

Westminster Sustainable Business Forum Water and Housing Inquiry

Background to CIWEM

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector. The Institution provides independent comment on a wide range of issues related to water and environmental management, environmental resilience and sustainable development.

CIWEM welcomes the opportunity to provide evidence to the Westminster Sustainable Business Forum inquiry on water and housing. This response has been formulated with the assistance of members from our Technical Panels who have a wealth of experience in the water and environment sector.

We have produced two recent reports which may be of interest to the inquiry: *Water efficiency: helping customers to use less water in their homes*¹ and *A Place for SuDS: Assessing the effectiveness of delivering multifunctional sustainable drainage*².

We consider that most of the present challenges to improving water efficiency and the resilience of homes are a result of weak and poorly implemented policy and capacity issues rather than from practical or engineering challenges. Therefore, the solutions needed will require strong direction from government, particularly the Department for Communities and Local Government and Defra and driven through local authorities.

Inquiry questions

1. If housebuilding, population growth, land use change and climate change proceed as projected, are we going to run out of water by 2050?

Supplying water to homes now accounts for over fifty percent of the total water abstracted from the environment³. To ensure that there is enough water in the future we will require the use of a 'twin-track' approach that includes both new sources of water and a reduction in the demand for water. Increased water efficiency means less water needs to be taken from the environment, treated and transported to homes, customers can save on their bills and the water industry can effectively plan for the future.

Population growth is not uniform across the UK leading to particular challenges in growth areas such as the south east of England and in planning for new towns. Where future shortages of water are identified, then water companies have a duty to put options in place to address these deficits and secure water supplies. Water Resource Management Plans (WRMPs) cover a 25 year time period to ensure companies have sufficient water to supply the public and maintain adequate water in the environment. English and Welsh water companies' WRMPs now include a better balance between

1 CIWEM. 2016. Water efficiency in the home. <http://www.ciwem.org/wp-content/uploads/2016/02/Water-Efficiency.compressed.pdf>

2 CIWEM. 2017. A place for SuDS. www.ciwem.org/suds

3 Defra. 2017. Water Abstraction statistics, England 2000 to 2015

supply and demand management measures because regulation has allowed decisions to take more account of the outcomes customers want.

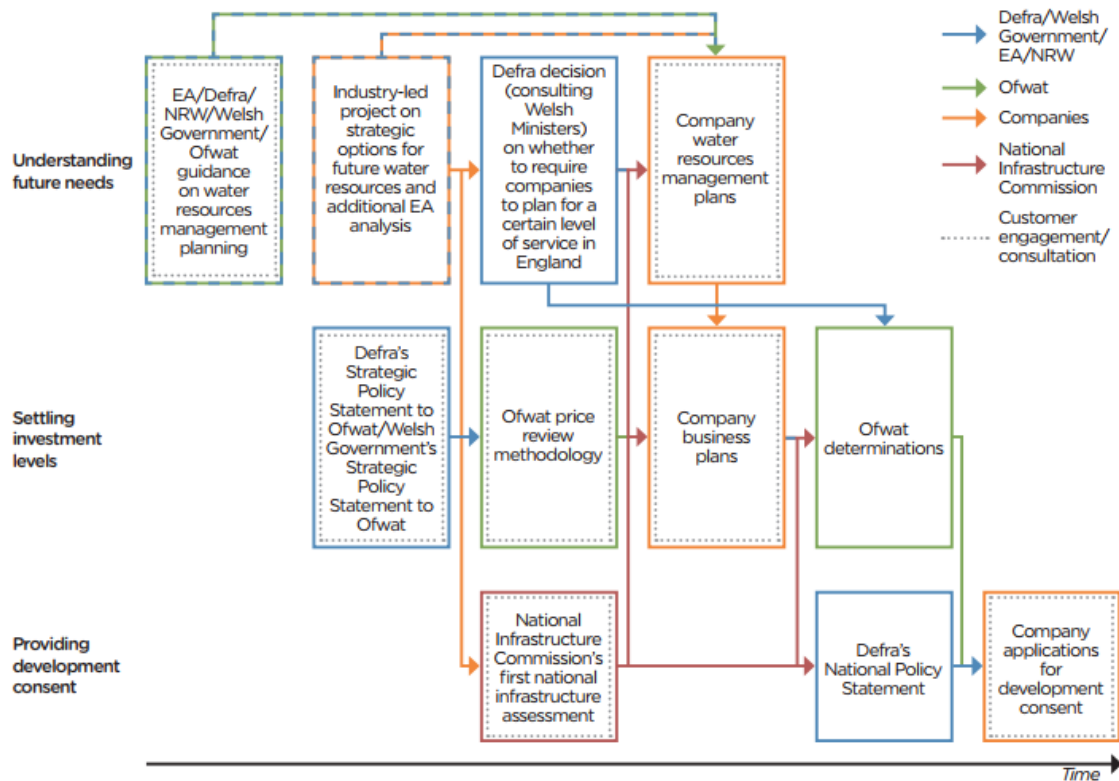
Although WRMPs are in place and are regularly reviewed that is not to say there aren't challenges. The significant and growing risks from severe drought, climate change, population growth and environmental drivers looking out to 2065 were explored in the Water UK Water Resources Long Term Planning Framework⁴. The report provides a significant new evidence base which has also informed the National Infrastructure Commission's first National Infrastructure Assessment. The high-level assessment will be tested through water companies' next WRMPs which will be consulted upon in early 2018.

