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Water Retrofit Policies Review – The Household Perspective

R&D Technical Report FD2649/TR

Produced: May 2010

defra
Department for Environment
Food and Rural Affairs

Defra's Flood and Coastal Erosion Risk Management R&D Programme

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Statement of use

This report is an outcome of Defra's Flood & Coastal Erosion Risk Management R&D Programme. It presents the findings of project **FD2649: Water Retrofit Policies Review – The Household Perspective**. The project's objective was to provide an evidence base on householders` attitudes towards water-related retrofit measures across three domains: water availability, surface water management and flood risk management, water pollution and quality. This work is focused on the specific detail of reactions to water retrofitting propositions. The work involves an exploration of responses to water measures and behaviours in the home as well as at a community scale

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Water Retrofit Polices Review – The Household Perspective

Research for Defra, May 2010

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Ipsos MORI

waterwise

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Introduction

This research, undertaken by Icaro Consulting in partnership with Waterwise and Ipsos MORI, explored householders' attitudes towards water retrofit measures. Such measures were explored in the context of four key domains: water conservation, flood risk management, sustainable drainage systems (SuDS), and water pollution.

The policy context

The impacts of climate change on water use, control and supply in England have been brought into sharp focus in recent years with the drought in South East England in 2004-06 and the floods of 2007. The Government has responded with Future Water[1], setting out a water strategy for England and a vision for what the water sector will look like by 2030.

Future Water's vision cannot be delivered by Government alone and so householders, alongside other stakeholders, will have a significant role to play. They will increasingly be asked to consider how their decisions impact on water use, whether in terms of the water-using appliances they install, what they pour down the sink, and how they water and drain their gardens.

The Government's Housing Green Paper[2], the Code for Sustainable Homes[3] and amendments to Building Regulations are all helping to integrate water measures - from rainwater harvesting through to Sustainable Drainage Systems (SuDS) - into new build homes. In addition, retrofitting water measures in existing homes also has the potential to form part of the wider policy mix. In response, Defra is considering a range of homeowner initiatives to support and encourage retrofitting. The challenge for government is to better understand homeowners' attitudes and behaviour so that it can design effective initiatives and interventions.

Research objectives

The key research objectives are outlined in Table 1. In addition to specific water measures, the research also tested a suite of policy interventions, from information campaigns through to policies involving both incentives and compulsion. And, furthermore, a series of cross-cutting questions are important to the research, including: the interplay between the technical and behavioural impacts of any given measure; whether the measures are perceived to offer benefits to individual homeowners or the wider community; and whether perceptions differ if the measures are applied in a new build or retrofit context.

[1] *Future Water: The Government's Strategy for Water*. Defra, 2008
[2] *Homes for the future: more affordable, more sustainable*. Housing Green Paper, CLG (2007)
[3] http://www.communities.gov.uk/planningandbuilding/buildingregulations/legislation/codesustainable

Table 1: Research question
Water availability
i. To understand homeowner attitudes towards water conservation, especially in relation to installing and using rain water harvesting and grey water systems in the home.
ii. To explore how likely owner-occupiers are to consider water efficiency and conservation with/without a water meter
Surface water management
i. To explore owner-occupiers attitudes towards retrofitting SuDS in their properties, taking account of voluntary and regulated actions.
ii. To explore owner-occupiers perceptions and attitudes towards SuDS in new builds/redevelopments – do they see them as an effective measure for tackling flooding, can they create a more pleasant place to live, and do they add or detract from house values? Would they consider purchasing a home served by SuDS? What concerns do they have? What would overcome them?
iii. To explore owner-occupiers opinions on responsibility for SuDS maintenance
iv. In addition to SuDS, many homes have features such as garden walls and embankments that can act as flood defence measures. What will encourage homeowners to value and look after the features that provide them (and their neighbours/ neighbourhood) protection from flooding?
Water pollution and quality
i. Explore owner-occupier perceptions and attitudes towards polluting household drains. Are they aware how their actions may affect their household or the broader community, especially the risk of local flooding? Do they care?
ii. Explore current behaviour of owner-occupiers. What do homeowners do now?
iii. Explore triggers or levers that could lead to a positive change in owner-occupiers behaviour
Flood risk management
i. Explore perceptions, attitudes and behaviour towards how householder actions (or inactions) can help manage flood risk on a wider community basis. The three other issues to be explored in this study each provide actions that owner-occupiers can undertake to help manage flood risk.
ii. Explore levers that can help respondents to understand their potential impact on communities downstream (e.g. awareness, education), and to take positive action, especially where individual properties may not be at risk of flooding.

Methodology

The research comprised four phases of work, detailed below.

I. Rapid Literature Review

A review of the evidence base was undertaken to identify and appraise key sources of existing household research. The scope of the research was limited to the past ten years and to the UK (with one or two exceptions where the research was considered to have high value/clear cross-over to the UK). The relevance of the literature was assessed according to the following factors:

i. Whether it specifically covered household retrofit programmes;
ii. Whether household attitudes and behaviour were discussed; and

iii. Whether the literature was relevant to either:

- Water availability and conservation
- Flooding and flood resilience, and
- Surface water drainage, including SUDS.

A four-category system of categorisation was used, as follows:

Highly Relevant: sources that met all of the criteria, from a recent and credible source;
Relevant: sources that met at least two of the criteria, from a recent and credible source;
Partly Relevant: sources that met only one of the criteria; and
Not Relevant: sources that met none of the criteria (e.g. the subject matter was technical, not attitudinal or behavioural).

A summary of the key findings is provided in Section 1, and the full bibliography is appended.

II. Deliberative Forums

A total of 89 participants took part in four separate, day-long deliberative forums (each involving 18-25 participants), held in March 2010. Each forum was divided into three smaller groups of 6-9. Recruitment was undertaken by the specialist recruitment agency Criteria, using a face-to-face approach and according to a recruitment questionnaire. Participants were paid a £125 'thank you' for attending.

The locations of these forums were Hull, Watford, Thatcham and Cambourne. These locations were selected to provide: (a) an urban/rural mix; (b) a geographical spread across England; (c) locations in close proximity to demonstration homes (i.e. for the subsequent site visits); and (d) a sliding scale of surface water flood experience (with Hull providing - by virtue of the extensive flooding in 2007 - one end of the spectrum, and Watford – with no recent experience of significant flooding – the other). While surface water flood experience was an important analytical dimension (i.e. to see whether this has any material impact on attitudes and behaviours in respect of SuDS measures), the research deliberatively screened out individuals who had been subject to a severe flood episode in their own home in order to avoid skewing responses.

Recruitment criteria were also set to ensure a spread of metered and non-metered properties[4], and to allocate participants according to Defra's Segmentation Model[5], an environmental segmentation that divides the public into seven clusters, each sharing a distinct set of attitudes and beliefs towards the environment. The research combined the seven segments into three 'uber' segments, as follows:

- **Segment 1** – the most environmentally receptive group, comprising Defra's 'Positive Greens' and 'Concerned Consumers';
- **Segment 2** – a mid-receptive group comprising Defra's 'Sideline Supporters', 'Cautious Participants' and 'Waste Watchers';
- **Segment 3** – The least environmentally receptive group, comprising Defra's 'Stalled Starters' and 'Honestly Disengaged'.

[4] Roughly one third of participants had a water meter
[5] http://www.defra.gov.uk/evidence/social/behaviour

Each segment was represented in each forum (Table 2). This consistency allowed for comparisons to be drawn across the forums, to observe whether trends in one segment (e.g. high receptivity to an option among Segment 1 participants in Watford) were consistently repeated, or contradicted, in the others.

Table 2: Environmental Segmentation across the Forums

	Forum 1 – Watford	Forum 2 – Hull	Forum 3 – Cambourne	Forum 4 – Thatcham
Group A	Positive Greens/ Concerned Consumers	Positive Greens/ Concerned Consumers	Positive Greens/ Concerned Consumers	Positive Greens/ Concerned Consumers
Group B	Sideline Supporters, Cautious Participants and Waste Watchers	Sideline Supporters, Cautious Participants and Waste Watchers	Sideline Supporters, Cautious Participants and Waste Watchers	Sideline Supporters, Cautious Participants and Waste Watchers
Group C	Honestly Disengaged and Stalled Starters	Honestly Disengaged and Stalled Starters	Honestly Disengaged and Stalled Starters	Honestly Disengaged and Stalled Starters

A range of stimulus material was developed to introduce and guide the discussion, and to make the options tested as 'real' as possible. These materials, presented under separate cover, outlined key details such as costs, payback times and installation considerations. A pre-task 'water pack' was also given to participants to complete prior to the forums in order to gather contextual information (e.g. their individual flood risk according to the Environment Agency website, current in-home water-saving behaviours, and so on).

III. In-home depth interviews

25 participants – drawn from all four locations – had follow up in-home depth interviews. These one-to-one interviews allowed for an exploration of how the measures discussed in the forums 'made sense' (or not) in the context of participants' homes and daily lives. Interviews lasted 45 – 60 minutes on average, and participants were paid £35 as a 'thank you'.

IV. Site visits

16 participants (drawn from those subject to the depth interviews) were taken on a site visit to see various water measures in situ. Like the in-home depth interviews, the purpose of the visits was to make the measures as real and tangible as possible, so that participants could respond to the look and feel of, for example, permeable paving and green roofs. The visits were to:

- **BRE Innovation Park (Watford forum)** - where a number of water-related technologies and measures are showcased (albeit in the context of new build developments);
- **Lamb Drove (Cambourne forum)** - a community-level SuDS trial in Cambourne, operated and maintained by Cambridgeshire County Council.

Participants were paid a £40 'thank you' for attending.

Outputs

This written report draws together the findings from each of the four strands, presenting them in a largely qualitative format (incorporating a series of indicative quotes).

The report also includes, where appropriate, other sources of feedback. For example, following the forums each participant was asked to rate the measures on a scale of 0 – 10 (0 = very negative; 5 = neutral; 10 = very positive), both in terms of retrofitting their own home as well as moving into a home (not necessarily a new build) with the measures already installed. These results are presented in a quantitative fashion (with percentages) to give some indication of the spread of opinions across participants, but in no way is this intended to represent a robust quantitative analysis.

In addition to this report, a DVD film has been produced – drawing on footage from the forums, the in-home depth interviews and the site visits to BRE Innovation Park and Lamb Drove. This was produced by Nice & Serious Limited, and the footage can be seen at www.icaro-consulting.co.uk

This report is divided into seven sections, as follows:

1. Findings from the rapid literature review

2. Perceptions of flood risk

3. Reactions to SuDS options

4. Reactions to water conservation options

5. Attitudes to water pollution from domestic sources

6. Reactions to water retrofit policy options

7. Conclusions

SECTION ONE

Rapid Literature Review

This section of the report sets out the key findings from the rapid review of the evidence base. The review finds good, albeit uneven, coverage across sustainable water issues, with the exception of SuDS which is under-research by comparison (Table 3). The review shows that:

- Studies on water conservation represent the largest share of the literature, reflecting the interest from Government and water companies, as well as the influence of Waterwise (which accounts for a significant proportion of the sources). However, there is a notable research gap in the literature in relation to retrofitting and, in particular, the interplay between technical measures and behavioural responses;

- Flooding is a topic that has been increasingly well researched, particularly since the 2007 floods. A significant proportion of this literature is focused upon flooding in general, followed by river and coastal flooding. In contrast, surface water flooding has rarely been researched as a separate and specific issue in its own right. Indeed, the smallest proportion of the literature (10%) relates to surface water drainage and – more specifically – to SuDS (which only two sources in the literature covered).

Table 3 – Thematic spread of available literature

Theme	Number of documents	%
Water conservation	38	43%
Surface water drainage	10	10%
Flooding	28	32%
Not classified	13	15%

This section of the report now goes on to explore specific findings under each of these headings.

A. Water Conservation

While the subject of water efficiency – as a whole - has been researched in depth, the evidence base is unbalanced in its distribution across different aspects of the topic. For example:

- There is an abundance of research in relation to habitual in-home behaviours (e.g. focusing largely on showering rather than bathing, turning off taps when brushing teeth, etc), to the extent that there would appear little need for any additional research in this area at the current time (other than action-based research designed to assess the impact of specific programmes of interventions);
- There is a smaller, but growing, body of research in relation to larger in-home water conservation systems (e.g. rainwater harvesting);

- There is a scarcity of literature in relation to the impact of retrofit schemes (i.e. the main focus of this research). There has been some recent research in the context of retrofitting smaller water efficiency measures (e.g. low flow taps and shower heads), as well as some lessons that can be usefully drawn from research exploring in-home energy retrofits (e.g. DECC"s Big Energy Shift). A notable gap is the research base is the interplay between technological retrofits and behavioural responses (i.e. does the latter, in practice, reduce the theoretical benefits of the former).

We provide a brief summary of what the literature says about householders; general perceptions of water, given its importance in establishing the context within which retrofitting decisions will be made. We then summarise the literature in relation to water efficiency systems (e.g. rainwater harvesting), before focusing on the literature that exists specifically in relation to retrofitting.

I. General perceptions of water

A major piece of qualitative research by Synovate for Defra (2009) provides one of the most authoritative accounts of how the public in the UK currently conceptualise their water use. The research concludes that, overall, there is **limited awareness** of both water scarcity and the environmental implications of water usage. People in water stressed areas worry about hose pipe bans during periods of hot weather but have few concerns beyond this, and there is very low awareness of the links between water consumption and other environmental issues (e.g. the carbon footprint associated with treating, supplying and heating water).

The research also found some practice of **basic water efficient behaviours**, such as turning off taps or showering instead of bathing. The motivations to adopt these behaviours were often lifestyle fit (although research by Ipsos MORI in the Thames Gateway (2007) also found that dislike of "waste" in general and a wider global perspective on how water is valued elsewhere in the world are motivating factors for some). Patterns of use are – in general - based on ingrained habits, beliefs that water is plentiful and a right, as well as a lack of conscious awareness and knowledge about the issue. Region has an impact with those in water stressed areas tending to be more aware of water scarcity issues (although even here awareness was still not high).

The literature has much to say on the subject of **water metering**. Many sources point to a positive impact by virtue of providing households with a financial incentive to reduce consumption. For example:

- Research by Savills Research/YouGov (2009) shows that many more people agree that water saving is important to save money (92%) than think that saving water helps the environment (48%). Furthermore, Walker (2009) found that respondents with water meters are also more likely to say they have taken other measures to reduce their use of water such as having a water butt in the garden, reusing bath water or not watering the garden as much.
- There is also general agreement – among those who are currently metered and those who are not - that metering is/would be effective in making water use a higher profile issue. However, there is a clear difference of opinion between these groups when it comes to whether water meters are a fair way to pay - only 39% of households without meters think they are fair, in contrast to 78% of those with meters.

Even though there is consensus in the literature that water metering has an impact, some sources question its significance in the absence of other supporting interventions. For example, a Waterwise position statement (2008) concluded that there is insufficient evidence to suggest that metering on its own leads to a sustained, and sustainable, change in consumer behaviour. Furthermore, Synovate's research (2009) found that while metering increased water efficient behaviour to some extent, the low cost of water (relative to other utility bills) is not high enough to drive significant behaviour change.

The literature suggests mixed attitudes to **block tariffs** - research by Ipsos MORI (2007) suggests consumers are cautious of the underlying motives (potentially driven by a level of mistrust in water companies), whereas research for the Consumer Council for Water (2007) suggests that there is support for a rising block tariff.

In terms of consumers' preferences for a **behavioural or technological-led approach**, the research in the Thames Gateway (Ipsos MORI, 2007) gave participants two possible scenarios to achieve water neutrality. The first, "Flush and Go", focused on technology with a universal retro-fit programme. The second, "Water Watch", sought to influence behavioural change with education and information campaigns plus compulsory water metering with variable tariffs. Participants found the technological solutions more appealing due to their convenience (i.e. once in place they did not have to think about them). However, concerns were raised that a universal retrofit programme could be seen as too interventionist, as well as questions about who would bear the cost. The education and information approach of "Water Watch" also had strong appeal, although participants argued it would have to be sustained to have any impact on attitudes and behaviour.

II. Rainwater harvesting and grey water recycling

There have been three major explorations of rainwater harvesting and grey water recycling in the past few years, all of which point to **positive in principle reactions**. This is particularly true for rainwater harvesting, whereas the acceptability of grey water recycling appears closely tied to what the water is used for. For example:

- Research by Savills Research/YouGov for Waterwise (2009) found that 60% of households said they would like to have a rainwater harvesting system in their home, while 50% said the same of grey water recycling systems for toilet and outdoor use. However, support for grey water recycling fell abruptly (to around one in three households) when the use of the grey water was extended to supply washing machines.
- Recent research by Icaro Consulting the UK Green Building Council, Zero Carbon hub and NHBC Foundation (2009) found – in the course of exploring sustainable district infrastructure – that reactions to the water elements of the proposition were the most positive (more so than the energy and waste elements). This was particularly true of using rainwater harvesting for flushing toilets/watering gardens (89% positive), as well as using grey water for flushing toilets/watering gardens (84%). The one potential exception was the use of grey water to supply washing machines - while the majority remained positive (65%), a significant minority became negative (19%). Indeed, focus groups confirmed that while some were unfazed by the prospect of grey water across a range of uses, a significant proportion – particularly younger respondents - harboured significant concerns.

- Research by the NHBC Foundation (2008) found that over three-quarters of homeowners would be happy to use recycled grey water to flush the toilet (78%), with almost as many also happy to use grey water in the garden (73%). There was far less interest in using grey water in washing machines, with less than a quarter signalling their approval of this application (24%). Consumer acceptance of using rainwater for toilet and outdoor use was also high (80% and 78%, respectively) and while the proportion comfortable with using rainwater to supply the washing machine also falls back, to 40%, this is less marked than for grey water.

III. Retrofitting

The evidence base in relation to public attitudes to water retrofitting is decidedly thin. There are some interesting findings amongst the evidence that does exist, although caution needs to be exercised in interpreting the findings because of the small number of studies they are based on.

