policy makers to deliberate on issues relevant to future policy decisions.

The dialogue brought together a group of 41 people from across Scotland to learn about the topic of the impacts of climate change on water, wastewater and drainage. The group met over five three-hour online workshops between October and November 2023 to answer the following key question: “How should we deal with the impacts that climate change is having – and will have – on water in Scotland?”

Over the course of the public dialogue, participants listened to presentations from specialists from across the water sector in Scotland, learned about the key issues in relation to the impacts of climate change on water, wastewater and drainage, discussed possible strategies and solutions to help address these impacts, and then drew conclusions together (which are presented in this report).

Further details about the process (including an overview of each session with date, times, content and specialists) can be found in Appendix A, but the overarching design of the dialogue is summarised in Figure 1.1 below. Alongside the online meetings, an online community helped support ongoing engagement with participants, facilitating continued learning, reflection and discussion.

Figure 1.1: Structure of the dialogue



Stakeholder engagement

In the early stages of the project, Ipsos facilitated a workshop with Consumer Scotland and a range of stakeholders from across Scotland’s water sector to help shape the design of the dialogue. The workshop explored stakeholder views on the options for adaptation and mitigation in the water sector, possible trade-offs and impacts, and likely future dilemmas that could benefit from public insight. Findings from the workshop informed the design of materials and helped to identify suitable specialists to present at the first three workshops.

Sampling and recruitment

The aim was to achieve a sample of at least 40 participants with over-recruitment to account for potential cancellations or drop-outs. In the end, 42 participants joined the first session and 41 continued to the end of the process.

Participants were recruited by telephone using a screening questionnaire. The questionnaire captured demographic information about the participants, designed to help ensure the group's profile was broadly reflective of the Scottish population. Those aged 16-34, living in a rural or island area or more deprived areas⁸, from an ethnic minority group, or with a long-term disability or long-term health condition were boosted to ensure sufficient representation of those voices. A table summarising the demographic profile of the group can be found in Appendix B.

To support and enable participation in all workshops, and in line with industry standards, participants were each paid £400 for joining the online sessions and online community. This was paid in instalments throughout the process. Participants were offered the loan of equipment if needed (including headsets, laptops or internet dongles) and were supported with training on how to use the technology and access the meeting platform. This allowed Ipsos to increase the diversity of those taking part. Workshops were also arranged to take place outside of regular office hours to increase participation.

Materials and input from specialists

Discussion guides and stimulus materials were developed by Ipsos and reviewed by Consumer Scotland and stakeholders. A range of specialists from Scottish Government and Scottish Water joined at different points in the dialogue to provide information that would be useful for participants' learning and deliberation (see Appendix A for details). Their presentations related to water and wastewater services, and the impacts of climate change on these (workshop 1); water resource planning, and household water use in Scotland (workshop 2); sewerage and drainage, surface water flooding, and ways of tackling the impacts of climate change on sewerage and drainage (workshop 3).

Presentations were delivered live and specialists stayed online to answer questions in a plenary setting, following smaller breakout discussions where participants had an opportunity to reflect on what they had heard and raise points for clarification. Any questions that were not answered during the live sessions were compiled in a Question and Answer (Q&A) document and posted on the online community before the next session (see Appendix C).

Participants were invited to join an online community, facilitated by Ipsos, which provided a secure space for participants to continue engaging on the topic in between workshops if they wished to (most opted to take part). Activities on the online community were designed and launched iteratively, so that they could be responsive to any issues that emerged from discussions and other events (such as Storm Babet, which caused mass flooding across the UK and particularly eastern Scotland and occurred between workshops two and three).

⁸ According to the Scottish Index of Multiple Deprivation (SIMD)

Visual summaries (by artist Skye McCool⁹) were also used throughout the online dialogue, which involved the use of drawings and text to convey the presentations, discussions and overall journey that participants experienced. These were used both as a learning tool, recognising different learning styles and preferred ways of accessing information, and as a way of engaging with participants via the online community in between sessions. An example is provided in Figure 1.2 below, and all five visual summaries can be found in Appendix C.

Interpretation of qualitative data

The conclusions set out and discussed in this report are intended to contribute towards the creation of a water policy framework in Scotland that places consumers at the heart of adaptation and resilience to climate change.

This report synthesises the diverse expressions of participants to draw out major themes of discussions and to draw attention to the way that they – individually and collectively – made sense of a complex topic, describing what mattered to them and why. On occasion, the report refers to verbatim assertions by participants and their understanding of the issues. These are not intended as authoritative statements of fact, but they tell us something important about how the issues can be perceived and understood by members of the public.

A robust and systematic analysis approach was used, with conclusions based on groups that are reflective of the diversity of the wider public. The deliberative nature of the project allowed for ongoing analysis throughout fieldwork, which ensured that emerging themes and principles that would form the basis of participants' conclusions - both from workshop discussions and online community activities - could be played back as the dialogue progressed. Analysis does not seek to quantify findings nor does it indicate statistical significance from a representative sample. A more detailed summary of the analytical approach to the dialogue can be found in Appendix D.

The COM-B¹⁰ behavioural model was used to inform the analysis of the data from this dialogue. This model recognises that behaviour is influenced by many factors and is widely used to identify what needs to change for a behaviour change intervention to be effective. According to this model, for any behaviour change to occur a person must have the:

- **Capability** – the physical strength, knowledge, skills and stamina to perform the behaviour;
- **Opportunity** – the behaviour needs to be physically accessible, socially acceptable and there must be sufficient time to do it;
- **Motivation** – they need to be more highly motivated to do the behaviour at the relevant time than not to do the behaviour (or to do something else).

⁹ [Skye McCool \(carbonmade.com\)](https://www.carbonmade.com/)

¹⁰ [The behaviour change wheel: A new method for characterising and designing behaviour change interventions | Implementation Science | Full Text \(biomedcentral.com\)](https://www.biomedcentral.com/fulltext)

Priority behaviours for water, sewerage and drainage were explored as part of this research. Participants focused on the perceived reasons underlying current behaviour in these areas, opportunities for - and barriers to - behaviour change, and the motivations for - and enablers to - behaviour change. The research team drew on the COM-B framework to support the analysis of water, wastewater and drainage behaviours in Chapters 2, 3 and 4 of this report.

This report offers insight into public perspectives on the key question posed to them after receiving and deliberating on essential information relevant to their task of considering how Scotland should deal with the impacts of climate change on water.

Figure 1.2: Illustration of how participants reached their conclusions



2 Water services and resources

This chapter summarises participants' views on Scotland's water resource management and approaches to tackling future water shortfall. It explores how participants balanced the need for investment in infrastructure and behaviour change at the consumer level in response to the impacts of climate change on water in Scotland. The chapter draws on findings from workshops one and two, in which participants learned about the current water infrastructure in Scotland, households' water use, and the impacts of climate change on water resources. It also draws on findings from workshop four, in which participants considered scenario examples of infrastructure projects and consumer behaviours in relation to water resources, and from the online community, where participants continued to engage with issues relating to water services and resources in between sessions.

Key findings:

- Participants felt there should be a shared responsibility for tackling the impacts of climate change on water in Scotland, with the Scottish Government, Scottish Water, businesses, and individuals/communities all playing a role.
- To help tackle the challenges ahead, participants were broadly in favour of a new Water Efficiency Strategy, national water resource planning and more stringent standards for water saving measures in new build homes as possible actions. However, there was some surprise that these things were not in place already and questions over whether they were ambitious enough actions to meet the challenges ahead. Views on these ideas were underpinned by a strong sense of urgency.
- Participants felt that action to reduce household and business water use and infrastructure investment would both be required to tackle the impacts of climate change on water resources. Given Scottish Water's ageing infrastructure, they recognised the need for investment and hard engineering solutions and wanted to see lasting solutions put in place.
- Even with infrastructure projects in place, it was broadly recognised that there would still need to be a focus on individuals reducing water usage. Participants felt that there would need to be guidance and support to help individuals make changes, and there were mixed views on the potential for water meters being installed.
- The support participants felt would be needed to facilitate behaviour change in this area included education and awareness-raising about the need to reduce water usage, guidance to help people make the necessary changes, harnessing technology to improve monitoring, and leadership from the Scottish Government to provide clarity on who is responsible for what.

Participants' starting point

Awareness of water in Scotland

At the beginning of the deliberative process, participants reported that they had limited knowledge of water in Scotland but were interested to learn more about it. While there was some awareness of where water comes from (e.g., reservoirs), it was widely felt that water is something that is available on demand and therefore not thought about.

"I turn the tap on, I get water there. That is my understanding." (Participant, Workshop 1)

Participants broadly understood that they pay for their water through their council tax bill but were less sure about how their bill was broken down or how much they paid specifically for water. For instance, there was a view that paying for water through council tax band rates was unfair which was based on a perception that how much you pay could be determined by where you live. However, there was also relief that water is not metered in Scotland as this could make water charges more expensive for households using more water (such as large families).

“I’m kind of pleased we aren’t metered. I have three teenage children and a stinky dog. We do a lot of washing [...] If I was being metered, I think I’d cry.” (Participant, Workshop 1)

Generally, participants had positive views of water in Scotland. When asked what words they associated with water, “fresh”, “safe”, “clear”, “good quality” and “taste” were mentioned. There was recognition that those living in Scotland are fortunate to have a supply of quality water compared to other places.

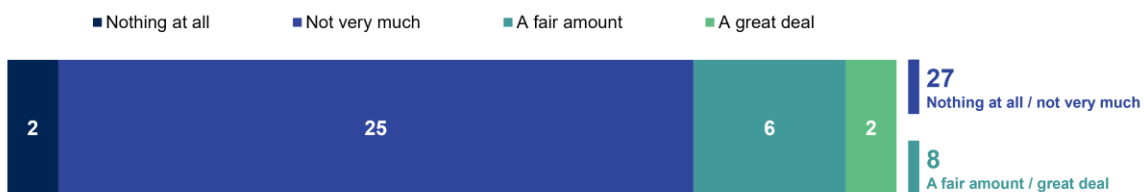
“I’ve lived in quite a few countries. Water was very, very minimal. I remember going out to a well with my clay pot to get water to bring back to my house [so] the word [I wrote down] was how lucky we are that we’ve got water in abundance. How long are we going to have this?” (Participant, Workshop 1)

Awareness of the impact of climate change on water

Most participants reported on the online community that before taking part in the first workshop they had heard ‘not very much’ or ‘nothing at all’ about the impacts of climate change on water, compared to a smaller number who had heard a ‘fair amount’ or a ‘great deal’. Awareness of the risks Scotland faced to its water due to climate change was also reported as low, with the majority feeling they had little or no awareness of these. Just over one in ten reported being somewhat or very aware of these risks (see figure 2.1 below).¹¹

Figure 2.1: Knowledge and awareness of climate change impacts on water

How much, if anything, had you heard about the impacts of climate change on water generally, before the first session?



How aware, if at all, were you that Scotland faces risks to its water due to climate change?



Online community survey, base: 35 participants

¹¹ Please note that these figures are based on a small sample size and should be read with caution.

Participants expressed alarm regarding what they heard in the presentations in workshops one and two about the impacts of climate change on water, and the challenges ahead for Scotland's water resources. Impacts highlighted as being of particular concern were the increase in rainfall and the fact that Scotland would face both more dry days and more heavy rain and flooding. The presentations also highlighted projections, based on a moderate climate change scenario, that by 2050 Scotland could be running short of 240 million litres of water a day in a drought which would be expected to affect some parts of the country more than others. Participants, noting this, felt worried about the sizeable water deficit that Scotland could face by 2050 and the subsequent risk to customers of water not being available at certain times. Considering these impacts, participants were also concerned about the limited time left to take action to mitigate the worst of them.

There was a sense of reassurance that Scottish Water was planning for the future. However, questions were raised as to whether Scottish Water could achieve its plans to reach net zero by 2040 (five years earlier than Scotland and ten years earlier than the UK as a whole) while also dealing with the impacts of climate change on water services, and why it had been left until now to deal with.

"I thought the figures were quite terrifying. In terms of the climate change, but 240 million deficit, what they are doing, will it help with that figure?" (Participant, Workshop 1)

Participants generally felt the weather in Scotland had changed in the last ten years. Changes they had observed included: warmer and wetter weather; more prolonged periods of dry or wet conditions; typical seasonal changes being disrupted, more extreme and erratic changes in weather leading to flash flooding; and changes in wildlife (e.g., plants growing and blooming at different times to usual and fish species struggling). Some did not think the weather in Scotland had changed much in the last ten years, however this was a more exceptional view.

"Seasons are completely out of whack to what they used to be. You don't get the cold anymore. We used to get snow, we don't get snow anymore. It's completely different. The summer, you're getting a better summer because we didn't really get a summer before. You notice a big difference in the seasons." (Participant, Workshop 1)

There was a general perception that Scotland would not be well prepared for extreme weather conditions. This view was based on past experiences of roads that had previously flooded and infrastructure that had been shut down by what participants saw as small amounts of snow. The COVID-19 pandemic was also highlighted as a recent example of the country's ill-preparedness for emergencies. Participants felt that the level of preparedness may vary depending on the area, with places more used to experiencing extreme weather being able to cope better than places that had not experienced those conditions before. But it was also recognised that even if places are prepared for weather events happening *now*, they might not be as well prepared for extreme weather that could happen in the future.

Managing Scotland's water resources

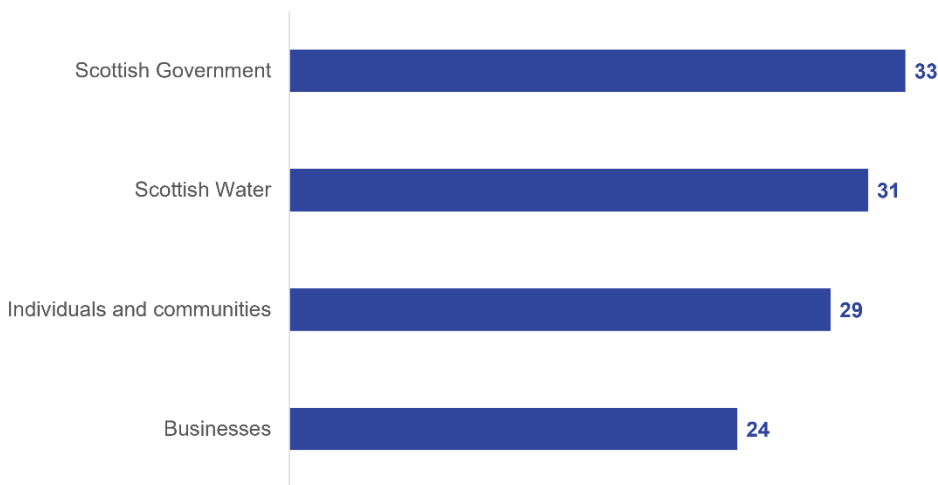
Learning more about how water is used in Scotland and the impact of climate change on water resources, participants were surprised by the average amount of water used per person (180 litres per day) and that this is higher in Scotland than elsewhere in the UK. Participants were also struck by how "precarious" the water supply was, and the challenge ahead of managing wetter winters and drier summers.

