All Party Group for Excellence in the Built Environment

HOUSE OF COMMONS
LONDON SW1A 0AA

Living with water

Report from the Commission of Inquiry into flood resilience of the future

March 2015

Acknowledgement
We would like to thank the witnesses who gave oral evidence and the organisations that provided written submissions to the Inquiry, as well as those that took seats on the panel.

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Chairman's foreword

Oliver Colvile MP
Chairman of the All Party Parliamentary Group for Excellence in the Built Environment

An increasing need for more houses, more dramatic storms and floods, as well as a significant changes to our environment, are having a significant impact on local communities and peoples' everyday lives.

Each year these seasonal "acts of god" are increasingly dominating our television screens and are having a significant impact on local economies.

Probably the most dramatic pictures over the last fifteen years were last year's scenes of the railway line at Dawlish, the flooding on the Somerset Levels and Tewkesbury in 2007 and 2012 as well as the torrent of water that decimated Boscastle in 2004.

Last autumn, the All Party Parliamentary Group for the Built Environment — of which I am the Chairman — conducted a public inquiry, with three public sessions, into delivering future flood resilience.

This included taking evidence from the industry, various Government agencies, local authorities and the development industry. Disappointingly the Environment Agency failed to appear before us or failed to provide us with any written evidence.

This report seeks to set out the challenges facing local communities, calls on both national and local government to demonstrate a greater sense of leadership and recommends a strategy which can help provide some practical answers to these challenges.

Executive summary

This report is the result of an open Inquiry into flood mitigation and future resilience. As such, all appropriate organisations dealing with these issues were invited to submit evidence, and oral supplementation was requested from a number of them. The weight of evidence we received focussed on the need for long-term water management and the means of providing a sustainable and affordable approach for dealing with the impacts of climate change — in essence 'Living with water'. That focus was perhaps unsurprising, given the timing and backdrop to the Inquiry. Evidence was taken at a time when the Government approach to the adoption of Sustainable Drainage Systems was subject to uncertainty, creating widespread concern amongst professionals in the built environment. This has meant that in the restricted time we have had available, given the looming election, our scrutiny of the approaches to do specifically with coastal and ground water flooding and defence, has been limited in scope. However, we see this Inquiry very much as the start of the conversation on flood resilience and mitigation with a future Government.

Our report says:

- Despite the ever increasing challenges, flood resilience and water management still remains a Cinderella issue at the highest political level, though its importance is no less than that of transport and power infrastructure and needs to be given the same priority as High Speed 2. Failure to take the issue of comprehensive water management much more seriously will have severe economic impacts on UK plc.
- All of our critical national infrastructure, including water supply and our drainage network, is under threat from climate change which poses both societal and economic disruption.
- Flooding is not a singular or isolated event. It affects many aspects of society and it carries economic risks that will increase as climate change marches on. As the associated risks to business increases under a minimalistic national plan, then the threat of them locating outside the UK becomes more likely.
- There appears to be no Government leadership, and no one single department or minister has overall responsibility for a strategy and vision for water management as a whole or for flooding across all of the domains in which it occurs.
- As a consequence we are missing an opportunity to put in place a sustainable long-term strategy for water management. The strategy must protect homes against the increased flooding we are likely to see in the wake of climate change and greater urbanisation, while at the same time protecting against increased water scarcity caused by drought.
- Flood risk is set to increase — the Environment Agency says 5.2 million properties are at risk of flooding, which is nearly one in six. Of these, 3.8 million are at risk from surface water flooding, which can be the most difficult to deal with.
- If we are to tackle this increasing problem we need a fundamental change in how we view flood management, from the current position of being all about flood defence to one of resilience, which means making space for water and getting 'more-from-less' by seeing all forms of water as providing multiple benefits.
- Professionals must play their part, too, in greater collaboration and knowledge sharing, to aid improved communication and integrated water management, so as to create and support multifunctional, multi-beneficial and sustainable places.
- If we are to properly prepare for what climate change throws at us, we need an honest, open debate and engagement with the public, both to educate households and communities in how they can build water resilience into their properties, but also to agree what level of water exceedance is acceptable.

- Climate change means that surface water will become more commonplace in future and will need to be managed carefully to avoid having to keep building new drainage capacity at vast and unaffordable expense. Instead, the public should be encouraged to see such events as 'big puddles' or as harmless water flowing along gutters and kerbs. This 'exceedance drainage' should be recognised as an acceptable way of managing water on the surface, providing it is done in such a way as to avoid unacceptable problems.
- The financing of flood defences and resilience is a very significant challenge. Funding for capital projects and maintenance of assets, both hard and soft is likely to remain an issue in the foreseeable future. Annual flood damage costs are in the region of £1.1 billion and could rise by as much as £27 billion by 2080 according to the Environment Agency. It has been estimated that maintaining existing levels of flood defence would require flood defence spending to increase to over £1 billion a year by 2035.
- Water management in the UK is complicated by the fact we have what has been described as 'the most disconnected water management system in the world'. Too many organisations have responsibility for aspects of water and drainage, and they are under no obligation to co-operate even where it is essential to deliver resilience.
- In addition, the ownership of assets is diffuse. Statutory flood risk management strategies - an obligation introduced under the Flood and Water Management Act - have yet to be introduced by many Lead Local Flood Authorities, we have been told.
- Sustainable Drainage Systems (SuDS) — or green infrastructure, such as ponds, swales and vegetation, are a key part of water management strategy, and work alongside proprietary SuDS. SuDs can provide many additional benefits to communities over and above simply the control of flood risk, such as enriching the environment and absorbing common pollutants. Traditional piped drainage systems, shown, typically, to cost more than the equivalent of SuDS in Defra's own studies, lack these benefits, only serving to convey surface water runoff rapidly away from where the rain falls.
- SuDS are only practical if there is a robust mechanism for ensuring responsibility for their long term management and guaranteed ongoing funding for maintenance. We are extremely disappointed that Schedule 3 of The Flood and Water Management Act 2010, which set out plans for SuDS implementation, maintenance and adoption, is not being implemented despite extensive backing from professionals and local authorities. Particularly disappointing is the dropping of plans for local authority-backed bodies — SuDS Approval bodies. These would draw up standards and ensure they were enforced, and would be responsible for long-term maintenance. Instead, Government will drive the implementation of the delivery of SuDS only through encouragement in the normal planning process.
- We understand why Government should be anxious to avoid applying the brakes to a house building sector which is now seeing the industry recover from its lowest outputs on record. Housing availability and affordability is one of the defining issues of the post-2008 crash in the UK political scene. However, we are worried that the latest proposals will also store up problems for the future by allowing developers to retain the right to connect to public sewers, thus further overloading drains, as well as allowing sites with fewer than ten homes to avoid SuDS measures altogether.
- As it is, there now remains no one responsible body for the adoption and maintenance of SuDS. This will lead to the continuation of confusion and with no obvious short or medium-term solution to the effective management of surface water using SuDS.

Recommendations

We would urge an incoming Government to consider the following proposals, as it continues to tackle the potentially devastating impact of flooding, which is only likely to worsen in the future in the wake of climate change.

- **Strong leadership:** Government needs to foster clear leadership on water issues and appoint a Cabinet champion to set in train a longer term vision for delivering a co-ordinated long term flood and water management strategy and it must ring-fence funding to do so.
- **Strategic land review:** This new water champion should instigate a review of land use policy, placing water and climate change alongside a range of other emerging priorities for a multi-functional landscape.
- **Public debate:** There needs to be clarity on what level of disruption the country finds acceptable as a result of water exceedance. At the moment there are differing standards around the country.
- **Learning to live with water:** We need a high profile programme to inform and educate the public on the importance of making homes flood resistant and resilient and managing expectations about water and living with it.
- **More cash for maintenance:** There needs to be even stronger emphasis on maintenance funding to ensure that existing flood protection assets are sustained.
- **Retrofitting for resilience:** Government should undertake an investment programme to retrofit towns and cities to make them more resilient, as an additional aspect of their flood defence spending. Seeking synergies through every aspect of regeneration and ongoing maintenance programmes and by working with all relevant stakeholders (highways, water companies) will also make retrofitting more cost effective.
- **Better design standards:** Everywhere in this country is in a water catchment so we need to reduce water runoff from every building, whether new or existing — helped with new Building Regulations for designing for flood resistance and resilience.
- **Using insurance to incentivise resilience:** The insurance industry needs to give thought to how it can incentivise improving flood resilience of properties, rather than simply reinstating structures to inadequate pre-flooding standards.
- **Using Flood Re insurance to promote resilience:** The Flood Re scheme, due to be introduced in the summer 2015, should be used to drive a step change in households' protection and resilience and we recommend those measures set out by the Sub-Committee on Adaptation to make this happen should be adopted.
- **Considering the most vulnerable:** Government needs to consider how we protect those who cannot afford flood insurance, particularly those living in tenanted properties. Local authorities can no longer provide such discretionary funding.
- **A bigger role for professionals in the built environment:** Promote greater co-ordination of professionals through a new Construction Industry Council grouping which could act as a sounding board through which to channel flooding policy.

SuDS and maintenance

- We believe the greater uptake of Sustainable Drainage Systems is vital and that the Government is mistaken in not implementing Schedule 3 in the Flood and Water Management Act 2010 and instead relying on the planning system. Schedule 3 would have ensured the use of SuDS on all new developments and set up SuDS Floods Approval Bodies to provide clarity over their management and maintenance and standards.

As a result of this U-turn, Government now needs to resolve as quickly as possible more detailed proposals for:

- **SuDS maintenance:** Ensuring long term management and funding for maintenance, which is absolutely critical if this blue-green infrastructure is not to fail. We suggest that those homes and businesses 'connected' to SuDS could be charged directly for the maintenance like a charge from a water company. The charge could be on local authority rates and what is currently paid to water companies for surface water should be gradually removed as SuDS are installed, unless it is the water companies which provide the SuDS service.
- **Reducing loading on public sewers:** Removing the automatic right to connect rainwater discharge to the public sewers as originally specified under the FWMA 2010. Many of these public sewers, which were built in Victorian times, are overloaded.
- **SuDS for all developments:** Ensuring that the limit of 'fewer than 10 houses' for SuDS to be included is changed back to two (to avoid a profusion of planning applications for nine houses). As SuDS have been demonstrated through Defra's own research to be cheaper, particularly where integrated within the scheme from its original masterplanning, the reason for the threshold as 'keeping the regulatory burden on smaller companies at a reasonable level' is erroneous.
- **National standards needed:** Detailing how it can be ensured that SuDS are designed to a set of national standards as part of the basis for new planning guidance.
- **Resolving adoption of SuDS:** Defining a clear procedure and any associated costs for the adoption of sites under the proposed planning-based system, as the lack of such a process has historically been the greatest limitation to the uptake of SuDS.

Section 1: The Inquiry

1.1 About the Inquiry

The growth of climate change and urbanisation is expected to result in greater risk of flooding in the UK in the 21st Century. How we tackle the threat is one of the biggest challenges faced by society. This, the third Inquiry of The All Party Parliamentary Group for Excellence in the Built Environment, looks at the problems caused to the UK by flooding and examines the potential for greater mitigation of these problems and significantly improving flood resilience including the potential for adaptation to changing environmental pressures. We very much see our findings as the beginning of a dialogue with a new Government.

This report is the result of an open Inquiry into flood mitigation and future resilience. As such all appropriate organisations dealing with the impacts of flooding, flood defence, mitigation and resilience were invited to submit evidence, and oral supplementation was requested from a number of them.

In its call for evidence, the Commission was particularly looking for practical strategies that would, for example, improve flood protection, adaptation and mitigation, as well as enable a better assessment of flood risk and a consequent improvement in insurance and valuation issues.