The study explored future scenarios of growth, socioeconomic, environmental and climate change on water resources and illustrates both the uncertainty and potential scale of deficits in the supply-demand balance in 2040 and 2065. The report examined the costs and benefits of more extensive demand management measures demonstrating the potential benefit to resilience. However, achieving cost-effectiveness in new, more innovative and 'extended' demand management strategies will require significant policy and regulatory support.

The report showed that demand management alone would not be sufficient and that a range of new strategic water resources schemes would be required. Many of these are already being explored through the WRMP framework. It illustrates the benefits of more integration of water resources and the transfer of water between regions, where that is sustainable to do so, alongside development of new storage and more innovative supply schemes. However, delivering large inter-regional transfers and new storage capacity are complex projects and require lengthy analysis and agreement before beginning work on associated infrastructure, which takes time.

There are a wide range of activities and processes currently underway to try to improve the understanding of future needs, define and set investment levels in the short to medium term, and to inform longer term development priorities. The report sets out each of these current activities and processes and how they fit together:

⁴ Water UK. Water resources long-term planning framework 2015-2065 <https://www.water.org.uk/water-resources-long-term-planning-framework>



Source: Defra / Water UK

It is worth noting that the publication of the WRMP19 early next year might bring a very different picture and until these are published we do not know exactly how they might reflect the Water UK framework. Population growth and climate change impacts are likely to be felt the greatest in the south east so the WRMPs in this area will be the best source of the information to answer this question.

The new National Policy Statement⁵ which Defra is currently consulting on will reduce the thresholds of national significant infrastructure for water resources making it easier for them to pass through the planning system (they will be decided by the Secretary of State rather than by local authorities). On water transfers, the department proposes to revise down the threshold from 100 million m³ per year (equivalent to approximately 274 MI/Day, or enough water for some 1.6-1.7 million people) to either 10 million m³ per year or 30 million m³ per year. This will encourage more transfers nationally.

Desalination plants are not included in Nationally Significant Infrastructure Projects definitions but Defra plans to change this. Currently there is only one large-scale desalination plant in operation in the UK, but Defra says it is likely that more will be developed in the coming years. There are 18 possible desalination schemes set out in the current water company water resource management plans, ranging in output from 20-155 MI/day.

There is a case for a national level 'adaptive plan' that supports ongoing WRMPs and balances risks against opportunities to defer costs. Such a plan would identify the key 'trigger points' that will determine which set of investments and policy interventions would be needed for the 2040 and 2065 horizons, depending on how risks materialise in the future. Some risks are immediate and need a prompt response: the risk of drought is present now and the government aims to achieve sustainable levels of abstraction by the 2020s. However, the Water UK report and companies' WRMPs illustrate the range of options that could be developed to manage supply and demand to 2050.

5. National Policy Statement for Water Resources. [Consultation on developing a National Policy Statement for Water Resources \(NPS\)](#) and proposals to amend the definition of nationally significant water resources infrastructure in the Planning Act 2008.

2. Are homes in England going to become increasingly at risk from flooding in the future? Can we quantify this as a call to action?

The increasing risk to the communities across the UK was well documented last year in the Climate Change Committee's (CCC) advice to the four administrative regions and this was backed up by detailed analysis of predicted flooding risk changes in the future. The inquiry should be looking at their recommendations and the detailed risks identified in that report and others.