Who should be responsible and what roles they should play

At the beginning of the process, there was a general perception that there should be a shared responsibility for tackling the impacts of climate change on water in Scotland. This view persisted throughout the dialogue as participants considered the roles that different actors might play.

Figure 2.2: Responsibility for tackling impacts of climate change on water in Scotland

Who do you think should be responsible for tackling the impacts of climate change on water in Scotland, if anyone?



Online community survey, base: 35 participants (multiple choice)

When discussing the roles that groups should play, participants felt that responsibility should cascade from the Scottish Government, through other organisations (such as Scottish Water, local councils, and businesses), down to individuals.

It was felt that the **Scottish Government** should take a lead role in coordinating initiatives to tackle the impacts of climate change on water. Participants defined this leadership as setting targets, regulating industry, and incentivising businesses, local councils and individuals to encourage changes.

“The government are the ones that have put in targets, environmental targets, so they have to take a lead role in helping organisations meet those” (Participant, Workshop 2)

Scottish Water were also thought to be responsible for providing leadership in terms of evidence and expertise. Working with the Scottish Government, participants saw a role for Scottish Water in providing information and a road map for the changes required.

“It may be worth representatives from Scottish Water going to Parliament and emphasising the impact and getting the people that know about climate change supporting them.” (Participant, Workshop 2)

Participants identified **private sector businesses** as being responsible for helping to tackle the impacts of climate change on water. This view strengthened over the course of the dialogue. In particular, it was felt that the role of businesses would be to find ways to reduce water use in their operations. For instance, those involved in the construction industry – such as architects and building contractors – were seen as having an important role in finding ways to reduce water use in homes, starting from how they're built. It was also felt that manufacturers of white goods should be subject to stricter regulation to ensure they design products that are water-efficient.

There was a strongly held view that businesses should not pass the costs of any changes they need to make onto consumers, which was highlighted by those who felt there was too much emphasis on consumers, and not enough on businesses being accountable. This point was raised at various points throughout the dialogue and was ultimately reflected in the conclusions that participants reached by the end of the process.

"I want to see the construction industry [held] to account for where they build houses, how they build houses, businesses using large amounts of water. We cannot put the cost back onto domestic consumers because they can't pay it." (Participant, Workshop 2)

It was also felt that **communities and individuals** should take responsibility for reducing water use at a local and household level. Ways in which people could reduce their water use is explored later in this chapter, but as highlighted above, this was qualified by a view that the burden should not fall on consumers to make changes ahead without more systemic action being taken and communicated to the public by the Scottish Government and Scottish Water, and without industry also making changes.


"We are responsible in our usage. [...] It's in everyone's interest, for whatever reason, to at least keep the water system going [...] From these sessions, I'm finding more and more that there is action being done, but apart from these sessions, I'm not aware of it to be honest." (Participant, Workshop 2)


Policy ideas


In workshop two, participants were presented with a list of possible actions that the Scottish Government could take. It was emphasised that these are not current policies, but ideas that could be considered in future. Participants were generally underwhelmed by the ideas presented (see figure 2.3); while they were viewed as good ideas, there was some surprise and concern that they weren't actions that had already been taken. There was also a view that these actions didn't go far enough, and needed to be more imaginative and ambitious to deal with the water resource problems that Scotland faces.


"If they're not doing these things already, what are they doing?" (Participant, Workshop 2)


Figure 2.3: Possible future policy options

- 

a) A new Water Efficiency Strategy headed up by Scottish Government Ministers, including high-level targets
- 

b) Setting more stringent standards for water-saving measures in new build homes
- 

c) Changing legislation so that water shortage orders can be put in place quickly in drought situations, enabling faster response
- 

d) Carrying out national water resource planning to assess where water is needed and how much is available to accommodate different uses (drinking water, farming, industry, renewables, what the environment needs etc)
- 

e) Introducing a National Catchment Risk Assessment for emerging contaminants (e.g. pharmaceuticals, hormones), to understand what the risks are to different catchments and water resources, and set out a plan for tackling them

Views on the various possible actions were underpinned by a strong sense of urgency.

“If we sit doing nothing, we’re not going to get anywhere... We need to be moving forward, but keep an eye out for other solutions.” (Participant, Workshop 2)

There was also a sense of frustration, based on a perception that the Scottish Government and Scottish Water had been slow to react to the water resource challenge.

“It feels to me that Scottish Water (and presumably the Scottish Government) know the problem but are slow in developing a strategy to tackle it.” (Participant, online community)

The possible actions that resonated most with participants included:

- A new **Water Efficiency Strategy**, which was generally thought to be the most important policy because it would underpin all the others. However, it was also felt to be too vague: “This sounds like a government soundbite with no detail - it is meaningless.” (Participant, Workshop 2)
- **National water resource planning**, which was felt to be a “common sense” approach and would tie in with the water efficiency strategy. There was a view that this could encourage consumers and businesses to consider what are essential and non-essential uses of water: “There are different levels of water requirement. There's a level of basic need and what water is used for and then there are things that are nice to have.” (Participant, Workshop 2)

- **Setting more stringent standards for water saving measures in new build homes.** This was broadly felt to be a good idea, but participants had some concerns about it. While it was pointed out that it could take a long time before the benefits would be felt, and might not be quick enough to mitigate the immediate risks to water resources, some questioned why it should take a long time. Participants also challenged the fairness of prioritising new builds, which could mean those living in older homes being left behind: "These things do tend to take a little bit, well, a lot of planning. I don't see why it should take ages. The new council houses around here already have solar panels. I don't see why saving water measures should be any harder really." (Participant, Workshop 2)

There were more mixed views on:

- **Introducing a National Catchment Risk Assessment for emerging contaminants.** This stood out to some in terms of the immediate impact on people's health, which was seen to be an important factor. Others were less clear about how this would contribute to tackling climate change, and there was a view that communications around this could come across as scare-mongering: "You could create fear unnecessarily for no benefit." (Participant, Workshop 2)
- **Changing legislation so that water shortage orders can be put in place quickly.** A view expressed by participants was that this would be a good way – albeit potentially inconvenient for some households – to manage water resource challenges efficiently and fairly in future: "That's important for an immediate solution, otherwise people will run out of water and other people waste it on their garden." (Participant, Workshop 2). Another view was that this would be the least important action, based on the perception that droughts were rare in Scotland. It was felt that this would need to be done carefully to avoid negative impacts on vulnerable groups (such as the elderly) and there was a call for clearer communication, as some thought previous hosepipe bans had included Scotland.

Tackling Scotland's future water shortfall

As previously highlighted, participants were alarmed by the water deficit that Scotland would face by 2050 and the risk to customers of a water shortfall. The presentations in workshop two outlined various ways to mitigate against such risks and participants discussed the possibilities of building (or upgrading) infrastructure and the role of households in reducing water use.

Infrastructure building and upgrading

There was initial surprise among participants about the age of Scotland's infrastructure, particularly that some of it was built in Victorian times (as was highlighted in a presentation in workshop one). Reflecting on this, one view offered by participants was that the water infrastructure would need to be upgraded, while another was that it should be maintained if it is still functioning.

"We always think new stuff comes along and is going to be so much better. But it isn't necessarily." (Participant, Workshop 1)

When considering possible infrastructure projects, there was a broadly negative reaction to infrastructure-heavy solutions, such as building new dams or new pipelines to move water to areas where it is needed. This was based on concerns over the costs involved and the negative environmental impacts, which were felt to be unacceptable. While there was some acceptance that a certain amount of disruption could be offset by an effective solution, there were doubts over how effective they would really be.

“We've got to be thinking in a more sustainable way, this is not sustainable. There are ways, there have to be ways to do this that isn't destroying stuff that is supporting the environment and sustainable.” (Participant, Workshop 2)

Instead, there was a preference for more localised solutions and updating existing infrastructure, which it was thought would have less of an environmental impact. Participants were surprised to hear in the presentation that only 1% of rainfall in Scotland was captured and queried whether infrastructure could be improved to enable more rainfall to be captured and stored. Use of grey water was also highlighted as an alternative means of tackling the water shortfall while minimising environmental impact.

“Wouldn't it be great if a strategic objective was to capture more than 1% of rainfall. How do we do that? That doesn't seem enough. The more you think about it, the amount of rain we had this weekend, and you couldn't get it.” (Participant, Workshop 2)

Discussions around infrastructure building and upgrading were underpinned by a strong view that the cost of this should not be borne by consumers alone, and that low income households should be protected from any rising costs.

“Everyone already knows about the current financial situation and I'm not sure the public would stand for any more rising costs. People are already struggling as it is and the last thing they need is more financial worries in my opinion. So ultimately, it comes down to the cost both in the immediate and longer term for people.” (Participant, online community)

Role of households

Even with infrastructure projects in place to tackle the water shortfall, it was broadly recognised that there would still need to be a focus on individuals reducing water usage.

As well as suggesting larger scale infrastructure for rainfall capture, there was an appetite for collecting rainfall at a household level. Participants were also supportive of consumers installing water-saving devices such as water butts for gardens or water hippos for toilets. As highlighted above, there was broad agreement that product labelling would encourage businesses to make, and consumers to choose, more water-efficient products. However, it was recognised that not everyone would be in a position to take up these actions.

“It's easy for me to buy a rainwater butt to collect gutter water. Someone in a council flat with limited means isn't going to spend £40 on a water butt.” (Participant, Workshop 2)

It was felt that consumers would need guidance on what devices are available, how to obtain, and how to install them. To ensure those on lower incomes were not left behind, it was suggested that Scottish Water or local councils could provide some devices for free.

“Responsibility falls on Scottish Water [...] to teach us [and] put the right infrastructure in place for us to be able to guide us.” (Participant, Workshop 2)

Participants also discussed the possibility of water meters being installed in households and there were mixed views on this. Those who were supportive of meters for monitoring purposes felt that they could help make people more aware of their usage and therefore more likely to take action to save water. At a national level, meters were seen as a means of gathering useful information on where water usage was highest so that campaigns to reduce usage could be more targeted.

“If people don't know what they're using and don't have a clear idea that they're using a lot or not using a lot, how will they ever be incentivised to change their behaviour?” (Participant, Workshop 4)

Participants who had previously lived in an area of England where metering takes place were surprised to learn about the low number of water meters in Scotland. It was suggested by participants that Scotland's higher water usage compared to England could be due to this lack of metering. Participants who reported positive experiences of using an energy meter felt that water meters would have a similar impact, although others did not consider their energy meter to have been very effective in reducing energy use. While there was less support for water meters being linked to billing, there was a view that this would be more effective at reducing household usage than monitoring alone. It was also suggested that water meters could be gamified to encourage engagement with water saving, and that customers could be encouraged to reduce water usage with discounts and offers.

“It's only when there is a financial impact that people will change their behaviour.” (Participant, Workshop 4)

However, where participants were opposed to meters, this was based primarily on concerns about them being linked to billing. There was a view that they could be a catalyst for water poverty and would penalise some groups, such as those on low incomes, those with large families, and those with disabilities or health conditions. For example, one participant with a disability described needing to use more water sometimes for pain relief or for cleaning medical equipment and felt they would be “punished” for it. It was strongly felt that linking usage to billing would be unfair to people who need to use more water and to those already struggling financially.

“I deal with people who are living in frozen houses because they can't afford heat. Those people are now going to go thirsty and dirty as well.” (Participant, Workshop 4)

There was also a perception that water meters would be controlling and invasive. It was therefore felt to be important that water meters (if introduced) would be rolled out carefully and not forcefully.

“There's a perception that installing meters is a form of control, in terms of society. If they were to be mandated, then look what's happened down in England. Bailiffs have forced entry into vulnerable people's homes to install smart meters.” (Participant, Workshop 4)

Changing consumer behaviours

There was widespread recognition that behaviour change would be an important factor in tackling the impacts of climate change on water in Scotland.

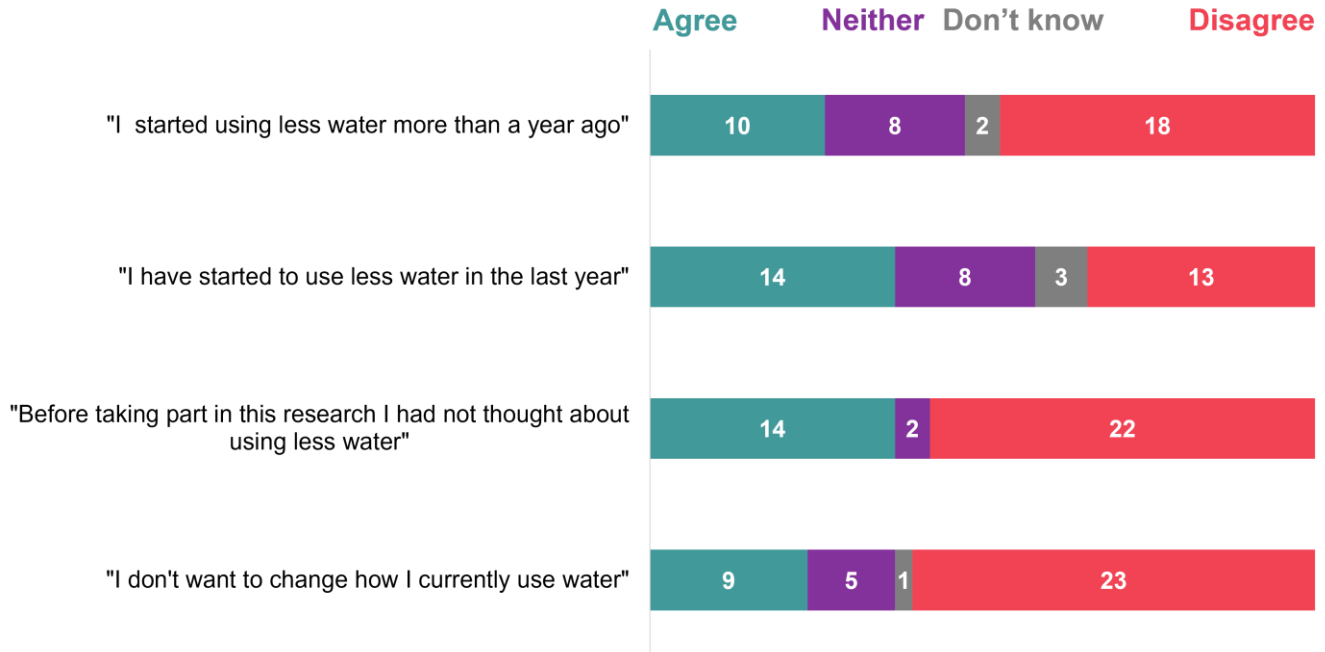
Current behaviours

Early in the dialogue, participants reflected on their own behaviours in relation to water. Some reported that they already make an effort to reduce water use. There were a range of motivating factors behind this, including:

- Financial, i.e., trying to minimise use of hot water to save money (such as by saving all the dishes to do one load of washing up).
- Better awareness of water as a finite resource and growing concern about climate change.
- Habit or upbringing: those who had spent time in other countries said they were used to using minimal water, while others said they were brought up very conscious of their water use.

