

Flood plain speaking
3rd edition

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Abstract

The Association of British Insurers' "Statement of Principles" on flood insurance is due to expire in 2013, following which flood insurance in the UK is likely to become harder to obtain for many residents of flood hazard areas.

This report critically examines approaches to the problem of flood insurance which were discussed at the "National" Flood Forum conference on 7th March 2012 - namely, the Oxera approach, the "Noah" project, the Terrorism Pool approach, and the Morpeth model. The report also examines the social justice issues raised by a report for the Joseph Rowntree Foundation (JRF) which was launched at that conference.

This paper also describes three very different solutions used in other countries which could easily be transposed into England. It also suggests an entirely new solution which would meet the social justice principles required by the JRF, but would not require taxpayer or insurer funding.

The paper includes a "Five point plan" under which flood insurance could become much cheaper and more available to all without any contribution from the taxpayer. Three of the points have already been implemented in Scotland where they have been proved to work, but the remaining two are being blocked by the insurance industry itself, despite the fact that they would produce significant extra income for the industry. The problem seems to be a lack of willingness on the part of government or flood insurers based in England to have an open mind or to learn from experiences in other countries.

Should the insurance industry be unable to agree any of these approaches, the author includes a list of options that insurance underwriters can use to underwrite different problem cases. Alternatively, there is a description of 42 ways in which Scotland's flood risk is significantly different from the risk in England in the hope that this may suggest ideas of other ways the authorities in England could approach the problem.

Finally there is a reminder that floods are not just about property. They are primarily about people and there is a section on some of the public health implications of flood events.

Preface to the second edition

The first edition of this paper was prepared in some haste for publication on the website of the Chartered Insurance Institute (CII) prior to the National Flood Forum (NFF) conference on 7th March 2012. As a result, the first edition contained a few misprints and these have now been corrected for this edition. The first edition did not contain any information about the "Noah" initiative as the writer had been informed this was confidential. However, "Noah" was announced at the NFF conference and so it has now been included in this edition.

A few additional points have been added arising from discussions at the conference:

- concern was expressed that drainage systems only have to cope with 30-year return period rainfalls and so the writer has included a mention of a paper on this subject which he co-wrote with drainage experts in Norway;

- some details of the Terrorism Pool have been added following comments from Gavin Shuker MP, the shadow minister for water and waste, that it was being considered under the Labour Party policy review;
- a 42nd difference between England and Scotland has been added; and
- the public health impacts of flood have now been considered in some detail.

Preface to the third edition

The third edition follows the publication of new information about the number of properties at risk of the 100-year flood in Wales, including surface water floods. Table 1 has been updated accordingly. The new figures show that nearly 28% of households in Wales are at risk of flood. Many were flooded in June 2012. Despite this, Carwyn Jones AC/AM, Minister for Environment, Planning and the Countryside, issued circular [CL 09-06](#) on 10 November 2006, to instruct planners to resume allowing new building in flood hazard areas.

It is not known if anyone from the insurance industry responded to this action which appears to have been taken without any consultation. This is another example of the need for the insurance industry to establish an organisation prepared to monitor government actions and lobby for insurance interests.

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Additional disclaimer

Please note that this publication reflects the author's personal views and does not necessarily reflect the views of the Chartered Insurance Institute or any of the above organisations.

Introduction

The insurance costs of the floods of 2007 in England, the most expensive in the world that year from only the 12th wettest English summer since 1766 were over £3bn from 185,000 claims, but insurers dealt with them efficiently ([Pitt: 2009](#)).

Since 1994, almost all the biggest UK flood events have occurred in England and Wales (Midlands (1998), England and Wales widespread (2000 and 2001), Boscastle (2004), Conwy Valley (2004 and 2005), Carlisle (2005), widespread again (2007 and 2008), Morpeth (2008), Birmingham (2009), and Cockermouth (2009) ([Crichton: 2011](#))).

In Scotland, only Moray and the Borders have suffered from major flood damage since 1994, despite the fact that winter rainfall increased by over 50% in the West of Scotland between 1961 and 2004. During 2011 Scotland had its highest rainfall since 1910, but no major floods were recorded.

Sustainable flood management (SFM)

This paper assumes a knowledge of SFM, which is covered by the GCSE in Geography in schools in the UK. A brief introduction is available on the CII website.

Ecology interests

Government legislation throughout Europe now gives priority to EU Directives on water quality, habitats etc. These can conflict with sustainable flood management. For example, the Water Framework Directive prevents the modification of rivers to cope with increased flows due to climate change (except in Scotland) and the Habitats Directive and Birds Directives are used as excuses to avoid the clearance of weeds and silt from watercourses, leading to blockages (except in Scotland).

The European public may find it hard to understand that while there is a legal duty to protect flora and fauna, there are usually only permissive powers to reduce the risks to people, property and infrastructure. Such conflicts should not be necessary. Organisations such as WWF Scotland and RSPB Scotland are to be praised for showing the way forward with their active support for sustainable flood management. Despite the primary purposes of these organisations, even they recognise that people are more important than animals or birds.

Contrast the November 2009 planning guideline for flood issues in the Republic of Ireland. This is an 81-page document, based on English planning guidelines. Insurance is mentioned only once. Banks, the finance sector, mortgages, blight etc are not mentioned at all. There is also no mention of social justice issues or the question of legal liability for injury, loss or damage caused by flooding. On the other hand, "environment" is mentioned 77 times.

In the whole of the EU, it is only in Scotland where the government states that sustainable flood management is more important than ecology.

Social justice

A new paper from the Joseph Rowntree Foundation ([O'Neill and O'Neil: 2012](#)) has highlighted the problems facing low income families and vulnerable people in flood hazard areas.

The report explains some of the options facing the insurance industry and government, and highlights the lack of contents insurance in low-income households. It argues that social justice requires measures aimed at protecting those groups.

According to the ABI, there are currently subsidies to 78% of homes in areas of significant flood risk. In other words, those in low-risk areas are overcharged in order to keep prices lower for most residents in high risk areas. There are fears that what the ABI call "stealth subsidies" may disappear as insurers start to charge a premium based on risk.

The inevitable increases in premiums in high risk areas could result in not only a sizeable swathe of blighted properties, but also very many blighted lives.

The report concludes that a minimal requirement of justice in any new flood insurance regime is that it protects the most vulnerable. More equitable results can be achieved in a number of ways, including for example mandatory cross-subsidisation in the insurance market, government-backed reinsurance, a public natural disaster insurance scheme or direct support for those in most need. There needs to be serious public debate - and quickly - about what the response to this problem should be.

In this writer's opinion, taxpayer funding to enable the most vulnerable members of society to live in the most hazardous areas does seem to be a strange form of "social justice". In the writer's experience of talking to hundreds of flood survivors, it is not compensation that most people want; it is a new home in a safe area. For example, he knows of an elderly lady who literally died from heart failure due to fear after being forced to return to her rented home after it was repaired following a flood.

Suicide rates in flooded areas often soar even when insurance is available. Accurate figures are hard to obtain, but there is anecdotal evidence that at least 12 flood victims jumped off the Humber Bridge after the floods in Hull in the summer of 2007. A new home in a safe area is often a much cheaper

solution than the health care costs of dealing with the trauma suffered by flood survivors or the cost of building ugly and expensive flood defences which impose a maintenance burden on future generations and can often make a flood more dangerous by sudden failure or overtopping.

Partnerships

The Scottish approach has been characterised by a willingness to work with insurers and other key stakeholders to solve problems together. An excellent example is the Flood Liaison and Advice Groups (FLAGs). Between 2000 and 2003, the Association of British Insurers (ABI) was instrumental in helping to establish 19 FLAGs with 28 Scottish local authorities covering more than 90 per cent of the Scottish population.

These FLAGs brought together representatives from the ABI, property developers, landowners, Scottish Water, the British Waterways Board, emergency planners, hydrology consultants, SEPA, Network Rail, the police and fire and rescue services together with land use planners and development control officers for the local authority and neighbouring authorities.

All these representatives would informally resolve flooding issues and in particular make sure that future insurance would be available. Many of them would hold annual public events to tell the public what was happening. All of them published their minutes and talked to community groups.

There is no doubt that this was a very successful initiative from the insurance industry which helped to stop flood plain development in Scotland in its tracks. Of those areas with a flood risk, only Moray refused to establish a FLAG with insurance representation and it continued to develop in the flood plain. Moray now has serious flood problems and many of their residents have difficulties obtaining flood insurance.

FLAGs provided much valuable advice to Scottish planning authorities and helped to spread best practice and catchment-scale policies. While most FLAGs have completed their aim of changing the mindset in Scotland, a number are still meeting because the local planning officers find them so helpful.

None of this happens in England or Wales. A recent [report](#) from Manchester University stated that in England:

- local communities and key stakeholders are ignored when forming local planning policy;
- there is a tendency for flood risk to be assessed and mitigated on a site-by-site basis, inhibiting the potential for strategic mitigation solutions;
- there are difficulties in balancing socio-economic and environmental priorities against flood risk concerns.

Shareholders will expect the prudent insurer to reflect the different approaches in the different countries of the UK.

They should also remember that there are also different approaches between countries of the UK as regards resilience to other perils, such as storm.

The Crichton risk triangle.

The "Crichton Risk Triangle", was designed for use by the insurance industry for catastrophe modelling (see Figure 1). Catastrophe models work on the basis that "risk" is a function of hazard, exposure and vulnerability, and each factor needs to be considered independently. Risk is

represented by the area of an acute-angled triangle. If any one side can be reduced then risk is reduced.

Figure 1. The "Crichton Risk Triangle" (© Crichton, 1999)



Hazard

In the case of flooding, "Hazard" represents the frequency and severity of rainfall events or storms. Climate change predictions indicate an increasing hazard over which society has little immediate control other than to clean watercourses, provide adequate drainage, and adopt natural flood management practices.

Increasingly, European countries are working together to effect these practices. For example, Germany is working with France on the Moselle catchment, and with the Netherlands on the Rhine.

Germany is also working with Scotland on sustainable flood management techniques. In a current EU funded research project, Scotland has been held up as an example to the rest of Europe in work on making cities more resilient. Wales has introduced some sustainable flood management techniques, but apart from a small demonstration project in Ripon, England is not using sustainable flood management at all.

Exposure

This represents the density and value of property located in flood hazard areas such as near rivers, the coast, below dams, or on low lying land, especially at the foot of a slope.

Population growth, migration, and smaller (often single person) households have meant a huge demand for land for development in many countries. In England, new build has reached an average of around 40 dwellings per hectare. In the Thames Gateway floodplain, a density of 200 dwellings per hectare is planned. Climate change and the "heat island" effect of densely populated areas can increase the frequency and severity of localised rainstorms in urban areas, leading to more flash floods.

Vulnerability

This refers to the flood resistance and resilience of the properties insured. A building's vulnerability depends on the design and construction. One answer is simple: to implement more resilient building regulations and standards, based on the latest research into the vulnerability of different materials.

The use of non resilient materials in flood risk areas is not sustainable; it simply leads to more debris for landfill every time there is a flood. Insurers are reluctant to practice resilient reinstatement if it costs more. Builders are often reluctant to reinstate in a non-standard way, even when it takes no

longer and costs no more. For example, employing measures such as putting electrical sockets higher up the wall, fitting plaster board sheets horizontally rather than vertically, etc.

Scotland has primary legislation in place to require resilient reinstatement after a flood or storm so that repairs are carried out to current building standards. This is an excellent way to improve resilience in existing building stock, by concentrating on those most at need - that is, those which have been damaged by flood or storm. This measure has not yet been implemented, but insurers have indicated they would welcome it as, although claims would cost more in the short-term, they would be working on a level playing field and claims should therefore reduce in future.

It is not just buildings; typical household and business premises contents are more valuable and more vulnerable than ever before. Electronic goods, chipboard and melamine furniture are especially at risk, as are foodstuffs. Baby clothes and toys need to be destroyed for health reasons if contaminated by flood water. Contents of single-storey properties, ground floor or basement flats are difficult to move to safety. Resistance measures such as flood-proof doors and windows or demountable defences can reduce damage to contents.

Building regulations in England and Wales do not address the issue of resistance or resilience, meaning that properties and their contents are especially vulnerable.

