Waterwise
344-354 Gray's Inn Road
London
WC1X 8BP
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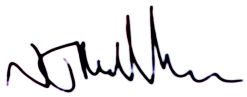
Dear Sir/Madam

Many thanks for the opportunity to provide information and evidence to the Future Homes Hub to inform your engagement with the government's 2022 Roadmap. This written response supersedes our response through the online portal and contains additional data and references.

We have provided responses below to most of the questions posed and where possible have included links to supporting evidence or information sources.

We look forward to supporting efforts to develop and implement the Roadmap and are happy to be on the mailing list for this work and also to meet with the team.

Regards



Dr Nathan Richardson
Head of Policy and Strategy
Nathan.richardson@waterwise.org.uk
07793 251450

cc Aaron Burton, Defra

Who is Waterwise

Waterwise was founded in 2005 and is the leading authority on water efficiency in the UK. We are an independent, not-for-profit organisation, receiving funding from supporters across and beyond the water sector and wider sponsorship and research projects. We like to be at the front, leading and supporting innovative efforts to realise our mission; that water will be used wisely, every day, everywhere, by everyone.

Regulations and standards

7. What water consumption is possible in terms of litres per person per day (lpppd) in the home and how can it be achieved?

A useful reference source is this work by Artesia for Ofwat which looked at the **potential for deep cuts in personal consumption**. The work highlighted that personal consumption was below 90 lppd in the 1960s but has gradually increased since. They identified and modelled a range of water saving opportunities in the home and mapped these onto various future pathways. Depending on the mix of fittings they modelled a number of pathways that reduced PCC to below 90 lppd and in one case to as low as 49 lppd.

5. Scenarios: 5.5. Scenario outputs – explanation of micro-component values

Micro-component	S0: Current ambition (PCC = 105 l/head/day)	S1:unfocused frugality (PCC = 86 l/head/day)	S2: Localised sustainability (PCC = 62 l/head/day)	S3: Technology and innovation (PCC = 49 l/head/day)	S4: Regulation and compliance (PCC = 73 l/head/day)
Toilet	Replacement of older larger cisterns continues and future regulations limit new installations.	Current market transformation to continue reduction in toilet flush volumes. Increased frugality – "if it's yellow let it mellow". Some flushing with bath/shower water.	There is an existing toilet at 1.5 litres (Propelair). If 50% toilets use non-potable water used (e.g. rainwater or greywater) and 50% @1.5 litres, then this is achievable.	There is an existing toilet at 1.5 litre (Propelair). If 50% @1.5 litres, and waterless toilets are developed for the other 50%, then this is achievable.	Regulation to push much lower flush volumes into the retrofit market. Limited use of non potable water for toilet flushing. Existing home retrofits via water neutrality regulation.
Bath	Bath use declines slowly without any specific interventions.	Assumption that baths become less frequent. Bathing limited to pets and children. Bathing reduces through frugality in this scenario.	Assumption that baths become less frequent. Bathing limited to pets and children. Bathing reduces through behaviour change in this scenario.	Assumption that baths become less frequent. Bathing limited to children. Bathing reduces through technology (smaller baths) in this scenario.	Assumption that baths become less frequent. Bathing limited to pets and children. Bathing reduces through behaviour change in this scenario.
Shower	Water companies focus their efforts on reducing shower consumption via "four minute shower" messages, timers, apps etc. Smart shower take up increases, some recycling showers emerge towards the end of time-line.	Shorter showers, flow controls and reduced frequency of use.	Some smarter digital showers and recycling showers to reduce volumes. Otherwise relies on shorter, less frequent and lower flow showers (just that people do this voluntarily in this scenario!).	Would be delivered through recycling showers – currently available (£3k) but deliver 90% saving. Prices fall as demand increases. Also digital showers for programming soaping/rinsing.	Regulation and water labelling delivers market transformation towards widespread take up of recycling and digital showers.
Taps	Water companies continue to focus on behaviour change messaging, targeting metered customers with highest consumption.	Following current guidance on not washing under running tap, turning off for teeth, shaving etc.	Non-potable water provision for laundry (hand washing), cleaning, etc.	Smart taps – no waste. Boiling water / chilled water taps – no running to waste. Technology for clothes and crockery/pans etc. to reduce the need for cleaning. Non-water based cleaning technologies.	Normal market transformation plus behaviour change. New developments are water neutral.
Washing machine	No specific interventions but planning controls mean more new properties have non-potable feeds for laundry.	More efficient washing – full loads, use of eco-cycles on products.	Extensive use of non-potable water for washing machines in new developments and retrofits.	Combination of waterless washing machines and non-potable water use.	Water labelling delivers more efficient products.
Dishwasher	No specific interventions.	More efficient washing – full loads, use of eco-cycles on products.	Extensive use of non-potable water for dishwashers in new developments and retrofits.	Combination of waterless machines and non-potable water use (e.g. with point of use disinfection).	Water labelling delivers more efficient products.
External use	Increased public awareness of water scarcity delivers some reductions and more new properties have non-potable feed for external use.	Less external use generally – more use of water butts.	Widespread use of rainwater/non-potable water.	Small reduction with smart irrigation.	Regulation drives water butts and xeriscaping.
Plumbing losses	Leaky loos recognised as an issue. Water companies offer free fixes and discounted replacements.	Frugality drives greater focus on losses especially in the home.	Services for loss detection and repair delivered as part of widespread markets.	Losses reduced to zero through smart meters, smart households, and leak free toilets.	Regulation drives down losses through products, labelling and behaviour change.