However, this was not widespread. A poll conducted at the start of workshop two (see figure 2.4) found that just over a quarter of participants reported that they had started to use less water more than a year ago, while just under half said they had not done this. When thinking about the last year, just over a third of participants reported that they had started to use less water, although a similar number had not.¹²

Figure 2.4: Poll results from workshop 2



Poll taken during workshop 2, base: 38 participants

Others described being conscious of water but felt limited in their ability to reduce their use. This reflected the workshop two poll results, which found that over half of participants disagreed that they had not previously thought about using less water and an even higher number disagreed with the statement 'I don't want to change how I currently use water' (see figure 3.4 above). Groups identified as needing to use more water included those with disabilities or health conditions, households with larger families, and those working in certain industries (such as farmers).

While some felt that they currently try to conserve water, or are conscious of their water use, others felt it was something that they don't think about. There was a perception that people in Scotland may be more wasteful than other countries, and participants suggested that this could be because of the absence of metering. However, it was also recognised that using less water might be more challenging for people not already in the habit of doing so.

"In my mind it's just an endless supply. So these conversations make me a little bit more aware of the reality of that and the implications." (Participant, Workshop 2)

¹² Please note that these figures are based on a small sample size and should be read with caution.

Participants were given the opportunity to try a water calculator,¹³ which was posted as an activity on the online community. There were a range of reflections among those who used the calculator. Some were surprised to find their water use was below average, which others were surprised to see how much they were using. While there was some interest in the water saving ideas and products that the calculator suggested, they were not considered to be useful or realistic for all households.

“Interesting. Looks like I’m doing not too badly but I could do better. I’ll certainly try out a few of the suggestions.”

“Bit shocked at how much water is wasted. I honestly didn't think it was that much. I will try harder to stop this and think of water wastage.”

(Online community responses)

Initial views on water behaviour change

There was broad agreement that behaviour change would be important and, as highlighted above, there was a sense that there should be collective responsibility for how water is used in Scotland. A short survey on the online community found that nearly all participants believed that it would be possible for them to cut their own water usage down ‘a little’ or ‘somewhat’, while one participant felt they could cut it down a great deal. No participants felt they could not cut down their water usage at all.

Nevertheless, initial barriers to behaviour change that participants identified were a lack of awareness or understanding of the need to reduce water usage. It was felt that this lack of understanding could be exacerbated by messages that appear contradictory, such as that there will be more rainfall but we will need to use less water. A lack of interest in issues relating to water and a lack of incentive to change were also highlighted as possible barriers, based on a view that people may not care enough to change their behaviour and might only cut down if they had to pay for what they used.

Priority behaviours: barriers and enablers

There are multiple consumer behaviours relating to water. For example, recent Consumer Scotland survey research on decarbonisation captured respondents’ views on 11 different water-related behaviours and identified self-reported perceptions of their impact on the environment.¹⁴ As it would not have been possible to cover all these behaviours in the available workshop time without compromising on coverage of other research objectives, Consumer Scotland identified six priority behaviours for exploration in workshop four: two relating to water, two to sewerage and two to drainage. This section focuses on the two water behaviours participants discussed, which were reducing time spent in the shower and fixing plumbing leaks from pipes and toilets. Participants explored the barriers and enablers to behaviour change in these areas.

¹³ <https://www.getwaterfit.co.uk/#/>

¹⁴ <https://consumer.scot/publications/consumers-and-the-transition-to-net-zero-html/>

Reducing time spent in the shower

As highlighted in earlier discussions around potential barriers to behaviour change, lack of knowledge and understanding was identified as a key reason why people might spend longer in the shower than is necessary. In particular, there was a view that people might not be aware of how long they take in the shower, and whether this is too long. Another view was that people might think they need longer showers to be clean, or might stay in longer to follow instructions on hair or body products (for example a hair conditioner advising you to apply and leave in the product for five minutes). It was also felt that inefficient shower systems would prevent people from wasting water in the shower.

Participants identified particular groups who might find it difficult to reduce the time spent in the shower, such as those in jobs that are physically demanding and those with a disability or health condition. It was also recognised that showers can be relaxing for some people and so they might not want to stop doing something they enjoy.

“People rely on baths and showers during the winter season for chronic pains and helping to open up sinuses and airways. A lot of people will take longer to shower if they have a wound which can't be touched. Also stoma bags. If you have a leak or it's burst it will take longer to shower.” (Participant, Workshop 4)

To enable behaviour change in relation to time spent in the shower, participants suggested:

- **Shower timers** to help people become more aware of their shower time, or a timer that switches the shower off after a period of time;
- **Awareness-building campaigns** to improve understanding about the value of water and the necessity of reducing time spent in the shower;
- **Improvements to shower technology** to make showers more water-efficient;
- **More holistic healthcare** (in terms of NHS services) so that those with disabilities or health conditions have alternative ways to manage their conditions without longer showers.

Fixing plumbing leaks from pipes/toilets

Lack of awareness and knowledge were highlighted as key barriers in relation to households fixing plumbing leaks, as it was broadly felt that people might not know they have a leak or how to fix it. Further, if a leaking pipe was not causing any obvious damage or affecting any appliances, it was reasoned that people may not be motivated to fix the issue. It was also suggested that in some circumstances, such as in rental properties, it might not be clear who is responsible for fixing a leak. The cost of fixing was identified as a further barrier, along with the perceived lack of availability of tradespeople.

To enable behaviour change in this area, participants suggested that:

- People would need to know how to identify and fix leaks;
- It would need to be clear who is responsible for fixing leaks (for example in a rental agreement);
- Grants to reduce any cost barriers and encourage people to make improvements affordably;

- Community hubs to provide support in dealing with plumbing issues;
- More tradespeople should be trained to meet demand;
- Awareness-building campaigns should be run to educate people on the consequences of not fixing a problem to make it more of a priority for people.

The balance between behaviour change and infrastructure

It was broadly recognised that dealing with the impacts of climate change on water would require both behaviour change and infrastructure changes. However, when participants considered two different scenarios (see appendices) in the fourth workshop, to explore the relative roles of behaviour change to use less water and of building or upgrading more infrastructure, their views were mixed on the emphasis that should be placed on each of these. One scenario outlined a future in which people in Scotland “use much less water” and less building and upgrading of infrastructure is needed than might otherwise be the case to ensure sufficient water supply. The other scenario set out a future where households and businesses “use somewhat less water” and more building and upgrading of infrastructure is carried out to increase the supply of water.

Those in favour of using somewhat less water, and focusing more on building and upgrading more infrastructure, felt this would be more effective if done right. This was based on the view that people cannot be relied upon to make the changes required, so the impact of this could be limited.

“There’s only so much benefit you can get from getting consumers to reduce their water usage [...] investing in the infrastructure is going to be the bigger driver than getting people to use less.” (Participant, Workshop 4)

Those in favour of using much less water, and building and upgrading infrastructure less, felt that infrastructure changes would take too long. Instead, focusing on behaviour changes to reduce water usage was seen to be a more efficient and sustainable approach, and would be more important at particular times, such as during droughts. When it came to forming conclusions, this view proved most compelling, leading to participants emphasising the role of reducing water use over infrastructure investment

“Once you change people’s behaviours it’s easier to sustain. Keep building additional capacity but you banked the investment in demand reduction.” (Participant, Workshop 4)

However, the sense of urgency to deal with the impacts of climate change on Scotland’s water, for some, meant that the emphasis needed to be on both reducing water use and building and upgrading more.

“What we’re seeing and what we’ve talked about, 10-30 years is a hell of a long time. We need to act quicker than that. We’ll run out of water. I think we have to act quicker than that. I think the only way to do that is to make the investment and at the same time reduce and improve the water efficiency of how the general public use their services.” (Participant, Workshop 4)

Forming conclusions on water services and resources

Based on participants’ discussions on how to tackle the impacts of climate change on water services and resources throughout the process, a draft set of conclusions were presented to them in the final workshop.

Participants were broadly in agreement with the draft conclusions on how to tackle the impacts of climate change on water resources and services, feeling that these were overall a fair representation of key points. However, they also suggested some additions and clarifications to provide more nuance, which are outlined below.

Reflecting earlier discussions around the role of different groups, participants wanted even more emphasis in the final version of the conclusions on the importance of leadership from Scottish Government, including ensuring there is a set of guidelines and targets for Scottish Water to adhere to. While it was recognised that a collective effort would be required from government, industry and citizens, without leadership from the top and clear communication between the parties involved it was felt that the situation would not be tackled effectively. Participants also wanted to be reassured that Scottish Government and Scottish Water were working effectively together in partnership, and that the public would be clearly communicated with so that people can start to be invested and feel part of the change. Related to this, participants also wanted to emphasise that businesses should reduce their water use as well as consumers.

Future-proofing Scotland's water resources and services was also seen as fundamentally important. Participants were clear that it was vital to take action now and emphasised that it is not only future generations that will be impacted by climate change, but also everyone living in Scotland at the current time. They also wanted to know that Scotland was investing in solutions that would last into the long term, rather than short-term 'sticking plaster' solutions.

When discussing the relative emphasis that should be placed on reducing water use and investing in infrastructure to help with demand, there was a view that change could happen more quickly on the behaviour change front, while infrastructure investment would take longer to make a difference. When it came to ratifying the conclusions, participants were therefore keen that action to reduce water use should be mentioned first before infrastructure investment.

Participants also added a point about the importance of Scotland investing in more innovative approaches to tackling the impacts of climate change on water resources. For example, there were suggestions for greater use of digital technology in metering (if introduced) and in the monitoring of local and regional water usage. They were keen to hear about examples of innovation from other countries that could potentially be introduced in Scotland, including the use of new technologies.

When it came to people reducing their water use, there was some awareness of different norms about water use in other countries, where water shortage is a huge problem and it has become a way of life to save as much water as possible. Following discussions around possible measures to conserve water, they felt that more clarity is needed on whether people should try to save water all year round or only at certain times of year, such as the drier summer months.

Although participants saw it as important to conserve water, there was also surprise expressed at Scottish Water currently capturing just 1% of rainfall¹⁵. Participants queried whether Scottish Water should aim to capture more than this amount, and whether if this was done it could mean that there would be less need for people to cut down their usage. However, they also noted that if this is not currently done because of the carbon cost of capturing and cleaning a higher proportion of rainfall, this should be explained to the public.

Participants emphasised the importance of the point (already in the draft conclusions) that any changes put in place to tackle the impacts of climate on water should take an equitable approach, whereby those who would struggle to afford to pay and/or are vulnerable are protected. This came up particularly in discussions about potential price rises for customers; while participants agreed these feel inevitable, they were concerned that not everyone would be able to afford to pay, especially if businesses also passed any costs associated with their changes onto consumers as well. Media coverage about the UK water sector and increased scrutiny around executive salaries and bonuses that emerged during the fieldwork period for this research (including for Scottish Water) was also mentioned, with participants questioning how such bonuses could be justified when so much investment is needed.

In regard to infrastructure investment, there was a suggestion from one group of participants (also received positively by participants in other groups) that customer water bills could be itemised so people can see how much money has been spent on investment. This would aid transparency by giving people confidence in how resources are being used, which in turn could encourage them to play their part: “the more you inform people, the better chance you have of changing usage and behaviours” (Participant, Workshop 5).

On the potential installation of water meters that aren't linked to billing, there was no consensus among participants either in the final workshop discussions or in previous sessions. The wording of both draft and final conclusions reflects these disagreements.

The group's final conclusions, reviewed and ratified by participants based on the themes highlighted above, are presented below (figure 2.5).

¹⁵ [Saving Water in Scotland - Scottish Water](#)

Figure 2.5: Participants' conclusions on tackling the impacts of climate change on water services and resources in Scotland

How should we deal with the impacts of climate change on water in Scotland?

Participants' conclusions were that:

Managing our water resources

- Everyone needs to play their part in tackling Scotland's water deficit: Scottish Government, Scottish Water, businesses and industry, people and communities.
- Scottish Government has a particularly important role to play, by leading, regulating and setting standards.
- There is a need both to take action urgently and to plan for the long term, as what we do now impacts both us and future generations. Both action to reduce water use and infrastructure investment are required.
- Scotland should invest in research and development into innovative approaches to tackling the impacts of climate change on water resources, including the use of new technologies.

People reducing their water use

- It is important that people and businesses understand the need to save water and do what they can to reduce how much they use. This will be challenging: some people and businesses won't want to change, while others may not be able to.
- There is some support for installing water meters that aren't linked to billing – this could help people to reduce their usage and lead to them valuing water more. However, participants questioned whether meters would make much difference if not linked to billing, and whether this would be a gateway to metered bills eventually.

Infrastructure

- Scottish Water's ageing infrastructure needs more investment, so that lasting solutions are put in place – including both new infrastructure and upgrades to existing infrastructure.
- Price rises to pay for this feel inevitable, but negative impacts on people who can least afford to pay should be avoided.
- Participants wanted to see an equitable approach, where vulnerable consumers and those on the lowest incomes are protected.

3 Wastewater services

This chapter outlines participants' views on how to approach current and future challenges facing Scotland's wastewater (sewerage) system. The chapter draws primarily on findings from workshops three and four, in which participants learned about Scotland's sewerage system and how it is being impacted by climate change, as well as potential solutions. Some data from the online community is also included, where this was relevant.

Key findings

- Participants had generally not thought much about wastewater services prior to this research unless they had a septic tank, and assumed this meant the system was working well.
- When they were presented with information about the combined sewer system in Scotland, there was some concern about the impact of CSOs into the sea, as well as surprise at the cost and the extent of sewer blockages.
- While participants acknowledged that changing the entire system would be too time-consuming and expensive, they felt that more should be done to improve the system and reduce the likelihood of CSOs. This included both updating the infrastructure and encouraging behaviour change to reduce the strain on the sewerage system.
- There were mixed opinions on which approach to monitoring CSOs is desirable in future. Some saw Scotland's current approach, where monitoring and upgrading is done for sewers identified as priorities, as acceptable, more cost-effective and a better use of available resources. Others believed that all sewers should be monitored, due to concerns around the environmental impact of overflows, transparency and accountability.
- Everybody was thought to have some responsibility for reducing the risk of CSOs and reducing strain on the system, from individual behaviour change to leadership at a national level. Manufacturers were seen to have a particular responsibility to ensure products that are not flushable are accurately labelled.
- Behaviour change was widely seen as an important part of reducing the strain on Scotland's sewerage system and minimising the risk of CSOs. Despite participants feeling they were relatively conscientious in relation to their own behaviours, it was thought more could be done. Participants also identified various barriers to change, however, and thought that certain groups may find it particularly hard, such as those with a disability or health condition or families with young children.

Participants' starting point

Participants using the main public sewerage system typically said that before engaging with this research they had not thought much about their wastewater services, apart from rare occasions where they had experienced an issue such as burst or corroded pipes. This was seen as a good thing however, as it was understood as an indication that the system was working well.

“From my perspective, the service is invisible. I would say that as a compliment. Unless you encounter an issue...an invisible service is a seamless service.” (Participant, Workshop 3)

During early discussions there were some concerns raised that sewage may be being released into the sea, based on news stories about this happening in England. One participant was worried that this may be the case for their wastewater, as they were unaware of any water treatment plants nearby.