The 2017 UK Climate Change Risk Assessment indicates that total rainfall will increase in winter in the UK and although predictions suggest that summer rainfall is likely to decrease, the same forecasts expect that the number of extreme rainfall events and variability is also likely to increase. This will increase the likelihood of flooding from rivers, surface water and groundwater and together with coastal flood risk means we will need to consider all appropriate adaptation measures to manage flood risk and better protect and prepare our communities for flooding.

In June the CCC Adaptation Sub Committee (ASC) published its review of progress in preparing for climate change. It finds that *"communities are becoming increasingly vulnerable to climate change... climate change has in effect been de-prioritised in the land-use planning system, and due to a lack of safeguards, new housing is adding to existing problems"*.

The ASC's top adaptation priorities (where plans and priorities do not account for climate change risks) include development and surface water flood risk, property level flood resilience and surface water flood alleviation. Sewer flooding is also occurring as a result of under capacity in the wastewater network, which can be particularly distressing for homeowners.

Development and surface water flood risk

New development should be made safe from flooding from all sources, but it should also not increase flood risk to others. It is for those proposing development to demonstrate that this will not increase flood risk to others by increasing development. However, planning and engineering staff within Local Planning Authorities (LPAs), along with statutory consultees including the Environment Agency (EA) and Lead Local Flood Authorities (LLFAs), need to have a good understanding of these issues and experience of this is mixed.

A range of parties including the CCC and our own members have expressed concern that either inappropriate development is still occasionally being permitted in areas of flood risk, or (more commonly) that planning conditions regarding flood resilience (including to surface water) are not being properly delivered at the construction stage. Reasons for this appear to relate largely to expertise and experience of local authority employees and sheer lack of resource to properly monitor and enforce planning conditions.

Surface water flood risk

During the ten years since the Pitt Review⁶ of the summer 2007 floods, progress in terms of managing surface water has been limited. Some recommendations, such as ensuring the delivery and adoption of sustainable drainage systems (SuDS) through the establishment of SABs (SuDS approval bodies), may have not been addressed partly due to austerity, but also because of a strong decentralisation and deregulatory drive.

A mechanism to scrutinise the presence and quality of SuDS in new developments and a means of enabling their adoption and long-term maintenance was set out in Schedule 3 of the Floods and Water Management Act 2010 (FWMA). The decision not to implement Schedule 3 was a conscious act by Ministers under the Coalition Government to remove perceived barriers to housing development which now (as then) appears ill-considered and unfounded. The local planning system was instead deployed to encourage SuDS in major new developments (more than ten homes), without the added value to be provided by SuDS approving bodies.

⁶ Cabinet Office: Learning lessons from the 2007 floods. June 2008

CIWEM and others⁷ have shown that this approach is failing to consistently deliver high quality, multifunctional SuDS in new developments despite evidence extensively showing that such systems are cheaper to construct and maintain if planned properly (something SABs would have driven). Not to mention delivering not insignificant wider societal benefits linked to water quality, place making, amenity and biodiversity.

The government was charged to review the effectiveness of this policy under the Housing and Planning Act 2016 (due in June 2017 but still pending at the time of writing). We are concerned that a message to the effect that current planning policy is regularly delivering some form of SuDS would be fundamentally misrepresenting the situation on the ground, because the policy (as written) and apparatus to deliver sustainable drainage in England are not fit for purpose.

This situation is indicative of much of the current landscape pertaining to surface water management. The structures and resources in place are currently failing to deliver on many of the recommendations of the Pitt Review, which remain valid ten years on. The government must take concerted action to improve this picture in order to reduce the current exposure of the public to surface water flood risk.

Sewer flooding

Urban drainage systems such as sewerage systems (whether a separate system or in the form of a combined sewer network protected by CSO) or highway drains usually act as a conduit to drain runoff rapidly to local water courses etc. Unfettered increases in the impermeable area they have to drain acts to multiply the effect of increasing rainfall intensity.

A study⁸ for Ofwat in 2011 looked at the possible long-term impacts on sewer flooding from population growth, climate change and urban creep. It covered nearly 100 catchment areas and concluded that sewer flooding will continue to get worse unless action is taken – particularly to remove rainwater from sewers. Rainwater uses up the space in the pipes that will be needed for sewage, so more rainwater means more flooding. The report concludes:

“In order to accept housing growth without a significant risk of increasing sewer flooding, a range of improvement strategies will be necessary to:

- Provide additional sewerage capacity, or remove some existing rainwater connections, to cope with the increase in wastewater flow.
- Prevent all connection of rainwater drains to foul or combined sewers at the time of construction of new buildings.
- Prevent all subsequent creep of the drained urban area around new buildings.
- Improve the condition of relevant foul and combined sewers, to reduce infiltration of water from surrounding ground in winter or after heavy rain
- Provide additional capacity, or proactively remove existing surface water connections where practicable, in order to adapt to the effects of climate change.”