- Retrofit schemes work best when developed **in partnership** with either social housing providers or energy supply companies (Waterwise, 2009);
- A Consumer Council for Water study (2006) reported that, in a study carried out in four locations in the south east of England, attitudes to metering and retrofitting water saving devices was strongly influenced by **historic resentment towards water companies**;
- Mackenzie-Mohr (2006) concluded that, when the price of water overall was low, the perceived **cost** and **inconvenience** of installing low flow showerheads was a barrier. The most successful retrofit schemes involved **direct installation** of retrofit devices by qualified personnel, rather than encouraging customers to fit them on their own;
- The literature notes the importance of targeting households at **moments of change**, when they are intending to refurbish their homes or when they have a meter installed for the first time (Waterwise, 2007). The same research also highlights the importance of portraying retrofitting as socially desirable in order to create new **social norms**. The research contends that consumers are more likely to adopt environmental practices if their neighbours have successfully adopted the measures (although also notes that this process can work in reverse, i.e. consumers will be less inclined to invest where there has been negative coverage);
- On a wider point relating to delivery, the literature notes the potential importance of **joining up and integrating** water retrofitting approaches with efforts in similar fields (e.g. energy) so that the householder is presented with a package of options that form part of a wider initiative on sustainable housing/living (Downing, T et al, 2003);
- Finally, and drawing on recent literature from the domain of energy, the Big Energy Shift (DECC, 2009) found multiple barriers to energy retrofits, most notably the upfront costs and concerns over payback time, the risk of taking up new 'untried' technology, and worries about disruption to the aesthetics of the house and everyday life (both in installation and living with the new technology). The recommendations to encourage mass take-up therefore included: **reduce upfront costs** to the householder wherever possible; increase perceptions of **immediate wins** and **long term value for money** through the way that pricing and payments are designed; **normalise the technologies** through exemplars and open homes; and develop the supply of **aesthetically mainstream products**.

B. Flooding

A significant proportion (31%) of the literature concerns flooding, with much of this recent since the 2007 floods. However, very few sources mention retrofitting directly, and much of the research has been focused on flood defences and the response by public authorities, rather than households taking flood resilience measures themselves. The authoritative research in this domain is led by Harries (various, 2007-9).

There is a consensus in the literature that the main factor driving behavioural responses to flood risk is **personal experience of flooding**. People with some experience of household flooding are more than six times as likely to take resilience or protection measures (only 6% of those with no experience of flooding have taken any action to prepare for floods and reduce possible damage, compared to 39% for those who do have flood experience).

The literature also points to other influences that hinder personal action:

- The desire to **feel secure** and maintain the **visual look of the home** (conforming to idealised social norms of what a home should look like) deters people from taking actions that would reduce the actual physical damage of a hazardous natural event. In other words, there is a conflict between measures that protect physical security ('safety' in Maslow's hierarchy) and those that protect ontological security (referred to by Maslow as 'esteem');
- 56% of householders in flood risk areas say that measures are **too costly** and 42% say that collective flood defence measures have already been put in place, **negating the need** for household-level measures (suggesting rebound impacts and unintended consequences);
- Many people **doubt the effectiveness** of the measures, even when they are recommended and paid for by the State. This stresses the importance of establishing and protecting public belief in the ability of resilience measures to provide emotional security; and
- Threatened **withdrawal of insurance cover** can be a strong potential incentive for implementing protection (since the very act of taking out of insurance can block other actions, since households feel that they have sufficiently addressed the risk).

Harries' analysis suggests that government policies to encourage take-up of protection and resilience measures should initially concentrate on people who have been **flooded a number of times**. People who have been flooded only once are almost equally as unlikely to take measures as people who have never been flooded.

Recent research by Ipsos MORI for the Environment Agency also suggests that there are moments of heightened receptivity to undertake flood mitigation measures – linked to large events – which provide key **windows of opportunity** to encourage uptake of such measures. This accords with findings in the field of risk (e.g. Gardner, 2009) that recent recall of a high profile event is a powerful psychological heuristic (often referred to as the "Example Rule"). The Example Rule's influence is such that it can lead to disparities between actual risk and perceived risk – for example, levels of earthquake insurance rise sharply immediately after an earthquake – a point where actual risk is lower – but then tail off over time as the memory of the example fades but when actual risk is once again increasing.

C. Surface water drainage

Only 10% of the literature is focused on surface water drainage in its own right (even though it is often inextricably linked to flooding and so arguably much of the literature here is relevant, to varying degrees). What is clear is that very few studies have been carried out in the UK to establish public acceptance of SuDS schemes. Furthermore, the limited studies carried out so far have particular features (social deprivation, weak community bonds and amenity concerns) that make drawing more widespread conclusions from them very difficult (Nowell/Bray, 2005). The following conclusions can, however, be drawn on a tentative basis:

- **Lack of awareness** about SuDS is very high - as high as 100% in certain areas that have been subject to research (Apostolaki/Jeffries study, 2005). Where information was provided, local residents felt that the information provided was inadequate, while 85% requested further information on the systems. Lack of awareness is not just linked to strategic community-level SuDS - research by Ipsos MORI for the Environment Agency (2009) demonstrates that a third of respondents have no idea what type of drainage system their own property has (with 16-34 year olds and women least likely to know).

- Apostolaki's research found that the public hold **strong views** as to what they like or dislike about SuDS, which is not dependent on familiarity with SuDS. The **amenity, recreational value and aesthetics** of schemes are major factors in determining public acceptability. On that basis, attitudes to ponds were more positive than to swales, because the perceived benefits (e.g. attraction of wildlife; improved amenity and recreational value of the surrounding areas; improvement of the landscape) were considered more obvious. In contrast, scheme function and efficiency were only of primary importance in areas knowingly facing flood risk. In contrast, child safety around water bodies and fly tipping consistently appeared as areas of concern in relation to SuDS.

- Finally, the Apostolaki/Jeffries research also shows the importance of **information provision**, which influenced attitudes on sensitive issues such as safety. This research lends support to other (technical) sources in the literature which argues for the need to publicise and inform the public about SuDS initiatives.

SECTION TWO.

Attitudes to Flood Risk

This section of the report sets out participants' headline perceptions of flood risk, specifically in relation to surface water flooding. In doing so, it sets the contextual backdrop for the reactions to the SuDS measures that follow in Section 3.

I. Perceptions of flood risk

The vast majority of participants did not feel at risk of flooding, a view they had formed in two main ways:

- They have never personally experienced flooding in their home (even in 2007 when the country as a whole – they acknowledged – had experienced major flooding); and/or
- They believed that the characteristics of their immediate area, in terms of topography or distance from the coast/a river, protected their property.

Some did acknowledge that surface water flooding could happen to anyone although this was very much a minority view. In addition, while participants were comfortable with surface water flooding in theory, in practice they kept returning to risk factors like proximity to rivers.

> *I'm not really concerned about floods in my local area purely because there's never been a history of it happening. It's a very hilly area as well and I live on quite a slope so the chance of floods is quite small.*
>
> Male, Segment 1, Watford

> *I just can't see it happening here, because we're not near a river, we're not relatively low, we've never had any flooding issues, so I can't see it. I mean, that's not to say that it won't happen, but I've never seen it happen, even when it's rained hard and things like that.*
>
> Female, Segment 2, Cambourne

Participants in Hull proved, to some extent, to be an exception - with some participants very alive to flood risk as a direct result of having family or friends who were affected by the flooding in 2007. They acknowledged, however, that they hadn't really thought about it much before then. In contrast, participants in Watford, in line with their actual experience, were the least concerned.

> *I've never really thought about flooding other than flooding from a river. I think certain areas are going to flood come what may, because of where they're situated, while other areas, like this, are probably never going to flood. I may be wrong, but that's how I think.*
>
> Female, Segment 3, Watford

I hadn't thought about if before, but a lot changed with the floods. A good friend of mine, she became ill, and she had to move into a small caravan, so it opened my eyes a lot with the floods. ... So, I have looked into it, and I would not move to where a house had been flooded.

Female, Segment 1, Hull

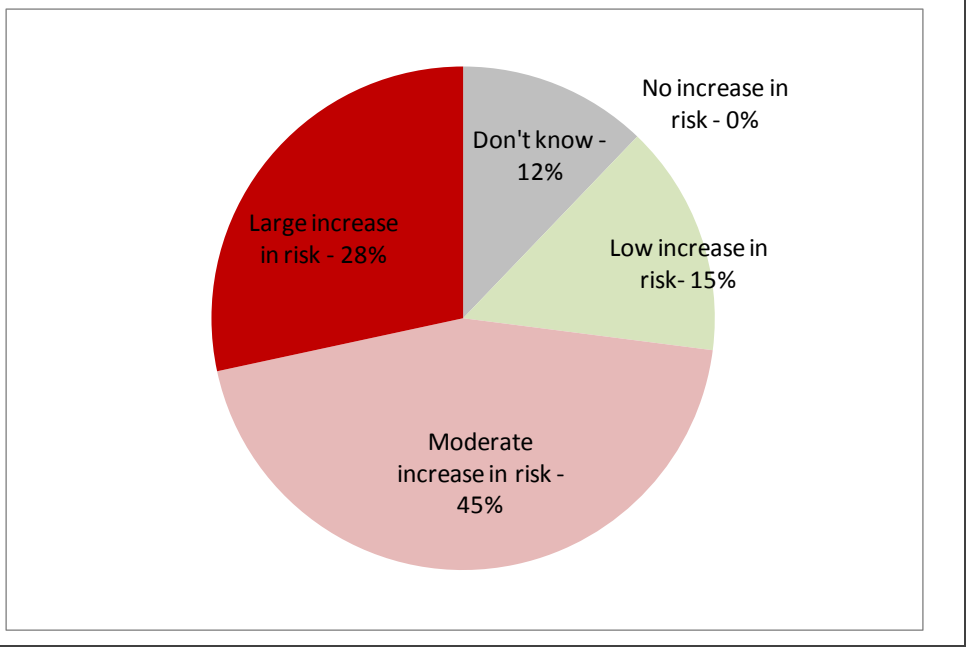
II. Perceptions of future flood risk

The majority of participants acknowledged that climate change would lead to a greater risk of flooding. This is also reflected in the analysis of the pre-tasking questionnaire (Figure 1), which demonstrates that around one in four (28%) think climate change will lead to a large increase in flood risk, and almost half (45%) who believe that it will lead to a moderate increase in risk.

Figure 1 – Perceptions of risk of future flooding due to climate change

***Question**: To what extent do you think climate change will increase the risk of flooding?*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves



Those participants in the more environmentally-receptive Segments 1 and 2 were more likely to cite the potential impact of climate change on flooding, whereas there was more scepticism among participants in Segment 3 who – rather than rejecting climate change outright - doubted that the impacts would be as severe as some had suggested. Some participants also cited alternative explanations, including poor maintenance of drainage systems, land management practices by farmers and a cycle of increasing population growth, urbanisation and car ownership leading to fewer green spaces:

I think it will get worse in the future because of the general climate changes that we see, you know heavier rain falls, more snow, and warmer days, just think it's very evident that things will change.

Female, Segment 1, Watford

It [climate change] might make a difference but I think it's exaggerated.

Female, Segment 3, Watford

More people are paving their driveways because there are more cars and parking is difficult. I just think it all has a knock on effect.

Male, Segment 2, Hull

III. Flood resilience measures

Very few participants had done anything to make their homes more flood resilient and, even among the handful who had adopted measures, most had done so for reasons unconnected with flood protection (e.g. having tiles instead of carpet because it was the design they wanted, or choosing gravel rather than concrete for the driveway because of security benefits). Another participant had installed a soakaway as a condition of planning consent for a home extension. In fact, only a few individuals in the Hull Segment 1 group had pro-actively taken measures in response to the floods in 2007 (including the removal of carpets downstairs, putting vented caps on cavity vents, and raising electricity points) and, even here, the majority had taken no action.

The reasons cited for a lack of action correspond closely to Harries' findings (Section 1), namely:

1. Without personal experience they do not feel directly at risk: this was as true in Watford (with very little incidence of flooding) as it was in Cambourne, Thatcham and – with only a few exceptions – Hull. Personal experience is key, since *even those* whose immediate surrounds had been flooded, but not their own home, assumed that this meant that they would not be flooded in future (i.e. it would be the same houses flooding again).

2. They could be spending unnecessarily: participants had reservations about making any kind of significant financial outlay to guard against a potential risk that may never happen. For many, having insurance in place met the need to safe guard against low probability / high impact events, and they could see no reason why they would need to take action beyond this.

3. Impact on the aesthetics of the home: participants were loathed to undertake any measure that detracted from the look and feel of the home. Once again, lack of personal experience reinforced the view that undertaking aesthetically negative changes were not commensurate with the level of risk they faced.

4. Doubts over effectiveness: the sense that flood protection measures would prove insufficient in the event of a serious flood was evident across all participants, *even those* who had already undertaken measures themselves.

IV. Responsibility for flooding

There was little evidence of a resigned acceptance of flooding, with participants believing that it is both necessary and possible to actively manage the situation rather than accepting periodic flood events as a fait accompli. Flood protection was largely felt to be the responsibility of other agents, including water companies (for maintaining drains), Government (for providing physical flood defences) and the council/developers (for preventing development in flood risk areas and ensuring that sufficient drainage infrastructure is built into any new plans). The latter, in particular, was a recurring theme across the forums.

> *There has been a massive amount of new building without the proper infrastructure, it should have been foreseen [by the local authority].*
>
> Male, Segment 1, Cambourne

Prompted to think about their own responsibility, views were decidedly mixed. Some felt that too much responsibility – across a range of issues – is now placed on individual homeowners. Others were more accepting that they had a role to play, typically in relation to their own homes (even though, as previously noted, they have not yet taken any actions beyond home insurance).

> *The Government and industry have not done enough and now suddenly it's all our responsibility.*
>
> Male, Segment 3, Thatcham

The research also explored the interrelationships and tensions between developments in one area impacting on communities downstream. Unlike in relation to their own homes, where participants were comfortable discussing their own personal risk and the boundary of where their own responsibility begins and ends, the issue of cross boundary fairness was difficult for them to conceptualise and – in the absence of any specific examples or planning application – was too abstract to elicit detailed discussion.

However, they did acknowledge the potential for cross boundary impacts (noting examples of houses from their own area that were located e.g. on low ground). And, as a matter of principle, they thought it was only fair that steps be taken to protect these areas. The main caveat was if they were personally put in a position of having to accept something unsightly, obtrusive or to their detriment. Such a caveat is interesting but – in the absence of a specific example to explore a trade off situation – it was not possible to establish what constitutes a "fair and proportionate" flood mitigation measure as opposed to one that is an unfair imposition. The local authority was widely seen as the best arbitrator of any tension given their strategic overview of flood risk, although several participants did not feel that their local authority always planned on this basis:

> *[The defences] protect 70-odd houses but the number getting flooded further down is far more than that. I'm just not sure they considered it all. They seem to get a few ideas and go with that rather than looking at the bigger picture and plan it all out.*
>
> Female, Segment 1, Cambourne

SECTION THREE.

Sustainable Drainage Systems (SuDS)

This section of the report looks at reactions to SuDS, providing an overview of the key motivations and barriers, before setting out specific reactions to three options – permeable paving, green roofs and 'rain gardens' (incorporating ponds, swales and soakaways).

I. Overview

The research reveals a notable divide in reactions to the three options. On the one hand there were positive *in principle* responses to both permeable paving and 'rain gardens', which applied equally across the forums and the Defra segments (with no discernable pattern according to environmental receptivity). In contrast, there were notably divided responses to green roofs and, moreover, there was a clear divide between Segments 1 and 2 (who were more positive, although by no means universally so) and Segment 3 (who were generally negative). The research identifies the following as key influences on reactions to SuDS and the propensity to retrofit them.

Awareness: there is very low awareness of SuDS, but the concept is familiar, easy to grasp and there are no in principle barriers of note. In fact, the discussions pointed to curiosity and demand among participants to learn more about strategic SuDS measures in their area (supporting Apostolaki's (2005) conclusion about the importance of information provision).

> *I didn't realise in these new housing estates when they have these big ponds and pools that that's actually to do with surface water.*
>
> Female, Segment 2, Cambourne

> *They've done all this work in a field near me and it doesn't seem to have worked because it floods all the time. I thought they had made a right mess of it. But quite possibly they could have done this (SuDS) and that's why it fills up with water. They should tell you, it would make a difference.*
>
> Female, Segment 1, Watford

Salience: while the reaction to SuDS was positive, the general low level of awareness, combined with participants' perception that they are not directly at risk of flooding, meant that SuDS was considered to be a relatively low priority. The exception was where participants felt directly 'touched' by a water issue, even something small scale like a poorly draining garden.

> *SuDS sound great but in the grand scheme of things it's not going to be at the top of most peoples' agendas. If you were at risk of flooding then perhaps.*
>
> Male, Segment 1, Cambourne

> *I'd be interested in this because the middle of our garden floods a lot. Next door have got a swimming pool and because they've paved the whole of their garden over it causes all the water to go into our garden.*
>
> Female, Segment 3, Watford

Costs and payback: the costs associated with SuDS – with the exception of green roofs – were not considered to be a major barrier. Several participants did consider certain permeable paving options expensive (relative to other materials like asphalt), although they were still within the realms of consideration. The choice of options on offer was also an important factor in this respect, allowing participants to decide which price range worked for them. Only in the case of green roofs was the initial outlay so large that it instantly removed this as a serious consideration for the majority of participants (even those who were positive).

> *That £16psqm would be prohibitive for me, but that's the thing, you don't have to have it – you've got the low cost option too which is great.*
>
> Female, Segment 1, Cambourne

Switching from outlay to payback, participants perceived little potential for direct cost savings. The drainage charge element of their water bill is not something they take much notice of, so the potential to eliminate this was met with both limited understanding (many guessed it could save £10) and a degree of scepticism that the water company would allow it.