The findings of this Ofwat report are supported by more recent work on water efficiency product labelling from the Energy Savings Trust. EST found that **it is possible to achieve levels of 95 lppd** using fittings already on the market and categorised as being of 5 and 6 star rated efficiency in the Australian Water Efficiency Labelling database. Further details of the water use performances of the various fittings used to do this are contained in the report. They also found that around 85 lppd was currently about the limit of fittings based savings using widely available products and in the absence of water reuse technology (see below).

Section 1.1 of the EST report includes a summary of the costs survey that EST undertook of manufacturers and others. This was focussed on costs linked to a labelling scheme but is still useful. Section 1.2 sets out how they developed a value for the extra costs of products to meet a **95 lppd scenario** and factored this for other efficiency levels. To do this they looked at products that are already on the market to get to 95lppd and then looked at their current costs versus average costs for less efficient products (see unpublished table below). These

costs are probably overly high as a developer could purchase these more efficient products in bulk. These extra costs are not significant and would fairly rapidly be offset by water and energy bill savings

	Average Device Cost (£)	Water Efficient Device Cost (£)	**Amount More Expensive (£)**	Amount More Expensive (%)
Showerhead	£26.07	£32.57	**£6.50**	25%
Bath	£229.69	£259.14	**£29.45**	13%
Tap	£54.63	£80.14	**£25.51**	47%
Toilet	£193.43	£256.29	**£62.86**	32%
Washing Machine	£325.02	£390.02	**£65.00**	20%
Dishwasher	£357.85	£429.42	**£71.57**	20%

More recently United Utilities shared the headlines from their **developer incentive scheme** where they financially reward developers if they build to a 100 lppd standard. Over 86,000 plots have been signed up with developers saving around £40 million on fees. Other companies such as Anglian and Thames have similar incentive schemes. In **Wales a 110 lppd standard for new homes** has been in place since 2018 and we are about to commission a project to review the impact of this change.

It should be noted that building houses to a theoretical water efficiency using the calculator does not mean that they will achieve that level of efficiency in practice. Evidence from Thames Water, which has been submitted separately, highlights that actual consumption in new homes built using the **calculator method** ranges from 120 to 179 lppd depending on estimated occupancy. There is emerging evidence similar to Thames from other water companies such as Welsh Water and we are about to commission research looking into this issue further. As part of the Roadmap it is important that we move away from the flawed calculator approach. In the short term we should use the **fittings based approach** in Part G but once the mandatory water label is in place Building Regulations could just require a minimum of A or B rated products to be used. This shift should be factored into the Roadmap.

As highlighted above, **with water reuse it is possible to get below 85 lppd**. Water reuse can contribute more than 50 litres per day per property. The Eddington development near Cambridge achieves around 80 lppd based on use of a community scale rainwater harvesting system coupled with a dual pipe supply network. There are many further examples and information on rainwater harvesting and greywater reuse in this review report and appendices commissioned by Waterwise in 2020 which also looked at the costs and benefits of rainwater harvesting and greywater reuse in the UK.