Those who had experience of using septic tanks (or who knew somebody that did) described higher levels of awareness around their sewerage system, including how it worked and particularly what could or could not be put into it. This was put down to “having to care”, since they were responsible for maintaining it. Among those with a septic tank, there had been some negative experiences of blockages that had been unpleasant to deal with. However, there were also those who were very satisfied with their septic tank and had never had any issues.

“A constant electricity supply [is needed] to pump air down into the septic tank to get a secondary fermentation. When that stops working you get a terrible smell back through the house. You then have to get it emptied; you have to pay...” (Participant, Workshop 3)

“It is a clever system. [...] I have no problems with my septic tank at all.” (Participant, Workshop 3)

Reducing the risk of Combined Sewer Overflows (CSOs)

After participants were presented with information about combined sewer systems and how they worked, there was some surprise that rainwater goes into the same place as sewage and concern about the impact of overflows into the sea. In response to the fact that one per cent or less of storm water that is discharged into the sea is untreated sewage, there were mixed reactions. While this was described as a “pleasant surprise” given the recent controversy around this issue in England, others found it to be too high. Indeed, there was a view that the existence of any CSOs at all was unacceptable:

“I feel that we cannot allow raw sewage into the environment. [The presenter] said it was a safety measure to stop it filling up your bathroom instead, but I think we need a new approach.” (Participant, Workshop 3)

There was also some scepticism around this figure and concern that the true number of CSOs may be higher.

The high cost of fixing sewer blockages each year also stood out to participants, as well as the amount of blockages (around 80%) caused by inappropriate household items being put down the sink or toilet.

However, participants were very pleased to learn about ways in which bio-waste had been collected and reused. Solutions like this, which bring multiple benefits, were especially popular among participants.

Approach to reducing CSOs

In response to the new information, (see Appendix A for an overview of workshop three's content) there was some discussion around whether the current system could be changed, for example by creating a separated sewer system or widening the pipes. However, following further deliberation and questions put to the speakers around the cost and practicalities of this, participants acknowledged that this may be unrealistic. There was appreciation of the scale of the problem, given the length and complexity of the underground pipe network and the amount of ageing infrastructure. While a different system would be ideal, participants recognised that this would be very time-consuming and expensive to change.

Despite this, there was a sense that more could be done to improve the sewerage infrastructure and reduce the likelihood of CSOs. As part of stimulus in workshop three, participants were presented with the possibility of the Scottish Government legislating to make removing rainwater from the sewer system mandatory, and there was strong support for this in theory (despite some uncertainty about how it would work in practice). Other ideas suggested by participants included investing in more treatment works, researching more efficient treatment methods, or installing more large-scale grease traps to combat blockages. This support was caveated though, by an expectation that any work would be sufficiently future proofed so that it would be long-lasting and cost-effective.

There was also a call from participants for more efficient, localised solutions such as creating separated wastewater systems in new builds or capturing and reusing more rainwater or grey water.

Approach to monitoring CSOs

There were mixed opinions among participants on the best way to approach monitoring CSOs.

Some saw Scotland's current approach, where monitoring and upgrading is done for combined sewer overflows identified as priorities, as acceptable, more cost-effective and a better use of available resources. This was partly based on the belief that most areas of Scotland would not have issues with CSOs and therefore monitoring all of them would be a waste of money. There was a sense that while the 'ideal' situation would be to monitor every CSO, the money would be better spent elsewhere.

"It is concentrating resources on where they are needed most. [...] I am supportive of this approach. Unless they can throw money and monitor every overflow, which is more ideal, they can concentrate on areas where it will have the most impact." (Participant, Workshop 3)

Furthermore, there was some apprehension around the idea of following the approach used in England and Wales, whose water companies were perceived negatively by participants. This caused participants to question the value of monitoring all CSOs without a guarantee that problematic overflows would actually be dealt with, and whether this approach would be necessary to get positive outcomes.

"The English system of constant monitoring doesn't work. [...] You can monitor it all you like. But you need to do something. Being aware of something isn't a solution. The sewage is just going out.." (Participant, Workshop 3)

Linked to this, participants who were happy with the current way of monitoring CSOs trusted Scottish Water and assumed the current approach was evidence-based and that the modelling was robust. For example, one participant highlighted that the pressures of a changing climate meant that actions to improve Scotland's water and wastewater systems had to be taken quickly and so prioritising time and resources efficiently using modelling (instead of monitoring every CSO) would be sensible, especially if it could divert additional money to updating other parts of the system:

"I appreciate it [modelling] wouldn't be perfect, but I think it's that thing with time not being on our side. [...] The advantage that we have as time moves forward is that tech is better than it ever was in the past, so why would we not try to capitalise on that to save resource? Then we can actually put it into updating a very old [sewer] network." (Participant, Workshop 3)

On the other hand, others believed that all sewers should be monitored for overflows, despite the additional cost. This related to concerns around the environmental impact of CSOs, believing we have a "right to know" and concern around transparency and accountability in terms of how the prioritisation of sewers is currently decided.

As mentioned previously, some participants were uncomfortable with the existence of any CSOs due to their negative environmental impacts. There were concerns about any incidences being missed by modelling, due to the perceived seriousness of the consequences, and that a more comprehensive approach to monitoring was worth paying for.

“I think Scotland should be monitoring all the combined sewage overflows, because, you know, our natural environment is being degraded by these sewer overflows. [...] I don't think modelling is good enough. [...] If that means that we have to allocate resources and perhaps put up bills and put more money into the system, then so be it.” (Participant, Workshop 3)

There was also a sense that citizens have a “right to know” about all problematic CSOs, linked to concerns that there could be a lack of accountability and transparency if not all overflows were monitored. Participants worried that the current approach may result in bias, with certain areas (specifically rural areas) being monitored more than others. Concerns were also raised about whether politics may have influenced the decision not to monitor all CSOs. For example, participants questioned whether the current approach may produce statistics that would make Scottish Water look better (by not recording all problematic overflows) or whether the current approach may have been chosen to keep bills down rather than because it was the best long-term approach for the country. There was a view among participants who supported increased CSO monitoring that this should be done because it was the right thing to do, despite the cost or the fact that this may be unpopular with the public.

“I would worry that those in rural areas would be the last thought about. It is all down to resources, and they have to prioritise somewhere.” (Participant, Workshop 3)

“How much of these decisions are being made for political reasons? Because it doesn't seem to have been in the media as much up here that this is an issue in Scotland.” (Participant, Workshop 3)

Responsibility for reducing strain on the sewerage system

Participants identified a range of actions that could be taken by different groups to reduce the strain on the sewerage system and help to reduce the risk of CSOs. While they felt that everybody had a part to play, different groups were thought to have different responsibilities.

They felt that the general public needed to understand how their behaviours may impact on the sewerage system and could do more to avoid putting inappropriate items down the sink or the toilet (see behaviour change section of this chapter for more detail). They also highlighted the role of businesses, particularly manufacturers. For example, discussion around products that could be made more flushable (such as specially designed toilet paper) or better labelled to ensure clarity around what can or can't be flushed. Participants also wondered if enough had been done to make appliances, specifically toilets, more water-efficient.

“We had a toilet you bought specific toilet roll which was more easy [sic] to fall apart. [...] [We could] nip some of the problem at the product end. Yes, changing behaviour is really important, but that would be another addition.” (Participant, Workshop 3)

Finally, it was thought that the Scottish Government had an important role to play in terms of leading and coordinating these efforts. This particularly came out in the final workshop, where participants were very supportive of having a national strategy for Scotland's approach to sewerage and drainage.

Changing consumer behaviours

Behaviour change was seen as an important factor in reducing the strain on Scotland's sewerage system, alongside investing in infrastructure which would take more money and time.

"I don't think we can wait to do big structural changes. Climate change isn't going to stop while we work it out." (Participant, Workshop 3)

While participants felt they were relatively conscientious about their behaviours relating to wastewater services already, there was appetite for doing more and a view that the public needed to do more. However, participants also identified various barriers to making these changes early on in their deliberation. Groups which participants felt may be less able to change their behaviours relating to wastewater services included those with a disability or health condition or families with children.

As outlined in the previous chapter, Consumer Scotland identified six priority behaviours for exploration. These included two sewerage behaviours, which were: not putting grease, fat or oil down the sink and not flushing inappropriate items such as sanitary items down the toilet. In workshop four, participants discussed barriers and potential enablers of change in relation to these behaviours, which are outlined below.

Putting fats, oil or grease down the kitchen sink

Participants came up with various factors that may influence people putting fats, oil or grease (FOG) down the kitchen sink. Firstly, it was thought that people may lack knowledge around how to correctly dispose of FOG. This was partly based on personal experience, with some participants saying that they themselves were uncertain about the best way to do this.

"I don't know how to dispose of oil and fats safely. I think education and letting people know how to do it [is important]." (Participant, Workshop 4)

However, not only did participants feel there was a lack of clarity around how to dispose of FOG, but there was also a perceived lack of practical options. For example, participants wanted to avoid putting liquid waste into their bins and noted that even putting FOG into a bottle first or washing dishes will create spillage/residue that goes down the sink. It was also suggested that this may be exacerbated for those in deprived areas, depending on the quality of their services relating to waste collection.

"The more wealthy streets get composters that go off to the digester. We don't have one. It's an infrastructure problem. [...]. The people in [local area] get blamed for being dirty because they put grease down the sink. But it's not their fault." (Participant, Workshop 4)

Participants suggested that even if people understood how to dispose of FOG correctly, it is quicker and easier to put it down the sink. It was also thought that people may do this due to a lack of understanding about the true consequences of this behaviour on the sewage system, for example a belief that it will be filtered out, or a belief that it is not really a problem. One participant pointed out that for people whose rubbish is not collected frequently, they may not want to put FOG in their bins as it may cause them to smell bad.

For this behaviour, participants were asked to consider why businesses may be discharging FOG into the sewer system. While there was some awareness that businesses (particularly in the food and drink sector) are required to install grease traps to minimise the impact of their FOG waste, participants suggested that they may not want to spend the time and money required to install, maintain and replace them.

To enable behaviour change in relation to not putting FOG down sinks, participants suggested:

- Raising awareness of how to dispose of FOG correctly, and of the damage it causes sewer systems;
- Putting instructions on bottles of oils on how to dispose of them;
- A “highly visible alternative” for disposing of FOG, like bottle banks in supermarkets;
- Making it socially unacceptable to put FOG down the sink (similar to drink-driving or smoking);
- Considering incentives (for example a tax rebate on recycling oils);
- Removing barriers to innovation (for example, one participant knew of people locally who wanted to collect and reuse cooking oil from fish and chip shops but gave up after facing various barriers);
- Strengthening legislation to ensure that there are consequences, such as fines, for businesses putting FOG down the sink (and enforcing this effectively, for example through spot-checks).

Putting wipes or sanitary products down the toilet

Participants discussed what might cause people to put inappropriate items, specifically wipes and sanitary products, down the toilet. Similar themes came out to disposing of FOG, such as a lack of knowledge around how to correctly dispose of these items, with some participants admitting that they had made this mistake themselves. This was seen as a particular issue for this priority behaviour due to many products being incorrectly labelled as flushable when they are not.

“I am that person 20 years ago, we blocked our sewer, it was less about misinformation but we didn't know. We were brand new parents, wet wipes were fantastic. We only found out when we blocked the sewer. It's a lack of information.” (Participant, Workshop 4)

While there was little discussion of other practical barriers, one participant did note in an earlier workshop that they noticed people put things down the toilet that they shouldn't have when there was a 'bin crisis' (i.e. bins not being collected due to strikes), highlighting the importance of having a practical alternative. In terms of motivations, a lack of understanding around the true consequences of this behaviour and simply doing it out of habit were again thought to be important factors.

To enable behaviour change in this area, participants suggested:

- Raising awareness of the damage caused by putting inappropriate items down the toilet;
- Encouraging people to have a bin in their bathroom for these items (to encourage new habits);
- Creating legislation to prevent manufacturers from putting misleading information on product labels;
- Promoting better, flushable products to replace wipes (for example, one participant recommended an “aloe vera based gel” that you can use on regular toilet tissue that can be safely flushed).

Forming conclusions on sewerage

As with water resources, in the final workshop participants were presented with some draft conclusions regarding sewerage based on their discussions throughout the process and given the opportunity to reflect on these and to refine them. These were interlinked with conclusions on Scotland's approach to drainage and participants discussed them at the same time. A full discussion of participants' conclusions on sewerage and drainage is therefore presented towards the end of the following chapter ('Drainage systems').

4 Drainage systems

This chapter covers participants' views on creating sustainable drainage systems in Scotland to mitigate against the threat of worsening surface water flooding due to climate change. The chapter draws primarily on findings from workshops three and four, in which participants learned about Scotland's drainage system (alongside discussions about the sewerage system), the impact of climate change on surface water flooding, and different types of solutions. Some data from the online community is also included.

Key findings

- Participants were more familiar with issues around drainage and surface water flooding (particularly in the context of Storm Babet) compared to issues with sewerage.
- When participants learned about the impact of climate change on surface water drainage, they were struck by the scale of the issue. Again, there was a widespread view that everyone has some responsibility for reducing surface water flooding. Local authorities in particular were seen to have an important role, given their responsibility for maintaining local roads and drains, and ability to influence local planning permission and regulation.
- Participants were positive about the potential for blue-green infrastructure solutions to improve surface water drainage. The multiple community benefits of this approach stood out, as well as the opportunity to involve communities more in the process. However, there were some concerns around the practicality and effectiveness of this across different areas. While participants acknowledged that in certain cases, more 'traditional engineering' solutions might be the most practical option, there were also concerns around expense and disruption.
- Behaviour change was widely seen as an important part of minimising the risk of surface water flooding. Participants identified various motivations and barriers in relation to the two priority behaviours discussed: not paving over outdoor space and installing a water butt.
- However, they were aware that behaviour change may not be easy for everyone, particularly those on a lower income or those who don't own their own property, or have access to private outdoor space.

Participants' starting point

In contrast to the "invisible" sewerage system, participants were more aware of issues with drainage and of surface water flooding. However, it is important to note that the fieldwork period for this research coincided with Storm Babet, where extreme weather was causing mass flooding across the UK, particularly in eastern Scotland. Before the third workshop which focused on sewerage and drainage took place, participants were invited to share any water-related news stories that they had seen on the online community, and many of these were focused on the impact of the storm.

"The biggest issues at the moment are with drainage, not wastewater services. We've just been through intense flooding and dealing with rainfall in the future is going to be a bigger challenge than dealing with sewage. As long as it works and isn't causing bad smells in your house, nobody will think about [wastewater services]." (Participant, Workshop 3)

Participants' personal experience with surface water flooding varied, from none at all to those who described frequent flooding in their local area, and from low-level inconvenience to more severe flooding impacts. Negative impacts of flooding that were discussed related mainly to transport (due to flooded roads/train stations), but also damage to homes and other local infrastructure such as playgrounds. One participant from a rural area highlighted that flooded farmland impacted on people's livelihoods. Both those in cities and in more rural areas had experienced flooding, but there was a perception that the severity of flooding varied across different areas and a concern that deprived areas are particularly affected. Certain groups were also thought to be more impacted by flooding, for example those without a car and reliant on public transport.