> *They'll just push the cost up - if you're saving £10 they'll want a bit of that.*
>
> Male, Segment 1, Hull

Aesthetics: the aesthetics of SuDS (or, more simply put, how good they look) is a first-order consideration, reinforcing Harries' (2009) findings about the importance of conforming to, and protecting, idealised norms about the look of a home. In all cases it was the visual impact on the house/ garden/ driveway that governed participants' reactions, with flood protection a notably second order consideration. For example, permeable paving evidently had aesthetic appeal among participants, and the variety of styles was an important factor to cater for a range of personal tastes. Likewise, swales, soakaways and ponds were judged primarily – as the literature review predicted – in terms of both their aesthetic and amenity value, not flood protection.

> *The permeable paving is particularly appealing because it's the kind of look I already have on my own front garden.*
>
> Female, Segment 1, Watford

Aesthetics are important to the extent that, in the case of green roofs, it was the principle factor in determining whether they were liked or disliked by participants. Whereas features that stand out from the norm are sometimes desirable (and set up the archetypal social desire to "keep up with the Jones") this was certainly <u>not</u> evident for green roofs - at least not at the current time. In fact, the opposite was true with participants keen not to stand out from their neighbours. On this basis, many participants either dismissed green roofs or saw them working only under certain circumstances – for example on sheds, flat roofs or in new builds.

> *It would look absolutely ridiculous - because it would be the only house in the street with it and it would just look daft.*
>
> Male, Segment 1, Thatcham

> *It's a good idea but a bit '21st century living'.*
>
> Male, Segment 1, Hull

> *I wouldn't put it on my house, it looks awful! Maybe on my shed though.*
>
> Female, Segment 2, Cambourne

Windows of opportunity: the research highlights that SuDS retrofits must fit in with – and take advantage of – the household's cycle of repair and renovation, i.e. key junctures at which households are looking to re-do their garden, driveway or roof. This went someway to negating the weak cost savings, since it was considered an outlay that they would have to make anyway.

> *I mean, you're going to do that anyway, at some point [replace your drive] and if it's going to cost roughly the same then why wouldn't you do it?*
>
> Female, Segment 1, Cambourne

> *I wish I'd known about it before, because obviously, when I did this extension, it would have been easier to put it in then, because we had diggers in the garden, everything was up - that would have been ideal.*
>
> Female, Segment 3, Watford

Maintenance: the level of maintenance required for SuDS is a significant consideration, and notable again that both permeable paving and rain gardens were perceived to be low maintenance, in contrast to green roofs which were perceived to be high maintenance (with lots of questions asked about how often the green roof needs to be watered, mown and weeded).

Effectiveness: In line with Harries' research (2009), a potential barrier to uptake - applying to all three SuDS options tested - is their perceived effectiveness at reducing the risk of flooding. In Hull, for example, the key question to which participants kept returning was 'would this have helped in 2007' (and there was a general consensus that they probably wouldn't).

> *I just think, for the amount of water that little square is going to soak up, it seemed a bit irrelevant really, unless every house had it.*
>
> Female, Segment 3, Watford

Confidence in installers: participants appeared uncertain as to whether the 'average builder' would be aware of SuDS options. There was a consensus that a qualified and experienced installer would be important to install permeable paving or green roofs to make sure the job was "done correctly" (even though at the same time they were unsure where to find one). In contrast, participants seemed much more confident of undertaking a DIY approach to the various features of a rain garden (which were typically perceived to involve 'digging a hole'), and they thought that the costs for professional instalment were extremely high.

> *I think you just need that guarantee of having it done correctly, and someone to go back to, to maintain it or if it goes wrong.*
>
> Female, Segment 1, Cambourne

Demonstration: the research demonstrates the importance of seeing new measures 'for real', as a means of building confidence and establishing new social norms. The site visits had a notable and positive impact on perceptions, with participants often noting that the measure was different to how they'd imagined it (even with the materials that had been prepared for the forums).

> *I was really impressed, the grassed areas were wonderful. And someone had to point out the paving because I wouldn't have noticed otherwise.*
>
> Segment 1, Cambourne

I was so impressed by how unobtrusive this looked, and in fact they were attractive – they were features of the landscape. They made the area look much nicer than it would otherwise have been. It's quite nice to have the explanation as well.

Segment 2, Cambourne

Individuals' rating of SuDS measures

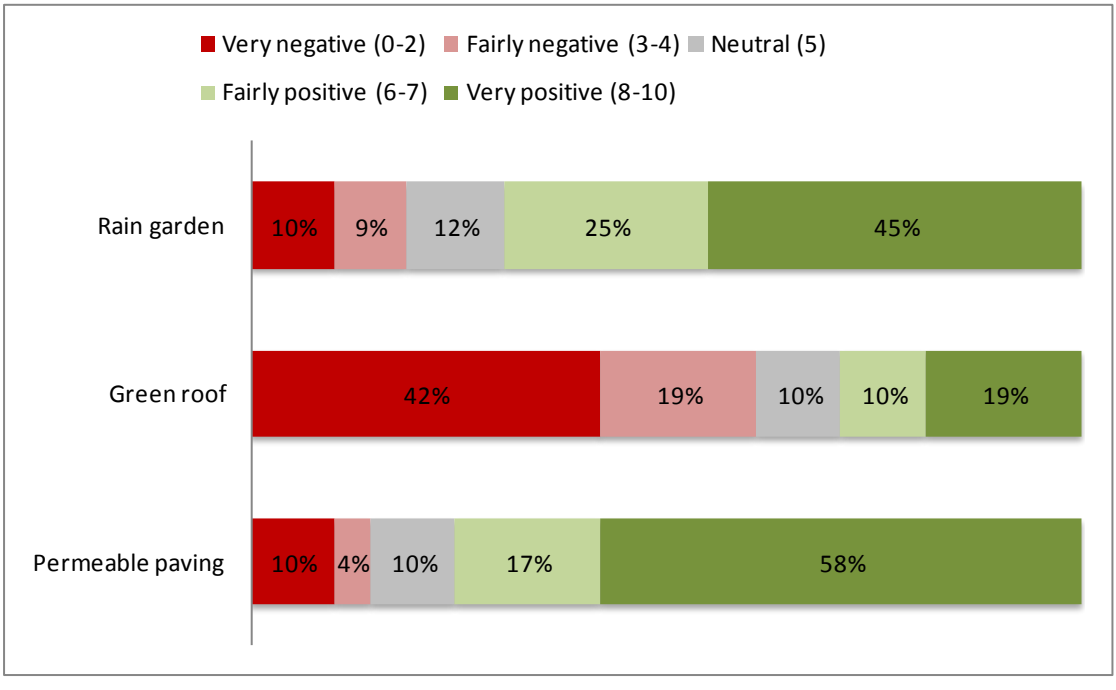
Each participant was asked to rate the measures on a scale of 0 - 10 (0 = very negative; 5 = neutral; 10 = very positive), in terms of (a) retrofitting their existing home, as well as (b) moving into a home (not necessarily a new build) with the measures already installed. The distinction between these contexts allows for an assessment of the gap between *in principle* reactions and the realities of installation (and associated barriers like financial outlay, hassle, risk and disruption). This analysis provides a tentative indication of the spread of opinions (albeit one that is heavily caveated, given that this is not intended to provide a robust, quantitative analysis).

The results demonstrate that three quarters of participants (75%) were positive to the idea of retrofitting permeable paving in their home, as were 60% of participants in relation to rain gardens (Figure 2). However, fewer than one in three (29%) gave a positive rating to the idea of retrofitting a green roof to their home, in contrast to 61% who were negative.

Figure 2 – Attitudes to SuDS measures (retrofitted in existing home)

***Question**: In terms of where you live now, on a scale of 0-10 how positive, negative or neutral would you be in having each of the following measures installed in your home?*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves

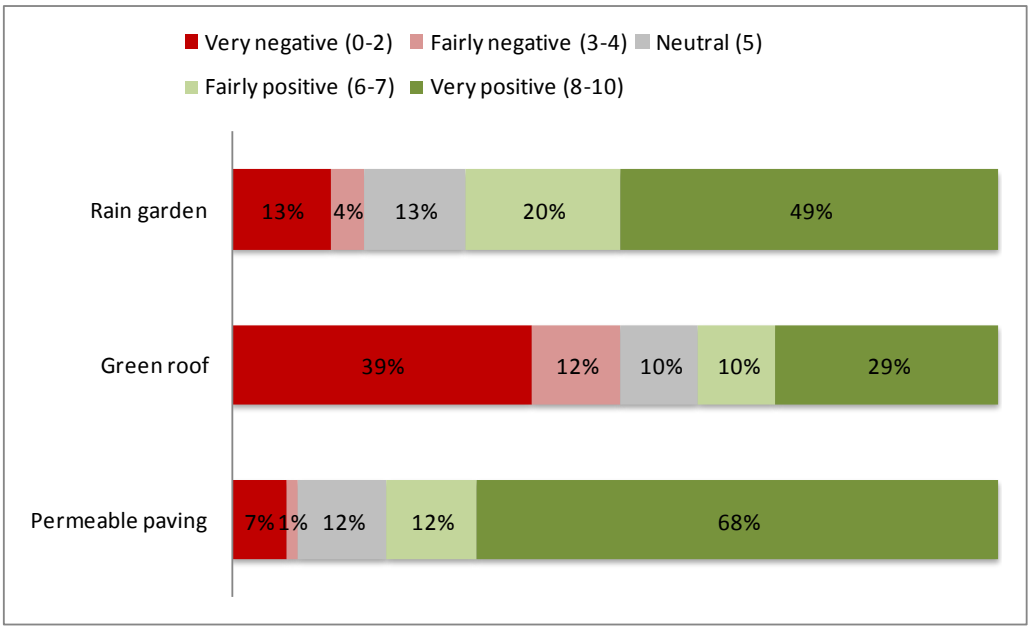


The ratings for each measure improve marginally in the context of moving into a home with the measures already installed - most notably for green roofs where positive ratings increase to 39% (Figure 3). However, and overall, views do not radically change suggesting that – for permeable paving and rain gardens at least – the challenge of retrofitting in existing homes is far from insurmountable.

Figure 3 – Attitudes to SuDS measures (already installed)

***Question**: And, thinking about moving home in the future, how positive, negative or neutral would you be in buying a home which already had each of the following technologies/measures installed?*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves

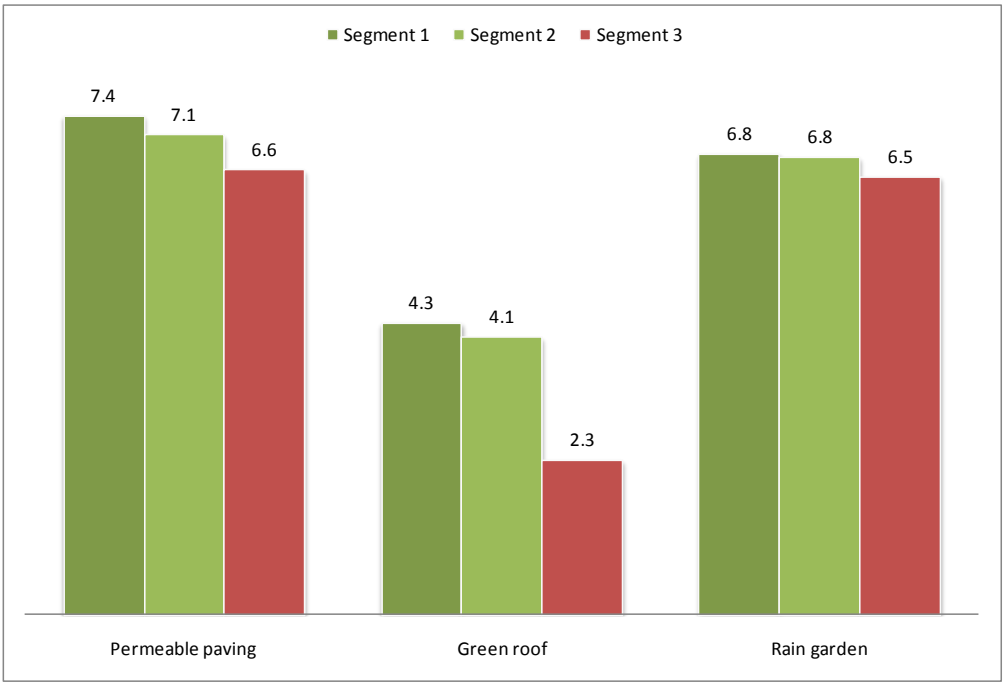


The results also support the finding that there was relatively little difference in reactions to permeable paving and rain gardens across the Defra segments (Figure 4). The result for green roofs demonstrates two things – a) there are clear differences between Segments 1 and 2 on the one hand, and Segment 3 on the other; b) even among Segments 1 and 2 the ratings are not strong (and reflect a strong polarisation between those who were very positive and those who were very negative – the end result of this 'love; hate' relationship tending towards the average).

Figure 4 – Attitudes to SuDS measures (retrofitted in existing home)

***Question**: In terms of where you live now, on a scale of 0-10 how positive, negative or neutral would you be in having each of the following measures installed in your home? [MEAN AVERAGE SCORES SHOWN]*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves



II. Reactions to specific SuDS measures

This section sets out reactions to each of the three SuDS measures tested – permeable paving, green roofs and 'rain' gardens.

Permeable paving

Permeable paving was widely liked, largely because it serves a very practical purpose, looks attractive (with a range of choices and styles to cater to different tastes), and is considered low maintenance/ low risk. The costs are in line with expectations and, if fitting in with the natural cycle of house renovations, are not considered to be an additional expense. The main barrier to uptake, other than the time delay to fit in with the cycle of renovation, is a lack of knowledge on where to find out more, and confidence in the capacity of local installers.

APPEAL

- "Makes sense" – easy to understand
- Plenty of different options to suit a range of budgets and tastes
- Either aesthetically neutral or positive, when compared to existing paving
- Low maintenance
- Low or no additional cost if fits in with replacement cycle of previous paving

BARRIERS

- Weak economic incentives
- Need for a qualified contractor to make sure the job is "done properly", potentially representing an additional cost and effort
- A few questions and concerns raised about performance, maintenance and durability compared with standard paving

"We've got permeable paving at our home. It's only 2 years old and it was put in by the contractors. We're delighted – we don't get flooding, rainwater seeps through the ground, we don't get big puddles on the driveway and it looks pretty"
F, Segment 1, Cambourne

"I'm surprised by all the different types of permeable paving and ground cover that you can get – it's really made me open my eyes"
F, Segment 2, Watford

"It's neat, it's practical and it does the job - that's all you want from paving"
M, Segment 2, Cambourne

Green roofs

Attitudes were strongly divided, with a minority of participants really liking them in contrast to a (larger) group who disliked them. Costs are a key barrier (and a deal breaker in many cases) in terms of the initial outlay, but the issue that really causes the split in attitudes is the aesthetic impact on the house (while almost all participants agreed that it "stands out", there was a divide in opinion as to whether this was a positive or negative). Concerns about hygiene, safety and maintenance are also significant. Acceptance was much greater for garages and flat roofs. The SuDS benefits were a low priority consideration, while other potential benefits were stronger at selling the concept – particularly environmental, biodiversity and insulation benefits.

APPEAL

- (for some) aesthetically pleasing
- Biodiversity benefits (urban habitats for bees, birds)
- Extra insulation so save on energy bills
- Extends the life of the roof
- Higher acceptance and appeal for garages, flat roofs and new build developments (e.g. *Grand Designs*);
- Recognition of a SuDS function (although a notably secondary benefit and some doubts as to how significant it would be against flooding)

BARRIERS

- (for others) aesthetically weird/ugly
- Up front costs far too high
- Concerns about plants wilting in summer and looking ugly
- Concerns about impact on building structure
- Questions about how much maintenance is required (e.g. watering, cutting)
- Concerns about lack of qualified installers / who to go to
- Worries that will lead to more insects/bugs in the house

"I'd be worried about bugs getting in to the house, I'd really hate that"
F, Segment 1, Watford

"I just find it attractive, a bit unique, a bit wacky, it would be nice to do a bit for the environment"
F, Segment 1, Thatcham

"I think the green roofing, although I quite liked it, I wouldn't want to see it on my house or a neighbour's house. But I think it's good for like, you know, if you had a shed in your garden"
M, Segment 2, Cambourne

Rain Gardens

The main advantage of rain gardens is their visual appeal and – on a community scale - their local amenity value in terms of providing local green and blue spaces (with associated quality of life and wellbeing benefits). Their flood protection function appeared to be secondary. The key barrier was the threat rain gardens might pose to children (and pets) and the threat of vandalism and dumping of e.g. shopping trolleys (which, conversely, would detract from the liveability of the area and negate one of the strongest selling points). This barrier was particularly prominent among women and in city locations / working class areas (e.g. Hull).

APPEAL

- Improve the look of the garden
- Inexpensive if a DIY measure
- Familiar – some participants had made their own soakaways (i.e. 'hole in the ground')
- Attractive on a community scale and increasing 'liveability'
- Some designs have very little noticeable difference from 'standard' approach and were considered a 'no brainer'

BARRIERS

- Costs expensive if installed by a contractor
- Safety concerns re children playing, particularly in view of the UK's perceived 'compensation culture' and a general lack of experience having water spaces close to where people live
- Higher maintenance in the garden
- Lack of maintenance in community spaces would lead to vandalism and fly tipping (e.g. dumped shopping trolleys).

"In the last house I had, there was a flooding problem at the bottom of the garden and I dug a huge channel and filled it with gravel and that worked"
M, Segment 3, Thatcham

"I don't think it has a major impact aesthetically. To be honest with you, if I walked by this it wouldn't really occur to me it was doing anything"
M, Segment 1, Watford

"I think ones in public areas can end up filled with rubbish and they need to be looked after. You don't just put in a pond and walk away"
F, Segment 2, Cambourne

SECTION FOUR.

Water Conservation Measures

This section of the report looks at reactions to water conservation measures, providing an overview of the key motivations and barriers, followed by an assessment of four specific options – water butts, rainwater harvesting, grey water recycling and community-scale rainwater harvesting.