Exposure and land use planning issues

A growing understanding of engineering and natural systems, combined with a long spell of relatively few UK floods between 1954 and 1990, seems to have made planners more confident that they could use floodplains in ways which would have seemed foolish to previous generations.

With hindsight and a growing awareness of the uncertainty inherent in extreme flooding events, these decisions now appear unwise ([Cook: 2010](#)). Insurers are well aware that the properties at the greatest risk of flooding are often those built during this post-war period. It is only now that there are moves for floodplain restoration in areas such as Berkshire, Conwy Valley, Dorset, and Hampshire.

It is particularly unfortunate that a combination of factors has meant that many older properties which were once safe from flood are now exposed, due to new factors such as:

- changing land practices to increase arable production, including the digging of field drains and construction of embankments to protect fields which used to store flood water;
- covering the flood plain with impermeable roads and buildings thus reducing flood storage;
- overloading sewers and watercourses by new urban development; or
- failing to clean sewers, watercourses, gully pots or culverts clogged by fly-tipping due to the Waste Directive.

[Table 1](#) shows that while new building in flood hazard areas has virtually ceased in Scotland, Wales and Northern Ireland, it has continued in England.

Table 1: River, coastal flood and surface water flood exposure in Britain. 100-year return period for river and surface water flood in England, Wales and Northern Ireland. 200-year return period for Scotland and coastal flood*

(*100-year figure for Scotland is negligible)

These figures do not include properties within the danger zones of dam break risk. Dam break maps started appearing in 2011. There are 680 large reservoirs in Scotland and 2010 in England and

Wales. 69 per cent of large reservoirs in England and Wales are a risk to the public according to the Environment Agency.

Country	No. of households in 2011 (millions)	Population in 2009		Flood exposure in 2011		
		Pop (000)	Pop per sq. km	At-risk households (000)	Proportion of existing properties at risk	Proportion of new build in flood hazard areas
England	22.52	50,016	383	5,200	23.1%	11%
Wales	1.28	2,935	141	357	27.9%	Negligible under 2004 planning policy
Scotland	2.41	5,056	64	109	4.54%	Negligible except in Moray (since 1995)
Northern Ireland	0.83	1,744	124	46	5%	Negligible (since 2006)

Note 1: The Environment Agency suggests that 2.8 million households are at risk of surface water flood in England. Figures for Wales include surface water flooding.

Note 2: It is clear that Wales has by far the biggest problem with flood exposure. Wales stopped allowing flood plain development under a new planning policy issued in 2004. However, Carwyn Jones AC/AM, Minister for Environment, Planning and the Countryside, issued circular [CL 09-06](#) on 10 November 2006, to instruct planners to resume allowing new building in flood hazard areas. Presumably this was following pressure from property developers. It is not yet known what effect this has had or whether planners followed his instructions, as obviously this is not something the Assembly wish to publicise. If you have any information about this matter, please [let the author know](#).

Sources: Office for National Statistics, the Environment Agency, DCLG, the Welsh Assembly, the Scottish Government and the Northern Ireland Rivers Agency.

Planning

Planning decisions in different regions of England have shown considerable variation over the years, but Yorkshire, Humber, East Midlands, and London stand out as having particular disregard for the dangers of flood plain development (see [Table 2](#)).

It has been argued that some of this development is in so called "brownfield" sites, especially in London, but without resilient designs and construction standards this is just as unacceptable to insurers. It is interesting that despite pressures on land, planners in the South East manage to keep

the proportion of floodplain building consistently lower than Yorkshire, which has much more land on high ground away from flood risks.

Table 2: Land use changes. Table P251 published by the Department of Communities and Local Government, 2011

Year	Government Office Regions										Percentage
	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East of England	London	South East	South West	England	
	1989	1	4	11	13	3	7	17	8	7	8
1990	1	4	13	12	2	6	16	7	6	7	
1991	2	3	15	8	5	4	13	5	5	7	
1992	5	3	11	7	4	5	19	6	7	7	
1993	1	4	10	12	4	4	15	6	5	7	
1994	2	4	10	9	4	5	17	6	8	7	
1995	4	3	11	10	3	5	21	6	7	8	
1996	2	2	9	10	4	4	25	5	7	7	
1997	3	2	9	11	4	7	24	6	9	8	
1998	1	3	6	4	4	5	23	7	7	7	
1999	2	3	9	7	4	6	24	7	8	8	
2000	1	5	11	9	2	6	22	7	8	8	
2001	2	5	11	10	3	5	18	7	9	8	
2002	2	4	11	12	3	7	20	6	11	9	
2003	2	5	12	11	2	7	28	7	8	9	
2004	1	3	9	11	4	7	27	6	7	9	
2005	1	5	12	9	3	8	15	6	8	8	
2006	1	4	15	12	4	9	19	8	7	9	
2007	2	6	14	12	5	6	16	5	5	8	
2008	3	2	14	10	4	5	23	5	7	9	
2009	1	3	10	10	3	10	21	9	8	11	
2010 ^p	2	8	11	7	4	4	21	5	7	9	

Notes:

The data in the table above is based on records received from Ordnance Survey up to March 2011. The table is therefore consistent with the Statistical Release published on 29th July 2011. There is a time-lag between land use change occurring and it being recorded, because some changes can take a few years to be recorded, therefore data is constantly being updated. Please see LUCS Guidance 3.2 for more information.

Areas of high risk cover approximately 10% of England. Comparisons between regions are affected by the varying proportions of areas of high flood risk in each region. This flood risk analysis is based on annually updated data sets of digitised boundaries provided by the Environment Agency. They reflect the river and coastal floodplains and provide indicative flood risk areas. They are estimated to be at risk of at least a one-in-100 chance of flooding each year from rivers or areas estimated to have at least a one-in-200 chance of flooding from the sea. These are approximate boundaries and do not take into account any flood defences.

Please see LUCS Guidance 6.2 and .63 for more information.

Contact: 0303 444 2280 / lucs@communities.gsi.gov.uk

[\(LUCS: 2011\)](#)

Flood insurance

Most Scottish local authorities follow elements of the Crichton insurance template (see [Table 3](#)) to avoid the situation of allowing the construction of properties which may become uninsurable and therefore blighted. The Crichton template suggests higher standards for vulnerable people.

Table 3 The Crichton [insurance template](#)

Type of property	Return period (years)	Annual probability (%)
Housing for the disabled or elderly	1,000	0.10
Basements	750	0.15
Ground-floor flats	500	0.20
Touring caravans for seasonal occupancy only	50	2.00
Other	200	0.50

Note: Extracts from the residential property section of the Crichton insurance template showing the levels of risk which may be insurable at normal terms. Higher risks may be accepted with premium loadings, but such risks could become unattractive to insurers under the [Solvency II Directive](#). The Crichton template is not a market agreement, simply mathematics.

By contrast, in England, new developments are still taking place in high-risk areas. It is becoming increasingly difficult to obtain insurance in such areas.

Mortgages are not granted without insurance so prospective owner occupiers are forced to seek properties in safer areas. This has not stopped developments in high risk areas; it simply means that property developers have tended to build for customers who do not need mortgages. For example:

- **Single-storey houses** for elderly people who have retired and decided to downsize and sell their existing homes when their mortgage has matured. They buy a home with the proceeds and use the remainder to supplement their pensions. This is especially common in seaside resorts. For example, most of the bungalows and static caravans flooded in Towyn in 1993 were occupied by people who had retired from Liverpool. They had no mortgages and as a consequence were not required to have insurance.
- **Social housing** for sale to housing associations for rental to low income families, especially single parent families with young children.
- **Sheltered housing and nursing homes** for the elderly and infirm.
- **Orphanages, children's homes and homes for the disabled.** To make matters worse, in England the Disability Discrimination Act requires houses to have no doorsteps and to have ground floor toilets, even in flood risk areas, thus making them much more vulnerable to flooding and sewage backup. In Scotland, building regulations require special resilience and resistance measures in flood hazard areas in such a way that disabled people are still catered for. This of course begs the question of why society causes disabled people to live in high-risk areas in the first place.
- **Schools and hospitals.** An unpublished insurance survey revealed that at least 89 hospitals in England are at a high risk of flooding and 70% of them have no flood defences. There are

also 2,374 schools at high risk in England. During the tsunami in Japan in 2011, patients in intensive care in hospital were simply left to die as there was no time to evacuate them safely.

The effect is that while these vulnerable people get special protection from the Crichton template in Scotland, in England they are precisely the people most likely to be forced to live in the most hazardous areas.

Looming deadlines

For the last 50 years, the insurance industry has bowed to government pressure to keep rates low in flood-risk areas. This has meant that policy-holders in safer areas have been overcharged for many years in order to subsidise those in high-risk areas.

This is becoming unsustainable. For example, some of the cleverer insurers have realised that they can easily undercut the premiums in low-risk areas such as Scotland. People living in high flood hazard areas may find the availability and affordability of flood insurance affected not only by the erosion of the subsidy, but also by the following three looming deadlines:

1 July 2013

Currently, those living in many flood hazard areas are protected by an understanding between the Government and the insurance industry (other than Lloyds) that flood insurance will continue to be available in all cases where the property was built before 1 January 2009, provided the flood hazard does not exceed the 75-year return period (1.3% cent annual probability), or in higher hazard areas where flood defences are planned to be in place within five years.

Insurers have announced that this understanding will expire on 30 June 2013 and will not be renewed. In the long run this will be a good move, because flood insurance provides economic penalties to discourage building in flood hazard areas. As such it has an important role in sustainable flood management policies. However, in the short term withdrawal of insurance cover is likely to lead to blight and a fall in property values.

22 December 2013

Under the [EU Flood Directive](#), by 22 December 2013 flood maps must be published showing areas at risk of a 100-year return period flood from rivers or coasts. In Scotland, these maps include surface water, groundwater and drainage or sewage flood risks. The first drafts of these maps have already been published.

31 December 2013

Insurers are preparing for the EU's [Solvency II Directive](#) which is due to apply to all 5,200 large insurance and re-insurance firms in Europe from 1 January 2014 (although this may be postponed for a year to accommodate French insurers who are not ready.)

Among other things, regulations will require insurers and re-insurers to calculate all risks they face up to the 200-year return period event in order to calculate their solvency capital requirement. The more insurers can remove flood risks with a higher risk than the Crichton insurance template from their books, the less capital will have to be reserved and the less their re-insurance will cost. Insurers will probably prefer such risks to "go away" owing to high premiums than to have to decline renewal.

It was only in 2007 that a generally applying legal definition of "flood" emerged for the first time, enabling insurers to apply flood excesses or even to exclude flood cover altogether ([Board of Trustees of the Tate Gallery v Duffy Construction Ltd \[2007\]](#)). Although insurers have not generally used their new-found ability to exclude flood cover (and it would probably not be allowed by the

insurance regulator anyway), pricing and excess increases will be enough on their own to have serious effects on insurance rationing. Consequent mortgage rationing will cause house prices to fall quickly and permanently in flood hazard areas.

The last 50 years have been characterised by commitments made by insurers in return for "requests" to the government to control floodplain development and increase spending on flood defences. All that has happened in England is that floodplain development has become easier by a succession of planning policies and spending on flood defences has been reduced. Localism will add a further spurt to flood plain development and the recession will further erode spending on flood defences.

Republic of Ireland

To see what is likely to happen after 2013, one only has to look at the Republic of Ireland. The insurance market there has never been distorted by any Statement of Principles. The market penetration of flood insurance in Ireland is much higher than in England. The Irish government has slavishly followed English planning guidelines which is to say, they allow virtually unrestricted development in the flood plain.

Irish insurers have benefitted from the fact that there is no postcode system in Ireland outside Dublin so they use a much higher resolution geo referencing system instead. Irish geographic information systems are much more sophisticated than in England and they can rate properties by grid reference.

The result is "blue-lining" of areas where it is simply not possible to obtain flood insurance. These areas have been blighted thanks to the actions of planning authorities and eventually will be abandoned by residents and businesses. Ultimately the abandoned properties will fall down, thus returning the flood plain to nature.

What will happen in England?

The expiry of the Statement of Principles should have little effect in Scotland or Northern Ireland. It could, however, have serious impacts in England where widespread "blue-lining" is increasingly likely. From one point of view, this would be a good thing in that, in the long-term, flood plains would be restored and fewer people would suffer from flooding.