The weight of evidence we received focussed on the need for long-term water management and the means of providing a sustainable and affordable strategy to deal with the impacts of climate change — in essence moving away from flood defence to one of 'Living with water'. That was perhaps hardly surprising given the timing and back drop to the Inquiry. Evidence was taken at a time when the Government's approach to the adoption of Sustainable Drainage Systems was very much a key plank of the 'Living with water' concept but the adoption of SuDS was uncertain and was creating widespread concern amongst professionals in the built environment. This has meant that in the time we have had available, given the looming election, our scrutiny of approaches is not comprehensive and do not specifically deal with coastal and ground water flooding and defences.

What has come over unequivocally was the risks to do with water exceedance and shortages are most likely to increase in severity as a result of climate change, yet the information presented to us was one of confused policy and missed opportunity, despite clear scientific evidence.

Hence, this report also stresses the need for the integration of flood water management, as we move from an approach based on flood defences to one of flood resilience, and a more holistic and integrated approach to water management generally.

Written evidence was submitted in the Autumn of 2014, and three open sessions, where oral evidence was presented, took place during November and December.

The APPG for EBE Commission of Inquiry comprises members of both Houses of Parliament, senior members of the construction professions and key influencers and decision makers in other aspects of society.

1.2 Members of the Commission

Oliver Colvile MP (chairman)
George Adams
Peter Aldous MP
Professor Richard Ashley
Peter Bonfield OBE
Tony Burton
Sue Illman
The Earl of Lytton (vice chairman)
Jack Pringle
Rt Hon Nick Raynsford MP (vice chairman)

1.3 Secretariat

Graham Watts OBE
Denise Chevin (rapporteur and report author)
Tamara Dale

Section 2:
Context and challenges

2.1 Scale of the problem

Few will have forgotten the devastating floods in December 2013 and early in 2014, when rail networks closed, thousands of homes were left without power and in some parts of the country residents had to be evacuated from their homes. In Boston in Lincolnshire the most serious tidal surge in 60 years led to 300 homes flooded. Meanwhile, a section of the sea wall in Dawlish, Devon, collapsed and left the railway to Cornwall suspended in mid-air.

Serious flooding can happen at any time and is one of the most difficult problems facing us as a nation. In December 2013, there was, for instance flooding across southern England, stretching through Dorset, Hampshire, Surrey and Kent, and extensive power cuts, with around 50,000 homes remaining without power through the Christmas period. Flooding impacts continued into the New Year and early January where those hit the hardest included the Somerset Levels, which was inundated for the second time in two years.

According to Department for Environment, Food & Rural Affairs (Defra), more than five million properties are at risk of flooding in England, that is nearly one in six. There are also more than 200 homes at risk of complete loss to coastal erosion in the next 20 years. It is possible that 2,000 more could become at risk over this period, Defra says.[1]

Analysis from the UK Climate Change Risk Assessment (CCRA) indicates that the built environment will be affected by extreme weather events. Impacts will arise through increased temperatures and changing rainfall patterns[2]. Flood risk will increase not only from climate change, but also as a result of increasing urbanisation.

The expected cost of damage to residential properties from tidal and river flooding alone is projected to rise from £640 million at present to over £1.1 billion by the 2020s. This does not consider the impact of surface water or sewerage flooding, nor the damage to non-domestic buildings, says the Building Research Establishment[3]. Additionally, as it points out, "Initial damage is one cost, but repair costs and insurance premiums must also be considered in the longer term. There is also a social aspect to consider, as flooding causes significant distress and potential health problems."

In 2004 the Flood Foresight report, looking at the risks to the UK from flooding and coastal erosion over the next 100 years, made assumptions about the implications of climate change for long-term flood risk. In general terms, it suggested that by 2080 climate change is likely to increase river flood risks by between two and four times, coastal flood risk by four to 10 times, while flood damage from urban drainage systems by between three and 30 times[4].

In evidence to this Inquiry, a group of 14 academics and experts — the technical team engaged in Flood Foresight — said that assessment still remains valid, having been updated in 2007 for Sir Michael Pitt's Inquiry, and if anything, the risks are even greater now.

In their submitted evidence they told us, "It is too early to say whether the floods of 2013/14 were caused by climate change, but the atmospheric phenomena that produced them are consistent with the expected impacts of global warming on the Jetstream and winter storms. It follows that work must continue to better understand and predict the probabilities, intensities, durations and spatial distributions of UK flood events, to provide the science base from which to plan and implement responses that are appropriate and sustainable."

Floods are expensive too: the economic cost of the summer floods of 2007 was about £3.2 billion and average annual flood damages are estimated to accrue to somewhere between £500 million and £1 billion[5]. Tragically, 13 people died.

As Colin Thorne, from the School of Geography at Nottingham University, also points out, "Flooding is complicated: firstly, because there are several different types of floods - river, coastal, surface water (pluvial) and groundwater; and secondly, because most floods are actually combinations of these types. This combination of types, known as coincident flooding, was a hallmark of the winter of 2013/2014, which featured sequences of and clusters and events involving various combinations of tidal, rainfall, river and groundwater sources"[6].

Of the more than 5.2 million homes at risk of flooding in England, over 2 million are at risk from river or coastal flooding and approximately 3.8 million are at risk from surface water flooding, according to the Environment Agency. Around 1 million homes are at risk of flooding from both. Insurance claims from the 2007 surface water floods outnumbered claims for river and sea flooding by 6:1. In fact, as rain falls everywhere in the country, each and every property is at risk from heavy rainfall — even properties situated on high ground, as property drainage is normally designed to cope with storms that occur on average once in 30 years[7].

Climate change is occurring at a pace that is steadily reducing these odds. We were told that commonly used statements such as "5.2 million properties are at risk of flooding" - even by the Environment Agency - can be unhelpful, as they lull the rest of the population into a false sense of security that they are safe from flooding. This was demonstrated in Hampshire in 2014, where groundwater flooding developed in many areas of chalk land that had not seen flooding previously[8]. Evidence from Heriot-Watt University, specialists in building drainage, supported the understanding that many more than six million properties are in fact at risk.

Nevertheless, BRE's paper says: "Pluvial floods are the type most likely to increase in severity as a result of climate change. They are also the most difficult to manage".

In the past, flooding has been traditionally managed by large-scale engineering solutions, whereby entire towns and communities are protected by hard (structural) flood defences like walls, embankments and at the coast, beaches and sand dunes. But increasingly there is a recognised need to move away from flood defences to a risk-based approach that aims for flood resilience. This uses a combination of flood defences with holistic management of fluvial, coastal and surface water flood risk, using a range of measures that can help reduce the likelihood and consequences of flooding and upstream catchment measures to improve the resilience of land, buildings and infrastructure. (A building that is resilient to flood is one that has the ability to recover in such a way as to keep functioning following a flood.)

Flood risk management can be achieved with moveable defences such as barriers, passive measures like embankments (and also planting of grass and trees to increase water infiltration to soil), emergency management measures (flood warnings and emergency management plans) and improved resilience to speed recovery after flood events occur.

CIRIA provided evidence of the need to reflect on how events, that cause water to be on the surface in urban areas, due to limited drainage capacity or blockages, but that do not cause flood damage, should be considered. The public should be encouraged to see such events as "big puddles" or as harmless water flowing along gutters and kerbs. This exceedance drainage should be recognised as an acceptable way of managing water on the surface, providing it is done in such a way as to avoid unacceptable problems. Climate change means that water on the surface will become more commonplace in future and will need to be managed carefully to avoid having to keep building new drainage capacity at unaffordable expense. This will need greater cooperation between those responsible, including the Lead Local Flood Authorities, Highway Authorities and others. Importantly, the way in which we lay out our

[1] https://www.gov.uk/government/policies/reducing-the-threats-of-flooding-and-coastal-change
[2] https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report
[3] Stephen Garvin, Director of Centre for Resilience, A future Flood Resilient Built Environment, Building Research Establishment
[4] Future Flooding, April 2004,Government Office for Science, part of Flood and coastal defence Foresight
[5] Colin Thorne, of the School of Geography, University of Nottingham, The Geographical Journal, Vol 180, No 4 December 2014
[6] Colin Thorne, as above
[7] British Standard on Building Drainage BS 12056 (2000)
[8] http://www.theguardian.com/news/2014/feb/16/weatherwatch-groundwater-flooding

urban areas and how they are planned, needs to recognise the need for these exceedance management measures, including "blue routes" passing surface water to places where the impact is negligible. This may involve modifying kerb heights and subtle alterations to road cambers and grassy areas to ensure the water flows the right way.

Managing flooding and water on the surface will become a complex interplay between how we lay out our urban areas, where we build and how we adapt our existing areas. Not all of those responsible for getting involved in this process yet understand their role or the need for them to change doing things "the way we have always done". Thus, there is a need to reconsider how we plan and layout our urban areas. In addition, the interplay between upland management of catchments and downstream impacts is well understood and there are opportunities to protect urban areas better by, for example, reforestation or changes in agricultural practices. An integrated approach to flood management is required across catchments at a variety of spatial scales.

The need to reinforce this integrated approach was made continually throughout our Inquiry. For example, the evidence submitted by the Flood Foresight technical team explained: "Our understanding of natural processes associated with inland flooding and its management has advanced significantly since 2008. Natural flood management and working with natural processes are part of the solution to our future river, surface and groundwater flooding problems, but only when combined with engineered defences in integrated portfolios of structural and non-structural measures."

The ICE told us in its submission: "Catchment wide green infrastructure solutions, especially upstream - offer the opportunity to reduce or delay runoff from catchments. These measures can also provide many other benefits such as creating and restoring habitats, enhancing biodiversity, capturing carbon, reducing sedimentation and improving water quality. It can also help to preserve and manage water resources, increasingly important in areas where there are water supply pressures. This type of joined up, longer-term thinking can make a big difference to our flood resilience."

However, what also became increasingly apparent from the submitted evidence was that there are still too many barriers to the take up of landscaped approaches — which include Sustainable Drainage Systems (SuDS) — not least because of a lack of understanding, a lack of ownership and a lack of maintenance funding, and too many different water management bodies and authorities to propagate an integrated approach to water and flood management.

Source of flood	The sea and coastal erosion	From rivers and watercourses	From direct rainfall	Groundwater Primary Source
Primary Source	Sea level rise, surges, waves	Burst banks and overtopping	Exceeding capacity of drainage system	Heavy rainfall and aquifer flows
Impact in rural areas	At the coast - loss or inundation of productive land/ non-productive	Inundation of agricultural and non-productive land, in towns and villages	As for rivers and watercourses	May be extensive and remote from where the rain occurred
Impact in towns and cities	At the coast – inundation and loss of property/ assets	Major devastation due to inundation adjacent to & spreading out from watercourses	Anywhere is at risk (we are all in the rain catchment), especially our houses	Mainly occurs where there are aquifers

2.2 Sources of flooding

Sources of flooding are various, as summarised in the table left. In many areas more than one of these types can occur at the same time with, for example, river flooding from burst banks happening at the same time as local heavy rainfall, causing flooding in the streets. There are also important interactions between rivers, coasts and how our towns and cities drain water away. In the 2007 floods, for instance, flooding occurred in cities like Sheffield, as the street drainage system could not drain water into the streams and rivers, due to the river water levels being too high.

At the coast, flooding may occur due to high water levels at high tides or even when the tide is lower due to atmospheric surges, as happened in 1953 on the east coast of England. On top of the high water levels, waves can reach several metres in height, leading to intermittent flows over defences; if these cause erosion of embankments, it can lead to collapses and an inrush of flood water. Typically, such systems are designed to deal with flood risks that might occur once in a hundred years or more. Climate changes are now known to be increasing sea level heights and also wind speeds, therefore increasing these flood risks.

Flooding from rivers and other watercourses can occur where the amount of water cannot be contained and it overtops the banks. Typically, this flooding is managed so that it would occur only about once every seventy years. As for coastal flooding, there may be areas where this excess water can be stored temporarily without causing too many problems, or where it can flow safely away. There are also complicated interactions between the water that flows off the land and that which soaks into the ground. The relative amounts as to what flows off and what soaks in will depend on the landscape and the hydrogeology, although the way in which the land is being used is also important, for example, with less water coming off forested land. Groundwater flooding often occurs a long way from where there is rainfall, due to the movement of water in the ground through aquifers, which may transport water a long way. In 2013/14, for example, groundwater flooding was a major problem that happened relatively slowly, with many people only experiencing a gradual rise of groundwater under their houses until they were inundated.