8. Do you have experience in meeting specific water consumption targets below 110 lpppd? What technologies, appliances and fittings do you use to achieve these levels?
See above.

9. Are you aware of any actual or potential conflicts with the current English Building Regulations and the Approved Documents that could be barriers to the adoption or trial of certain water efficiency measures? Any examples of specific revisions that are needed to Parts G and H?
We are aware that **existing regulations prevent the adoption of water recycling showers** in the UK (https://orbital-systems.com/; https://www.flow-loop.com/). This new technology is very exciting as it can significantly reduce water and energy use (by 70-90%) in an area where water and energy usage trends are increasing. We would like to see the regulations reviewed to ensure they are fit for purpose and, if the risks are acceptable, do not hinder the roll-out of potentially game changing innovations such as water recycling showers.

The issue relates to the Water Supply (Water Fittings) Regulations 1999 and their equivalent in Northern Ireland and Scotland. Under these regulations a water recycling shower would not be allowable as Section 4 (3) requires that "every water fitting shall comply with the requirements of Schedule 2 to these regulations as it applies to that fitting".....Schedule 2 Paragraph 14 states:

> ***14.***—*(1) Any water fitting conveying–*
>
> *(a) rain water, recycled water or any fluid other than water supplied by a water undertaker; or*
>
> *(b) any fluid that is not wholesome water;*
>
> *shall be clearly identified so as to be easily distinguished from any supply pipe or distributing pipe.*
>
> *(2) No supply pipe, distributing pipe or pump delivery pipe drawing water from a supply pipe or distributing pipe shall convey, or be connected so that it can convey, any fluid falling within sub-paragraph (1)*

Additionally, the Water Supply (Water Quality) Regulations 2010 sets out:

> ***4.***—*(1) Water supplied to premises—*
>
> *(a) for such domestic purposes as consist in or include, cooking, drinking, food preparation or* ***washing,*** *or*
>
> *(b) for food production purposes,*
>
> *is, subject to paragraphs (4) and (5), to be* ***regarded as wholesome*** *for the purposes of Chapter 3, as it applies to the supply of water for those purposes, if the requirements of paragraph (2) are satisfied*

Crucially for water recycling showers, the regulations specify that water must be **wholesome for washing**. Water is only classed as wholesome as it is supplied by the water companies

to their standard and water recycling showers must therefore maintain that quality verified by regular testing, and therefore could not be installed without contravening regulations.
An additional point of reference on this issue is Section 67 (Standards of Wholesomeness) of the Water Industry Act 1991. This defines the specification for "wholesome" for water companies. It is worth noting that the regulations do allow the Secretary of State to allow for relaxations or departures from the prescribed requirements for wholesome water.

As highlighted above we want to see the regulations reviewed to ensure they are fit for purpose and, if the risks are acceptable, that they do not hinder the roll-out of potentially game changing innovations such as water recycling showers.

10. Do you know of any product standards, codes of practice or technical specifications that should be considered for development, revision or adoption to aid the UK in improving water efficiency?

Defra are currently consulting on options to update regulations to reduce the **occurrence of leaky loos**. Around 5-8% of dual flush toilets leak and they are wasting nearly 400 Mld of drinking quality water. Research into the issue is here and our position statement is here.

In addition, as highlighted above in our response to Q9, we want the government to review the regulations around water fittings to ensure that they are fit for purpose and not unnecessarily limiting game changing new technologies such as **water recycling showers**.

We also need the government to look at the definition of "**readily discernible" when it comes to dual flush toilet buttons**. Many of the dual flush button designs on the market are confusing despite the requirement in the Water Supply (Water Fittings) Regulations (Schedule 2 Para 5) for them to be "readily discernible". Research by SES Water with 1200 customers found that less than 30% of householders knew which button delivered the reduced flush in their home. Incorrect use of the buttons could be leading to over 200 Mld of wasted water a day. Research by WRAS presented at a 2021 Waterwise webinar with 2000 water users revealed similar findings. They found that the best ways to ensure that dual flush buttons are readily discernible is to have clear and permanently displayed information on or adjacent to the buttons and for the big flush button to be at least 50% larger than the small flush to achieve over 80% customer recognition. We need the government to provide a clearer indication of what it regards as readily discernible.