I. Overview

In principle reactions to the measures were positive. Water butts and rainwater harvesting immediately stood out, if for different reasons – the former because it is familiar, simple and cheap, the latter because it is considered innovative (with an element of the 'wow' factor about it) as well as resonating at an intuitive level (i.e. taking advantage of a 'natural' resource). Reactions to grey water recycling were also positive, although - in line with the literature review – much depended on what the water is used for. And while reactions to community rainwater systems were likewise positive, concerns about the practicalities and novelty of communities sharing a system soon overtook the discussion.

The research identified the following key influences on reactions to the measures and the propensity to retrofit them in existing homes.

Perceptions of water availability: in line with the literature review findings, perceptions of water were strongly guided by a belief that it is an abundant resource in the UK and that any historical shortages have either been the result of one off droughts or the failings of water companies. Although participants said that they didn't want to waste water (motivated, typically, by a general dislike of waste, recognition of water as a precious resource and, in the developing world, a limited one), the perception that "it rains a lot here" nonetheless undermines the consistency and strength of the rationale for action. Such views were evident across all of the environmental segments and forum locations – especially so in Hull but also in Watford, where even the recent experience of the drought in 2004-6 was insufficient to challenge the prevailing view of water as an abundant resource.

> *Our country is green because it rains.*
>
> Female, Segment 3, Thatcham

Water is also considered to be cheap, with agreement among participants that water prices are low relative to other bills. In terms of water metering, many participants said that it either has had – or would have – some impact on their water consumption. However, others were less convinced by the impact because they could not physically see their meter, and thus could not make a direct link between behaviour, consumption and the bill.

> *I suppose water is a natural resource and there might be shortage in the future so it makes sense to save it, but I'm more concerned about me.*
>
> Male, Segment 3, Watford

> *I don't think £474 a year for the water rate is a lot. It's half your council tax. It's a tenner a week for water.*
>
> Male, Segment 3, Hull

Familiarity with water conservation measures: many had not heard of rainwater harvesting, while even fewer had heard of grey water recycling or community rainwater systems. Attitudes to retrofitting water conservation measures evidently lag behind those towards energy. For example, a number of participants said that they'd undertaken, or were actively thinking about, loft insulation, cavity/solid wall insulation and solar panels. While there remain barriers to energy retrofits (which, in keeping with the *Big Energy Shift* research, focus on cost, payback, disruption and confidence in the technologies) participants were comfortable discussing the options. This was less true of water retrofit measures, even among the more environmentally-receptive.

> *Everyone's talking about CO2 emissions - I think this is a bigger issue in the general psyche - and that comes down to water being undervalued as a resource. I mean, it needs to be ramped up, how important it is, how much energy it takes to produce clean water.*
>
> Male, Segment 2, Cambourne

> *I've not really seen something like this [grey water] before so I think the information needs to sink in a bit and then you might respond to it a bit more positively. I didn't immediately respond positively but then I thought 'why not'? And I think it's just because I haven't heard of it.*
>
> Male, Segment 1, Cambourne

Upfront costs: with the exception of water butts, cost emerged as a primary barrier. Participants were immediately resistant to the initial outlay and the discussions – probing on price thresholds - revealed that anything above £1,000 - £2,000 was considered prohibitive and an immediate 'deal breaker'. Water butts were considered far more affordable although, even here, participants were not willing to spend large amounts of money and £100 seemed to be a natural limit for many (and for this outlay they believed that they should get a large/'top of the range' water butt).

> *I'd love it [rainwater harvesting], but it's just the costs.*
>
> Female, Segment 1, Cambourne

> *It's something [water butt] I can afford now. I can stick it in the car, take it home, fix it to the shed and instantly I'm watering the garden. Whereas that [rainwater harvesting] is out of my pocket for at least 15-20 years.*
>
> Male, Segment 2, Cambourne

Payback: participants were strongly motivated by cost savings (especially so in Segment 3 where this represented the main – and sometimes only – reason for taking an interest in the measure). The payback periods represented, at best, a weak motivation. Participants were looking for paybacks of 5-10 years, not 20-30 years. At worst, they signalled that water retrofit measures made no real financial sense, confirming for some participants that it only applies to those who are committed to the environment (banishing it immediately to a niche market).

> *You will eventually get a return of investment but it could take 15-20 years, for me that's obviously a long time to wait to get an investment.*
>
> Male, Segment 1, Watford

> *The thing that sort of surprised me was how little the saving was. When you put all the figures in like it costs x amount, it would take x years to recoup the savings, and so on. I thought that was quite a surprise - I was, like, weighing it up, was like...mm, not much incentive there.*
>
> Female, Segment 3, Watford

Unlike the findings of the *Big Energy Shift* where participants were found to be cognisant of - and sensitive towards – the potential for future increases in energy prices (which would thus make energy measures more attractive), there was little feeling that water prices would change to the extent that it would alter the fundamental cost-benefit equation. The prospect of adding value to the house was also a consideration, although views on whether the measures contributed to this aim were mixed. There was general consensus that none of the measures would have a negative impact on house prices (with the possible exception of green roofs). At the same time, however, few participants believed that it would add significant value, largely because the measures were so novel that there is little public awareness of – let alone demand - for such innovations.

> *It wouldn't sway me one way or the other. I wouldn't pay more for it myself but it wouldn't bother me either.*
>
> Female, Segment 3, Watford

> *Well there's no guarantee I'm going to sell to somebody who gives a monkeys about what you've got fitted and what you haven't.*
>
> Male, Segment 2, Cambourne

Instant rewards: in general, water retrofit options were perceived to offer little in the way of "instant gratification", either financially or in terms of non-cost benefits like comfort and style. To participants, the measures are either hidden from view, payback slowly, or provide insurance against a future event (e.g. flooding) that may or may not happen. Rainwater harvesting is one exception, given that it was perceived to have an element of innovation about it. Nonetheless, even this fared badly when compared to the instant and tangible rewards associated with other home improvements, such as kitchen or bathroom upgrades.

> *In a new build people are going to instantly reap the benefits of those cost savings, aren't they.*
>
> Female, Segment 1, Thatcham

> *When you spend money, you want to see something for it straight away.*
>
> Female, Segment 2, Hull

Confidence in the technology and installers: many participants voiced concerns that some of the measures are relatively new and therefore constitute a risk. Several pointed out that, as with all specialist systems, maintenance and repair costs for the first movers will be high. Others noted that they would be "guinea pigs" for the first generation technology while others would stand to benefit later on from cheaper and more reliable versions.

> *The risks involved would be if it hadn't been thoroughly tested and you were a guinea pig in case the systems were to flood themselves, or go wrong or stop working. As long as they are easy to maintain and they work efficiently and you've got a long warranty then that would be absolutely fine.*
>
> Female, Segment 2, Watford

Feeding concerns over the technology were question marks over the capacity of installers and the comprehensiveness/length of warranties likely to accompany the measures:

> *You'd expect the warranty to be at least 10 years. But it could become part of the scheme where they repair your boiler or pipes, the Homesure thingy.*
>
> Female, Segment 1, Cambourne

Demonstration: participants were very keen to hear whether these systems have already been 'tried and tested' in the UK (or Europe), and there was a near-universal call for more demonstration. Participants evidently lacked any kind of 'reference point' for comparing these measures with current systems, and so had difficulty imagining how they work, what they look like and how they would impact on their own home.

> *I would like to talk to people who have actually been through the process of having it installed, to actually talk to them to see how disruptive it is. That's obviously a concern and maybe it's not as bad as you think it might be.*
>
> Male, Segment 2, Cambourne

Indeed, the site visit to BRE Innovation Park to see the measures in situ had a discernable and positive impact on perceptions (more so than had been the case when the measures were outlined 'on paper').

> *My views have definitely changed. When we spoke about these kinds of things [rainwater harvesting] on Saturday I would have said no, 100%. But actually, having seen it in action, I think it's a good idea.*
>
> Male, Segment 1, Watford

> *I didn't actually have an idea what it was going to look like. You can't really imagine, so it's nice to actually see it. It's all very well being told about them but it's important that you can see that it's not unattractive, and that you can tell it's not going to change the look of your home.*
>
> Male, Segment 3, Watford

Disruption, hassle and loss of space: some participants' default assumption was that retrofitting these measures would involve massive upheaval, over a period of weeks. However, moderate levels of disruption (involving days rather than weeks) were considered more tolerable. Participants were also relatively accepting (albeit begrudgingly) of disruption at the neighbourhood level, noting that things like road works had become a normal part of everyday life. The impact of the measures on existing space in the home was also a prominent concern for some, especially in relation to grey water recycling which was perceived to require a significant amount of space in bathroom areas.

> *You're going to have to come in through the house and get the floor up, aren't you, to get the pipe work into the house. On a new build I think all these things are wonderful but to do it into a house like this it would be a big job.*
>
> Male, Segment 1, Thatcham

Building on the findings in the literature review (e.g. Downing, T. et al, 2003) about the potential to integrate different retrofit options, 'packages' of measures that give homeowners several improvements at once were welcomed.

Clear benefits for new build: reflecting concerns about the disruption and hassle associated with retrofitting, participants were much more enthusiastic about the measures in relation to new build developments, a context in which they received near unanimous support (with several participants noting that they would actually be disappointed if they bought a new build and it did not include such systems):

> *I can see in new property, in new build, especially offices, that sort of thing, yeah, that's what, that would be probably the sort of thing that would come in as standard when there's a norm but there's no way I'm going to rip all my bathrooms out to put that in.*
>
> Male, Segment 1, Thatcham

> *My dream home is an ultra green modern home with all these features. I would absolutely love it. But practically speaking rainwater harvesting would be a serious challenge to get in here because of the lack of access at the back, so I don't think it's relevant for here.*
>
> Female, Segment 1, Cambourne

Aesthetics: this was prominent only in relation to water butts, since some participants did not like the look of water butts and wanted 'more fashionable' designs. By contrast, there were fewer concerns raised about rainwater harvesting and grey water recycling, since these were considered to be measures that would largely be 'invisible' (i.e. built into the plumbing, in the loft, etc.)

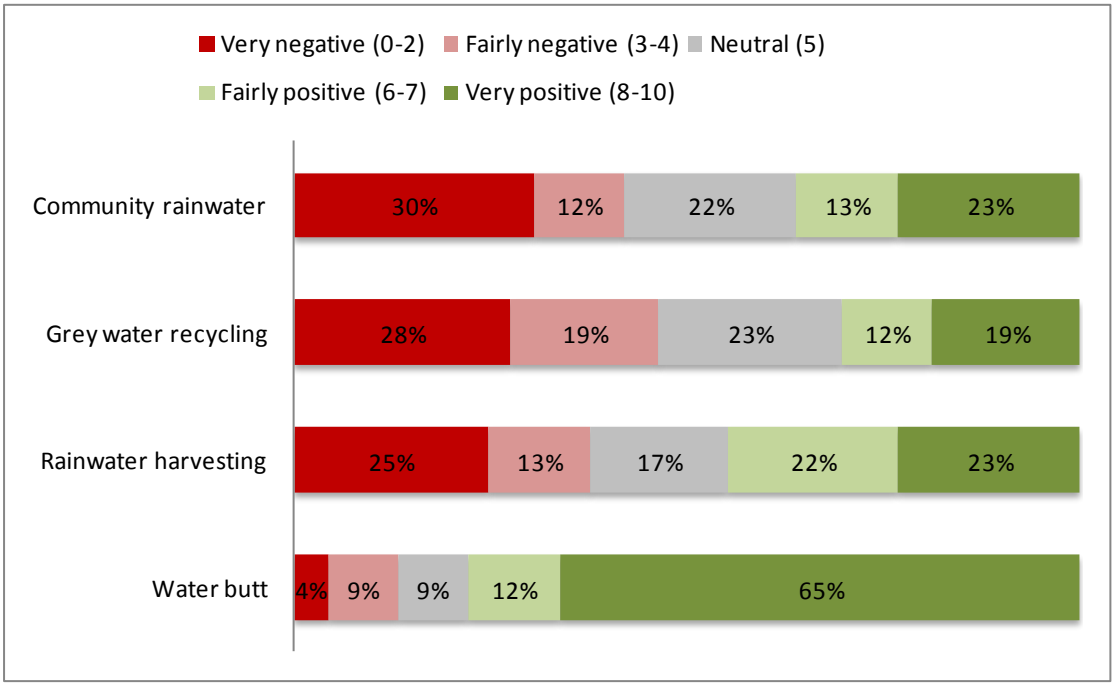
Individuals' ratings of the measures

As with the SuDS measures, each participant was asked to rate the measures on a scale of 0 - 10 (0 = very negative; 5 = neutral; 10 = very positive), both in terms of (a) retrofitting their existing home as well as (b) moving into a home (not necessarily a new build) with the measures already installed. As before, this analysis provides only a tentative indication of the spread of opinions (given that this is not intended to represent robust, quantitative analysis). The results demonstrate that water butts, relative to the other measures, are very highly rated – over three quarters of participants (77%) say they would be positive about having them at their current home (Figure 5). Reactions to retrofitting other measures are more evenly divided, with 45% positive to rainwater harvesting in-home, 36% to community-scale rainwater harvesting, and 31% grey water recycling (in contrast to roughly similar proportions who are negative).

Figure 5 – Attitudes to water conservation measures (retrofitted in existing home)

***Question**: In terms of where you live now, on a scale of 0-10 how positive, negative or neutral would you be in having each of the following measures installed in your home?*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves

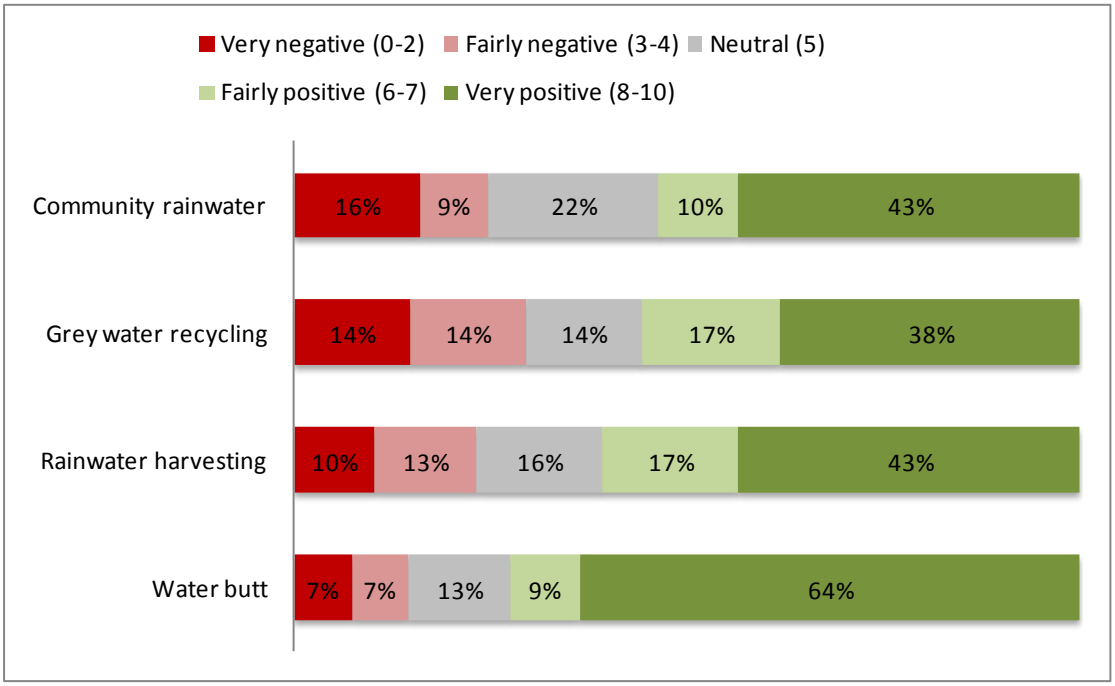


The differences between retrofitting the measures and moving into a home with them already installed are much more marked than they were for SuDS measures (Figure 6). The proportion of respondents who rate rainwater harvesting positively, for example, jumps to 60% (in line with the percentages quoted in the literature review), while grey water and community-scale rainwater harvesting are rated positively by 55% and 53%, respectively. This confirms that barriers around installation (finding installers, confidence in the technology, hassle and disruption, etc) are highly significant. In contrast, and behaving more like some of the SuDS measures, there is little change in the ratings for water butts - reflecting their ease of installation in existing properties.

Figure 6 – Attitudes to water conservation measures (already installed)

***Question**: And, thinking about moving home in the future, how positive, negative or neutral would you be in buying a home which already had each of the following technologies/measures installed?*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves

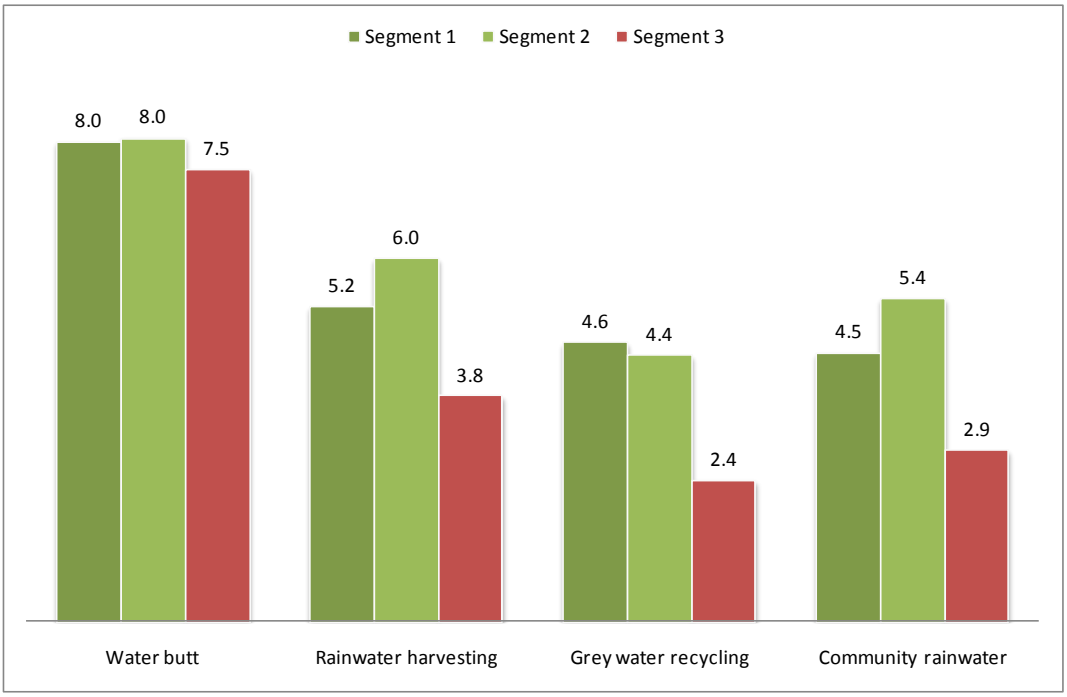


The results of the rating exercise also go some way to substantiating the finding that there is very little difference between the views of those in Segments 1 and 2 according to the Defra Segmentation model (Figure 7). In contrast, there is a clear distinction between both of these segments and Segment 3 who – with the exception of water butts – are less positive to all measures.

