

## University of Dundee

### Exploring the Social Impacts of Flood Risk and Flooding in Scotland

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SCOTTISH EXECUTIVE

# Exploring the Social Impacts of Flood Risk and Flooding in Scotland

Environment Group



**EXPLORING THE SOCIAL IMPACTS OF FLOOD RISK  
AND FLOODING IN SCOTLAND**

**Alan Werritty, Donald Houston, Tom Ball, Amy Tavendale  
and Andrew Black**

**School of Social Sciences – Geography, University of Dundee**

**Scottish Executive Social Research  
2007**

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# CONTENTS

<b>EXECUTIVE SUMMARY</b>		i
<b>CHAPTER ONE</b>	<b>INTRODUCTION</b>	1
	<i>Background</i>	1
	<i>Objectives of the project</i>	2
<b>CHAPTER TWO</b>	<b>LITERATURE REVIEW</b>	3
	<i>Introduction</i>	3
	<i>The impacts of flooding</i>	3
	<i>Living with flood risk</i>	7
	<i>Summary</i>	19
<b>CHAPTER THREE</b>	<b>METHODS</b>	20
	<i>Socio-demographic profiling of flood risk areas and selection of study areas</i>	20
	<i>Questionnaire survey of households in flooded/ flood risk areas</i>	22
	<i>Focus group discussions</i>	24
	<i>Semi-structured interviews with institutional Stakeholders</i>	25
	<i>Data analysis</i>	26
	<i>Summary</i>	26
<b>CHAPTER FOUR</b>	<b>HOUSEHOLD SURVEY</b>	27
	<i>Socio-demographic and residential characteristics of the sample</i>	27
	<i>Characteristics of the floods</i>	30
	<i>The experience of being flooded</i>	31
	<i>Impacts of flooding</i>	32
	<i>Living with floods</i>	40
	<i>Summary</i>	47
<b>CHAPTER FIVE</b>	<b>FOCUS GROUP DISCUSSIONS</b>	48
	<i>Impacts of flooding</i>	48
	<i>Living with floods</i>	56
	<i>Summary</i>	63

<b>CHAPTER SIX</b>	<b>INTERVIEWS WITH KEY INSTITUTIONAL STAKEHOLDERS</b>	<b>64</b>
	<i>Aims and scope</i>	64
	<i>Flood warning to local authorities and key emergency responders</i>	64
	<i>Flood emergency planning</i>	66
	<i>Social aspects of flood emergency management</i>	71
	<i>Flood alleviation and avoidance</i>	73
	<i>Insurance coverage in flood risk areas</i>	77
	<i>Summary</i>	78
<b>CHAPTER SEVEN</b>	<b>DISCUSSION AND RECOMMENDATIONS</b>	<b>79</b>
	<i>Impacts of flooding</i>	79
	<i>Living with flood risk</i>	81
	<i>What works in terms of living with floods?</i>	82
	<i>Recommendations</i>	87
<b>REFERENCES</b>		<b>89</b>
<b>Appendix A</b>	<b>– Maps showing locations sampled in Household Questionnaire Survey</b>	<b>98</b>
<b>Appendix B</b>	<b>– Tables from Household Questionnaire Survey</b>	<b>105</b>
<b>Appendix C</b>	<b>– Questions used in Semi-Structured interviews</b>	<b>133</b>

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Dundee, January 2007

## **ABBREVIATIONS**

<b>ABI</b>	Association of British Insurers
<b>AVM</b>	Automatic voice messaging
<b>DEFRA</b>	Department of Environment Food and Rural Affairs
<b>EA</b>	Environment Agency
<b>EU</b>	European Union
<b>FLAG</b>	Flood Liaison Advice Group
<b>GIS</b>	Geographic Information System
<b>IFRC</b>	International Federation of the Red Cross and Red Crescent Societies
<b>ISDR</b>	International Strategy for Disaster Reduction
<b>JBA</b>	Jeremy Benn Associates
<b>NGOs</b>	Non-Governmental Organisations
<b>PTSD</b>	Post Traumatic Stress Disorder
<b>RECAP</b>	Tayside Region Emergency Co-ordinating and Planning Group
<b>RPA</b>	Risk and Policy Analysts Ltd
<b>SDP</b>	Strategic Drainage Plan
<b>SECG</b>	Strathclyde Emergency Co-ordinating Group
<b>SEPA</b>	Scottish Environment Protection Agency
<b>SEERAD</b>	Scottish Executive Environment and Rural Affairs Department
<b>SFVI</b>	Social Flood Vulnerability Index
<b>SNIFFER</b>	Scottish and Northern Ireland Forum for Environmental Research
<b>SPP7</b>	Scottish Planning Policy 7
<b>SPSS</b>	Statistical Package for Social Sciences
<b>SUDS</b>	Sustainable Urban Drainage Systems
<b>TA</b>	Territorial Army
<b>WHO</b>	World Health Organisation
<b>WRVS</b>	Womens' Royal Volunteer Service



## **EXECUTIVE SUMMARY**

1. This project assesses the impacts that recent floods in Scotland have had on people, their attitudes and behaviour and establishes 'what works' in relation to flood prevention programmes and flood warning and dissemination systems. It also identifies the consequences of living in a flood risk area for those with and without the experience of being flooded.
2. The report comprises a literature review (Chapter Two) followed by an outline of the methods used to capture and analyse the data in selected locations across Scotland and an assessment of the socio-demographic profiles of flood risk areas when compared with Scotland as a whole (Chapter Three). The main findings of the project are derived from a household survey in which flood impacts and attitudes to managing flood risk are assessed (Chapter Four), a series of focus groups which add a 'human face' to the material on flood impacts and contrasting attitudes to managing flood risk (Chapter Five) and interviews with key institutional stakeholders who manage flood risk both nationally and locally (Chapter Six). The report ends with a discussion on these findings, a summary of 'what works' and a series of recommendations for future policy development and further research (Chapter Seven).

### **Methods**

3. Questionnaires were delivered by hand to 2,085 households in seven locations (Breachin, Edinburgh, Elgin, Forres, Glasgow-Shettleston, Hawick and Perth) and by post to 236 households in scattered rural and coastal communities. The respective response rates for hand-delivered and postal questionnaires were 1,154 (55.3%) and 69 (29.2%) respectively, giving an overall response rate of 52.7%. Within the 1,223 returned questionnaires, 633 were from households which had been flooded and 590 from households not flooded but located within areas that had been flooded over the period 1993-2005. Focus groups were conducted with respondents from the household survey at five locations. Structured interviews were conducted with senior staff from eleven institutional stakeholders drawn from local authorities, SEPA, the Scottish Executive, Scottish Water and the insurance industry. Socio-demographic profiling of the flood risk areas yielded a slight over-representation of single pensioner households and a slight under-representation of lone parents with children, but in other categories lower socio-economic groups were well-represented when compared with urban Scotland as a whole.

### **The experience of being flooded**

4. In the surveyed locations, rivers overtopping their banks was the most common cause of flooding (85%) followed by surcharging sewers and overland flow ('pluvial flooding' – 10%) and coastal storms (5%). The flood waters were nearly always contaminated with mud and/or sewage.
5. Of the flooded households surveyed 42% received some kind of warning, one third of which provided more than 3 hours notice of the flood. The most common form of warning to those flooded was from neighbours (32%) and just over 51% of

flooded households had received an official warning (official phoning or knocking on door, loud hailer or automatic telephone message). Approximately a third of those who had been flooded and a fifth of those living in flood risk areas now use SEPA's *Floodline* as an information source, but this leaves a significant majority of those at risk in the surveyed locations unaware of the service. Nearly 80% of those using the service found it "helpful or very helpful". Receiving a warning increased confidence in getting a sufficient warning next time, but this was lessened by the actual experience of being flooded. Direct methods of dissemination were strongly favoured, particularly officials knocking on the door, and media messages.

6. The most common immediate responses to a warning were to remove possessions from the ground floor, deploy sandbags or flood guards, move vehicles and vacate the property. Neighbours and friends provided most of the emergency assistance with local authority and Fire Service staff assisting around 20% of flooded households. Only 5% of those forced to leave their homes used an Evacuation Centre but 45% of households required temporary accommodation for 6 months or more. The main providers of temporary accommodation were friends and relatives (44%) and the public and private rental sector (52%).

7. Direct economic losses for households averaged around £32,000 for damage to buildings and around £13,500 for damage to contents. Around 10 days of time off work (paid and unpaid) was needed to deal with the immediate aftermath of being flooded.

### **Flood impacts**

8. Respondents to the household survey were invited to rank 20 potential flood impacts and the outcomes coded on a four point scale: 0 – not applicable or no impact, 1 – mild, 2 – serious and 3 – extreme impact. When all 20 potential impacts were grouped into three classes and the scores aggregated, **intangible impacts** (relating to non-material and/or emotional losses) registered markedly higher values than **tangible impacts** (relating to material losses), and **immediate** impacts were generally higher than **lasting** impacts. **Intangible immediate impacts** (overall score of 1.81) included *the stress of the flood itself*, the anxiety of *being out of one's home*, the discomfort of *living in temporary accommodation* and the time and effort in *dealing with insurers and builders* to return home as soon as possible. **Intangible lasting impacts** (which focus on the time and effort to return to a normal life) were more sustained and included *fear of future flooding*, *strains within the family itself* and *loss of sentimental/irreplaceable items*. Collectively these scored 1.29 overall, lower than the intangible immediate impacts, but higher than the tangible impacts which scored 1.12 overall. One immediate consequence of these findings is that the cost-benefit analyses for flood alleviation schemes should consider including intangible social impacts.

9. Impacts on surveyed households were also examined in terms of respondents' take up of insurance, their occupational status, household income, housing tenure, whether a warning was received and the frequency and nature of the flood. Households with insurance registered higher stress levels, in part as a result of dealing with loss adjusters and builders whilst living in temporary accommodation.

Households with an annual income of less than £20,000 also reported higher levels of stress and anxiety and more adverse health impacts. Tangible impacts were rated more highly for households with a skilled or semi-skilled highest earner compared to those with a professional or managerial highest earner. Pluvial floods with little or no warning and floods with high levels of sewage contamination generated higher tangible impacts and strikingly higher lasting intangible impacts. Greater flood depths markedly exacerbated the stress of the flood and disruption of living in temporary accommodation. Repeated flooding added to anxieties over future flooding and declining property values. Floods with the most severe impacts were those in Elgin (1997 and 2002) and Glasgow-Shettleston (2002).

### **Managing flood risk**

10. In terms of living with the risk of flooding, nearly two thirds of those in the household survey who were flooded regard future flooding as “likely” or “very likely”, but this reduces to around 40% for those not flooded. Most households gained their knowledge of flood risk from neighbours, friends or the local authority. The experience of being flooded does not improve householders’ confidence in what to do in a future flood.

11. Contents insurance covered 91% of households living in flood risk areas, reducing to around 75% for social tenants. 84% of flooded households had contents insurance of which 37% were subsequently charged a higher excess. Knowledge of ‘pay-with-rent’ contents insurance is known about by 37% of council tenants and the take-up 13%. However, given that around 75% of social tenants who have been flooded now have contents insurance (with around 10% using ‘pay with rent’ schemes), further promotion of such schemes should address affordability and the reluctance of some insurers to provide cover. Over six in ten flooded households in the survey have some degree of flood proofing (removable flood guards or sand bags, sometimes provided by the local authority) and have moved irreplaceable items to a safe place.

12. When invited to state preferences for flood risk management by far the most popular measures were structural defences closely followed by a flood warning service and upstream storage in reservoirs. Payments to rural landowners to increase upstream storage of flood waters and demolition of the most threatened properties, with compensation or relocation of residents, attracted much lower levels of support. In terms of where protection from flooding **should lie**, respondents assigned the main responsibility to local authorities (58%) followed by the Scottish Executive (42%); SEPA, Scottish Water and home-owners or landlords all registering <20%. When asked where this responsibility **actually lay**, these shifted to local authorities (45%), home-owners or landlords (26%) and Scottish Executive (17%) with SEPA and Scottish Water registering <12%. It is striking that in neither set of answers did respondents register home-owners and landlords as primarily responsible for flood protection. When asked if they would be willing to pay additional council tax to fund flood protection the majority of respondents declined, but 10% of those who had been flooded would be willing to contribute at least an additional £100 per year. Willingness to pay was lower for households renting from local authorities or housing associations and higher for households with an income >£20,000 per year.

## **Personal accounts of being flooded**

13. Findings from the household survey were further probed and elaborated by focus groups held in Elgin, Forres, Glasgow, Perth and Edinburgh. A more nuanced set of findings emerged privileging individual stories and revealing the human face of flooding with greater clarity.

14. In terms of tangible impacts most participants reported a downturn in the property market immediately after the flood and problems in recovering additional day-to-day expenses such as meals in hotels and restaurants. Most loss adjusters and insurance companies were prompt and efficient in agreeing and settling claims, but the settling of relatively minor sums was occasionally contentious. Extensive delays were claimed on behalf of some social tenants in being re-housed and returned to their original homes. Loss of no-claims bonuses and high flooding excesses became an unexpected issue for some participants.

15. The trauma of being flooded and its immediate aftermath was by far the most significant intangible impact reported in the focus groups, disproportionately felt by the elderly and most vulnerable. Anxiety and stress often peaked after the flood, when the scale of disruption became clearer and initial coping strategies dwindled. Physical and mental ill-health impacts also became more apparent, exacerbating existing chronic conditions. Dealing with building contractors and monitoring the timing and quality of repair work proved especially stressful. The loss of family photos and mementoes was particularly acute for the elderly for whom these items were amongst their most cherished possessions. Some participants reported how difficult it was to maintain family cohesion when children live in hotels or stay with grandparents and schooling suffers. Relationships within the family were also severely tested by living in temporary accommodation and simultaneously dealing with tradesman in short supply and checking on the quality of their work.

16. In terms of living with the continued risk of being flooded, the value of warnings was questioned by some participants in terms of what could be done to minimise personal losses, partly reflecting a lack of information. Risk perception is highly variable with floods attributed to ‘acts of God’, land management upstream and poor maintenance of urban water courses. Local risk assessment is variously based on a realistic understanding of structural defences and less robust anecdotal information on historic floods. Most focus group members acknowledged a degree of personal responsibility in dealing with floods but this was tempered with blame attached to local authorities for alleged failings both during and after floods.

## **Responses of senior flood risk stakeholders**

17. Questions to senior flood risk stakeholders on flood warning and dissemination, raising flood awareness, emergency planning, the role of Flood Liaison Advice Groups (FLAGs) and the role of insurance helped to characterise the roles of key institutional stakeholders.

18. Key flood risk management objectives for local authorities are (i) reducing flood risk to a manageable level where the risk is known, (ii) using the planning

process to direct development away from flood risk areas, (iii) seamless co-ordination with the emergency services in providing temporary flood defences and evacuation of people at risk; and (iv) promoting flood alleviation schemes (where cost-benefit analysis permits) with public involvement in the procedures from the earliest stages.

19. SEPA's flood warning service covers the majority of communities at risk, but gaps still have to be filled, especially in Aberdeenshire and the upper Forth estuary. The extension of *Flood Watch* to cover coastal areas at risk will soon be implemented alongside a progressive expansion of inland warning schemes. Dissemination of warnings varies markedly across Scotland. In the Scottish Borders and Moray, local authority staff report Automated Voice Messaging highly effective in its contact rates for those registered. The police continue to disseminate warnings in the Highland Council area and parts of Perth & Kinross, but have withdrawn this service in other parts of Scotland. Since it is rarely possible to warn against pluvial flooding, Scottish Water is fitting non-return valves, sealing manhole covers and providing flood guards in selected high risk urban areas based on its Flooding Register. Several of the local authorities interviewed have sought to engage community groups in disseminating flood warnings and initiating emergency response, but the level of training required and the need to maintain this competency between floods is viewed as a challenge.

20. Raising flood awareness via information campaigns remains a priority with managers interviewed in both local authorities and SEPA acknowledging very limited public understanding of flood risk and where the statutory duties for flood defence actually lie. At present raising awareness largely rests on SEPA's locally focused campaigns and local authority Biennial Reports and Flood Liaison Advice Groups (FLAGs) which bring together landowners, local authority engineers and planners, Scottish Water and the insurance companies.

21. National flood emergency management is based on eight regional co-ordinating bodies whose role has been strengthened following the Civil Contingencies Act 2004. Local authority flood emergency plans include liaising with SEPA, proactive distribution of sand bags (to both households and local authority staff), activating temporary defences and the deployment of council employees as local flood wardens. This 'nested' structure works well and has been commended by central government.

22. The Association of British Insurers' policy on flooding is to continue to provide cover for properties with a risk of flooding of less than 1 in 75 years. For a risk of more than 1 in 75 years, cover is available where improved flood defence is planned within 5 years. For properties which have been flooded new applications may be refused and existing policy-holders will see increased premiums and excesses. Flood proofing to reduce losses is encouraged but is not made a condition of obtaining cover.



## CHAPTER ONE

## INTRODUCTION

### Background

1.1 The impacts of floods have long been recognised as complex and multi-faceted. In Scotland, flooding fatalities have been rare in recent decades, but financial damage to property, disruption to communications and business losses have all featured regularly in appraisals of flood impacts (eg *Scoping study into the costs of Flooding*, JBA, 2005). Such appraisals are subject to considerable uncertainty, with economic impacts featuring more prominently than social impacts which are more difficult to encapsulate. Not surprisingly, there is a growing awareness by flood risk managers that social impacts have been under-represented in post-flood appraisals.

1.2 Following a series of damaging floods across parts of England and Wales (1998, 2000 and 2002) and Scotland (Perth 1993, Strathclyde, 1994, Edinburgh 2000, and Elgin 1997, 2002) flood risk management in the UK has undergone a series of radical reviews (Institution of Civil Engineers *Learning to Live with Rivers*, 2000; DEFRA *Making Space for Water*, 2004) and the Foresight Project *Future Flooding* (Evans *et al.*, 2004, Werritty with Chatterton, 2004). Collectively these reviews have proposed less reliance on hard engineering solutions, schemes which work ‘with’ rather than ‘against’ nature and more of a ‘people dimension’ in flood risk management. *Future Flooding* also stressed the need for a paradigm shift in which flood risk management relies less on state intervention and more on an acceptance of individual responsibility.

1.3 In response to substantial flood losses during the 1990s the Scottish Executive developed a policy of ‘Awareness, Avoidance, Alleviation and Assistance’ which also enhanced the ‘people dimension’ in flood risk management. In 2003, sustainable flood management became a duty for responsible authorities under section 2 of the Water Environment and Water Services (Scotland) Act 2003. This concept was subsequently defined by the National Technical Advisory Group on Flooding (Scottish Executive, 2005) as follows:

*“Sustainable flood management provides **the maximum possible social and economic resilience** against flooding by protecting and working with the environment, in a way which is fair and affordable both now and in the future” (emphasis added).*

The inclusion of social resilience designed to “enhance community benefit with fair outcomes for everyone” is noteworthy. Further work on implementing the Water Environment and Water Services (Scotland) Act 2003 is currently being undertaken by the Scottish Executive’s Flooding Issues Advisory Group.

1.4 For the full potential benefit of these policies to be achieved, there is a need for a more robust evidence base surrounding flooding and flood risk. A number of key questions remain to be asked. What precisely are the social impacts of being flooded or living in a flood risk area? How important are less tangible issues such as feeling secure in one’s own home compared to the more easily quantified economic costs? Are such feelings of insecurity felt more strongly by certain groups, such as

the elderly and disabled, and what are the implications for their health and well-being?

1.5 Moving beyond the impacts of a flood on the individuals affected, what are the likely implications for community cohesion? While a flood may initially bring neighbours close together in helping each other through the immediate aftermath, what of the longer term implications, for example if fear of future floods causes people to start moving away?

1.6 Are the communities in flood risk areas more or less affluent than the Scottish average? This is likely to have a major impact on householders' resilience to a flood, for example in terms of their ability to put flood proofing measures in place, secure alternative accommodation (temporary or permanent), replace possessions, etc. What is the take up of insurance cover and is this differentiated by social class, income and housing tenure?

1.7 Finally, what awareness of, and attitudes toward, flooding are held in communities in flood risk areas and how are they differentiated by social class, age and housing tenure? How might public policy respond to differential expectations and levels of awareness?

### **Objectives of the project**

1.8 The project has the following objectives:

1. To assess the range of impacts that experience of recent flooding in Scotland has had on people, their attitudes and behaviours; and
2. To establish 'what works' with particular population groups and locations in relation to flood prevention campaigns and flood warning/dissemination systems.

1.9 In fulfilling these objectives, it aims to answer the following questions:

- What are the social impacts of living in a flood risk area, for both those who have been flooded and those not flooded?
- How important are social impacts, such as disruption, upset, stress and ill-health, for those in flood risk areas, compared to the economic impacts which are more easily quantified?
- Are such feelings of insecurity more strongly felt by certain social groups, such as the elderly and those on low incomes, and what are the implications for the health and well-being of those groups?
- What degrees of awareness of, and attitudes toward, flooding are held in communities and how might public policy respond to this?
- How do the key institutional stakeholders manage flood risk, and to what effect?



## CHAPTER TWO      LITERATURE REVIEW

### Introduction

2.1      The social disruption caused by floods can seriously undermine the quality of life of individuals and impact on the fabric of affected communities (Gordon, 2004). As well as the physical and health dangers of flood waters, the psychological impact of the emergency and aftermath causes longer term effects that may be exacerbated by stresses such as having to move out of the home, cleaning up, negotiating with insurers and getting damage repaired and goods replaced (RPA, 2005). Even when the ‘recovery’ phase is over, there may be difficulties caused by living with the ongoing risk, obtaining and paying for insurance and the effect on house prices and community cohesion.

2.2      The economic cost of flooding in Scotland is estimated to average £31.5 million per year from inland flooding and £19.1 million from coastal flooding (Werritty with Chatterton, 2004). These broad-brush estimates focus on direct costs and say little about the social impacts of flooding in Scotland (JBA, 2005). Media coverage, while often dramatic, is usually short lived and limited to ‘rescue’ situations and anecdotes of hardship. The people featured then disappear into the background and have to pick up the pieces out of the public view.

2.3      Over 170,000 residential and commercial properties in Scotland, some 10-12% of the total, are thought to be at risk of flooding at present (Werritty with Chatterton, 2004). However, a much larger group will be at risk in the future with climate change likely to result in higher winter rainfall (especially in the west), more intense summer storms and rising sea levels (Baxter *et al.*, 2001; Hulme *et al.*, 2002; Milly *et al.*, 2002; Werritty *et al.*, 2002). Further factors that will increase future flood risk include legacies of drainage systems that have inadequate capacity, poor building construction techniques and flood defences adapted to a former hydrological regime (Price and McKenna, 2003; Evans *et al.*, 2004). These factors combine with the planning ‘inertia’ of homes and businesses already located on floodplains, low-lying coastal zones and urban areas at risk of flooding.

2.4      This literature review collates information from a range of sources, mainly academic journal articles, government and consultants’ reports, media reports and industrial data sources. The objective is to summarise the current state of knowledge about the impacts of flooding on individuals and communities, the impacts of living with flood risk, and opinions on the best way to manage flood risk.

### The impacts of flooding

#### *Flood-related deaths*

2.5      Deaths directly attributable to the physical impact of floods are relatively rare in the UK, although many more are documented in Europe, where floods have been both deeper and faster-flowing (Rosenthal *et al.*, 1998; Rosenthal and Bezuyen, 2000). The most commonly affected groups are those mobile at the time of the flood, who encounter floodwaters and associated storm conditions (Jonkman and Kelman,

2005; DEFRA, 2006). Bye and Horner (1998) document five deaths from the 1998 floods in England and Wales. In Scotland, the January 2005 storm and flooding led to five deaths in the Outer Hebrides, and three lives were lost during the severe floods that occurred in northern England.<sup>1</sup>

2.6 Limited information is available on *indirect* mortality from floods, for example, due to the shock of the event exacerbating pre-existing health conditions such as heart disease and strokes, particularly among the elderly. But Ohl and Tapsell (2000) observe that such deaths are closely related to the prevailing socioeconomic and existing health conditions of the community. Increases in population mortality rates of 50% were noted in Bristol following the 1968 floods, in a controlled study (Bennet, 1970), and a similar proportionate increase was noted on Canvey Island following the 1953 storm surge (Baxter *et al.*, 2001). There is also evidence of an effect on suicide risk (see para 2.11 below). These deaths represent a substantial social impact from floods, but one that is very difficult to quantify owing to the lack of recent longitudinal studies.

## ***Health***

2.7 Flooding impacts directly on both physical and psychological health, with a strong interaction between the two. The most extensive recent study, global in scope, is the Tyndall Centre's *Floods health and climate change: a strategic review* (Few *et al.*, 2004; summarised in Ahern *et al.*, 2005). In this work, which includes studies in England, Australia and the USA, the health impacts of flooding are closely related to age and pre-existing health (RPA, 2005).

2.8 Physical health impacts of floods include shock, gastrointestinal illnesses (particularly if flood waters were contaminated with sewage) and respiratory illnesses (Hajat *et al.*, 2003). Although few incidents have been reported in the UK in recent years, there is evidence of gastrointestinal effects after the severe flooding in the Midlands in 1998 (Ohl and Tapsell 2000). Reacher *et al.* (2004) also noted an increase in self-reported gastroenteritis and respiratory complaints following the 2000 floods in Lewes, England. Vector and rodent-borne diseases have not been reported for recent floods in the UK.

2.9 According to the World Health Organisation (2001), psychological health impacts, although well documented in the literature, have yet to be fully addressed in terms of disaster preparedness or service delivery. But impacts that have been recorded include acute stress, clinical depression and anxiety, as well as post-traumatic stress disorder (PTSD). A number of reports have shown that these impacts are made worse by the scale of the flood, the time taken to return to normal, the presence of contaminants, evacuation, and ineffectiveness of other actions and help received (Green *et al.*, 1985a,b; Tapsell and Tunstall, 2000, 2006; Tapsell *et al.*, 2002; Adeola, 2003; Galea *et al.*, 2005; RPA, 2005). Victims of the 1997 floods in California showed evidence of acute stress, with both short and long term reactions (Waelde *et al.*, 1998; 2001). Increases in stress and depression have been observed

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<sup>1</sup> Data obtained from BBC website - see [http://news.bbc.co.uk/2/hi/uk\\_news/4160387.stm](http://news.bbc.co.uk/2/hi/uk_news/4160387.stm);  
[http://news.bbc.co.uk/2/hi/uk\\_news/scotland/4172163.stm](http://news.bbc.co.uk/2/hi/uk_news/scotland/4172163.stm).

following various floods in the UK (Bennet, 1970; Green *et al.*, 1985b; Tapsell *et al.*, 2002; Reacher *et al.*, 2004). These can last for years (Tapsell and Wilson, 2003), and although the effect may diminish with time, recurrence can occur in response to triggers, such as anniversaries (Echterling, 1987). Psychological health is strongly mediated by support structures and interventions have the potential to reduce the mental health impact if timely and comprehensive (WHO, 2003). However, these structures may be poor to nonexistent where the flood is unexpected (Tapsell and Tunstall, 2000).