The government has committed to introducing a **mandatory water efficiency label for many water using products** along similar lines to the energy label and the mandatory water labels in place in Australia, New Zealand and elsewhere. Research by the Energy Savings Trust has identified significant water, energy and money savings from such a scheme. The label will set minimum and maximum water use performance standards for each level of label rating and can also set a minimum water use performance standard for each product such that products that are more inefficient than this minimum expectation cannot be sold in the UK. Once in place the label can be used to planning policy and Building Regulations requirements for new build and also to requirements for large scale

retrofit programmes and public procurement activities all of which could require the use of A to C rated products, for example. The label can also be linked to incentive schemes and to a potential addition to the Energy Performance Certificate system to include water efficiency alongside energy.

Current and potential technologies

Do you know of any developments in design, technology or construction to improve water efficiency in the following areas? Please indicate potential water savings, timescales and costs if known.

11. WCs, baths, taps or showers?

As highlighted above around **5-8% of dual flush toilets leak** and they are wasting nearly 400 Mld of drinking quality water. A typical leaky loo wastes between 200 and 400 litres per day. Research into the issue is here and our position statement is here. There are new products hitting the market that avoid the issue by incorporating an air gap such as the Cistermiser EvoFlush. Solving this problem could reduce household consumption by 100s of lppd if a property has a leaky loo and averaged out across the population by around 10-20 lppd. .

In our response to question 10 we highlight the issue of **dual flush button design** not being readily discernible as required by the Water Fittings Regs. The solution is simple and could save over 200 Mld or 5-10 lppd…..put permanent markings on the buttons (e.g. 1 drop v 3 drops) and make one button at least 50% bigger than the other.

There are an increasing number of low cost **water reusing toilets** on the market that include a wash basin above the cistern that helps to refill the toilet cistern. They are commonplace around the world. Adoption of this simple micro-water reuse technology should be encouraged in both new build and retrofit given around 25% of water use in the home is from toilet use.

Water recycling showers are emerging on the market (https://orbital-systems.com/; https://www.flow-loop.com/). This new technology is very exciting as it can significantly reduce water and energy use in an area where water usage trends are increasing. They could reduce household consumption by as much as 20-30 lppd.

A number of useful examples of water saving products are included in Chapter 1 of the 2021 Water Conservation Framework report for Ireland.

12. White goods?

13. Leak detection?

We believe all new homes and commercial premises should be fitted with leak detection devices and they could be included in retrofit programmes.

Ideally these devices should be smart water meters which are able to quickly detect leaks in homes which they pick up as continuous flow. Thames Water and Anglian Water, who have rolled out the most smart water meters, are seeing significant reductions in water

demand through being able to find leaks fast. As well as household leakage around 25% of the water supplied to commercial premises has been found by Thames Water to be leaking in their premises so there are huge water saving opportunities there.

There are also **other excellent in-home sensors and devices** on the market such as Waterfall and the Aguardio sensor that provide an alarm if there is a leak inside the property.

14. Dual supplies: Have you any opinions, evidence, or case studies on their real-world performance? Dual supplies is the provision of separate wholesome and non-wholesome water supplies.

We would like to see **all new properties fitted with dual supply pipework** even if not immediately connected to a source of reused water such as rainwater or greywater. The cost of retrofitting dual pipe systems into existing properties is far higher than when they are included at the build stage - see here.

15. What other technologies are available that may inform the roadmap?
There are a range of flow controllers or restrictors that can be used to regulate water flow into a property or into specific devices in a property such as a shower. These have been trialed in homes in the UK and found to deliver significant water savings. **All new properties could be fitted with an inline property level flow restrictor** unless it can be justified why not.

There are opportunities to **reuse final effluent** from wastewater treatment works for non-potable use where drinking water quality is not needed.

Rainwater harvesting and grey water reuse

16. Have you seen any examples of domestic schemes where rainwater and/or grey water are applied at a development level?

Please provide details of the scheme and how it has performed.

There are **a number of examples** of rainwater harvesting and greywater reuse in this review report and appendices commissioned from Ricardo by Waterwise in 2020. The research also looked at the costs and benefits and policy options to promote their uptake (see Q18).