Groundwater flooding is especially prevalent when there is a long period of rainfall that completely soaks the ground, resulting in there being no spare capacity underground to keep storing water. It also lasts a long time, and in 2014, there were still areas of the south east of England at risk of this type of flooding months after the prolonged periods of rainfall had ceased. Climate change is increasing these flood risks, not least as rainfall is increasing — with more prolonged periods of wet weather in the winter in much of the UK and more intense, sharper storms in the summer.

In towns and cities, the drainage systems are designed to capture and store or drain away any rainfall that is not used for other purposes, such as in a reservoir. Typically these drainage systems are designed to cope with rainfall maxima that occur on average once in thirty years. However, these drainage systems are not designed to cope with very heavy rainfall occurring for long periods and often become overloaded, resulting in flooding of properties, roads and important infrastructure like power stations. In 2007, for example, a major water treatment plant was flooded in Gloucestershire due to a combination of flooding from the River Severn and local heavy rainfall — with the loss of drinking water from the works for over a fortnight, affecting nearly half a million people.

As well as not being able to contain the heaviest storms, drainage systems in towns and cities are also prone to blockages by

debris and leaf fall. Increasingly, towns and cities are being planned so as to make sure that where the capacity of the drainage system can no longer cope, any water on the surface is moved away safely or stored temporarily until the heavy rainfall has abated. As well as climate change increasing these flood risks, a 2011 study for Ofwat showed that urban drainage flooding is also increasing due to continual paving over of urban surfaces for car parking and patios, much of which is unplanned and unpredictable. This means that where originally water soaked into the ground, it now cannot do so and runs off into the drainage system, increasing its load.

2.3 Recent improvements and changes by Government

The pace of addressing the issue of flooding picked up in the wake of the devastating floods in the summer of 2007, which forced Government to examine its approach to flooding more widely. It commissioned Sir Michael Pitt to conduct an independent review of the way the events were managed[9]. The report was published in June 2008 and contained a detailed assessment of what happened and what might need to be done differently. It put forward 92 recommendations covering prediction and warning of flooding, prevention, emergency management, resilience and recovery. Many of the recommendations were far-reaching and called for a radical reshaping of flood-risk management practice.

Alongside the final report, Sir Michael's team published an implementation and delivery guide, setting out who the team felt was responsible for ensuring implementation of each recommendation and the suggested timescale for doing so.

A Government response was published in December 2008 and the ministers in post at the time accepted all of the report's recommendations and gave an undertaking to implement them in line with the delivery guide. Since then, progress reports have been published in June and December 2009 and then in 2012[10]. Key legislation has included the following:

- The Flood and Water Management Act 2010 - providing for better, more comprehensive management of flood risk for people, homes and businesses. It places a duty on all flood-risk management authorities to co-operate with each other. It also includes a simplified overarching framework, which allows different organisations to work together and develop a shared understanding of the most suitable solutions to surface water flooding problems.
- The National Flood and Coastal Erosion Risk Management Strategy for England and statutory guidance on co-operation and requesting information, published in July 2011. The strategy's overall aim is to ensure that flooding and coastal erosion risks are well-managed and co-ordinated, so that their impacts are minimised
- The National Flood Emergency Framework, published in July 2010. This provides guidance and advice for councils and others on planning for and responding to floods.
- The Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011, transferred private sewers that connect to the public sewerage system to the water and sewerage on 1 October 2011. This transfer was intended to provide customers with the assurance of having a regulated company, responsible for maintaining and repairing the sewerage system serving their property, which works to minimum standards of service, is overseen by Ofwat, and on whom they can call if they have problems.

Witnesses pointed out, that despite the increasing flood risks, the problem is not treated with the same sense of urgency as, say, airport capacity or rail. That said, in the last seven years there has undoubtedly been greater focus from successive Governments on the need to tackle flooding issues, following severe events and widespread criticism.

However, Government appears unable to consider the dual issues of water supply stress, which will increase in the future, and flood risk as simply parts of the water cycle that need to be managed in a holistic and integrated way. Future Water, published in 2011[11], sets out principles that included taking an integrated approach in terms of both water management and planning. Yet, the 2014 Water Act has not followed these principles; rather it has added to the disintegration of the way in which water is managed in England and Wales.

Controversially, Schedule 3, a key element of the Flood Water Management Act 2010, is not to be implemented, to the disappointment of the Commission and the consternation of many of our witnesses. Amongst other things, Schedule 3 provided a framework for the implementation and ownership of Sustainable Drainage Systems and without which key barriers, we believe, will remain. The omission of Schedule 3 also means that the fundamental principle in the point above of ensuring that everyone should have a regulated drainage system to a minimum standard of service, which is overseen by Ofwat, and on whom they can call if problems arise, will not be met. The debate around Schedule 3 is ongoing, and the latest Government consultation, in December 2014, only looks set to create more uncertainty. This is discussed in more detail in Section 3.3.

2.4 The complicated governance of water management

The complexity of flooding is exacerbated by the sheer number of bodies and agencies involved in managing water in the UK, which makes taking an integrated approach difficult. The number of bodies is described on page 16. We think it useful to include it by way of explanation, given that getting different authorities to work together in consort, was one of the main obstacles cited for taking an integrated approach to water management. In fact, during the course of our Inquiry, it was said that we have the most disjointed approach to water management in the world, with a mixture of statutory and permissive rights. When the rest of the water cycle is included, the situation becomes even more complex and disjointed, preventing a co-ordinated, integrated and effective approach.

Furthermore, the Flood and Water Management Act 2010 (FWMA) also requires a Lead Local Flood Authority (LLFA) to develop, maintain, apply and monitor a strategy for local flood risk management in its area. Local flood risk includes surface runoff, groundwater and ordinary watercourses (including lakes and ponds).

There is no deadline for producing a local strategy, nor is there a prescribed format or scope beyond the legislative requirements contained in the Flood and Water Management Act.

[9] http://webarchive.nationalarchives.gov.uk/20100807034701/http:/archive.cabinetoffice.gov.uk/pittreview/_/media/assets/www.cabinetoffice.gov.uk/flooding_review/pitt_review_full%20pdf.pdf

[10] The Government's Response to Sir Michael Pitt's Review of the summer 2007 Floods Final Progress Report, 27 January 2012. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69489/2012-01-31-pb13705-pitt-review-progress.pdf

[11] https://www.gov.uk/government/publications/future-water-the-government-s-water-strategy-for-england

Who is in charge of water management[12]

Defra
Defra has overall national responsibility for policy on flood and coastal erosion risk management, and provides funding for flood risk management authorities through grants to the Environment Agency and local authorities.

Department of Communities and Local Government
Department of Communities and Local Government (DCLG) through Local Planning Authorities have a key role in the planning process to ensure flood risk is appropriately taken into account in the planning process. The policy on how to take flood risk into account can be found in the National Planning Policy Framework. DCLG is also responsible for Building Regulations.

The Environment Agency
The Environment Agency is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. This includes, for example, setting the direction for managing the risks through strategic plans; providing evidence and advice to inform Government policy and support others; working collaboratively to support the development of risk management skills and capacity; and providing a framework to support local delivery.

The Agency also has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion risk management authority. As part of its strategic overview role, the Environment Agency has published a National Flood and Coastal Risk Management Strategy for England. The strategy provides a lot more information designed to ensure that the roles of all those involved in managing risk are clearly defined and understood.

Lead Local Flood Authorities
Lead Local Flood Authorities (unitary authorities or county councils) are responsible for local flood risk management, and for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.

Internal Drainage Boards (IDBs)
Internal Drainage Boards,which are independent public bodies responsible for water level management in low lying areas, also play an important role in the areas they cover (approximately 10% of England at present), working in partnership with other authorities to actively manage and reduce the risk of flooding. They have permissive powers to manage water levels within their respective drainage districts. IDBs undertake works to reduce flood risk to people and property and manage water levels to meet local needs.

Riparian owners
If a property is adjacent to a watercourse of any description, or this passes through or under the property, you are a 'riparian owner'. Riparian owners should be maintaining their waterways regularly and keeping vegetation and obstacles that may restrict the flow of the water clear from the bed and banks. This includes major rivers which they are adjacent to. In practice few if any riparian owners maintain major rivers due to the costs and complexity of this. Most riparian owners are unaware of these duties.

District councils
District councils are key partners in planning local flood risk management and can carry out flood risk management works on minor watercourses, working with Lead Local Flood Authorities and others, including through taking decisions on development in their area which ensure that risks are effectively managed. District and unitary councils in coastal areas also act as coastal erosion risk management authorities.

Highway authorities
Highway authorities are responsible for providing and managing highway drainage and roadside ditches, and must ensure that road projects do not increase flood risk.

Water and sewerage companies
Water and sewerage companies are responsible for effectually draining areas by managing the risks of flooding from water and foul or combined sewer systems providing drainage from buildings and yards. Some water companies will not accept surface water to discharge into their pipe network if it has come through a soft SuDS system.

Duty to co-operate
Under the Flood and Water Management Act 2010 all risk management authorities mentioned above have a duty to co-operate with each other and to share data. A key theme of the Pitt Review was for flood risk management authorities to work in partnership to deliver flood risk management better to the benefit of their communities.

Regional Flood and Coastal Committees
Eleven Regional Flood and Coastal Committees have been established in England. These are responsible for ensuring coherent plans are in place for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines; for promoting efficient, targeted investment in flood and coastal erosion risk management; and for providing a link between flood risk management authorities and other relevant bodies to develop mutual understanding of flood and coastal erosion risks in their areas.

[12]Much of the information in this section is taken from Defra https://www.gov.uk/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities

Section 3: Opportunities and barriers to increasing flood resilience

3.1 Government spending on flood mitigation measures

A number of our witnesses stated that flooding risks will increase unless more money is invested in both capital projects and in maintenance of existing schemes. The Institution of Civil Engineers even went as far as saying that "the current funding arrangements for strategic flood risk management are not appropriate and do not provide the necessary resource to adapt to and mitigate the long-term risks and uncertainties we face from climate change." The organisation is calling for Government to agree to a long-term capital and maintenance programme that goes beyond the proposed six-year plan[13].

The ICE says: "Maintenance investment is a significant concern. Maintenance funding for water courses which includes flood barriers and pumping stations, managing grass, trees and bushes on flood embankments and inspection and repair of flood defence structures, has been decreased from £68m in 2008/09 to £57m in 2012/3. The impacts of poorly maintained assets are evident from the winter 2013/14 flooding and a more consistent and long term approach to maintenance investment is required."

The RICS agreed: "There has to be growing investment in the infrastructure. It's as important as a new airport runway and High Speed 2."

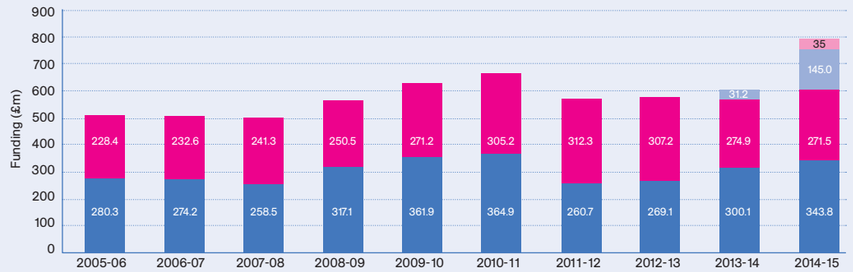
The ICE also took issue with the Environment Agency's prioritisation system for flood defence expenditure, which focusses on the protection of homes, rather than infrastructure.

It said: "In our view, there needs to be sufficient consideration given to the risk of flooding in strategies to safeguard national infrastructure, such as roads, rail and power stations. Funding for flood maintenance is too low and this should be addressed — but not at the detriment of the capital budget. One new concept that ICE supports is that no new infrastructure should be built, if we are unable to maintain our current stock of infrastructure assets."