It recommends: “Urban creep should be addressed as a matter of priority, to reduce the need for expensive modifications of the foul or combined sewerage system. Enforcement of existing building regulations, such as those preferring sustainable drainage of new driveways, will help to prevent further urban creep, but might not be enough on its own. In some catchments, reversing urban creep by proactively removing existing surface water connections could be a more cost-effective, and environmentally sustainable solution than increasing the capacity of the sewer network.”

Property level flood resilience

Property flood resilience (PFR) is an important part of our response to existing and predicted flood risks, particularly in areas where it is not possible to protect communities by structural flood defences or where it is necessary to manage residual flood risk.

7 CIWEM: A Place for SuDS? Assessing the effectiveness of delivering multifunctional sustainable drainage. February 2017. Available from www.ciwem.org/suds

8 [Future impacts on sewer systems in England and Wales](#). Report for Ofwat. June 2011

PFR addresses the whole fabric of the building to minimise water ingress and improve its resilience. It includes measures such as flood barriers and gates, raising electrics and installing tiles and concrete floors. These can be fitted as part of preparing for flooding, or during the repair of buildings after they have been flooded. CIWEM considers the provision of PFR is an affordable part of flood risk management alongside catchment level measures and strategies, particularly in areas where it is not possible to protect communities by more conventional structural flood defences or where it is necessary to manage residual flood risk.

The range of information, guidance, standards and training available on the delivery of various elements of PFR is very fragmented and varies in terms of detail; in some instances, it is contradictory or focuses only on one aspect such as the product itself, rather than its actual installation, which can be critical. Property owners and occupiers need assurance that the whole process is regulated, so that once installed, their measures will work to the advised specification.

CIWEM, ICE and RICS are currently developing a code of practice which will enable property owners, built environment professionals and local authority planners to competently and confidently specify and deliver PFR. The Code of Practice and guidance provide a robust and integrated framework (that can support training) covering key stages of the process, including the assessment of property flood risk and PFR options, development of the overall design philosophy, selection and installation of measures, certification and appropriate management and maintenance. It is expected to be complete in the next year.

3. [How do we build more water-efficient homes and communities \(garden towns, housing estates\) that will be resilient to climate change? What do you know has worked and failed previously? What has prevented the building of water-efficient flood-resilient homes in the past?](#)

Since 2010 the Government's *Building Regulations* have set a consumption standard for new homes not to exceed 125 litres of water per person per day (lpd). The 2015 revision of Part G⁹ contains an additional optional requirement of 110 lpd where required by planning permission in areas of local need¹⁰. It also replaces a number of disparate requirements for new development including the Code for Sustainable Homes (CSH). However, these are clearly weaker and less ambitious than the old CSH which included 80 lpd standard for code level 5.

CIWEM considers that where possible, product-level standards for water using devices should be encouraged in preference to whole-building standards. This is because property level standards as enshrined in the current water use calculator include assumptions of appliance use rates and allow those using them to 'trade-off' between appliances and thus reduce the overall effectiveness of the property-level standard. Product-level standards could be explicitly linked to the new water efficiency label performance ratings, which would ensure a consistent approach to water efficient products in new homes and in the refurbishment of existing homes. Product-level standards have been adopted in Scotland for toilets and taps¹¹.

As technology and understanding improve, standards should be continually reviewed. Research has shown that both current whole building standards of 125 lpd and 110 lpd can be achieved at no additional cost, compared to a 'do nothing' scenario¹². Therefore it should be expected that 110 lpd should be the minimum standard in the next five years. Around 80 local authorities are using the 110lpd standard in their planning guidance. Further research is needed on what more can be achieved and by what means with more stringent standards made mandatory for all new homes in areas of designated water stress.