2.10 Other studies focused on flooding in developed nations have investigated the extent of impacts on psychological health across social groups. They show that the impacts are differentiated, and tend to be higher among more ‘socially vulnerable’ individuals. In Australia, Abrahams *et al.* (1976) found an increase in depression in both men and women following the 1974 Brisbane floods. In a follow-up study, Price (1978) investigated the age-related effects of the same floods, finding that those between 35 and 75 years of age were most affected. Women showed greater symptoms, but this gender difference disappeared at over 65 years of age. In the USA, Melick (1978) and Logue *et al.* (1981) found no significant mental health effects in working class males three years after a flood resulting from tropical storm Agnes in Pennsylvania, 1972. However, the apparent lack of impact may have been due to a long time lapse after the event. Phifer *et al.* (1988), investigating 55-74 year olds, found an inverse relationship between health impact (depression and anxiety) and socioeconomic status. Greater impacts were seen in those who had a previous history of depression.

2.11 There is also evidence that flooding, via increased depression, leads to greater suicide risk. Fifty such suicides were documented in Poland by the International Federation of the Red Cross/ Red Crescent Societies as ‘likely to have been caused’ by the widespread River Oder flooding in 1997 (IFRC, 1998). Data on suicide links to flood impacts are lacking in the UK, although 13 out of 1510 respondents in the RPA (2005) survey (see Box 1) reported having ‘had thoughts’ of suicide. Cognitive psychological impacts of floods may also occur. Thus those who have been flooded in the past may believe they are at immediate risk when they are not, and consequently experience anxiety more often than before the flood, sometimes with persistent effects (Beck *et al.*, 1985). There may also be ripple effects and knock-on impacts of the disaster on friends, family and those involved in the emergency (Eyre, 2004). The ‘anniversary’ effect, providing unwanted reminders each year after the event, has also been noted (Echterling and Hoschar, 1987).

2.12 Children may also be affected psychologically, although the severity is mediated by the degree of support from their family structure. Green *et al.* (1985a) document psychological effects specific to this group, including symptoms of PTSD and behavioural difficulties several months after the flood (an effect also found in Scotland by Fordham and Ketteridge, 1995).

### ***Intangible losses and health***

2.13 A study by RPA (2005) in England and Wales showed that damage to and loss of memorabilia and irreplaceable items was ranked as a major impact by respondents.

Although ranked below the effort of getting a house back to normal, having to leave home, and anxiety about future flooding, the loss and damage of memorabilia was ranked above health impacts. Financial hardship after a flood can also be devastating and has strong links to psychological health (Green *et al.*, 1985b).

### ***Community and housing impacts***

2.14 Flooding impacts on communities are complex and varied. There is some evidence that, in the aftermath of a flood, cohesion can increase with ‘everyone pulling together’ (termed ‘social fusion’ by Gordon, 2004), but much of this evidence is anecdotal. Instead the flood may eventually act as a divisive influence on the community due to its impact on certain groups. This arises from the perception (real or imagined) that particular groups are favoured by emergency and longer term assistance even though these groups might, in fact, have had greater need. Such effects can override social fusion, creating ‘cleavage planes’ (Gordon, 2004). This was noted by Fordham and Ketteridge (1995) in communities in Perth and Strathclyde, flooded in 1993 and 1994 respectively. One thousand out of the 1200 flooded properties in Perth comprised local authority housing (Smith, 1993). In the aftermath of the flood it was widely thought that these tenants had been favoured over owner-occupiers and private tenants.

2.15 The longer-term flood impacts on a community are poorly documented and vary markedly. In some locations the flood risk may reduce longer term investment in a flooded area with a knock-on effect on the housing market if substantial out-migration occurs. Yeo (2003) provides an international review of the impacts of flooding on property values, reporting effects lasting from two to more than ten years, and a wide range of changes in value associated with flooding. They vary from reduced values of up to 60% (though more typically in the order of 25%) to increased values associated with the benefits of repairs. Some reduced valuations were associated with the publication of flood risk maps.

### ***Scotland***

2.16 Although the economic damage from the 1994 Strathclyde floods and the 1993 Perth flood were reported as exceeding £100m and £30m respectively, the indirect social and health effects were not costed for either event (Chatterton, 1995). However, some qualitative data are available on the impacts of flooding on some of the communities involved. Thus Fordham and Ketteridge (1995) reported on problems faced by residents in Ferguslie Park, Renfrewshire with anecdotal evidence of inadequate emergency accommodation and many difficulties faced in the aftermath by those residents with inadequate insurance. In Perth, some difficulties were noted in prioritising assistance, with owner occupiers having felt ‘left out’ by the emergency services. Enarson and Fordham (2001) also noted that the impacts of these two flooding events were highly gender-specific, with women shouldering much of the burden of organising re-housing and/or household reconstruction, obtaining social security benefits and coping with family strains including support for partners and child care. This led to persistent strain and self-reported evidence of stress and depression.

2.17 More recently, the *Scoping study into the cost of flooding using the August 2004 event as a case study* (JBA, 2005) estimated the overall costs of the widespread flooding and associated damage in Scotland from the August 2004 floods at between £7.2 and £31 million. This estimate includes some ‘monetised’ social costs; evacuation costs, loss of earnings and loss of recreation opportunities, plus costs of treating injuries and worry about future flooding. Several other costs were not monetised, including loss of irreplaceables, damage to natural habitats and historical sites, loss of confidence in authorities and services, loss of services, loss of income/earnings, loss of community and disruption due to flood warnings or alarms. Those costs that were assigned a monetary value ranged from £0.6 to £3.7 million. However, the report noted that:

*“Worry about future flooding is only included for those properties that were flooded. This may be an underestimate in that other households may also be concerned about the potential for flooding, particularly if their property is close to that flooded in 2004”.* (JBA, 2005, p31)

The report further postulated that

*“Overall the non-monetised impacts are not expected to be significant when compared with the money estimates.”* (JBA, 2005, p34)

This assertion has not yet been tested in Scotland by a social survey. The key findings of the RPA (2005) survey also require appraisal in Scottish communities, which may, as proposed by Werritty with Chatterton (2004) have different characteristics to those in England and Wales.

## **Living with flood risk**

### ***Social drivers of vulnerability***

2.18 A full analysis of the effect of the floods requires us to link the physical hazard to the social impacts resulting from it. These impacts are both direct, from the flood itself and indirect, from living with it ‘in the background’ (Green *et al.*, 1994; Oliver-Smith and Hoffman, 1999).

2.19 The Office of Science and Technology ‘Foresight’ study *Future Flooding* (Evans *et al.*, 2004) is the most significant attempt to date to isolate the controls on flood risk in the UK and, by linking physical and societal drivers, the optimal responses to future risk. Using a source-pathway-receptor flood risk model, the study found that for three out of four modelled socioeconomic scenarios to 2080, social factors were the most important determinant of the impact of future flooding events, but also had the highest range of uncertainty. Prominent among the ‘key messages’ for researchers was to reduce the uncertainty in knowledge of these social factors and, from this, to make a strategic assessment of the optimal responses to flood risk for particular areas (see Box 2).

2.20 The concepts of *vulnerability*, *coping capacity* and *adaptation* help define the potential for managing future flood risk (Hewitt, 1983; Green, 1994; Cutter, 1996;

Smit and Pilifosova, 2001; Brooks, 2003; Wisner *et al.*, 2004). *Vulnerability* is the set of conditions and processes that determine both the likelihood of exposure and resulting susceptibility of individuals and social systems to the hazard. Few (2006, p. 20), adopting Blaikie *et al.* (1994), defines vulnerability in the context of floods as:

*“a set of conditions and processes that determine the likelihood of exposure and the resulting susceptibility of humans or human systems to the adverse effects of a flood hazard.”*

There is a growing interest in using the social aspects of vulnerability as tools to develop policies that can minimise risk and maximise the ability to anticipate and adapt to the flood hazard. Characterising the social aspects of vulnerability comes from investigating the impacts of past floods at the individual and community level, and living with continuing and increasing vulnerability to future floods. Generalisation is difficult as the relationship between the scale of the event and the actual or potential hardship suffered is not unique; the same event may have very different effects even on adjacent households (Wisner *et al.*, 2004). Although vulnerability is multi-faceted, helpful indices can be derived based on the social characteristics of particular areas, such as the Social Flood Vulnerability Index (SFVI) (Tapsell *et al.*, 2002) which integrates social factors (presence of long term sick, elderly and lone parents) and financial factors (non-homeowners, non-car owners, presence of unemployed, and amount of crowded housing). Flood alleviation benefits can then be assessed more accurately with this information to hand (Penning-Rowsell and Green, 2000).

2.21 *Coping capacity* is implicit in the above definition of vulnerability. It takes a positive approach, emphasising the ability of individuals and groups both to avoid exposure to hazard and to tolerate and recover from the adverse effects when that hazard becomes a disaster (Handmer, 2003; White *et al.*, 2004; Few, 2006). It is important to emphasise the action potential of individual communities and not just label them ‘disaster prone’ (Bankoff, 2001). Social factors and institutional factors must both be studied in order to establish the best policy approach to maximise coping capacity and thereby reducing vulnerability (Woodward *et al.*, 2000). The authors of *Future Flooding* (Evans *et al.*, 2004) drew up a suite of possible policy approaches, technical solutions and other interventions to manage future risk along the source-path-receptor route (see Box 2).

2.22 The best approach in enhancing coping capacity is to focus on diverse needs, looking at the level of social capital and degree of economic security and equality in each area (Cutter, 1996; Crichton, 1999; Bankhoff, 2001; Enarson and Morrow, 2001; Adeola, 2003; Handmer, 2003; Walker *et al.*, 2003; Fielding and Burningham, 2005; Van der Veen and Logtmeijer, 2005). Existing surveys in developed countries have suggested that large differences can exist in the demands faced by families with children, women, minorities, the sick and the elderly, both during and after the flood event (Buckland and Rahman 1997; Morrow, 1999; Tapsell and Turnstall 2001; Enarson and Fordham, 2001; Cutter *et al.*, 2003). Local coping capacity may, in some cases, also have been weakened by past floods. Their effects may also be persistent and result in existing community divisions being exacerbated by another flood (Fordham and Ketteridge, 1995). The weakening of coping capacity may continue through a decline in family cohesion, residential property values (Yeo,

2003), community focal points, including local businesses, and an increasing disconnection with government and stakeholders. The possibility of a ‘downward spiral’, with ever-increasing vulnerability, then becomes a threat that must be addressed.

2.23 *Adaptation* to the flood hazard denotes a long-term increase in coping capacity which can arise from a combined change in individual behaviour, resources, infrastructure and functions of individuals and their community (Parker, 2000; Brooks, 2003; Few, 2006). Although applied extensively in developing countries (Wisner *et al.*, 2004), this concept has also proved useful in developed countries, particularly in the context of coping with climatic change and consequential increased flood risk (Baxter *et al.*, 2001; Smit *et al.* 2001; Evans *et al.*, 2004). By studying the social characteristics of particular areas, we can analyse the ‘adaptation likelihood’ of the existing social *status quo* (Brooks, 2003) and focus on what appears to work best. Integrating these social and institutional adaptative responses to a flood hazard may lead to a ‘virtuous circle’ where the processes by which vulnerability is reduced also reinforce community links and connection with stakeholders. As Few (2006, p 27) notes “response to flood risk that is rooted in public inclusion and local scale capacity building is a key element in long term risk reduction”.

2.24 A consensus is emerging that the adaptations that are required are those that integrate policies and actions at the higher systems level, such as defence, warning, emergency management, the range of assets at the local level and the knowledge and skills of individuals and stakeholders (Neal and Phillips, 1995; Brown and Damery, 2002; Few, 2006). Attention must still be given to maximising the effectiveness of those methods that need high level organisation and management, such as flood warning and strategic emergency planning (Buckland and Rahman, 1999; Few, 2003). According to the IFRC (2002), full preparedness should include:

- risk and vulnerability mapping
- disaster awareness and education
- early warning and evacuation
- stockpiling of relief materials
- training in response skills
- planning at all levels to ensure co-ordination of the disaster response.

In this regard it will be helpful to develop an accurate picture of the state of this integration in Scotland from the point of view of the public at risk of flooding, and stakeholders, which forms one of the objectives of this project.

### ***Distribution of risk and vulnerability***

2.25 An important part of planning for flood risk is to track where those communities at risk of flooding are located and their relation to those likely to suffer the most severe social impact.

### **Box 1**

#### ***The appraisal of human-related intangible aspects of flooding (RPA/DEFRA/EA, 2005)***

##### **Methodology**

The study separated groups of householders in areas of England and Wales affected principally the floods of 1998 and 2000. A 'non-flooded-at risk' group was surveyed alongside flood-affected groups in thirty locations.

The two groups were selected and segregated by reference to the Environment Agency's 'at risk' database, based in turn on the (then-current) indicative floodplain map.

The survey focussed on the general health differences and indicators of stress between the groups, which were analysed by a questionnaire, administered by interview. Health effects were determined by standard questionnaires addressing general health and post-traumatic stress. Most of the flood impacts were rated on Likert scales (e.g. response classes ranging from 'disagree strongly' through to 'agree strongly').

##### **Key Findings**

The results confirm that flooding causes short term physical effects, and both short and long term psychological effects. The degree of impact is linked to socio-demographic factors (mainly prior health history, age), flood characteristics (mainly assessed depth) and post-flood effects such as problems in settling insurance claims and in getting houses back to normal.

For those actually flooded, the study focused specifically on the relative stress effects of the initial shock ('worst time') and 'after-effects' of flooding. Analysing the effect of floods in relation to socio-demographic indicators, the findings (from bivariate analysis) were that short- and long term psychological effects (stress and depression) occurred, to a significantly greater extent in:

- women
- lower social grades
- certain age groups, especially those in their 50s
- the long-term sick
- families with children
- those in 'vulnerable housing'
- those in rented housing
- the unemployed
- those unaware of flood risk.

In relation to longer term *post-flood* effects on health, the study found that:

- Adverse health effects were increased by problems with insurers and builders, and having to leave home
- Short-term adverse effects were reduced if outside assistance was received, but longer-term impacts were not
- 15% of men and 29% of women consulted a doctor after the event
- Worry about future flooding was much higher for the already-flooded group (65% somewhat or very worried) compared to the 'not flooded but at risk' group (42%).

Analysis was carried out on willingness to pay (WTP) to mitigate these adverse health effects:

- More than 60% of all households expressed some willingness to alleviate the health impacts of flooding by paying for extra 'flood defence' (note that the question was phrased in this way rather than paying for 'flood alleviation measures')
- Highest WTP values were from those in their 50s, also the group that reported highest impacts
- WTP values for those flooded averaged £200 for those flooded and for those at risk £150 per household per year. £200 was chosen as the fairest value for input to cost/benefit appraisal.
- The value of £200 was chosen as the fairest measure of WTP.



2.26 Digital terrain models coupled with inundation algorithms provide increasingly accurate maps of areas at risk of fluvial and coastal flooding (Hall *et al.*, 2005). SEPA's Indicative River and Coastal Flood Map based on these models provides a major advance in depicting flood risk across Scotland (SEPA, 2006). But few data exist on awareness and attitudes to flooding and the economic and social profiles of those living in flood risk zones. Awareness of both the risk and appropriate response enables residents to prepare in a way that can reduce the social impacts of a flood event when it occurs. When coupled to effective warning systems and workable emergency plans, severe damage and/or its social impacts may be limited or even averted. The key message is that the success of such systems and plans depends on individual and community awareness, attitudes and participation (Twigg *et al.*, 2001; Enders, 2001).

2.27 DEFRA's project *Flood risks to people* aims to develop a methodology for vulnerability and risk mapping for floods in the UK and thus channel attention to areas that need most focus on flood preparedness. The project develops concepts of 'hazard rating', 'area vulnerability' and 'people vulnerability' that result from combining the physical characteristics of the flood with locational and social characteristics (DEFRA, 2006). The 'area vulnerability' score includes fixed features, such as housing type and the effectiveness of measures to manage the risk, such as the presence of flood warning. 'People vulnerability' is related to the age and health of the people in this area and their likely behaviour during flooding (e.g. likelihood of self-evacuation once the flood has started, putting themselves at physical risk).

2.28 Knowledge of the economic and social characteristics of those in flood risk zones has also been the focus of research. The possibility of using spatially referenced data to generalise the economic characteristics of those at flood risk was examined by Fielding and Burningham (2005). In this study designed to detect any social inequalities, social class characteristics of the population at risk from flooding at selected sites in England were compared with the population considered not at risk. Much depends on the basis of aggregation; the use of broad census districts for spatial subdivision giving a different result to a grid model-based aggregation method. The grid model was considered more accurate and indicated that lower income groups were disproportionately located in the flood risk zones. A UK-wide study by Walker *et al.* (2006) also concluded that more vulnerable groups are more likely to live in areas at risk of coastal flooding. However this effect, whilst significant at a regional level, was not replicated for the UK as a whole, again hinting at important scale effects. A study in Florida designed to prioritise areas for evacuation purposes reported similar findings in relation to the risk of hurricane damage (Chakraborty, 2005). Both studies imply it is difficult to generalise on the social profiles of those living in hazardous locations. At some scales there may be a clear discrepancy in economic and social characteristics between those at risk and those not at risk, but there are no consistent regional or national patterns. No attempt has yet been made to extend this methodology to Scotland.

### ***Warnings and emergency preparedness***

2.29 Effective warnings maximise a community's ability to adapt to an impending flood and help minimise loss and trauma. They are deemed to be a crucial factor in

reducing the risk of loss of life, and are often a most cost effective measure in regions where defences are not physically or economically feasible. The lack of warning systems has been linked to the high casualty rates and economic damage in the Czech Republic and Poland during the floods of 1997. In Germany, where warning systems were present, both were much lower in the same event (Rosenthal *et al.*, 1998; Penning–Rowse *et al.*, 2004; DEFRA, 2006).

2.30 Most people affected by the 1998 floods in England and Wales did not receive a warning, which led to a revision of the Environment Agency’s procedures and the establishment of *Floodline* (subsequently extended to Scotland by SEPA). In the 2000 floods in England and Wales, there was no loss of life and the warning systems gave authorities more chance to evacuate those at risk (Kelman, 2001). The effectiveness of warnings, however, is highly dependent on lead times. There is a stark contrast in lead times between pluvial/flash floods and fluvial floods, with the lead times for pluvial flooding drastically lower or non-existent (Rosenthal and Bezuyen, 2000). In January 2005 several areas in northern England and Scotland had little or no warning, either because the flooding was coastal (e.g. Western Isles of Scotland) or because of very rapid combined pluvial and fluvial flooding (e.g. Carlisle). The provision and lead time of warnings is an important aspect of ‘area vulnerability’ in DEFRA’s *Flood risks to people* project (para 2.27). There are severe difficulties in developing warning systems for pluvial flash floods (Bruen, 1999), but ongoing projects are seeking to address this.

2.31 Flood warning systems in the UK have generally met with favourable comment internationally. Thus Handmer (2002) noted the value of the media and web-based warnings from the Environment Agency and SEPA, and the clarity of the four stage alert classification. However, in a wide-ranging review of flood warning systems in North America and Europe, he also identified several areas of general concern that apply to the UK: the need for effective processes to ensure community engagement, determining and delivering appropriate advice on what action to take on receipt of a warning; and identifying high risk groups to ensure they get the advice that they need.

2.32 Glantz (2003) in a wide-ranging global review of various approaches to flood warning points to several ‘dos and don’ts’. Prominent among the ‘do’s are:

- educate and remind, especially between hazard episodes, bearing in mind the inherent public tendency to discount the past;
- time warnings correctly;
- involve stakeholders as early as possible in the development and review of a warning system; and
- identify what it is that makes societies more or less vulnerable and more or less resilient.

2.33 It is clear from these reviews that the dissemination requirements should not be neglected. Co-ordination between public sector bodies and local institutions across a variety of sectors is crucial to establish dissemination plans that ‘work’ when a flood strikes (IFRC, 2002). It is helpful to survey examples of interaction between communities and management bodies (Davis *et al.*, 2004). Best practice places stress on co-operation and community participation, which also helps manage public

expectations of a warning system and ensures that the public are aware the system does not stand alone but must be combined with further advice (Keys, 1991;

#### **Box 2**

#### **Foresight: Future Flooding (Evans et al. 2004)**

#### **Methodology**

The project analysed the potential future losses from flooding across the UK under four different socioeconomic scenarios to reflect different potential national governance and sustainability approaches between now and the 2080s, and the effects that these approaches would have different effects on greenhouse gas emissions (and, consequently, modelled climatic change).

**World markets** (Internationalist, libertarian/ market-enabling, high growth high emissions)

**National enterprise** (Nationalist, individualist, statist/ market-regulating medium-low growth, medium-high emissions)

**Local stewardship** (Localist, co-operative, interventionist, low growth, medium-low emissions)

**Global sustainability** (Internationalist, communitarian, corporatist, medium-high growth, low emissions)

#### **Results**

The report suggests that in the 2080s, the number of people in England at high risk from flooding would increase from 1.4 million at present to between 2.0 million and 3.3 million, depending on the scenario followed. The expected annual economic damages in England to residential and commercial properties might increase from £0.9 billion to between £1.5 and £20 billion. At minimum, socioeconomic influences multiply overall risk between 3 times (for governance scenarios that emphasised sustainability) up to 20 times (for the lower sustainability scenarios – see Executive Summary, p23). £10-30 million increases in spending, year on year, could be required to come with the increased risk.

The report examined 80 responses to these risks, categorised into **direct response** (ie flood defence, forecasting), **governance** (institutional change, adaptation etc), and **radical** (e.g. soft engineering solutions).

It noted the importance of social engagement to the success of those responses:

*While there is scope for improvements in science and technology to unlock large reductions in risk through measures concerned with forecasting and flood-fighting, it is issues of governance and stakeholder behaviours that will determine the extent to which flood management measures ... can be implemented in practice. In this regard, the receptor-related response groups ... are closely influenced by scenario-specific public attitudes and societal values (Vol 2 – Managing future risks --p32).*

Werritty with Chatterton (2004), extended the project to Scotland. They assessed that an increase would occur in economic damage to the 2050s, from £31.5 to £52.9 million).

Social influences were considered to be even higher-ranking drivers to future flood risk in Scotland than in England and Wales. The highly urbanised nature of Scottish society, coupled to future projected increases in rainfall magnitude and frequency with often antiquated urban drainage systems, elevates the future risk level under all four modelled scenarios. They note, however, that the high degree of social cohesion in Scotland has the potential to reduce the adverse social impacts of flooding significantly. This assertion requires closer evaluation within Scottish communities.

Lichterman, 2000). Twigg *et al.* (2001) comment that this engagement allows people to express needs and priorities and reinforces local organisation. Parker (2000) points out the need also for a relationship of trust with authorities, which is helped by familiar individuals on the ground persuading the public to act on warnings.

2.34 International examples exist of attempts to link flood warning to positive behaviour by recipients. Australia's 'total flood warning' system (Handmer, 2000) provides an example that emphasises prediction and dissemination, alongside prescribed responses by management agencies and communities, plus institutional co-operation in the review and improvement of the scheme. Another example of a successful approach is provided by Blandford, South Canterbury, New Zealand, where full information brochures and outreach programmes, along with site-specific signage and warning status signs, have been introduced (Kingsbury, 2000). The measures have proved successful in alerting tourists and others temporarily on the site to the dangers and steps to take in the event of a flood.

2.35 In relation to evacuation, problems have been identified: notably, the resistance of a population that has not been subjected to a flood before. Pfister (2002) observed that this was a significant factor in the lack of response to an evacuation order in New South Wales, Australia, and noted that the effect of 'crying wolf' might make future evacuation more difficult (also reported by Dow and Cutter (1998) as an effect of repeated hurricane warnings in the USA).

2.36 A further area of concern is that of the 'residual risk' groups that remain even after implementing flood warning dissemination and evacuation plans (Handmer, 2001). This group is highly uncertain in size, but contains those potentially subject to most impact following a flood and most at risk of death. These less visible groups require inclusion in flood warning plans as well. Handmer also identifies people mobile at the time of the flood, those in the site temporarily, seasonal workers and those socially isolated as examples of less visible groups.

2.37 The need to be aware of vulnerable groups has been reinforced by a survey into attitudes to flood warning systems by Thrush *et al.* (2005). This study sought to identify groups in England particularly at risk through being located in areas flooded in 2000, but who were also less likely than others to receive, or to respond to, warnings. Confirming many of the published findings noted above, socially vulnerable groups in risk areas were both less likely to receive warnings and less able to take action in the event of receiving them. In terms of receiving warnings, those at risk included minority ethnic groups (especially where language was an issue); older people who were confused; those with mental or physical illness; and those with other special needs, including hearing impairment (particularly relevant for telephone warnings). In terms of taking action on receiving a warning, those most at risk included single people (compared to households with two or more adults), those new to an area, and families with young and/or dependant children.

2.38 In Scotland, SEPA reported low levels of awareness of *Floodline* among those living in the 42 flood risk areas covered by its *Floodline* warnings (SEPA, 2004, 2005). A large number of respondents aware that they were in a risk area were unaware that they were in a *Floodline* warning scheme area. Awareness increased following various campaigns, including an 'awareness fortnight' in 2003 and a

follow-up advertising campaign in 2004, and trailer and information displays in flood risk areas during 2005. The most recent information from SEPA indicates that, in a telephone interview sample of 200 adults in 11 'at-risk' zones in October 2005 and prior to a flood awareness campaign, 95% did not think their property was at risk of flooding. Although a majority had heard of *Floodline*, only around 24% said they knew a little or a lot about its operation. Of those responding to feedback questionnaires following a visit to a mobile exhibition, 67% of households had been flooded in the past, but only 30% had made any preparation for flooding. Encouragingly, 81% said that they would be making preparations for flooding as a result of the visit, indicating the value of this direct community contact.

2.39 A recent scoping study assessing the benefits of flood warning schemes reviewed SEPA's existing cost benefit assessment procedures and urged a shift in focus away from "the movement of possessions, to a holistic approach incorporating the benefits from operational and resilience activities" (SNIFFER, 2006, p. ii). Whilst noting the importance of intangible losses from flooding (life, injury, health and well-being), clear guidance on quantifying such losses in terms of flood warning benefits awaits further research. However, the study concluded that an economic valuation of the tangible benefits of flood warning in Scotland could be undertaken based on the Multi-Coloured Manual (Penning-Rowse *et al.*, 2005) whilst noting that high levels of uncertainty in existing flood damage data sets could make it challenging to attribute actual savings to any given flood warning scheme.