In the short term, there are serious transitional issues. Various options have been suggested:

The Oxera approach

The economic consultants Oxera were commissioned by the Association of British Insurers (ABI) to advise on a solution to the problem of insurance in high-risk areas. They reported to the ABI in September 2011, but at the time of writing the report has not yet been published and is still confidential. However, the ABI has made a [presentation](#) based on this report.

Oxera's proposed solution is a high-risk pool, to which all ABI members would have access and which would underwrite the flood element of a household policy at a subsidised premium. Subsidies would come from government, consumers, and the insurance industry and would be transparent. It suggests a flat rate on the sum insured regardless of the flood risk so that high-value properties would receive more subsidy than low-value properties.

In other words (although this is not stated) this would discriminate against vulnerable low-income policyholders. The advantage for ABI members (although, again, this is not stated) is that major composite insurers with a large book of legacy business in flood hazard areas could shed the tainted part of the risk and retain the profitable part with all of its opportunities for cross-selling motor and life and other products.

Defra's response was to reject the possibility of a government subsidy which leaves the model dependent on continuing subsidies from low risk policyholders.

The Morpeth model

Morpeth is a town which was badly flooded in 2008. The flood defences in the centre of town did not help, and if anything made the floods worse by stopping the water and sewage from draining back into the river.

Morpeth residents participated in a survey into the effect of the floods on their insurance costs and found that the average increase in insurance was over 70%.

The Morpeth Flood Action Group, Morpeth Town Council, and Morpeth Chamber of Trade have subsequently worked on developing a [solution](#) and this was completed in November 2011.

The original Morpeth model, published in August 2010, was that all flood claims would be paid by a flood pool. This contrasts with the Oxera model where the pool is exclusively for high-risk properties. The original Morpeth Model envisaged a community flood levy on all household policies.

However, the authors changed their minds about their model because it did not reflect the risk and there was no financial incentive to reduce risk and no scope for insurers to compete to provide the best terms.

The revised Morpeth Model retains the idea of some form of pooling, but differs from the Oxera model in a number of ways. First they offer some comments on the Oxera model as follows:

- *Whilst low-risk policies are administered by the insurance company, it is not clear who takes on the high risk policies. If they are to be administered by a separate entity employed by the pool the costs incurred by that entity could reduce the value of the savings that might otherwise be made.*
- *Because the threshold is based on cost of reinstatement with no reference to the ability of households to pay, properties could be ceded to the pool purely because of their size and not because of flood risk. This could mean that higher earning households would receive more of a subsidy than those less able to pay.*
- *There is no explanation of where the subsidy would come from. Government is not likely to provide it. The subsidy will therefore have to be raised from within the industry.*
- *Although a competitive market is retained there could still be an element of cherry-picking by some insurance companies as they attempt to reduce premium assessment costs. That could impact on the cost of the risk assessed premium ceded to the pool.*
- *If those administering the pool decide to employ their own risk assessors there will be additional costs.*
- *There is a danger that the model could create a two tier market that is not equitable.*
- *The insurance industry is failing to share the exposure to claims from properties at high risk of flooding.*

These are all sensible comments.

The Morpeth Model basically involves a continued subsidy from low-risk properties to high-risk properties, but the subsidy would be more transparent and would be based on the Council Tax Band of the property.

This would be more equitable for low income families, but would enable property developers to continue to develop in flood plains and sell their developments to private buyers and not just to institutional buyers. So this is likely to be supported by property developers and the big composite insurers and the ABI. It would reduce the possibilities of blight and effectively prevent floodplain restoration. It still envisages some short-term Government support until the pool is funded.

The authors of the Morpeth Model draw favourable attention to the Scottish FLAGS system and recommend that a similar system be introduced in England and Wales. They also suggest that while developers would still be allowed to build in the floodplain they should be required to pay a bond into the pool to cover possible future flood damage and consider this would "encourage robust and sustainable design."

Unfortunately, of course there is no guarantee that developers would be willing to pay an adequate bond without compulsion, knowing that if there is a flood they are immune from legal action for damages. Far less is there any chance that they will implement "robust and sustainable design" without the compulsion of resilient building regulations.

Project NOAH

This is a solution proposed by the insurance and reinsurance brokers Marsh and Guy Carpenter, both part of the Marsh & McLennan group of companies, working with Landmark, an insurance information company and RMS, a catastrophe modelling company linked to Landmark.

This solution would allow insurers to pass on the peak flood risk for their entire portfolio to Noah under a quota share agreement to cover their retention under their reinsurance treaties. The insurer would retain a small proportion - say, 10%. Noah would price the risks based on the nature of that insurer's portfolio using specialist underwriters and information systems. Insurers could then pass on these costs to some or all of their customers in whichever way they wished.

This solution allows the insurers to keep their customers and cross-sell other products to them such as motor or life business. It is currently being tested with a selection of insurers with a view to launching in summer 2012.

Noah claims that it has created a model to determine the technical risk for every property in the UK using the RMS model and property data from Landmark, and that its specialist flood underwriters would have access to information available on flood risk and would price the business accordingly to the direct insurer. The pricing could reflect risk reduction measures taken by the policyholder.

The insurer would benefit from a reduced solvency capital requirement under the Solvency II Directive and the customer would benefit from continuity of cover and the ability to shop around for the best deal, depending on how the direct insurer apportions premium costs around its portfolio.

A major composite with a lot of legacy business in the flood plain might continue the subsidies from low-risk properties to cover the premiums for high-risk cases. A newer insurer such as esure or Halifax, holding little high-risk business but with better knowledge of the differences between Scotland and England would have the opportunity to do away with subsidies in order to cherry-pick low-risk cases.

Noah therefore has many attractions:

- The major composite with considerable legacy business in flood hazard areas may be able to underwrite the flood risk more cheaply by passing the risk to Noah. In any event, they can make savings on the Solvency II Directive and retain business in flood hazard areas for cross-selling.

- The newer insurer who has been careful to avoid flood hazard areas can get a cheap quote from Noah for any flood risks it has inadvertently picked up. Its costs will still be low and this will enable it to continue to cherry-pick business in low-hazard areas. Alternatively, it will be able to start actively writing business in flood hazard areas knowing that it can cede the flood risk to Noah.

Noah has indicated that it will also be prepared to model the flood risk costs in areas of social deprivation in order to provide an indication to government of the extent of subsidy needed to offer affordable insurance for low income households.

The Terrorism Pool solution

At the time of writing, this is the solution being considered by the Labour Party in Parliament for their next policy review, so it is worth looking at it in some depth.

Pool Reinsurance Co. Ltd was established in the UK in 1993 in response to the terrorist explosion in St Mary Axe in London at the Commercial Union insurance head office. From 1993 to 2001, there were ten major terrorist incidents in the UK, the biggest being the Manchester Arndale centre in 1996 and the Warrington bomb in 1993.

July 2005 saw the London Transport explosions with over 50 killed. There was an attack on Glasgow Airport in 2007. The current security level in the UK is "Severe" which means that intelligence suggests another attack is "highly likely".

Following the 1992 bomb, the insurance industry found that it could not continue to underwrite terrorism and threatened to withdraw cover. This prompted the UK government to agree to play a role in an industry-led solution.

Since the pool was established in 1993, total claims paid amount to over £600m. Current premiums total £300m per annum.

Pool Reinsurance Co Ltd is a private mutual insurance company. Its solvency is (in effect) guaranteed by HM Government and it is owned by member insurance companies.

Pool Re only writes commercial property and business interruption risks. It does not cover personal insurances or liability insurance. It may cover residential property, provided this is owned by a commercial business. It only covers property in Great Britain. There is a separate government compensation scheme for Northern Ireland.

Members agree to always offer a quote for terrorism cover where requested. The retrocession cover with government is unlimited but any monies drawn must be paid back out of future premiums. Any properly authorised insurer can become a member.

The terrorism cover must be linked with a general property insurance cover with the same terms, limits and conditions.

A no adverse selection principle applies. That is, members have to cede all their terrorism risks and policyholders have to cover all of their properties for terrorism or none of them. This is to ensure that the book of business is diversified, with adequate premium volume.

Definition of "terrorism"

Terrorism is defined as an activity directed towards the overthrowing or influencing of government using force. "Influencing of government" makes this a wide definition which could include ideological terrorism against civilians, providing the organisation has the influence of government as an aim.

Insurers use a similar definition to exclude terrorism so there is unlikely to be a problem of an event "falling between two stools". According to Atkins, in practice the main issue arising from the definition is the question of where an insurer goes to seek recovery following an event rather than whether the insured has cover under the policy.

Exclusions:

- war and related causes;
- damage by computer viruses, hacking and other cyber crime;
- there is no exclusion of chemical, biological or nuclear attack;

Loss settlement

The primary insurer pays the claim and then, following a certification process makes a recovery from Pool Re.

Underwriting issues

Terrorism risk has a number of features:

- deliberate act on the part of the terrorist;
- frequency can be influenced by political and social issues;
- motivation of perpetrators can be complex and is often not driven by money;
- impossible to predict frequency or severity;
- the risk is constantly evolving;
- a terrorist campaign could result in multiple attacks;
- clear catastrophe potential.

Could a Pool Re type solution work for UK flood insurance?

Prior to 2007, a Pool Re type solution for UK flood insurance would not have been possible because there was not a clear legal definition of the word "flood". This changed with the EU Flood Directive and the Tate Gallery court case.

A Pool Re solution works for terrorism, but flood risks are very different. While a flood could happen anywhere, there are some areas where the hazard is much greater; for example, low-lying areas near rivers or the sea, or in areas where watercourses and drains are inadequate or not properly cleaned or maintained. These areas can be identified objectively and hazard calculations made.

However, a flood pool could operate on similar lines to the Terrorist Pool. A private mutual insurance company owned by its members would be obliged to consider underwriting the flood claims from any policy issued by a member, but would be free to charge whatever premium was appropriate. Unlike the terrorism pool, in some cases the flood risk would be so high that it might have to reserve the right to decline cover for particular areas unless flood resilient construction has been used - for example, building on stilts, or floating houses.

The flood pool insurer would need to invest in or take over ownership of whatever flood risk databases have been created by member insurers so that its expertise is at least equal to and ideally

greater than any one member. Ideally it would benefit from an agreement with government to act as insurer of last resort.

Flood risks could be underwritten either on a primary, or on an excess of loss basis and this might have to be decided at the outset and apply to all flood risks. It would also have to be decided whether to include private residential property risks owned by individuals.

Would such a solution be of benefit to insurers and the public?

Much will depend on the point of view...

The insurance industry as a whole

Pro:

- By concentrating the risk and the expertise in one company, that company would have the resources and the expertise to act as an influential and powerful lobbyist to persuade government to tighten up land use planning policy and building regulations. It would have the power to stand up against opposing interest groups such as property developers and land owners, and could work in partnership with NGOs such as the "National" Flood Forum and WWF.
- It could send insurance industry representatives to attend meetings with local planning authorities (as used to happen in Scotland) to influence their decisions on particular developments and flood defence schemes and speak authoritatively on flood insurance issues.
- It could commission research into flood and flood risk management.
- During and after a flood event, it could commission airborne and satellite based surveys of the extent of the flood, to assist with future mapping and with claims validation, and to reassure the stock market about the extent of possible losses.
- It could organise claims management on a more rational basis by allocating whole streets to each loss adjusting company to make claims management more efficient and improve customer service.
- It could provide training for loss adjusters in handling flood claims.
- It could introduce the flood and storm event reporting (FASTER) system to streamline claims handling and data collection and to identify potential fraudulent claims.
- It could take over the sponsorship of the National Flood Insurance Claims Database in order to carry out sophisticated modelling and claims validation.
- It could negotiate cheaper flood reinsurance terms than any single insurer.
- It could spread best practice from other countries.
- It could negotiate with architects and property developers to provide more resilient buildings; for example, building on stilts or using the ground floor for car parking, installing flood proof doors, windows, walls and airbricks, fitting non return valves on drainage etc. It could introduce an approvals scheme which would allow insurance to be offered on buildings in high-hazard areas provided they are built to the flood pool standards. There is a precedent for this in the Blue Book system used in Australia.