Figure 7 – Attitudes to water conservation measures (retrofitted in existing home)

***Question**: In terms of where you live now, on a scale of 0-10 how positive, negative or neutral would you be in having each of the following measures installed in your home? [MEAN AVERAGE SCORES SHOWN]*

Base: 89 participants attending the deliberative forums. NB. This is not intended to represent a robust statistical analysis, purely to outline the spread of opinions across the forums themselves



II. Reactions to specific water conservation measures

This section sets out reactions to each of the four water conservation measures tested – water butts, rainwater harvesting, grey water recycling and community-scale rainwater harvesting.

Water Butts

Water butts were generally the most attractive measure to conserve water, due to affordability, familiarity, the tangible and immediate benefit, and the perceived ease of installation. Some participants suggested that they would have even more appeal if they could be linked to a pump to allow for hose use, rather than having to use a watering can. Barriers, in contrast, were few in number but did include: the higher price of some of the larger versions of water butts, their visual appearance, their ability to fit into tighter garden spaces and – in a few cases – questions about the smell of the water / potential to attract insects. Their appeal, however, is limited to those who do (any level) of gardening, and the prevailing context of low water costs and lack of metering means it is seen more as a 'good thing to have' rather than a cost saving measure.

APPEAL

- Cheap and easy
- A 'must have' for active gardeners
- Little need for awareness building – considered self explanatory and easy to find
- Rain water is perceived to be better for plants than mains water
- Conserving water / precious resources

BARRIERS

- Aesthetics – some people find them ugly /want different designs
- Space constraints – demand for slim-line) designs
- Questions from some about the potential for smell, algae and insects
- Cost of the larger butts.
- Need for a nudge – several said that they had been meaning to 'get around to getting one' (but had not yet done so)

"I'm quite keen on the idea of a water butt; it's something quick, inexpensive something you can do to make a difference at not a lot of inconvenience to yourself"
F, Segment 3, Watford

"A huge round thing is completely impractical for small gardens, but the flat ones would be perfect for us. We've talked about putting one at the end of the garden"
M, Segment 2, Cambourne

"The water, does it grow algae? Do you have to put anything in it? Does it get smelly?"
F, Segment 1, Watford

"Now the water butt is on the shopping list. Definitely. I've been meaning to get one for a while"
F, Segment 1, Cambourne

Rainwater harvesting

Reactions to rainwater harvesting were very positive. It appears to resonate as a 'natural' and intuitive option, and there is also, for some, an associated 'wow' factor in terms of the technology. All participants were comfortable using the water as a source for toilets and gardens, and many were also comfortable sourcing washing machines, dishwashers and even showers. However, this in principle support is tempered by questions and concerns about installation, risk and maintenance. Furthermore, the financial equation (both initial outlay and payback) is critical – for those most engaged with the concept it provides only a weak incentive at best; for those (mainstream) participants who are interested but less engaged it is nothing short of a deal breaker that relegates the measure to a 'lovely idea in theory' that they have absolutely no intention of exploring further. In terms of location, outside & underground was considered better than outside & over ground (because of fewer impacts on space and the look of the garden), but several would prefer putting in a gravity-fed system in the loft (as per their current system).

APPEAL

- Using a natural resource
- Better for plants/appliances than mains water
- Potential double win of saving money and the environment
- Like the idea of 'significant' water savings, i.e. 50% (compared to savings of 10-30% savings which were perceived to be much less significant and impressive)
- Could potentially increase house value (although not everyone was convinced)
- Considered a 'no brainer' for new builds

BARRIERS

- Initial costs
- Poor rate of return on investment (and zero rate if not on a water meter)
- Disruption of installation in retrofitting
- Risk of the new - questions about how proven the technology is
- High maintenance costs from only specialist providers
- Perceived lack of trained installers
- Some participants expressed discomfort at using for things like washing machine, showers (reflecting concerns about how reliable the filter system would be)

"That's what I've always envisaged, capturing the water and then pumping it into the house, for things like the loo. If it's also pure enough to drink, then fantastic. You know, it'd take a bit of getting used to, but why not? You know, as long as it's clean enough, who cares?"
M, Segment 2, Cambourne

"I just think that if it went wrong you've got to spend a lot of money on getting someone down there to fix it and, you know, if the filters don't work properly I would maybe be slightly concerned that you'd have dirty water coming through"
M, Segment 2, Watford

"It's a great idea but the cost is just prohibitive"
M, Segment 1, Thatcham

Grey water recycling

Reactions to grey water recycling, seen as something that is similar to rainwater harvesting, were also positive in principle. However, there appeared to be less resonance of this as a 'natural', intuitive option, and it also lacked the "wow" factor of being innovative and exciting (in contrast, it was considered functional and a good idea). Furthermore, the specific use of the water took on more significance - toilets and gardens were again considered acceptable but more concerns were raised about extending to other uses. Costs and payback was a major barrier, simply ruling it out as a genuine consideration for many. Concerns were raised about installation and the impact on space in the home – the schematics shown as part of the supporting materials led some participants that this wasn't for them as they didn't have enough space in their bathroom.

APPEAL

- Great for new builds
- A very useful and functional way of saving water
- Potential double win on cost savings and environmental benefits

BARRIERS

- Initial outlay and payback – (far) too much and (far) too long, respectively
- Space constraints - likely to reduce the amount of liveable space in the home
- Upheaval of installation (e.g. knocking down walls, re-plumbing entire house)
- Concerns over using the water beyond toilets and garden
- Risk of the new - questions about how 'proven' the technology is
- High maintenance costs
- Perceived lack of trained installers
- Need to get used to it

"It's not financially viable here because I'm not going to be here long enough to appreciate it and it wouldn't put enough value on the house when you sell so, but I liked the idea, I think in the future a lot of people are going to be forced to do it because we are going to run out"
F, Segment 1, Thatcham

"It's a sodding great big thing, and in our bathroom we couldn't have that"
M, Segment 3, Hull

"When you look at the payback period, 20-30 years, that's a very long time!"
F, Segment 1, Cambourne

"People would need to get used to seeing grey water, because we're so used to clean water. And I've always thought it's crazy to use clean water to flush toilets – when you look at the third world where they have dirty drinking water it seems a crime"
F, Segment 1, Cambourne

Community-scale rainwater harvesting

This measure was considered to have all the same advantages of in-home rainwater harvesting, with the added benefit of reduced upfront costs. However, concerns around installation and the 'riskiness' of technology itself remained and – more significantly – many participants could not easily conceptualise the idea of a community-scale system, and within a short space of time a number of barriers were suggested in terms of fairness, free riding and communities in the UK 'not working like this'. While the in principle reaction remained positive, participants struggled to understand how this could possibly work in anything other than a new build development where the systems – and responsibilities of individuals – were designed in and made explicit from the start. Many also suggested this would be ideal for commercial / public buildings (and could not understand why more had not been done with these buildings).

APPEAL

- Using a natural resource
- Better for plants/appliances than mains water
- Potential double win of saving money and the environment
- Considered great for new builds and commercial/public buildings

BARRIERS

- Major concerns around retrofitting
- 'Alien' concept – lack of any reference point/understanding of how this could work
- Concerns about lack of community – perceived need to get on well with neighbours to make this work
- Questions about maintenance, responsibility and what happens if the system 'goes wrong'
- Concerns about 'free riding' and neighbours using up all the water or using an unfair amount

"In principle I've got no problem with it. But to retrofit Victorian terraces in that way, it would be a massive amount of upheaval and a massive amount of agreement from all the people. I mean, I know the two old boys either side of us, they wouldn't be up for it"
M, Segment 2, Cambourne

"You'll get arguments over who is using more if the tank runs out. It could create more trouble than it was worth"
M, Segment 3, Hull

"It's just not a British way of thinking, doing everything together. If it was installed now, then 20 years from now the next generation would grow up and they'd be completely at home with the idea of it, and they'd know they've got to work together"
F, Segment 1, Cambourne

SECTION FIVE

Attitudes to Water Pollution

This section of the report outlines key findings in relation to water pollution from domestic sources. The discussions focused on two consequences of water pollution: pipe blockages and phosphate-based pollutants entering the aquatic environment.

The report now looks at each type of pollution in turn although, as an overarching comment, when prompted to think about different ways in which households could cause pollution, participants immediately and spontaneously focused on substances that could lead to pipe blockages, including food scraps, oil and hair. In contrast, while some participants raised the issue of chemicals going down the sink this appeared a largely secondary concern.

I. Pollution leading to pipe blockages

High levels of general awareness about the need to avoid putting certain things, like oil and food, down the sink appears to have only a limited impact on actual behaviour. For example, while some had adopted behaviours like tipping fat somewhere to let it solidify before disposing of it, others continued to put these things down the sink anyway, accompanied by a range of dubious practices that they believed counteracted the impact (e.g. pouring fat down the sink with hot water/washing up liquid, or pouring it down the toilet or gutter rather than the sink).

> *If it's raining outside I can't be bothered so I tip the fat down the sink and put the hot water on.*
>
> Female, Segment 3, Thatcham

> *Sometimes I put things down the toilet instead of the sink to avoid it getting blocked.*
>
> Male, Segment 1, Watford

Even though participants felt that knowing what not to put down the sink is "just common sense", the education materials nonetheless threw up some items that participants were very surprised to learn should not be disposed of:

> *You'd think you could flush toilet wipes wouldn't you?*
>
> Female, Segment 1, Cambourne

> *My seven, eight and ten year old use can-do wipes. I wouldn't then take that off them and put it in the bin. I don't want to see that. I'd always flush them down the loo. That's why they invented them.*
>
> Female, Segment 3, Watford

Reactions to water companies' campaigns was characterised by very low awareness. One or two had seen TV programmes (e.g. Grimebusters) that had raised their awareness of the issues, while a few others had heard a radio advert in their local area. None had heard of, or seen, a fat trap.

> *There was something on the radio recently about, you know, people pouring their cooking oil down the sink, I don't remember the figures or anything like that, but they were just saying how bad it is and how, you know, in some places sort of pipes that are maybe sort of half a metre wide are down to like a few centimetres or something.*
>
> Female, Segment 2, Cambourne

Turning to key motivations, it was evident that visual representations of the problem had a strong impact on participants, partly because of the 'gross out' factor but also because they immediately began to personalise the issue and think about how it could affect their own pipes (and the problems that they could face). Any focus on community-level impacts (e.g. problems with sewage and draining systems in general), appeared to be a less powerful motivator as it was 'away' from them and considered to be the water company's responsibility.

> *I think it's more about how it's going to affect us individuals…that has more of an effect than seeing a couple of fish dying. Bring it close to home – how it affects you.*
>
> Male, Segment 1, Watford

> *When I saw the pictures that really did make you think, oh blimey, this is really bad, when you see it like that. I think people should be made more aware, and there's a difference in saying it and showing it visually.*
>
> Female, Segment 2, Cambourne

II. Pollution leading to phosphates in the aquatic environment

As noted above, the issue of phosphate pollution was not spontaneously raised as much as pipe blockages. While the pictures shown in the forums were emotive – evoking sadness at the thought of despoiling natural areas and killing fish – participants seemed to quickly disconnect the impact from their own behaviour. Some, for example, did not think that household products like dishwashing tablets or washing powder could lead to the situation depicted by the photos, believing that this could only be caused by industrial sources of pollution. Others immediately suggested that other actors should take action, for example manufacturers to reduce the level of phosphates in products, or water companies to design systems that remove phosphates before they reach rivers.

> *How about taxing them more [the bad products] to bring the price up so the eco ones are more competitive.*
>
> Female, Segment 1, Cambourne

> *With garden products they cut the levels of bad things in there by law but they're still on sale under the same brands and I don't think people realise. Why don't they just do that for other products with new legislation so the phosphate levels can't go above a certain point?*
>
> Female, Segment 1, Cambourne

When pressed further on their own responsibility, several participants were able to point to – and name – products on the market that are more environmentally friendly (e.g. Ecover). Most, however, felt that these products are not as effective and/or are more expensive than their "standard" equivalents (even those who were using them).

> *It's alright if you've got a few bits that aren't very dirty. But if you've got kids clothes, towels and tea towels and stuff like that...and it doesn't smell nice and fresh when it comes out either.*
>
> Female, Segment 3, Watford

Given the scenario of trading off a little less 'sparkle' from their dishwasher for a more environmentally-friendly product, mixed views were evident across the groups. Some participants claimed they were willing to accept a little less performance for environmental gain, others seemed relatively unwilling to compromise on the cleanliness of the dishes, while a few suggested – somewhat half heartedly – that they would be happy to at least try them (particularly if from a main brand). There was, however, support for the notion of regulation to set limits, as well as a wider belief that it would be perfectly possible for companies to innovate to reduce pollution without significant impact on performance and/or price.

> *I think I would consider trying them. Erm...and then, you know, see... I mean, if the dishes are clean, fine.*
>
> Female, Segment 2, Watford

> *I don't know if any of the big manufacturers offer anything...if someone like Persil made something like that then I'd be more inclined to buy it. I tend to like having a make that I recognise. I wouldn't buy own brand.*
>
> Female, Segment 3, Watford

SECTION SIX.

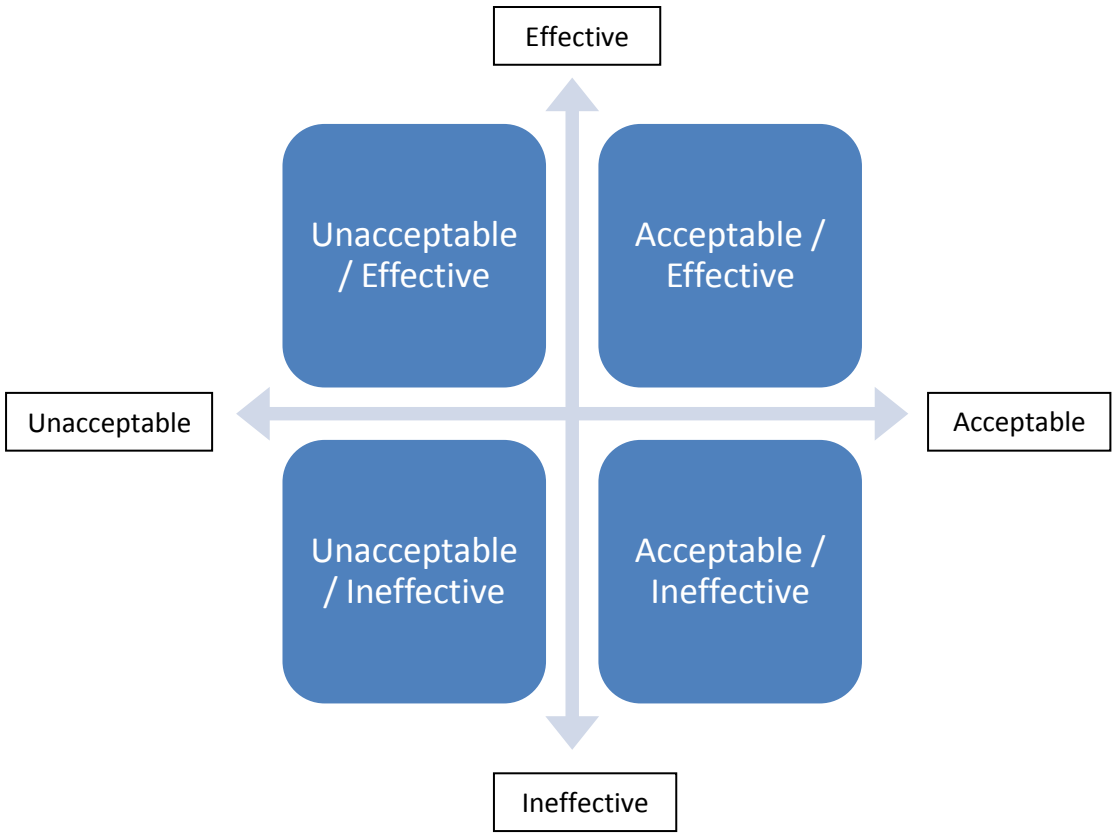
Reactions to Water Retrofit Policies

This section of the report sets out participants' reactions to 11 policy options that were presented and discussed at the forums. None of the options represent official government policy, but rather were chosen to represent a mix of different approaches – some focused on information, encouragement and incentivisation; others on rules, minimum standards and compulsion. The section looks first at the common features that underpin, and govern, participants' reactions, before presenting a summary of reactions to individual policies in turn.

I. Overview

Participants were asked to consider each option and place it on a quadrant – with one axis representing "public acceptability" and the other representing "policy effectiveness". This gave four main groupings by which to categorise the policy (Fig 8).

Figure 8. Analysis framework for policy discussions



The combined result of the mapping exercise, drawing together the results for each forum and each environmental segment, is outlined in Table 4 - darker shading represents areas of general consensus, while lighter blue shading represents minority positions. The analysis highlights the following:

- For some policies there was **general consensus** – for example, community-initiated/led schemes were widely considered perfectly acceptable but ineffective; compulsory water metering was considered acceptable and effective (by all but two of the Hull groups), as was smarter billing; while, in contrast, new rules for drainage connections was widely considered to be effective but unacceptable;

- In other cases there were **two dominant reactions** - information campaigns, for example, were considered acceptable by all, but there was a clear divide in terms of perceived effectiveness. In contrast, both planning restrictions and a policy of designated assets were both widely considered effective, but split the groups in terms of acceptability;

- Other policies elicited a range of views with **no clear or consistent pattern** – for example, schemes that are community-focused were considered to be, variously, acceptable/effective; acceptable/ ineffective and unacceptable/effective. A policy of higher prices also received quite different reactions across the forums.