"An area up the road, among farmland, has a dip and there is a permanent sign that says there will be surface water flooding." (Participant, workshop 3)

"I know why street water is a problem in my area. I live in a really poor area. Ten minutes' walk away, in a much wealthier area, the potholes have vanished, and they don't have so much street flooding." (Participant, workshop 3)

There was a view that surface water flooding had been an issue for a long time. When people had noticed a change over time, it was thought to be getting worse, and this was linked to climate change. There was some frustration expressed that more had not been done to prevent flooding effectively, especially since it was felt to be often the same places that are repeatedly affected. Participants wondered about the spread of responsibility when it came to local drainage systems and the impact of local council cuts on road maintenance.

"I think it's getting worse. I live rurally. The fields around us are looking more like reservoirs. We are definitely getting more rainfall and it doesn't really look like the existing infrastructure is set up to deal with it." (Participant, Workshop 3)

Reducing the risk of surface water flooding

In workshop three, information on Scotland's drainage system including the challenges posed by climate change and potential solutions was presented. As they had already done in regard to challenges facing the sewer system, participants reflected on the scale of the problem. However, problems around surface water flooding were less of a surprise than problems with CSOs, given their higher awareness of recent issues around surface water flooding.

Participants were struck by the large amount of green space being paved over each year, which raised concerns about new developments and responsibility around this. There was a worry that Scottish Government should have done more to prevent irresponsible developments which did not take surface water drainage requirements into account, especially given climate change has been common knowledge for a long time. There was a call for stricter legislation around this going forward.

"They can't just build and walk away. [...] they're not being responsible at all. It's definitely going to [need] legislation." (Participant, Workshop 3)

However, participants were somewhat reassured to hear about the potential solutions which were presented to them. There was a clear desire for more investment in pro-active flood prevention measures and there was particular enthusiasm around the concept of 'blue-green infrastructure', such as creating rain gardens or drainage ponds in more built-up spaces. The potential community benefits of this came out as a theme across breakout discussions. Participants liked that blue-green solutions supported increased biodiversity and would make local areas more attractive (in contrast to more 'grey concrete structures'). More green space could also boost community wellbeing.

“Nature is the best thing to combat nature. [...] It's nice to look at, to see different colours and nice trees rather than the same grey concrete structure over and over again.” (Participant, Workshop 4)

“I want to see the community at the heart of everything that is done.” (Participant, Workshop 3)

Despite this enthusiasm, participants did point out that these options may not always be practical, for example one participant did not think there was enough space for this between existing buildings where they lived. This type of solution seemed to be easier to put in place for new developments compared to existing ones, possibly limiting their impact. Participants also wondered if creating more green spaces may not work well alongside other initiatives such as '20-minute neighbourhoods'¹⁶, which participants imagined may require paving over green space. Some participants perceived a tension between the need to build new housing and the need to preserve green soakaway spaces, although others felt that this would be less of an issue if better use could be made of current buildings.

“It's like the strategies are in silos. There's no joined up thinking here.” (Participant, Workshop 3)

Participants also considered possible unintended consequences, for example creating more ponds could pose a safety risk to children or they could get dirty or vandalised without proper maintenance. Maintenance was noted as an additional expense, but possibly also an opportunity to create local jobs.

While there was less discussion at this stage around hard engineering solutions such as storm tanks, there was a sense that while this may sometimes be the most effective solution for certain areas, it would not be practical or affordable to do only this in isolation. Participants generally wanted infrastructure investment to be complemented by other, more innovative approaches, including behaviour change (discussed further in the last section of this chapter).

“...building our way out, it will just be too expensive and it's too narrow-minded. I think it's a good thing, it needs to be done. As we've already seen, tackling the sewer overflows, the large tanks that they're building, it can't be looked at as a stand-alone.” (Participant, Workshop 3)

Hard engineering solutions and blue-green infrastructure case study approaches

Following initial discussions around sustainable drainage solutions in Workshop 3, participants were presented with two specific case studies to discuss in Workshop 4. The first was the construction of a storm water storage tank in Craigleith, North Edinburgh. This was provided as an example of a hard engineering solution, where major investment was put into upgrading the capacity of the sewer network in order to better protect nearby properties from flooding. The second was an example of blue-green infrastructure: a sustainable drainage system (SuDS) in Cardiff called 'Greener Grangetown'¹⁷. This included installing 108 rain gardens to slow rainwater flows, as well as catching and cleaning the water before diverting it to a nearby river. The local environment was also made more appealing by adding planted areas to local streets and cycling infrastructure along the river embankment.

¹⁶ 20-minute neighbourhoods are places that are designed so residents can meet their day-to-day needs within a 20-minute walk of their home. [The Programme for Government 2020](#) commits the Scottish Government to take forward ambitions for 20-minute neighbourhoods in Scotland. Further information can be found here: <https://www.climatechange.org.uk/research/projects/20-minute-neighbourhoods-in-a-scottish-context/>

¹⁷ For more information about Greener Grangetown, see: <https://www.susdrain.org/case-studies/pdfs/greener-grangetown-case-study-lightv2.pdf> or <https://www.arup.com/projects/greener-grangetown>

Overall, participants were very positive about Greener Grangetown. In line with earlier discussions around blue-green infrastructure, participants liked the fact that it would bring community benefits. However, positivity around this was strengthened by the extent to which local communities had also been involved in developing the project. Participants thought that taking into account local knowledge could lead to more benefits for more people.

“I find [Greener Grangetown] more appealing [than the Craigleith storm tank] because more people are involved and they get their outcomes in many different things.” (Participant, Workshop 4)

“With my personal experience, having disrupted public works, it affects everything. But having something that works with the community, I've never seen it done but something like that is a breath of fresh air.” (Participant, Workshop 4)

Considering Greener Grangetown led to participants reflecting on further benefits of blue-green approaches. For example, they pointed out that visible solutions like this could help to create more awareness and educate people around drainage systems. Participants could also see how it might be tailored to different local areas. Wastewater systems, as well as opportunities for education.

“The rain gardens bring visibility to the problem, whereas the other one [the storm tank] hides it all away. This is on the surface so they [the community] can see why it's there and try to address the problem themselves as well.” (Participant, Workshop 4)

“I've been thinking what it means for my local community. [...] I could think of dozens of spaces that could be useful [for blue-green infrastructure]. It would be a dream come true, the benefits would just be incredible.” (Participant, Workshop 4)

However, practical limitations of this approach discussed in the previous session remained a concern.

When participants discussed the Craigleith storm tank, there was positivity around investing in something that would make a significant difference for local people. While the disruption to communities was seen as a disadvantage, this was compared favourably to the level of disruption otherwise caused by flooding. There was a view that there will always be complaints about disruption, but that the benefits would be long-term and would benefit everyone.

“I know this area quite well. I think this is a brilliant idea. [...] It might have upset the locals, but at the end of the day, they're all going to benefit from it.” (Participant, Workshop 3)

Participant 1: “The road being closed for ten months would be annoying, but it's better than having sewage going up the pipe. A lot of people if they knew, they would moan less.”

Participant 2: “I had no idea what it was. I knew it was Scottish Water but there was no local knowledge of it.” (Participant, Workshop 4)

The storm tank was seen as unattractive (particularly in comparison to Greener Grangetown), but it was suggested that this could be combined with elements of blue-green approaches to make it more aesthetic, for example placing planters or even a pond around or on top of a storm tank. One participant looked up an image of the storm tank online during their breakout discussion and participants agreed it looked better after it was fully completed and planted up.

However, as with infrastructural changes proposed to ensure water supply, participants raised concerns around the cost and the extent to which major engineering solutions like this could be guaranteed to be future-proof in the face of climate change. One participant highlighted that given this option requires a high amount of resource, it may hinder other initiatives that may bring more value:

“Edinburgh is expanding all the time. [...] How long is this going to be viable for?”
(Participant, Workshop 4)

There were also some concerns about who would benefit the most from this solution compared to Greener Grangetown, where participants could see more advantages for the local community.

Balancing hard engineering solutions and blue-green infrastructure

On the whole, participants saw a need for both hard engineering and blue-green infrastructure in reducing the risk of surface water flooding. There was widespread agreement that different approaches may work better in different areas, and that the best solution would depend on the needs of particular areas. This included the local context in which a Sustainable Urban Drainage Systems (SuDS) was being implemented (for example, whether it was in a built-up or more rural area), what the community needs were and how urgently it was needed.

“We need a bit of both. [...] [We need] a bit of joined up thinking with the funding, the two solutions can come together. Scottish Water can fund the drainage, and then we can do something to help them. Partnership working. The biggest partner is the public.” (Participant, Workshop 4)

“[Greener Grangetown] is pre-emptive. The storm drain is reactive. That area of Edinburgh was affected by sewer flooding. I'm not sure those people would have wanted it to take longer and require their input? [...] I think they're addressing different issues.” (Participant, Workshop 4)

However, participants typically preferred blue-green approaches when possible, with a widespread view that the storm tank and approaches like it should be done as a 'last resort' after other options are considered. This was based on the expense and disruption of large-scale engineering works, as well as the lack of co-benefits compared with those offered by more 'natural' blue-green solutions.

“Instead of going straight to hard concrete solutions, focus first on the soft, less invasive, more natural solutions first and only if they don't fit then go to the [engineering solutions].”
(Participant, Workshop 4)

Responsibility for tackling surface water flooding

In workshop three, participants were asked who they thought was responsible for addressing surface water flooding in Scotland. There was a widespread view that, to a certain extent, everyone is responsible. However, participants did differentiate between what they felt different groups had responsibility for. This largely reflected discussions they had already had around water resources, with the Scottish Government being seen as responsible for taking the lead, coordinating efforts and creating legislation (for example around new building developments).

Businesses in the housing sector, including developers and landlords, were seen as playing an important role in ensuring properties or other developments had sustainable drainage solutions. Yet there was a sense that, due to being profit-driven, businesses would only take responsibility if forced to. Therefore, establishing legislation around this was mentioned as a responsibility for local government and planning agencies. At the same time, there was some caution about businesses shouldering the total cost of these changes and fears that this may increase house prices of new builds. Again, it was suggested that the government had a responsibility here to provide support and incentives, as well as regulation.

Local authorities were widely seen as having a significant responsibility to reduce surface water flooding, but not everyone thought they were being sufficiently pro-active. Their responsibility for the upkeep of local infrastructure, such as public roads and drains, was seen as an important factor in flood prevention. However, participants wondered if budget cuts to services may actually be making the problem worse.

“They only come and clear leaves when there is a flood warning. In rural areas, they only take action when there is a weather warning. There is a lack of housekeeping these days.”
(Participant, Workshop 3)

“Councils need to take responsibility. I know they are stripping back their services like garden services, [...] cleaning the streets and gutters, [...] forestry services. [...] More money needs to be put in [...] I am fine to pay more tax if [that would mean] these things were in place.”
(Participant, Workshop 3)

When it came to the general public, participants felt that individuals were responsible for their own behaviours impacting on wastewater systems. However, there was an acknowledgement that these behaviours may not be easy or practical for everyone and there was also a view that consumers should not have to pay extra for doing the right thing. Therefore, it was thought that those in a position of authority (such as local authorities, the Scottish Government and Scottish Water) had a responsibility to support the public to be able to make these changes, financially or otherwise.

“[There were] a lot of really interesting ideas of things I could see myself wanting to do, but yet another example of it being a class issue. People in local authority housing or renting are not going to be in a position to cut into drainpipes. [...] A lot of people aren't in the position to make the changes they are suggesting.” (Participant, Workshop 3)

Similarly, the involvement of local residents in community level solutions, such as Greener Grangetown, was thought to require facilitation from government.

“[Greener Grangetown is] a good crossover between community engagement and people taking responsibility whilst being supported by some level of government. They shouldn't outsource all governance to us, we should work together.” (Participant, Workshop 4)

When participants were asked about how quickly they would like to see action on surface water flooding take place, there was a desire for this to be done as soon as possible. In fact, there was an expectation among some participants that it would already be in progress and some frustration was expressed that more had not already been done, given the gravity of the situation.

“I would hope it is already in progress. [...] It needs to be seen as a priority. From what I have seen in the last three weeks, this will be a real environmental disaster if it isn't dealt with. Three people died last week in Scotland, due to the flooding.” (Participant, Workshop 3)

Changing consumer behaviours

There were less direct experiences of behaviours relating to drainage, as those discussed tended to be more active behaviours (such as paving over green space) compared to the more passive behaviours discussed previously (such as stopping doing routine things like putting wipes down the toilet).

While there was positivity around the scope for behaviour change relating to drainage, participants highlighted again that not everyone would be equally able to do this. For example, they could see challenges for those on a lower income or who do not own their own property or have access to private outdoor space.

“As someone who lives in the middle of the city, who is a student and rents, a lot of those alterations that would be great, you cannot do them in cities because there isn't the space, and people don't have permission to do them.” (Participant, Workshop 3)

“It's all well and good saying, 'Yes, this is available to everybody,' but we're in a cost-of-living crisis. People are not going to go out and say, 'Oh yes, I'll buy [a water butt].’” (Participant, Workshop 3)

As explained previously, Consumer Scotland identified six priority behaviours for exploration in workshop four. These included two drainage-related behaviours, which were: not paving over outdoor space, and installing a water butt. In workshop four, participants discussed barriers and potential enablers of change in relation to these behaviours, which are outlined below.

Paving over outdoor space

Participants were asked to consider what may cause people to pave over their outdoor space, particularly for the purpose of creating driveways¹⁸; a behaviour that can exacerbate surface water flooding. It was thought that it may be difficult for some people to maintain a garden (due to physical ability or a lack of time). In addition, there was thought to be a lack of knowledge about more water-resilient ways to create a driveway, such as using porous materials or a grid which allows grass to grow.

A lack of affordable, practical alternatives was also discussed. For example, it may be expensive for people to park on the road, there may be a lack of on-street parking space, or they may need to expand their driveway to make space for more than one car.

However, even if these previous factors did not apply, participants identified motivational barriers that may cause people to pave over their gardens. This included the fact that a driveway is easier to maintain than a garden and helps to keep cars clean. It was also seen as a desirable feature that may make people's houses more valuable or attractive to sell. As for other priority behaviours, participants highlighted a lack of awareness, sometimes including for them personally, around the fact that paving over gardens would have any negative impacts on surface water drainage.

“It's the first I heard of this as an issue. I put tarmac on my driveway and I had no idea this was a [problem].” (Participant, Workshop 4)

¹⁸ The discussion guide and visual stimulus for this erroneously described this behaviour as 'paving over driveways' rather than 'paving over outdoor space'. However, it is unlikely that this influenced discussions, and it was clear from the content of the discussions that participants understood this behaviour was about paving over green space/gardens to create driveways.