### ***Insurance***

2.40 Insurance provision covering both buildings and contents is the dominant means of managing flood risk at the household level in the UK. There is a stark differentiation in the impact of floods on those with and without insurance (Fordham and Ketteridge, 1995). Affordable flood insurance cover for buildings has been readily available from the early 1960s to the late 90s, due to the agreement drawn up between the British Insurance Industry Association (forerunner to the Association of British Insurers - ABI) and the UK Government. This availability, tied to the expansion of owner-occupation, has resulted in the vast majority of Scottish homeowners and landlords having building cover for floods, usually as a condition of their mortgages, with average household premiums around £250 (Crichton, 2005).

2.41 Over the past 10-15 years the amount paid for flood damage by insurance companies has increased rapidly. Global losses in the 1990s exceeded US\$200bn, with insured losses from the 2002 European floods at €3.4bn (Munich Re, 2005). In the UK, the 2000 floods generated insured losses of more than £1bn (Environment Agency, 2000) causing the industry to consult on a range of strategic options for the future (Green and Penning-Rowse, 2002). The response has been to develop internal risk assessment methods enabling the industry to take on new business thanks to the more detailed information gained from these methods on the flood risk of individual properties (ABI, 2005). Coverage is now provided to 'almost all' households in 'high' flood risk locations, although the industry makes no claim to provide universal coverage (ABI, 2005).

2.42 The current ABI pledge on providing household and business insurance dates from 11<sup>th</sup> November 2005. Where properties are subject to a 1-in-75 year or worse risk of flooding, households and businesses should still be able to obtain insurance cover where there are plans to improve defences in the next five years. However, the position remains that insurance provided will be subject to premiums that reflect the assessed risk to the property and market forces.

2.43 Introducing the new agreement, Stephen Haddrill, the ABI's Director General, said

*“The insurance industry is committed to ensuring that flood insurance remains available to existing customers where flood defences will be in place within five years. This is good news for the millions of homeowners and businesses who rely on insurance for financial protection from the cost of flooding. The Government’s commitment to effective management of flood risk is very welcome, and enables our members to continue flood cover for almost all households and businesses at risk of flooding. “However, we expect climate change to dramatically increase the flood risk, so continued improvements on the ground are vital. For flood insurance to remain widely available, the Government must make further progress in reducing the flood risk in vulnerable communities throughout the country” (quoted from ABI news release Friday, 11 November 2005).*

It is noted that no distinction is made between the UK and Scottish governments in this statement, although the difference in approach to flood risk management in Scotland has had an influence on the policies of some insurance companies, and arguably should have had more (Crichton, 2003a and pers. comm.).

2.44 The social impact of the change in the price and availability of insurance has been poorly documented both in Scotland and the UK as a whole. Insurance penetration is likely to be lower for those on low incomes, and the policy changes by the industry threaten to make the impact ever greater for those groups. Contents insurance is also likely to have been taken up to a lesser degree in this group. Around 20-25% of UK households do not have home contents cover (Priest *et al.*, 2005) and the attendant risk from flooding is likely to be borne more disproportionately by lower income groups (Arnell, 2000).

2.45 A variety of reasons are documented for this lack of insurance cover, ranging from incomplete information on risk to inability to afford it (Whyley *et al.*, 1998). Among those who are covered for both buildings and contents, there may be a reluctance to take other flood protection measures or to act on flood warning – the so-called ‘moral hazard’ (Handmer, 1989).

2.46 Fordham and Ketteridge (1995) found that lack of insurance and under-insurance for home contents were common factors in exacerbating the impact of the early to mid 1990s floods in Scotland. The causes for underinsurance were said to have been unrelated to the flood risk, but reflected the ‘red-lining’ of areas of public housing by insurance companies due to risks of vandalism and theft. Data are scarce on the take-up of contents insurance in flood risk zones in Scotland and whether similar insurance company concerns still prevail in such zones. On a UK level, it has

been found that 80% of all households are covered by contents insurance, but only around 50% of tenants, including local authority tenants, have contents insurance. As noted by Hood *et al.* (2005), this is significant as having contents insurance makes it far less likely that the occupier will seek emergency assistance and temporary housing at local authority expense. Initiatives have been taken to encourage the uptake of ‘pay with rent’ schemes for public sector tenants (Demos and Toynbee Hall, 2005). Following the discovery that 42% of public sector tenants had no contents insurance, the Scottish Executive allocated £500,000 in 2003 to aid the promotion of existing schemes. Currently, 80% of Scottish councils operate such schemes, although take-up by tenants still appears to be low (Crichton, pers comm.).

2.47 Removable flood defences may provide a solution to lack of insurance for some householders. Crichton (2003b) observed that over 150 types of removable protection were then available on the open market, although due to uncertainties about their effectiveness or deployment, their use would be unlikely to change the eligibility of the property for insurance coverage. However, at present there is little research into the extent of their uptake or into social attitudes to these systems, although some evidence exists that local authorities have promoted their uptake in flood risk areas. The uptake of flood resistance measures following flooding of buildings (‘resilient reinstatement’), which could reduce the value of future claims for properties that have been flooded in the past (ABI, 2003) has also yet to be assessed.

### *The ‘sustainable approach’ to flood risk management*

2.48 DEFRA’s *Flood risks to people* project reflects a general move towards viewing flood preparedness as a suite of non-structural measures which include planning and building control, insurance and effective forecasting and flood warning (DEFRA, 2006). All these measures will be required on a national basis across the UK as and when the proposed EU Floods Directive becomes law. In Scotland, there are already legal implications of such measures with the provision of sustainable flood management now a statutory duty on responsible authorities as the Water Environment and Water Services (Scotland) Act 2003 comes into operation.

2.49 For the purposes of Scottish legislation sustainable flood management has been defined as providing:

*“..the maximum possible social and economic resilience against flooding, by protecting and working with the environment, in a way which is fair and affordable both now and in the future”.*

This definition was recommended by the National Technical Advisory Group (Scottish Executive, 2005) for implementation of the Water Environment and Water Services (Scotland) Act 2003, and includes ‘enhancement of community benefit with fair outcomes for everyone’ as one of its objectives. ‘Resilience’ encompasses the four ‘A’s’: **Awareness** of flood risk, **Alleviation** of the effects of the flood, **Avoidance** of the risk where possible, and **Assistance** in the event of difficulties.

2.50 As part of the non-structural and planning aspects of ‘alleviation’ and ‘avoidance’ approaches, catchment wide management and ‘soft’ defences should be

implemented generating environmental gain by the restoration of riparian wetlands restoration and the creation of detention ponds (Davis, 2004; Scrase and Sheate, 2005). *Making space for water* (DEFRA, 2004) which strongly advocated this approach has met with a generally favourable response from consultee stakeholders in England. It advocates a mix of policies to prevent creation of new risk, manage existing risk and increase resistance and resilience. It also stresses the need to understand and accept the respective roles of the state, central and local government, NGOs and individuals, in flood risk management. This 'integrated portfolio' of responses will, it is hoped, contribute to the sustainable development objectives of reducing the threat to people and property and delivering the greatest environmental, social and economic benefit. However, the flood alleviation capabilities must be capable of withstanding extreme events, and research in this respect reports mixed results (Scottish Executive, 2005).

2.51 Use of riverbank realignment and land restoration is occurring in Scotland by some local authorities using powers available to them under the Flood Prevention and Land Drainage (Scotland) Act 1997. The various measures incorporated include alleviation work in river channels, biodiversity improvements, farming practice improvements, using local knowledge and public participation as well as technical studies of the catchments concerned. Although reported to having beneficial effects (Smith, 2005), there is a lack of information on social attitudes in Scotland for such rural flood management measures.

2.52 There are also international examples of good practice to draw on. One approach is the plan in London, Ontario, Canada, where land use planning and wetland re-establishment have been combined with existing hard dams and defences to create a catchment with a high degree of resilience to flooding (Brick and Goldt, 2001). The land use planning regime is strict: no new development is permitted on the floodplain and existing residents can only sell to the municipal authority when they move, who then demolish the property. The Napa River Flood protection project in the USA also indicates the value of community participation in implementing a sustainable river management scheme for a river that had been artificially straightened, again with a strong emphasis on ecological restoration (Bechtol and Laurien, 2005).

2.53 Sustainable urban drainage systems (SUDS) in urban areas, if properly designed and maintained, also have potential to contribute to the sustainable flood management approach. The SNIFFER project on *Social impacts of stormwater management techniques* (SNIFFER, 2005) investigated social attitudes in zones where sustainable flood management systems have been implemented in urban areas across the UK. It found that the public held strong views on what they favoured in such systems, with an emphasis on aesthetics, amenity and recreation value. There is a need both to take the public's views into account and for better publicity about proposed schemes prior to implementation, to ensure social acceptability, particularly where current awareness levels are low.



## **Summary**

2.54 This chapter has reviewed the impacts of flooding (flood-related deaths, health-related intangible losses, and community and housing impacts) and has included a small number of earlier studies relating to Scotland. Living with flood risk (social drivers of vulnerability, distribution of risk and vulnerability, warnings and emergency preparedness, and insurance) provided a second area in the review. Recent more sustainable approaches to flood risk management in Scotland, the rest of the UK and abroad have also been examined.



## CHAPTER THREE

## METHODS

3.1 Capturing the complexities of human responses to flooding and assessing ‘what works’ in terms of flood prevention and warning schemes requires a flexible and wide-ranging methodology which embraces both quantitative and qualitative approaches. The methodology adopted in the project comprises four distinct but complementary strands:

- 1) Socio-demographic profiling of flood risk areas in Scotland and selection of study areas
- 2) Questionnaire survey of households in flooded/flood risk areas
- 3) Focus group discussions with residents in flooded areas
- 4) Semi-structured interviews with institutional stakeholders

### **Socio-demographic profiling of flood risk areas and selection of study areas**

3.2 In order to establish what type of communities are most exposed to flood risk, and to ensure that the selection of study areas is representative of this, the socio-demographic characteristics of the populations living in flood-risk areas across Scotland have been identified from the 2001 Census of Population. This information has been used for two purposes:

- To assess whether potentially vulnerable groups are over or under represented in flood-risk areas.
- To assess how representative the returns in the household survey are of flood-risk areas across Scotland as a whole.

3.3 Socio-demographic profiling is necessary because certain types of individuals and households may be more vulnerable to the impacts of flooding than others, for example the elderly, lone parents, children and people whose activities are limited by ill-health or disability (DEFRA, 2006). In addition, housing tenure may influence the nature and severity of the impacts of a flood, for example local authority landlords often have limited capacity to rehouse flood victims whereas owner occupiers may be able to access accommodation paid for through their buildings insurance.

3.4 It is also important to establish whether potentially vulnerable groups are over or under represented in flood-risk areas across Scotland (cf Fielding and Burningham, 2005). On the one hand, it could be postulated that local authority housing and lower income households in the private sectors are more likely to be located in flood-risk areas because the land and housing may be cheaper. On the other hand, some attractive riverside locations may act as magnets to higher income households.

### ***Methods***

3.5 The key challenge in profiling the socio-demographics of small areas such as flood-risk zones is matching the spatial units used to report Census results to outlines of flood risk. The smallest geographical units for which Census data in Scotland are available are Output Areas. There are 42,604 Output Areas across Scotland with, on

average, around 50 households and a population of 120. Because Output Areas are designed to have approximately equal populations, they are of substantially greater geographic extent in rural areas reflecting the lower population density found there.

3.6 Analysis using a Geographical Information System (GIS) indicates that there are 287 Census Output Areas that are completely contained within flood-risk areas (as defined by the IH 130 indicative flood risk maps and, where available, more recent maps held by the relevant local authority). Although this approach excludes significant areas of flood-risk, most of these are relatively sparsely populated and it has the advantage of not spuriously introducing any Census data from outside flood-risk areas. The 287 selected Output Areas are composed mainly of clusters in Angus, the Scottish Borders, Edinburgh, Glasgow, Moray and Perth & Kinross.

3.7 The main disadvantage with this approach is that the 287 Output Areas largely represent towns and cities at the expense of remoter areas. For this reason, the socio-demographics of the 287 'flood-risk' Output Areas should not be compared against Scotland as a whole, as this would simply reflect the substantial socio-demographic differences between urban and rural areas. For example, 27.5% of households in the 287 flood-risk Output Areas rent their home from the local authority compared to only 21.6% in Scotland as a whole. At first sight, this could suggest that local authority housing is more likely to be built in flood-risk areas, but when large Output Areas in remoter parts of Scotland are excluded the figure for comparison rises to 27.0%, indicating virtually no difference between flood-risk and non-flood-risk areas.

3.8 Consequently, the analysis presented here compares flood-risk areas in built-up areas with urban areas not at risk of flooding. The possibility that the results would be different in remoter areas cannot be discounted.

### ***Socio-demographics of flood-risk areas***

3.9 In urban areas, the socio-demographic profile of flood-risk areas is generally very similar to that of areas not at risk of flooding. For example, 27.5% of households in flood-risk areas rent from a local authority compared to 27.0% overall (Table 3.1). The corresponding figures for employed persons in 'elementary' (i.e. unskilled) occupations are 14.5% and 14.1% respectively. Lone parents with dependent children and households containing a person with a limiting long-term illness both form slightly lower proportions of households in flood-risk areas (7.5% and 37.6% respectively) than elsewhere (8.3% and 38.4% respectively). Another minor difference between flood-risk and non-flood-risk areas is that older people are slightly more likely to live in the former (17.3% of people in flood-risk areas are aged 65+ versus 15.6% elsewhere).

### ***The representativeness of the household survey returns***

3.10 Previous experience indicates that retired people and those of higher socio-economic status are more likely to participate in household surveys. While older people (aged 70+) are inevitably over-represented in our returns (22.2% of survey returns versus 11.2% of the Scottish population), lower socio-economic groups are

relatively well represented. For example, 9.9% of our survey returns fall into the ‘elementary’ (i.e. unskilled) occupational category versus 12.7% in Scotland as a whole, a difference of only 1.8%. The under-representation of local authority tenants is slightly greater (15.8% versus 21.6% nationally) but again is not as substantial as is sometimes the case with this type of survey.

**Table 3.1 Socio-demographics of flood-risk areas**

Socio-demographic group	% of persons or households in socio-demographic group	
	Flood-risk areas in urban Scotland*	Urban Scotland**
Persons aged 65+	17.3	15.6
Single pensioner households	16.7	15.8
Lone parents with dependent children	7.5	8.3
Rented from Local Authority	27.5	27.0
Rented from Housing Association	6.7	6.9
Elementary occupations	14.5	14.1
Households with person(s) with a limiting long-term illness	37.6	38.4

\*For flood-risk areas, ‘urban Scotland’ is defined by the Census Output areas that are completely contained within flood-risk zones (n=287; mean=1.90ha; median=1.59ha; total pop=30,089).

\*\* For areas not at flood-risk, ‘urban Scotland’ is defined as Census Output areas less than 3ha on the basis that this gives a size distribution of Output Areas comparable to that of those in flood-risk areas (n=25,311; mean=1.64ha; median=1.63ha; total pop=2,770,719).

### ***Selection of flood risk areas***

3.11 Having listed Scotland’s major floods over the period 1993-2005 and coded them as **fluvial** (over-topping of river banks), **pluvial** (surcharging sewers combined with overland flow) and **coastal**, a representative sample of flood risk areas was compiled. Floods of differing origins were sampled from **small urban areas** (Brechin, Elgin, Forres, and Hawick), **large urban areas** (Glasgow, Edinburgh and Perth) and **scattered inland and coastal rural locations**. The number of households sampled in each of these locations is given in Appendix B; Table 1. The number of households located in large urban, small urban and rural areas is given in Appendix B; Table 8. The number of households recording each type of flood (fluvial, pluvial and coastal) is given in Appendix B; Table 9.

### **Questionnaire survey of households in flooded/ flood risk areas**

3.12 In order to generate information relating to *flood impacts* (objective 1) and *attitudes to floods, knowledge and awareness of floods and behaviour during floods* (objective 2), a survey was undertaken on households which had been flooded and households located within flood risk areas but not flooded (as defined on the first generation IH 130 indicative flood risk maps and, where available, more recent maps held by the relevant local authority).

3.13 The survey was undertaken via a questionnaire designed to be completed by respondents with minimal or no assistance from a member of the project team. In urban areas the questionnaire was delivered by hand to each household and usually collected the next day, with the team member occasionally assisting in its completion. Collection was focused on evenings and weekends to maximise the number of returns; two return visits being made where necessary. FREEPOST envelopes were provided when follow up visits still failed to generate a response.

3.14 Address lists of households which had been flooded and households, not flooded, but located in flood risk areas were generated in advance of visiting each survey site. For smaller urban areas (Brechin, Elgin, Forres and Hawick) questionnaires were delivered to all households within the historic flood envelope. For larger urban areas (Edinburgh and Perth) a sample was drawn of properties closest to the river with a variable upper limit in any one survey site of c. 250-550 properties. Scottish Water provided addresses of properties in the east end of Glasgow which experienced pluvial flooding in 2002 from which a representative sample of 262 properties was drawn. Across all survey sites a maximum of 10% of upper floor properties was included in the total sample. The number of households visited in each survey site is listed in Appendix B; Table 1.

3.15 For scattered rural inland and coastal locations, the questionnaire was delivered by post, respondents being provided with an envelope for return by FREEPOST. A sample of addresses of flooded households in Orkney, Shetland, Culloden, Menstrie, Eyemouth, Dunoon, Newcastleton and Corpach was generated from information in local authority 2003 and 2005 Biennial Reports and telephone contact with council staff and SEPA representatives. Reconstructed outlines of flood extent were often available, which allowed accurate selection of properties.

3.16 The questionnaire (which will be provided with a statistical annex due to be published on the SE website in summer 2007) was divided into five sections:

- *Your experience of flooding* (information on the actual experience of being flooded).
- *Impacts of the flood* (immediate and lasting impacts of the flood).
- *Living with floods* (awareness of flood risk and measures to reduce the impacts of flooding).
- *Your thoughts and opinions* (views on flood protection measures and where responsibility for providing protection lies).
- *About you and your household* (information on composition of household, housing tenure, occupation, educational qualifications and household income).

Households which had been flooded were invited to complete all five sections. Households which had not been flooded, but which were located within the flood risk area, were invited to complete the last three sections.

3.17 A draft questionnaire was piloted in Brechin in order to:

- assess what sampling strategy would generate an appropriate proportion of flooded versus 'not flooded but at flood risk' households;

- assess response rates from different risk groups, in particular households that lived within an historic flood envelope versus those outside the envelope; and
- test the suitability of the questionnaire, for example in terms of topics covered, question design, routing and overall length.

3.18 Having delivered questionnaires to 67 properties in Brechin which yielded 46 returns (68.7% response) it was concluded that sampling within the historic flood envelope would generate a representative sample of households living in a flood risk area. Many properties which had been flooded, but had subsequently changed occupancy, yielded a robust sample of households ‘at risk but not flooded’ alongside other properties within the historic flood envelope which were ‘at risk and had been flooded’ but with no change in occupancy. The questionnaire was revised in light of the Brechin returns following discussions within the project team plus contributions from the Project Steering Group.

### **Focus group discussions**

3.19 Focus groups provide a means to elucidate detailed and nuanced information on people’s attitudes and motivations in much more depth than is possible via a questionnaire survey.

3.20 Focus group participants were recruited from the household questionnaire survey. Respondents to the survey who had been flooded were asked if they would be willing to participate in a focus group to explore some of the issues in greater depth. Expenses of £15 was paid to each respondent who attended a group. Focus groups were held in Elgin, Forres, Edinburgh, Glasgow and Perth with 10-12 respondents being invited to each venue to explore their views on:

#### *General attitudes towards flooding and flood risk:*

- the balance of responsibility for mitigating flood losses – individuals versus public authorities
- the range of options for reducing losses available to individuals living in flood risk areas
- the types of flood proofing and/or action individuals would be willing to take to mitigate flood losses
- individual’s attitudes to flood insurance

#### *Experiences and perceptions of flood prevention schemes and flood warning schemes:*

- awareness of flood alleviation schemes either in place or being planned
- changes in behaviour due to campaigns designed to raise awareness of these schemes
- perceived effectiveness or potential effectiveness of these schemes and how far they instil confidence or anxiety
- the accuracy and reliability of warnings
- the effectiveness of the warnings which resulted in their evacuation

3.21 Each focus group, held in a hotel, lasted around 90 minutes with 5-10 of the invitees attending alongside two or three members of the project team. Each session was recorded onto audio tape and then transcribed to provide a verbatim record.

**Table 3.2 Key institutional stakeholders' interviews and dates**

<b>Date</b>	<b>Contact</b>	<b>Issues discussed</b>
14.12.05 telephone	Underwriting Policy Manager Norwich Union Insurance	Draft questionnaire Strategic methods used by NU and others to mitigate flood loss Ideas for further future mitigation of loss
30.1.06 interview	Head of Flood Warning Development SEPA	SEPA policy on flood warning provision Experience of flood warning development Warning in coastal areas and catchments with short lead times
9.2.06 interview	Head of Flood Warning SEPA Highland and Grampian region	Same issues as above but specifically northern experience
10.2.06 interview	Perth & Kinross Council	Emergency planning Warning dissemination
14.2.06 interview	Glasgow City Council  Emergency Planning  Building and Land Services	Flood incidents in Urban areas  Warning Dissemination  Interaction with Emergency Services Post-flood recovery Flood alleviation scheme promotion
23.3.06 interview	Scottish Executive SEERAD	National policy on flood prevention
28.4.06 interview  and 13.8.06 telephone follow-up	Edinburgh City Council  Emergency Planning  Flood Prevention	Flood incidents in Urban areas  Warning Dissemination  Interaction with Emergency Services Post-flood recovery Flood alleviation scheme promotion
2.5.06 interview	Renfrewshire Council	Network regeneration and flood prevention Flood alleviation scheme promotion
7.7.06 telephone	Aberdeen City and Aberdeenshire Councils	Emergency planning Watercourse management Flood Liaison and Advice Groups
7.06 telephone and email exchange	Moray Council	Emergency planning Post-flood recovery AVM system
8.06 telephone plus written responses	Scottish Water	Measures to prevent urban flooding Flood warning and emergency procedures Network maintenance and renewal

### **Semi-structured interviews with institutional stakeholders**

3.22 The purpose of the interviews with institutional stakeholders was to examine 'what works' in terms of flood prevention and flood warning (particularly in relation



to the social aspects of such campaigns) and engagement with the community and other stakeholders in flood risk areas. These issues were discussed with practitioners at both national (Scottish Executive, SEPA) and local levels (local authorities). Interviewees and dates are shown in Table 3.2 and the issues covered in Appendix D. Most interviews lasted around 90 minutes and, with permission, were recorded.

## **Data analysis**

3.23 The returns from the Household Survey were coded and then analysed using SPSS (a statistical package with routines specifically designed for analysing social science data). Summary tables, often involving cross-tabulation of responses against socio-economic status, provided concise and efficient outputs of the main findings. For some responses it was possible to determine statistically significant differences between sub-groups (eg 'flooded' and 'not-flooded') using a Chi-Squared test. The transcripts of the Focus Group discussions were examined following the same sequence of issues as for the Household Survey (impacts of flooding, living with floods and managing flood risk). Verbatim quotations from participants' contributions were extracted from the transcripts to provide illustrations to each of these themes. In a similar manner the tape-recorded semi-structured interviews with institutional stakeholders were examined to collate answers across a range of questions and provided quotations to amplify specific findings.

## **Summary**

3.24 This chapter describes the methods adopted in this study. Households in locations variously flooded between 1993 and 2005 by rivers, coastal storms or failed urban drainage comprised the target population. A self-complete questionnaire-based survey was designed to elicit responses on flood impacts and the experience of living with floods from households which, during the study period, had either been flooded or were at risk of being flooded. The draft questionnaire was piloted on households in Brechin within an area flooded in 2002. In a revised form, it was subsequently delivered by hand to a sample of households in small urban areas (Elgin, Forres and Hawick), large urban areas (Glasgow, Edinburgh and Perth) and, by post, to scattered inland and coastal rural communities. Focus groups were organised at five locations with participants recruited from respondents to the household survey who had been flooded. The group's experiences and attitudes were recorded onto audio tape and then transcribed to produce a verbatim record. Semi-structured interviews (also recorded) with a range of institutional stakeholders were designed to elicit views on 'what works' in terms of flood prevention, flood warning and engagement with those who live in flood risk areas. Socio-demographic profiling of the flood risk areas yielded a slight over-representation of single pensioner households and a slight under-representation of lone parents with children, but in other categories lower socio-economic groups were well-represented when compared with urban Scotland as a whole.



## CHAPTER FOUR HOUSEHOLD SURVEY

4.1 The questionnaire survey was delivered to 2,321 households in Brechin, Edinburgh, Elgin, Forres, Glasgow-Shettleston, Hawick and Perth (Table 4.1 and Figure 4.1). Households were randomly selected within historic flood envelopes provided by the relevant local authority. This meant that all surveyed households were at risk, but due to local topographic effects or changed occupancy since the flood, not all households had been flooded. The locations of the major urban communities sampled in the household survey can be inspected in Ordnance Survey 1:50,000 map extracts of Brechin, Edinburgh, Elgin, Forres, Glasgow-Shettleston, Hawick and Perth in Appendix A. The flood outlines on these maps are those from the Indicative River & Coastal Flood Map (Scotland) published by SEPA in November 2006. This was not available at the time of the household survey (March - June 2006) but it does provides a general indication of the sampled communities within the flood-risk areas.

4.2 Responses from 1,223 households were obtained giving an overall response rate of 52.7%. The bulk of the sampling was undertaken by a door-to-door survey, questionnaires being delivered one day and generally collected the next. The scattered nature of the target population for rural and coastal areas (236 households in Inverness, Mentrie, Eyemouth, Dunoon, Copach, Highland region, Orkney and Shetland, Figure 4.1) made a door-to-door survey too costly and a postal survey was adopted instead. The response rate of 29.2%, whilst lower than for the door-to-door survey, is still acceptable for surveys of this kind.