Table 4 – reactions to policy options	Acceptable – effective	Acceptable – ineffective	Unacceptable – effective	Unacceptable – ineffective
Information campaigns	Hull Seg 1; Seg 2 & Seg 3 Thatcham Seg 1, Seg 2 Cambourne Seg 1 & Seg 2 Watford Seg 2	Thatcham Seg 3 Watford Seg 1 & 3		
PAYS	Hull Seg 1 & Seg 2 Cambourne Seg 1 Watford Seg 2	Thatcham Seg 1 & Seg 3 Cambourne Seg 2 Watford Seg 1 & Seg 3	Hull Seg 3	Thatcham Seg 2
Planning Restrictions	Thatcham Seg 1, Seg 2 & Seg 3 Cambourne Seg 1 & Seg 2 Hull Seg 1 Watford Seg 3	Hull Seg 3		Hull Seg 2 Watford Seg 1 & Seg 2
New Rules for drainage connections			Cambourne Seg 1 & Seg 2 Hull Seg 1 & Seg 2 Watford Seg 1, Seg 2 & Seg 3 Thatcham Seg 1 & Seg 2	Hull Seg 3 Thatcham Seg 3
Compulsory water metering	Thatcham Seg 1, Seg 2 & Seg 3 Cambourne Seg 1 & Seg 2 Hull Seg 1 Watford Seg 1, Seg 2 & Seg 3		Hull Seg 2 & Seg 3	
Water restrictions	Cambourne Seg 1 Thatcham Seg 2 & Seg 3	Hull Seg 1	Hull Seg 3	Watford Seg 1, Seg 2 & Seg 3 Hull Seg 2 Cambourne Seg 2
Designated assets	Hull Seg 1 & Seg 3 Cambourne Seg 1 & Seg 2 Thatcham Seg 2 Watford Seg 1 & Seg 2		Thatcham Seg 1	Thatcham Seg 3 Watford Seg 3 Hull Seg 2
Higher prices	Watford Seg 1, Seg 2 & Seg 3 Hull Seg 2		Cambourne Seg 1 & Seg 2 Hull Seg 1 Thatcham Seg 2 & Seg 3	Hull Seg 3 Thatcham Seg 1
Fines	Hull Seg 3 Thatcham Seg 1	Hull Seg 1	Thatcham Seg 2 & Seg 3 Watford Seg 1, Seg 2 & Seg 3	Cambourne Seg 1 & Seg 2 Hull Seg 2
Community schemes 1	Hull Seg 1, Seg 2 & Seg 3 Cambourne Seg 1 & 2 Watford Seg 1	Thatcham Seg 1 Watford Seg 3	Thatcham Seg 2 & Seg 3 Watford Seg 2	
Community schemes 2	Thatcham Seg 1 & Seg 2	Hull Seg 1, Seg 2 & Seg 3 Thatcham Seg 3 Cambourne Seg 1 & Seg 2 Watford Seg 1, Seg 2 & Seg 3		

Turning to some of the common overarching themes to emerge, it was evident that participants used a **series of heuristics** – or mental short cuts – to rapidly form judgements about the acceptability of a policy:

- The need to understand the **purpose** of the policy was a recurring line of discussion and, for this reason, having information campaigns was considered important. This was less so in terms of a means of achieving behaviour change, but rather to give a consistent "big narrative" on the reasons why the policy was necessary and a priority.

- Participants attempted to judge the costs (in terms of both money and time) of **administrating and policing** the policy, i.e. could the policy be achieved at reasonable cost, or would the costs of administration outweigh the benefits of the policy. This factor led participants to generally dismiss fines as a viable option and worry about a policy of water restrictions or extending the reach of planning regulations.

- Participants applied what can best be described as the **"Big Brother" test**, i.e. does the policy involve an overly authoritative move by the state to achieve its objectives - however well intentioned - at the expense of the rights of home owners. This had particularly important ramifications for designated assets, since assessments of this policy went from completely acceptable under a certain set of implementation circumstances (i.e. a 'proportionate' policy aimed at strategically important, community-level SuDS) right through to completely unacceptable (i.e. if there was a 'designation police' retrospectively designating all manner of small scale SuDS in peoples' gardens). Participants often used the language of being "bullied" into acting, and language and tone indeed played a key role in influencing reactions (e.g. with several participants immediately picking up, negatively, on phrases like "households will do x" in the policy description).

- A key question that participants used to guide them was whether the policy was perceived to involve **incentives (i.e. carrot) or compulsion (i.e. a stick)**. While it is not surprising that incentives were favoured, their inclusion in the policy mix was also seen as an important way of justifying, and counterbalancing, penalties and minimum standards (i.e. to demonstrate that Government is on the side of residents and wants their support in delivering the policy aims).

- Policies which gave households a **choice** were less contentious. However, there is a fundamental distinction to be made between different types, or levels, of choice. For example, there was less resistance to – and even positive backing for – the notion of choice editing, where choices could be adapted to favour specific options or rule others out. Several forms of choice editing were in fact suggested spontaneously, for example that manufacturers should be compelled to remove non-permeable paving from sale altogether. This was because the choices that participants really cared about – and wanted to preserve - was the right to choose the style, cost and brand of paving, not whether the paving is permeable or not. A similar discussion was evident in relation to phosphates in household washing products – if the choice architecture was structured so that all products simply had less phosphates, then consumers could focus on the choices that they are familiar and comfortable making (e.g. cost, brand, special offers, etc). Participants also expressed a desire for guided support, acknowledging that - given their lack of familiarity with 'new' systems like SuDS, rainwater harvesting and grey water recycling - they needed help choosing the most appropriate option.

- Participants were looking for policies to be **'fair'** – a concept which had various manifestations, including whether or not the policy applies equally to everyone, whether it impacts disproportionately on vulnerable groups, and – crucially - whether it would be applied retrospectively or 'from this moment on' (which was particularly relevant in the discussion about designated assets). Retrospective application of policies was widely considered unfair because it did not allow households to make a choice, whereas application of the same policy but moving forward was considered much more acceptable because a household could chose to do something or not, or buy the property or not.

> *The ones I really dislike are where they could retrospectively do something. I completely understand though if it comes up on the solicitor's searches that you can't remove that feature, then that's something you know you're buying into. But if they all of a sudden can come round to your house and tell you something, then I don't really like that idea at all.*
>
> Female, Segment 3, Watford

- Responses to policies were also evidently influenced by **levels of trust** in water companies and the local council. For example, in Hull there was a very high level of mistrust towards the council – participants believed that they had already extracted large amounts of money from them without getting much work done in return, and so they thought the implementation of SuDS would be no different. There was much less distrust towards the council in Thatcham and Cambourne, while in Watford there was a general ambivalence towards the council alongside a recurring theme that they were already "paying too much" Council Tax and therefore did not want to pay any more.

The discussions point to some **key variations**. In terms of location, the most notable distinction was the general antipathy of participants in Hull to water restrictions – they found it hard to see past the fact that water is abundant in their region and therefore perceived that they would be subsidising areas, like the South East, where it wasn't.

Turning to variations by environmental segment, those in Segment 3 tended to want little burden placed on them individually – leading them to prioritise policies, like planning regulations, where the state dictates what can and can't be done (which was slightly at odds with their negative reaction to 'Big Brother' approaches). Those in Segment 1, by contrast, preferred policies that supported, rather than compelled, them. Interest in receiving information on water measures also varied quite dramatically - several participants in Segment 3 conceded that they would personally have no interest in hearing more, whereas others in Segments 1 and 2 were more engaged and called for a more comprehensive approach to communicating on this issue, using a combination of TV, radio and leaflets (although some still doubted how much impact this would have).

Finally, participants appeared to prefer a strategic approach (involving a combination of coordinated policies, deployed sequentially over time) over single policies. Indeed, there was support for the notion of a **policy road map** for water for the next 10 years, and some participants had suggestions for how the policy deployment should be phased. For example, there was a near universal view that the information campaigns, compulsory water metering and demonstration new build developments were a necessary 'starting point' to build acceptance for other policies (i.e. the information campaign would give a "big narrative"; the water metering would give households a reason to change behaviours and consider specific measures; while the demonstration homes would provide confidence and normality, and give households evidence that other people are doing this).

The first things are informing people and meters because I think those two would make the biggest immediate difference. The other thing that we all spoke about is obviously installing these systems into the new builds as well, which I think would be fantastic, because then, if you were looking at a new property, you could have it already done for you, rather than having it put on an older house where, you know, it could be a lot of upheaval. Then, finally, introducing the Pay As You Go scheme for people in the older houses as well.

Female, Segment 2, Cambourne

This information could be followed by something else like legislation. So this could be preparing residents for future action or consequences.

Male, Segment 1, Cambourne

You can't have these policies without water metering, because otherwise it doesn't make sense.

Male, Segment 1, Watford

II. Reactions to specific policies

The following section sets out details of each of the policies that were tested, alongside participants' reactions to them.

Information campaigns

I find out more about what happens when drains are polluted/become blocked because of household behaviours and want to make a changes around my home.

My water company and local authority team up to provide more information about household drain pollution.

I receive an information pack with my water bill.

I find out about it from a campaign run through my local school / social / sporting group.

I now know what items shouldn't be put down the sink or flushed down the toilet – I use the bin instead.

I put a small bin in my bathroom to reduce the temptation to flush bathroom rubbish.

Plus I can get free fat traps from my local authority. I put them out with the rest of my waste collection.

When I go out, I see the 'Bag it & Bin it. Don't flush it' sign. It reminds me to do the right thing.

PROS

- No restriction of choice – it's down to individuals to take notice or not
- Need for a big narrative (i.e. why this is important) to raise the profile of the issue
- A good way for e.g. water companies and local authorities to demonstrate leadership
- There is a need for information on specific actions and what kinds of support is available for homeowners
- An important first step to help support other water policy initiatives
- Even among Segment 3 there is a view that it's "worth giving a go"

CONS

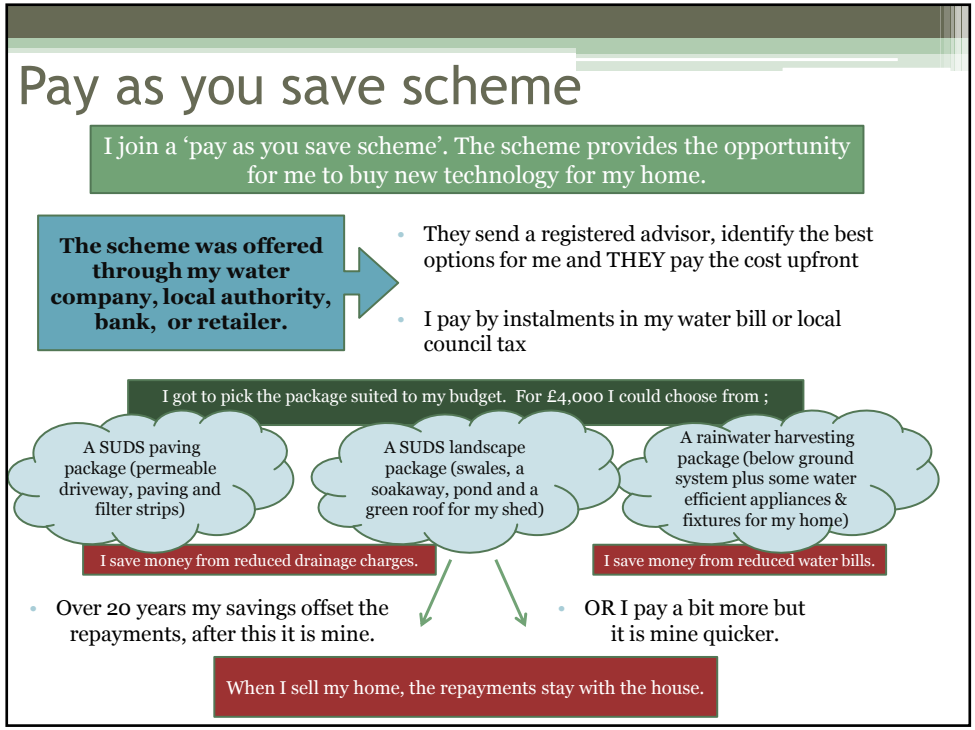
- Lack of interest (especially among Segment 3)
- Difficult to get the message across - even some in Segments 1 and 2 admit to immediately throwing away supplementary information that comes with the bill
- Information on its own will not change anything – needs to be joined up with other policies that promote specific actions

"I think the base level of knowledge is incredibly low. I think advertising campaigns and then leaflets and maybe even qualified professional advisors would be needed to make these kinds of things reach the public"
F, Segment 1, Cambourne

"I got my water bill yesterday I took the bill bit out and whatever else comes with it, I throw it away"
F, Segment 2, Watford

"We thought it was acceptable but do we actually really look at it, take much notice? It's quite a difficult message to get across"
M, Segment 3, Watford

"I think that's where in the past environmental campaigns have failed as each local authority has had different messages, different campaigns and logos"
F, Segment 1, Cambourne



PROS

- No upfront cost (removing a key barrier)
- Money comes out of savings in water bills
- It made some participants seriously consider options like rainwater harvesting
- Important in demonstrating households are being supported to do things, not mandated (i.e. carrot rather than stick)

CONS

- Lots of questions on how it would work (e.g. the balance between repayments and savings; fixed price instalments? Interest free loan?)
- Questions about the agenda of the lender – needs to be independent, impartial advice – not water companies 'trying to make even more money out of them'
- Would need to create/choose their own 'package' of measures
- Some would need a financial incentive, not just financial neutrality
- Pay-back period too long – looking for 5-10 years
- Worry about the impact on selling house
- Belief that grants are simpler, so long as they are large enough to offer a 'significant' reduction in upfront costs (e.g. 50% or more)

"If the Pay As You Go schemes come into practice then it's [rainwater harvesting] something we would consider. Without that it would be a big outlay, which we haven't really got, to be honest with you"
F, Segment 2, Cambourne

"I think there are a lot of people who'd like to do something and with this it's not going to hit them where it hurts"
M, Segment 1, Cambourne

"If it takes 20 years to start making a profit then it's hardly worth it"
F, Segment 1, Thatcham

"The problem might be that if you're not necessarily looking to stay at your property for 10, 15 years then the disruption you'll have to put up with…you're not going to see any direct benefits"
M, Segment 2, Watford

Compulsory water metering

By law all homes will be required to have a water meter.

- I'm in control now. I am responsible for the water I use in my home

I can save money by using less water.

- I got a smart meter to record my water use. Information is sent remotely to my water supplier, no one needs to come out to read the meter.

Plus the smart meter can detect leaks in my pipes. I can get them fixed before they become a problem.

- I have smart billing. My bills are easy to read because I can see my average household water usage and compare how much I use throughout the year

PROS

- Perception it would cut water consumption (especially with 'smarter', more visible meters) – giving households an incentive to do things differently
- Considered a positive step by some; an inevitable change by others
- The principle of paying based on use is considered fair (and there is a precedent in terms of gas and electricity use) - but only if everyone has one
- An important means of supporting other water policies (there is no financial motivation for undertaking measures like rainwater harvesting without it)
- High level of engagement with the smarter bill information (across all groups, even those who said that they didn't want to receive more information)
- High level of interest in knowing how much water they use, broken down by different appliances and behaviours - suggestions that such information would immediately change household behaviours.