Meanwhile, Government has announced it is investing £2.3 billion in more than 14,000 flood

Flood defence spending

The following graph and notes are taken from the House of Common's Library Standard Note SN/SC/5755 Flood defence spending in England, (last updated, 19 November 2014)



Notes
1 Figures for 2014-15 are allocation, not to spend
2 Overall revenue funding for 2013-14 increased as a result of additional funding from government to cover incident response costs and urgent repairs to assets during the winter storms
3 £30 million of additional funding was allocated for 2013-14, against which £31.2 million was spent. This included both capital and revenue.
4 Additional funding allocated for 2015-16 (not shown) amounts to £60 million
5 Previous years will also include an element of incident management costs and repairing assets damaged during flooding
6 Funding for 2015-16 will be announced during 2014-15
Source: National Audit office analysis of figures from the Department for Environment, Food & Rural Affairs

[13]https://www.gov.uk/government/news/£2.3-billion-to-be-spent-on-new-flood-defences

and coastal erosion defences across England over a six year period, including the Somerset Levels, Boston and the Lower Thames that suffered serious flooding in winter 2013/2014 last winter. The investment plan is set out in the document Reducing the risks of flooding and coastal erosion, published on 2 December, 2014[14].

Defra says that this investment, coming on top of the £3.2 billion spent between 2010 and 2014/15, represents a 9% real term average increase compared to the £2.7 billion investment in the previous five years and that it is also the first time there has been funding committed for six years.

However, Professor Richard Ashley has pointed out[15] that the monies are not new and, in fact, have been taken from other flood defence management budgets, with the Environment Agency expected to make further 10 % efficiency savings, and Lead Local Flood Authorities (LLFAs), on average losing 18 % of their budgets.

What is more, £600 million is assumed to be provided by communities and local authorities to supplement Government funding over the six year period. "Given that in the current spending period up to 2015, around £140 million has been raised from such partnerships, there are serious questions around adding a further £100 million per year from similar contributions in the next funding period. This will also leave many communities without essential protection where they cannot raise the many millions required," Professor Ashley said. A report in February 2015 from the cross-party Environment, Food and Rural Affairs select committee raised concerns that the £600 million from the private sector would not be raised[16].

"We support the principle, but we have repeatedly expressed concern about the relatively small amounts of private sector funding secured to date," the Committee said.

One authority working in this way is Kent County Council, which is a Lead Local Flood Authority. Representatives told us: "Funding resources are limited, and reducing. It is very difficult to fund local schemes." (Box 3)

Meanwhile, in November 2014 a report from the National Audit Office was critical of the Government, and said that that the risk of flooding is rising as a result of funding cuts. It claimed that maintenance spending had fallen by 6% in real terms over the last five years of coalition Government, and overall spending had fallen by 10% in real terms, when the one-off emergency sum of £270m for the 2013/2014 floods had been excluded. However, Government claimed the NAO had used the wrong numbers. In a statement it claimed: "The Government prefers to compare the six year period after the 2010 election with the six years before. The latter includes several low spending years before major floods in 2007 lead to a sharp increase."

The NAO report did, however, praise the Environment Agency, which builds and manages England's flood defences, saying it had improved the cost effectiveness of its flood risk spending. It was, said the NAO, offering value for money.

Inquiry member Professor Richard Ashley has also been critical of the allocation of new money, pointing out: "There is evidence that political 'good news' and media attention has influenced where the money is going to, with further funding for example for the protection of people living in the Somerset Levels", which contravenes the standard procedures for prioritisation of spending set out by the Environment Agency.

As numerous studies and experts, like the ICE, are forecasting, the cost of keeping pace with ever increasing risks to flooding is likely to increase and we are also concerned whether the £600 million earmarked to be raised in partnership funding will materialise.

The Committee on Climate Change Adaptation Sub Committee said, in its progress report in 2012, that investment in flood defences has helped to reduce flood risk to 182,000 homes in the last three years and improved the condition of some defences. But it also said that, if current investment plans for flood defence continue, the country will be faced with an increasing risk of flooding from climate change. The Environment Agency estimates that investment needs to increase by £20 million above inflation every year to keep risk levels constant in the face of climate change and deterioration of flood defence assets[17].

We appreciate there can be no bottomless pit in terms of spending on flood mitigation, and that is why we believe there needs to be a greater public awareness and greater debate around the issue of surface water. As a society, we need to be able tolerate and live with some degree of flooding - such as seeing more water on surfaces (exceedance flows) as outlined - and become more individually aware of the need to understand and manage water on our own properties. Households and businesses need to be encouraged to do more for themselves and there needs to be more effort to support a greater public awareness of the resistance, resilience and adaptation measures.

However, there are no measures in place or assistance to help reduce surface water runoff at the householder or individual building level, whereas a grass-roots incremental approach could be taken, especially taking advantage of the effectiveness of local use of SuDS.

[14]Defra, Reducing the risks of flooding and coastal erosion published on 2 December, 2014.
[15]Professor Richard Ashley, Our government consistently refuses to see the value in water, 9 December, 2014, Construction News. http://www.cnplus.co.uk/opinion/expert-opinion/
[16]http://www.parliament.uk/business/committees/committees-a-z/commons-select/environment-food-and-rural-affairs-committee/news/report-defra-performance-in-01314/
[17]http://www.theccc.org.uk/publication/climate-change-is-the-uk-preparing-for-flooding-and-water-scarcity-3rd-progress-report-2012/

Kent County Council on the challenges faced by local authorities

Taken from evidence presented by Bronwyn Buntine (Flood Risk Management Engineer) and Max Tant (Flood Risk Manager)

In January 2014, parts of Kent were severely flooded. Within the River Medway catchment, there were 700 properties that were flooded. A solution to the extent of this problem can only be addressed at a strategic level, and requires assessment of our flood assets at a catchment level. For example, the Leigh barrier which protects Tonbridge was built in 1982 and was recognised as having a finite capacity. The partnership led by the Environment Agency, with KCC, is supporting the Leigh barrier flood alleviation scheme, at the cost of £35million. Funding will be sourced from Government, but will be supported by additional funding from Kent, Tonbridge and Malling, and Maidstone. The effective contribution from other partners has brought the project forward, as it was originally scheduled for 2035, whereas work will now commence around 2019/2020.

The second example is of a local flooding problem, affecting Down's Road in Folkestone. This is a small catchment. Urban creep (incremental building over of soft surfaces in urban areas, through the gradual addition of garages, conservatories, new patios and other hard paved or built features) has added significant flows to the sewer system, as well as increased flows from outside the catchment to the system to which Down's Road contributes.

The lack of drainage capacity results in chronic flooding of eight residences. This is not just surface water, this is from a combined sewer system. This problem has been difficult to resolve as a complete solution would be extremely expensive, and because of its complexity, we have needed lots of partners.

As part of undertaking a surface water management plan, a partnership has been formed to help fund these solutions. We also have formed the community flood forum which enables effective communication with the community. So actions will be undertaken by both KCC and Southern Water, we don't know yet what the solution is but something will be done.

So what are the lessons learnt from this particular example? One is that urban creep and other changes in the catchment have been significant, and they haven't been anticipated. We're talking about a catchment that includes houses that were built in the 1930s, in the last 10 years we've seen a significant change in their front yards, their gardens have been paved and they contribute to the sewer system.

Funding is limited for this type of project, and given the small number of properties affected, even if the frequency of flooding was higher, it's going to be a difficult thing for us to be able to find and create a viable solution.

Sustainable drainage is particularly important for us, given that we have growth pressures across Kent, and it is critically important that new development considers surface water management early in its design process where there is great opportunity for the inclusion of surface water management with little cost.

Therefore, this has become quite important for us in the way that we work with our constituent planning borough and district councils. We try to promote the need for the councils to consider this early on in their design processes. But we have no statutory position to ensure appropriate drainage on new developments. We can provide consultation response, but it's not mandatory.

So, the message is that many authorities are involved in flooding; it's not just KCC or the district councils, it's the IDBs, it's the sewage undertakers etc. We are not statutorily consulted, but we can provide advice and try to exert an influence on district councils, but that does not mean that they necessarily consider what we put before them.

There are different priorities, and different funding regimes between partners, and this makes it difficult to coordinate resources. Funding resources are limited, and reducing. It is very difficult to fund local schemes. The Leigh barrier is costing £35 million, that's a lot of money. But we have places like Down's Road, it might only be eight properties, but those people are flooded two or three times a year, and we possibly may not be able to receive money through the EA funding or from the water company.

3.2 Flooding and planning

One of the greatest tools we ought to have at our disposal in reducing the risks of floods to homes in the future is the planning system. But the system of mechanisms and controls that in theory have been in place to reduce development in high risk areas is not doing its job, despite the National Planning Policy Framework, including the three-tier risk approach to flood risk assessment.

The National Planning Policy Framework (NPPF) sets strict tests to protect people and property from flooding, which all local planning authorities are expected to follow. In summary, these steps are designed to ensure that if there are better sites in terms of flood risk, or if a proposed development cannot be made safe, it should not be permitted.

To assess the flood risk, local planning authorities are expected to undertake a Strategic Flood Risk Assessment, in order to fully understand the flood risk in the area to inform their Local Plan preparation. However, they have been notoriously poor in doing so, particularly in connection with surface water and groundwater flooding. In areas at risk of flooding for sites of one hectare or more, developers undertake a site-specific flood risk assessment to accompany applications for planning permission.

When development is proposed in locations where there is a risk of flooding as alternative sites are not available (the sequential test), local planning authorities and developers are required to ensure development is appropriately flood resilient and resistant, and will not increase flood risk overall.

However, many authorities are still without Local Flood Risk Management Strategies and local scrutiny of plans and actions appears to be lacking[18].

The NPPF encourages local planning authorities and developers to reduce the risk and impact of flooding through the use of Sustainable Drainage Systems as part of new developments. It also states that local planning authorities should take advice from the Environment Agency and other relevant flood risk management bodies such as Lead Local Flood Authorities and Internal Drainage Boards. Historically, the role of the LLFAs in relation to individual planning applications has been at the policy level, but not at the application level. However, if the current DCLG intention to make LLFAs the consultative body for water management issues in planning applications, then this role will clearly change and be strengthened. This will require appropriate resourcing and funding.

As discussed earlier, Lead Local Flood Authorities (unitary authorities or county councils) are responsible for managing local flood risk, including from surface water, ground water and ordinary watercourses, and for preparing local flood risk management strategies. Local planning authorities are therefore expected to work with lead local flood authorities to secure Local Plan policies compatible with the local flood risk management strategy.

However, witnesses repeatedly told us that because of the severe pressure they are under to encourage housing development, local planning authorities often choose to overlook the advice from Lead Local Flood Authorities (which have not been statutory consultees). Also, flood mitigation measures laid out as a requirement for planning permission are not always followed through, and are not being enforced.

In their evidence, the Flood Foresight technical team said: "There has always been development in floodplains and this will continue. It is important that flood risk management does not constrict growth, but even so the floods of 2013/14 reinforce the Flood Foresight message that development in floodplains must be carefully planned, with the type of development and the buildings themselves designed to be resilient to the types of floods to which they are exposed and the frequency, depth and duration of inundation that may be expected." For example, in evidence, Espen Østbye-Strøm and Justin Meredith, of Floodline Developments showed the amphibious houses now being built in the Netherlands in areas of high flood risk where they are very popular amongst dwellers. Floodline has built a few of these homes in the UK with more sites in the pipeline. The houses and financial model for these schemes is extremely interesting. Floodline says, "We have successfully achieved planning permissions for floating and can-float structures in the UK, and importantly these structures come with standard mortgage, insurance and warranty policies."

In 2012, the Adaptation Sub-Committee of the Committee of Climate Change[19] also noted that development was continuing in floodplains, although there were suggestions that the rate had slowed.