The former CSH level 5/6 of 80 lpd is difficult to achieve without rainwater harvesting or greywater recycling, which remain relatively marginal technologies in the UK mass market. Continued research,

9 [The Building Regulations 2010, Part G approved.](#)

10 <https://www.gov.uk/guidance/housing-optional-technical-standards>

11 [Scottish Building Standards 2013.](#)

12 Environment Agency: Assessing The Cost Of Compliance With The Code For Sustainable Homes WRc Ref: UC7231

development and testing of rainwater and greywater systems, in order to understand their cost-effectiveness and address remaining public health concerns is needed to determine whether it is feasible for these systems to become more mainstream. The grey/rainwater harvesting industry should work to provide this evidence. Development scale schemes may work but the evidence is still being collected. In the meantime, product-level standards can, and should be used to drive the installation of more water efficient fittings. Existing guidance, such as that of the AECB¹³ could be used by local authorities to set 'good' and 'best' product standards.

The public sector should take the lead in promoting the use of water efficient products when publicly owned buildings are upgraded or refurbished. More support should be provided to ensure water efficiency is included in programmes focused on alleviating fuel poverty and maintaining housing standards (such as RENEW¹⁴ in London and 'Arbed'¹⁵ in Wales).

Existing housing stock

Improving the water efficiency of existing housing stock which will be just as important to deliver overall water efficiency as new builds. Existing homes can be made more water efficient through fitting water saving devices and the use of water efficient appliances and products. Fitting water saving devices within existing homes in toilets, taps and showers can save as much as a third of average water use, up to 50 litres per person per day¹⁶. Many water companies offer advice and supply these products for free or at a discounted rate to customers. As part of Southern Water's programme 30,000 home audits and retrofits by 'green doctors' were undertaken to help customers understand their water use. This type of engagement is essential when undertaking such significant changes to households to ensure acceptance and buy-in, otherwise customers may revert to previous products and behaviours.

More generally there are several policy/regulatory drivers that were used in the late mid to late 2000s, but have since been scrapped, failed, or fallen out of favour which were useful:

Eco-towns

Only one of the proposed 15 eco-towns, Northwest Bicester in Oxfordshire, will now actually be built to the originally proposed standards in planning policy statement 1: ecotowns. This includes CSH level 5 rainwater harvesting and water recycling, SuDS and a long term plan for their maintenance. Eco-towns had the potential to be exemplars (and potentially laboratories) for lots of technologies including water efficiency.

Some new development is proceeding along these lines despite the change in policy. For example, the North West Cambridge Development includes the largest water recycling system in the country¹⁷ that aims to minimise the risk of localised flooding in an area that is already prone to flooding, whilst also reusing the water to reduce potable water consumption per person across the whole development. This is a useful testbed to fully investigate rainwater harvesting to see if it is a practical and cost-effective approach for the UK and what contribution it can make to sustainable and resilient homes. The work could go on to explore opportunities for developing these systems further and encouraging innovation, so they can be used in future. This scheme would not have been built without a subsidy from the university as developers will not put in these schemes unless they are cost effective or there is another driver such as lack of water availability that may prevent development. Yet such schemes could help where this is the case, especially to help manage peak demand.

Water Cycle Studies

13 AECB. 2009. [AECB Water Standards](#).

14 Greater London Authority. 2014. [RE:NEW](#) – Making London's homes more energy efficient.

15 Welsh Government. 2013. [Arbed](#) - Strategic energy performance investment programme

16 Southern Water. 2015. Saving water, energy and money

¹⁷ <http://www.nwcambridge.co.uk/vision/sustainability/water-recycling>

Water cycle studies were used to a) assess the impact on water demand within the framework of the water companies' water resource management plans and set out the proposed measures which will limit additional water demand (b) demonstrate that the development will not result in a deterioration in the status of any surface waters or groundwaters; and (c) set out proposed measures for improving water quality and avoiding surface water flooding.

Water cycle studies were a good idea for large new development in areas of flood risk and/or water scarcity to provide a plan for the necessary water services infrastructure improvements. If applied correctly they provided a useful framework for planners, developers and water companies to work collaboratively on holistic solutions to water management problems. At the very least they put water on a similar footing to transport in planning terms.

Water neutrality

Water neutrality is the idea that demand for potable water in new development should be minimised, then the offset by reduced demand in neighbouring areas. At present there is no real regulatory or policy driver for this. It may be politically/ socially unpopular but at some point in the south east this will need to be reconsidered.

Flood resilience

Since 2010 there has been regular expression of concern by CIWEM's members at the lack of capacity within local authorities to properly consider and manage the range of flood risk. The main driver here is whether flood management is the core business or a niche part of what a given risk management authority (RMA) does. For example, the EA are well resourced, but for lead local flood authorities (LLFAs) on a council level, adult social care, children's services, highways, waste management etc. will nearly always be seen as higher priorities. Unless an area has seen recent severe flooding, it can be hard for the council to give flood management the priority and resources it needs to manage risk to a level that the public and policymakers expect.