17. Do you have any evidence on customer or user experience or perceptions with recently installed water reuse systems?

No, but we did undertake some small scale **social research into public perceptions** of rainwater harvesting and water reuse systems. The research can be found here. In the online survey undertaken as part of the research 87% of respondents expressed interest in a RWH system, and 86% in a GWR system. All of the interviewees felt positive about the idea of a RWH system and around half of the interviewees also felt positive about a GWR system.

18. The viability of a water reuse system can vary due to its size, complexity and ownership. What scale of rainwater or greywater reuse tends to be viable and why?

The review reports linked above include analysis by Ricardo of the costs and benefits of both rainwater and greywater systems at various development scales.

Range of costs and benefits for installing RWH based on the collection area of a residential building

Collection area	Example building types	Costs: CAPEX + OPEX ('000 £)	Water cost savings ('000 £)	Private net benefits ('000 £)	Societal benefits ('000 £)	Total net benefit ('000 £)
Small (<500m^2)	Standalone dwellings, Houses, Bungalows;	£12 - £19	£1 - £19	-£9 - £26	£21 - £77	**£10 - £100**
Medium (500 – 2000m^2)	Some larger houses or two semi-detached houses;	£25 - £38	£8 - £200	-£17 - £150	£50 - £163	**£35 - £340**
Large (2000 – 5000m^2)	Row of terraced houses or blocks of flats;	£20 - £35	£7 - £150	-£15 - £120	£35 - £335	**£20 - £450**
Very Large (>5,000m^2)	Large scale residential developments (including hybrid developments)	£35 - £60	£70 - £340	-£17 – £280	£30 - £920	**£14 – £1,200**

Their analysis of the costs and benefits of domestic RWH installations summarised in the tables above show **a total net benefit** across all collection areas and demand requirements in domestic buildings, and the vast majority of non-domestic buildings (the exception is small and very large buildings with high demand).

The overall benefit increases both as the collection area and demand increases, this is primarily due to the size of the storage tank. Further to this when the wider social (indirect) benefits, such as reduced demand on water infrastructure, CO2 savings and flood damage reduction (see Q22) are also considered, the potential benefits over a 20 year system lifetime increase substantially.

In addition, Ricardo looked at the costs and benefits of greywater reuse systems. In this case a positive net benefit was seen for larger scale installations only such as offices, shops and flats.

Costs and benefits of installing a GWR system in a building based on the systems yield (greywater produced)

Yield	Example building types	Costs (CAPEX + OPEX; '000 £)	Total water cost savings ('000 £)	Private net benefits ('000 £)	Societal benefits ('000 £)	Total net benefit ('000 £)
Low (<500m³)	Smaller households (such as retired people or young adults), small commercial shops.	£ 45	£ 5	-£ 40	2	**-£ 37**
Small (500 – 1,500m³)	Larger households (potentially families).	£ 100	£ 52	-£ 48	£18	**-£ 30**
Medium (1,500 – 4,000m³)	Retail and commercial stores, leisure centres, some offices.	£ 120	£ 108	-£ 13	£34	**£ 25**
Large (4,000 – 10,000m³)	Large commercial settings such as shopping centres, multi-unit offices or flats.	£ 170	£ 190	£ 21	£67	**£ 88**
Significant (>10,000m³)	High rise offices or blocks of flat, hotels, multi-purpose developments.	£ 270	£ 780	£ 510	£275	**£ 787**

19. What procedures and systems can be put into place to ensure that water reuse systems are safely maintained for the lifetime of the building?
Maintenance contracts should be negotiated and agreed at the point of installation. We suggest you contact organisations that provide such services

20. How should the ongoing maintenance of communal water reuse systems be financed and can you provide any examples of projects with these financing arrangements?
This is a topic that the Ofwat Innovation Fund project Enabling Water Smart Communities is going to be considering.

21. Integration of water supply, drainage, flood alleviation and flood resilience is increasingly important. Do you have any case studies that demonstrate good practice of their integration?
The Ricardo reports highlighted elsewhere in our response provide examples where integrated systems have been installed. They also consider flood management benefits as part of the costs and benefits analysis as a societal benefit (see Q18).