As we discuss at length below, Government is now proposing that Lead Local Flood Authorities should become statutory consultees in planning determinations. This is certainly a welcome move, though we would prefer to see the tougher plan of action, as set out in Schedule 3 of the Flood Water Management Act, to have been adopted in full where compliance would have been mandatory and not just guidance (Section 3.3).

3.3 Surface water, SuDS and Schedule 3 of the Flood and Water Management Act 2010

A key narrative of our report is the need to take a longer term and more integrated view of water management and ensure our communities and infrastructure are resilient to future climate change and increased urbanisation. Excess water needs to be balanced against water scarcity and we need to learn to live with changing weather patterns. We received a great deal of evidence making the case for the greater use of Sustainable Drainage Systems (SuDS) as part of flood mitigation strategy. This was a key recommendation in the Pitt Review. However, we are concerned that recent Government proposals could make the adoption of SuDs even less likely to happen.

SuDS are designed to slow the rate of surface water run-off and allow infiltration by mimicking natural drainage in both rural and urban areas. Slowing run-off helps reduce the risk of flash flooding occurring when rainwater rapidly flows into the public sewerage and drainage systems. SuDS solutions include above ground "soft" landscaped features including swales, raingardens, detention ponds and filter strips and below ground "hard" SuDS solutions, such as concrete soakaways and attenuation tanks. Most SuDS solutions will feature a combination of hard and soft features.

As CIRIA said in its evidence; "SuDS are also considerably more flexible and adaptive than traditional pipe, and gully drainage and are often cheaper than traditional drained developments. The value of SuDS is recognised internationally and the delivery of SuDS in the UK, to some extent, lags behind other countries."

And as the Landscape Institute pointed out, because they are often involved in integrating SuDS in green spaces, like wetlands, parklands, or planted areas, they can:

- create better places to live and work,
- even-out water demand and actively manage water security,
- improve water quality,
- improve habitats, at the same time as dealing with surface water.

The Pitt Review proposed that SuDS should be included in new building developments and their deployment is a key element of the Flood and Water Management Act 2010. Schedule 3 of the Act called for local authorities to set up SuDS Approval Bodies (SABs) with responsibility for approving SuDS schemes; these bodies would then be responsible for adopting those schemes once a development has been completed. Adoption was an essential component of the Act, as it has been the

[18] Adaptation Sub_Committee Progress Report 2014 http://www.theccc.org.uk/wp-content/uploads/2014/07/Final ASC-2014 web-version-2.pdf

[19] (http://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/)

single greatest block to the uptake of SuDS throughout.

This approach, outlined in the FWMA, has been discussed by Government, local authorities and developers for the last four years. There has been much deliberation over the implementation of these requirements – partly out of fear of adding additional cost burdens to house builders – culminating in a plan published before Christmas 2014 which will see SuDS implemented through the existing planning approval system, rather than SuDS approval bodies.

Government claims that using the existing planning system should enable the SuDS legislation to be introduced relatively quickly to allow communities in danger of flooding to start to benefit from SuDS solutions. Elsewhere in the UK, in Scotland, Wales and Northern Ireland, SuDS are being vigorously promoted.

The Commission considered a significant weight of evidence around the need for the Flood and Water Management Act to be fully implemented, and is highly concerned how this could be achieved, as a consequence of the potential change of process from that envisaged within the FWM Act, to a "preference for SuDS" where SuDS is deemed "appropriate", with an approval system delivered via planning, as is being proposed now.[20] Worryingly, the term 'appropriate' is not defined, making its effective implementation questionable.

There was a very strong consensus amongst all those submitting written and oral evidence over the key issues for its successful implementation. These key issues also recognised the long drawn-out lobbying and discussions that have both delayed the implementation process, and allowed the potential outcome to lose not only its clarity and effectiveness, but potentially provide a system that is not sufficiently robust and enforceable. It also is unlikely to resolve some of the complex issues of ownership and responsibility (and long-term maintenance), which currently prevent its delivery.

Key issues raised in the Commission in relation to SuDS

- The system must be mandatory and not advisory, through the planning system to ensure that the requirement for delivering improved sustainable surface water management and reducing flood risk is achieved on all developments, not only for those of more than ten properties as Government now stipulates[21].
- It was clearly understood that ALL development has the potential to contribute to increased flood risk, as nearly 50% of all development is not "major" as defined by the planning system, and therefore should also fall within the scope of the Act, as originally intended.
- It was also understood that there is a need to separate surface water from combined sewer systems to reduce flood risk in existing towns and cities, to both increase capacity in the sewer network, and to reduce the volume of surface water flowing through treatment works unnecessarily.
- SuDS are one method of delivering surface water drainage, and as such are an essential infrastructure and must be planned, delivered and managed as such.
- Use of soft systems or mixed hard and soft systems does not change the fact that they are part of the drainage network, and must be funded and managed as other essential infrastructure such as roads or power.
- Having an obligatory system for adoption and maintenance of SuDS is fundamental to their successful implementation and long term hydraulic function. The current Government policy fails to take account of the current confused and uncertain position regarding this.
- Funding for long term maintenance must be secure, and the system of raising funding equally clear and secure.
- There must be a "duty to co-operate" between water companies, highway authorities, local authorities, the IDB, land and property owners and other relevant stakeholders, which obliges them to allow surface water to flow through their systems where land ownership, responsibility or topography demand.
- The automatic right of connection to a sewer under Section 106 must be removed, as proposed in the FWM Act.
- In the longer term, and in order to achieve greater resilience across communities, there is a need for a wider appreciation of how surface water is managed. Accepting traditional, out of sight out of mind, approaches to drainage should, therefore, not be an option as it does little to improve self-resilience and, actually, is both ineffective and unaffordable in the light of climate change as stated by Ofwat.
- At the same time, SuDS are only one component of an integrated approach to managing surface water. Their use, together with other measures, can turn surface water from a "problem" into an opportunity as a valuable resource. Recent studies have shown that by 2020, there will be significant water shortages in SE England[22] and changes in practice are required now if this is to be counteracted. Elsewhere in the world, notably in Australia, this resource is recognised and innovative approaches are being taken to make the most of all forms of water wherever it occurs, as was mentioned earlier[23]. In England the fragmented arrangements for managing water resources, flooding, supply, sewage, water quality, environment, surface and other waters make integration and maximisation of the efficiency and benefits of managing water properly very difficult. Hence a valuable source of multiple benefits to society is not being exploited and this is adding burdens to customer bills that could become intolerable even by 2020[24].

Since the end of our evidence sessions, Government has published the outcome of its autumn consultation, which confirms the intention to press ahead with a planning based SuDS approval system, despite 71% of respondents expressing concern that it would not be effectively delivered through the planning process.

At the same time, the Government launched a further consultation to consider the proposed new role of the LLFAs as statutory consultees, and the reduced role of the EA (amongst other issues under consultation). This ended on 29 January 2015.

The Government's response to the first consultation and the second consultation are both lacking in detail, which will have to be addressed if it is to be effective in delivering reduced flood risk to existing development, and risk free development for sites planned to be developed.

From our consideration of the consultations, we are concerned on a number of fronts:

- The proposals do little to address concerns of who will have responsibility to ensure the construction and maintenance of SuDS, or how it will be funded.
- The lack of technical expertise and capacity currently held by local planning authorities to approve and inspect sustainable drainage systems.
- Requirement for SuDS only covers developments of more than 10 properties, when even small developments, especially when aggregated with other developments, can still have a significant impact on those who live downstream if surface water is not sustainably managed. This is true when considering both the individual and cumulative impact of non-major developments.
- The complexity of ownerships and responsibilities between water companies, the Highways Authority, local authorities, the IDB and private

[20] https://consult.defra.gov.uk/water/delivering-sustainable-drainage-systems/supporting_documents/20140912%20SuDS%20consult%20doc%20finalfinal.pdf
[21] Pickles commons statement
[22] http://www.wrse.org.uk/
[23] http://watersensitivecities.org.au/
[24] Green Alliance (2015) Water efficiency and the cost of living: how better water stewardship could reduce water bills.

individuals and whether they will allow others' surface water to flow either across their land or discharge into their systems is not addressed, and continues to form a major obstacle. A duty to co-operate, plus clear statements from Government to confirm the intent of the need to co-operate as contained within the Water Act 2014, is still required.

- National Standards were designed to accompany Schedule 3 of the FWMA. The SAB was to give technical approval, or not, to the SuDS design. Left to the LPA, even with the LLFAs acting as statutory consultees, these standards are just a consideration, not a requirement. The proposed planning based regime is likely to result in a complex and highly variable set of standards for surface water being applied that will vary between planning authorities.
- We strongly supported the idea in the Pitt Review that in new development the automatic right of connection to a sewer should be removed, which as a consequence would force consideration of more sustainable options first in a prescribed sequence. But it now appears that the automatic right of connection to a sewer may not be removed — though again it is not entirely clear.
- The most cost effective use of SuDS comes from early consideration in the design process as part of an integrated approach to enriching the entire urban realm, creating great places, putting water forward as a major opportunity, seeing and using water as a resource and at the same time protecting the environment and people from flood and health risks. All of this can be obtained at less cost than what is now spent in dealing with "problem water" and will help to keep customer bills down. But there is no indication of how an "early consideration" approach is to be promoted by the proposals.

DCLG's statements regarding the need for capacity building within planning authorities is welcomed, as is the consideration of increasing the role of Building Control to inspect site works (although RICS gave evidence that this is largely ineffectual under current arrangements of "self-certification"). However, we await to hear what this actually will mean in practice.

The Commission agrees that if the role of the SAB is to be removed, then the LLFA is the most appropriate body to provide consultation advice, and agree that making them statutory consultees is essential. It mentions the issues of costs, which must be addressed, as the existing budget for LLFAs is currently intended to be reduced by up to 33% overall (averaging 18%) for 2015/16 from the monies allowed in 2014/15. However, it will be the local planning authorities' responsibility to become "intelligent clients" and ensure that development proposals address flooding issues appropriately in their design.

As Paul Shaffer from CIRIA remarked: "Ever since I've been involved in sustainable drainage, maintenance has been an issue, and getting sustainable income for whoever is going to do it has been an issue. But what's happening now with the consultations that came out a month or so ago has opened it up as a whole host of options for maintenance to be had. Within that, though, there is still no certainty as to where funding would be coming from. And in the past, local authorities have been able to undertake maintenance. But I don't think there are any easy answers in terms of the maintenance questions."

3.4 Retrofitting SuDS

While there are challenges around delivering SuDS in new developments, the greatest benefits are likely to arise from retrofitting SuDS, we were repeatedly told. CIRIA said that retrofitting the surface water management measure provides:

- Flexibility in surface water capacity, allowing multifunctional use for long term surface water management.
- A reduced impact of surface water in sewers on the downstream environment.
- Opportunities to adapt to climate change; and opportunities to engage with the public on visible surface water management systems.

Brian Rogers, representing the Institution of Civil Engineers said: "Catchment wide green infrastructure solutions (which many SuDS comprise), especially upstream, offer the opportunity to reduce or delay runoff from catchments. These measures can also provide other benefits such as restoring habitats, enhancing biodiversity, capturing carbon and improving water quality. This type of joined-up, longer term thinking can make a big difference to our flood resilience. But the current funding arrangements for strategic flood management are not appropriate and do not provide the necessary resource to adapt to and mitigate against the long-term risks and uncertainties we face from climate change."

There certainly seem to be few drivers to retrofit SuDS. As the ICE said, catchment wide management would afford the most benefit. But the complicated landscape of organisations involved in water management over a catchment, combined with capital issues and long-term maintenance are difficult hurdles to overcome, and there is no simple answer

3.5 Lack of coherent technical standards

Another recurring theme in our Inquiry has been the lack of consistent technical standards and guidance for coherent flood resilient design.