**Table 4.1 Response rates by survey location**

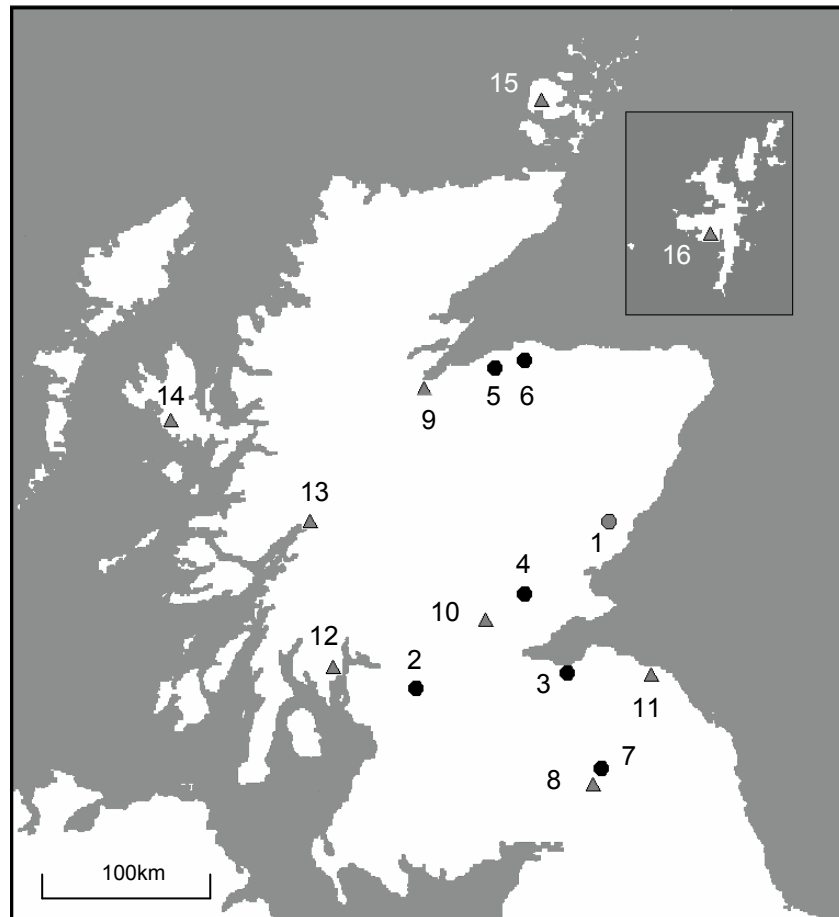
Survey Location	Properties visited	Returned Questionnaires	Response Rate (%)
Brechin	67	46	68.7
Edinburgh	539	316	58.6
Elgin	412	237	57.5
Forres	444	261	58.8
Glasgow-Shettleston	262	113	43.1
Hawick	115	55	47.8
Perth	246	126	51.2
Scattered rural & coastal (by post)	236	69	29.2
<b>TOTAL</b>	<b>2,321</b>	<b>1,223</b>	<b>52.7</b>

### Socio-demographic and residential characteristics of the sample

4.3 The sample yielded 633 flooded properties and 590 non-flooded properties (Appendix B; Table 2) generating a close to even split between respondents who had been flooded (51.8%) and those who lived in a flood risk zone (48.2%).

### *Age and occupation*

4.4 The age profile within households (Appendix B; Table 3) broadly reflects national patterns; 22.2% of households include at least one adult more than 70 years old. The occupational groups of the highest earner are also broadly in keeping with the national profile (Table 4.2). For both 'age' and 'occupation' the sub-samples are sufficiently large to enable differential responses to flooding and flood risk to be examined at a later stage.



**Figure 4.1 Sample sites used in the household survey**

● Pilot survey   ● Main survey   ▲ Scattered rural and coastal

- |                |                         |
|----------------|-------------------------|
| 1 Brechin      | 9 Inverness             |
| 2 Glasgow      | 10 Mentrie              |
| 3 Edinburgh    | 11 Eyemouth             |
| 4 Perth        | 12 Dunoon               |
| 5 Forres       | 13 Corpach              |
| 6 Elgin        | 14 Highland (scattered) |
| 7 Hawick       | 15 Orkney               |
| 8 Newcastleton | 16 Shetland             |

**Table 4.2 Occupational group of highest earner in household**

<b>Occupational group</b>	<b>Number of households</b>	<b>Per cent of households</b>
Managers and senior officials	74	8.8
Professional	144	17.2
Associate professional and technical	153	18.3
Administrative and secretarial	91	10.9
Skilled trades	135	16.1
Personal services	44	5.3
Sales and customer services	30	3.6
Process, plant and machine operatives	83	9.9
Elementary occupations	83	9.9
<b>TOTAL</b>	<b>837</b>	<b>100.0</b>

***Housing tenure and property type***

4.5 In terms of housing tenure (Table 4.3), the majority of the properties are privately owned (75.6%) with rented accommodation provided by local authorities (15.8%), housing associations (4.9%) and private landlords (3.1%). This profile also broadly conforms to the national pattern.

**Table 4.3 Housing tenure**

<b>Housing tenure</b>	<b>Number of households</b>	<b>Per cent of households</b>
Owned with mortgage	467	40.7
Owned outright	400	34.9
Rented from council	181	15.8
Rented from a housing association	36	3.1
Rented from a private landlord or employer	56	4.9
Other	7	0.6
<b>TOTAL</b>	<b>1,147</b>	<b>100.0</b>

4.6 The two dominant types of housing stock (Appendix B; Table 6) comprise terraces and tenements (63.1%), followed by detached and semi-detached properties (35.3%). Groundfloor only bungalows and flats made up 43.1% of the properties sampled and houses with both ground and upper floors 49.2% (Appendix B; Table 7). The remaining 7.7% of properties comprised upper floor flats which had been flooded, below to the agreed ceiling of 10% (para. 3.14).

***Location***

4.7 The majority of properties (49.2%) were located in small urban areas (Brechin, Elgin, Forres and Hawick) with a further 45.4% drawn from large urban

areas (Glasgow, Edinburgh and Perth). The balance of 5.6% was drawn from scattered inland and coastal rural locations (Appendix B; Tables 1 and 8).

### Characteristics of the floods

4.8 Inundation by rivers overtopping their banks (fluvial flooding) was the single most important source of flooding (85.4%), followed by urban flooding (pluvial) caused by surcharging sewers combined with overland flow (9.9%). Coastal flooding was only recorded in 57 properties (4.7%), but this does represent a significant proportion of properties recently subject to coastal floods. The categorisation of flooding type was made by project staff, reflecting information provided by SEPA staff and local authorities in their Biennial Reports for specific events in the sampled locations (Table 4.4).

**Table 4.4 Types of flood**

Type of flood	Number of households	Per cent of households
Fluvial	1,045	85.4
Pluvial	121	9.9
Coastal	57	4.7
<b>TOTAL</b>	<b>1,223</b>	<b>100.0</b>

It is recognised that a clear distinction between fluvial and pluvial floods is not always possible. In this study pluvial flooding relates primarily to the Shettleston event in the east end of Glasgow in 2002. The occurrence, severity and spatial extent of different types of flood over the last decade has constrained our ability to include more properties subject to pluvial and coastal flooding.

4.9 In properties which had been flooded, 60% reported water over one foot deep (30 cm) and only 6.3% less than one inch deep (2.5cm), implying that most floods generate significant depths at ground floor level (Appendix B; Table 10). In 48.5% of properties sampled, the ground floor was inundated and in 16.4% of properties inundation only extended to the gardens and outhouses or garages (Appendix B; Table 2).

4.10 In 81.4% of events the flood waters contained mud, silt or gravel (Appendix B; Table 11) and in 59.4 % sewage (Appendix B; Table 12). All types of floods (fluvial, pluvial and coastal) contained significant amounts of sediment but, as one might expect, sewage was more prevalent in pluvial (73.3%) than in fluvial floods (57%).

4.11 Of those who had been flooded, 74% had experienced flooding in their homes or communal stair and 26% only in their gardens and/or outhouses (Appendix B; Table 2). Of the 629 respondents who had been flooded 71.7% had experienced one flood, 22.7% two floods and 5.6% three or more floods (Appendix B; Table 13).

## The experience of being flooded

4.12 Of those who were flooded, 88% of respondents were at home when the flood occurred. In addition to noting rising water, in 42% of properties a flood warning was received mainly via neighbours (31.8%) or an official (27.5%). For 273 respondents (43% of the sample) *Floodline* accounted for only 8.1% of warnings. (Appendix B; Table 14). Overall, 33.4% of households received a warning at least three hours before their property became inundated (Appendix B; Table 15).

4.13 Priority actions prior to the flood (Appendix B; Table 16) comprised removing possessions from the ground floor (39.3%), deploying sandbags or flood guards (37.4%), followed by moving the car (33.9%) and vacating the house (21.3%). Of the 86.8% of respondents who undertook mitigation measures in response to a warning (Table 4.5), 49.2% removed possessions from the ground floor, 45.9% deployed sandbags or flood guards, 39.7% moved a vehicle to higher ground and 28.9% evacuated members of the household. Only 62.5% of those not warned undertook the same mitigation measures, but at much lower levels of activity. In general, the flood warning generated a higher level of activity in each of these priority actions.

4.14 When priority actions are cross-tabulated against the length of the warning lead time (Appendix B; Table 18), actions within the house were scaled down after three hours, possibly reflecting physical exhaustion and/or evacuation of the property.

**Table 4.5 Actions taken prior to the flood, by whether received flood warning**  
(per cent of respondents)

Action	Received flood warning?	
	Yes n=242	No N=333
Deployed sandbags, flood guards or other defence	45.9	31.2
Removed possessions from ground floor	49.2	32.4
Household members vacated the house	28.9	15.9
Moved car to higher ground	39.7	30.0
Other	2.9	3.0
No action taken	13.2	37.5

4.15 By far the largest source of assistance (Appendix B; Table 19) was from neighbours (55.8%) and family (53.3%), followed by friends outside the locality (27.9%), the local authority (21%) and the Fire Service (19.7%). Of those respondents who had been home when flooded, 58% assisted their neighbours. A further 44% of those at home, but not flooded, also provided assistance.

4.16 The majority of those forced to leave their home (Appendix B; Table 20) stayed with friends/relatives (44.2%) and/or rented alternative accommodation (52.4%). Very few (4.8%) reported using an Evacuation Centre, but this may reflect in part the subsequent use of alternative longer-term accommodation. Many moved from one type of accommodation to another during the period in which they were displaced from their homes.

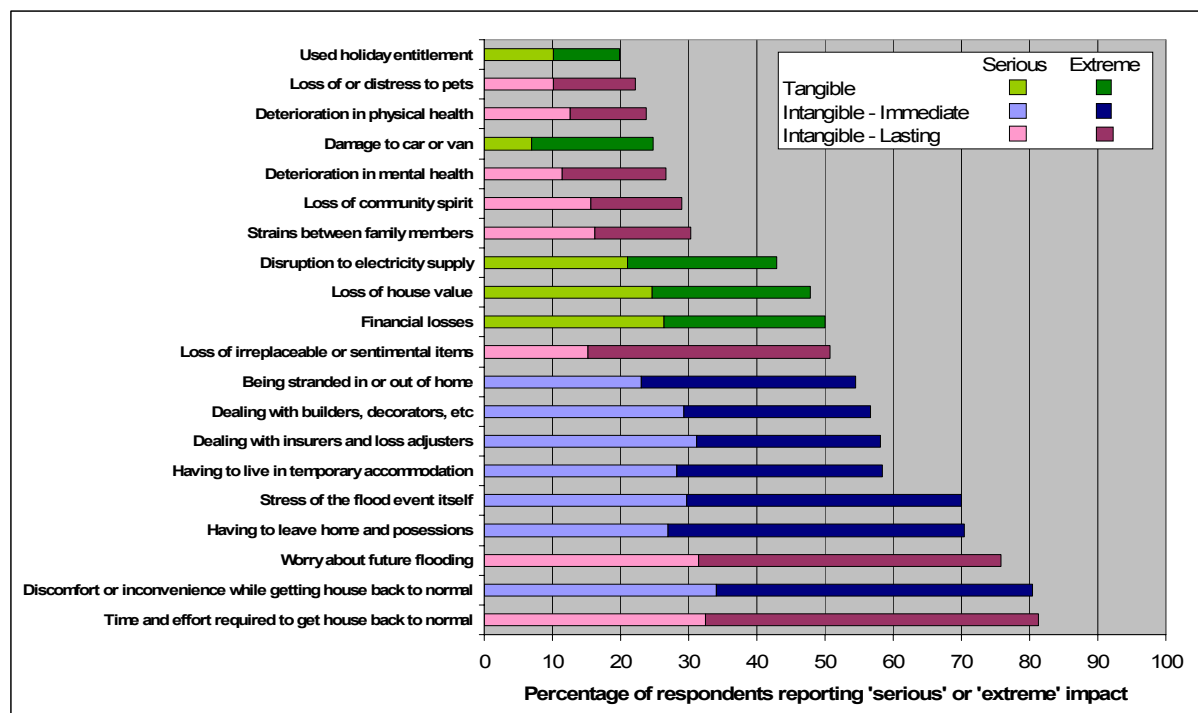
## Impacts of flooding

4.17 Once flooded, 78% of those affected (Appendix B; Table 21) vacated their homes and, of these, 45.4% were out their homes for six months or more, the remaining 54.6% returning within six months.

4.18 Direct economic losses sustained by individual households (Appendix B; Tables 22 and 23) comprised damage to buildings and contents (mean values of £31,980 and £13,552 respectively, though in many cases these losses would be offset by insurance) and unpaid leave averaging 10.4 days. An average of 6.3 days annual leave was also taken in the wake of flooding. The average length of compassionate leave taken from work (with the cost being met by employers) was 9.8 days.

4.19 In order to gauge the impacts of flooding on households, respondents were invited to score 20 potential impacts on a scale: 'not applicable', 'no impact', 'mild', 'serious' and 'extreme impact'<sup>2</sup>. The overall results in terms of respondents reporting a serious or extreme impact are shown in rank order in Figure 4.2 and listed in Table 4.6.

**Figure 4.2 Categories of flood impacts ranked according to severity**



4.20 Each category can also be assessed in terms of its average score (0-3). Time and effort to return to normal (2.21) and discomfort/inconvenience (2.20) are clearly identified as the most severe impacts, closely followed by worry about future flooding (2.14), stress of the flood itself (2.03) and having to leave home (1.91). Impacts directly related to being out of one's home are then registered including dealing with

<sup>2</sup> Responses were then coded 0 – not applicable or no impact, 1 – mild, 2 – serious and 3 – extreme impact. From this an average score for each impact was then generated on a scale 0-3.



insurers (1.67) and builders (1.62), living in temporary accommodation (1.62) and being stranded in/out of home (1.62). Financial loss (1.53) together with loss of house value (1.36) and damage to car (0.76) occupy the second half of the bar chart alongside losses of irreplaceable/sentimental items (1.53), deterioration in physical (0.82) and mental health (0.94), strains between family members (1.02) and loss of holiday entitlement (0.65). Other impacts that score relatively modestly include disruption to electricity (1.33), loss of community spirit (0.97) and loss or distress to pets (0.71); although the last of these may be depressed by responses from households without pets.

4.21 In an attempt to probe deeper in terms of flood impacts, each of the 20 categories has been assigned to one of three groups: **tangible** (relating to material losses) and **intangible** (relating to non-material and/or emotional losses). The latter group is further sub-divided into **immediate** impacts and **lasting** impacts (Table 4.6). **Tangible impacts** are losses that can readily be expressed in material terms (for example, loss in house value, damage to buildings contents and vehicles resulting in a measurable financial loss). By contrast, **intangible impacts** typically involve affective responses. They are less readily convertible into costs although monetised values can be attributed to them by economists (for example, see JBA (2005) and RPA (2005)). Intangible impacts can be further divided into those whose impact is felt during and **immediately** after the flood (for example, being forced to evacuate, the stress of being flooded, dealing with insurers and builders) and impacts that are delayed but **lasting** and only surface several months later (for example, worry about future flooding, loss of irreplaceable family pictures and memorabilia, deterioration in physical and mental health). It is recognised that this typology is not absolute and there are gradations between impacts that are tangible or intangible and immediate or lasting. Nevertheless, we have found this typology helpful in categorising the range of impacts experienced by households that have been flooded.

4.22 Average scores across all households for each of the new classes of impacts have been derived in Table 4.6 for the whole population sampled ('no response' included in the calculation) and for only those who reported an impact ('no response' excluded from the calculation). The former is valid when generalising impacts across the whole population which experienced flooding; the latter is valid if only those who reported an impact (zero, mild, serious or extreme) are included. For example, across the whole sampled population 'loss or distress to pets' scores very low (0.71) whereas amongst pet-owners this impact increases nearly two-fold (1.45). For the sampled population the scores are tangible impacts 1.12, intangible immediate impacts 1.81 and intangible lasting impacts 1.29. **Two points immediately stand out: intangible impacts register markedly higher values than tangible impacts and the immediate impacts are, on average, strikingly higher than the lasting impacts.** These findings undergo some adjustment when only households which reported an impact are included. The rank order across categories remains the same, but the scores change differentially. Tangible impacts are now 1.52 (up 0.4), intangible immediate impacts 2.07 (up 0.26) and intangible lasting impacts 1.57 (up 0.28). For households that register a flood impact, average tangible impacts approach intangible lasting impacts, but intangible immediate impacts are markedly higher than either. This finding is also apparent in Figure 4.2 with individual serious or extreme tangible impacts recorded by 19-50% of households whereas for intangible immediate impacts the range is 51-82% of households.

**Table 4.6 Flood impacts**

Impact	Overall impact on sampled population*		Intensity of impact on those affected**	
	Mean	N	Mean	N
<b><i>Tangible:</i></b>				
Financial loss	1.53	563	1.69	508
Loss of house value	1.36	557	1.70	443
Disruption to electricity supply	1.33	550	1.63	449
Damage to car or van	0.76	534	1.40	292
Used holiday entitlement	0.65	530	1.19	288
<b>AVERAGE SCORE</b>	<b>1.12</b>		<b>1.52</b>	
<b><i>Intangible – immediate:</i></b>				
Discomfort/inconvenience	2.20	586	2.31	556
Stress of flood itself	2.03	601	2.09	582
Having to leave home	1.91	575	2.33	471
Dealing with insurers	1.67	590	1.88	524
Living in temporary accommodation	1.62	585	2.03	467
Dealing with builders	1.62	578	1.97	474
Being stranded in/out of home	1.62	556	1.88	478
<b>AVERAGE SCORE</b>	<b>1.81</b>		<b>2.07</b>	
<b><i>Intangible – lasting:</i></b>				
Time and effort to return to normal	2.21	591	2.33	560
Worry about future flooding	2.14	601	2.21	581
Irreplaceable/sentimental items	1.53	585	1.85	484
Strains between family	1.02	570	1.29	449
Loss of community spirit	0.97	552	1.17	457
Deterioration to mental health	0.94	560	1.21	438
Deterioration to physical health	0.82	579	1.06	450
Loss or distress to pets	0.71	564	1.45	278
<b>AVERAGE SCORE</b>	<b>1.29</b>		<b>1.57</b>	

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

\*\* 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

4.23 The composition of intangible immediate impacts across the sampled population (column 2 in Table 4.6) all relate to the stress of the flood itself (2.03), the anxiety caused by being out of one's home (1.91), the discomfort of living in temporary accommodation (2.20) and time and effort spent dealing with insurers (1.67) and builders (1.62) in order to return home. Although labelled 'immediate' this group of impacts often extends over many months (45.4% of households were out of

their home for six months or more, Appendix B; Table 21). Given the primacy of the goal of returning home, it comes as no surprise that this group of impacts scores so high. However, once the household has returned to its home, many of these impacts will diminish in significance – hence the use of the term ‘immediate’. When only households which registered an impact are included in the sample, the absolute values of impacts increase but, apart from having to leave home (markedly up) and having to deal with insurers (markedly down), their rank order is unchanged (Table 4.6, column 4).

4.24 By contrast, the individual elements that collectively comprise intangible lasting impacts register effects that have a sustained and longer term impact within households across the sampled population. The high score attributed to the time and effort required to return to normal (2.20) points to the flood as a highly disruptive element within the life of the household. Part of that return to ‘normal life’ is hindered by worry of future flooding (2.14), the loss of sentimental/irreplaceable items (1.53) and strains within the family (1.02). Concerns over physical and mental health do not score so highly (0.82 and 0.94 respectively), but this may possibly reflect the stigma attached to scoring mild or serious impacts within such categories. When viewed alongside strains within the family and worry about future flooding, the mental health impacts of flooding could be more severe than is implied by the self coding of the questionnaire (see para 5.18). When only households which reported an impact are included the absolute value always increases, but the rank order is little changed with only loss or distress to pets and deterioration in mental registering higher ranks than before (Table 4.6, column 4).

4.25 Tangible impacts for the sampled population recorded the lowest group average score (1.12). None of the individual impacts scored especially high with financial loss (1.53) and loss of house value (1.36) and loss of electricity (1.33) registering the highest values. All values increase when only households reporting these impacts are included, but the rank order remains unchanged (Table 4.6). It is striking that this group of impacts, which reports material losses most easily measured in economic terms, scores the lowest aggregate score. This may reflect the relatively high take up of insurance, with 94.7% having contents insurance (Appendix B; Table 43).

4.26 We now explore flood impacts on households, sub-dividing the responses according to their experience of the flood (warning received, insurance status, age profile, occupational status, household income, number of times flooded, type of flood, depth of flood, location and housing tenure).

### ***Warning***

4.27 Receiving a flood warning is associated with a lower average score in terms of time and effort to return to normal (2.18 compared with 2.24 for households with no warning), reducing worry about future flooding (2.10 compared with 2.17) and the loss of irreplaceable items (1.48 compared with 1.57) and lower overall financial losses (1.48 compared with 1.57). All of these differences are modest, and it is interesting that the largest differences in this group (loss of irreplaceable items and overall financial losses) are those for which residents can take action to reduce flood

impact. Overall average intangible-immediate impacts are slightly reduced (1.79 with a warning and 1.83 without a warning) but are unchanged for overall average intangible lasting impacts (Appendix B; Table 25). Tangible impacts also report a slight reduction when a warning is received (1.11 versus 1.13).

### ***Insurance***

4.28 The effect of having contents insurance on reported flood impacts is complex. The questionnaire was designed primarily to check on contents insurance, it being recognised that many living in rented accommodation would be unsure as to their buildings cover (in Appendix B; Table 22 only 184 reported the actual value of buildings losses). However in practice, properties being bought via a mortgage, or properties rented from a local authority, will be covered by buildings insurance – as will the majority of privately owned non-mortgaged properties. Thus the term “contents insurance” can broadly be interpreted as including both buildings and contents. As expected, dealing with insurers (1.95 with insurance, 1.88 without) and builders (1.73 with insurance and 1.00 without) register higher impacts when contents insurance is held, as does living in temporary accommodation (1.68 with insurance, 1.50 without). Discomfort/ inconvenience (2.27 with insurance and 1.97 without) and time and effort to return to normal (2.28 with insurance and 2.05 without) also register more severe impacts despite having contents insurance. This may reflect higher levels of affluence in households with contents insurance with higher claims generating additional and extended post flood adjustment. This is partly confirmed by higher tangible impacts and higher intangible-immediate impacts being reported by those with contents insurance (Appendix B; Table 26).

### ***Elderly household members***

4.29 The presence of at least one member of the householder more than 70 years old has little effect on average individual impacts. In only two categories does the presence of a septuagenarian strongly increase the average score: having to leave home (1.98 compared with 1.89) and being stranded in/out of home (1.73 compared with 1.58). However, it is striking that all three groups of impacts score lower averages when a septuagenarian is a member of the household (Appendix B; Table 27). A possible explanation is that the handling many post flood impacts are moderated by family and/or friends.

### ***Income level***

4.30 Some of the largest differences in response emerge when the sample is subdivided into households with annual incomes above and below £20,000. For those below this income threshold, the stress of the flood (2.02 compared with 1.83), having to leave home (1.95 compared with 1.70) and the fear of being stranded in/out of one’s home (1.61 compared to 1.26) generate higher levels of anxiety. To this should be added the higher impact of losing irreplaceable items (1.56 compared to 1.23) plus increased strains within the family (1.02 compared with 0.88), more severe mental (1.07 compared with 0.64) and physical health effects (0.92 compared with 0.47) and

a view that community spirit has been weakened since the flood (0.86 compared with 0.74). This profile of responses points to vulnerable households where modest incomes may inhibit post flood recovery. It is also striking that in the aggregate scores (Appendix B; Table 28) tangible impacts are not income sensitive, but both immediate and lasting intangible impacts are more severe for lower income households.

### ***Occupational status***

4.31 When households are grouped according to the occupational status of the highest earner (Appendix B; Table 29) there is a general pattern of average tangible impacts being more severe in skilled or semi-skilled households (1.19) when compared with professional or managerial households (1.10). A similar pattern obtains for intangible lasting impacts (1.37 compared with 1.16). For immediate intangible impacts, occupational status is a poor discriminator.

### ***Frequency of flooding***

4.32 We can also explore whether repetition intensifies or lessens individual flood impacts, by comparing responses from individuals flooded once, twice or three or more times. In fifteen out of seventeen instances the impact of being flooded a second time was more severe with individual scores increasing by as much as 0.54 (worry about future flooding and loss in house value). The impacts following a third flood fall back somewhat, possibly reflecting a fatalistic reaction, but these results are based on much smaller samples with associated reductions in confidence. The contrast in average scores is marked and noteworthy (Appendix B; Table 30) with tangible impacts up from 1.05 to 1.34, intangible immediate impacts up from 1.74 to 2.06 and intangible lasting impacts up from 1.20 to 1.55 on being flooded a second time. Repetition would appear to intensify the pain especially in terms of lasting impacts.

### ***Flood type***

4.33 Differential impacts in terms of flood type and depth of flood waters can also be examined, although the small number of returns from those affected by coastal floods precludes their separate analysis. Pluvial flooding generated strikingly more severe impacts in terms of financial loss (1.97 compared with 1.47 for fluvial floods), more significant losses of irreplaceable items (1.80 compared with 1.50), the stress generated by the flood (2.29 compared with 2.01), worry about future flooding (2.37 compared with 2.12), strikingly increased strains within the family (1.33 compared to 0.98), and greater deterioration in mental health (1.32 compared with 0.90) and physical health (1.14 compared with 0.79). In general, pluvial floods are characterised by less warning and higher levels of sewage contamination than fluvial floods – both of which are likely to generate higher tangible impacts and strikingly higher lasting intangible impacts (Appendix B; Table 31). However, care must be taken in generalising from these findings as the sample size for responses for pluvial floods was relatively small (56) and mainly related to the Glasgow-Shettleston flood

in 2002. The socio-demographic profile of the flooded population in Shettleston may be responsible for some of the reported differences in response.

### ***Flood depth***

4.34 As expected, the impact of a flood is strongly correlated with the depth of the flood water (Table 4.7). Whereas average group scores for a depth of 1 inch (2.5 cm) for tangible and intangible immediate impacts are 0.88 and 1.38 respectively, these increase to 1.31 and 2.05 when the flood water depth exceeds 12 inches (30 cm) - the level experienced by 60% of respondents. Within individual impacts, loss of irreplaceable items (up from 0.61 to 1.93), having to leave home (up from 1.35 to 2.20), the stress of the flood itself (up from 1.68 to 2.24) and living in temporary accommodation (up from 0.97 to 1.89) register substantially more severe impacts once flood waters exceed 12 inches.