22. How could policy be developed to encourage greater integration of water supply, drainage, flood alleviation and flood resilience?
This 2020 independent review report into rainwater harvesting and greywater reuse looked at a range of UK policy options to encourage the take up of rainwater harvesting and greywater reuse systems including planning regulations, building standards, developer incentives For each policy option they modelled the potential water savings in Mld for household and non household developments and included flood alleviation benefits alongside water supply benefits. The table below shows the modelled savings seen in 2041 arising from various policy options. There are significant water savings achievable including through policies that link SUDs and rainwater harvesting to address water availability.

Table 3-3: Modelled mega-litres/day reductions for shortlisted policies in domestic properties in England and Wales[34]

Policy	2031	2041
Business As Usual (BAU) – modelled total demand	8,769	9,049
P1: National requirement for new developments to be built to <80 l/p/day[35]	411	821
P2: National requirement for installation of RWH in all new developments.	411	822
P2.1: LPA requirement for installation of RWH in all new developments over a certain size.	232	463
P2.2: LPA requirement for installation of RWH in all new developments in specific (water stressed) geographic region(s).	173	346
P2.3: LPA requirement for installation of RWH in all new developments over a certain size in specific (water stressed) geographic region(s).	102	204
P3: LPA requirement for SUDs /stormwater attenuation schemes to be designed with RWH in new developments.	232	463
P4: LPA requirement for installation of GWR in all new non-domestic buildings with high non-potable water demand.	-	-
P4.1: LPA requirement for installation of GWR in all new non-domestic buildings with high non-potable demand in specific (water stressed) geographic region(s).	-	-
P5: National requirement for retrofit of RWH in all public buildings.	-	-
P5.1: National requirement for retrofit of RWH in all public buildings over a certain size.	-	-
P5.2: National requirement for retrofit of RWH in all public buildings over a certain size in specific (water stressed) geographic region(s).	-	-
P6: National requirement for the installation of a water reuse system in all new developments.	411	821
P7: Behaviour change campaign to encourage uptake of RWH. Including the provision of technical guidance and case studies	57	113
P8: Extend existing schemes (e.g. BREEAM, BRE Home Quality Mark) to include the installation of RWH or GWR.	149	298

Real-world experience for homeowners and residents

23. Do you have experience or records of how people actually use water in homes?

If so, please provide details.

Defra conducts a regular longitudinal survey of how people use water in their homes. CCW also undertakes regular customer surveys and will have data on this. The water companies also use micro-component analysis of how water is used in homes to inform their water resource management plans. The Energy Savings Trust published a breakdown in 2013 based on information from 86,000 homes.

Ofwat published information on how the split of water use in homes has changed over time in their 2018 report on options for reducing consumption. This is summarised in the table below. There is a consistent increasing trend in the proportion of household water used for personal washing, which is backed up from observations of the transition from a weekly bath to daily showering. As highlighted earlier there is a significant opportunity to reduce water and energy use and reverse the personal washing water use trend through requiring showers to be more water efficient and through emerging technologies such as water recycling showers.

Table 1: Proportions of household end-use consumption

End-use	1976	1991	2003	2015
WC flushing	30%	24%	29%	24%
Clothes washing	11%	15%	13%	12%
Personal Washing	28%	32%	36%	39%
Dish washing	8%	8%	9%	10%
External use	2%	5%	7%	4%
Other internal use	22%	16%	5%	11%

24. Do you know of any research into user acceptance of water-efficient fittings?

If so, please provide details.

The Australian Water Efficiency Labelling scheme has commissioned a number of independent scheme reviews including customer insights. Sales data shows customers are choosing more and more efficient products over time and that water efficiency is one of the top reasons for product choice by customers.

The UK water companies undertake 1000s of home visits to customers each year including fitting water efficient shower heads and fixing leaks. They will have data on customer satisfaction from those activities.

Likewise Save Water Save Money through their Get Water Fit programme will have data from the thousands of water saving devices they have sent out to customers.

25. What impact do water efficiency measures have on 1) drainage and/or 2) wastewater treatment systems?

Do you have any examples or know of research on the topic?

We don't have data on this however it is worth bearing in mind that personal water use was at less than 80 lppd in the 1960s.

It is self evident that any reduction in water loading to sewerage systems delivered by water saving in the home will **reduce pressure on sewerage capacity** and therefore on CSO's. We asked the government's sewage overflow task force to look specifically at this area but have not seen any feedback from them.