Representing the Royal Academy of Engineering, Dr David Kelly, of the Centre of Excellence in Sustainable Design, Heriot-Watt University told us: "In order to improve the flood resilience of properties and to ensure that rainwater drainage systems are adapted to future changes in climate, the industry needs Government and policy makers to provide incentives that act as

Why SuDS are so important to local authorities

David Edwards, Flood and Water Manager, Shropshire Council, explained the importance of SuDS and the need for a clear adoption and funding mechanism.

Key to managing future flood risk is the need to ensure that surface water generated by new development is dealt with in an appropriately sustainable manner. Schedule 3 of the Flood and Water Management Act 2010 was to give us and other Unitary/ Upper Tier Councils, as Lead Local Flood Authorities, the tools we needed to successfully implement just this.

This part of the Act provided a real opportunity for both Government and industry to work together to sustainably drain new development. It included a robust and accountable means of maintenance for the future. However, with the apparent U-turn on the implementation of Schedule 3, this will be an opportunity lost. Whilst some detail remained to be resolved, Lead Local Flood Authorities such as Shropshire Council were ready to implement this part of the Act. It would have delivered sustainable surface water drainage for development sites.

The proposals included within Schedule 3 could address precisely the benefits being referred to in this Inquiry. The draft national SuDS standards, together with their supporting guidance and further, local, guidance, really did have the potential to nationally deliver development that is, by definition, more resilient to flooding and climate change. The benefits would have been widespread too, with build and maintenance costs being reduced, reduced future flood damages and an increased sense of community wellbeing through appropriate multi use landscape design.

As it stands now, with the latest consultation on simply amending existing planning regulations, we will at best continue as we are doing now with regard to sustainable drainage on new development. In Shropshire I provide comments, as a consultee, to the LPA on the appropriateness of developer's proposals for the management of surface water on new sites. Whilst there is guidance on how this should be done, left to the planning system, sustainable drainage is merely another element of the balanced decision making process.

Making sustainable drainage a requirement of new development, as was proposed under Schedule 3, was going to change the order of development site layout and design for the better. It could have put sustainable water management at the heart of development rather than simply "hiding rain under the ground as quickly as possible" - the approach we will continue to see without it.

If we are serious about the sustainable management of flood risk as a result of new development, we must have a more robust approach than that which is currently proposed in Defra's new consultation. Schedule 3 of the Flood and Water Management Act would have gone a long way to deliver just this.

The need for catchment wide water management

Julian Jones of Water 21 (a not-for-profit organisation that works with landowners and communities to develop sustainable protection against flood, drought, and public health risks in the community) gave evidence on the need for catchment wide water management. Catchment wide management plans are seen as an essential tool in increasing water resilience in the built environment. The aim of catchment wide plans is to reduce the downstream maximum water height of a flood (the flood peak) or to delay the arrival of the flood peak downstream, increasing the time available to prepare for floods. These aims are achieved by restricting the progress of water through a catchment. This can be done by storing water using and maintaining the capacity of, ponds, ditches, embanked reservoirs, channels or land; and increasing soil infiltration, potentially reducing surface runoff. As well as aiding with flood risk mitigation, such an approach provides a balanced opportunity for addressing water resource pressures, which are important as supply abstractions are to become more constrained in the future at the same time as demand for water will increase. Water 21 devised the UK's first empirical catchment flood planning methodology in 2008, and applied this to a notional 1 in 75 year storm event, finding that this could be stored with land owner agreement several times over within a very steep catchment in Gloucestershire. If an empirical approach were applied to the development of catchment plans, not only flood control, but multiple objectives could be met, ranging from public health, to drought control, and reduced water charges.

What is missing is the overarching catchment planning and facilitation by a favourable regulatory requirement. I suggest that a means to allocate responsibility for managing rainwater according to land ownership and tenure is devised, and appropriate practice facilitated through the structures and the professions, be set in place by the Flood and Water Management Act, to be overseen by the local authorities including public health as an aspect of their normal planning obligations.

This deficit demonstrates the need for a long term strategic view by Government on water supply, as managing our catchments and utilising our surface water more effectively could significantly reduce (or remove) this deficit.

catalysts for change for the methods used to design these systems.

"Current design codes need to be substantially updated to include projected changes in future rainfall and to provide guidance to designers on how best these systems can be designed and adapted for both current and future rainfall variability."

We also received evidence outlining the part Building Regulations and local authority building control could play. For example, the representative body for building control teams in local authorities, LABC told us: "Once identified as an area for development and an area with potential for flooding, it is clear that any construction there should be such that it can offer resilience. This can be achieved by putting appropriate requirements into Part C of the Building Regulations, which already deals with the harmful effects of ground moisture. At the time of publication there were proposals to incorporate suitable measures into Part C. These amendments to the Building Regulations were not implemented."

LABC also pointed out that the recent Government review of Housing Standards[25] suggested ways of linking certain requirements identified at planning stage with ensuring technical compliance using building control, and these are now being implemented. "A similar approach could be adopted for flood resilience where areas identified as requiring special measures would be set out in local plans, and ensuring compliance would be achieved through building control." In the recent consultation on SuDS implementation via the planning system DCLG states it is considering increasing the role of Building Control to inspect site works. However, we wait to hear what this actually will mean in practice.

Again, even were this implemented, while it may further the uptake of SuDS in new development, it would do nothing to drive uptake in existing properties.

Making buildings in areas already prone to floods (or which may become so due to the effects of climate change and urban creep) resilient or resistant to the ingress of water cannot be achieved using Building Regulations unless the owner proposes that significant alterations should be carried out. Where he or she does so then Building Regulations will apply, and the same link with planning suggested above can be applied.

The LABC also argued that where housing in a flood risk area is being extended, the owners should be required to upgrade the existing property as well as ensuring that the extension is fully compliant with flood-resisting measures. This is the concept of "consequential improvements". Though we think this would be an excellent proposal, currently it would be difficult to convince the public and as the LABC concedes, it has advocated these for energy efficient measures, but no Government has yet introduced these.

Our view is that there needs to be greater interconnection between how Government encourages property owners to manage energy and how they manage water. If as much effort was put by Government into supporting property water management as there is for energy, then considerable advances and uptake could be achieved at modest cost.

Water scarcity

Over recent decades England has been affected by a drought every seven years on average. Security of supply has improved through continued investment by water companies. As a result, significant interruptions to public water supply from drought, such as those requiring the use of standpipes, are rare. Restrictions such as hosepipe bans and constraining the level of abstraction are more common. Current levels of abstraction are putting undue stress on the natural environment.

Climate change is likely to alter annual and seasonal rainfall patterns, but the extent and timing of changes remain uncertain. Water companies estimate that without action to prepare, nearly half of water resource zones could be at risk of deficit during a drought by the 2020s due to the combined effect of climate change and population growth. The CCRA suggests that the supply-demand deficit in the 2020s could range from negligible to 3 billion litres per day, with a central estimate of 1.2 billion litres per day (7% of existing supply).

In their latest plans, water companies proposed measures to deal with around 1.4 billion litres of deficit by 2035. Just over half of their effort focussed on measures to improve supply, with the remainder of their effort split between reducing consumer demand or limiting leakage.

From Climate change – is the UK preparing for flooding and water scarcity? Adaptation Sub-Committee Progress Report 2012

3.6 Flood mapping and better data

Figures from the Environment Agency clearly set out the number of properties most at risk of flooding, while a newly published map shows the properties most at risk of flooding from surface water. However, we were told by those giving evidence that the database showing the base data for flooding is limited and potentially misleading, as it is based on invalid assumptions regarding sewer flooding and is not fit for purpose.

The RICS witness Philip Wilbourn also raised the issue of unavailability of Environment Agency flooding data, which if they permitted free access to would provide home owners with more information about risks to their homes and allow professionals to advise homeowners based on the data. Although many Government departments and agencies, including Ordnance Survey, release datasets as "free data" for commercial re-use, the Environment Agency - which has a separate commercial status - has resisted such moves. Normally the agency charges for the use of its data and imposes strict copyright rules, which prevent its reuse.

We are pleased to see it has been announced that this is to change, though it is not entirely clear how much. The Environment Agency is preparing to release a raft of flood mapping data for free commercial use in March[26]. The RICS has subsequently told us: "The chartered surveyor has an important role on consumer protection but the highly restrictive

[25] **https://www.gov.uk/government/consultations/housing-standards-review-technical-consultation**
[26] **http://data.gov.uk/blog/funding-agreed-important-new-open-data-projects**

copyright of the Environment Agency prevents any use of the data for commercial gain. Having this restriction lifted would be of enormous help to the consumer. The devil is in the detail. We wait to see what is being published."

"The situation currently is certainly ludicrous. We are concerned that the consumer is being poorly advised at the moment and that much more work can be done to ensure that they make informed choices when buying their own homes."

However, another concern was the accuracy of data more generally, which has repercussions for spatial planning and the viability of development. Spatial planning is seen as a key aspect of managing flood risk in a number of ways: through general land use planning in determining larger scale land management issues, and land allocations; at the development level, for ensuring that all new build mitigates its own flood risk and any potential downstream impacts; and through regeneration and project based initiatives to retrofit SuDS or plan specific flood alleviation measures.

Witnesses flagged up the need to map out data problems better with surface water and claimed few of the models being used to assess and map this hazard take explicit account of the impact of below-ground drainage systems. The financial squeeze on local authorities makes the most up to date and accurate modelling systems unaffordable.

Will McCann of Arup said: "Every single city and urban area in this country now has a set of surface water hazard maps which are made using quite simplified assumptions about surface water. And when you actually look at them in detail, it shows that they are simplifications and the situation can be rather different. Now that information is used by spatial planners to inform the spatial planning process, to decide where to put housing and decide where the high hazard areas are, so it is important that that process is informed by good information.

"I also think there's a big problem at the moment with local authorities and the Environment Agency trying to develop solutions. Places like Leicester have got river flooding problems, but they've also got substantial surface water problems, and the reason they're struggling is because the two sources of hazard are not equally well understood. And if you're dealing with a flooding problem, you need to make sure you deal with all the sources of the flooding. So we should invest and get to understand this hazard better."

3.7 Insurance issues

One of the most concerning aspects of flood mitigation we considered was insurance - particularly the practice in which insurance claims pay to cover the cost of reinstating the flood-damaged property to its state before flooding, and therefore the restored property is no more protected to stop the same problem from happening again.

The Adaptation Sub-Committee's progress report[27] found that there is considerable scope to cost effectively reduce flood losses by households fitting property-level measures, such as flood gates and air brick covers. It found that the historic pace of fitting such measures would need to increase by a factor of 20 in order to reach and support all the appropriate households by 2035. Yet, we heard from witnesses that, after floods, homes are refurbished without including any additional flood resilient measures, even in high risk areas. Stephen Garvin of BRE showed us how much knowledge there is about how best to do this and how recent advances in technology now make fitting resistance measures much more affordable. In April 2014 the Government introduced a £5000 grant for homeowners whose property had been flooded. The scheme will close at the end of March 2015, but we understand that its uptake has been low[28].

Insurers produce guidance to educate homeowners on increasing resilience of their homes and point out that it will reduce premiums. The ABI says that insurers are willing to undertake repairs that increase resilience as long as they are cost neutral[29]. As one of our witnesses told us: "There is no incentive for insurance companies to build back better once the damage has been done, because there is no guarantee that they're going to get the premiums back over the next few years."

Andrew Wescott of the Institution of Civil Engineers concurred, saying: "You might say to insurers that if they pay for betterment it's going to save the problem next time, but they won't look at that because that householder could change insurer next week.

"Insurers are businesses and what they are trying to do is ensure that the insured get repaired in the shortest time."

The Association of British Insurers told us: "It is worth noting that insurance is based on the principle of indemnity, not betterment. Insurance is there to put people back in the same situation they were in before flooding took place, and not to improve the build of the customer's home. The insurance industry regularly provides information to customers at flood risk about the type of property level protection measures that they may want to consider in which could limit the damage caused by a flood, or reduce the chances of flood water entering the property.