**Table 4.7 Flood impacts, by depth of flood (mean score\*)**

<b>Impact</b>	<b>Depth of flood</b>		
	<b>Under 2.5cm</b> min n=31	<b>2.5-30cm</b> min n=164	<b>Over 30cm</b> min n=303
<b><i>Tangible:</i></b>			
Average score	0.88	0.90	1.31
<b><i>Intangible – immediate:</i></b>			
Average score	1.38	1.58	2.05
<b><i>Intangible – lasting:</i></b>			
Average score	0.93	1.06	1.50

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

### ***Housing tenure***

4.35 Housing tenure also has a significant effect on flood impacts (Table 4.8). Council house tenants typically register lower tangible impacts, but much higher lasting intangible impacts than owner occupiers. Especially severe impacts for council tenants include the stress of the flood itself, having to leave home, living in temporary accommodation, the fear of being stranded in/out of one's home, overall financial losses (and in particular the loss of irreplaceable items) and deterioration in both physical and mental health. For owner occupiers flood impacts were typically less severe except for dealing with insurers and builders, and concerns over loss of house value. The overall impact of a flood on council tenants appears to be more onerous and longer lasting when compared with owner occupiers, raising questions as to the relative vulnerability of both groups.

## Location

4.36 Location also moderates the severity of flood impacts, in part reflecting the character of the most severe flood experienced by each household (Appendix B; Table 34). In terms of tangible impacts, the floods in Elgin (1.32), Perth (1.27) and Glasgow-Shettleston (1.25) were the most severe and those in Hawick (0.81) and Brechin (0.74) the least severe. The same rank order obtains for immediate intangible impacts (Elgin 2.14, Perth 1.98 and Glasgow-Shettleston 1.92). But Glasgow-Shettleston (1.60) records the second highest value for lasting intangible impacts, very similar to that for Elgin (1.67). Overall, the experience of flooding in Elgin generates the highest average scores, closely followed by Glasgow-Shettleston.

**Table 4.8 Flood impacts, by housing tenure (mean score\*)**

Impact	Housing tenure				
	Owned with mortgage min n=192	Owned outright min n=208	Council min n=66	Housing association min n=10	Private landlord min n=13
<b><i>Tangible:</i></b>					
Average score	1.23	1.11	0.96	0.76	0.77
<b><i>Intangible – immediate:</i></b>					
Average score	1.91	1.70	1.92	1.54	1.49
<b><i>Intangible – lasting:</i></b>					
Average score	1.32	1.17	1.61	1.26	0.96

\*'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

4.37 The overall impact of flooding on community cohesion is unclear with 17.1% of respondents reporting an improved sense of community and 15.6% reporting a deterioration (Appendix B; Table 35). Further analysis may be needed to clarify any perceived lessening in community cohesion, especially if non-flood related drivers are involved.

4.38 When questioned on reasons for moving or considering moving (Table 36), 44.1% of respondents now saw their property as a poor investment, 83.2% feared another flood and many attached negative qualities to their house (i.e. the house will never be the same and the house brought back negative feelings about the flood).

## Living with floods

### Risk perception

4.39 Given that all respondents live within or close to an area that has recently been flooded, it is striking that 63.6% of those who have been flooded view future flooding as “very likely” or “likely” whereas this reduces to 41.2% for those who have not been flooded (Table 4.9). The experience of being flooded significantly increases the perceived likelihood of future flooding. The perception of flood risk also significantly varies with location (Appendix B; Table 38) with 88% of the sampled residents in Elgin viewing future flooding as “very likely” or “likely” (perhaps partly as a function of repeat flooding), this reducing to 44.4% in Brechin and 22.9% in Perth (now protected by a flood alleviation scheme).

**Table 4.9 Perception of flood risk, by whether flooded (per cent of respondents)**

<b>Perceived likelihood of being flooded in the next 10 years</b>	<b>Flooded</b> n=610	<b>Not flooded</b> n=575	<b>TOTAL</b> n=1,185
Very likely	30.0	11.5	21.0
Likely	33.6	29.7	31.7
Unlikely	23.9	36.3	30.0
Very unlikely	10.7	16.2	13.3
Zero or negligible likelihood	1.8	6.3	4.0
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Chi-squared = 86.532; df=4; **p<0.001**

4.40 The experience of being flooded does not result in reported improved knowledge of flood risk (Appendix B; Table 39) with 67.8% of those flooded claiming to be either “not very well” or “not at all informed”, a value very similar to those who have not been flooded. Information on flood risk is mainly acquired informally from relatives and friends or more formally from the local authority (Appendix B; Table 40). National and local media are also significant sources, and *Floodline* is an important source (33.2%) but only for those who have been flooded. It comes as no surprise that respondents who have been flooded worry significantly more often than respondents who have not been flooded (Appendix B; Table 41). The most important triggers for such worry are “heavy rainfall” or “seeing the river rise or in spate” (especially for those who have been flooded), followed by “forecasts of heavy rainfall” and “reports on flooding in the media” (Appendix B; Table 42).

### ***Managing flood risk***

4.41 Contents insurance is held by 90.8% of respondents, this increasing to 94.7% for those who have been flooded, a significant difference between respondents (Appendix B; Table 43). However, when asked whether the cover specifically included flooding (Appendix B; Table 44), these values (still significantly different) reduced to 72.2% (all respondents) and 84.0% (flooded respondents). A significantly higher excess for contents insurance was reported by households that had been flooded: higher excesses being required for 27.4% of all respondents and 36.8% of those who had been flooded (Appendix B; Table 45).

4.42 We also explored whether the take up of contents insurance differed according to housing tenure both at the time of the flood and afterwards at the time of the



survey. At the time of the flood social tenants were much less likely to have contents insurance than those who either owned their property or were buying it via a mortgage (Table 4.10). By the time of the survey (1 to 13 years later depending on location) the take up had increased by 6.2% (council tenants) and 22.6% (housing association tenants) but had declined by 20.9% (private renting) possibly reflecting a high proportion of short-term tenancies. The increase for housing association tenants points to a marked change in behaviour, albeit by a very small sub-set of the whole population surveyed.

**Table 4.10 Contents insurance at time of flood and at time of survey, by housing tenure**

Housing tenure	Per cent with contents insurance at time of flood	Per cent with contents insurance at time of survey
Being bought with a mortgage	95.8 n=214	98.2 n=383
Owned outright by household	94.9 n=236	96.9 n=322
Rented from council	69.0 n=87	75.2 n=145
Rented from a housing association or trust	42.9 n=14	65.5 n=29
Rented from a private landlord or employer	68.8 n=16	47.9 n=48

4.43 ‘Pay-with-rent’ contents insurance is known about by 36.9% of council tenants, this value being slightly higher (39.1%), but not significantly so, for those who have been flooded (Appendix B; Table 47). However, 73.9% of social tenants have contents insurance with 7 out of 87 council tenants having elected the ‘pay-with-rent’ route (Table 4.11). Overall this means that around 75% of social tenants have contents insurance with around 10% using ‘pay-with-rent’ schemes, and around 25% with no insurance. When asked why contents insurance had not been taken out, 46.9% of social tenants cited cost and 21.9% the non-availability of cover (Appendix B; Table 49). Whether or not the *c.*25% of social tenants without cover can be persuaded to join ‘pay with rent’ schemes will depend, in part, on insurance companies making cover available and the affordability of the premiums.

4.44 Household’s take up of flood alleviation measures is strikingly higher for those who have been flooded (60.7%) compared with those not flooded (31.1%). The most favoured responses are not having sentimental or irreplaceable items downstairs, the purchase of removable flood guards or sandbags and keeping the drains and ditches around the property cleaned out (Table 4.12). Receiving demountable flood guards or sand bags from the local authority is also a popular option, alongside building protective walls.

**Table 4.11 Uptake of ‘Pay-with-Rent’ schemes among council tenants, by whether flooded** (per cent of respondents)

Has insurance through ‘Pay-with-rent’	Flooded	Not flooded	TOTAL
	n=51	n=36	n=87
Yes	13.7	11.1	12.6
No	78.4	75.0	77.0
Don’t know or N/A	7.9	13.9	10.3
TOTAL	100.0	100.0	100.0

Chi-squared = 0.925; df=2; p>0.01

**Table 4.12 Flood alleviation measures taken, by whether flooded** (per cent of respondents)

Flood alleviation measure	Flooded	Not flooded	TOTAL
	n=560	N=533	n=1,093
Installed non-return valves on drains	2.0	0.8	1.4
Keep ditches and drains around the property clean	18.0	9.0	13.6
Built walls around the property	12.0	3.6	7.9
Purchased water pumps	3.2	0.2	1.7
Purchased removable flood guards or sandbags	19.3	6.6	13.1
Received removable flood guards or sandbags from the council	12.9	8.1	10.5
Avoid keeping sentimental or irreplaceable items downstairs	22.5	6.2	14.5
Avoid having expensive furniture or floor coverings downstairs	8.4	2.8	5.7
Replaced plasterboard with plaster	1.8	0.2	1.0
Installed concrete floors	7.0	1.3	4.2
Replaced carpets with rugs	5.5	2.6	4.1
Moved power sockets	9.3	0.9	5.2
Moved electrical appliances	4.3	0.9	2.7
Other	10.0	6.2	8.1
Not taken any flood alleviation measures	39.3	68.9	53.7

4.45 Respondents who have not been flooded register similar priorities, but the percentage take up is often very small. Reasons given for not undertaking individual flood alleviation measures were mainly reliance on others to build flood defences or improve drainage (by implication this was a local authority duty), followed by an expectation that insurance would cover losses and the perceived low likelihood of a flood of similar severity (Appendix B; Table 51).

4.46 Finally, we explore flood risk management based around warning systems. *Floodline* was known about by 74.2% of those flooded but by only 59.4% of those not flooded (a significant difference – see Table 4.13). Usage of *Floodline* is also significantly higher amongst those who have been flooded (35.5%) compared with

those not flooded (13.1%, Table 4.14). High levels of customer satisfaction with *Floodline* are reported across flooded and non-flooded households – 77.7% and 79.3% respectively finding the service “helpful or very helpful” (Appendix B; Table 54).

4.47 Of respondents who had been flooded, 51% received a formal flood warning (official phoning or knocking on the door, loud hailer, automatic telephone messaging), this significantly falling to 34.4% for those not flooded (Appendix B; Table 55). Just over half of the respondents (52.7%) received one flood warning, this falling to 27.8% for two warnings and 19.5% for three warnings (Appendix B; Table 56), these values being similar for flooded and non-flooded respondents.

**Table 4.13 Awareness of *Floodline*, by whether flooded (per cent of respondents)**

<b>Heard of <i>Floodline</i></b>	<b>Flooded</b>	<b>Not flooded</b>	<b>TOTAL</b>
	n=597	n=544	n=1,141
Yes	74.2	59.4	67.1
No	25.8	40.6	32.9
TOTAL	100.0	100.0	100.0

Chi-squared = 28.369; df=1; **p<0.001**

**Table 4.14 Use of *Floodline*, by whether flooded (per cent of respondents)**

<b>Used <i>Floodline</i></b>	<b>Flooded</b>	<b>Not flooded</b>	<b>TOTAL</b>
	n=501	n=397	n=898
Yes	37.5	13.1	26.7
No	62.5	86.9	73.3
TOTAL	100.0	100.0	100.0

Chi-squared = 67.483; df=1; **p<0.001**

4.48 In terms of future warnings (Table 4.15), it is striking that only 46.2% of households that had been flooded and warned were “confident or very confident” of a sufficient warning in the future, this falling to 21.2% for those not warned and flooded. By contrast, those who had not been flooded took a significantly more positive view with 60.7% of those warned and 40.2% of those not warned being “confident or very confident” in future warnings. Prior experience of being warned raises confidence but, paradoxically, to lower levels amongst those flooded than those not flooded. On the other hand, those who have been flooded but not warned are nearly half as confident as those who have been neither flooded nor warned. Thus having received a warning in the past increases confidence in getting sufficient warning next time, but this is lessened by the actual experience of being flooded, possible reflecting what can be done with “sufficient” time. Surprisingly, those who have been warned but not flooded, have by far the highest confidence in future warnings; but this may not be sustained through repeated false alarms.

4.49 However, prior experience of being flooded did result in significantly higher levels of confidence in knowing what to do in a future flood (65.3% “confident or very confident” – Table 4.16) when compared with those who had not been flooded

(52.7% “confident or very confident”). The most preferred means of being warned were an official knocking at the door, individual action (checking the river) and a loudhailer in the street, television or a phone call (Appendix B; Table 59), with a mix of these actions being favoured by a large number of respondents.

**Table 4.15 Confidence of sufficient warning of a future flood, by whether ever received a warning and whether flooded (per cent of respondents)**

Level of confidence	Flooded*		Not Flooded**	
	Has received a warning n=292	Has never received a warning n=280	Has received a warning n=188	Has never received a warning n=348
Very confident	9.9	2.9	9.6	6.6
Confident	36.3	18.2	51.1	33.6
Not very confident	38.4	45.0	34.6	40.2
Not at all confident	15.4	33.9	4.8	19.5
TOTAL	100.0	100.0	100.0	100.0

\*Chi-squared = 49.637; df=3; **p<0.001**

\*\*Chi-squared = 30.262; df=3; **p<0.001**

**Table 4.16 Confidence of knowing what to do in a future flood, by whether flooded (per cent of respondents)**

Level of confidence	Flooded	Not flooded	TOTAL
	n=585	n=550	n=1,135
Very confident	18.3	10.5	14.5
Confident	47.0	42.2	44.7
Not very confident	25.1	37.1	30.9
Not at all confident	9.6	10.2	9.9

Chi-squared = 26.401; df=3; **p<0.001**

4.50 We now explore whether receipt of a flood warning varies with socio-economic status. Neither age, nor income group, nor occupational class nor housing tenure register any significant difference in terms of flood warning (Appendix B; Tables 60-63). This implies that the agencies responsible for dissemination do so in an even-handed manner to the 42% of sampled households which received a warning.

4.51 Finally we examine the acceptability and responsibility of a range of flood management policies. The most acceptable forms of flood management (considering effectiveness, cost and fairness) are structural flood defences (favoured by 91.1% of all respondents), closely followed by fitting valves to sewers and storm drains (89.0%), a flood warning service (88.5%) and using upstream storage in reservoirs (86.0%). Neither demolition of the most threatened properties with compensation or relocation of residents (39.2%) nor payment to rural land owners to increase storage of water in the soil (72.1%) approach the levels of support accorded structural flood defences (Table 4.17). But respondents who have been flooded are more supportive of demolishing threatened properties than those who have not been flooded (45.1%

compared with 33.3%). Overall, structural measures are still seen as providing the first line in flood defence.

**Table 4.17 Acceptability of flood management policies, by whether flooded**  
(per cent of respondents indicating policy is acceptable)

Flood management policy	Per cent indicating policy is acceptable		
	Flooded min n=473	Not flooded min n=440	TOTAL min n=922
Structural flood defences	92.6	89.4	91.1
Valves fitted to sewers and/or storm drains	89.5	88.4	89.0
Upstream reservoirs	88.2	83.6	86.0
Sustainable urban drainage systems	80.2	77.1	78.7
Flood warning service	90.3	86.6	88.5
Demolition of the most threatened properties and relocation of the occupants	45.1	33.3	39.2
Pay farmers and land managers upstream to undertake practices that increase the water-holding capacity of the ground	76.0	67.9	72.1

4.52 When respondents were asked where they thought the main responsibility for protecting property from flooding **should** lie, responsibility was unequivocally assigned to local authorities by 58.4% of respondents, and to a lesser extent to the Scottish Executive (31.9%), with fewer than 20% of respondents identifying SEPA and Scottish Water (Table 4.18). When these answers are sub-divided according to socio-economic characteristics, households with septuagenarians preferentially allocate responsibility to the Scottish Executive and away from local authorities (Appendix B; Table 66), whereas households with an annual income of less than £20,000 reverse this allocation with local authorities overwhelmingly favoured (Appendix B; Table 67). When the same question is asked across occupational classes, the local authority continues to be most favoured responsible body, but by a lower percentage of those in professional and managerial grades (Appendix B; Table 68). Unsurprisingly, council and housing association tenants overwhelmingly see flood protection as a local authority duty. However, this declines sharply in favour of the Scottish Executive amongst home-owners and households with private landlords (Appendix B; Table 69). When asked where responsibility for flood protection **actually** lies, 22.9% of respondents accepted individual responsibility (up from 8.3% in terms of where responsibility **should** lie), with local authorities, the Scottish Executive, SEPA and Scottish Water identified as responsible authorities as before, but by a lower proportions of respondents (Table 4.19).

**Table 4.18 Views of where main responsibility for flood protection SHOULD lie**

<b>Where main responsibility for flood protection SHOULD lie</b>	<b>Number of responses</b>	<b>Per cent of responses</b>	<b>Per cent of respondents</b>
Yourself	93	5.9	8.3
Landlord	51	3.2	4.6
Local council	654	41.4	58.4
Scottish Executive	357	22.6	31.9
SEPA	211	13.4	18.9
Scottish Water	184	11.6	16.4
Other	30	1.9	2.7
TOTAL - responses	1,580	100.0	
TOTAL - respondents	1,119		141.2

**Table 4.19 Views of where main responsibility for flood protection DOES lie**

<b>Where main responsibility for flood protection DOES lie</b>	<b>Number of responses</b>	<b>Per cent of responses</b>	<b>Per cent of respondents</b>
Yourself	257	18.6	22.9
Landlord	29	2.1	2.6
Local council	508	36.7	45.4
Scottish Executive	188	13.6	16.8
SEPA	119	8.6	10.6
Scottish Water	114	8.2	10.2
Other	14	1.0	1.3
Don't know	154	11.1	13.8
TOTAL - responses	1,383	100.0	
TOTAL - respondents	1,120		123.6

**Table 4.20 Willingness to pay extra Council Tax per annum for flood protection, by whether flooded (per cent of respondents)**

<b>Extra Council Tax per annum</b>	<b>Flooded n=558</b>	<b>Not flooded n=530</b>	<b>TOTAL n=1,088</b>
Not willing to pay any extra	58.4	51.5	55.1
Under £20	12.2	17.4	14.7
£20-£49	13.4	17.4	15.3
£50-£99	5.7	7.2	6.4
£100+	10.2	6.6	8.5
TOTAL	100.0	100.0	100.0

4.53 Finally respondents were invited to specify their willingness to pay additional council tax which would be hypothecated for flood protection measures (Table 4.20). More than half of respondents were unwilling to make any additional payment. Of the remainder 8.5% were prepared to pay £100 or more, 6.4% £50-99 and 15.3% up to £49. Those who have been flooded are more willing to make a higher contribution – 10.2% of those flooded would pay more than £100 compared with 6.6% of those not

flooded. Income is also a statistically significant discriminator of willingness to pay (Appendix A; Table 72) with 15.9 % of higher income households (>£20,000 per year) offering to pay £100 or more, compared with only 7.0% for lower income households (<£20,000 per year). When analysed by housing tenure, those owning their home with a mortgage express the greatest willingness to pay (albeit with nearly half not willing to pay any extra), while social tenants express the least willingness with almost two-thirds not willing to pay any extra council tax for flood protection (Appendix A: Table 73). Again this is a statistically significant discrimination.

## Summary

4.54 This chapter has reported the findings from a questionnaire survey of households in eight locations flooded within the period 1993-2005. Overall, roughly equal numbers of flooded households and households at risk, but not flooded, were surveyed. The single most important finding is that intangible impacts are more severe than tangible ones. Also immediate impacts are more severe than lasting impacts, but the latter (which include long-term health effects) can individually be very onerous, especially for vulnerable households where modest incomes may inhibit post flood recovery. Flood warnings and insurance can help mitigate flood impacts. But only 33% of those who have been flooded use *Floodline*, and contents insurance take up is significantly lower for social tenants than owner-occupiers. Only 13% of respondents correctly identified owners or landlords as mainly responsible for flood defence.





5.1 This chapter summarises the main findings from the five focus groups. The chapter is structured to parallel that of Chapter Four. The impacts of flooding (objective 1) are summarised under the headings ‘tangible impacts’, ‘intangible immediate impacts’ and ‘intangible lasting impacts’. The findings in terms of living with floods (objective 2) are reported in terms of ‘risk perception’ and ‘managing flood risk’. This chapter puts the human face on being flooded and living with the risk of being flooded. The quotations from focus group respondents amplify and deepen the findings in Chapter Four.

## Impacts of flooding

### *Tangible impacts*

5.2 Changes in property values Most focus group participants reported a downturn in the volume and value of house sales immediately after the flood. This contrasted with more recent sales being close to the market values for non-flooded properties. Nevertheless, anxieties remain on whether a particular property will sell, for example due to a history of repeat flooding and that visible flood measures serve to devalue property:

*“If I get flooded again, I won’t claim on the insurance because I’ve then got a house that’s been flooded twice and I’ll never sell it. You asked why not use flood defences like your neighbour. The fact when I sell my house the first thing you see is boards fitted, special blinds, there’s obviously a problem”. [Forres]*

By contrast, one focus group participant in Glasgow reported a house in their street with flood guards fitted being sold to someone who did not even ask what they were, or enquire about flooding in the area.

5.3 Lost earnings Focus group discussions rarely included lost earnings, implying that not many people are affected by this. However, one Glasgow participant who was a taxi driver reported not being able to work for six weeks because his car was written off by the flood.

5.4 Other financial losses General out of pocket expenses incurred as a direct result of a flood was the most often reported other financial loss:

*“I don’t think there’s anybody here could say that they didn’t end up out of pocket because of the flood. Just the mere fact you go into a hotel. Yes, you go into a hotel but the insurance company don’t pay for your food, so you have to go out and buy your food either in the hotel or a restaurant”. [Forres]*

5.5 Role of insurance in mitigating tangible losses As noted below, a major immediate impact reported by participants was the disruption associated with having to leave one’s home and the resulting discomfort and inconvenience. However, these

impacts were mitigated by the relatively good experiences most focus group participants had with their insurance companies in the aftermath of the floods:

*“I couldn’t believe how much it cost. And the second time, like we just had got a brand new heating system in. ‘No’ [don’t keep it]. Replace it again. In fact, my kitchen [about] which I actually said to them, ‘I don’t even really know [how much it cost]. We’ll maybe just keep the kitchen. It’s just brand new.’ ‘No’. All it went out and all back in again. I have to admit, the insurance companies were good - there was no quibble”.*  
[Glasgow]

*“He was like that, ‘No, everything out’. And I said to him, ‘There’s no any [checks to be done]? You know, you hear people, you know, insurance companies’ ... and he said, ‘No. You’re talking about a whole house. You don’t start nitpicking with people.’ He said, ‘They’ve lost everything. They’re upset’.”* [Glasgow]

5.6 Although insurance companies’ response in the aftermath of a flood was generally viewed favourably, some participants reported negative experiences:

*“I know a chap and his wife went to stay with his mother and because they were staying with a relative, the insurance company halved the fee they were paying. So that old lady was subsidising the insurance company. And where I was staying, I put in bed and breakfast, they wrote back and said, ‘We see you are getting breakfast, so we deduct £2 something.’*  
[Perth]

*“I thought they were a bit penny pinching because in correspondence to them when I was complaining about the builder, I explained the trouble we’d went to lift the carpet, to get the furniture up the stair. I would never do it again. No way. I mean, they tell you to do it. The flood comes, then if it comes, it can come and it can destroy the lot because I’m trying to save them money and they’re giving me a hard time, you know”.*  
[Edinburgh]

5.7 An important difference between the experience of those repairing their home through their own private buildings insurance and council tenants relying on the local authority housing department may explain some of the greater impact of flooding reported by council tenants in the household survey:

*“I found that my insurance was quick and everything. I mean, I know ones in my street that are council houses. They were waiting for months and months and months. Our insurance company got them in right away and started on the job”.* [Glasgow]

### ***Intangible impacts - immediate***

5.8 Trauma Many participants appeared to experience the flood itself and its immediate aftermath as quite traumatic. Words frequently used to describe the time of the flood include ‘shock’, ‘horrendous’, ‘fear’ and ‘panic’:

*“My son came running in and he said, ‘There’s nothing can be saved here’. I was actually ... took out in a rowing boat wearing a pair of pyjamas, a pair of slippers and my wee bag I lifted every day. I was just in shock because it was just after my boy died. I just stood and I tried to save this and that... hopeless”. [Glasgow]*

*“It was really stressful. I mean, I seen people maybe ... the first day or so, they were alright and then all of a sudden you see them sitting there crying. They just crack up”. [Glasgow]*

*“Panic. It’s all panic... you think, ‘I’m going out the house, what do I need if I’m going out? I need medicines, so I get my medicines’ - my wife’s diabetic – ‘I need toiletries, I need towel, I need a change of underwear, I need clothing’. So you’ve got to pack a bag and packing a bag in 10 minutes to go out, you don’t know how long you’re gonna be out for, is impossible. You don’t think, ‘Oh my photos’ because you’re just full of... fear. Fear sets in. Medication – that’s the kind of things you think of.” [Elgin]*

*“I had hens. I also had bees. The flood wiped out the bees. I had to swim in four and a half feet of water to get out the hens, which was sewerage and, you know, the whole thing was just absolutely horrendous”. [Forres]*

5.9 Anxiety and stress After the trauma of the flood itself, many participants reported a period of ongoing anxiety and stress associated with being out of their home and making the necessary arrangements for repairs:

*“I think you’ve a fear factor initially of adrenaline that helps to carry you through it ... I think in a lot of cases, panic sets in and actually gets you through whatever it may be and then after that’s finished, then it sets in. Then it’s the desperation to get alternative accommodation or whatever and then after that it’s getting the loss adjuster to come and look. You walk back through your house again and it’s covered in sewage. That’s a devastating moment”. [Elgin]*

Uncertainty appears to contribute to feelings of anxiety, particularly for council tenants who often do not have as much control over where they will be re-housed compared to someone with private insurance paying for alternative accommodation:

*“It’s the fact of ... where are you going? You know, you’re going out your house and there’s nothing organised where you’re gonna go, what’s gonna happen to you or anything like that”. [Elgin]*

5.10 The anxiety and stress of having to organise many things simultaneously reportedly can have an impact on family relationships:

*“It puts a strain on your relationship as well because of the stress and everything of trying to find somewhere else to stay and sort everything out ... you’re just ... you’re falling out with one another and everything”.*  
[Elgin]

*“My wife and I usually get on quite well but there was something about work needing done in the house and a couple of times she said, ‘You’ll need to go and see this, you’ll need to go and see that’ and she just said it once too often and I flipped, ‘You go and see about it’, and we had a massive row, you know. It’s just... it was totally out of character, you know”.* [Edinburgh]

5.11 A commonly reported problem was security, which seemed particularly acute in Glasgow:

*“We were broken into about 10, 12 times... oh, we gave up. And we had left not very much up the stairs but we’d left a few things that they just kept scattering everything and then breaking windows, breaking in down the stairs to get in and what the insurance company wouldn’t do was class that as the same claim and they were saying that to get the window fixed down the stairs, they wouldn’t incorporate it in with the claim just fixing all the rest of the house. And we were saying, ‘That’s just ridiculous. It’s because we’re out the house with the flood that we’re getting broken into’ and they were saying, ‘No, you would need to do a separate claim then. It’s £100 excess plus ...’ and we were like that ... we got that sorted in the end but I mean...”* [Glasgow]

5.12 Disruption and inconvenience in leaving one’s home Simply being out of one’s home reportedly takes its toll on people because of the frustration and uncertainty of not knowing how long it will be until it is possible to return, for example:

*“It’s the time that you’re out [that impacts on you the most]. I mean, we were out for a year or almost a year, it was 11 months we were out and you just think, ‘Am I never getting back to my own house?’, you know. It seems to drag on and on and on”.* [Elgin]

5.13 Participants reported a greater impact on vulnerable individuals of being displaced from home, in particular the elderly and those without friends and family close by who could help out:

*“That’s where the problem arises. It’s the aftermath. It’s the elderly. It hits them the hardest. The lady stripped everything. She took all her bedding from the house, all her curtains, all her towels, all her clothes and they were all covered in muck with flooding and she brought them up to Bishopmill House in black carrier bags, black plastic bags, 29 of them and proceeded to wash them through the machines. None of the laundries and*

*none of the drycleaners in the town would touch anything out of the flood area. Whenever you gave your address, no thanks, you're not coming through here with it. So you were stuck". [Elgin]*

5.14 Many participants reported that living in hotel accommodation presented difficulties in maintaining normal family life, particularly for those with young children:

*"Two kids traipsing around town, trying to find something that they want to eat and there is nothing ... you know, you think it would be the best thing in this world to just have your tea made for you every night but it really becomes a bind". [Forres]*

As well as discomfort and inconvenience resulting directly from displacement, participants reported a wider range of impacts resulting from disruption to families, for example impaired performance by children at school:

*"We stayed with a chap that used to stay with us but my son couldn't. There wasn't enough room for him, so he stayed with his gran and that was one of the problems because we didn't have our eye on him. I just bounce back but my son's exams suffered that year." [Glasgow]*

5.15 As well as displacement from home, putting a new home together brings a lot of disruption and stress. Some participants reported difficulties in finding what they needed, for example accessories to match existing décor, and having to return damaged, faulty or incorrect goods that had been delivered or installed.