- Even in a Pool Re type scenario it is not appropriate for the industry to use policyholder premiums to pay for flood risk management schemes which benefit insured and uninsured equally. However in the context of flood research, it could fund demonstration projects on natural flood management and resilient reinstatement methods to help lead the way to a more sustainable flood risk management policy on the part of government.

Con:

- It would be expensive to set up, not only buying in data, but also expertise including hydrologists and mapping experts.
- Larger insurers which have already invested in flood risk expertise might feel that they are losing competitive advantage and barriers to entry.

The public

Pro: would enable flood insurance to still be available, but at a price which is likely to be very high.

Con: the public would no longer be able to shop around for a cheaper quote for flood cover and such a pool might be considered to breach competition legislation.

Small insurers

Pro:

- would enable them to clear flood hazard policies off the balance sheet without incurring public relations problems
- would reduce the need to invest in flood maps and geographic information systems;
- would enable them to write otherwise profitable business in high flood hazard areas currently avoided by them.

Con: might be expected to share the losses of the pool depending on how it is set up.

Large insurers

Pro: would enable them to solve the issues of accumulated legacy business in high flood-hazard areas in readiness for Solvency II.

Con:

Such insurers are likely to have large investments in high resolution flood maps and geographic information systems to identify flood risks at individual address level. They are likely to see four advantages from these systems:

- they create barriers to entry for new insurers without such data
- they offer competitive advantage in that the insurer can underwrite flood risks more accurately.
- they enable better reinsurance rates than competitors.
- they enable the insurer to write otherwise profitable business in high flood-hazard areas which are currently avoided by the rest of the market.

Large insurers might then see joining a pool solution as giving up their current advantages.

Mortgage lenders

At present, to satisfy the requirements of mortgage lenders where the property is used as security, it must have insurance cover which includes the flood risk. If an excess applies it must not exceed £2,500. Many insurance policies now have flood excesses greater than this amount, and an increasing number exclude flood altogether.

Summary so far

There are four possible approaches on the table:

1. Oxera suggest a solution that suits the major composite insurers who dominate the ABI. Namely: a pool to take away the toxic flood risks from those insurers' books, leaving them with the profitable parts of their accounts which they can then milk for cross-selling other products. Whitehall is unwilling to pay subsidies, so where will the money come from?
2. Morpeth suggest a well thought-out approach. They recognise that the Government would not subsidise high-risk cases and recommend that the community do so on the basis of council tax band. Would local communities be happy with yet more taxation to help a minority who have chosen to live in nice places like Morpeth?
3. The Noah Project is a variation on the Oxera approach but the ABI has refused to support it, claiming it will not fulfill its aims of maintaining affordable flood cover. It is, however, supported by the British Insurance Brokers' Association (BIBA).
4. The Terrorism Pool approach. The Government would collect a premium from a high-risk flood insurance pool and would pay out to the pool in the event of a major loss. In other words, the Government would act as a reinsurer of last resort. The scheme works well for terrorism where the losses are very uncertain and could be substantial. It is less likely to work well for flood, where specialist underwriting would be required to properly assess the risks.

Some alternatives

The writer would like to mention some alternatives which might be considered.

Alternative 1: a variation on the Australian solution

Australian insurers solved the problem of high levels of damage claims from storms. They were frustrated that government refused to implement resilient building standards which were effectively set by property developers to keep costs low.

As a result, the insurance industry produced their own building standards called the Blue Book. They worked with banks to ensure that property owners would not be able to get affordable insurance or mortgages unless their property was constructed according to the Blue Book.

The Government continued to spend money on maintaining their inadequate building standards, but builders soon learned to ignore them and use the blue book instead for all new build and repair. It took a few years, but now the buildings in Australia are much more resilient against storms and hurricanes. However, the land use planning systems in Australia still leave much to be desired.

There is no reason why insurers and mortgage lenders in the UK could not follow Australia's example. They do not even have to write their own blue book. All they need to do is say that they will not insure or issue mortgages to any new property that does not comply with Scottish building standards or with the Crichton insurance template.

As an interim measure, they could maintain subsidies as before, but should note that it will be increasingly hard to collect a disproportionate share of subsidies from policyholders in Scotland, Wales and Northern Ireland where flood plain development no longer happens.

Alternative 2: the Ontario solution

If a problem has been allowed to build up, then a solution that is initially more expensive for the taxpayer but is also more sustainable and compassionate than the first option is to correct the errors of the past by providing funding to enable people to move away to a safer area.

This policy has already been introduced in Moray in Scotland where, for many homes, it was found to be much cheaper than building flood defences. Generally this solution would be cheaper in Scotland where fewer properties are at risk.

For insurers it could work in the same way as the "total loss" clause in motor insurance. This usually states that where a car is so badly damaged in the first year that repairs would cost more than 60% of the value, it will be replaced with a brand new car. A special clause on a household buildings policy could state that if the flood damage was such that repair costs would exceed a percentage of the market value of the property as agreed at each renewal, the insurer could simply pay the market value and take possession of the building. The insurer could then demolish the building and replace it with a building on stilts or wheels or leave the site open as recreational space to provide flood storage.

The best examples of such "buy out and relocate" schemes are those which operate in Ontario, Canada and North Dakota, USA. Under these schemes, the state buys the property at market price and demolishes it, returning the land to parkland for recreation. In Ontario, property owners in flood hazard areas are not allowed to sell their property to anyone other than the state.

In North Dakota, evacuated properties are often bulldozed to prevent the residents moving back in. The photograph below was taken by the writer from a bridge over the Thames River in the centre of London (Ontario). On the left bank is the old fashioned solution of flood walls which make the river look ugly, and unnatural. The walls have been left to protect a baseball court (you can see the floodlights in the photograph) but are not maintained. On the right bank is the sustainable flood management solution, where all the properties have been bought by the state at market value and then demolished.

Image 1: The Thames River in the centre of London, Ontario



(Copyright Crichton: 2001.)

This has been the policy since 1964 and London now has an attractive riverside parkland right through the centre of the city, providing recreation and breathing space for the citizens. The flood walls on the left bank will be allowed to collapse eventually. This is surely a better solution than using taxes to enable people to continue to live in a high risk area?

Alternative 3: the Scottish Solution

Persuade planners to refuse planning permission in flood hazard areas especially for vulnerable uses in line with the Crichton insurance template shown in [Table 3](#). This has been the case in Scotland since 1995, and this firm approach has meant that developers have by now sold almost all their land banks in high-risk areas (other than Moray) and accept that they will never get permission to build there.

Developers have accepted the position with good grace because they recognise that almost every local planning authority follows the same template so they are working on a level playing field and developers cannot play one authority off against another (they did try this at first).

They also realise that if the planners give consent and there is a flood, it is not just the planners, but also architects and developers who could be subject to litigation to pay the costs of any flood damage and to pay compensation for the distress caused. They cannot be sued for such damage in England.

If it is to be introduced in England, the Scottish solution requires a sea change in the culture, legal system, planning policies etc. Scottish culture is perhaps less preoccupied with helping property developers make profits. However, some of the 42 differences outlined in [Table 7](#) may be transferable to England.

To sum up the alternatives:

- The Australian approach would only work well if all insurers and mortgage lenders could be persuaded to work together and adopt a common stance to the issue of insurance and mortgages. This is unlikely, and besides it would only assist in making new and repaired properties more resilient. The problem is too urgent to rely on the Australian solution alone. Nevertheless there is much to be said for trying it for the benefit of future generations.
- The Ontario solution is the only truly sustainable policy, given the extent of flood plain development which has already taken place. It is however the least likely to be selected.
- The Scottish approach is cheap and very effective. There are many ways in which the Scottish flood risk is lower than in England and 42 are listed in table 7. Perhaps one or two of them could be copied in England some day? In the meantime it would seem grossly unjust to expect Scottish residents to continue to subsidise property developers in England.

So, having pointed out the problems with each of these solutions, can this author suggest a more practical solution? Yes he can.

The Crichton solution

The first priority of any solution is surely to solve the pressing and urgent problem of social justice as explained by the excellent Joseph Rowntree Foundation report. The only problem is how to pay for it and how to prevent cheap flood insurance encouraging property developers to continue to build in the floodplain.

The issue of civil litigation has received a lot of attention recently owing to its growing cost. Lord Justice Jackson carried out a full scale [review](#) into this cost in 2010. Lord Young also carried out a [review](#) of health and safety legislation. These reviews tried to get a better balance between access to justice and burdens on business.

In announcing the results of the Young Review, Lord Young commented that health and safety rules had become a "joke" and were responsible for endless form filling and bureaucracy. Yet when it comes to those responsible for placing vulnerable people in homes which are at a serious risk of flooding, they seem to get away with it entirely. They cannot be sued in England or Wales.

In environmental risks, there is a well established principle; "the polluter pays". When it comes to flood, one should remember Gilbert White's words: "Floods are 'acts of God', but flood losses are largely acts of man" ([White: 1942](#)). Those responsible for flood losses are clearly the planning officers and committees, the hydrology consultants, the property developers and the architects; in other words, the experts people rely on to take reasonable care to avoid damage or injury.

Insurers and communities should work and lobby for the following changes:

- Change the law in England and Wales to make these "experts" legally liable when they get it wrong and people are flooded. This might not be so hard as it sounds. The law was only changed in the Ryeford Homes case in 1989 when developers and planners were given legal immunity thanks to the efforts of clever counsel ([Ryeford Homes Ltd v Sevenoaks District Council \[1989\]](#)). Before that, planners were liable ([Hedley Byrne v Heller 1963](#)).
- Surprisingly, the ABI has not expressed any interest in this approach. If the ABI is unconcerned about this, perhaps Lloyds and individual insurers could get together and try to change the law back again or even persuade Parliament to introduce legislation similar to Scots Law? Alternatively, perhaps some enterprising solicitor might fund a test case on a "no win no fee" basis. It would be well worth taking a few class actions to court to try to change the legal principles because then insurers could start to recover the billions of pounds that flood claims cost from the people responsible for causing the flood losses. Perhaps this might change the behaviour of developers and planners - it certainly did in Scotland - and it would also provide an input of funds to reduce insurers' claims costs. Insurers would then be more inclined to charge lower premiums. Courts might even be prepared to grant punitive damages which could be used to contribute to a fund to subsidise insurance premiums for low income families. Such a change in the law could also help owners of very old properties which have just started to flood in recent years due to development upstream.
- Many thousands of people in the UK are vulnerable to the risks of dam break, and while the law does make reservoir owners liable in such cases, so many homes could be flooded that most reservoir owners would not be able to afford to pay compensation to everyone. The Scottish Parliament recognised this and recommended that reservoir owners should be subject to compulsory public liability insurance to prevent the homes in dam-break danger zones from being blighted. For some inexplicable reason the ABI objected to this move. This short sightedness will result in a growing number of homes becoming uninsurable as dam break maps start to be published.
- Until 2011, dam break inundation maps in England have always been secret so that people were building in danger zones without being aware of the risks. In England alone 1,386 large reservoirs have people living in the danger zones immediately below the dam wall. The total figures are still secret, but on a conservative estimate, if there are on average only 1,000 homes at risk below each dam, that represents over a million additional households at risk. In one case, a 300-year-old dam has 40,000 people living in the direct path of a dam break inundation. The walls of that reservoir are cracking and subsiding due to general subsidence

from coal mining. When movement detectors showed the embankments slipping the owner simply ordered them to be disconnected. While most major corporate reservoir owners will have cover, it may not be adequate, and many other owners will have no cover at all. It would be prudent to assume that there will be no guarantee of recoveries of flood losses from reservoir owners.

- Stop sending planning gain money from the local communities in England and Wales to disappear into the Treasury in London. When the new legislation on planning gain was out to [consultation](#), this writer suggested that planning gain money stay in the local community for the common benefit of all, as in Scotland, but he was the only person from the insurance industry to respond to the consultation and his request was refused. If the ABI had responded as well and had taken a firm approach with government, perhaps there might have been a different result.