To enable behaviour change in this area, participants suggested:

- Raising awareness of the environmental impacts of paving over green space;
- Raising awareness of and incentivising the use of water-resilient approaches to creating driveways;
- Strengthening regulation to prevent people/contractors/developers from creating paved driveways, including negative consequences, such as fines, for those who do this;
- There was a suggestion that wider action around reducing car use generally would help.

Installing a water butt

Another drainage-related behaviour participants discussed was installing a water butt. Again, an important barrier suggested was a lack of knowledge around how to get one installed. Limited opportunity to do this was also seen as a factor, in that many people do not own any outdoor space and not everyone who does own outdoor space may be able to afford to spend money on this. Finally, as with previous behaviours, there was a feeling people may not be motivated to do this because of a lack of awareness around water butts and the benefits of having one. Participants highlighted that they did not generally see water butts themselves, and that if more of them were visible this may help.

To enable behaviour change in this area, participants suggested:

- Building awareness around the use and the value of water butts;
- Providing financial support or grants for buying/installing them;
- Having community water butts;
- Installing water butts in new builds;
- Making water butts aesthetically pleasing.

Forming conclusions on sewerage and drainage

As with water resources, in the final workshop participants were presented with some draft conclusions regarding sewerage and drainage based on their discussions throughout the process and given the opportunity to reflect on these and to refine them. While broadly happy with the summary, participants made some changes after some final deliberation.

Participants added an overarching conclusion that there should be a robust long-term strategy from Scottish Government on sewerage and drainage, similar to the strategy there would be for water supply.

Participants removed the wording that we are 'stuck with what we have' when it comes to the current combined sewer system, put in place in Victorian times. This was because they felt it was overly defeatist and did not reflect the spirit of their discussions over the course of the process. Instead, they pointed out that Scotland should be looking to the future, considering how to change the system over time and putting separate systems in for rainwater and sewage wherever possible, and added a line into the conclusions to reflect this. Enforcement of wastewater and drainage standards for new build developments was mentioned as an important part of this.

The draft conclusions already reflected that participants held different views on how Combined Sewer Overflows (CSOs) should be tackled. This was welcomed by participants, as they were aware both positions had come up. Discussions focused on the importance of Scottish Water being held accountable for their performance in managing CSOs, and on calls for more transparency about CSOs (for example, how they are managed, how priorities are decided on, costs of monitoring, and making local communities aware of CSO locations and when they are operating).

Participants agreed with the draft conclusion that a more pro-active approach should be taken to reducing the risk of surface water flooding. They added points expanding on this, to clarify that this needs investment, requires partnership working, and should draw on local knowledge. Examples were that local people know where flooding tends to happen, and often take action, such as by pulling out dead trees from rivers that otherwise create dams where they're not needed and contribute to flooding. This point was seen as underlining the importance of engaging local communities (referenced again in the final conclusion).

Discussions about the conclusions relating to 'hard engineering' and 'blue-green' infrastructure solutions centred on wanting to know more about the costs, effectiveness and impacts of each type of solution. They felt this would help to clarify the extent to which each type of solution would make sufficient difference in tackling the problem of surface water flooding. For example, participants suggested that Scottish Water could publish case studies and technical papers evaluating the effectiveness of different blue-green solutions.

Participants were very much in favour of 'water resilient design' solutions, such as rain gardens, and welcomed the draft conclusions about these solutions. They noted that it was important for these solutions to be supported long-term and maintained, so that they don't fall into disrepair.

There was also positivity towards partnership working with communities. Participants wanted local authorities and developers to engage with communities to put solutions in place to reduce surface water flooding that work for those communities, emphasising that local people should be able to suggest improvements as well as react to them.

The group's final conclusions, reviewed and ratified by participants based on the themes highlighted above, are presented below (figure 4.1).

Figure 4.1: Participants' conclusions on dealing with the impacts of climate change on sewerage and drainage

How should we deal with the impacts of climate change on sewerage and drainage in Scotland?

- There should be a robust long-term strategy from Scottish Government on sewerage and drainage, as there would be for water supply.

Combined Sewer Overflows (CSOs)

- A different system, which separates rainwater and sewage, would be ideal, but it would be too expensive to retrofit the existing combined sewer system. Scotland should plan for and implement separate systems as far as possible, working in partnership with communities and developers.
- There was no consensus on how CSOs should be managed, and participants wanted more evidence on the different approaches:
 1. Some saw Scotland's current approach, where monitoring and upgrading is done for sewers identified as priorities, as acceptable, more cost-effective and a better use of available resources. However, they also questioned whether the approach could be improved, for example through stepping up monitoring efforts or introducing better technology for mapping and modelling.
 2. Others felt all sewers should be monitored for overflows. This related to believing we have a 'right to know', concern about how the prioritisation of sewers is currently decided, or the potential environmental impact of CSOs.

Reducing the risk of surface water flooding

- A more pro-active approach should be taken to reducing the risk of surface water flooding. This needs investment, requires partnership working, and should draw on local knowledge.
- Both 'hard engineering' and 'blue-green infrastructure' solutions will be needed to tackle the problem of surface water flooding. Participants wanted to know more about the costs and impacts of each.
- Participants felt positively towards 'water resilient design' solutions, such as rain gardens. This related to their benefits for local communities, the attractiveness of places, and the local environment.
- Local authorities and developers should ensure waste water and drainage standards are met. They should also engage with communities to put solutions in place that work for them.

5 Communication, engagement and behaviour change

This chapter covers participants' views on awareness-raising, communication, engagement and behaviour change in relation to how Scotland tackles the impacts of climate change on water resources and services, sewerage and drainage¹⁹. It explores participants' views on what information the public need and how these information needs should be fulfilled. The ideas participants suggested for education and communications campaigns are presented, along with their thoughts on how to frame and communicate the important messages. An important theme of community-level awareness-raising and engagement that emerged during the deliberations is also explored, and cross-cutting themes relating to behaviour change are summarised.

Key findings

- Upon learning more about the issues, participants strongly believed that awareness should be raised of the value of water and the need to conserve it, as well as the current and future impacts of climate change on Scotland's water. Regarding how to raise awareness, participants felt that education in schools would be key, along with widespread and effective communications campaigns for raising awareness. There was also an appetite for information and communication throughout decision- and policy-making processes, to improve understanding and ensure transparency.
- Participants felt that raising awareness needs to be coupled with a broad range of actions to support people in making changes. These included: providing information about what the necessary water-related behaviour changes are and guidance on how they can be carried out in practice, how behaviours can be changed, and the positive impacts of alternative behaviours; harnessing new technology to make it easier for people to make more water-efficient choices; and stricter product standards for manufacturers and developers.
- There was a strong view that the way in which people consume media and advertising has changed, and communications strategies must reflect this. However, participants thought that multiple mediums would need to be used for communications to have a sufficiently wide reach, and advocated targeting and tailoring communications to specific groups.
- When considering how communications should be framed, there were mixed views on whether these should be more positive and encouraging or use more 'hard-hitting' messaging.
- There was a clear appetite for community-level awareness-raising and engagement. Ideas for how this could be achieved included public engagement sessions of a similar style to the deliberative workshops; public roadshows; information being presented at existing community gatherings, and involvement in decision- and policy-making processes. Participants felt that communities should be able to initiate this engagement, and that local knowledge should be valued in planning and decision-making.

¹⁹ From hereon in, impacts on these services are described as impacts "on water" for brevity.

What the public need to know

After hearing presentations from Scottish Water and Scottish Government speakers, participants expressed surprise and shock early on, at how little they had previously known about how water resources, sewerage and drainage are managed in Scotland, and the challenges posed by climate change. This meant that from the first workshop onwards they emphasised the importance of raising awareness of these topics among the Scottish public and providing relevant information to them. There was a consensus that without this awareness and information provision, public attitudes to and behaviours regarding water would be unlikely to change in the future. In the final workshop (and on the online community) participants had the opportunity to discuss specifically how awareness-raising and supporting the public could and should be done.

Information needs

There was a clear appetite among participants for more information on the topics discussed throughout the deliberative process. This was reflected in the large number of questions they posed to the presenters in the first three workshops - some of which were answered live, and some afterwards via the online community (see Appendix C). As well as asking questions to clarify their own understanding, participants identified several information needs on behalf of the Scottish public.

A key point they made was the importance of raising awareness about the value of water and the need to conserve it. It was felt that many people in Scotland perceive water to be an ever-abundant resource and that the public must be better informed that this is not the case.

“The public need to understand and respect that the water ecosystem is a finite resource and will need investment and more efficient use to maintain it.” (Participant, online community)

Linked to this, there was broad agreement that the public should be better informed about the impacts of climate change on water, and what these are likely to mean for Scotland in future. This was based on a perception that there is a general lack of knowledge on this topic currently.

“Communicate better to the public how big the problem is, we need to know.” (Participant, Workshop 5)

Participants thought that better informing the public on the challenges faced by the water sector would be important in building support for the difficult decisions that the Scottish Government and Scottish Water would inevitably need to make. If the public were made aware of the reasoning behind the decisions being made, and why behaviour needs to change, it was felt that they would likely be more receptive to changing their behaviours and to new policies:

“People need to start being invested and feeling a part of this. The only way is for people to actually be honest with us and tell us what's happening. If people just see we need water meters and more bills, [they'll think] it's all just another way to tax us. I think for us to be sort of shareholders in this, the communication needs to start now.” (Participant, Workshop 5)

When discussing any potential behaviour change, whether relating to water services, sewerage or drainage, participants felt that information on the negative consequences of certain behaviours and the positive impacts of others would be crucial for encouraging change. They consistently highlighted the need for support and guidance in regard to what the necessary behaviour changes are, how behaviours can be changed, and the positive impacts of alternative behaviours. For example, they wanted clear guidance on what not to put down the toilet and why; why fat and grease should not be put down the sink and what to do with it instead; why and how to identify a leaky pipe, and how-to videos or helplines which would help equip people with the skills to fix leaking pipes.

“If people understand the consequences of their actions or indeed lack of action this may help to encourage behaviour change.” (Participant, online community)

Transparency was a key theme that emerged throughout deliberations, in addition to calls for the public to be included in decision- and policy-making processes. For example, participants were keen for information to be provided on how priorities are decided for monitoring CSOs. There was also a suggestion that Scottish Water could publish case studies and technical papers on the effectiveness of different infrastructural drainage solutions, to help the public understand how they compared to each other. Furthermore, participants wanted to be informed on the impacts that they, as consumers, would face due to certain policies (particularly financially).

“Even if the government pay for it, it's our money anyway. We're going to have to pay for it. It does need more transparency; [people] need to know more about the cost.” (Participant, Workshop 5)

How to raise awareness, communicate and engage with consumers

Education

Participants proposed education as an important way to raise awareness. They emphasised the importance of education in schools to reach the younger generation and create new, positive social norms. It was also pointed out that children learning in school could also aid their parents' education.

“We should definitely make it part of the school curriculum so that not only does it bring awareness at a young age but also becomes a way of life.” (Participant, online community)

In terms of what this might entail, participants suggested that Scottish Water could work with teachers to produce educational materials, such as lesson plans, worksheets and activities linked to the national curriculum. They suggested interactive ways of engaging school pupils such as using the arts or taking them on trips to see how their water is managed. There was also a view that education on water via the formal system could be started younger, at nursery, and/or continued for longer through college or university.

“Maybe information/resource packs for teachers including information and resources such as lesson plans, worksheets, activities linked to the national curriculum. These could be produced by Scottish Water in conjunction with teachers.” (Participant, online community)

“When I was 8 years old, we actually, as a school trip every year, the school would go to a sewage works and take a class round and we saw firsthand – the whole processing, and what blocks toilets, and how important it is not to put anything down toilets. [...] that really stayed with me. [...] living it yourself, rather than seeing it on a screen or reading about it, actually physically feeling it around you and smelling it, and being in the physicality of it really makes more of an impact.” (Participant, Workshop 5)

Communications campaigns

Discussions also focused on the need for widespread and effective communications campaigns for raising awareness about climate change and water. Participants were sceptical about what impact Scottish Water's communications campaigns had had to date, as they had not been aware of these prior to taking part in the process. This led them to call for improved, proactive and more wide-ranging communications about these issues from Scottish Water and the Scottish Government. As one participant said of Scottish Water:

"They've got to shout it from the rooftops." (Participant, Workshop 5)

A participant also raised the question of whether communications might be more effective if they came from somebody other than the Scottish Government or Scottish Water and suggested that a new organisation could be created with the remit of raising awareness about water and climate change.

Regarding communications channels, participants agreed that TV advertising was less effective than it used to be, due to changes in how people consume media and advertising. Suggested alternatives for reaching people included social media platforms such as Instagram and TikTok. These were seen to be influential apps, particularly for younger generations who would be important to reach. There was also a suggestion that influencers or public figures could be involved in social media campaigns:

"People engage with social media more than advertising. It's a form of advertising, but people engage and take more information in." (Participant, Workshop 5)

"Britain has such a wealth of these famous characters that are all invested in climate change, and credibly respected individuals that have been TV personalities for so long. Surely if they were reached out to, they would pitch in, and help lend a bit of credibility and awareness. I think that should definitely be focused on or thought about at least. Because when you've got the big names saying it, that have been talking to us about climate change all this time anyway, the message is going to get through, right?" (Participant, Workshop 5)

For others, traditional methods such as community magazines or public information films could also still be useful:

"For something like this an old fashioned door drop would ensure every household got the communications. Many communities have magazines that are grateful for advertorials about their local area and what could be achieved. Not fashionable tools but effective." (Participant, online community)

"Public information films should be on TV as they were in the 80s to make people aware of what is happening and to pass new legislation." (Participant, online community)

The point was also made that communications should be "multi-faceted" using several methods of communication (for example social media and gamification alongside traditional methods) to reach as many people as possible:

"The issue right now is that our society has gotten to a point where there is no catch-all way of engaging everybody, engaging all the public, because there's different elements, like access to different types of media. If there is any effort to engage the entirety of the public, it has to be very broad-reaching, it has to go across a lot of levels, otherwise it's not going to hit significant portions of society." (Participant, Workshop 5)

Participants noted that in some cases communications should be targeted to specific demographics, to have the desired impact. For instance, there was discussion around communications regarding drainage-related behaviours, and the importance of messaging reaching people with the ability and responsibility to make changes to their home. Contributing to this view was a sense that different audiences may be best reached through different means:

“In terms of the best ways of engaging people I think it's different methods for different groups: homeowner vs renter, economically active vs inactive, rural vs urban dweller etc. I appreciate that involves a huge PR/communications strategy which in itself would have a large cost but the alternative is spending less on something which doesn't have much impact at all which is arguably more of a waste.” (Participant, online community)

This point was also linked to discussion around differential capabilities to change behaviour and participants felt that communication campaigns should reflect this. Specifically, participants highlighted that messaging about avoiding paving over outdoor spaces or installing water butts would not be relevant to members of the public who are renting from the council, or from private landlords, but that it would be important to reach property owners. A point was also raised about the need for communications to reflect the different priorities that people may have in future, depending on the area of Scotland in which they live (for example flood-risk areas compared with drought-risk areas).