In addition to this, the funding for flood management for LLFAs is not ring-fenced, meaning that many councils will choose to spend it on areas they perceive as higher priority at any particular time. Central government funding is also a challenge, for example LLFAs do not get Flood Defence Grant in Aid revenue funding to maintain Ordinary Watercourses and only receive approximately a quarter of what it costs them to operate as a statutory consultee for planning. Without funding and any council perceiving flood risk management as a priority or at least an area to not cut funding for, capability and capacity can and does suffer.

Today, having lost skills and resource, authorities are experiencing significant challenges with the recruitment of people with the relevant skills, in particular drainage engineers. Several issues exist including the inability to offer attractive employment packages to drainage professionals in local government compared to the private sector.

Sustainable Drainage Systems (SuDS)

SuDS provide surface water drainage functionality whilst providing the potential for adding a range of further benefits to developments linked to water quality, amenity and biodiversity. In 2016 CIWEM undertook the largest survey to date on policy and practice in SuDS¹⁸. Our findings show the current policy and regulatory framework is failing to achieve the government's objectives. There are various reasons for this including:

- LLFAs have no remit under the current policy to comment on historic flooding at the site, or to comment on known groundwater flood risk areas.

18 The State of SuDS Delivery in the UK. 2017. Water and Environment Journal <http://onlinelibrary.wiley.com/doi/10.1111/wej.12283/full>

- Developments under 10 dwellings (the threshold for a 'major application') are not required to consider SuDS, however such developments form a significant portion of applications in certain parts of the country.
- LLFAs have no powers under the FWMA to insist that developers consider the drainage hierarchy when designing surface water management (see point below).
- Planning allows developers to opt out of fitting SuDS if they demonstrate it would be 'inappropriate'. A lot of this is due to a perceived opinion that SuDS systems are more complicated and more costly to implement and maintain than 'traditional' drainage.
- Developers are not required to consider SuDS at an early stage resulting in lower quality measures being fitted in later in the planning process.
- Although government has published technical standards for the design, maintenance and operation of SuDS this is only guidance and is non-statutory.
- There is insufficient emphasis on surface SuDS techniques within the guidance, allowing developers to meet on-site requirements through below ground measures such as underground tanks or over-sized pipes, which do not provide optimum benefits for the environment or local amenity.
- There is no requirement to consult water companies, even if drainage systems are being designed to discharge into their sewer system.
- There is little appetite amongst developers for training and best practice awareness relating to SuDS, to show how SuDS are rarely more expensive or complicated than 'traditional' drainage. In fact, if designed well and incorporated with amenity space and blue/green infrastructure, SuDS can save significant sums in both construction and maintenance.
- There can be a tension in unitary authorities and county councils carrying out their roles of LLFA and local highway authority in the matter of SuDS. Due to often uncertain future maintenance costs and a decline in revenue budgets, there can be a reticence within local authorities to adopt SuDS measures.

The government should also seek to resolve maintenance and adoption of SuDS in England as the Welsh Government has recently acted to implement Schedule 3 of the Flood and Water Management Act. Schedule 3 would arguably have provided for effective resolution of the challenges around sustainable drainage. This would have ensured that local authorities had the lead, resources and regulatory 'teeth' to assess, carry out asset management and regulate all new surface water schemes, assets and maintain assets left over by developers. At the present time, there remains no consistently workable alternative to achieve this.

There is something of a polarised debate concerning whether local authorities or water companies would be best placed to adopt the majority of SuDS in England. There are pros and cons to both propositions, but the government must find a way to resolve what is at present a real block to delivering widespread SuDS. It may be that water companies are best placed to adopt SuDS associated with new developments. Retrofitted SuDS, those in the public realm or on large privately owned land may represent a more complex set of circumstances. Either way, SuDS must be designed and planned to be adoptable by the most appropriate party and technical standards and any appropriate regulations reviewed to facilitate this.

4. What are the practical solutions that can both improve water efficiency and mitigate flood risk? What are the new innovative solutions in the sector, and what micro-trials can be successfully operated at scale? What are the 'game changers' that will have a significant impact? What transferable practical lessons can we learn from international as well as national experience?