With these income streams, the [Rowntree approach](#) starts to look feasible and equitable. A change in the law would at a stroke remove both of the problems with the Rowntree solution and be fairer to everyone. Funding would be available to help reduce flood insurance premiums for all, not just low income families. Not only that but it would be paid for by the people who profit from putting vulnerable residents in high risk locations in the first place and this would discourage the practice in future. The subsidy fund could also make discretionary grants to support insurance with rent schemes or to provide funds for hardship cases.

It does mean that planners employed by local authorities in England and Wales would need to make additional claims on their officials' indemnity professional liability policies. Irresponsible local authorities would see their officials' indemnity premiums increase and this in turn would impact on local council taxes.

At the end of the day, the local council taxpayer would fund the liabilities as envisaged under the [Morpeth solution](#). The public would pay extra flood tax according to the both the rateable value of their properties and the extent of irresponsible planning decisions by their council in the past. This would ultimately be reflected at the ballot box - especially if the public realised that the flood tax was needed because of the greed and incompetence on the part of their elected members. However, the bulk of the costs would be borne by irresponsible property developers and architects and this could teach them to avoid flood plain development in future because their professional indemnity insurer would forbid it.

The Crichton solution involves a five point plan as set out below:

1. Remove the immunity against legal actions for negligent misrepresentation. Apply legislation along the lines of s101(1) of the Law Reform (Miscellaneous Provisions) (Scotland) Act 1985. This should reduce the amount of new build in the flood plain and ensure that those occupying new build in the flood plain do so knowing the risks. By enabling insurers and flood survivors to recover their costs from those experts who failed to warn of the risks or misrepresented the location as being safe, premiums should rapidly reduce to more affordable levels for new and recent build.
2. Revise building regulations for new build along the lines of the Scottish building standards to make properties more resilient and resistant to flood damage. Enact legislation to make the new building regulations apply retrospectively after flood or storm damage so that the costs of resilient reinstatement are borne by insurers and existing stock is made flood and storm resilient. (The author has discussed this with senior managers from all the major insurers and they are happy for this to go ahead as long as there is the level playing field of legislation.)

3. Create statutory duties on local authorities to clean and maintain watercourses, gully pots, culverts, SuDS installations etc at least once a year (as in Scotland) and make them legally liable if they fail to do so adequately and a flood results (as in Scotland).
4. Require housing associations and public landlords to provide automatic "free" insurance with rent cover on domestic contents unless the tenant opts out. The premium would be built into the rental figure. Opting out should not result in a reduced rental. Such a scheme would avoid adverse selection and thus keep premiums low.
5. Require all owners of reservoirs greater than 25,000 cubic metres in volume to hold public liability insurance with a limit of indemnity of at least £1m, and where people live or work in the dam break danger zone, require reservoir owners to install transponders for Permanent Scatterer Synthetic Aperture Radar Interferometry (PS InSAR) monitoring of movement in dams or embankments. This should detect sub millimeter movement and give early warning of failure, and should both save lives and help to prevent premium increases for the million-or-so people currently at risk of dam break floods. Transponders cost less than £100 each.

None of these measures would require additional funding from the taxpayer. Spending on cleaning and maintenance would be recovered from reduced flood repair bills. Benefits are not limited to new properties; even older properties should benefit because floods of those properties are often due to flood plain development upstream or a failure to clean watercourses. Owners or insurers of such properties would therefore still be able to claim recovery of their costs.

Knowledge of the flood hazard

It may be argued that the residents of flood hazard zones are not aware they are at risk until they actually have a flood. This is so even now they have access to flood maps on the Environment Agency web site. The writer can understand this, having lived in a town called Leagrave (i.e. the source of the River Lea) in an estate called Marsh Farm. At the time despite the place names he was oblivious to the flood risk and if asked would have assumed the local planners would not have allowed the development if it was not safe and that if he had been flooded he could have sued the planners and developers for compensation. Of course he would have been wrong. So even if the flood risk might be obvious from the name of the area (see Image 2, for example,) this does not mean that residents necessarily know of the risk until the flood occurs, especially if the location has been negligently misrepresented as being safe by the authorities.

Image 2: An area near Kingston upon Hull which was badly flooded in 2007



(Copyright Crichton 2007).

Costs of flood damage

The cost of flood damage is often underestimated. Central government has so far chosen to ignore the British National Flood Insurance Claims Database, established with ABI assistance and now perhaps the largest of its kind in the world, with data on thousands of flood claims from the 25 leading UK insurers. Regular analysis reports from the database enable insurers to accurately model the cost of a flood depending on the depth, duration and type of property affected.

Household insurance policies are underwritten on a particularly generous basis in the UK. Buildings claims are settled on a rebuilding costs basis and contents claims are settled on a "new for old" basis. This basis is typically some 2.5 times more expensive than the "economic loss" basis used by the Government in England and Wales to calculate the benefits of a flood defence. Commercial property claims are underwritten on an "indemnity" basis which means they are subject to a much stricter application of "average". This means the sum insured must adequately reflect the value at risk, or the claims payment is reduced even for partial losses.

Even shallow floods can cause massive insurance costs. Kingston upon Hull was badly affected in June 2007 even though the flood was not deep enough to cover the doorstep unless a vehicle created a bow wave. (see [Image 3](#)).

Image 3: Flood damage in Hull



(Copyright Crichton 2007).

Examples of the results are shown in [Table 4](#) (even where the depth is below floor level, as in Hull in 2007, the insurance costs are significant). These figures are extracted from the British Flood Insurance Claims Database.

Table 4: [Costs of flooding](#)

	Sum insured	Cost	
		0 millimetre depth	200 millimetre depth
Buildings	£150,000	£11,043	£23,155
Contents	£35,000	£ 7,108	£10,059
Alternative accommodation	Where buildings sum insured is £150,000	£ 2,617	£4,078
Total		£20,768	£37,292

Whole event insured losses in Hull in 2007 were estimated at £1.5bn. Yet the flood losses in Hull (like most flood losses) were entirely preventable. There were seven main causes:

1. The houses had been built on the flood plain below sea level. The area which suffered most is clearly marked as flood plain on the 1924 Ordnance Survey map. Hull has the largest number of homes on the floodplain of any UK city other than London. 95% of Hull is below sea level. Planners should have realised this and at the very least have insisted on the flood risk being

taken into account in the design, for example having the houses raised by a few steps. Many of the older buildings in the centre of Hull are six or seven steps above ground level.

2. Most of the flooded houses have front gardens just the right size for parking a car. Almost all of the occupiers had paved over their front gardens with non porous paving or sealed monoblocks for parking so the rainwater could not soak into the ground and just ran off into the street. Planners should have insisted on porous surfaces in gardens (they do now, but only for new build).
3. The streets are narrow and drivers did not slow down in the flood water, leading to large waves coming into the houses every time a vehicle passed. The police and local media should have spread the message of the dangers.
4. Flood proof doors and windows were not fitted. Nor were any demountable defences. This is down to individual householders, although in Scotland local authorities often arrange discounts for their residents.
5. The streets were lined with grass verges and trees meaning that the drains were clogged up with grass cuttings and dead leaves. Gully pots should have been opened up for cleaning at least once a year and preferably again in the autumn.
6. The gully pots in the streets had been partly tarred over in road resurfacing work, indicating that their grills had not been removed to clean the drains for a long time. (In Scotland gully pots must be cleaned annually.)
7. The original 1920s gully pots were still in place and are totally undersized for current levels of rainfall. (see [Image 4](#).) Gully pots should be replaced, ideally to Scottish standards. (See [Image 5](#).)

Image 4: A gully pot in Hull



(Copyright Crichton 2007).

The current standard for drainage in England is that it should provide drainage for up to a 30-year return period event. By contrast, in Norway the local authority and utility are held legally liable for any surface water flood less extreme than the 100-year return period event thanks to the proactive approach by Norwegian insurers who sued them and recovered their claims payments (Lindholm et al, 2007). Perhaps UK insurers or flood survivors should try this sometime?

Image 5: A gully pot in Scotland



(Copyright: Crichton 2012).

Resistance and resilience

It should be mentioned that it is not up to insurance companies to dictate planning policy, simply to price the consequences. Sometimes it makes sense to build in the flood plain because the location is attractive to customers. In such cases the flood risk can be minimised by sensible design and construction methods such as flood-proof doors and windows, using the ground floor for car parking, or even building on stilts (see [Image 6](#)).

Image 6: A restaurant on stilts beside the River Conwy in Llanrwst, North Wales



(Copyright Crichton 2010).

The "common enemy" rule

The historic "common enemy" rule permits the owner or occupier of land to undertake protective works to prevent flooding of that property, even if as a result the flood waters that would have otherwise entered their land cause damage to another's property. This means that if a neighbour or a property developer constructs flood defences which cause your house to flood, you can do nothing about it.

In the [Arscott case](#), heavy rainfall in October 1998 caused flooding near Aberfan to 32 homes to a depth of a metre. They blamed the National Coal Board (the predecessor of the Coal Authority) which had deposited colliery spoil on land adjacent to the river which raised the land some 12 feet. The claim was dismissed under the Common Enemy rule, another factor being that the flooding was not a foreseeable consequence of the infilling at the time that the work was done. For a more detailed analysis, see [Lowther: 2004](#).

However, while the common enemy rule allows individuals to undertake measures to protect their own property, the Environment Agency (EA) in England discourages such measures. Interestingly, the EA in Wales seems to allow them and the Arscott case was a Welsh one. Image 6 shows a property in Wales.

In Scotland both common law and SEPA allow individual flood protection measures, and in some cases the local authority may be obliged to take over the maintenance and repair of local flood walls.

Thames lock keepers

During the 2007 floods, the EA's flood telemetry systems failed in many places, and 23% of properties that were flooded from main rivers did not receive flood warnings in time. The EA was severely criticised for this by the Pitt Review. Hundreds of homes in Oxfordshire and the Reading area were saved from flooding by the quick actions of riverside lock and weir keepers to manage the river flows. One of them was given a local hero award by Gordon Brown.

In November 2011, the EA announced that it was disposing of resident lock keepers (so they could rent out their cottages) and replacing them with the type of telemetry that failed in 2007. A local MP, Martin Salter, has pointed out that even if the telemetry works, emergency call-out costs would exceed any savings from this move, and that hundreds of years of collective experience of the river will be lost as lock keepers move away.

As a result, properties near the Thames will be at a much higher risk of flooding in the future. The first areas to be affected will be Grafton, Cleeve, Sunbury, Cherstey, Goring and Whitchurch. It is suggested that underwriters carefully review their approach for these areas.

Underwriting guidance for the flood insurance market after 2013

What will insurers do when the 50-year old commitment to provide flood insurance expires in 2013? This is still not known, but it is likely that the major composite insurers will put together a scheme which may not suit smaller niche players.

For the smaller insurer, there will be great opportunities to attract low-risk business by taking the trouble to examine all the underwriting factors - factors which are often ignored and little understood by the majors. Location is just one example: the majors tend to be focused on their geographic information systems (GIS) to tell them which postcodes are high risk, but this can blind them to other factors which a more responsive insurer could pick up; for example, the Thames lock keepers issue mentioned above.

Sometimes a GIS can be more hindrance than help when it comes to fine tuning. Insurers should also be aware of the tremendous opportunities to obtain data using freedom of information legislation. It is amazing what information can be found, free of charge, just for the asking.

While location is not everything, it is important. Some options are summarised in [Tables 5](#) and [6](#), below. The options are intended to reflect the planning approaches in different regions of England over the last twenty years (see [Table 2](#)). It is logical that where local planners have acted irresponsibly over the last twenty years, insurers need to take punitive action rather than continue to support their incompetence or greed with stealth subsidies. If the relevant planning authorities agree to change their policies and prove that they have done so then insurers could reconsider.

Table 5: New business, provided no flood claims in the last five years. Guidance for insurance underwriters for individual risks

Area	Category	Underwriting action
Northern Ireland, Wales and Scottish areas other Moray and East Lothian	A1. Low risk. Buildings constructed only in safe areas as per the Insurance template. E.g. after 1995 (2004 in Wales)	No change. Possible premium reductions as "stealth subsidy" disappears
	A2. Buildings constructed in high-risk areas. E.g. before 1995 (2004 in Wales).	High excess. Sue planners in Scotland
Properties in England, Wales, Northern Ireland, Moray and East Lothian.	B1. England other than East Midlands, Humber, London, or Yorkshire.	Rate increases depending on risk.
	B2. High risk areas in Moray, East Midlands, Humber, London, or	Total loss basis to be considered to enable

	Yorkshire.	floodplain restoration.
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Table 6: Existing business renewal terms for individuals

Risk which have had a flood claim in the last five years should be rated at one category higher for each claim. Possible options depending on risk.