5.16 Dealing with builders Many focus group members found dealing with builders stressful especially in terms of the quality of their workmanship.

*"A lot of cowboys came out the woodwork when it's insurance jobs, you know". [Glasgow]*

*"The only people that were dealing with it were the people that were contracted to deal with the whole house and when we came in after it had been put in... there was like tears on the linoleum and a scratch on the wallpaper and we said, 'What about this?' 'Well, we didn't put it in' ... 'Well, you're the only people that were in the house and we certainly didn't put it in'. But we couldn't prove it, we just had to leave it. There was nothing we could do". [Perth]*

*"We were out for a year and our insurance company employed these cowboys... we ended up trying to get them off the site and then we had to find our own contractor after that, which was a nightmare. We fought with the insurance company right up until April, the house was in such a mess. I mean, there wasn't an even wall or anything. That round your door there, you could put your hand in at the top and at the bottom it was tight. That was how far off our walls were. Now, I wanted it back the way [it was]... and he said, 'Oh, wait till it's finished, wait till it's finished'. There was no way [we were going to do that]. My husband and I were up*

*2, 3 in the morning having cups of coffee and cigarettes, we were so stressed out and I was saying to him, 'You should say this to them' and we were just falling out with one another because of it". [Elgin]*

5.17 Participants reported anxiety resulting from lack of control over the work when contractors are being paid by insurance companies and are overwhelmed with work. For example, there was much frustration expressed at the length of time repairs took to properties. In some cases this was compounded by householders visiting their property to assess progress to find that often no-one was working on their property because contractors apparently found it more time-efficient to work on a whole street in one go:

*"What some of them were doing... because they had so many properties ... they would do a bit on yours, go round to another property and do a bit on that and then go round and do a bit on another one and then they'd come back to you the next day and do another wee bit". [Perth]*

*"I contacted the insurance company. It was two days before anybody appeared to see me. So they started to arrange work to be done and then on the Saturday night I think it was, I got this wee naffer fellow, 'I'm gonna be your builder, so I said, 'Aye, aye'. Turned out to be a complete cowboy". [Edinburgh]*

Many focus group participants had difficulties finding trades people due to high demand after the flood. This seemed to be especially the case in Edinburgh, with particular shortages of plasterers and electricians.

### ***Intangible impacts - lasting***

5.18 Health impacts As well as the anxiety and stress of dealing with getting back into one's home, many focus group participants talked about longer-term ongoing mental health issues, with elderly people reportedly being affected the most:

*"You need somebody ... how do you explain it? You need a psychiatrist or a psychologist. The Council workers got that. They got counselling. That's what I'm saying. We need, not necessarily me or whatever, but the elderly, somebody who's 70, 80 year old and they are completely stressed out ... they did become compulsive. They've got compulsive habits every day. They didn't have them before, they now have. They've now got this stress syndrome. You need somebody to come up and got to talk to them, to understand them... It's not the younger ones. The younger ones can hack that, no problem. We're still stressed but we'll get round it sooner or later". [Elgin]*

*"Well, I live alone, and I was eight months [staying] with my daughter and I'm still not right... well, I don't think any of us will ever be right because I mean, we're no just young teenagers". [Glasgow]*

*“I was in the house for about 3 weeks to a month after it before they moved [me] and I’ve got a lot of health problems. I was ill and it was all that sewage and they put a dehumidifier in but they had to take it out because I’ve got asthma and it was bringing on asthma attacks”.*  
[Glasgow]

5.19 As well as the widespread reporting of stress and anxiety, a number of focus group participants highlighted a range of impacts on physical health, from exhaustion due to not sleeping and physical exertion (usually sand-bagging) to a slipped-disk from moving furniture. Other narratives included:

*“I had a daughter who was quite ill at the time with a virus and that [the flood] had a real impact on her recovery. In fact, I think it was really 6 months ... 6 months without a voice. And how much of that was because of this ... you know, she had the illness to start with but how much it was prolonged was because of the stress”.* [Forres]

*“I wasn’t aware of it, you know but I heard my son talking to somebody, ‘God, my dad’s aged 10 years’.”* [Edinburgh]

5.20 Several people reported elderly neighbours never really recovering from being flooded. A couple of focus group participants (plus several respondents on the doorstep during the household survey) attributed fatalities to the flood – albeit people who were frail prior to being flooded:

*“My next door neighbour, she’s elderly, she elected to stay overnight and I think ... I don’t know whether family were coming the next day to get her ... but she had a subsequent fall. It was within weeks and she died. So whether it was all the stress plus the fall just, I don’t know”.* [Perth]

*“The first flood, we had my mother in law, elderly lady. Totally confused, in new accommodation. It threw her, never really recovered. She’s passed away since between the floods. I’m no saying the flood was the cause of her passing away but she was totally confused in the new house. It affects folk... she was elderly, it affected her, so the elderly people really suffer a lot more than others”* [Elgin]

5.21 Loss of irreplaceable items The loss of material possessions apparently can create a sense of emotional loss, particularly for retired people who often see their home and its contents as representing their lifetime’s work. The loss of sentimental items, especially photographs, appears to be particularly upsetting:

*“My mother died of cancer, I lost all her photos, all the photos of the kids, all the like baby stuff, you know, memories, you know when they’re first born, the memory box”.* [Elgin]

*“Weddings and photos, my husband and I through the years, my only son, he was there the year before [son deceased]. An awful lot of sentimental stuff. My father was a seaman. He brought me a lot of stuff I couldn’t replace. In fact, my daughter ... we were actually in tears because I had*

*this ottoman and it was hand carved and actually I was offered a lot of money for this a few years before that. I said, 'I wouldn't part with this'. I said, 'Even if you gave me thousands', I said, 'because this belonged to my father'.*” [Glasgow]

*“You can't renew them and there'd been like a lot of things like people had bought us like my 21<sup>st</sup> birthday books, a lot of them went, that my granny had given me. My gran's not with me. Things like that are sad. You're looking at your stuff and you're thinking, 'That has to go' or 'That's gone'. As you say, you look for something but we lost that in the flood. Things like that. That's when it's quite hard”.* [Glasgow]

*“My life was in two skips, things which you cannot replace, wedding photographs, birth certificates. I was in the RAF during the war and my flying log was all ruined. I had a couple of wings off my uniform, gone. These are things that you cannot replace ... not by an insurance company or anybody else”.* [Perth]

5.22 Community impacts and responses On the whole local communities seem to have responded quite well to the demands of the initial displacement of residents:

*“I mean, I suppose where I stay in Greenfield anyway it was like a building site. In the morning, all the workers started arriving and you could come down and just make sure everything was getting done you know. But everybody was out all blethering. You were talking to people you never spoke to before, you know what I mean, because all of us having experienced the same kind of a thing and they were all out blethering, bringing you out a cup of tea and chatting away and things like that”.* [Glasgow]

*“This sounds silly but it brought Kingsmill and South West Murdie closer together. When I first moved in there, it was like them and us, Kingsmill and Murdie. Because everybody was thrown together in the same situation, right, left and centre, you had to pull together. If someone was having a problem, you're there to help... everybody has good days and bad days and you had to look out for folk, like the young lad who's blind up from us”.* [Elgin]

5.23 However, some participants were sceptical about just how genuine the desire to help was among non-flooded residents:

*“I would say it was more curiosity than help but then I don't know how much of that's our own pride in not asking for help cos I would never have thought to ask my neighbours, you know. I took my washing to friends and to the laundry rather than asking neighbours who had no washing.”* [Glasgow]

Two of the five focus groups (Glasgow and Perth) mentioned difficulties in distributing funds from emergency appeals, with most people not receiving anything and not knowing what happened to the money. For example:



*“I ended up having a meeting with them, with the councillors and with the Lord Provost, it basically ended up they accused me of calling them liars and that. I mean, it did become a bone of contention and from this day ... from that day onwards, I would never contribute a penny to any appeal. Appeals cause an awful lot of ill feeling and an awful lot of problems”.*  
[Perth]

5.24 In addition to the immediate disruption to people’s lives while out of their home, (see 5.12-5.15) some participants reported permanent restrictions on their activities, mainly resulting from not wanting to leave their property unattended:

*“We can’t go on holiday, we take separate holidays now because someone needs to be there if there is a flood... unless we can get someone to come and stay in the house that we trust, you know, that we don’t mind staying, we’re stuck”.* [Edinburgh]

## **Living with floods**

### ***Risk perception***

5.25 *Causes of floods* A range of views were expressed about the perceived causes of floods, often at variance with the actual causes. Many focus group members appeared to look for someone to hold responsible for a particular flood, typically a landowner or the local authority, for example:

*“It’s not an Act of God, it’s an act of incompetence whoever built the wall not strong enough”.* [Edinburgh]

More generally local authorities were often blamed by participants for not dredging rivers, not cleaning drains, allowing building on floodplains and not constructing flood defences.

5.26 In the period following a flood, rumours often start about the cause of the flood. For example, in Edinburgh the perception that gates at Leith docks should have been opened in 2000 to allow the river to flow to sea faster than normal was expressed by a number of participants. In Perth participants talked of a rumour still circulating, a decade-and-a-half after the flood, that the army blasted the river bank to save commercial properties in the town centre at the expense of local authority housing in North Muirton. The existence of this rumour was captured (and rebuffed) by one of the participants:

*“I was chair person of the flood committee and we were kept fully up to date with everything that was happening and everything was fully explained to us and there was rumour and there was counter rumour, even North Muirton being sacrificed to save the town, obviously it wasn’t. But there were all these rumours and counter rumours. There was even supposed to be a film of the TA blasting. There’s all sorts of things but it was all rubbish... and it’s up to people to listen ... you know, it was explained to us and even after it being explained, people didn’t always*

*believe it so at the end of the day it was down to what you want to believe". [Perth]*

Also in Perth, participants reported that a rumour persists that the flood was caused by a poorly constructed dam breaking. This may reflect negative local attitudes toward rural landowners.

5.27 Most prevalent is a widespread view (reported in all five areas where focus groups were held) that drains and culverts should be cleaned out more often and that this is a significant cause of the apparent rise in the number of floods in Scotland over the last fifteen years or so.

5.28 *Perceived levels of risk* Perception of the risk of future flooding varied greatly from person to person, depending in large measure on where they live. Those close to a river and those who have been flooded more than once generally appear to view further flooding as more likely.

5.29 Most flood victims in the Elgin focus group were almost certain there will be another flood, reflecting the fact that there have been two large floods within five years. Indeed, one focus group participant reported that a council official has admitted to them that it is likely there will be another flood. However, another Elgin respondent to the household survey wrote that they felt relatively confident that lightning would not strike three times in the same place.

5.30 There is reportedly a degree of faith in the flood gates that have been installed in Perth, but tempered by recognition that the gates had not been tested by particularly high levels on the Tay at the time of the focus group. Adding to Perth residents' relative peace of mind is the view that the river is highly unlikely to rise to the same extent as it did in 1993, as this was caused by unusually deep snow across Tayside followed by a very rapid melt.

5.31 In Glasgow, local papers apparently have reported that the east of Glasgow will flood again due to under-capacity in the urban drainage system. However, other participants at the Glasgow focus group took the view that Scottish Water has done enough to prevent another flood in Glasgow, whilst recognising that improvements to the urban drainage system are being implemented gradually, local area at a time.

5.32 While many people may suffer from anxiety about flooding, at the same time they are often able to rationalise the level of risk they face. For example, one focus group participant argued that people who have been flooded – including himself – overreact to the risk of a future flood, simply because their minds have been focussed on flooding:

*"You're talking about risks and assessing the risks. All it [having been flooded] does is focus your attention on flooding ... Statistically, there's more chances of you being flooded from your tank in the attic bursting and flooding your house that way. There's also more chance you'll have a household fire through electrical fault than normal sort of flooding. There's a risk that you might get struck by lightning. There's probably as much risk of that as, you know, getting flooded. It's just focusing your*

*attention at a particular time on a particular risk. If you asked the non-affected section of the population if flooding was a constant concern, then of course they'll say no. So we are a special group, we're contaminated by the experience". [Forres]*

5.33 When needing to get information on the imminent level of flood risk, most people indicated that they rely on observing the river:

*"We're round at the river every time it rains. My husband was round last night looking at it." [Elgin]*

*"As soon as we get a couple of days rain... I mean, I get up every morning and it's force of habit ... I look out to see how the water is, you know and, you know, after a night's rain, you think, 'Oh it's come up about 2 or 3 feet', you know". [Edinburgh]*

5.34 Local knowledge of historic flood patterns, while sometimes an asset, can also blind people to the fact that different spatial and temporal patterns of rainfall will affect different rivers in contrasting ways, producing different floods:

*"I think the problem we had with the warning side of things was that we were never considered at risk. The areas that were flooded were never really considered at risk because I happened to be at work the same day that you said the Fire Brigade were pumping out the river. One of my friends actually lives down on the Findhorn, down at Mondoll and he got a phone call to say that there was a high flood risk of the Findhorn and would he care to go home and, you know, check out his property and make preparations for flooding. And he left work that afternoon and told me that 'I'm off to do a check cos there's this flood warning out for the Findhorn'. And I said 'Bye, good luck to you mate', you know, 'Cheerio, all the best', unbeknown to me that it wasn't him that was under threat. It was us under threat from the Mossat, not the Findhorn. So I think the historical perceptions were that the Findhorn was always the threat and with the volume of rain that was falling, it was the Findhorn that was liable to flood, not the Mossat." [Forres]*

5.35 During the household survey, a number of people at the edge of flood envelopes indicated on the doorstep that they were not at flood risk because the flood did not reach their property. This view appears to be based on a perception that every flood will be identical.

5.36 In terms of assessing the longer term risk faced, some focus group participants appeared quite well informed about climate change and the possible impact on flooding, for example:

*"Well they're saying that your winters are going to be milder and wetter" [Glasgow].*

## ***Managing flood risk***

5.37 *Flood proofing* Most focus group participants were not keen on the idea of using flood guards from a practical point of view:

Participant 1: *“The problem [with flood guards] is if you put them on and you go back in your house, they’re not easy to get over. Or you cannot get back into your house. They’re easy enough taken off but if you’re flooded and you put your barrier up, how do you get back into your house? You can’t get over that. I’ve tried it”.*

Participant 2: *“I’ve tried it and I’m fairly fit and I struggled trying to get over it. I had to get a chair from inside the house to climb over onto another chair and pull that chair in, then go in, then close my front door. It’s not that easy and if you’ve got an elderly person, they are going to struggle if they had their own barriers and that’s why we don’t have the barriers”. [Elgin]*

Some council tenants reported flood guards being stored centrally by the local authority, labelled with people’s addresses. There was scepticism as to the feasibility of deploying flood guards from this central store in sufficient time to avoid flooding.

5.38 Other participants were of the view that trying to prevent flood waters from entering their home can be futile. Therefore they simply ensure they can quickly retrieve key items:

*“You tend to get your life in a little bit more order is one of the things that we’ve done now. Whereas before it happened, you maybe weren’t good at file keeping or receipt keeping, invoices and that sort of stuff and maybe didn’t keep all your legal documents and all that in a special place that you can just grab, you know, maybe you had some a bureau, some in a bottom drawer here, some over there, you know. Now I think since it happened to us, everything’s got its place and if there’s a threat of flood, we’ve got a couple of boxes of legal documents, photographs, anything that you think is important, within minutes you can have that sorted and then you put your feet up, go to bed and wait” [Forres].*

5.39 *Flood warnings and emergency planning* Although many focus group participants were quick to complain at either not receiving a warning or not getting sufficient warning of a flood, the limitations of what participants say they can do to prepare for a flood make them lukewarm or even sceptical about the benefits of flood warnings:

*“Well, we would still have a chance to save a few things but, I mean, what happens then, OK, you’re gonna be flooded. Where are you gonna go? I’ve no got the money for hotels or anything. Whether I’m on benefit or not, there’s folk working that still can’t afford it. Where do you go? They say, you’re gonna be flooded. I’ve no family to go to”. [Elgin]*

Some questioned the value of the information contained in a flood warning *per se*, for example:

*“They have a much flaunted flood warning system. Who needs a warning of a flood? If your eyes are open, you can see it’s going to flood”.*  
[Forres]

*“I think the whole argument about warnings is academic. I honestly do, because what can you do? We live in bungalows, we get a warning you’re gonna get flooded, move all your stuff upstairs. Sorry, can’t do that”.*  
[Forres]

On the other hand, some saw value in flood warnings, albeit limited:

*“You can take a couple of precautions, move your car out, you know, I lost my car. If I’d had a warning, I could have maybe taken it out”.*  
[Forres]

5.40 Other participants reported feeling let down by not having been given sufficient warning and information on what to do to prepare for the flood. An example of this came from Perth, perhaps triggering improvements in flood warnings and emergency planning since the flood in 1993:

*“we pulled the car out of Lincoln Court and went right and there was a lorry full of sandbags. Right? We’re like, what’s going on here, cos we hadn’t heard a thing. So my husband went over and they said that they think there might be flooding but they don’t know. They’d have to wait until the 4 o’clock high tide and then they would know. So, OK. So we went away ... and it wasn’t until I put the kids to bed and I went upstairs and I saw the neighbours flooding out their houses and it was pouring down and I could see the road outside - it was just water. ... So they had sandbags. We took some sandbags and the rest ... they brought sand and they just dumped it in the middle of the road and they gave us the sandbags to fill as the water’s coming up – but we didn’t know what we were doing or where to put the sandbags - and then it covered the sand and washed the sand away [laughs]”.* [Perth]

There was also more general frustration reported at local authorities’ responses to the floods:

Participant 1: *“I was very disappointed that the Council didn’t ask the Army to step in. The Army’s there, it’s got men, the manpower, it’s got the lorries, it’s got the equipment”.*

Participant 2: *“It felt amateurish, didn’t it?”*  
[Several participants concur] [Edinburgh]

5.41 Insurance Many participants reported losing their no-claims bonus and some reported increases in excesses for flooding when making their insurance claim. Many people found this vexing as they were not at fault:

*“The only impact on the insurance was the aftermath because of the box asking who was responsible for the damage. I lost no claims insurance*

*cos I had a no claims bonus on my household insurance and my contents insurance". [Glasgow]*

*"the one thing that I really got angry was I mean, my taxi was underwater, right over the steering wheel and nobody would take the blame for it. It had my mobile phone in it, my fire extinguisher. My computer which cost £1000 and the company wanted £250 excess off me but nobody would take ... so I just had to claim off my own insurance and my premium then went sky high because the Water Board, everybody just wouldn't take responsibility for it". [Glasgow]*

Large flooding excesses and lack of access to alternative insurers because of living in an area that has been flooded were commonly reported problems. For example, one focus group participant whose insurance provider introduced a £10,000 excess for flooding after the flood explained his frustration at not being able to do anything about this and the anxiety that such a large excess brings:

*"We wrote to our MSP who wrote to the insurance company complaining and got a letter back saying that they wouldn't even consider reducing the excess until the council has installed flood foundations. So you can imagine, every time it rains, we're round at the river, looking to see. I mean, £10,000 excess for flooding; it's just..." [Elgin]*

*"The insurance initially stayed the same for about a year and then the following year it shot up and we thought, right, we need to try and get a better quote and as recently as a year ago when you gave your postcode they told you no, you're in a floodplain". [Forres]*

5.42 Ownership of managing flood risk Most focus group participants accepted a degree of responsibility for protecting their own home from floods and for living with the consequences of living in a flood-risk area. However, many perceived a wider culpability for the flood that other organisations are not willing to accept:

*"There's a question at the bottom [of an insurance claim form] and it says, "Who do you hold responsible?" Everybody that I've spoken to has put Edinburgh Council." [Edinburgh]*

*"I have been in touch with Scottish Water beforehand and after the flood because of the ongoing problems that we had. When we started getting flooded, I phoned him and he automatically authorised a group of men to drain the water away to stop it getting to us. So they were working on it, you know. I can't stand and let them take blame for doing nothing but at the end of the day, it was their fault, they should have done something quicker and we wouldn't have got the experience we did". [Glasgow]*

5.43 Many participants were of the view that local authorities were contributing to future problems by granting planning permission to build in high flood-risk areas, for example:

*“I don’t think that the District Council are helping either. They’re trying to build on every flood plain that’s going. The flood area where I had four and a half feet of water and had to take my hens out of. ... Actually, you know, anyone can put in planning permission. They’ve actually got planning permission in for my ground, which I’m not selling, but they have and I mean, I think that’s ridiculous”. [Forres]*

5.44 In some local settings there was a strong perception of alleged injustice in the priorities given to different types of property owner. For example, that the army were brought in to pump out Murrayfield stadium in Edinburgh in preparation for a rugby match while people’s homes were still under water vexed one participant:

*“Murrayfield was out of action for 3 or 4 days, we were out of action for 3 or 4 months. Basically that’s what it boils down to”. [Edinburgh]*

5.45 In Edinburgh, there is reportedly strong negative feeling towards the Scottish Rugby Union for objecting to the proposed flood alleviation scheme, and consequently delaying its implementation. In this case the residents’ perception reported in the focus group is that commercial interests are overriding the interests of householders. One participant expressed concern at who is and is not willing to make sacrifices for the proposed flood alleviation scheme:

*“with the current proposed plan, we’re gonna lose so much of our garden and we’ve not complained and our neighbour’s a chiropractor and she’s got a little gravelled area ... and she has objected”. [Edinburgh]*

5.46 On the question of ‘managed retreat’ from areas that have been flooded, some participants indicated that they would have been relatively happy to have been permanently re-housed at the time of the flood, including owner occupiers. Indeed, most participants knew former neighbours who had opted to ‘cut their losses’ and move out. However, a substantial proportion of focus group participants were strongly opposed to this idea, with their notion of ‘home’ being closely bound to a specific property, particularly if they have lived there for a long time. For example:

Interviewer: *“How would you feel about permanently moving if you were fully compensated?”*

Participant 1: *“No. I mean, I was sitting out there yesterday, beautiful sunshine, lovely piece of grass in front of me, nice ... I mean, the wall is very artistic, it’s an old fashioned rubble wall, the birds are singing and there’s wood pigeons... and it’s brilliant, you know. I don’t want to move from there. I’m quite happy to, you know...”*

Participant 2: *“That’s why you bought the house”.*

Participant 1: *“That was why I bought it, aye”.*

Participant 2: *“You probably worked all your life in order to...”*

Participant 1: *“That’s right. I mean, I’ve gradually moved up and, you know, this is what I’ve come to and I’m quite happy there”. [Edinburgh]*

In the Elgin focus group, it was argued that it would not be feasible to permanently re-house everybody who was flooded because so many properties were affected in

relation to the size of the town. In addition, there was a view expressed that the state did not have the right to prevent people from taking risks with their own homes:

*“you are happy living where you are cos you like that house and I think you’re right – so the State shouldn’t tell you otherwise”. [Forres]*

5.47 Many participants expressed frustration with the slow-pace and perceived lack of willingness to listen seriously to the suggestions of local people in planning flood defence schemes. This appeared to be particularly acute in Elgin:

*“We went to one of the meetings that they had and I remember suggesting that until they do something, could they not dredge the river. And they looked at me as though I was daft and said, ‘What is the point of dredging the river? It’ll only silt up again’. I said, ‘Well, dredge it again until such times as you get things decided’. But oh no, oh no, they knew best”. [Elgin]*

*“they’ve formed yet another sub committee to report back to the Council about the flood progress or the contractors, etc and we’re all still in limbo and wondering what is happening. Now, there is another meeting promised round about September this year but when you get to that, it’s not the Council it’s a contractor and you get plans brought out like this thing here [holds up very detailed plan followed by laughter]. Now, this is a consultant producing this very expensive plan for the Council and I don’t know if half the Council has even looked at it. It’s total frustration and lack of confidence that anyone is really driving this forward”. [Elgin]*

## **Summary**

5.48 This chapter has summarised the main findings from the five focus groups, relating to the impacts of floods, the experience of living with flood risk and attitudes towards managing flooding and flood risk. Using verbatim quotations extracted from transcripts of the focus group discussions it has amplified and deepened the results of the household survey reported in Chapter Four. By eliciting individual narratives and personal experiences it has helped put a human face on what it means to be flooded.



## **CHAPTER SIX      INTERVIEWS WITH KEY INSTITUTIONAL STAKEHOLDERS**

### **Aims and scope**

6.1 To examine the monitoring, warning and emergency response aspects of flood preparedness we interviewed senior decision-makers in SEPA, local authorities and central government (see Appendix C for the interview pro-formas). We also explored local authorities' experiences of handling floods to establish what they found worked, or otherwise, in terms of warning dissemination, general emergency planning and management.