Some water companies are taking innovative approaches to improve water efficiency and mitigate flood risk in new homes:

Anglian Water has just also launched a consultation¹⁹ on reducing connection charges for Developer, Self Lay Provider (SLP) and New Appointments and Variations (NAV) customers for connecting new homes. If a new home uses technology such as rainwater harvesting and water efficient showers, which help the occupants to reduce their consumption to 100 lpd, then it may waive the infrastructure charges for that connection (currently around £722 per connection for dual service areas).

Severn Trent Water is investing £30M in a developer fund to promote water efficiency. This will also waive the infrastructure charges if the new home is less than 110 lpd. Developers can also qualify for either a 75 per cent or 100 per cent discount on the sewerage infrastructure charge by showing that a surface water connection is via a sustainable drainage system or that there is no surface water connection at all.

Water labelling

Labelling water using products with their key performance criteria is an essential part of a market transformation as it provides manufacturers, wholesalers, retailers and purchasers with clear, consistent and simple information. This kind of initiative should be part of a suite of measures to improve water efficiency in existing households, alongside household metering, smart metering and tariffs. There needs to be a clear understanding of how a water label can be used to make the improvements sought, how it can be tied into development planning, new builds as well as retro-fits (either proactive retro-fits or what home owners do to maintain and improve their properties).

The development of the European Water Label²⁰ scheme for new products is welcome. It is being developed and implemented by experienced professionals from a range of stakeholder organisations (water companies, bathroom manufacturers and retailers) in a technically robust and commercially viable manner. It should be supported by government, regulators, water companies and others involved in promoting water efficiency. Over time it is hoped that customers will select products based on these ratings as they would with energy efficiency labels. At present the label is only for bathroom products and CIWEM considers there would be great benefit if the scheme were to extend to all water using devices. This should become statutory and not voluntary and would at least start to put water use in the minds of purchasers and consumers when buying water using devices.

Hot water efficiency

In most homes more than half the water used in the home is hot water. The government should put more emphasis on the role that hot water efficiency can play in reducing customer bills. Water efficiency measures that reduce hot water use should be included in a government energy efficiency incentive scheme to replace the Green Deal and to also help achieve statutory carbon reduction targets.

Innovative tariffs

Appropriate tariffs need to be developed to accompany the change to more households paying for their water on a meter to achieve the right balance between affordability and resource efficiency. Tariff trials undertaken to date²¹ indicate that rising block tariffs for discretionary water use above a fixed volume for normal use, could provide the necessary protection for low income and special situation households and provide the signal to reduce non-essential water use. Rising block tariffs do not necessarily require occupancy information and could instead be based on 'baseline consumption', monitored using smart meters during 'off-peak' periods such as October to November and February to March.

However, Wessex Water's trial also found such tariffs to be unpopular with the public, particularly seasonal tariffs, with a perception that the motivation behind them is profit. Approaches where

19 <https://media.anglianwater.co.uk/proposed-new-developer-charges-aim-to-create-water-efficient-communities/> and <http://www.anglianwater.co.uk/developers/charges/>

20 European Water Label. <http://www.europeanwaterlabel.eu/>

21 For example: Wessex Water. 2012. Towards sustainable water charging: conclusions from Wessex Water's trial of alternative charging structures and smart metering.

customers are rewarded for water efficiency, rather than penalised may prove to be popular. More trials will be needed to determine the best approach.

Other soft approaches can be used, for example as part of Southern Water's universal metering scheme customer bills are produced in traffic light colours to show their performance relative to neighbouring properties. Increasing the frequency of bills may also stimulate positive behaviour as consumers are reminded more regularly about the impact of their water use on their bill. Incentives, nudges and awareness are also relevant and tariffs themselves are one way of influencing behaviour.

Sustainable drainage systems

SuDS are a practical solution to removing excess water from the drainage network. The benefits are well documented, evidence from the Welsh Government (its recent review²²) concluded that sustainable drainage is £1,500 cheaper per property compared with conventional drainage provided it is planned and designed in from the start and CIRIA has been publishing detailed guidance and advice on the practicalities of installing sustainable drainage for many years.

The data collected by Welsh Water demonstrates that evapotranspiration from green infrastructure is a significant factor in removing runoff from the catchment. A swale in one area recorded 70-80% removal for runoff from the area draining to it whilst other relatively small basins planters serving a steeply sloping urban area have recorded over 50% removal. Water removed through evapotranspiration is taken out of the catchment entirely – the runoff is not merely passed onto another part of the urban drainage system which is often overstretched.

5. What are the three key risks for your organisation/sector from water management failures (drought/flooding)?

N/A

6. What are the three key mitigation measures required to reduce these risks to homes and communities? What action would make a difference in the next 12 months? Are there actions we need to take now to deliver medium/long term benefits?