Participants expressed a range of views in terms of framing communications. Those in favour of more positive framing suggested messaging that focused on loving and valuing water:

“I'm sick of the negative story, I want to fall in love with water so much that wasting it seems like a wasteful thing to do. If someone can do that then it'd make a big difference.” (Participant, Workshop 5)

Others, however, strongly believed that to be effective, communications must more clearly demonstrate the magnitude and urgency of the challenges faced in Scotland, and the negative implications if sufficient action is not taken. Participants thought this could be achieved through more “hard-hitting” campaigns:

“Some dark images of the future if there's no water. Really hard-hitting stuff, to actually make a change” (Participant, Workshop 5)

There was also a view that it would be important to avoid communications campaigns making the public feel that they are being blamed, “lectured” or “dictated” to:

“Less blame and more of a positive approach. If you point the finger at people they are going to rebel and say they didn't know.” (Participant, Workshop 5)

There was a suggestion that storytelling could be an effective way of getting the message across. For example, participants suggested a storyline on Coronation Street, a David Attenborough programme, or a disaster movie to reach wider audiences. There was a sense that a cultural shift is needed, with one participant suggesting that the media, particularly television programmes, could also have a role to play by modelling positive behaviours to encourage people to follow suit. Another view was that communications could be made more interactive, for example through use of quizzes or entry into a prize draw.

“We can lobby the programme-makers to stop showing bad habits. You no longer see people smoking on telly [...] we pick things up subliminally, if we always see people turning the taps off instead of letting things run, maybe we'll do that too.” (Participant, Workshop 3)

Another important theme in the discussions about communicating with the public was that messaging should be comprehensive, yet simple and clear. The '3 Ps' message was seen to be an effective example of this.

“Messaging needs to be bitesize and the full extent of the problem fed over time” (Participant, online community)

Participants also pointed to examples of previous issues that awareness has been effectively raised about (such as energy saving and recycling), suggesting that these should be learned from. They also highlighted examples of effective campaigns that have led to certain behaviours being seen as antisocial, such as dropping litter, drink driving, and smoking. There was a suggestion that effective communications campaigns should similarly make certain water-related behaviours socially unacceptable.

“Just thinking back to what other big behaviour change campaigns have there been in the years, smoking and drink driving. The common theme is an element of stigmatisation, it used to be acceptable for people to smoke and now it's not, what's the stigma recognising we are in a different domain here, what can be used to provide public peer pressure to those who decide not to change their behaviour?” (Participant, Workshop 5)

Community-level awareness-raising and engagement

A further key theme that emerged across the workshops was a strong desire for community engagement. Participants put forward a range of ideas for how communities could be engaged on water, wastewater and drainage issues in future. These ideas included:

- Public roadshows to gather and engage communities and raise awareness
- Targeting places where people already gather – a participant who had previously lived in Germany raised the example of coffee mornings she had attended, where people would come and discuss issues to raise awareness or get information from attendees
- Using stalls in public spaces like hospitals, where people could stop and pick up an information leaflet to learn more.

Participants consistently commented on how much they had learned throughout the deliberative workshops, and it was suggested that similar workshops at a community level could be an effective way of raising awareness and engaging the public.

“I think what I would like to feed back to Scottish Water is that many of us felt a sense of pride and ownership about our water. I am sure this came from the learning we experienced. If this had such an effect on us then I'm sure that running public engagement sessions with local communities would bring a similar outcome.” (Participant, online community)

As well as sharing ideas for how awareness-raising could be achieved at the community-level, participants thought it to be important that communities be engaged in decision- and policy-making processes. There was a strong view that fostering a sense of ownership amongst communities would help to educate them about the value of water and the impacts of climate change, and encourage behaviour change and buy-in to decisions being made:

“Getting the community to feel more involved as stakeholders is the thing, rather than just thinking it's the water company. It's our water and it makes a difference to us as a community.” (Participant, Workshop 5)

There was extensive discussion around community involvement in workshop 4 in particular, when participants were presented with case studies of different infrastructural drainage solutions. As previously discussed in Chapter 5, there were particularly positive reactions to the community engagement aspects of the Greener Grangetown case study – a blue-green infrastructure solution implemented in Cardiff. Participants were enthused by the community having been engaged all the way through the project, from the early design stage through to implementation.

Participants also noted that the process of bringing together the community would be beneficial in and of itself. For example, when discussing water resilient design solutions, one participant noted:

“Not only does it enhance your town or city, but it gets the community together. Community is lacking.” (Participant, Workshop 5)

Participants felt that community engagement in decision-making should be a two-way process. It was felt that Scottish Water and local authorities should proactively engage with communities whenever possible. They wanted to feel their input was being sought when decisions were being made in their local area:

“Priorities are important. Local engagement. A general point for many things. Authorities engaging with locals to see how they can best help instead of, 'We're going to install this flood gate. We think that's the best thing to do.'” (Participant, Workshop 5)

Taking this further, participants also felt that communities should be able to initiate conversations and suggest improvements, rather than solely reacting to suggestions made by local councils or developers:

“There should be a mechanism for individuals within a community or groups within a community being able to say to Scottish Water, say to the local authority, 'We want to see changes in our streetscape [...]' and local individuals to initiate it, rather than just waiting for local authorities to initiate it.” (Participant, Workshop 3)

Participants also felt that local knowledge should be valued in planning and decision making. This was grounded in the view that communities often know which local areas tend to flood, for example, and thus which areas are most in need of help, support or infrastructure improvements:

“You need to bring local knowledge into it too. It's all well some authority saying this area's in trouble. This area does this and that. Go and ask. They know.” (Participant, Workshop 5)

Linked to the need for transparency and accountability discussed earlier in this chapter, it was suggested that members of the public could also be more directly engaged in decision-making processes, by sitting in on Scottish Water board meetings. To illustrate:

“Sometimes they have some of these board meetings or meetings to decide what they're doing – get some of the public to sit in with them, to actually be there when they make the decisions, and [get them to] listen to what the public's asking them”. (Participant, Workshop 5)

Behaviour change

Throughout the dialogue, some cross-cutting themes emerged in relation to facilitating consumer behaviour change. They are summarised here.

Firstly, while participants were aware of potential barriers to making some of the suggested changes, there was a view that the public would be generally open to doing things differently with the appropriate support.

“I think in general people would be open to trying to take care of their water [...] if help is put in place to help people transition. Getting movement, conquering inertia is always where you need to put the most amount of input in.” (Participant, Workshop 3)

As discussed earlier in this chapter, participants consistently highlighted the importance of education and awareness-raising of what behaviour changes would be needed and why, as well as guidance around how to achieve this. However, they believed bringing about social change will also require broader actions and support for consumers. Furthermore, there was a recognition that sometimes people would act in self-interest even if they understood there may be wider negative consequences to their behaviours. Therefore, participants felt that information campaigns may need to be followed up with stricter legislation for manufacturers and developers. In relation to sewerage, for example, there was an emphasis on the products people use, both in terms of correct labelling around what is (or is not) flushable, and more innovation in terms of alternative products to non-flushable wipes.

Harnessing technology to improve monitoring was identified as another way in which consumers could be supported to change behaviour. As previously discussed, water meters and product labelling were seen as possible ways to make it easier for people to monitor and reduce water use, and to make more water-efficient choices. However, there were concerns about meters being linked to billing. Another suggestion was to use artificial intelligence (AI) to alert people to leaks, while shower timers were suggested to improve people's awareness of how long they take in the shower so that they can try and reduce this time.

“Especially now with AI, is there not something to be done there to see if a change is noticed, automatic feedback to the customer to tell them there might be a leak.” (Participant, Workshop 4)

Participants also raised the idea of subsidised/free provision of water saving devices to ensure that those on lower incomes are not left behind (see Chapter 2). Furthermore, participants saw role modelling as important, feeling that visible leaders 'at the top' of Scottish Water and Scottish Government should be seen to model the desired water and sewerage behaviours themselves.

As discussed in the previous section, actively involving communities in decisions around climate adaptation was also seen as an enabler to behaviour change, through taking local people's needs into account and creating buy-in and an incentive. It was felt that when there was enough community buy-in, this may even be more effective than imposing punitive measures. For example, one participant felt that solutions which contributed to improving the community could help with this:

“Additional fees are fine to an extent but a lot of people couldn't afford it. I was drawn by the incentive word. [...] [How about] a council say they are ready to invest in the community to some extent, they will bring flooding benefits, 'but you need to step in and help us do it'. There is a bigger prize to help build a community which would encourage the community to rake leaves into the bin.” (Participant, Workshop 3)

Finally, although there was broad acceptance of the need for individual behaviour change, it was also felt that too much emphasis was being placed on individual actions and not enough on larger-scale actions. There was a clear appetite to see the Scottish Government leading by example, with regulation on businesses, more investment in innovative strategies to tackle the issues, and more clarity around who is responsible for what changes. Ultimately, participants saw an important role for the public in making changes, but wanted to know that the Scottish Government, Scottish Water and businesses were also taking action to support the public and making changes themselves.

“I can't reduce [water use] that much without these structural changes [...] why are we not looking at changing building regulations, putting pressure on landlords, going round the world to look at innovative technologies.” (Participant, Workshop 4)

“You need to see a good example from your local council. [...] If we don't trust the council or government, there is no incentive to do this stuff.” (Participant, Workshop 3)

Forming conclusions on raising awareness and supporting consumers

From early on in the process, participants had emphasised the importance of raising public awareness about the impacts of climate change on water and the importance of conserving it, as well as the impacts of climate change on sewerage and drainage. These points were therefore very familiar to participants by the time they came to discuss the conclusions in the final workshop. This meant that discussions about awareness-raising and supporting consumers focused on the specifics of how this could and should be done, rather than whether there was a need to do it in the first place.

Discussions centred on how best to reach and engage different consumer audiences (such as platforms, formats and messengers that would be most effective at reaching the public), how messages and stories could be framed, and the importance of evaluating campaigns to help optimise their effectiveness.

As outlined previously in this chapter, participants pointed out that bringing about behaviour change will also require broader actions to support consumers in addition to communications campaigns, including: other actions to address people's information needs; making people aware of alternative solutions and providing a range of devices that can help conserve water; and stricter legislation for manufacturers and developers, so that they were held accountable. Suggestions included a ban on new developments paving over shared space with lots of concrete, improved enforcement of existing rules about paving over driveways (the requirement to have run-off to something permeable), and fining people for misusing drains. Participants also saw role modelling as important, with visible leaders 'at the top' of Scottish Water and Scottish Government being seen to model the desired water and sewerage behaviours themselves.

“If people feel ownership over something and it's local and real, those kids that help building the rain garden will turn off the tap when they brush their teeth, the two things intertwine” (Participant, Workshop 5)

The group's final conclusions, reviewed and ratified by participants based on the themes highlighted above, are presented below (figure 5.1).

Figure 5.1: Participants' conclusions on awareness-raising, communications, engagement and supporting consumers

Raising awareness and supporting consumers

Participants' conclusions were that:

- There is a fundamental need to change how people in Scotland value, use and conserve water. At present people typically feel we have an abundance of water, and awareness of the impacts of climate change on water is very low.
- Everyone needs to save water. This should not only be down to consumers, but to business and industry too.
- Raising awareness is important, as it would help people understand that they need to save water and why it makes a difference. This could be done through education (starting in schools) and awareness-raising campaigns to bring people on board.
- Scottish Water and Scottish Government should run effective and well-targeted communications campaigns.
- Consumers can be supported in several ways, including:
 1. addressing people's information needs;
 2. making them aware of and providing a range of devices that can help conserve water, ideally low-cost or free of charge;
 3. showing and/or providing people with alternative solutions; and
 4. stricter legislation for manufacturers.

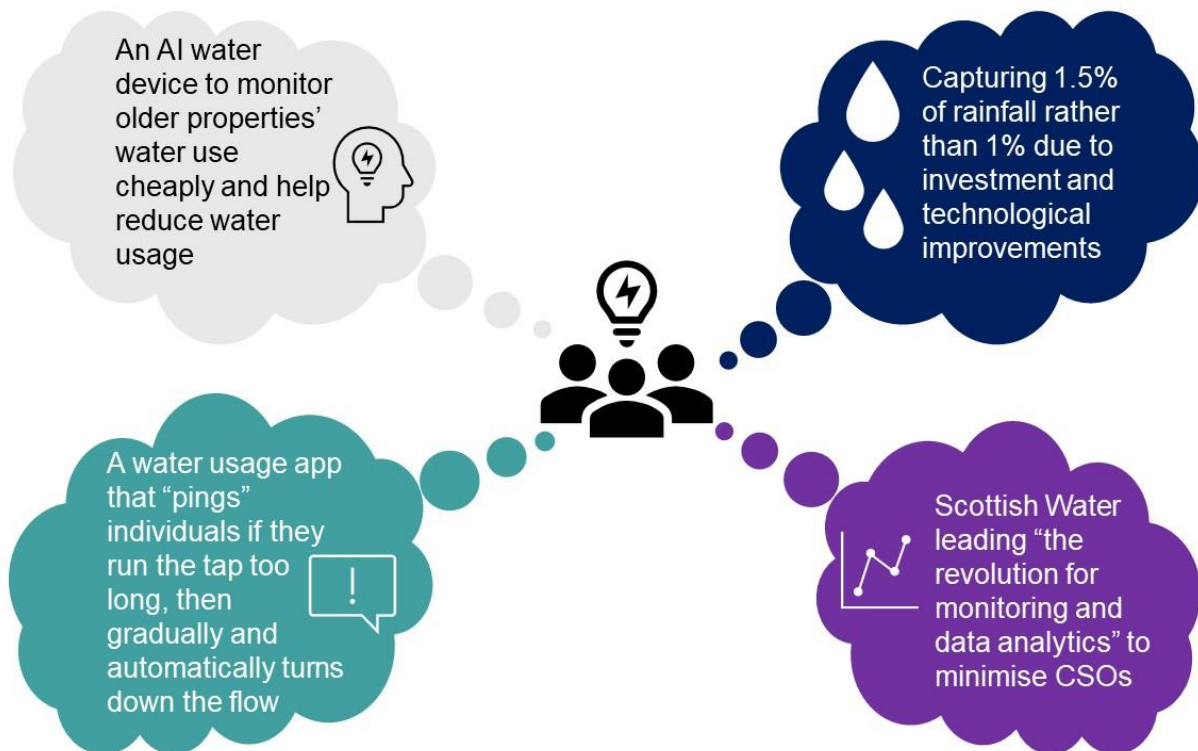
6 Hopes for the future

The themes participants emphasised in their 'emails from the future' broadly reflected those they had already highlighted as important in reaching their conclusions. In addition to the points outlined above about consumer behaviour change, they highlighted changes that had been made by 2040 so that people valued water much more than at present, and the important role that public communication and engagement had played in raising awareness of the issues and driving that change in attitudes.

Their emails highlighted a range of possible impacts of climate change on Scotland, ranging from relatively minor changes (“Yes, our summers are drier than you experience in 2023, but there’s still what feels like far too much rain”) to more major shifts (“The temperature has risen by average of two degrees Celsius and we are really feeling it”, or “Welcome to 2040... Climate change is really taking a hold and the poles are being wiped out by the kilometre every day”). One participant emphasised the role that climate change events can have in catalysing action, explaining how “the great flood of 2025 following the summer drought of 2024 prompted a major policy shift”.