Risk Return Period (years)	Category and Underwriting action.
200 to 1,000	C1. Strictly apply "average"
100 to 200	C2. Change cover to indemnity basis and strictly apply "average". Exclude cover for basements. Require flood-proof doors and windows etc.
50 to 100	C3. Change cover to indemnity basis and strictly apply "average". Exclude flood cover for basements and ground floor rooms. Require flood proof doors and windows etc.
75 to 100	C4. Change to "first loss" basis of cover
50 to 75	C5. Change to a parametric or "benefit" basis of cover
0 to 20	C6. Refer to a bookmaker for a gaming contract on a benefit basis.

More detailed information

Group A. New business in Northern Ireland, Wales, and Scottish areas other than Moray and East Lothian - individuals. Insurers can afford to be very selective about new business and are likely to be attracted to areas which have used FLAGs or other means to manage their flood risks with insurance advice since 1995 (2004 in Wales, 2006 in Northern Ireland). Flood is now well controlled in these areas, especially compared to England (see [Table 7](#)). Options are:

- **Category A1:** Low risk. Buildings constructed in safe areas e.g. after 1995. (2004 in Wales, 2006 in Northern Ireland). No change. Low cost insurance readily available. Possible reductions as stealth subsidy disappears.
- **Category A2:** Buildings constructed in high risk areas e.g. before 1995. Increase the flood excess substantially, especially after a flood claim.

Unfortunately a high excess provides a strong incentive for policy-holders to exaggerate the claims cost and commit fraud to cover the cost of the excess. It also reduces any incentive to minimise losses.

Insurers should provide advice and risk surveys to implement resistance and resilience measures and agree amongst themselves to encourage resilient reinstatement and lobby the Scottish Government to implement the retrospective resilient reinstatement section of the Scottish Building Standards Act. They should also encourage self help groups and volunteer flood wardens to help councils to monitor and maintain watercourses.

In Scotland, insurers and loss adjusters should aggressively sue planners, architects and developers and encourage policyholders to do the same to recover the costs of the excesses.

Group B: New business for properties in England, Moray and East Lothian - individuals. This type of new business will be much less attractive than group A, above. So long as planners and developers have legal immunity from actions to recover flood damage, this business will tend to be considered on an accommodation basis only.

- **Category B1:** England other than East Midlands, Humber, London, or Yorkshire. Abolish subsidies and charge the full technical rate for high-hazard properties. This will make the true risk more transparent and may prompt government action.

If the UK Government seek the re-introduction of stealth subsidies this should be strongly resisted, as it only encourages flood plain development. It is also likely to be particularly strongly resisted in Scotland, which has been paying a disproportionate share of the subsidy for the last 50 years. Rate increases depending on risk.

- **Category B2:** High-risk areas in Moray, East Midlands, Humber, London, or Yorkshire. These are areas where the planners are still allowing a large proportion of new build in flood hazard areas (see [Table 2](#)).

In order to correct these actions, insurers should insist that cover be issued on a total loss basis at an appropriate premium in high flood hazard areas. This means that if the flood exceeds a set depth the insurer buys the property at market value and then demolishes it. The insurer should then retain ownership of the land in perpetuity to prevent rebuilding. Alternatively, it could build a block of flats, with the ground floor used only for parking and flood-water storage.

Another solution would be that, on the periphery of the flood-risk area, the land could be sold subject to a restrictive covenant that it will not be used for ground floor housing. In the long term, this could operate to restore floodplains and remove people from risk, but very high premiums would be required in the short term without government support. Many would not be able to afford the high premium and would be forced to go without insurance. Unless they could afford to repair their property after a flood, they may have to abandon it.

Either way, this should lead to blight or a movement away from flood hazard areas. Such a situation may encourage government and planners to take action in these regions. In Scotland, planners and developers could be sued to recover flood damage and encourage them to be more careful in future.

Group C: Existing business - individuals.

Insurers will still wish to retain existing business especially where the policyholder has been loyal to the same insurer for a number of years. Rather than dealing with such business solely by the use of premium increases and high excesses, insurers should treat each case on its merits.

In England, often the cause of the flood loss is not the location of the property insured, but the reduction in flood storage upstream due to development of agricultural land drainage, or the failure to clean watercourses or gully pots. Community action groups can make a difference here. For example, in Scotland community action groups have exerted peer pressure on farmers to fill in their field drains and let their fields flood. Individuals should shop around until they find insurers who recognise what they are doing to reduce risk.

The following proposals involve some alternative solutions. Some of these would require the insurance regulator's agreement.

Risks which have had a flood claim in the last five years should be rated at one category higher for each claim. The following options are in addition to increases in premium. Any claims costs in Scotland should be recovered by legal action against the local planning officer, and if possible the architect and developer.

- **Category C1: 200 to 1,000-year return period probability.** Apply average to future household claims. "Average" means that policyholders who try to save money by having inadequate sums insured suffer from reduced claims payments.
- **Category C2: 100 to 200-year return period.** Decline to issue any property damage cover to homes or businesses without local flood protection such as flood proof doors and windows and demountable defences (see [Image 7](#)). Demountables are less attractive because there is no guarantee that they will be deployed in time. Exclude cover for the contents of basements. If this is not possible, decline renewal.

Image 7: demountable flood defences in Venice



(Copyright Crichton 2010).

- **Category C3: 50 to 100-year return period.** Exclude flood cover for commercial property risks and seek authority from the Financial Services Authority to exclude flood cover for personal property contents of ground floor or basement rooms. If this is not possible, decline renewal.
- **Category C4: 20 to 50-year return period.** Discontinue underwriting policies in the highest hazard areas on an indemnity basis. Instead offer a first loss policy where the insurer would pay up to the sum insured or the extent of the loss, whichever is less. This would encourage the policy-holder to move property out of the way of the flood and to deploy demountable defences or to abandon the property altogether.

- **Category C5: 20 to 50-year return period.** Issue cover in high hazard zones on a benefit basis similar to personal accident insurance. Again the policy-holder would choose what level of cover was required in advance. If the policy-holders choose, say, a benefit of £10,000, in the event of a flood to a specified depth, proved by photographs or tide marks or an Environment Agency report, the insurer would pay out a flat sum of £10,000 right away, which the policy-holders could spend in any way they wished. The sum might be more than the cost of the damage or it might be less. This would enable speedy claims settlement and encourage the policy-holder to move property away from the flood in time, or salvage and reuse as much property as possible, fit flood proof doors and windows or to deploy demountable defences.
- **Category C6: <20-year return period.** Not insurable because losses are inevitable. Encourage resident to consider arranging a gaming contract with a local bookmaker for household contents as the probability of loss is too high for an insurance company. This would operate in the same way as a benefit policy.

Insurance companies could work with licensed bookmakers to provide flood insurance from their retail outlets on a weekly premium basis. Many of the busiest of these outlets are located in low income social housing estates which are also likely to be the most vulnerable locations. In such locations the local "bookie" is likely to be more trusted than a distant insurance company or broker. Bookies are experienced risk professionals and could easily be trained to assess flood risks and measures to be taken to reduce them, such as demountable defences. Their on-the-spot local knowledge and ability to assess the probabilities of high-risk events could be a valuable asset. The insurance company could reinsure the risk with the bookmaker or the bookmaker could underwrite the risk directly.

Group D: Insurance with rent schemes for social housing tenants - groups.

This group is often comprised of low income vulnerable people who are living in flood risk areas not from choice but from necessity. Often they will be reluctant to pay for household contents insurance, but without it they will be much less resilient to floods or storms.

The proposal is that household contents insurance be provided free of charge to all tenants so long as the rental payments are up-to-date. The sum insured would be a multiple of the amount of rent paid, but higher sums insured could be provided for additional premium. Tenants could opt out of the insurance (for example, on religious grounds) but would receive no discounts on their rent as the insurance is "free". Not all tenants would be acceptable; for example, those with criminal convictions or drug addicts.

Schemes would be arranged with insurance companies by landlords who would have to pay the premiums. Landlords would need to adjust their rents accordingly. However, by removing adverse selection almost entirely and achieving high business volumes, unit costs would be relatively low. The insurance regulator might even agree to the provision of a mini-policy which operates on an indemnity or benefits basis, rather than new for old, thus saving costs significantly.

Ideally such schemes should be subsidised by the Government for people on welfare benefits.

Group E: Small and medium-sized enterprises (SMEs)

The [AXA International Small Business Report: Obstacles to Growth in 2012](#) (published in November 2011) shows that in the UK:

- 73% of SMEs have insurance on their business property;

- 80% have a contents insurance policy.

However, the report also showed that only 39% claimed to have business interruption cover to protect against lost income resulting from unforeseen events

The AXA survey also looked at SMEs in a number of countries, and found that overall, 40% of SMEs do not currently have a business continuity plan. This rises to 59% of sole traders and 47% of micro-businesses (those employing fewer than 10 people).

Continuity planning is least common among firms in the UK, Poland, Germany and the US. Typically, SMEs simply think that they are too small to think about continuity planning. 36% of those with no plans agreed with the statement "my business is too small" while 28% did not see the need to make a plan.

SMEs often have little choice about the location of their premises. They have to be where their customers are. Not enough attention is paid to the importance of SMEs in providing local employment and social cohesion. The corner shop, the pub, the hairdresser etc are all important places for people to meet and chat. If they go, then blight is likely to follow. Without business interruption insurance, and continuity planning, SMEs are particularly vulnerable to flood risks.

The insurance regulator gives insurers have much more freedom of action with SMEs. Any of the options listed above could be used.

Differences between England and Scotland

[Table 7](#) is an attempt to show some of the ways in which, from an insurance point of view, it appears that Scotland may have a different flood risk than England. Rainfall levels in Scotland in 2011 were the highest for over a hundred years yet there were no major floods reported.

This table is not intended to be prescriptive - each country is working under very different circumstances, so different solutions are inevitable. However, it is hoped that this table might stimulate some debate.

Table 7: [42 differences between England and Scotland regarding flood risk](#)

A: Exposure and planning

	Description	England	Scotland
1	Planning Policy (see also Table 1)	11% of all new buildings have been allowed in the floodplain between 2000 and 2005 (TSO: 2006). PPS25 allows building in flood hazard areas if nowhere else available	Negligible building in floodplain since 1995. SPP7 forbids building residential property in areas where the flood risk exceeds the 200-year return period
2	Direct involvement of local communities and local knowledge	No system for planners to consult with insurers or other key stakeholders (White et al : 2007) No system for consultations on a catchment wide basis.	Until 2011, planners were obliged by law to set up Flood Liaison and Advice Groups (FLAGs) for dialogue with key stakeholders, including insurers and adjoining local authorities (SPP7) If developers are asked to commission hydrologist reports, they are archived

		and made available to FLAG members. Almost all Scottish councils, covering 94% of the population, established FLAGs with insurance representation. Although no longer compulsory, they have achieved their purposes and many still operate.
3	Can flood survivors take legal action against planners under common law for allowing floodplain development?	No (Ryeford Homes Ltd v Sevenoaks District Council [1989]) Yes (Hedley Byrne v Heller 1963 [1964]) This gives an added incentive to refuse development in flood hazard areas and consult on flood defence proposals
4	Housing density and population density (high density means more pressure to build in the floodplain)	Average 40 dwellings per hectare for new developments. Thames Gateway floodplain will have up to 200 dwellings per hectare. Average population density: 383 per square kilometre 30 dwellings per hectare are considered high density. Average population density: 64 per square kilometre
5	Published flood maps	River, estuary and coastal flood, modelled and historic, excluding combined effects As for England but including combined effects. Drift geology maps show glacier paths and can act as a proxy for very extreme events. Draft maps published in June 2011, which include surface water flood and vulnerability data
6	Maps of areas at risk from reservoir failure (insurers will be able to use these maps to assess flood risks, which may affect premiums)	Secret even from the police on the grounds of national security until 2011 (the police in England were apparently regarded as a security risk). Publication now under way, but no area as yet has proper dam-break contingency plans Freely available to emergency planners, police and rescue services since January 2008, so that contingency plans can be drawn up. Full publication to start in 2012 (Crichton: 2011b).