In the next 12 months there will be the outcome of the government's SuDS Review, a review of the National Planning Policy Framework (NPPF), the new Defra NPS on water resources and water company WRMPs, all of which could have an impact in this area.

To improve the delivery of SuDS, CIWEM proposes three key actions:

1. Defra to improve the scope and outcomes of the non-statutory technical guidance to enable the efficient delivery of SuDS which will provide the widest practicable range of benefits, over and above runoff reduction, and to ensure designs are optimised for adoption;
2. DCLG and Defra to clarify the process for adoption and responsibilities among alternative adopting agencies; and to develop clarity amongst key adopting agencies including water and sewerage companies and local authorities on the design requirements to enable adoption;
3. DCLG to make minor revisions to Planning Practice Guidance to ensure that the preceding two actions do not increase the likelihood that SuDS are removed from planning applications or permissions on the grounds of practicability and cost.

CIWEM suggests that in reviewing the NPPF DCLG should include a SuDS-specific paragraph that relates to all developments:

22 Welsh Government. 2017. Sustainable Drainage Systems on new developments Analysis of evidence including costs and benefits of SuDS construction and adoption.
<http://gov.wales/docs/desh/publications/170209-suds-evidence-epc-final-report-en.pdf>

Sustainable Drainage Systems

SuDS will play an important part in the country's resilience by reduce the causes and impacts of flooding; SuDS can also provide other key benefits including

- *removing pollutants from urban run-off at source;*
- *combining water management with green space with benefits for amenity, recreation and wildlife.*

Development should utilise sustainable drainage systems (SuDS) unless there are exceptional reasons for not doing so'.

It would also be beneficial to develop databases of all SuDS installed in a given county (or district, as appropriate), with information on sizes and flow rates. This would be useful as in the future further development may occur, and need to connect into existing SuDS components.

7. How do we build the garden housing estates of the future? How do we retrofit existing housing estates more resilient?

See also answers to question 3.

There needs to be an innovation challenge; one that looks at integrated measures and provides an overall net benefit for customers, environment and economy. This should look across water, wastewater and flooding to ensure we identify where outcomes and measures to achieve those outcomes overlap – water efficiency, SuDS, greywater, (large) building or community scale initiatives as well as large infrastructure schemes. This could tie into the 25 year environment plan and provide catchment measures that provide a wide range of ecosystem services to wholesale waste and water operations. Housing shouldn't be considered in isolation, we really must take a wider multi-sector view, including the environment, agriculture (and supply chain services), energy and industry.

The amount of new housing and associated non-household development that is required to sustain the UK economy will inevitably place increased demand on the water environment, unless more action is taken to manage this. Minimum sustainability standards including water use will be needed to drive efficiency. A small proportion of these developments should be exemplars, which demonstrate how to go beyond these minimum standards, whilst still remaining financially viable for mainstream developers and attractive places to live for new residents.

Water neutrality has been explored, and proven feasible in theory as a way of minimising demand from new development and offsetting this new demand via water efficient activity in the surrounding area²³. Local authorities in areas of water stress should consider the feasibility, funding and delivery of water neutrality initiatives as part of their planning requirements. This should also capitalise on the joint benefits of water efficiency, water recycling, water sensitive urban design and effluent reuse.

We need to focus on existing housing stock, yet we need to be careful not to apply a solely demand management led approach, this should be about innovation and customers. The key is what customers expect and demand from water services and how this could be influenced. We need to move away from terms like education and behaviour change and have more sophisticated methods of customer engagement reflecting the diverse range of lifestyles, expectations and demands people place on the water environment. Some customers may need to or wish to use more water, and therefore technologies and innovation that allow that but do not necessarily radically increase water use, (e.g. finding ways to re-use water if a customer uses large volumes of clean water), should be sought.

Experience from the US shows that in applying new shower regulations, builders just applied these in units with multiple, multi directional shower heads. We will need to anticipate the unintended consequences of a more innovative customer. Stimulating innovation to develop the technology to allow this is important as well as to start putting into practice the behavioural understanding that we are beginning to have. Initiatives like the 'three Ps', 'stop the block' and media coverage of fatbergs seems to be gaining some traction around what should and should not be put down the toilet

23 Environment Agency. 2007. [Delivering water neutrality in the Thames Gateway](#).

(alongside the campaign to correctly label so-called flushable wipes). We need to develop similar 'conversations' about water use.