"After a customer's property has flooded, when the repairs are taking place, insurers will often discuss with the customer whether resistant and/or resilient repairs would be appropriate. Sometimes these repairs may not cost more than the normal reinstatement process and if this is the case then insurers are willing to put these measures in place. Ultimately, however, this is the customer's decision, and if the cost of property level protection is more than the standard repair, it will be down to the customer to install and pay for these measures.

"Insurers will always seek to take account of any measures which can be shown to have reduced the flood risk to a property. These will be taken into account when insurers are assessing a property's flood risk, and then setting the price or policy conditions of the insurance.

"We support the broad principle of property level protection measures as they can help reduce the flood damage to a property and could enable the homeowner to return to their home earlier, for example, if a property has water resistant plaster on the internal walls, then the time it takes for a property to dry out may be reduced.

"However, our experience shows that many homeowners are reluctant to install them for a range of reasons — some consider that measures may not be aesthetically pleasing, they may act as a constant reminder of a distressing time of flooding, or they may think that it is a clear indicator that their home has previously flooded and therefore would affect the value of their home in the future."

We find the attitude of insurers deeply defeatist and we would urge an incoming Government to encourage a little more firmly insurers to come up with waysthrough which they could promote and drive resilience in flooded homes.

One mechanism that has the potential to ensure that homes at risk of flooding become more resilient is the introduction of Flood Re. Flood Re was developed after floods in Somerset and the Thames Valley, with Parliament passing the Water Act 2014.

Flood Re is designed to allow insurance companies to charge every home owner £10.75 to raise £180 million each year to be put into a pooled fund to help provide affordable insurance in areas of high flooding risk. Flood Re is only designed to last for 25 years and it is a transitional arrangement to a free market pricing structure for domestic flood insurance. It is expected to be introduced in the summer of 2015 though no firm date has yet been fixed.

Giving evidence to our Inquiry, the RICS was critical of the fact that the scheme will not cover tenants, small businesses and commercial property, and was also

[27] **http://www.theccc.org.uk/publication/climate-change-is-the-uk-preparing-for-flooding-and-water-scarcity-3rd-progressreport**

[28] **http://www.repairandrenewgrant.co.uk/**

[29] **Association of British Insurers A guide to resistant and resilient repair after a flood, Guide to https://www.abi.org.uk/Insurance-and-savings/Topics-and-issues/~/media/0837E8F0B35147D59A92D0A7231A572F.ashx**

concerned about the impact the scheme may have on property prices. "How do valuers properly appraise residential assets where the guarantee of flood insurance cover is a shrinking asset? If the homeowner typically takes on a 25-year mortgage but there is only 15 years left on Flood Re, what then?" asked Philip Wilbourn representing the RICS.

But the Adaptation Sub-Committee on Climate Change pointed out in 2013 after the agreement was reached between Government and the Association of British Insurers to set up Flood Re[30] that without a clear transitionary framework agreed at the outset, there is the risk that difficult decisions to reduce the benefit of Flood Re to high risk households and insurers will be continually postponed by the government of the day. The Committee pointed out that unless Flood Re provided incentives for improving flood resilience it will provide pretty poor value for money.

It has said: "We currently expect the number of households at significant flood risk to increase over the coming decades. Current investment plans are insufficient to counter the combination of deterioration in existing flood defences, sea level rise, and the more frequent and intense rainfall patterns predicted. This remains the case despite the recent recovery in capital investment and the planned increases with inflation through to 2021. Spending on the maintenance of existing defences has been in decline. Unless transition occurs, we can expect more households to become underwritten by Flood Re over time. This would create a growing burden of costs falling on other insurance bill payers. The current impact assessment for the policy does not take account of future climate projections."

In the long-term, the most sustainable and cost-effective way of achieving affordable flood insurance is to reduce the risk of flooding. Flood Re spreads the risk — it will not reduce it unless it is designed to incentivise people to do so.

According to the Environment Agency, each £1 spent on flood defence reduces future damages by an average £8. Each £1 invested in property-level protection typically achieves benefits of £5 or more. Flood Re does not reduce flood losses; it protects some from the costs of flooding at the expense of others. Overall, including the additional "distributional" or "equity" benefits of Flood Re, the policy achieves 70 pence in benefits per £1 of economic cost. This can be improved if Flood Re becomes instrumental in incentivising additional flood risk reduction.

The Adaptation Sub Committee on Climate Change called for a number of measures including:

- The Flood Re administrator[31] could be given a role in law to promote awareness and to share the information it will hold on flood risk with householders, the public authorities, and perhaps the general public in the context of house purchasing decisions. Flood Re offers the potential, for the first time, for a targeted dialogue with the highest risk households in the country.
- Place flood risk reduction at the core of Flood Re's purpose. Rather than solely pay flood claims, households underwritten by Flood Re could be offered and in certain circumstances be required to fit property-level measures or have flood resilient repairs after a flood event. The benefit to Flood Re's finances, and therefore the long-term levy requirement, will be substantial as over time Flood Re's exposure to claims would diminish.

It also says that Flood Re is likely to accumulate significant cash reserves, of which a small proportion could be used to manage down the long-term levy requirement through risk reduction activity.

And the Committee called on the Government to set out, perhaps in legislation, a framework for how the costs and benefits of Flood Re will be phased out over its proposed 20-25 year timeframe. "Without this commitment, important signals to high risk households will be lost, and Flood Re could become a permanent and growing burden on other policyholders," it said.

In a letter to the newly appointed Flood Re chief executive in July, Lord Krebs, the Chairman of the Adaptation Sub-Committee reiterates the Committee's concerns about the scheme. The letter says: "Flood Re offers the opportunity to achieve a step change in household protection and resilience measures over its lifetime. However, the scheme is not currently configured to achieve this." He went on to set out five ways of designing Flood re to promote flood alleviation, reduce costs and improve value for money.

As the Association of British Insurers says: "There is currently no limit to the number of times a property within Flood Re can be flooded and still be covered within the scheme. Flood Re will be reviewed after five years and any changes that are considered necessary will be discussed with and approved by the Secretary of State. However, Flood Re is only designed to be operational for 25 years, and is not the solution to the UK's rising flood threat, which requires Government commitment and spending on long term ambitious solutions."

Our view is that, as it stands, Flood Re is a missed opportunity for driving uptake of resilient repairs after a flood, particularly for those properties subject to repeat flooding.

In addition, the introduction of Flood Re could still leave vulnerable those who cannot afford insurance and we would like to see more done to support the poorest. Local authorities used to do this, but now their funding has been severely reduced they can no longer provide such discretionary funding. We would suggest that Government look at this aspect again and see what more could be done for the least well off, particularly those living in tenanted properties.

[30] http://www.theccc.org.uk/wp-content/uploads/2013/11/ANNEX-to-Letter-to-Rt-Hon-Owen-Paterson-MP-22Nov13.pdf

[31] Letter from Lord Krebs, Chairman of the Adaptation Sub-Committee to Brendan McCafferty, Chief Executive Flood Re, February 2015 http://www.theccc.org.uk/wp-content/uploads/2015/02/2015-02-02-Lord-Krebs-to-Brendan-McCafferty-Flood-Re.pdf

The Association of British Insurers explains Flood Re

The ABI and the Government agreed a Memorandum of Understanding (MoU) in June 2013 on how to develop a not-for-profit scheme - Flood Re – to allow flood insurance to remain widely affordable and available, while allowing a sustainable transition to risk reflective pricing over 25 years. The not-for-profit company – Flood Re – will allow insurers to pass the flood risk element of a home insurance policy into a fund that will pay any subsequent flood claim. It is designed to enable high flood risk households to obtain affordably priced flood insurance.

In face of the rising flood risk, we have estimated that between 300,000 – 500,000 flood-risk UK households would struggle to obtain affordably priced flood insurance without a scheme like Flood Re. It will provide a fund to enable insurers to pass the flood risk element of home insurance (buildings and contents) at a premium that will be capped depending on the property's Council Tax band (see below). Flood Re will not set premium rates. Insurers will pass into Flood Re those high flood risk homes they feel unable to insure themselves..

Separately, all home insurance customers will pay a levy into the fund. This is not an additional amount (on average £10.50 a year on all home insurance policies) as it broadly reflects the existing cross-subsidy between lower and higher flood risks. This levy, along with Flood Re's premium income, will be used to cover the exposure for those high risk homes that insurers pass into Flood Re.

Flood Re is planned to be open for business in the second half of 2015.

Section 4: Concluding remarks and recommendations

Despite an increased focus on flood management, we consider that England is missing an opportunity to put in place a sustainable long-term strategy. The strategy must protect homes against the increased flooding we are likely to see in the wake of climate change and greater urbanisation, while at the same time safeguard against increased water scarcity.

We heard overwhelming evidence calling for a more holistic approach to water management that can balance the impact of increased surface water run-off with what is predicted to be a water shortage caused by drought.

In short, what is required is a fundamental change in how we view flood management, from flood defence where we protect ourselves to one of resilience, living with and making space for water and the opportunity to get "more from less" by seeing all forms of water as providing multiple benefits.

The principles for this were explained by evidence from CIRIA and Arup in terms of "water sensitive urban design" (WSUD), a term and approach developed in Australia that is gaining traction in many countries as a means of managing all aspects of water together with the planning of urban development and regeneration processes for maximum societal benefit[32].

Though this is by no means a new philosophy - and to a certain extent the UK has been working towards it - from the evidence we heard in our Inquiry there are huge challenges still to be overcome to ensure that we have the administrative and physical infrastructure in place to achieve this.

To begin with, we have what has been described as the most disconnected water management system in the world. Too many organisations have responsibility for aspects of water and drainage, and they are under no obligation to co-operate even where it is essential to deliver resilience. Local authorities are primarily in charge of surface water, although the water companies share some responsibilities, and the Environment Agency is responsible for flooding related to coastal areas and rivers, and they do not always work together — even though legislation is in place to enforce a duty to co-operate and the Environment Agency has a duty under the FWMA 2010 to coordinate and overview flooding as a whole.

In addition, the ownership of assets is diffuse. Statutory flood risk management strategies, an obligation introduced under the Flood and Water Management Act, have yet to be introduced by many Lead Local Flood authorities, we were told. In addition, there are many examples, where riparian landowners in proximity to a watercourse do not discharge their maintenance responsibilities. Often, this is due to lack of awareness of the duties, or in the case of covered watercourses, because they are unaware of their existence.

What is more, this fragmented approach is mirrored at a higher political level where, again, there appears to be no Government leadership and no one single department or minister has overall responsibility for a strategy and vision for water management as a whole nor for flooding across all of the domains in which it occurs.

The damaging impact of this schism has been demonstrated recently with the long-running saga of the implementation of Sustainable Drainage Systems, which are seen as essential in catchment wide flood water management. Defra's initially positive approach to SuDS has been increasingly weakened over the last four years by Government's concerns about putting the brakes on house building, culminating in the change of approach to a planning based system through DCLG.; a scheme, which during its consultation saw all the built environment institutions in opposition to the proposals. Many SuDS are called blue-green infrastructure, which mimics natural storage and attenuation processes with features like ponds, swales and wetlands. Though this needs to be in conjunction with hard traditional flood defences we were told it is a more cost effective approach; this is supported by Defra's own cost-benefit assessments, particularly if considered at the outset in spatial planning.

Evidence presented by CIRIA and others to the Inquiry repeatedly demonstrated that SuDS provide many additional benefits to communities over and above simply the control of flood risk, such as enriching the environment and absorbing common pollutants. Traditional piped drainage systems, shown to typically cost more than the equivalent SuDS from Defra's own studies, lack these benefits, only serving to convey surface water runoff rapidly away from where the rain falls

However, SuDS are only practical if there is a robust mechanism for ensuring responsibility for their long term management and guaranteed ongoing funding for maintenance. But establishing a way forward has proved problematic. The Flood and Water Management Act 2010 set out plans for SuDS implementation, maintenance and adoption in Schedule 3 of the Act. However, four years after its introduction, the issue has still not been fully resolved. The neat solution originally put forward was for the setting up of local-authority-backed bodies — SuDS Approval bodies. These would draw up standards and ensure they were enforced and be responsible for long-term maintenance. Instead, Government will drive the implementation of the delivery of SuDS only through encouragement in the normal planning process.