B: Vulnerability: social justice, financial inclusion and human welfare issues

	Description	England	Scotland
7	Published comprehensive record of injury and property damage caused by all flood events and action	No formal systems	All non-agricultural flood events, no matter how small, must be recorded by local authorities and details published every two years, along with action taken or proposed to prevent a

	taken		recurrence - valuable information source for insurers
8	Social housing and "pay with rent"-type contents insurance schemes. The social impacts of flooding are severe, especially without insurance	No action to encourage insurance schemes. Sample surveys show a range of 34-44% average take-up of insurance for social tenants (Vestri: 2007). Now unlikely to increase as insurers are reluctant to accept new business in flood hazard areas	Following £400,000 spend by the Scottish Government on promoting pay with rent schemes, the Scottish Housing Survey of 2007 shows that, overall, 64% of people in the most deprived 15% of areas of Scotland had home contents insurance, compared with an average of 89% for the rest of Scotland
9	Deprivation index	The Index of Multiple Deprivation produced by the Office for National Statistics is at electoral ward level and ranks electoral wards based on an assessment of a mix of economic indicators. Boundaries are incompatible with the post code system	The Scottish Index of Multiple Deprivation is calculated at a much higher resolution than England. Scottish "data zones" average only 200 houses and are similar in size to Census Enumeration Districts. Boundaries coincide with the postcode system and so can be used with data from credit referencing agencies
10	Target lists for evacuation of vulnerable people	No action known	Many emergency planning officers have established lists of people requiring special assistance for evacuation
11	Flood rescue	No legal obligation to rescue flood victims. The Chief Fire Officers Association in England and Wales says: " <i>The UK [meaning England and Wales] simply does not currently have the capability to respond to a major flood event.</i> " Many areas do not have trained personnel or appropriate equipment for flood rescues	Statutory duty for fire and rescue services to provide flood rescue cover. Senior officers regularly attend FLAGs and discuss issues with insurers and other stakeholders. There are also 14 well-trained and fully equipped specialist rescue teams across Scotland, with rescue boats, pumps, buoyancy aids, survival suits, etc.

12	Population issues and social cohesion. Immigrants and ethnic minorities can be especially vulnerable to flooding owing to language and cultural differences	England's population expected to increase from 51.5 million in 2008 to 60.7 million by 2033 according to Office for National Statistics figures published in March 2010. A significant proportion of this increase will be driven by immigration	In Scotland, where the birth rate has reached a 13-year high, the population still expected to increase only from 5.1 million to 5.4 million by 2031
13	Advice and support for flood victims' families and flood survivors	"National" Flood Forum only applies to England and Wales and receives no government funding	Scottish Flood Forum, funded by the Scottish Government

C: Hazard - sustainable flood management

	Description	England	Scotland
14	Sustainable flood management (SFM)	No legal requirement. Single demonstration project in Ripon discontinued in 2007 due to lack of funding. New scheme started in Pickering in 2010. Some local floodplain restoration now taking place, but not co-ordinated	Required under primary legislation. Major natural flood management demonstration projects have been running for some years. In a current EU-funded research project, Scotland has been held up as an example to the rest of Europe for its work on making cities more resilient using SFM (Department of Public Works and Water Management : 2010). Scottish Rural Development Grants available to landowners to store water in times of flooding to reduce flooding downstream
15	Water Framework Directive	Adaptation of rivers and lakes to cope with increased rainfall from climate change and thus reduce flooding risks is forbidden .	Transposed subject to sustainable flood management requirements . This means that rivers and lochs can be adapted to cope with increased rainfall (Scotland is the only country in the EU to do this)
16	Cleaning watercourses of weeds and rubbish (EU Waste Directive means cut backs in refuse collection)	No statutory duty and no funding for cleaning watercourses. Habitats Directive and Birds Directive often used as reasons for inaction. Fly-tipping into	Statutory duty on local authorities to regularly clean watercourses with central grant funding. Falkirk council now cleans some watercourses on a weekly basis owing to fly-tipping

		watercourses now widespread	
17	Land drainage - such schemes often increase the flood risk downstream	5 million hectares drained by 1900. Since accelerated by the wars and farming subsidies. Land drainage still takes place	Figures not available, but Scottish topography is generally less suitable for major land drainage. Land drainage schemes terminated in Scotland in 1997
18	Sewage and surface water drainage (EU Waste Directive means more waste such as cooking oil, nappies, "wet wipes", etc. flushed into sewers, leading to blockages. Roads drain into gully pots, which can be blocked by leaves, grass cuttings, and winter road gritting	The householder has a right to be connected to public sewers under Section 106 of the Water Industry Act 1991, even if the sewer has insufficient capacity. At present some 20,000 households at risk of sewer flooding once in a ten-year period. Professor Howarth points to a "concerning decline" in the level of performance in respect of pollution incidents involving water companies in England and Wales (Howarth: 2004). When Hull was flooded in 2007, it was found that street gully pots were undersized and had been partly tarred over by old road surfacing work, showing they had not been opened for cleaning for a long time	New developments not allowed if the sewage or water supply systems do not have surplus capacity. Scottish Water will not sanction any new developments where surface water drains into watercourses unless the relevant local authority accepts responsibility for the additional discharge, and presumably any flooding and legal liability which might result. Hence the almost universal use of sustainable drainage systems to reduce the risk of storm water overloading sewers or rivers. Street gully pots opened and cleaned annually
19	Sustainable drainage systems (SUDS)	Not always used owing to uncertainty over ownership or responsibility issues. Anecdotal evidence of inappropriate systems which can increase flood risk. The EA regards SUDS as having a number of applications, including flood management	Considered for every new development. FLAGs have been invaluable in spreading best practice - one has produced award-winning national guidance in consultation with insurers on drainage impact assessments (Aberdeenshire Council : 2002). SEPA regards SUDs primarily as a means of controlling diffuse pollution, rather than an element of flood management because SUDS is of limited value against floods
20	Sustainable drainage	No maintenance standards or agreement on who will	Statutory provision for Scottish Water to set standards for SUDS

	systems (maintenance)	maintain	and to adopt and maintain
21	Flooding from agricultural land	No action taken to prevent	Local authorities have the power to require farmers to prevent mud escaping from fields onto roads - by contour ploughing on slopes (where safe), not ploughing to the edge of low-lying fields, and by planting hedges and building embankments
22	Water undertakers	Fully privatised. Emphasis on capital developments to add value for shareholders rather than on maintenance work to reduce leaks and sewage spillages	Publicly owned Scottish Water has additional responsibilities such as the maintenance of SUDS and provision of temporary demountable flood defences pending upgrades on sewage works. Since devolution, leakage has been reduced by more than one-third
23	One of the main ways to reduce flood hazard naturally is to plant woodland upstream of populated areas in the catchment	Percentage of the population with access to over 2 hectares of woodland within 500 metres of their home: England 15%; Wales 18%; Northern Ireland 7% (Woodland Trust: 2010).	Percentage of the population have access to over 2 hectares of woodland within 500 metres of their home: 28% (Woodland Trust: 2010).

D: Hazard - flood defences

	Description	England	Scotland
24	Detailed information on flood defences	Not readily available	The Scottish Flood Defence Asset Database shows type, standard of protection, and area protected. Available online to members of FLAGs and hydrologists (Bassett et al : 2007).
25	Minimum standard of service for new flood defences	No minimum standard outside the centre of London	100-year return period plus climatechange allowance (Scottish Executive: 1997). Effect of the latter is the equivalent of designing for the 200-year return period or better (Bassett et al : 2007).
26	Cost-benefit assessment for grant aid for	Spending on flood defences is rationed by a "priority scoring" method. This method means that the	Benefits must exceed costs. In England benefits are based on estimated losses to the local

	flood defences	benefits have to be at least six times the costs to justify a scheme. There can be delays of many years before a scheme is built. Often, schemes only protect against small-scale floods, and are poorly maintained. In practice benefits have had to be seven times costs for recent projects. Proposals for a new system were set out for consultation in November 2010 (DEFRA, 2010). Treasury rules require the economic appraisal to consider only economic losses and not financial losses. This has the effect of rationing grants for flood defences. Financial (or "real") losses are around 2.5 times higher than economic losses. For example, economic losses assume that if a householder's ten-year-old carpet has to be replaced, he will have to find another ten-year-old carpet, or if there are two supermarkets in the town and one is flooded, the economic loss is zero because people can go to the other one.	economy. In Scotland, calculations can be based on actual financial loss data. Tables of average costs for different flood depths and types of property are calculated from many thousands of British flood claims from 25 leading insurers since 1993. The British Flood Insurance Claims Database (see Table 4) is the biggest database in the world on flood damage costs and results in benefits some 2.5 times higher than the English method (Black, Evans : 2008)
27	Authority to build flood defences	Around 600 separate bodies, under the general supervision of the Environment Agency (EA). Planners and elected councillors have no need to worry about finding the money for flood defences so they have no disincentive to allow developments in hazard zones	Only the local authority and relevant riparian owners. Discourages planners from floodplain development because they know their council will have the problems and costs of defending it and will be democratically accountable
28	Completing of flood defences	No target for completion. New buildings are being constructed in hazardous areas faster than defences can be built	Targets announced for the completion of flood defences for the 100-year return period event by 2008 for both river and coastal floods (Scottish Executive: 2005). Climate change is taken into account
29	Condition of flood defences	According to the National Audit Office, only 61% of flood defence structures in England and Wales are in "good" condition or better, and an extra £150 million needs to be spent	An independent survey in 2007 of flood prevention schemes shows the schemes provide over 90 kilometres of assets including 35 kilometres of embankments, 21 kilometres of walls,

		each year just on maintenance (National Audit Office, 2001).	16 kilometres of culverts and 18 kilometres of channel improvements. Of assets surveyed, 87% are in "good" and "very good" condition, and a number of the rest could readily be improved through maintenance improvements (Bassett et al : 2007).
30	Annual average flood defence spend per household at risk	£219. Spending per capita in England is higher than in Scotland, but there are 5.2 million properties at risk in England compared with Scotland's 99,000	£454

E: Hazard - flooding caused by storm conditions

	Description	England	Scotland
31	Sea levels are rising, thus increasing the risk of flooding from storm surge. In 1999, a five-metre storm surge was recorded in the North Sea.	More low-lying coastal areas. Land south of a line from Dundee to Abersoch is sinking in response to tectonic uplift north of that line. For example, Lowestoft mean sea-level rise is 2.57 millimetres/year.	Glacio-isostatic uplift is taking place due to the land recovering from glacier weight. Although this rate is declining, it has partially compensated for sea level rise. For example, Aberdeen mean sealevel rise is 0.87 millimetres/year
32	Percentage of coastline subject to coastal erosion due to geological factors, making them vulnerable to flooding	30%	7%
33	A major climate change model ("PRUDENCE") suggests that storm tracks could move south of 55 degrees latitude	Carlisle is approximately 55 degrees latitude	Scotland suffered from a storm in 1993 which broke the European record for low atmospheric pressure at 912 millibars (followed by the 1993 Tay floods). Since then, major storms in 1999, 2005 and 2007 have mainly affected England and Wales