26. Do you know of any appliances or products that have operation methods or user interfaces *that may be counterproductive in the long run to save water?*

Please provide details and case studies, if possible.

Research by the water sector has found that there are significant levels of public confusion over some **dual flush toilet button designs** where it is not clear which button delivers which flush. This is potentially wasting millions of litres of water a day through incorrect usage. In one survey only 28% of customers knew which button delivered the small flush. Customer research by WRAS found that for many designs it was literally 50:50 whether users knew which button was which. The WRAS research found that to make the buttons truly discernible as required by the Water Fittings Regulations the buttons need to be permanently marked (e.g. one drop/three drops) and the large flush button needs to be 50% bigger than the small flush button.

27. Are you aware of any devices, fittings or appliances that are known to be unreliable or are prone to failure?

Please provide details and case studies, if possible.

As highlighted above around **5-8% of dual flush toilets are leaking** and they are wasting nearly 400 Mld of drinking quality water. A typical leaky loo wastes between 200 and 400 litres per day. Research into the issue is here and our position statement is here. The problem is related to the dual flush valve seals. A combination of poor quality materials and a lack of maintenance is leading to seal failures that allow a continuous flow and significant wastage of drinking quality water. Not all designs and brands are as leak prone and there are products hitting the market that avoid the risk of failure by reintroducing an air gap such as the Cistermiser EvoFlush.

Skills and supply chain challenges

28. Do you or your organisation have the right skills or understanding of water efficiency and how to build water-efficient homes?

If not, can you suggest which areas need improving?

Waterwise is a small not for profit NGO focussed on water efficiency. We provide training, undertake campaigns, commission research and convene a range of water efficiency networks. We are about to launch a new UK Water Efficiency Strategy on September 14th.

There are lots of areas where we believe we can support the development and implementation of the Roadmap. For example;

- By increasing the breadth and scale of our existing water efficiency training to help raise awareness of the need to save water and how it can be done.
- By expanding our Community and Office Checkmark water saving recognition schemes to other settings
- By working with the Future Homes Hub to develop a central web based resource of good practice and case studies building including drawing in material from our own open source water efficiency database.
- Through commissioning or undertaking collaborative research to address evidence gaps as we have done on water labelling, water reuse and water neutrality.

29. Have you experienced a lack of skills or understanding in other organisations around water efficiency and how to build low-water-use homes?

If so, which areas need improving or could benefit from developing a competent person's scheme?

Anecdotally we hear that developers struggle to identify water efficient solutions/products and that plumbers/specifiers may often opt for products they know rather than more efficient alternatives. Since the code for Sustainable Homes was closed there is a lack of a central portal or website where these sorts of organisations can go to get independent advice and case studies of what is possible, especially on water reuse.

Whilst the proposed mandatory water label will help with regards performance information on many fittings we believe that the Future Homes Hub could work with Waterwise and some of the networks and groups we engage with to **develop suitable resources targeted to help developers and specifiers** (see also Q28 above).

30. Is there currently sufficient capacity/availability in the supply chain for the products that could reduce water consumption?

If the capacity is not currently available, when do you think it will be?

31. Can the process of certification be improved to facilitate the introduction of new water efficiency or water reuse products?

Other considerations

32. Are there any other considerations or topics that we should investigate to help inform the roadmap?

The Roadmap needs to include water neutrality
We believe that **water neutrality should be part of the roadmap** and that water hungry developments in already water stressed areas should be water neutral, especially larger developments. They should not add to local water demand in areas that are already water stressed and they should not put further unsustainable abstraction pressure on the environment. Water neutrality was included in the Future Homes Delivery Plan published in December 2021 but isn't mentioned in the current consultation.

We published a review of water neutrality in 2021 setting out how it can be achieved through water efficient fittings, water reuse and demand offsetting. We are watching with interest developments in Sussex North which will provide evidence that achieving water neutrality is possible for new development. We believe that water neutrality should be required in other water scarce areas. Thames Water introduced in 2022 a new three tier developer incentive scheme which aims to encourage developers to achieve water neutrality for new development with a payment of £1800 per plot if achieved. They are also working with developers in the London area on a number of water neutral developments. Affinity Water secured a £2.9m funding from the Ofwat Innovation Fund to progress a collaborative water neutrality trial across 3000 homes in their area.