6.2 We also examined the measures that local authorities and SEPA feel work best for promoting flood awareness outwith flood events. Under this heading come awareness campaigns (including those of SEPA), flood newsletters, and publicity for community 'self-help' initiatives. We explored the social aspects of planning for more permanent flood alleviation, the promotion of flood alleviation schemes and the often complementary approaches that emphasise planning, development control, and maintenance of watercourses using statutory powers. The information gained allowed us to assess how the selected local authorities involved communities in alleviation schemes and/or awareness campaigns.

6.3 We sought the views of Scottish Water on the social issues of emergency planning, maintenance and network renewal. We also contacted a representative from the insurance industry to establish how flood mitigation measures impact on insurance companies' decisions on policy provision and charges. We invited comment from SEERAD on the social aspects of flood risk as viewed by the body that sets national funding policy for flood alleviation schemes and warning programmes.

6.4 In the second part of the discussion in Chapter Seven we summarise the findings on 'what works' in terms of flood alleviation planning, via responses to a series of questions related to the social aspects of flooding and flood risk.

### **Flood warning to local authorities and key emergency responders**

#### ***Extent of National Coverage by SEPA flood warnings***

6.5 The majority of communities at risk of fluvial flooding are covered by flood warning schemes and included as part of the *Floodline* system. Significant population centres without coverage and at risk of being flooded include the Forth estuary from Grangemouth to Stirling, and parts of West Lothian including Livingston. In Aberdeenshire, the Dee, Don and Deveron catchments also lack flood warning schemes. Although problematic in terms of establishing adequate warning lead times, SEPA staff report that these catchments are now under review for new schemes as resources permit.

6.6 SEPA is dependant on local authority or Scottish Executive funding for new flood warning schemes; new funding often being triggered following damaging floods SEPA's cost-benefit appraisal method (policy no 34) is then implemented, with

expectations in terms of the reach of the system and the information that can be provided and managed as well as technology and resources permit. The local authority also needs to show clearly how it plans to use the information in its flood emergency plan.

6.7 SEPA acknowledges that the re-active nature of this policy has constrained expansion of warning provision to date; the majority of the areas covered by warning having suffered at least one flood in the past. In future, the development of a national flood warning strategy has the potential to maximise social benefit by covering many more areas at risk (as established by the 2006 flood risk maps) if certain pre-defined criteria, such as adequate lead times, are met. SEPA endorses this strategy as it would help focus on those locations with most pressing needs. The requirements of the Civil Contingencies Act 2004 place a mandatory duty on emergency planning groups (see para 6.13) to assimilate a community risk register. This duty may provide a useful database for assessing those at flood risk. In turn, by stimulating production of flood emergency plans and alleviation strategies in authorities that have yet to produce them, it may help target flood warning provision more effectively. This duty also has obvious relevance for warning dissemination, as it may identify areas that would benefit from warning systems.

6.8 Some SEPA staff claim, with some concern, that expansion of their warning duty has stretched their existing commitments. This has adversely affected their basic recording of hydrometric data on which the accuracy of flood warning systems ultimately depends.

6.9 In terms of public awareness, SEPA runs campaigns to increase public knowledge of *Floodline* and has links with some local authorities to promote awareness after flood events. The *Floodline* awareness campaign findings are summarised above in para 4.46.

### ***Coastal flood warning***

6.10 At present the Clyde estuary is the only coastal zone in Scotland covered by a flood warning scheme. Extending this to other sections of Scotland's coastline is problematic in terms of lead times. For example, the lead time for the January 2005 storm, which caused severe flooding and wave damage in the Western Isles and north eastern coasts, was only a few hours. Noting the difficulties in providing clear flood warning to such areas, SEPA is developing an extension of the *Flood Watch* service to selected coastal communities based on more intensive use of the Met Office's predictions of sea surges.

6.11 The coastal flood warning system for the Clyde covers three authorities downstream from Glasgow City Centre (see Kaya *et al.*, 2005). Both Glasgow City and Renfrewshire Councils commented that this provides excellent warning times (typically 36 hours). The authorities along the river have pre-designated trigger levels at which they receive a faxed warning predicting when the specified level is expected to be exceeded, and for how long.

6.12 In some restricted areas, there may be potential for specific warning of more localised coastal flooding. An example is provided by Scottish Borders Council in Eyemouth, where a link has been made with the local harbour master to give a visual alert, combined with a removable flood defence to protect properties along a stretch of road near the harbour where the risk is highest.

## **Flood emergency planning**

### ***Regional Co-ordination***

6.13 A regional multi-agency approach to emergency planning has become the norm, with eight corporate groups established nationally in former regional government areas to oversee strategic aspects of emergency planning. These groups co-ordinate the actions of the emergency services, local authorities, voluntary groups and utility companies. Although such a structure is now required under the Civil Contingencies Act 2004, the Act's requirements builds on existing best practice. Thus the planning groups investigated in this report (Tayside Region Emergency Co-ordinating and Planning Group ((RECAP), Strathclyde Emergency Co-ordinating Group (SECG) and the Grampian Joint Emergencies Committee) have all benefited by sharing infrastructure and manpower. Interviewed local authority staff also praised the voluntary sector, including the Women's Royal Volunteer Service (WRVS), for its contribution to emergency planning. The national viewpoint is also positive:

*“ ... a tremendous example of people being pro-active, if there is a significant enough event the groups get together for a de-brief meeting...the new generation of professionals are getting together and recognising the benefits from regional organisation.” (SEERAD interview)*

6.14 Within the regional structure, the police and emergency services act as intermediaries and as chief co-ordinators, interacting with the local authorities on a tactical basis. In areas where flood warnings are provided, these Category 1 responders are warned by SEPA directly. Perth & Kinross Council commented that their interplay with the other responders in RECAP “works perfectly” and is refined by periodic training exercises (of necessity, desk-based for flooding scenarios) and analysis of lessons learned from past events. Glasgow City Council noted that in the Strathclyde group, all parties are familiar with each other from the legacy of regional authorities and have come together seamlessly during past incidents. Interaction with SEPA at the training and incident level is also valued. For example, Scottish Borders Council staff report close interaction with SEPA between flood events in refining warning dissemination, and training of Duty Sergeants specifically to deal with flood emergencies.

### ***Local Emergency Plans***

6.15 The interviewed local authority staff often anticipated the receipt of a flood warning based on a combination of severe weather forecasts and their own river monitoring. Once the hydrometric warning arrives, and informed by past experience, they maintain a two-way dialogue with SEPA as the event develops.

6.16 In most interviewed authorities, the response is based on speed of rise of the main rivers rather than an individual warning on a particular reach. Generally coordinated by the emergency planning manager in the affected local authority or authorities, the response is supported by emergency planning officers in the regional Emergencies Committee.

6.17 Within this general structure, authorities adapt to their specific requirements, based on accumulated experience about the behaviour of the watercourses. In Glasgow, the emergency plan stipulates rapid distribution of sandbags along known vulnerable stretches of the Clyde, Kelvin and White Cart. Only 4 hours warning can be given for the White Cart, so additional protection in winter is provided by laying sandbags on certain stretches to the known 1 in 5 year return level. This strategy provides a time buffer to permit better dissemination of warnings and, if necessary, evacuation of residents. However, the seasonal appearance of sandbags is a visible reminder of flood risk that, according to Glasgow City Council staff, is unpopular with some residents.

6.18 Edinburgh City Council operate a standby rota to ensure Council labour is available to respond to severe weather warnings, and that workers are adequately rested.

*“We tend to be out (checking rivers) before SEPA call us out. We also speak with SEPA and the weather forecasters and get a feel for the event. Say we came in on a Friday and there was a forecast that things were going to be bad over the weekend, we would ...come back in at night to relieve those who stayed on duty, and in the meantime we would action a flood volunteer rota and find out who is available from the list of co-ordinators. These are the ‘public faces’ of the Council. They will be allocated areas and liaise with emergency headquarters, but their main job is to keep the public informed”. (Edinburgh City Council)*

Volunteer Flood Co-ordinators in Edinburgh have been allocated to known flood risk areas. Operating on a rota, they are Council workers alerted by phone to provide the crucial on-the-ground link between the Council and the emergency services. In particular they prioritise sandbag distribution as the flood progresses, with large sized sandbags available at Council depots for distribution in areas known to be at risk.

6.19 Scottish Borders Council responds to weather warnings by automatic pager messages which give all those responsible in the Council an early alert, even before SEPA’s flood warnings are received. Due to the size of the region and the interconnectedness of the main rivers, the plan involves active monitoring of all major rivers in the region with continuing dialogue with SEPA on hydrological patterns as the situation develops. The Borders emergency co-ordinating group is convened at a control room in the Council offices. It is not usually possible to protect areas as part of a seasonal routine, so resources and labour are distributed according to the developing event.

6.20 Aberdeenshire Council at present has no flood warning provision beyond a general *Flood Watch* on its major rivers (para 6.5), and so relies on weather monitoring and dialogue with SEPA hydrologists to give early warnings.

6.21 Perth & Kinross is unique among the authorities interviewed in having an alleviation scheme for the main population centre (Perth city). However, the authority still relies on early warning in order to close floodgates in a timely manner. Staff report that fully closing the 84 gates when risk levels are low was found to be too disruptive to local traffic flows, so the authority has a prioritisation scheme, with groups of gates closed only when the river is expected to reach a certain height. Close monitoring of conditions upstream and tidal predictions give up to 24 hours warning time of a flood on the Tay, with the police then managing the remaining local disruption from floodgate closures.

### ***Flood warning dissemination***

6.22 Authorities have various means in place to disseminate warnings. Procedures are stipulated in the regional emergency planning framework, and the extent to which the police and other emergency services are involved varies between authorities. These services are a vital part of the dissemination to households within urban Glasgow and Edinburgh, in the latter interacting with the Voluntary Flood Coordinators. According to SEPA, the police still disseminate warnings door to door in the Highland Council area, but not in the former Grampian region. They have withdrawn from issuing direct warnings within the Tayside RECAP group, although still play a role in Perth & Kinross, since it has been found that they are the optimal means to ensure that the warning is reliably passed on. Beyond Perth city, cascade systems operate. SEPA issues the warning to the police, who then disseminate to the person at the head of those flood warning groups that might be affected by the flood. The warning then cascades through those who are registered with the group, but the Council has noted difficulties with this system. There are inherent delays and no audit trail, so it is difficult to know how effective the system is when operated. Also it has been observed that farmers may not talk to each other and there have been incidents where failures to spread the warning have caused livestock deaths. In Perth city, a cascade operates for businesses in the central area but has not been introduced for householders, since the police are still actively involved in dissemination. More generally, Scottish Borders Council staff stressed the advantages provided by local contact and knowledge gained from experience with their flood warning groups.

6.23 In the Borders and parts of Moray, Automatic Voice Messaging (AVM) is used to disseminate warnings to designated flood warning groups. Scottish Borders Council presently offers coverage for all properties 'at risk' (defined by presence in one of the 24 flood warning groups). SEPA aims to achieve a 3 hour minimum lead time for flood warning to allow time for the Council to disseminate the warning and for householders to respond. The system now has around 600 properties registered out of total number of more than 4500 currently at risk. It is capable of delivering SMS text messages. If an occupier approaches the Council and requests that their property be added to the system, it is checked against the risk database. The property occupier then has to provide a small set of details including the phone/SMS numbers on which they wish to be warned.

6.24 The decision to issue warnings via the AVM will be taken by the Council in close liaison with SEPA. Dissemination appears highly effective, with Scottish

Borders Council claiming that they can obtain a 90% contact rate. The AVM system is checked and evaluated after each use by 'Bordercare', a 24/7 facility that both issues warnings and acts as a help facility for the public. Being web-based, the AVM software can be accessed easily by anyone in the Council who needs to modify its operation, and has double failover systems built in.

6.25 Moray Council's AVM system operates in areas that have been flooded in the past, principally Forres, Elgin and Rothes. The Council invites all of its tenants in these areas to complete a form to register them on the scheme. The system alerts the tenants in most cases to fit the flood guards that the Council has installed on their properties. Others in these areas, including private householders and business, can also register for the scheme if they wish. Three hundred contacts are registered on the system at present.

6.26 Both Councils make pro-active efforts to publicise their systems. The Scottish Borders Council leaflets households and works jointly with SEPA in their flood awareness campaigns. Moray Council placed articles in the local press when their system was launched in 2005 plus leaflets in local libraries and on the Council website.

6.27 Costs of running the AVM in these areas comprise fixed costs of £3,000 to £5,000 per annum, plus 'per contact' charges when the system is activated.

6.28 Two issues surrounding the wider application of AVM have emerged:

*Inclusion* Scottish Borders Council noted that people who should be in the AVM scheme are not always registered because they fear their details would become more widely known. In fact, the Council assures householders as to confidentiality. The insurance industry viewpoint (para 6.63) appears to be that they would liaise with a householder after a flood and even suggest inclusion in an AVM system if one were available.

*Warning content* The systems at present merely refer the client to *Floodline*, which may not be in keeping with public expectations. SEPA promote guide materials and a CD-ROM that tell people how to prepare and flood responsibilities, entitled 'Preparing for Flooding'. These have been distributed during their awareness campaigns and community meetings. Combined efforts by councils and SEPA working together are said to be helpful in managing expectations.

6.29 A recent unpublished report commissioned by the Scottish Executive has examined how the efficiency and speed with which a flood warning is issued can be improved. The Executive is currently pursuing the implementation of such enhanced flood warning systems jointly with SEPA, local authorities and the Police. Were a nation-wide service to be developed, local authority experience in deploying AVM systems would be of value.

6.30 In terms of dissemination it is clear from interviews with local authority staff that there are several areas nationally where the police have withdrawn from issuing flood warnings directly to the public and which do not have direct coverage to those at risk by a direct method such as AVM. In such regions, reliance may be placed on a

cascade system, or on reference to *Floodline* by householders, alongside dissemination by radio and television authorised by the police.

### ***Warning and emergency response for pluvial flooding and drain surcharge***

6.31 Urban flooding from surcharging sewers, blocked culverts and/or surface runoff has occurred in several areas in the past decade, most notably in the Shettleston area of Glasgow in July 2002. By its very nature, warning for pluvial flooding is problematic, and at present no adequate system is available, although there is the potential to develop one that interacts with burn or culvert monitoring in areas where risk is a particular concern.

6.32 As a result, local authorities have acted in a variety of ways to reduce the risk from culverts and watercourses within their respective areas. Edinburgh City Council notes that smaller flood incidents can often occur from drain backup without a flood warning, so there is a need to monitor watercourses and weather pro-actively. Glasgow City Council has a rolling maintenance programme for culvert screens operated by dedicated staff, which helps to ensure that backups will not occur. In the longer term, the Strategic Drainage Plan (SDP) for the city is being developed in conjunction with Scottish Water to reduce the direct flow of water into culverts. However, since the SDP is still at the planning stage, interim measures have been taken by Scottish Water in high risk areas, including fitting of non-return valves, sealing of manhole covers and provision of flood guards and vent covers to protect properties from drain backup outside the property.

6.33 Scottish Water maintains verifiable records for properties that have flooded due to overloaded sewers, for which it has a legal obligation. The aim of these records, which are held in an Overloaded Sewer Flooding Register, is to provide an auditable method for identifying specific properties affected by flooding or at risk of experiencing flooding. The Flooding Register is Scotland-wide and is made up of a series of flooding clusters within sewerage catchments. Scottish Water is also developing an emergency response plan. Its Strategy and Planning unit works with a Flood Management Group that examines all aspects of emergency planning with regard to flooding.

6.34 Scottish Borders Council has telemetered alarms on culverts in Jedburgh and Galashiels known to be high risk. These send signals direct to the Council offices when the culvert depth becomes high as a result of blockage, allowing maintenance teams to respond. Perth & Kinross Council alerts businesses in high water table zones in the city centre to the possibility of basement flooding. The process is conducted by a business warning cascade system, initiated by a warning from SEPA.

## **Social aspects of flood emergency management**

### ***Local initiatives for flood awareness and emergency planning***

6.35 Many authorities have taken local initiatives to try and encourage participation in both flood warning dissemination and flood emergency management. The use of

cascade systems in Perth & Kinross, noted above, are examples primarily focussed on dissemination, but there are further initiatives that specify positive action by those receiving the warning. Comments have pointed to both benefits and drawbacks. On the one hand, the strategy can encourage independence and free up local authority resources for other areas of the emergency plan, while also giving the community a tangible sense that ‘something is being done’ with regard to flood prevention. On the other hand, participation can also raise unrealistic expectations which may lead to disillusionment after a flood event if not carefully managed. These expectations may, in turn, be based on lack of knowledge about responsibilities for flood defence on the part of householders. A further potential difficulty is that the personnel involved may not be trained to the level of the local authority workforce and Category 1 responders, even though they may be required to work independently in an emergency.

6.36 As part of the Scottish Borders Council’s initiatives to encourage community engagement, the authority has distributed Environment Agency ‘floodpack’ toolkits to six Community Councils, and encouraged them to develop a local plan that could be put into operation in response to a direct flood warning. However, the Council has encountered some difficulty in establishing and maintaining contact with the Community Councils, noting that a flood event is often required to provide the stimulus for contact.

6.37 Local authorities and SEPA have also noted a general lack of knowledge among the public as to which public bodies are responsible for providing flood protection (both temporary and permanent) and flood warning. Information on this has come from various sources: questionnaire returns from awareness campaigns, feedback after flood events and promotional campaigns for flood alleviation schemes. The general finding is that awareness goes up markedly after a flood event, but rapidly tails off thereafter.

6.38 In light of this finding, local authority efforts have been focussed on improving awareness via information campaigns and newsletters. Examples exist of comprehensive flood information leaflets, for example those in Scottish Borders and Edinburgh, that are delivered to properties in flood risk areas. This information sometimes refers directly to flood incident and maintenance data from the local authority Biennial Flood Reports. Renfrewshire produces a ‘digest’ of its Biennial Report for distribution to the public, and finds this helpful in spreading information about actions taken, further reinforcing the sense that the Council is ‘doing something’.

### ***Sand bags and removable flood defences***

6.39 Local authorities vary in their management and deployment of sand bags. Possible approaches, sometimes used in combination, are:

- distribute sand bags to properties during a flood event, with or without priority according to whether the property is local authority owned;
- provide filled sandbags or filling facilities for private use at the site of the emergency;
- provide facilities at depots for individuals to fill bags and take them away.



The last option has generally found the least favour, as it is difficult to control how many bags are taken. The balance between the three approaches may differ from event to event and even within a local authority.

6.40 Scottish Borders Council distributes information leaflets outlining responsibilities for flood protection and location of sandbag stores, many of which are located in defunct fire station yards. They have established initiatives with community groups to both increase sandbag depot availability and encourage access through publicity campaigns. Interviewed staff reported that a pilot area run in Selkirk by the local rugby club has been successful. However, the Council is also trying to wean the public off reliance on sandbags, and has been encouraging uptake of temporary removable flood defences. It notes a tendency among the public to assume that the Council will supply and fund all these measures. Furthermore, the Council has reported that as it takes the initiative, the Community Councils and other groups tend to take a step back and assume that the proposed measure (for example, local management of sandbag stores and funding temporary flood defences) is the local authority's responsibility.

6.41 In Aberdeenshire, a pilot scheme at Inverurie is encouraging similar local control over sandbag distribution, although, as with the some of the initiatives in the Borders, this is not yet fully operational.

6.42 Glasgow City Council makes sandbags available in depots for public use. Elsewhere in the urban areas studied, sandbag provision is kept under local authority control. Thus in Edinburgh, the plan restricts public access to depots, since it has been found that the emergency response works best when the distribution is controlled by those in the incident room who are interacting with the voluntary co-ordinators and others at the site of the emergency.

*“... the person in the incident room will know where the (the sandbags) need to go, since he has the big picture of everyone phoning into him.”  
(Edinburgh City Council)*

6.43 Many local authorities are also now using large temporary barriers such as removable dams in the street in areas known to be at flood risk. But ensuring they are installed in time, especially in the absence of Council staff, makes their use difficult. It may be necessary to come to an arrangement with a local contact point, possibly within the Community Council and/ or flood warning group.

### ***Evacuation***

6.44 Evacuation is typically a slow and difficult operation, and hazardous both for rescuers and evacuees. There is often a lack of willingness to evacuate resulting in increased risk to members of the emergency services.

6.45 All the local authorities contacted have evacuation plans that integrate emergency planning, emergency services and social work departments. These co-ordinate closely with the regional body, and involve the voluntary services (particularly the WRVS) in opening and staffing designated rest centres. Some authorities mentioned the potential for problems and negative feedback when

complications have arisen with evacuations and particularly those which occurred during the night. In Edinburgh, the evacuation of nursing homes during the April 2000 flood led to the use of hospitals as emergency refuge centres. On this occasion few householders attended rest centres during the incident, a fact that was attributed to the time of day and the large amount of self-evacuation that occurred.

6.46 Perth & Kinross Council has developed a one-stop registration system for temporary evacuees based on computer software developed within the Council, a system that has also now been adopted by some other authorities. This system avoids the need to process multiple registrations, e.g. for housing, social work, with often-traumatised householders, and is also easy to use for the voluntary staff who are called in to help.

6.47 Longer term re-housing of evacuees has created difficulties for some authorities where large numbers of social tenants have had to move. In particular, Glasgow City Council noted that there were delays in dealing with housing associations. Organising new accommodation has to be negotiated with a multiplicity of such associations, causing delays and adding to the social costs.

### ***Post-flooding - mitigating costs to the community and businesses***

6.48 All local authorities see a recovery plan for businesses and communities as helpful. Scottish Borders Council is in the process of developing one, incorporating lessons learned from the flooding incidents of January and October 2005, when many businesses, particularly in Hawick, were badly affected.

### **Flood alleviation and avoidance**

#### ***Social aspects of flood alleviation scheme promotion***

6.49 Councils were asked about their experience of promoting flood alleviation schemes or other flood prevention programmes. Of those investigated, White Cart (Glasgow) and the Braid Burn (Edinburgh) are flood alleviation schemes now at an advanced planning and build stage respectively, while the Water of Leith scheme (Edinburgh) has had extensive consultation and a local public inquiry. Also investigated were the option appraisal and planning procedures followed in Renfrewshire.

6.50 In all cases, extensive public consultation was recognised as essential from the outset.

*“What we did right from the start was to say ‘this is not just an engineering scheme’ – it is a combination of approaches and the difficulty is not with the hydrological aspects but in making sure everyone buys into the scheme.” (Glasgow City Council, commenting on the White Cart flood alleviation scheme)*

6.51 Glasgow and Edinburgh Councils ran exhibitions to publicise their schemes and solicited feedback by questionnaires. These are considered to have been an effective way to ensure social input to the planning process, making the community ‘feel involved’. In Edinburgh, at the Braid Burn exhibition, proactive publicity also helped to remove many objections that were largely on cosmetic or minor technical grounds.

*“[X] was the best attended exhibition, there was a high density of people there, and at the end of the day there was not one objection from that area, a couple of complaints and a few constructive criticisms...”*  
(Edinburgh City Council)

In Glasgow:

*“We sent a caravan around, we got 700 visitors and they were all asked to fill in a questionnaire, for which we got 190 responses. The questionnaires looked into areas like ‘do you support the concept of floodplain storage’ and we also asked them which specific option of the several available they supported. The vast majority, even in the upper catchment, were positive”.* (Glasgow City Council)

Nevertheless, dealing with objections still creates inevitable delays, estimated by Edinburgh City Council as around eighteen months for the Braid Burn scheme, and presently still outstanding for the Water of Leith scheme.

6.52 In Renfrewshire, informal contact throughout the formal consultation process was regarded as helpful, with the public kept involved from an early stage.

*“We find it is much better to make things as informal as possible rather than blind people with science about the statutory process, ... will follow the informal consultation up with adverts in the local paper and get together Community Councils, community groups and elected members. We take along our plans and draft ideas of what we are planning, what [the scheme] is going to look like, what it is designed to do and what it won’t do”.* (Renfrewshire Council)

### ***Social factors in flood alleviation scheme cost-benefit appraisal***

6.53 In calculating the cost against the environmental benefits of flood prevention schemes, some local authorities have included social benefits from avoided damage and social impact, and the benefits of extra amenity. However, in Edinburgh, the cost-benefit ratio came out strongly in favour of construction for both the Braid Burn and Water of Leith schemes, with little adjustment of the economic analysis to allow for social impacts. For the Water of Leith:

*“We used the insurance (claim) costs and the costs of transport disruption... the analysis came out strongly in favour. In most of our areas that will be protected by the flood defence there is quite a high proportion of insured high value housing”.* (Edinburgh City Council)

6.54 In Glasgow, riverside amenity provides a benefit that the Council assessed in a non-quantitative way by means of the visitor survey, but no attempt was made to value the environmental benefits by any economic methodology.

*“The visitors were shown plans and were asked if they thought we should make environmental improvements. That aspect of it was very strongly supported.” (Glasgow City Council)*

A need to factor in social impacts is potentially vital for schemes with relatively low total asset value in the protected area. Thus Renfrewshire Council needed to allocate priorities among three planned flood prevention schemes covering areas affected by the 1994 floods. The fact that all three areas were impacted in 1994 helped in a comparative prioritisation procedure. This was needed as resources were not available to develop all three schemes simultaneously:

*“We used the 1994 event as a test. We knew as a result of that event how much property and risk to life there was in all three areas, so we commissioned a consultant to do a draft feasibility/cost analysis of the flood alleviation schemes.” (Renfrewshire Council)*

6.55 In deciding the priority order for the schemes, the Council calculated cost-benefit ratios using the economic analysis specified in the Flood Hazard Research Centre’s ‘Multi-coloured Handbook’ (Penning-Rowsell *et al.*, 2003) rather than the methodology factoring in social cost and intangible costs. The latter method has the potential to increase the social benefit calculation for schemes in the future. However, the Council noted that re-housing many social housing tenants from these areas after the 1994 floods presented a problem in obtaining data for this purpose.

6.56 From a national point of view all approved schemes recently brought forward by local authorities have been funded by grant aid from the Scottish Executive at either 50% or, since 2004, 80% of the scheme cost. Owing to the number and increased costs of schemes now being brought forward, the Scottish Executive is currently considering prioritisation as part of future scheme appraisal alongside an enhanced role for social factors.

#### ***Alternative local authority action: watercourse management and development control***

6.57 Management of watercourses within local authority powers under the Flood Prevention and Land Drainage Act 1997 provides a complementary route to flood alleviation that is being used, sometimes in innovative ways, by some of the authorities we consulted. Thus in Renfrewshire, the Network Regeneration Department provides a link between planning/development control and watercourse maintenance. This link both helps to ensure that new development does not materially add to flood risk (through an increase in water drainage) as well as co-ordinating maintenance on watercourses for which the local authority has a duty under the 1997 Act.