F: Regulations

	Description	England	Scotland
34	Building Regulations	<p>In the Building Regulations for England and Wales currently set, some provisions for flood mitigation in Approved Documents C, H and J. Approved Document C provides practical guidance on site preparation and resisting contaminants and moisture, but does not provide information on preventing or reducing the impacts of flooding. Approved Document H provides practical information on drainage and waste disposal and deals with mitigation of flood risk associated with the surcharge of drains and sewers. Approved Document J identifies the need for secondary containment where there is a significant risk of oil pollution, but does not contain recommendations for ensuring storage above the predicted flood level</p>	<p>Building Standards deal with mitigating damage to buildings and removing threats to the health and safety of occupants as a result of flooding. Guidance is given on the use of building materials not adversely affected by flood water. The Scottish Building Research establishment is expert in testing new materials for flood resilience and techniques in resilient repairs. Scottish primary legislation on Building Standards already includes provisions which would allow for resilient standards to be made retrospective after flood or storm damage, as already happens with fire precautions. A compulsory resilient reinstatement would be an excellent first move to adapting existing building stock to be less vulnerable to future flooding</p>
35	Reservoir safety enforcement	<p>EA - owns 169 reservoirs itself (a possible conflict of interest?) (Crichton: 2011b)</p>	<p>SEPA - does not own reservoirs itself. The Scottish Parliament recommended compulsory public liability insurance for reservoir owners, but certain London insurers objected owing to their ignorance of Scottish legal principles and their lack of experience in underwriting such risks. Such a move could have dramatically improved Scottish safety standards, at no cost to the taxpayer. Similar moves would be difficult to implement in England because of different legal precedents</p>
36	Reservoir safety inspection threshold	<p>Compulsory for reservoirs greater than 25,000 cubic metres in volume</p>	<p>Compulsory for reservoirs greater than 10,000 cubic metres in volume. (Reservoirs (Scotland) Act 2011)</p>

37	Communications in an emergency	No special treatment	Planning policy specifies that mobile phone base stations and electricity sub-stations be located in such a way that they cannot be disabled by flood events (SPP7)
38	Waterborne pathogens. Between 1993 and 2003, there were over 4,000 cases of waterborne disease in Britain, half of which were	No controls known	Statutory controls and monitoring. Cryptosporidium and E. coli were found in only 14 of Scotland's 32 council areas in 2004
39	Following the Strategic Environmental Assessment Directive the person commissioning a plan or programme which is likely to have environmental impacts must produce an Environmental Assessment	No requirement in England and Wales to produce a strategic flood risk assessment. Although was proposed in December 2005 in draft planning guidelines for PPS25, this did not appear in the final version	In Scotland, insurers can claim damages from a local authority if they fail in their obligation to undertake a strategic flood risk assessment
40	Legislation to transpose the Floods Directive ⁷	New powers and duties for local authorities and the EA in response to the Pitt Review and the Floods Directive, but reduced funding will limit their effectiveness	Emphasis on co-ordination, co-operation and the involvement of stakeholders and public
41	Use of "Planning gain" - the sums of money paid by developers out of the profits they make for the increase in land value created by gaining planning permission.	This goes straight to the Treasury and does not benefit the local community (TSO: 2006). This money should really be used to contribute to the costs of insuring properties in flood risk areas.	Planning gain stays within the local community and is used to improve community facilities such as schools, community centres etc. It is administered by the community council. If there were any properties at risk of flood, the money could be used to help the people living in them.
42	Use of buy-out and relocate schemes to restore the floodplain.	No examples known.	Large numbers of recently built business and residential properties at risk are being bought by Moray Council and demolished, because that is cheaper than defending them.

Public health impacts of flood

Last, but certainly not least, a reminder of the impacts of flooding on mental and physical health. Table 8, below shows only the immediate effects. Also to be taken into account is the fact that risks are increased by the spread of waterborne pathogens and zoonoses.

Table 8: Percentage of flood survivors reporting health effects from flooding

Physical effects	%	Mental effects	%
Stiffness in joints	23	Anxiety during rain	80
Respiratory illness	21	Stress	67
Gastro-intestinal problems	20	Depression	56
Weight loss	20	Sleep problems	51
Skin irritation	16	Panic attacks	27
Muscle cramps	16	Anger attacks	24
High blood pressure	14	Nightmares	18
Sprains / strains	14	Suicidal thoughts	9
No physical effects	36	No mental effects	6

Source: extracts from a table produced by Prof. Dennis Parker, Middlesex Flood Hazard Research Centre

Zoonoses

Zoonoses are diseases or conditions that can be passed from vertebrate animals to humans. These can vary from country to country. Some countries have diseases such as rabies or heartworm disease, both absent in the UK (so far).

In the UK, floods can release anthrax from the soil; urine from dogs, cattle and rats can spread Weil's disease. Council cut-backs on rubbish collection are blamed on the EU Waste Directive and have been followed by a sharp increase in call outs to deal with rat infestations. A leading pest control firm claimed in 2008 that call-outs for rodents had increased by 18% in one year in Scotland, and one local authority claims a 50% increase in the Scottish Borders area.

There are well over five million rats in England alone, with nearly two percent of properties affected. There are no official figures for the UK's rat population and estimates range from 15m to 100m. A single pair of rats can produce up to 2,000 offspring in a year. Flood survivors often have to share higher ground with packs of fleeing, hungry rats and rat bites during a flood event are increasingly common, especially amongst children.

"Pay as you throw" schemes are leading to increased fly tipping which is producing food sources for rats, urban foxes, seagulls and other wildlife. Falkirk council in Scotland has reported that in some areas watercourses now have to be cleared of rubbish on a weekly basis due to fly tipping. Local authorities in Scotland have a statutory duty to clear watercourses, but not in England and Wales

where fly tipping could lead to an increased flood risk. Birds such as seagulls and pigeons foraging for food could spread avian flu.

Animals and birds exposed to flood water, hazardous materials, diseases, parasites, or toxins can cause a risk to humans. Pets are often passed among rescuers or cuddled by children.

There are a number of zoonoses found in the UK, for example:

- anthrax;
- coliform bacteria;
- salmonella;
- campylobacter;
- giardia;
- ringworm;
- borreliosis (also called Lyme disease) from tick bites;
- tick-borne encephalitis (TBE);
- amyotrophic Lateral Sclerosis (ALS motor neuron disease);
- Weil's disease and dog or cattle leptospirosis;
- bovine spongiform encephalopathy (BSE);
- Creutzfeldt-Jakob Disease (vCJD).

Waterborne pathogens (see Table 9)

Flooding events can spread pathogens from soil into watercourses and reservoirs and subsequently into water supplies especially in warm weather. Organic farming could lead to more E Coli in the soil. Cut-backs in refuse collection can lead to more items being flushed down the toilet, leading to sewage pipe blockages and raw sewage overflows. Sustainable drainage systems are standard in Scotland, with maintenance responsibilities specified in legislation. These systems can alleviate flooding and pollution, but maintenance responsibilities in England and Wales are unresolved.

Pathogens from overflowing sewers, slaughterhouse waste, animal urine/faeces or the bodies of dead animals can cause contamination of water supplies - sometimes with fatal results.

Cryptosporidium parvus in particular is not destroyed by normal water treatment or sewage treatment plants. An outbreak in Milwaukee, Wisconsin in the USA in 1993 made 400,000 people ill and more than 100 died. Possible sources include cattle along the two rivers that flow into the Milwaukee harbour above the water treatment plant, local slaughterhouses and human sewage. Rivers swelled by significant rain and snow runoff could have spread the pathogens for long distances.

Morris states that between 1993 and 2003 there were 4,000 officially recorded incidents of waterborne disease in Britain and that half of these were caused by cryptosporidium. More recent figures are not known, and there is a need for legislation to enforce greater control and monitoring of pathogens. Such legislation has already been passed in Scotland.

Waterborne pathogens can also develop in standing water such as in gully pots, or stagnant water. "Low flow" toilets can reduce the speed of flow in sewers and if it reduces below 600mm per second, then pathogens can develop in sewers, ready to be brought to the surface during a flood.

Table 9: Examples of waterborne pathogens found in the UK

Pathogenic bacteria	Parasitic Protozoa	Viruses
Shigella dysenteriae Vibrio cholerae Escherichia coli Vibrio parahaemolyticus Salmonella typhi / paratyphi Campylobacter spp.	Giardia lamblia Entamoeba histolytica Cryptosporidium parvum Toxoplasma Gondii	Hepatitis A and E Rotavirus Norwalk agents

The high incidence of gastro intestinal conditions amongst flood survivors should be of particular concern (see Table 8). Unfortunately the practice of using sandbags during a flood event is still common, and children can often be seen playing in the flood waters or the sand. After a flood, sandbags are contaminated and should be disposed of quickly and safely. Often this does not happen. It is much better to use well-engineered temporary flood defences which can later be cleaned properly.

Conclusions

England faces some difficult problems owing to high population density, immigration, and a concentration of population in the low-lying flat areas of the South East.

Land-use planners in the South East are often faced with situations where demand for housing cannot be satisfied without resorting to flood hazard areas. In such cases the answer may be more resilient building regulations as in Scotland. Even better would be to make these retrospective after a flood or storm so existing building stock can be made more resilient.

Given the UK Government's failure to take action to control the development of flood hazard areas or apply resilient building regulations in England, it would surely be no surprise if the insurance industry were to apply punitive economic measures to force more responsible behaviour and avoid the needless exposure of millions of people to the risks of flooding.

The UK Government appears to be happy to pander to the profit motives of property developers and ignore the suffering of people who cannot escape from the hazard zones owing to loss of equity from big increases in insurance costs, if cover is available at all. Firm action by insurers could make the consequences of irresponsible planning decisions more transparent. However, this would require strong leadership within the industry, something which is clearly missing.

It is not the job of insurers to subsidise flood plain developments and if government wishes to do so in order to support the profits of property developers and contractors who make large donations to political parties that is up to them and, ultimately, the electorate. However, they should understand that such action will simply have the effect of putting more vulnerable people at risk of flooding.

Sooner or later, drastic measures may be needed; especially after the UK insurance commitments end in 2013. The UK Government could mitigate the transitional effects - perhaps a government-funded insurance scheme for those on social security benefits, a campaign to make homes flood-proof, or a "buy-out and relocation" scheme for the highest risks, as in the USA and Canada.

At the very least, some moves towards sustainable flood management, resilient building regulations, and training of architects in adapting housing design for flood and storm risks would be sensible, but

most important of all would be a change in the law to hold to account those planners, architects, hydrologists, landlords, and property developers who are responsible for placing vulnerable people in high-risk locations in the first place.

Recommendations for Government

1. Remove the immunity against legal actions for negligent misrepresentation. Apply legislation along the lines of s101(1) of the Law Reform (Miscellaneous Provisions) (Scotland) Act 1985. This would need to be combined with a readiness of insurers to go to court to recover their flood losses.
2. Amend the building regulations for new build to make properties more resilient and resistant to flood damage and implement new legislation to make the new building regulations apply retrospectively after flood or storm damage so that the costs of resilient reinstatement are borne by insurers and existing stock is made flood and storm resilient.
3. Accept data from the British Flood Insurance Claims Database in cost benefit appraisals for new flood risk management schemes. This is now the biggest database of its kind in the world.
4. Require any new flood risk management schemes to include an element of flood attenuation using natural flood management measures, such as removal of agricultural land drainage and agricultural flood protection measures.
5. Require housing associations and public landlords to provide automatic "free" insurance with rent cover on domestic contents unless the tenant opts out. the premium would be built into the rental figure. Opting out should not result in a reduced rental.
6. Require all owners of reservoirs greater than 25,000 cubic metres in volume to hold public liability insurance with a limit of indemnity of at least £1m; and where people live or work in dam break danger zones require them to install transponders for permanent scatterer synthetic aperture radar Interferometry (PS InSAR) to enable continuous monitoring for subsidence, landslip, or collapse by the EA or SEPA.

None of these measures would require funding from the taxpayer. The first measure should reduce the amount of new build in the flood plain and ensure that those occupying new build in the flood plain do so knowing the risks. The second measure should reduce damage to such properties and the retrospective rules could gradually improve resilience in existing stock. The other suggestions are self explanatory.

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Hedley Byrne v Heller 1963 [1964] AC 465, [1963] 2 All ER 575, [1963] 3 WLR 101. (Although this was an English case, the Law Reform (Miscellaneous Provisions) (Scotland) Act 1985 s101(1) adopted the decision into statute in Scotland and declared that damages are recoverable in respect of negligent misrepresentation. This means that the Hedley Byrne position still stands in Scotland, despite subsequent English case law which has reversed it for planning authorities.)

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The Scottish Parliament considered the Directive so important that, instead of statutory instruments, primary legislation to transpose the Directive was enacted in the form of the Water Environment and Water Services (Scotland) Act 2003. In respect of flood risk management, the Act (subsections (3) and (4)) requires "Scottish Ministers, SEPA and the responsible authorities to work in an integrated fashion and co-operate with each other to promote sustainable flood management". Subsequently, the insurance industry has been frequently consulted through FLAGs.

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