The Roadmap needs to consider retrofit and non-household settings
We appreciate that this consultation and call for evidence has been issued by the Future Homes Hub which is focussed on new housing developments. However, it is critical the governments Roadmap also considers retrofit of the millions of existing homes plus non-domestic buildings as well as houses. This is what the government committed to do in the minister's July 1st commitment which said "*In 2022 develop a roadmap towards greater water efficiency in new developments and retrofits, including the exploration of revised building regulations and how the development of new technologies can contribute to meeting these standards. We will ensure that the underlying legislation can, where appropriate, accommodate any potential future expansion of rainwater harvesting, water re-use and storage options*"

In terms of retrofit there are huge opportunities to join up energy, carbon reduction and water saving advice and interventions given the links between them. According to the Energy Savings Trust about 12% of a typical gas heated household's energy bill is from heating the water for showers, baths and hot water from the tap and heating water for use in our homes makes up about 4% the UK's total carbon dioxide emissions - see here. We want all energy efficiency advisory and retrofit programmes to integrate water efficiency options (and vice versa), taking the whole house approach as recommended by the Construction Leadership Council in the National Retrofit Strategy.

Around 30% of water consumption is outside of the home in schools, hospitals and businesses. It is therefore vital that the Roadmap covers these non-household settings as well as looking at water use in existing and new homes. We have highlighted above the huge amount of water leaking within non-household premises and many of the examples of water reuse are also In non-household settings. There are also lots of examples of corporates committing to water neutrality or water positivity.

- Facebook - Water Positive by 2030 (own operations and offsetting)
- Sainsbury's - Water Neutral stores + fully water neutral by 2040 (own operations and offsetting)
- Mars - Water Balancing at 5 sites by 2025 (match each litre demand with 1 recycled)
- Microsoft - Water Positive by 2030 (own operations and offsetting)
- BP - Water Positive by 2035 (own operations and offsetting)
- L'Oreal - creating hair care products that use less water
- Molson Coors - 22% greater water efficiency + offsetting
- IHG Hotels - Reduce water footprint of hotels in water risk areas
- Hilton Hotels - reduce water use intensity by 50% by 2030
- PepsiCo - Water Positive by 2030 (high risk areas) (own operations and offsetting)

What do we need to see included in the Roadmap

We want to see an immediate change to Building Regulations so that all new homes are built to at least 100 litres per person per day standard rather than the unambitious 125 or 110 standards currently in place. Looking further ahead we want the Roadmap to include the following key milestones.

1. From 2024 require all energy efficiency advisory and retrofit programmes to integrate water efficiency options (and vice versa), taking the whole house approach as recommended by the Construction Leadership Council in the National Retrofit Strategy.

2. By 2025 move to a fittings based approach for new build and large scale retrofit with the use of water efficient products required. Efficiency expectations to increase in 2030 with the scheme to be adequately enforced. Water efficient products to be identified using the new mandatory water efficiency product label which supports delivery of all our five asks.

3. By 2025 require the use of rainwater harvesting, water reuse and Sustainable Drainage technology for all new developments in water stressed areas with a similar requirement for developments over 100 homes in other areas. As a guide, such technology to provide at least 50 litres per domestic property per day. All new builds should be dual piped to facilitate water reuse.

4. By 2025 launch a Water Performance Certificate (WPC) to sit alongside or as part of the existing Energy Performance Certificate (EPC). The WPC would draw on the labelling grades of installed products to give a property an overall rating. The WPC to be updated and shared when a building is built, sold or rented.

5. By 2030 all new development in water stressed areas should be expected to be water neutral, drawing on approaches tested in a number of pilots and on experience in Sussex North.

33. What could we learn from other countries on water reuse? Please provide any examples of where it has been done well or things to avoid.
There is a lot we can learn from the actual experience in other countries. The various reports linked in our response all include international examples (water labelling, rainwater harvesting, water neutrality).

34. Would you be prepared to participate in any work groups set up to look at specific or general issues? If so, which areas would you most like to contribute to and what is your particular field of expertise or interest?
We are very keen to be involved in work groups taking forward both specific or general issues. As well as our direct involvement as Waterwise we also convene a range of networks and stakeholder groups on many of the topics covered in this call for evidence and can help link to those stakeholders.