So it is disappointing that there will no longer be a requirement for SuDS Approval bodies, which would have lifted many of the barriers to implementation as they would have put in place arrangements for maintenance.

We understand why the Government should be anxious to avoid applying the brakes to a house building sector which is now seeing the industry recover from its lowest outputs on record. Housing availability and affordability is one of the defining issues of the post-2008 crash in the UK political scene.

Even so, we are worried that the latest proposals will also store up problems for the future by allowing developers to retain the right to connect to public sewers, thus further overloading drains, as well as allowing sites with fewer than ten homes to avoid SuDS measures altogether.

There remains no one responsible body for the adoption and maintenance of SuDS. This will lead to the continuation of confusion, with the effective management of surface water using SuDS gradually becoming the norm only over a lengthy period of time as it is the only affordable way to deal with climate and other societal changes as stated independently by both Ofwat and Defra.

There needs to be a definitive and clear arrangement that compels the major stakeholders to co-operate. The proposed planning based regime is likely to result in a complex and highly variable set of standards for surface water being applied that will vary between planning authorities. Some authorities may "compete" to have developments in their area by diluting the need to manage surface water in the best way, for maximum community benefit. This is potentially a recipe for chaos and as planning authority boundaries do not correspond with drainage catchment boundaries, a recipe for poor control of flooding within catchments.

Going forward all the evidence points to flood risk as getting worse and costing us more. The alternative is paying for insurance based on average annual damages that are up to six times the cost of fixing the problem. How flood defences are to be financed is a very significant challenge. Funding for capital projects and maintenance of assets, both hard and soft, is likely to remain an issue in the foreseeable future. Yet despite these ever increasing challenges flood resilience and water management still remains something of a Cinderella issue at the highest political

[32]Abbott J., et al (2013). Creating water sensitive places – scoping the potential for Water Sensitive Urban Design in the UK. CIRIA publication C724. http://www.ciria.org/Resources/Free_publications/Creating_water_sens1.aspx

level, whereas its importance is no less than that of transport and power infrastructure.

That said, water is an emotive subject because of the misery flooding causes. And we have the spectre at times of management on the hoof, with money going to those communities that shout the loudest — and in the case of the Somerset Levels, with money being spent on media-driven mitigation measures like dredging which experts told us can do more harm than good in the long term.

If we are to properly prepare for what climate change throws at us, we need more of an honest, open debate and engagement with the public, both to educate households and communities into how they can build water resilience into their properties, but also to further understanding and discussion of what level of water exceedance is acceptable, in areas such as roads.

Professionals must play their part too in greater collaboration and knowledge sharing to aid improved communication and integrated water management to create and support multifunctional, multi-beneficial and sustainable places.

Recommendations

We would urge an incoming Government to consider the following proposals as it continues to tackle the potentially devastating impact of flooding which is only likely to worsen in the future in the wake of climate change.

- **Strong leadership:** Government needs to foster clear leadership on water issues and appoint a Cabinet champion to set in train a longer term vision for delivering a co-ordinated long term flood and water management strategy and it must ring-fence funding to do so.
- **Strategic land review:** This new water champion should instigate a review of land use policy, placing water and climate change alongside a range of other emerging priorities for a multi-functional landscape.
- **Public debate:** There needs to be clarity on what level of disruption the country finds acceptable as a result of water exceedance. At the moment there are differing standards around the country.
- **Learning to live with water:** We need a high profile programme to inform and educate the public on the importance of making homes flood resistant and resilient and managing expectations about water and living with it.
- **More cash for maintenance:** There needs to be even stronger emphasis on maintenance funding to ensure that existing flood protection assets are sustained.
- **Retrofitting for resilience:** Government should undertake an investment programme to retrofit towns and cities to make them more resilient, as an additional aspect of their flood defence spending. Seeking synergies through every aspect of regeneration and ongoing maintenance programmes and by working with all relevant stakeholders (highways, water companies) will also make retrofitting more cost effective.
- **Better design standards:** Everywhere in this country is in a water catchment so we need to reduce water runoff from every building, whether new or existing — helped with new Building Regulations for designing for flood resistance and resilience.
- **Using insurance to incentivise resilience:** The insurance industry needs to give thought to how it can incentivise improving flood resilience of properties, rather than simply reinstating structures to inadequate pre-flooding standards.
- **Using Flood Re insurance to promote resilience:** The Flood Re scheme due to be introduced in the summer should be used to drive a step change in households' protection and resilience and we recommend those measures set out by the Sub-Committee on Adaptation to make this happen should be adopted.
- **Considering the most vulnerable:** Government needs to consider how we protect those who cannot afford flood insurance, particularly those living in tenanted properties. Local authorities can no longer provide such discretionary funding.
- **A bigger role for professionals in the built environment:** Promote greater co-ordination of professionals through a new CIC grouping which could act as a sounding board through which to channel flooding policy.

SuDS and maintenance

- We believe the greater uptake of Sustainable Drainage Systems is vital and that the Government is mistaken in not implementing Schedule 3 in the Flood and Water Management Act 2010 and instead relying on the planning system. Schedule 3 would have ensured the use of SuDS on all new developments and set up SuDS Floods Approval Bodies to provide clarity over their management and maintenance and standards.

As a result of this U-turn, Government now needs to resolve as quickly as possible more detailed proposals for:

- **SuDS maintenance:** Ensuring long term management and funding for maintenance, which is absolutely critical if this blue-green infrastructure is not to fail. We suggest that those homes and businesses 'connected' to SuDS could be charged directly for the maintenance like a charge from a water company. The charge could be on local authority rates and what is currently paid to water companies for surface water should be gradually removed as SuDS are installed, unless it is the water companies which provide the SuDS service.
- **Reducing loading on public sewers:** Removing the automatic right to connect rainwater discharge to the public sewers as originally specified under the FWMA 2010. Many of these public sewers, which were built in Victorian times are overloaded.
- **SuDS for all developments:** Ensuring that the limit of 'fewer than 10 houses' for SuDS to be included is changed back to two (to avoid a profusion of planning applications for nine houses). As SuDS have been demonstrated through Defra's own research to be cheaper, particularly where integrated within the scheme from its original masterplanning, the reason for the threshold as 'keeping the regulatory burden on smaller companies at a reasonable level' is erroneous.
- **National standards needed:** Detailing how it can be ensured that SuDS are designed to a set of national standards as part of the basis for new planning guidance.
- **Resolving adoption of SuDS:** Defining a clear procedure and any associated costs for the adoption of sites under the proposed planning-based system, as the lack of such a process has historically been the greatest limitation to the uptake of SuDS.

List of witnesses who gave oral evidence

Stuart Ryder
Landscape Institute

Robert Barker
RIBA

David Edwards
Shropshire County Council

Simon Watkins
Julian Jones (Water 21)
Professor Sue Charlesworth
(Centre for Agroecology
Water and Resilience Coventry University)
Watkins Design Associates

Bronwyn Buntine
Max Tant
Kent County Council

Will McBain
Dr Faye Beaman
Arup

Stephen Garvin
Building Research Establishment

Paul Shaffer
CIRIA

David Schofield
Hydro Consultancy

Espen Østbye-Strøm
Justin Meredith
Floodline Developments

Brian Rodgers
Andrew Wescott
Institution of Civil Engineers

Dr David Kelly
Professor Dorte-Rich Jorgensen
Royal Academy of Engineering's Centre of Excellence in Sustainable Building Design at Herriot Watt University

Philip Wilbourn
Alan Cripps
Royal Institution of Chartered Surveyors

List of all written submissions

Arup

Augean plc

Building Research Establishment

CIRIA

Floodline Developments

Hydro Consultancy

Institution of Civil Engineers

Kent County Council

Local Authority Building Control

Landscape Institute

F P McCann

Robert Mann

The Prince's Foundation

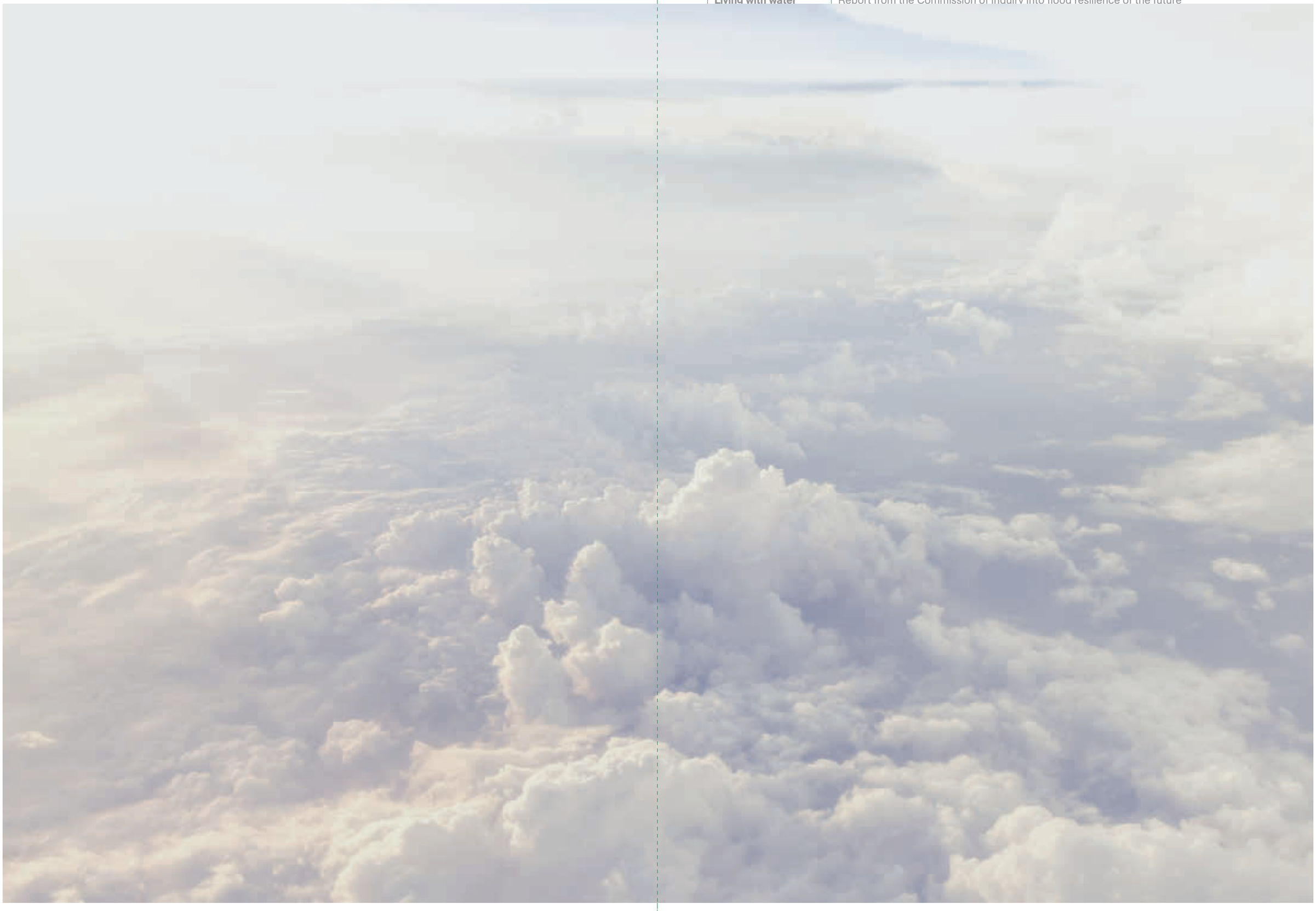
Royal Academy of Engineering Centre of Excellence in Sustainable Building design at Heriot-Watt University

Royal Institute of British Architects

Royal Institution of Chartered Surveyors

Shropshire Council

Watkins Design Associates



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