CONS

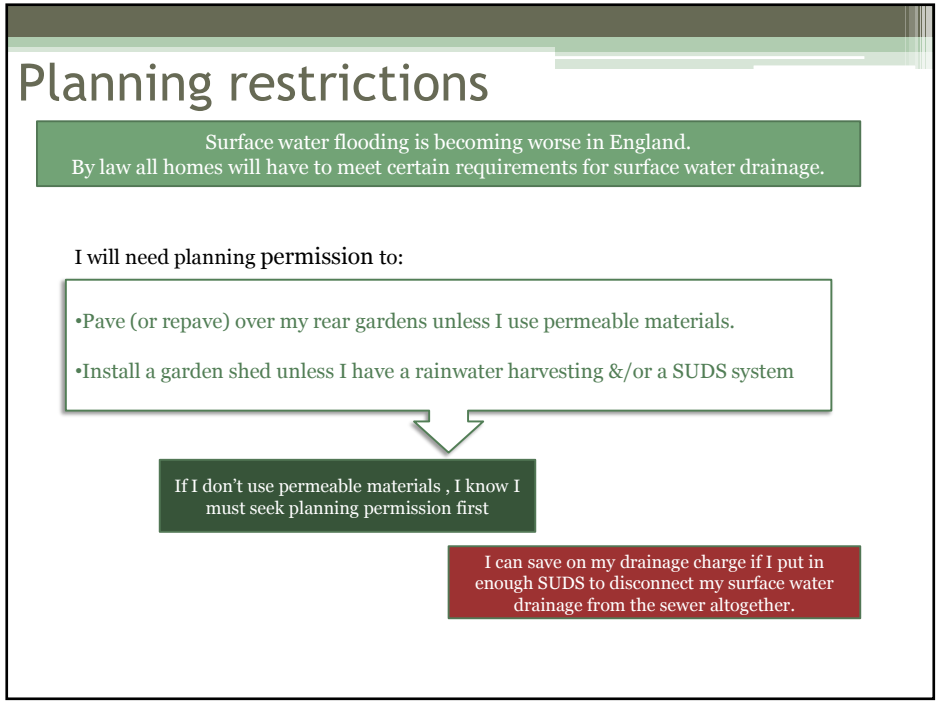
- Household needs more protection – if there is a leak, or if the bill is higher than it should be (examples of horror stories from some participants in the group)
- Impacts disproportionately on larger families

"It would certainly make you look more closely at how you could use some of the technology we were talking about earlier"
M, Segment 1, Cambourne

"If every household has a water meter, then it would make us think more about what we're doing - and that's not a bad thing really"
F, Segment 3, Watford

"If you could kind of see the units ticking away, then I think it would make it more visual, wouldn't it. I don't even know where the meter is. If we had a read out for everything in the house – electric, water – and it could monitor it in cash terms and in real time, then obviously you're going to be more careful. I know I would, because I'm tight!"
M, Segment 2, Cambourne

"I had no idea it [long showers] uses that much. They'll be some shorter showers in my house now, I can tell you!"
F, Segment 1, Watford



PROS

- Simple and clear – "the rules"
- Familiar to people
- Fair because it is the same for everyone
- A necessary 'pain in the arse'
- New rules have a symbolic value in communicating the importance of the issue

CONS

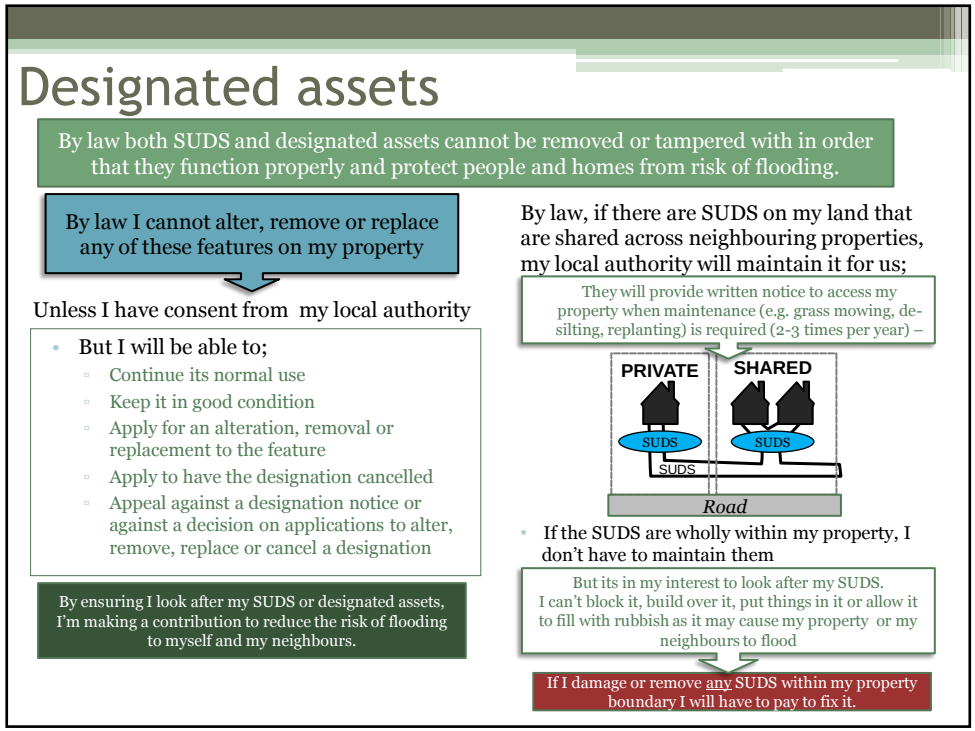
- Worries that the council could take their powers too far, i.e. looking at small things in their garden, 'petty' decisions by planning officers
- Concerns about how this could be enforced, and the cost of enforcement
- Seen as a bureaucratic and slow process
- Concerns that contractors would not know / would not tell households, exposing them to the risk of the Council fining them

"What I feel is really strange is that you're under planning permission in the front but not in the back. That seems a bit weird really, because if they're going to do one, maybe they should do the other as well, you know, because obviously you're still going to get rain in the back garden"
F, Segment 2, Cambourne

"If you got a building firm to do it then it'd be fine but you could just do what you wanted if you did it yourself, who would check?"
M, Segment 1, Thatcham

"Where's the funds going to come from and who's going to police it"
M, Segment 2, Watford

"I think we worry too much about putting legislation in and people grumbling, they should just get on with it – but they'll be much more likely to accept it if they know why"
M, Segment 1, Cambourne



PROS

- Considered fair if the designation is 'from this moment on', rather than retrospective (i.e. giving households choice to e.g. buy a property or undertake a change knowing what they are buying into/what the implications are)
- Low cost option, assuming maintenance is basic/responsibility of council
- If applied sensibly, a fair policy that protects the community from flooding.
- The council is considered the right actor to protect the wider community
- Considered more appropriate for community-scale features or shared assets, less so for smaller private features

CONS

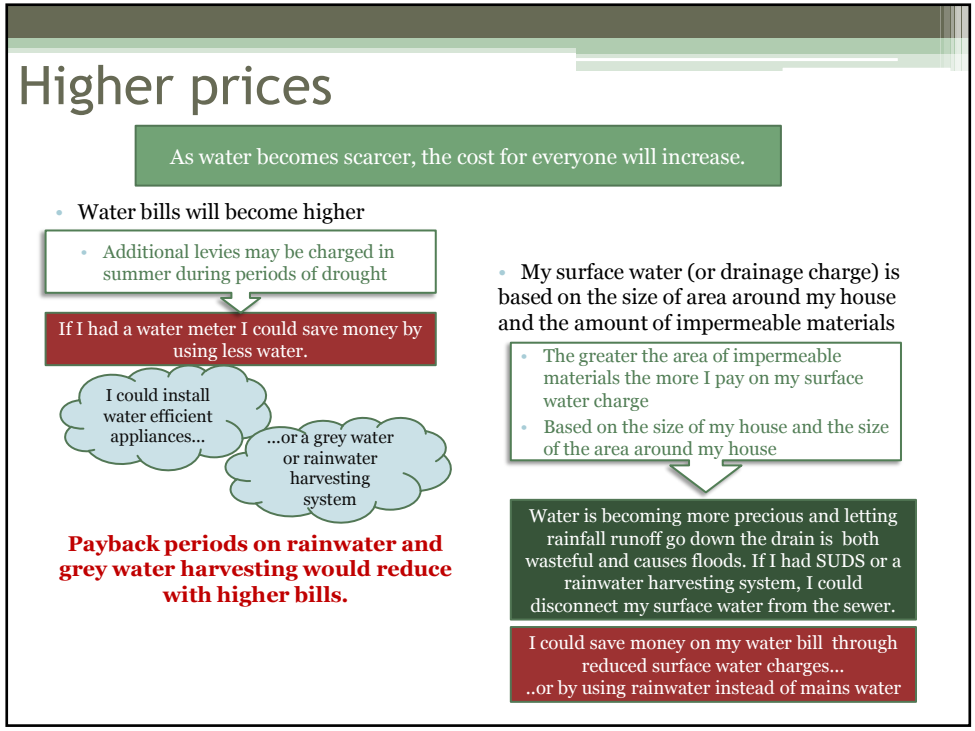
- Unacceptable if applied retrospectively
- Unacceptable if process 'goes too far' and invades individuals' rights
- Unease around designation of small, private features (e.g. pond in a garden), giving a sense of 'Big Brother' telling homeowners what they can and can't do
- Unacceptable if high maintenance costs / time burden on individuals
- Questions about how easy it would be to appeal against a designation
- Concerns shared responsibilities could cause disputes between neighbours.

"There needs to be assessment based on their ability – both physical and financial to maintain it and help provided as and when necessary"
F, Segment 1, Cambourne

"It could work well but there are lots of caveats attached to this one – it depends on how far it's extended"
M, Segment 2, Cambourne

"If you've bought a property in good faith 15 years ago then you're not really going to appreciate someone coming along saying this is a designated asset and you're not allowed to do anything with that ever again"
M, Segment 2, Hull

"It's like when you buy a listed building - you know what you're buying into and if you don't like the package then you don't get into it"
F, Segment 2, Watford



PROS

- Acceptance (often begrudging) that the policy would be very effective and would make water saving measures look more financially attractive
- Some thought this was fair because homeowners could still choose whether or not they wanted to make cost-savings by taking action.
- There was a feeling that higher prices are inevitable – and acceptable within limits - if water is scarce (comparison made with petrol).

CONS

- Concerns about impact on vulnerable groups – "water poverty"
- A view that this is just a way for water companies to make even more money
- Some believe that they pay enough already (energy bills, council tax, etc) and too much burden is being placed on the householder
- Scepticism that water is a scarce resource that requires price increases to reduce consumption
- Scepticism of block tariffs because – perception that water companies could say water is scarce as an excuse to put up prices and not reduce them later.

"It's an undervalued resource and it will remind people it's an important thing"
M, Segment 2, Cambourne

"We would have people with water poverty. You'll end up hitting those who could least afford to pay"
F, Segment 1, Watford

"That surely is just pure profit for the water company"
M, Segment 2, Cambourne

"Nothing concentrates the mind quite like money"
M, Segment 3, Watford

"The probability is that bills will go up and you'll use less water. I would pay as little as possible"
M, Segment 3, Thatcham

Water restrictions

Water is becoming scarcer and summers are getting drier. Hosepipe restrictions are routinely brought into place in summer months.

Water restrictions include;

- Hand watering gardens with a hosepipe (no sprinklers) between 6am -8am on allocated watering days only
  - Even numbered (and no number) properties – Saturday & Tuesday
  - Odd numbered properties – Sunday & Wednesday
  - No watering on Monday, Thursday, Friday
- Washing cars with buckets only
- No washing down paths, patios or driveways with hosepipes or buckets

I can avoid water restrictions by installing greywater or rainwater harvesting systems for outdoor use.

If I had a water meter, I would save money because I'm forced to use less mains water.

My garden is important to me. With water restrictions in place I would consider;
- **planting a drought resistant garden or;**
- **installing a rainwater or grey water harvesting system to avoid water restrictions.**

PROS

- Effective and acceptable measure if circumstances demand it (i.e. drought)
- Not much of an imposition if applies only to hosepipes (a feeling that people should have water butts and adapt gardens to cope with warmer weather)
- No costs
- Familiar policy

CONS

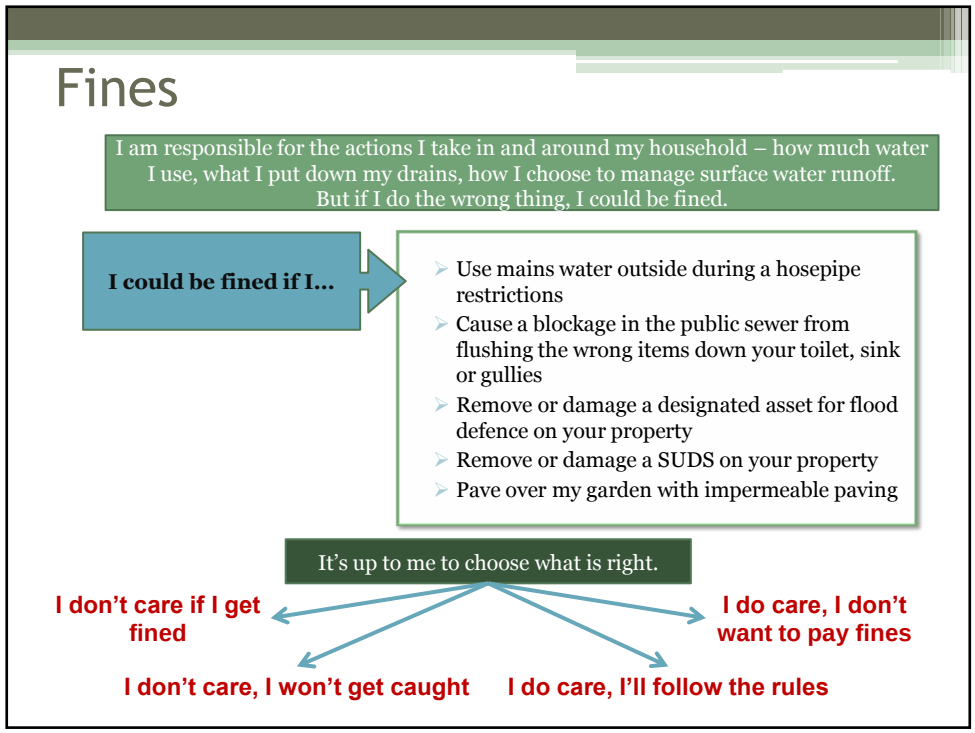
- Feeling that water is plentiful in the UK so this can only ever be acceptable in exceptional circumstances
- Resistance to the idea of neighbours spying on each other
- Blame focused on water companies for not planning better / preventing leaks
- Questions about effectiveness and cost of policing the measure
- Concerns about some of the "new" rules i.e. odd and even house numbers

"It's clear and easy if you're house is odd or even but what about if your house just has a name!?"
F, Segment 1, Cambourne

"I agree in theory but who is going to police it?"
M, Segment 1, Hull

"It's fair enough. Water's for drinking and essential things and watering the garden is well down the list"
M, Segment 1, Watford

"Actually, if water restrictions were in place then you'd consider what you were planting wouldn't you – to make sure they were more drought resistant"
F, Segment 1, Cambourne



PROS

- Sometimes an effective and necessary way to impose the Law
- Familiar with these and accept fines as part of every day life – if you break the law you're fined

CONS

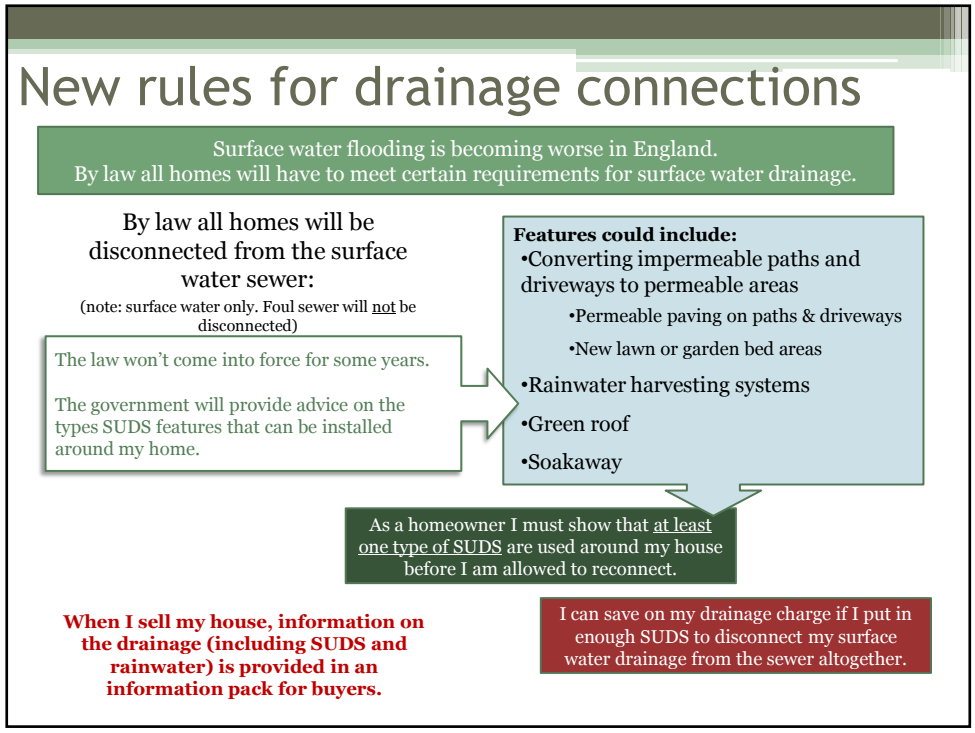
- Some question the effectiveness - they compare it to speeding / using mobile phones while driving - which people do anyway, because they don't think they'll get caught.
- Ineffective if no-one polices it; but conversely too costly if it is properly policed
- Resistance to the possibility of being criminalising homeowners.
- Resistance to the spread of "Big Brother" approaches and the ubiquity of fines.
- In the absence of other policies, too much emphasis on the stick and not enough on the carrot.

"But how can you do it. How can you prove who's blocked a sewer?"
F, Segment 1, Cambourne

"It is impractical to police it"
M, Segment 2, Watford

"You can have hose pipe police but the rest of it is pretty impossible"
M, Segment 2, Cambourne

"I don't think anybody would ever get fined"
M, Segment 3, Thatcham



PROS

- Widespread agreement that it would be effective
- Some think it might be acceptable if the Council / water companies took the lead in terms of implementing the measures in public spaces – but would need lots of lead in time (10+ years), information and support for households.

CONS

- Logistically impossible
- High cost of implementation
- Violates homeowners' rights
- Impact on vulnerable groups
- Authoritarian/Draconian measure - only acceptable if all other options – including support and encouragement – have failed and there is a clear and imminent threat.

"The idea is good but I don't like being bullied into doing this"
M, Segment 1, Watford

"It is a ludicrous solution"
M, Segment 1, Hull

"It would be incredibly impractical with 65 million people and getting contractors to come and put in SuDS and stuff. It would be impossible"
M, Segment 1, Cambourne

"You could give a long time frame in which to switch, like the TV switchover. Enough time to comply and lots of information"
F, Segment 1, Cambourne

"There'll be a riot. They're asking for trouble"
M, Segment 2, Thatcham

Community schemes 1

The local council and/or water company redesign surface water drainage in our streets

- The side of the road is re-landscaped into planted SUDS, and rainwater from the houses is connected to them
- The road is re-surfaced to make it permeable
- Some local parks and roads are made "overflow areas" and are flooded during storms – so that houses are not
- The local authority maintains the SUDS

Above: Landscaped curb extension with planting Source: Martina Keefe

My street is more attractive, and may be less likely to flood. My house might be worth more

I may be asked to contribute, or pay higher taxes or water bills

I may pay lower water charges

Above: Landscaped curb with permeable paving Source: Martina Keefe

Is the effort worth it? It looks nice but…
- **I don't know if my house is at risk of flooding**
- **My house might still flood if people upstream don't take action – although the SUDS will make this less likely**

PROS

- Responsibility transferred to the council (where some participants think it should be)
- Community-wide effort so a) fair (i.e. everyone involved) and b) more likely to be effective (i.e. lots of SuDS rather than one or two ineffective changes)
- Some felt that at least they would see something tangible for their council tax – as long as the extra charge is "not too much"
- More acceptable if water companies also made a financial contribution

CONS

- A feeling among some that it should be done anyway, i.e. households shouldn't have to pay extra since they believe they pay enough Council Tax already
- Some lack of trust, and scepticism, in the capacity of local government to coordinate and maintain the scheme properly
- Uncertainty around whether households would be willing to invest time in participating (beyond just taking up options suggested by the council)
- There was also a perception that water companies had a role to play and should make a contribution to the cost of making the modifications.