There was a particular focus on the development of innovative solutions to help tackle the impacts of climate change on water, as there had been throughout the dialogue. Examples are shown in Figure 6.1 below.

Figure 6.1: Innovative solutions in participants' 'emails from the future'



Participants' emails revealed a desire for far-reaching change driven by the Scottish Government and Scottish Water, including the importance of a national water strategy, investment in infrastructure, and partnership working with each other and with industry to drive sustained change:

“Flooding and build-up of water has dramatically reduced as the different gov't agencies are now working much closer together and upgrading existing structures and drainage to cope with heavy rainfall as well as designing and implementing many new technologies to ensure the days of flooded basements and impassable roads are now a thing of the past.”

There was also much emphasis on how the look and feel of local areas had changed by 2040 due to solutions put in place to adapt to the impacts of climate change on drainage, such as remodelling concrete areas in cities to incorporate sustainable drainage solutions. Participants linked this to positive impacts for local communities:

“The housing schemes around here have been revitalised thanks to all the developments and it has brought back a sense of community”.

Figure 6.2: Example emails from the future

Dear 2023 [self]

I am glad that you had foresight and took the time to stop and think and care about the impact that your actions and planning would have on us now.

Thanks to you, I can still turn on a tap and get fresh, clean water but I am more aware of how precious that water is. The thought of letting water run down the drain, clean and unused is as abhorrent as throwing away healthy, fresh food.

I no longer wash my car with drinking water or flush it down the loo. Why did it take so long to see how wasteful that was?

My environment looks, on the surface, very similar to yours but beneath the surface many changes are in place... some small but powerful like the way our parks and green spaces are planted to prevent floods. Some bigger like the attention to what is in the products we use. We won't accept harmful chemicals as part of our washing powder or manufacture processes... we have a sense of pride in the part we all play.

You taught us about flushing the three Ps. Three Ps that we think of now are people power, planning and progress.

My wish for the next 20 years is that water is still fresh, clean and freely available but also valued, understood and there for generations to come.

It's been almost 20 years now, and it's hard to imagine the perceived worst-case scenarios we were presented with, and how gloomy things seemed before.

Water meters were installed in every household, and this led to a reduction in water wastage and was coupled with incentives toward saving water. It actually turned out quite fun trying to improve water usage each month for a while... And a lot of the new appliances use so little water compared to before now too.

A lot of the concrete areas of the city have been remodelled and are now combined green spaces with more vegetation and ground soil so the area actually looks better than it did before!

We were initially thinking about potential huge shortfalls of water, but it hasn't actually been too bad. We're more careful of water usage now but with the new tech and increased reservoir capacities we don't really have to think about it too much now. Even if it was a bit more of a thought for the first 10 years or so.

It's hard to think that small changes can lead to a big overall difference, but it has, and I'm glad we made the change sooner rather than later - looking at some other places that didn't.

Here's to another good 20 years.

7 Conclusions and reflections

The aim of this research was to help build Consumer Scotland's evidence base by providing insight into how consumers can and should be part of Scotland's transition to a more resilient and sustainable water sector. This final chapter sets out conclusions regarding the six objectives for the research.

Are consumers aware of climate change impacts in the Scottish water sector and do they understand the need for adaptation?

Most participants felt they knew little or nothing about the impacts of climate change on water prior to taking part in the research. Awareness that Scotland faces risks to its water resources due to climate change was very limited. This reflected that although participants had positive views of water in Scotland, they had not typically thought much about it previously, which they attributed to it being available on demand. Similarly, participants had generally not thought much about wastewater services previously unless they had a septic tank, although they were more aware of issues with drainage and surface water flooding.

When participants learnt more about climate change impacts they were struck by the scale of the issues, expressing alarm. They were surprised by the average amount of water used per person (180 litres per day) and that this is higher in Scotland than elsewhere in the UK, how "precarious" the water supply was, and the challenge ahead of managing wetter winters and drier summers. When they were presented with information about the combined sewer system in Scotland, there was some concern about the impact of CSOs into the sea, as well as surprise at the cost and the extent of sewer blockages. This meant that, after learning about the issues, participants saw a clear and urgent need for greater efforts for adaptation in the water sector.

What information is needed and in what format to support informed consumer decisions?

From early in the learning phase of this deliberative research, participants felt there was a fundamental need to change how people in Scotland value, use and conserve water. Education and raising awareness were consistently highlighted as important factors in empowering all consumers to do things differently, through improved understanding of the challenges Scotland is facing with its water resources, sewerage and draining systems due to the impacts of climate change, and knowledge of what they can do to help tackle these.

Participants felt that better informing the public could help the Scottish Government and Scottish Water to build support for future decisions. If consumers were made aware of the reasoning behind the decisions being made and why behaviour needs to change, it was felt that they would be more likely to be receptive both to new policies and to changing their own behaviours. Greater transparency, for example itemising water bills so that consumers can see how much money has been spent on investment, was also highlighted by participants as something that would give consumers confidence in how resources are being used.

Participants identified information needs around what the necessary water-related behaviour changes are, how behaviours can be changed, and the positive impacts of alternative behaviours. For example, they noted the need for more clarity on whether people should try to save water all year around or only in the drier summer months; clear guidance on what not to put down the toilet and why; why fat, oils and grease should not be put down the sink and what to do with these instead; and why and how to identify a leaky pipe.

By the final stages of the research, participants' focus had moved onto the specifics of how awareness-raising and support for consumers could and should be done. Discussions centred on how best to reach and engage different consumer audiences, how messages and stories could be framed (with mixed views on whether these should be positive and encouraging or use more 'hard-hitting' messaging), and the importance of evaluating campaigns to optimise their effectiveness. Participants thought that multiple platforms, formats and messengers would need to be used for communications to have a sufficiently wide reach. Suggestions included: making use of social media platforms, such as Instagram and TikTok; gamification to help drive consumer interest and engagement; greater use of storytelling and involving influencers and public figures in campaigns; as well as more traditional communication methods, such as community magazines or public information films. Participants also advocated targeting and tailoring communications to specific groups, such as young people, homeowners and renters and those living in rural and urban areas.

There was a clear appetite for community-level awareness-raising and engagement. Ideas for how this could be achieved included public engagement sessions of a similar style to the deliberative workshops; public roadshows; information being presented at existing community gatherings, and involvement in decision- and policy-making processes. Participants also felt that communities should be able to initiate this engagement.

[What are consumers' views on a range of policy options and solutions relating to water resources and services, sewerage and drainage?](#)

By the final stages of the deliberative research process, participants expressed a strong desire for Scotland's water sector to be looking to the future, putting solutions in place to tackle the impacts of climate change on water, sewerage and drainage, and innovating. They wanted to see far-reaching change driven by the Scottish Government and Scottish Water, including the importance of national strategies both for water supply and for sewerage and drainage, investment in infrastructure, and partnership working with each other and with local authorities and housing developers to drive sustained change. Participants were keen to see Scottish Government and Scottish Water investing in innovative approaches to tackling the challenges facing the water sector as a result of climate change, for example through greater use of digital technology in the monitoring of local and regional water usage and in metering (if introduced) and continuing to identify innovative solutions from other countries.

Regarding the proposed Scottish Government policy options, participants were broadly in favour of a new Water Efficiency Strategy, national water resource planning and more stringent standards for water saving measures in new build homes as possible actions. However, they questioned why these things were not in place already and whether they were ambitious enough, reflecting the strong sense of urgency they felt regarding adaptation.

Participants felt that action to reduce household and business water use and infrastructure investment would both be required to tackle the impacts of climate change on water resources. Given Scottish Water's ageing infrastructure, they recognised the need for investment and hard engineering solutions and wanted to see lasting solutions put in place.

Considering potential options to tackle the impacts of climate change on sewerage and drainage, participants expected that both hard engineering solutions and blue-green infrastructure solutions would be needed to tackle the risk of surface water flooding, and wanted to know more about the costs and impacts of the different solutions. Participants were generally positive about the potential for blue-green infrastructure (BGI) solutions to improve surface water drainage, which related to the multiple community benefits of this approach and the opportunity to involve communities more in the process. There was recognition that different BGI approaches may work better in different areas, and that which approach is optimal would depend on the needs of a given area, for example whether it was in a built-up or more rural area), what the community needs were and how urgently it was needed.

A strong theme that emerged from participants' deliberations was the importance of actively involving and working in partnership with local communities to tackle the impacts of climate change on water, sewerage and drainage in Scotland. Participants felt that communities should be able to suggest improvements, based on their local knowledge (for example, of specific locations where repeated surface water flooding happens), as well as giving their views on solutions being proposed by Scottish Water, local authorities or developers.

There were two policy topics where participants held widely differing views from one another, did not feel able to reach consensus and called for more information and evidence to be provided, reflecting the contentiousness and complexity of the issues. This indicates that both are likely to prove controversial among consumers, and that careful policy development and further work to understand and test how consumer concerns can be addressed would be required if Scotland's water sector wishes to look at these options further.

The first was the potential introduction of water metering for domestic customers. While there was some support for installing meters that are not linked to billing, on the grounds this could help people to reduce their usage and lead to them valuing water more, participants also questioned whether meters would make much difference to usage if not linked to billing, and whether these would be a gateway to metered bills eventually.

The second was the management of Combined Sewer Overflows (CSOs). Some participants saw Scotland's current approach to CSO management, where monitoring and upgrading is done for sewers identified as priorities, as acceptable, more cost-effective and a better use of available resources, although they also questioned whether improvements such as stepping up monitoring efforts and introducing better technology for mapping and modelling could be made. Others felt all sewers should be monitored for overflows, which related to believing the public have a 'right to know', concern about how the prioritisation of sewers is currently decided, or the potential environmental impact of CSOs.

[What are consumers' views on where responsibility should lie for tackling the impacts of climate change on water in Scotland, how urgently this needs to be done and what considerations should be taken into account?](#)

Participants felt strongly that everyone needs to play their part in tackling the impact of climate change on Scotland's water resources, sewerage and drainage systems: Scottish Government, Scottish Water, businesses and industry (including developers), local authorities, people and communities. The Scottish Government was felt to have a particularly important role to play, by leading, regulating and setting standards.

There was a clear appetite for leadership by example from the Scottish Government and Scottish Water. This was based on the view that it would not be fair or realistic to place too much emphasis on individual and community actions without larger-scale interventions from government and Scottish Water driving forward change too. Participants also wanted to be reassured that Scottish Government and Scottish Water were working effectively together in partnership.

There was felt to be a clear need for urgent action to tackle the impacts of climate change on water in Scotland, and to plan for the long term, as what is done now will impact both on everyone living in Scotland at the current time and on future generations. Participants thought that change would be able to happen more quickly on the behaviour change front, while infrastructure investment would take longer to make a difference. They also wanted to know that Scottish Water was investing in solutions that would last into the long term, rather than short-term 'sticking plaster' solutions.

Affordability was a key concern raised by participants throughout. Price rises for customers were seen as inevitable to fund necessary infrastructure improvements, but there was a strongly held view that negative impacts on people who can least afford to pay should be avoided. Participants wanted to see an equitable approach, where vulnerable consumers and those on the lowest incomes are protected.

[What are consumers' motivations and opportunities to make changes to their water behaviours to be more sustainable, and what support do they require to do so?](#)

There was widespread recognition that behaviour change from consumers and businesses would be an important factor in tackling the impacts of climate change on water in Scotland, by reducing demand for water, lessening strain on the sewerage system and minimising the risk of surface water flooding. It was felt there would be a broad openness among the public to doing things differently with appropriate support. However, participants also recognised change is likely to be challenging, as some consumers may not want to change and others may be less able to, such as consumers on lower incomes, those with a disability or health condition and those who rent rather than owning the property they live in or do not have access to private outdoor space.

Awareness-raising was seen as a precondition to changing behaviours and was felt to be especially important in regard to the sewerage system, as wastewater was thought to be a more 'invisible' service. However, participants recognised that awareness-raising will not be sufficient on its own to support behaviour change and needs to be coupled with a broad range of actions to support people. They felt support should include: the provision of information and guidance to help people make the necessary changes; better access to devices and technology that can help consumers to monitor and reduce their water use (ideally low-cost or free of charge); introducing stricter standards for manufacturers, such as stopping companies labelling wipes as flushable; strengthened regulation for developers; improving drainage legislation and enforcement; installing water butts in communities and new builds; and role modelling, with visible leaders 'at the top' of Scottish Water and Scottish Government being seen to model the desired water and sewerage behaviours themselves.

Participants recognised the importance of social norms in shifting behaviours, highlighting examples of effective campaigns that have led to certain behaviours being seen as antisocial, such as dropping litter, drink driving, and smoking. They suggested that effective communications campaigns should similarly make certain water behaviours socially unacceptable (although it should be noted that as many water behaviours take place in the home, social norms may be less powerful in changing behaviours than they are for more public behaviours such as littering).

How effective was a deliberative approach in enabling members of the public to engage with this topic?

The deliberative approach used for this research was ideally suited to enabling members of the public to engage with a complex, multi-faceted and often unfamiliar topic. The opportunity to learn from and have dialogue with specialists, and with each other, helped participants to formulate their views on the most important considerations to them. This allowed them to develop thoughtful conclusions for the future of Scotland's water resources and sewerage and drainage systems.

In total, participants took part in 15 hours of deliberation across 5 dialogues. The greater amount of time and space for discussion involved in a deliberative approach – in contrast to some other qualitative approaches, such as focus groups - ensured that the key areas were introduced gradually. This allowed time for participants to fully immerse themselves and build their understanding before meaningfully responding to the questions and tasks.

Over the course of the dialogue, this learning raised new issues or new ways of looking at things for some participants. For example, there was surprise at the possibility of water shortages, the scale of the infrastructure challenges to deal with water shortfalls, and how little rainfall is captured currently. For others, a deepening understanding of water resources and sewerage and drainage systems helped to consolidate existing views on water, while developing an increased sense of the urgency and an appreciation of the need for collective action to meet the challenges ahead, guided by clear leadership and communication from decision-makers.

By the end of the process, there was broad agreement that how people value, use and conserve water must change if the supply is to be sustained. This conclusion was founded upon participants' own experiences of being part of the dialogue and their increased understanding of the issues. Feedback from participants indicated they felt that taking part in the dialogue gave them a better understanding of the water sector, having had the opportunity to engage with specialists and learn from each other's experiences. They also felt supported through the dialogue, with smaller group discussions giving them space to share their views.

It was striking that, despite the scale of the challenges facing Scotland's water due to climate change impacts, participants were not defeatist. Rather, they expressed their desire for Scotland's water sector to look to the future and put solutions in place rapidly to adapt to the impacts of climate change on water, sewerage and drainage, including innovative approaches. The research findings indicate that, given the time and space to consider the issues, consumers are clear that they themselves can and should be part of Scotland's transition to a more resilient and sustainable water sector.

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