"I think it's very acceptable and I'd be willing to pay something towards it, as long as it's not too much obviously"
F, Segment 1, Cambourne

"At least you could actually see what you're paying for and getting from the council"
M, Segment 2, Cambourne

"It's acceptable - depending on how much you'd have to pay"
M, Segment 1, Watford

"I would not be happy even if it was a slight increase in council tax – we pay enough now"
F, Segment 2, Watford

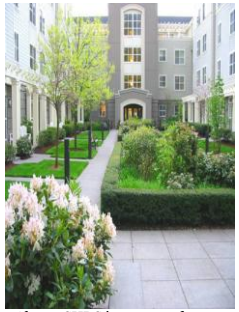
Community schemes 2

I joined my local community scheme to tackle surface water flooding

As a community we decide we want to do something about surface water, so our properties won't be flooded.

- We work together to decide what needs to be done
- We fit out our own properties
  - e.g. with SUDS, rainwater harvesting
- We bring in experts and share skills and knowledge
- We identify public spaces to converted to SuDS
  - By the side of roads, local park, schools
- We help design &/or build and install the features
- We ask the local authority to maintain it

HOW DO WE PAY?
- Raise the money locally through donations and business?
- Apply for grants
- Use volunteer labour
- Fund it ourselves?
- Influence local government budgets?
- Water company?



Above: SUDS in courtyard
Source: Bob Bray

Above: SUDS street planters
Source: http://www.portlandonline.com

WHO HELPS US DELIVER?
- Local authority
- Water company
- Self-driven (with/ without government advice)
- Low carbon community/ with energy efficiency schemes
- Community initiatives (e.g. Muck-in-for-life)
- School groups, scout groups

PROS

- Great idea in theory
- Community-wide effort so a) fair (i.e. everyone involved) and b) more likely to be effective (i.e. lots of SuDS rather than one or two ineffective changes).

CONS

- Concept of community is difficult
- Would not work in practice – too much effort/time to coordinate, community doesn't really exist/get involved in this way, potential for disputes between neighbours over what are the best measures to use, some people would not get involved/contribute but would 'free ride' on the benefits

"If the council did it and we were asked to maintain it, then that would be different"
M, Segment 2, Watford

"This would never work even if people were well intentioned and well meaning. It's a big project"
M, Segment 3, Thatcham

"I live in a close of nine houses, but five of those houses don't even talk to one another. I'd love there to be enough community spirit but there isn't"
F, Segment 3, Thatcham

"It's a nice idea but in the real world who has time?"
F, Segment 2, Watford

SECTION SEVEN

Conclusions

This final section of the report draws together the findings, outlined in the previous sections, to answer the key research questions that formed the basis for this research.

Research question
Water availability
i. To understand homeowner attitudes towards water conservation, especially in relation to installing and using rain water harvesting and grey water systems in the home:
ii. To explore how likely owner-occupiers are to consider water efficiency and conservation with/ without a water meter

The research reveals significant potential for water conservation retrofit options. Supporting the findings of the literature review, many participants were positive - in principle - about a range of measures. This was particularly true of rainwater harvesting - which benefits from resonating at an intuitive level (i.e. taking advantage of a 'natural' resource) as well as being considered innovative – and water butts (which are considered cheap, easy and familiar). In principle reactions to grey water recycling were also positive, although much more depends on what the water is used for, while for community-scale rainwater harvesting systems it is concerns about the practicalities of communities sharing a resource that presented an immediate barrier.

While there is a widespread perception that the measures should be widely applied in the context of new build developments, the situation is less clear cut for retrofitting. The research identifies a series of barriers to uptake, which draw strong parallels with those identified by the *Big Energy Shift* for in-home energy systems. For example:

- Upfront costs, weak pay back and disruption present the key direct barriers to uptake;
- In addition to direct barriers, there are a series of questions and caveats that temper in principle support, particularly around maintenance, confidence in the technologies (and suppliers) and understanding how the measures would work 'for real' [A process of demonstration (leading to familiarisation and normalisation) would go some way to addressing these concerns and take away the 'fear of the new'];
- The current framework within which households make decisions about water consumption provides little motivation for change. The perceived low cost of water relative to other bills, the absence of comprehensive water metering, a default perception that water is an abundant resource in the UK, and the low priority attached to water relative to other issues (e.g. energy, recycling) all combine to provide little impetus for change and serve only to maintain the status quo.

However, and unlike the findings from the *Big Energy Shift*, this research suggests that the public are some way off seriously contemplating water conservation measures. In several cases participants were hearing about the measures for the first time and - at the other end of the spectrum - not even the environmentally receptive 'first movers', who had already invested in energy efficiency/renewable energy measures, had yet taken any action.

The research suggests that one of the first steps required to increase the profile of the measures and encourage uptake is a "big narrative" that supports the need for change, and which sets out a coordinated and sequential policy roadmap moving forward.

A different kind of information – focused on operational information (i.e. how much water does each appliance or behaviour use) and delivered via either smarter billing and/or smarter metering – would also provide motivation to review their consumption and consider specific water conservation measures.

Action is required to address the fundamental balance between upfront costs and payback – on the former an initial cost of anymore more than around £1,000 appears prohobitive; on the latter anything longer than 5-10 years provides, at best, only a weak motivation. The proposition also needs to provide more in the way of immediate gain and instant gratification.

Concerns about hassle could be addressed through better integration across water measures and – potentially – integration with in-home energy retrofits, to present households with a package of measures that could be undertaken at the same time.

Finally, there is a need to normalise the use of water retrofit measures, highlighting the importance and potential for area-based approaches (i.e. whether street by street, neighbourhood-wide or 'whole area'). Rather than focusing on a disparate set of thinly distributed example (which can be dismissed as something different to the norm, or an interesting one-off exception), the evidence suggests the need to establish a concentration of exemplars in a given area to reach a critical mass and challenge prevailing social norms. These exemplars need to include new build and retrofit houses, as well as commercial and public buildings.

Research question
Surface water management
i. To explore owner-occupiers attitudes towards retrofitting SuDS in their properties, taking account of voluntary and regulated actions.
ii. To explore owner-occupiers perceptions and attitudes towards SuDS in new builds/redevelopments – do they see them as an effective measure for tackling flooding, can they create a more pleasant place to live, and do they add or detract from house values? Would they consider purchasing a home served by SuDS? What concerns do they have? What would overcome them?
iii. To explore owner-occupiers opinions on responsibility for SuDS maintenance
iv. In addition to SuDS, many homes have features such as garden walls and embankments that can act as flood defence measures. What will encourage homeowners to value and look after the features that provide them (and their neighbours/ neighbourhood) protection from flooding?

While awareness and recognition of SuDS is low, the principle is familiar, easy to grasp and considered a 'good idea'.

Attitudes to different measures vary. In terms of both permeable paving and rain gardens, the relatively low costs of installation, participants' comfort with the measures (i.e. they are not considered new technologies that represent a leap into the unknown), and their positive impact of the aesthetics of the home and/or the amenity value of community spaces means that there is significant scope to encourage uptake among homeowners, in both a new build and retrofit environment. In this respect they differ from major water conservation measures (which were considered highly desirable in the context of new build developments but met with caution in relation to retrofitting). Both measures also benefit significantly from the choice of options available – which affords for different tastes, styles and budgets. The flood protection role of SuDS is a motivating factor for uptake, but it is secondary.

Perceptions are quite different in relation to green roofs. Costs are very much a key barrier in terms of the initial outlay which is considered prohibitive (by some margin), closely followed by the fact that they are considered 'visually weird'. Whereas the other measures were positive in terms of how they look, green roofs violate many participants' desire for their homes to conform to idealised norms of what a home should look like. This was not true in all cases (with several participants positive to how they looked) but more often that not participants were only comfortable with the look of green roofs in specific contexts (*Grand Designs* new builds, sheds, flat roofs), and they did not want their home to stand out from their neighbours.

Turning to barriers to the uptake of SuDS, the research points to the following:

- Lack of direct experience of flooding, and hence a lack of personalisation of flood risk;
- At a community-scale, the safety of community-level SuDS (e.g. ponds) for children and the potential for poor maintenance and/or fly tipping to despoil the liveability of the local area (and, in doing so, turn a key positive selling point into a negative);
- Questions about the effectiveness of SuDS in reducing the risk of flooding;
- Uncertainty about how whether contractors would be aware of SuDS options, whether they would be qualified to install them correctly, and whether there is such a thing as a specialist SuDS installer.

While certain SuDS measures are considered desirable, there was little evidence that they are sufficiently high ranking priorities for people to look out for them when making home buying choices. In order to maximise the potential for uptake, the research suggests two issues are key:

- *Normalisation through demonstration* – participants wanted to see SuDS "for real" and be reassured that they are 'normal' measures to be adopting (i.e. that others are adopting too). The site visits to Lamb Drove in Cambourne and BRE Innovation Park had a notable and positive impact on perceptions;
- *Windows of opportunity* – propensity to install SuDS is highest at key junctures when households are looking to re-do their garden, driveway or roof. This went someway to negating the weak cost savings argument, since it was considered an outlay that they would have to make anyway. The literature review suggests that a second moment of potential change is following severe flood episodes, where heightened receptivity to risk provides a (short) window of opportunity to promote the uptake of SuDS measures.

Turning, finally, to maintenance of existing SuDS, some combination of awareness, support and formal designation of responsibility emerge as key motivations. Irrespective of scale (e.g. community-wide, shared assets between groups of neighbours or individual properties), awareness of strategic SuDS is very low, and participants suggested that the very act of becoming aware of these features would increase the likelihood they were valued and maintained. Where maintenance goes beyond low cost/low effort actions (that were considered reasonable to expect householders to undertake), this provides an opportunity for local authorities or other actors to support households and demonstrate that they, too, value SuDS. Furthermore, in terms of supporting future maintenance a policy of designated assets was widely backed if it was demonstrably for the benefit of the community (and not applied retrospectively/over zealously).

Research question
Water pollution and quality
i. Explore owner-occupier perceptions and attitudes towards polluting household drains. Are they aware how their actions may affect their household or the broader community, especially the risk of local flooding? Do they care?
ii. Explore current behaviour of owner-occupiers. What do homeowners do now?
iii. Explore triggers or levers that could lead to a positive change in owner-occupiers behaviour

The research demonstrates that participants made a distinction – in several key respects – between pollution that causes blockages as opposed to pollution that causes eutrophication.

On the former, participants' responses demonstrated that (a) they were able to immediately identify sources of household pollution (e.g. oil, food scraps); (b) they were surprised to learn of other things that should not be disposed in the sink/toilet (e.g. baby wipes); and (c) awareness of the impacts in terms of community drainage systems – and the potential to cause/contribute to flooding – was low (instead, the impacts were thought of in terms of their own pipes and drainage). However, high levels of awareness about the need to avoid putting certain things down the sink appears to only have a limited impact on actual behaviour. For example, while some had adopted behaviours like tipping fat somewhere to let it solidify before disposing of it, others continued to put these things down the sink anyway (accompanied by a range of dubious practices that they thought counteracted the impact).

Overall awareness of phosphate-based pollution was much lower and this issue did not have the same traction. Even though the images shown in the forum session were emotive – evoking sadness at the thought of killing fish – participants quickly disconnected the impact from their own behaviour/responsibility (believing that could only be caused by industrial level pollution). Furthermore, few participants said that they regularly purchase eco-friendly products, with the majority continuing to perceive that the products are more expensive and less effective.

Turning to key motivations, it was evident that visual representations of pipe blockages had a strong impact on participants, partly because of the 'gross out' factor but also because they immediately began to personalise the issue and worry about their own pipes and the potential problems that they may themselves face as a result of any blockages. In contrast, a focus on the wider community (e.g. problems with sewage and draining systems in general) was easier to dismiss as it was 'away' from them personally and considered to be the water company's responsibility. In terms of phosphates, the main focus was the actions that other actors should take, i.e. manufacturers to reduce the level of phosphates in products and water companies to design sewage systems to remove phosphates before they reach rivers and streams.

Research question
Flood risk management
i. Explore perceptions, attitudes and behaviour towards how householder actions (or inactions) can help manage flood risk on a wider community basis. The three other issues to be explored in this study each provide actions that owner-occupiers can undertake to help manage flood risk.
ii. Explore levers that can help respondents to understand their potential impact on communities downstream (e.g. awareness, education), and to take positive action, especially where individual properties may not be at risk of flooding.

The issue of community-level impacts was difficult for participants to conceptualise, largely because their immediate interest and focus was on their own home and their own behaviour. While they were able to recognise the premise of communities collectively coming together (sceptical though they were that this would happen in practice), they did not see their own individual choices adding up to part of a bigger whole. So, for example, their concern about water pollution leading to blocked pipes was in relation to their own pipes; likewise their demand for permeable paving was in relation to making their homes look nice.

However, irrespective of whether they were consciously aware of wider community impact, the research shows very clearly that participants were personally willing to adopt a number of measures that would – in the end – offer benefits at the community level. Furthermore, participants were very evidently influenced by what others around them are doing, reinforcing the significance of social norms and the potential for community-scale approaches to establish new social norms in favour of SuDS measures.

The community dimension would also undoubtedly resonate more if it were led by other agents, such as local authorities and water companies. Participants were accepting of such agents working at a community-scale on their behalf. For example, and subject to questions about cost and local disruption, there was support for the idea of the local council initiating community-wide SuDS schemes in the area (as well as interest among participants to find out more). Indeed, such an approach would also address the perceived ineffectiveness of SuDS if they are not widely applied in an area, which acts as a barrier to uptake.

And, finally, participants did recognise the potential for cross boundary impacts and, as a matter of principle, they thought it was only fair that steps be taken (again by the council, as an independent arbitrator who could adopt a strategic perspective) to protect areas at particular risk.

APPENDICES

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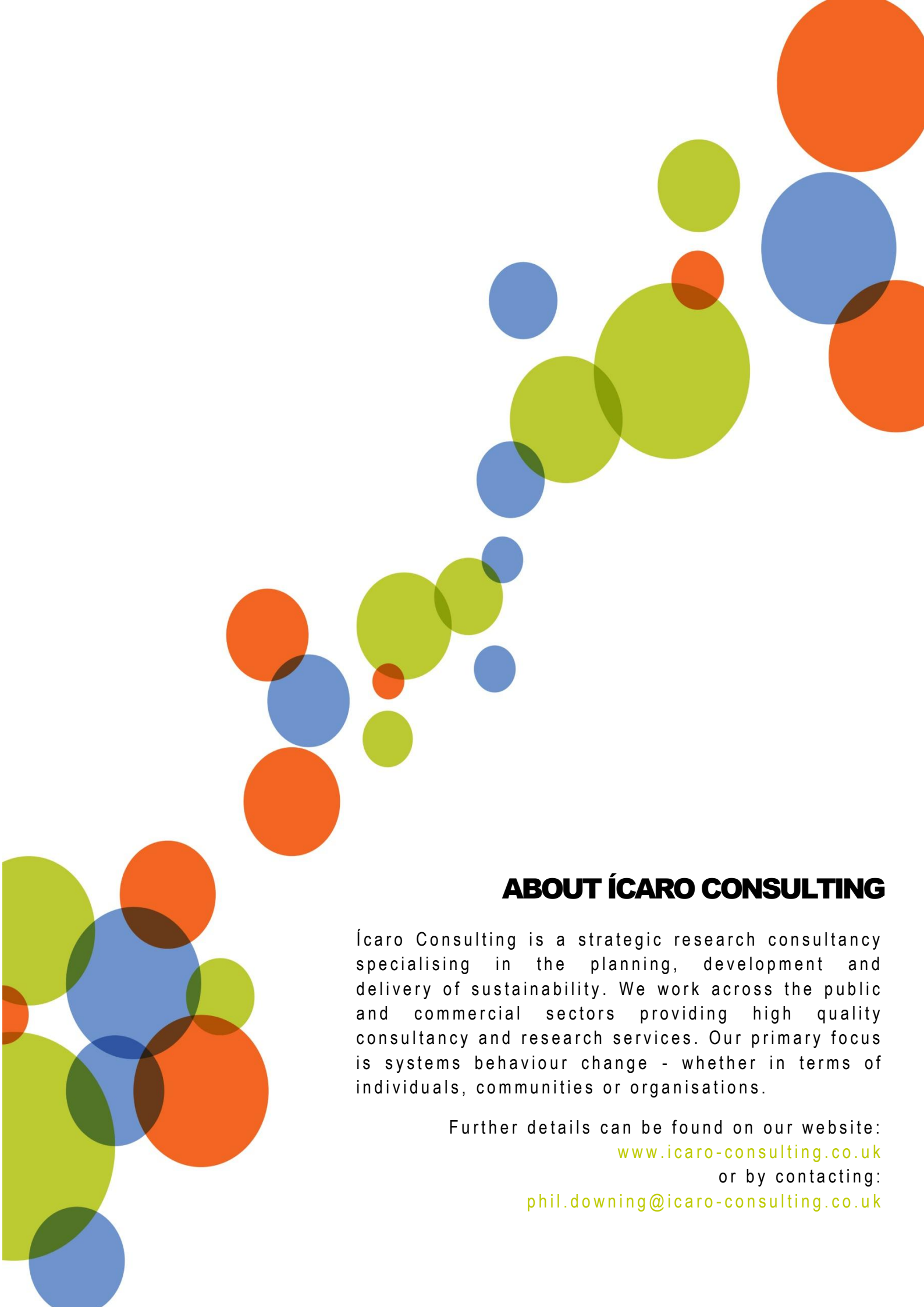

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