6.58 The work also involves often delicate liaison with landowners, including riparian owners.

*“...we approach the landowner or riparian owner and explain to them what their duties are, so we explain that to them, and then where reasonable, we can go in and do what we can [under the statutory powers]” (Renfrewshire Council).*

However, such powers can, if used effectively, allow some degree of flood risk management without resorting to a large formal flood prevention scheme. In some cases this can be used to advance sustainable catchment planning through interaction with other stakeholders such as NGOs.

*“We would do as much in the short term as we could, in terms of both works and maintenance to try and improve the flow where we could, ‘tweaking’ the system here and there as much as possible...We come into this as people who have a track record for building things in concrete, so we recognise that there is a need to let them build confidence in what we are about and what we are trying to achieve.” (Aberdeenshire Council)*

It is acknowledged that these works and maintenance programmes cannot always provide a risk reduction below the 1 in 75 year return period that is critical for insurance provision (see section 6.59 below). In these cases Aberdeenshire, and some other authorities, provide assistance for homeowners to purchase removable flood defences.

6.59 Such improvements are most effective when coupled to land use control, under the widely praised *Scottish Planning Policy SPP7: Planning and Flooding* (Scottish Executive, 2004). The Flood Liaison and Advice Groups (FLAGs) use SPP7 to advise local authorities on development control, strategic planning and prioritisation of watercourse maintenance, as well as the emergency planning issues of flooding. In Aberdeenshire, the FLAG is conceived as a ‘broad church’ that facilitates stakeholder dialogue, with social involvement where possible:

*“There is a two-tier level of attendance. At the first tier there are people who are fairly closely involved in flooding: SEPA, Development Control, Scottish Water, insurers, planners and engineers from [Aberdeen] City and Aberdeenshire Councils. There is a second tier of people who come occasionally and who are ‘on call’ e.g. if there is a specific item, the Forestry Commission, Fishery Boards, Universities...” (Aberdeenshire Council)*

The involvement of the insurance industry and Scottish Water was seen by Aberdeenshire to be a beneficial aspect of FLAGs, although it was also noted that more mandatory information exchange with both industries would help the operation still further, potentially delivering greater social benefits. Scottish Water has an Overloaded Sewer Flooding Register of properties affected by internal flooding and this register used to inform its Capital Investment Programme. It also runs specific response groups to address the issues of planning and network capacity.

## **Insurance coverage in flood risk areas**

6.60 A representative from Norwich Union, part of Aviva plc and one of Scotland's largest insurers, provided insight into insurance industry policy in dealing with properties in flood risk areas. Some of the comments noted below are also part of general insurance industry policy, as expressed by the Association of British Insurers (ABI).

6.61 Norwich Union developed its own flood-risk maps after many properties in England were flooded in 1998 outside areas identified on the Environment Agency's flood-risk maps. Norwich Union's maps are based on a model of the river system plus a digital elevation model and incorporate the locations of known flood defences. In addition, the industry has funded research into the links between flood characteristics and damage. Such 'flows research' plots flow rate and height against the amount of damage caused in a property. The findings have led to more effective risk assessment in economic terms and have improved the advice that can be given to households on steps they can take to mitigate flood damage.

6.62 The general policy of the insurance industry, re-iterated in a national statement in November 2005, is continue to provide coverage to properties at less than a 1 in 75 year risk of being flooded. For a risk of more than 1 in 75 years, cover is available where improved flood defence is planned within 5 years (ABI, 2005). If a property has been flooded in the past, insurance will not be provided as a matter of course. In this instance, new applicants may be turned away, while existing policyholders would have their premiums increased and their excess raised to £5,000 (or higher in the case of a large property). Even those properties that are covered are subject to open market influences on premiums and excesses which are now rising in areas known to be at high flood risk.

6.63 For both 'flooded' and 'at risk' households, it is not general practice within the industry to add conditions to a policy that might insist the owner take measures such as temporary flood protection or signing up to an AVM system. This is because such conditions would be extremely difficult to enforce and police. However, the insurance company would typically talk to an owner about such measures if they had been flooded. This finding raises questions about the extent to which incentives can be provided for the uptake of temporary defences and direct warning systems.

6.64 The representative from Norwich Union noted a general trend in recent years toward an increase in the total value of settled claims. Given the measures that are being taken by the industry to reduce the risk exposure of their flood insurance portfolio, it takes seriously the possibility that climate change may already be exerting an influence on flood occurrences.

6.65 Norwich Union would like to see Flood Searches become a mandatory part of Home Buyers Reports. A flood search provides information on whether a property has been flooded in the past and whether a property is in a flood risk area. In addition, a solicitor would be able to ask a seller if a property has been flooded in the past.

## **Summary**

6.66 This chapter has examined the policy context within which the earlier findings from the household survey and the focus groups can be evaluated. Key flood risk management objectives for local authorities and regional emergency planning groups have been identified; existing and planned expansion of SEPA's flood warning service outlined; challenges in raising flood awareness clearly posed and the role of insurance industry noted. The chapter has also helped identify 'what works' in terms of warning dissemination, general emergency planning and management.





7.1 This chapter draws together the findings from the household survey (Chapter Four), the focus group discussions (Chapter Five) and the interviews with key institutional stakeholders (Chapter Six). In this chapter we discuss earlier findings on flood impacts (objective 1), examine “what works” in terms of living with floods (objective 2) and make recommendations for improved delivery of flood risk management. In each of the section on “what works” we pose and answer questions relating to (i) warnings and dissemination, (ii) emergency planning and temporary flood alleviation, and (iii) ownership of managing flood risk.

### **Impacts of flooding**

7.2 The most important single finding in terms of flood impacts is that intangible impacts register markedly higher values than tangible impacts, and immediate intangible impacts are generally higher than lasting intangible impacts (para 4.22 and Appendix B; Table 24). This is a striking result with far-ranging policy implications, especially for the method by which project appraisal is undertaken for proposed flood alleviation schemes in Scotland (see recommendation 15, para 7.39). The rank order of the individual impacts which make up tangible and intangible impacts are broadly similar to those reported by RPA (2005) although our typology is more detailed.

7.3 Time to return to normal, and discomfort/inconvenience were the two most severe individual impacts (para 4.20) and this was mirrored in the focus groups where disruption to normal life (often over more than six months) was clearly seen as a major impact (paras 5.12-5.15). The stress of the flood itself and future worry about flooding were other intangible impacts, far more severely felt by low income households (para 4.30). Social tenants also have higher impact scores than owner occupiers and may have a lower resilience in coping with floods. As in the RPA (2005) study, health impacts did not score highly in the household survey (Appendix B; Table 24), but they did register strongly in the focus groups, especially for the elderly and those already ill (paras 5.18-5.20). These results are broadly in agreement with more detailed studies on health impacts undertaken by Tapsell *et al.* (2001) following the 2000 floods in England.

7.4 The loss of irreplaceable and sentimental items does not score so highly as other impacts in the household survey (Appendix B; Table 35 reflecting the findings of RPA, 2005), nevertheless, comments in the focus groups revealed intense personal losses in the form of valued photographs, treasured heirlooms and irreplaceable memorabilia (para 5.21). These narratives are amongst the most poignant of those reported from the focus groups. Some losses are absolute, impossible to value in monetary terms and leave a deep and lasting impact.

7.5 As in previous studies it is difficult to specify the longer-term impacts on communities. Some anecdotal evidence exists of enhanced cohesion in the focus group discussions (para 5.22) but this is countered by scepticism over the longer term and claims that emergency assistance was not allocated equitably (para 5.23). Fordham and Ketteridge (1995) reported similar findings from communities in Perth and Strathclyde flooded in 1993 and 1994. Trends in property prices are likewise

ambiguous (cf Yeo 2003) with reduced values reported immediately after the flood not necessarily sustained in the longer-term (para 5.2).

### **Living with flood risk**

7.6 The above findings endorse the Foresight project's conclusion that social costs are likely to be the key driver in flood risk management in the 21<sup>st</sup> century (Evans *et al.*, 2004). Enhancing social resilience is already included as one of the objectives of sustainable flood management in Scotland (Scottish Executive, 2004; Werritty, 2006) and the conceptual framework for delivering this objective has already been sketched out by many in terms of *vulnerability*, *coping capacity* and *adaptation* (eg Wisner *et al.*, 2004). But operationalising these concepts for Scotland and promoting social resilience remains a major challenge requiring much more detailed research on the location and needs of communities at risk of being flooded.

7.7 In promoting social resilience, the IFRC (2002) recommended emergency planning actions provide a useful checklist:

- risk and vulnerability mapping
- disaster awareness and education
- early warning and evacuation
- stockpiling of relief materials
- training in response skills
- planning at all levels to ensure co-ordination of the disaster response.

SEPA's Indicative River & Coastal Flood Map (Scotland) published in 2006 provides a map of flood risk, but vulnerability mapping (likely to be required under the EU Flooding Directive) remains to be done. Research on characterising and mapping vulnerable communities is well-advanced in England (DEFRA, 2006, Fielding and Burningham, 2005) and these methods should be appraised and customised for use in Scotland (see recommendation 13, para 7.39). SEPA and local authorities already provide flood warnings for communities covered by *Floodline* (para 6.5), have robust and well-tested evacuation procedures (paras 6.44-6.47) and well co-ordinated planning for disaster response (paras 6.14 and 6.15). But raising disaster awareness and education remains an under-performing area which needs enhanced effort and targeting of communities most at risk (recommendation 3, para 7.39).

7.8 Previous studies in the UK have found some evidence that more vulnerable groups are exposed to higher levels of flood risk than the population at large. However, this is a qualified finding as the results are not consistent across spatial scales (Fielding and Burningham, 2005) or types of flood risk (Walker *et al.*, 2006) and methods for spatial aggregation are not standardised. In our study socio-demographic profiling failed to find any strong evidence of social segregation in terms of flood risk at the level of Census Output Areas. In particular, the proportion of social tenants in flood risk areas was the same as that for urban Scotland as a whole (para 3.10). However, further research is needed to check whether this finding masks social segregation at other scales.

7.9 Flood warning systems in the UK have generally been commended in the international literature (eg Handmer, 2002). But enhanced provision will need more community engagement, the effective delivery of appropriate advice on what to do following warning and identification of high risk groups to ensure they receive appropriate advice. In reviewing existing practice from around the world Glantz (2003) recommends managers to:

- educate and remind, especially between hazard episodes, bearing in mind the inherent public tendency to discount the past
- time warnings correctly
- involve stakeholders as early as possible in the development and review of a warning system
- identify what it is that makes societies more or less vulnerable and more or less resilient.

Some of these actions are already being implemented in Scotland: timing warnings and educating and reminding those at risk. But maintaining a high level of awareness between floods remains a challenge (para 7.23) as does identifying contrasting levels of social resilience and vulnerability.

7.10 Many studies have reported that warnings are most effective when there is strong community engagement in dissemination (eg Key, 1991) but obtaining and sustaining such engagement is costly and onerous (para 6.35). Much depends on the level of trust developed between the community group and local authority (Parker, 2000).

7.11 An unexpected finding from the household survey was that receiving a warning increases confidence in getting sufficient warning next time, but this is lessened by the actual experience of being flooded (para 4.48). Since having been previously warned also results in greater confidence in what to do next time (para 4.49), the effectiveness of a warning largely depends on the time it provides to take appropriate action. Campaigns designed to raise flood awareness should thus enhance confidence in flood warnings and knowing what effective actions can be taken in the time and with the assistance available.

7.12 Another important focus for raising flood awareness is in the relative efficacy of contrasting approaches for managing flood risk and the allocation of responsibilities for flood protection. At present public awareness in both these areas is singularly ill-informed (paras 4.51 and 4.52). If non-structural flood defences and greater reliance on 'soft engineering' are to be major components of sustainable flood management (Scottish Executive, 2004), the public needs to be more aware of the implications of these changes in managing flood risk (recommendation 12, para 7.39).

7.13 The relatively low score for financial loss as a flood impact points to the role of the insurance industry in mediating such losses (Table 4.6). Given the relatively high levels of building and, to a lesser extent, contents insurance, most of the financial costs of flooding are under-written by the insurance and re-insurance markets. However, this situation looks set to change with rapidly increasing claims and higher premiums and excesses placed on existing and new customers (para 6.62). At present around 25% of social tenants are not covered by contents insurance (para 4.43). More

vigorous promotion of ‘pay with rent’ schemes may help reduce this number, but affordability and the availability of cover may reduce further take up. Given the likelihood of increased flood risk under climate change (Werritty, 2007) and the potential withdrawal of insurance cover for high risk locations (para 6.62), the prediction that social impacts will be the key driver in managing future flooding (Evans *et al.*, 2004) looks increasingly robust.

### **What works in terms of living with floods?**

7.14 Key questions arising from our analysis of the social aspects of warning provision, warning dissemination and effective responses are:

1. *How could SEPA best extend the utility of its existing flood warning service?*

7.15 SEPA’s *Floodline* was ranked fifth amongst the preferred means of receiving flood warnings and only 8.1% of respondents to the household survey had used it to receive a warning (Appendix B, Table 14). Overall, approximately a third of those who had been flooded and a fifth of those in flood risk areas now use *Floodline* as an information source and report high levels of satisfaction, but this leaves a significant majority of those at risk unaware of the service. Accordingly, raising flood awareness via focused campaigns, especially in high risk areas as depicted on the new flood risk maps, should remain a top priority for SEPA and be resourced appropriately.

2. *How are warnings most effectively delivered to at-risk householders?*

7.16 The most popular delivery of flood warnings is via an official knocking at the door (Appendix B Table 14). Whilst this may not always be logistically possible, such direct action is valued as a stimulus to taking preventative action. Other favoured methods of delivery include announcements via radio and television, loud hailers and phone calls. The use of Automatic Voice Messaging (AVM) has proved locally effective in Moray and the Scottish Borders and may be a suitable for disseminating warnings to other dispersed rural communities. In large urban areas dissemination by local officials and broadcast media are the most favoured means of delivery.

3. *What are the barriers to effective response in the event of a timely flood warning, and what can be done to address them?*

7.17 Given that 88% of flooded respondents were at home when the flood occurred, such warnings clearly reach most individuals. However provision must also be explored for those not at home (12% in our survey) and care taken to ensure that the most vulnerable individuals receive a warning. AVM might assist in reaching the former and an official knocking at the door is desirable for the latter. Once a warning has been received, preventative action to reduce losses generally follows. But such action needs to be qualified by a lack of confidence in the receipt of sufficiently timely warnings in the future.

7.18 Noting that only 42% of those flooded between 1993 and 2005 received any kind of warning, the overall utility of a flood warning service can be maximised by relevant local authorities:

- expanding awareness via publicity campaigns (in partnership with SEPA and where appropriate Scottish Water);
- increasing awareness of *Floodline* and how warnings are locally delivered;
- engaging community resources to assist in disseminating warnings; and
- making sure those living in flood risk areas are aware of appropriate actions to take on receiving a warning.

Pamphlets updated each two years, possibly in conjunction with the local authority Biennial Reports to the Scottish Executive, could provide a suitable framework for raising awareness.

4. *What problems are associated with AVM dissemination, and how could these be overcome?*

7.19 Current impediments in deploying AVM include generating a critical mass of registered users within a given community and, when successful, technical constraints in disseminating very large numbers of individual warnings within a fixed time interval. Registering initial users, and maintaining and updating the database, require dedicated personnel, possibly linked to raising flood awareness campaigns. The capacity constraint which inhibits the use of AVM in large urban areas will probably be overcome by technical advances.

5. *To what extent is the lack of a national flood warning coverage a problem, and what are potential ways of dealing with this?*

7.20 The lack of national flood warning coverage is a problem. Those parts of Scotland which have yet to be covered by *Floodline*'s recognised Flood Warning Schemes are served by *Flood Watch*. This service which provides a general early alert for possible flooding is not coupled with regional emergency planning arrangements. Areas with significant populations at risk and not currently covered by recognised flood warning schemes include the upper Forth Estuary and parts of Aberdeenshire. Emergency plans exist for the communities on the Rivers Dee and Don but not for Stirling and Grangemouth. Given the large number of households at risk, all four areas should be prioritised as new flood warning schemes are implemented.

7.21 The lower Clyde estuary is the only area currently covered by a coastal flood warning scheme which uses predicted storm surge levels provided by the Met Office. However, SEPA is developing a new service within *Flood Watch* for selected coastal communities in partnership with the relevant local authorities.

#### Emergency planning and temporary flood alleviation

7.22 Key questions arising from our analysis of the social aspects of emergency planning and temporary flood alleviation are:

6. *What is the role of sandbags in providing temporary flood defence?*

7.23 Sandbags are widely used to provide temporary flood defence, but their deployment varies across local authorities. Glasgow City Council makes pro-active use of sandbags which are distributed each winter should flooding occur on the White Cart. Other local authorities deploy sandbags reactively once river levels are rising as this provides maximum flexibility in targeting material and human resources as directed by the emergency co-ordination centre. Some authorities provide depots and materials for the public to fill sandbags, an arrangement which works better if a community contact is on hand to assist. However, in line with SEPA's guidance to households at risk, a more favoured strategy is for sandbags to be strategically deployed by council staff, leaving householders to fill and mount their own defences.

7. *What is the role of other temporary flood defences?*

7.24 The use of temporary and demountable flood defences is growing. The Perth flood alleviation scheme has 84 gates activated by council staff with advice from SEPA's local flood warning scheme. Other local authorities use flood dams to provide strategic defences for groups of properties.

7.25 However, the household survey and focus groups reported high levels of dissatisfaction with local authority provision of temporary defences. This may reflect the inevitable partial view of any given emergency as viewed by individual households during the event. Post-flood contact by council staff explaining the deployment of temporary defences can reverse this and enhance satisfaction levels.

8. *How can local residents help in flood protection and emergency management?*

7.26 Engaging local residents in disseminating warnings and assisting in deploying sandbags offers the possibility of community-based assistance. But success in mobilising these community resources thus far has been limited. Given the general reluctance to accept personal responsibility for flood defence, such a lack of community engagement is not unexpected. Indeed as local authorities reach out to propose self-help, the community often takes a step back on the assumption that the local authority is accepting responsible for flood alleviation. Also, the longer the interval since the last flood, the greater is the likelihood of such dis-engagement. Mobilising community resources to assist in disseminating warnings and rendering emergency assistance thus remains a major challenge.

9. *How effective have emergency evacuation plans been when put to the test?*

7.27 No adverse comments were reported in the focus groups implying that emergency evacuation procedures generally worked well. Although only 4% of those evacuated used the rest centres provided by local authorities, a high proportion is likely to have been the elderly or infirm. The generally high levels of satisfaction with the emergency services may, however, mask concerns as to how the most vulnerable evacuees were handled. Sharing best practice in this area across all the regional co-ordination centres should be a priority.

10. *To what extent do local authorities need to have post-flood plans?*

7.28 Staying with family or friends or in private rented accommodation accounted for around two thirds of housing needs following a flood. Nevertheless, because the numbers to be re-housed varied markedly from flood to flood, local authorities still faced a challenge in rehousing evacuees. Delays were reported in the focus groups pointing to the need for greater co-ordination between local authorities and the diverse providers of rented public housing. Concern was also voiced over the security of premises once vacated, with burglary being a major problem. Securing properties after a flood would ease some of the longer lasting intangible impacts.

*Ownership of flood risk management*

7.29 Questions arising from our analysis of the ownership of flood risk management are:

11. *What can be done to reduce the impact of flooding in urban areas some of which lie outside SEPA's 1 in 200 year flood risk areas?*

7.30 In the short term Scottish Water have undertaken remedial measures to reduce flood risk in those urban areas prone to surcharging sewers. Local authorities also have a duty to maintain urban watercourses free of obstructions. Routine checking and cleaning of screens and culverts by the most pro-active local authorities substantially reduces this flood risk. The Biennial Reports to the Scottish Executive provide a public record of local authority actions to reduce urban flood risk and these could be combined with pamphlets outlining what can be done by householders at risk to reduce impacts before and at the onset of a flood.

7.31 In the longer term, major infrastructure renewal (eg the Glasgow Strategic Drainage Plan and Refrewshire's promotion of Sustainable Urban Drainage) will significantly reduce the impact of pluvial flooding. But such schemes have long lead-in times, require successful partnerships involving Scottish Water, local authorities, SEPA and developers and require significant capital inputs to re-design existing drainage systems.

12. *How effective have public bodies been in raising awareness on the allocation of statutory duties for flood risk management?*

7.32 Only 23% of householders in our survey recognised that the main responsibility for flood defence lay with themselves as owners or their landlords. Many felt that the main responsibility should lie with their local authority or the Scottish Executive. When asked why they had not undertaken any measures to protect their property, nearly 40% of householders regarded this as a local or central government duty. Public bodies clearly have a major educational task ahead in addressing these widely held misconceptions.

13. *What is the role of public consultation in planning flood alleviation schemes?*

7.33 Some local authorities that had involved the public in the early stages of planning a flood alleviation scheme reported very positive outcomes. Informal consultation removed many of the objections which can seriously delay progress in bringing forward a scheme. Addressing local concerns early in the process also promoted higher levels of community engagement. However, several focus group members reported very negative experiences with the community being alienated rather than engaged by engineering consultants acting on behalf of the local authority.

14. *Which forms of flood defence are most favoured by the public? How might this influence local authorities' approach to flood alleviation?*

7.34 Traditional forms of flood defence (involving embankments, upstream reservoirs and flood warnings) are the most favoured forms of flood alleviation. Sustainable urban drainage and paying farmers for upstream storage (increasing water storage within the soil or in valley floor wetlands) also scored highly. Demolition with compensation or re-location of residents at risk was favoured by a significant minority of responses in the household survey. The public appears to accept a multi-faceted approach to flood alleviation, but lacks understanding on how more sustainable approaches to flood risk management might work. This is another area where local authorities and SEPA need to raise awareness.

15. *How appropriate are current Scottish Executive procedures in providing grants for local authority flood alleviation schemes?*

7.35 At present local authorities and their consultants use standard cost-benefit methods based on the Treasury Green Book and the 'multi-coloured handbook' produced by Middlesex University's Flood Hazard Research Centre (Penning-Rowsell, *et al.*, 2003). These permit the inclusion of some information on social costs to pre-set economic values and generally provide a robust framework for deriving cost-benefit ratios. But some local authorities have urged that more weight be given to social costs, especially where small numbers of vulnerable households fail to reach the required economic value of assets to be protected by the proposed scheme. This report re-enforces this proposal that, in cost benefit ratios, more weight be given to intangible impacts disproportionately felt by the most vulnerable members of society.

16. *How does the insurance industry assist householders manage the risk of being flooded?*

7.36 Overall market penetration for contents insurance exceeds 90% but this reduces to around 75% for social tenants. 'Pay with rent' schemes should be promoted with greater vigour by local authorities and the Scottish Executive for the 25% or so of uninsured social tenants. For those with insurance, the way claims are processed after a flood is generally viewed positively. But having been flooded, premiums can rise dramatically and be coupled with five figure excesses. For households on modest incomes, this will increase anxiety about future flooding.



7.37 Insurance companies are increasingly reluctant to provide cover for households in flood risk areas. Cover tends to be provided for existing customers (often with higher premiums and excesses) but this will not extend to new customers unless the risk is less than a 1 in 75 year flood or new defences are planned within the next five years.

17. *Given the anticipated impacts of climate change, how is the insurance industry assisting in the overall reduction of flood risk?*

7.38 In response to market forces, the insurance industry is reducing its exposure to projected losses from future climate change and flooding. Given this re-balancing of its portfolio, plus a reluctance to reduce premiums when flood proofing measures are introduced within the home, the industry's contribution to the overall reduction in flood risk could lessen in the short-term. However, in the longer term, working in partnership with local authority FLAGs, the industry could help implement SPP7 and ultimately constrain and reduce development within flood risk areas.

## **Recommendations**

7.39 Given the above findings and drawing on the discussion, we make the following recommendations:

- 1. We recommend that relevant local authorities, in partnership with SEPA, mobilise communities in areas at risk of being flooded to assist in disseminating warnings and rendering emergency assistance and, where appropriate, to join council staff in installing temporary and/or demountable defences.**
- 2. We commend to relevant local authorities current initiatives to provide Automatic Voice Messaging for communities at risk of being flooded, noting the rich pool of experience available should Automatic Voice Messaging be extended to other areas of Scotland.**
- 3 We commend SEPA's current flood awareness campaigns and, given the recent publication of an Indicative River & Coastal Flood Map for Scotland, recommend that SEPA now targets communities with the highest risk of future flooding.**
- 4. We commend to relevant local authorities SEPA's planned expansion of *Flood Watch* to coastal areas at risk of tidal/ storm surge flooding.**
- 5. We recommend that, where practicable, flood warning schemes be extended to all communities at risk. When new schemes are appraised, the existing cost benefit appraisal process should be adapted to incorporate the intangible social impacts of flooding.**
- 6. We recommend that all regional emergency planning bodies share experience to develop and implement best practice in evacuation procedures, especially by recognising the location and needs of the most vulnerable groups.**

- 7. We recommend that relevant local authorities prioritise the preparation of a post-flood plan to provide counselling for traumatised flood victims, prompt re-housing of social tenants and the securing of damaged properties from criminal activity.**
- 8. We recommend that relevant local authorities be encouraged to consult communities on their preferred options for flood alleviation schemes from the earliest stage, using informal approaches to individual households at risk and ‘plain English’ wherever possible.**
- 9. We recommend that the Scottish Executive and relevant local authorities implement further measures to increase the take up of ‘pay with rent’ contents insurance, especially in high flood risk areas.**
- 10. We commend those insurers who deliver timely, resilient and efficient repairs to buildings and household contents damaged by flooding and urge the ABI to promote this as best-practice across the industry. We recommend that insurers review the increased premiums and excesses charged to households following a flood, giving regard to the industry’s contribution towards reducing the social impacts of floods.**
- 11. We recommend that Scottish Water, relevant local authorities, developers and other stakeholders prioritise areas for implementing remedial measures to reduce the risk of pluvial flooding.**
- 12. We recommend that further research be carried out into public attitudes to sustainable flood management, building on existing data and recent Scottish Executive consultations on sustainable urban drainage systems and sustainable flood management.**
- 13. We recommend that further research be undertaken to identify the location of communities especially vulnerable to the impacts of flooding, and to recalibrate vulnerability indices developed elsewhere for use in Scotland.**
- 14. We recommend that further research be undertaken on the immediate and long-term physical and mental health impacts of flooding in Scotland.**
- 15. We recommend that the intangible social impacts of flooding as well as the potential environmental benefits, be incorporated to a greater degree in option appraisal guidance for relevant local authorities, alongside the standard cost-benefit approach.**
- 16. We commend the use of FLAGs as an effective way of promoting sustainable flood management, and recommend they be deployed in all relevant local authorities.**
- 17. We recommend a continued role for the Scottish Executive’s Flooding Issues Advisory Committee as a means for facilitating on-going exchange between key institutional stakeholders and the promotion of sustainable flood management.**

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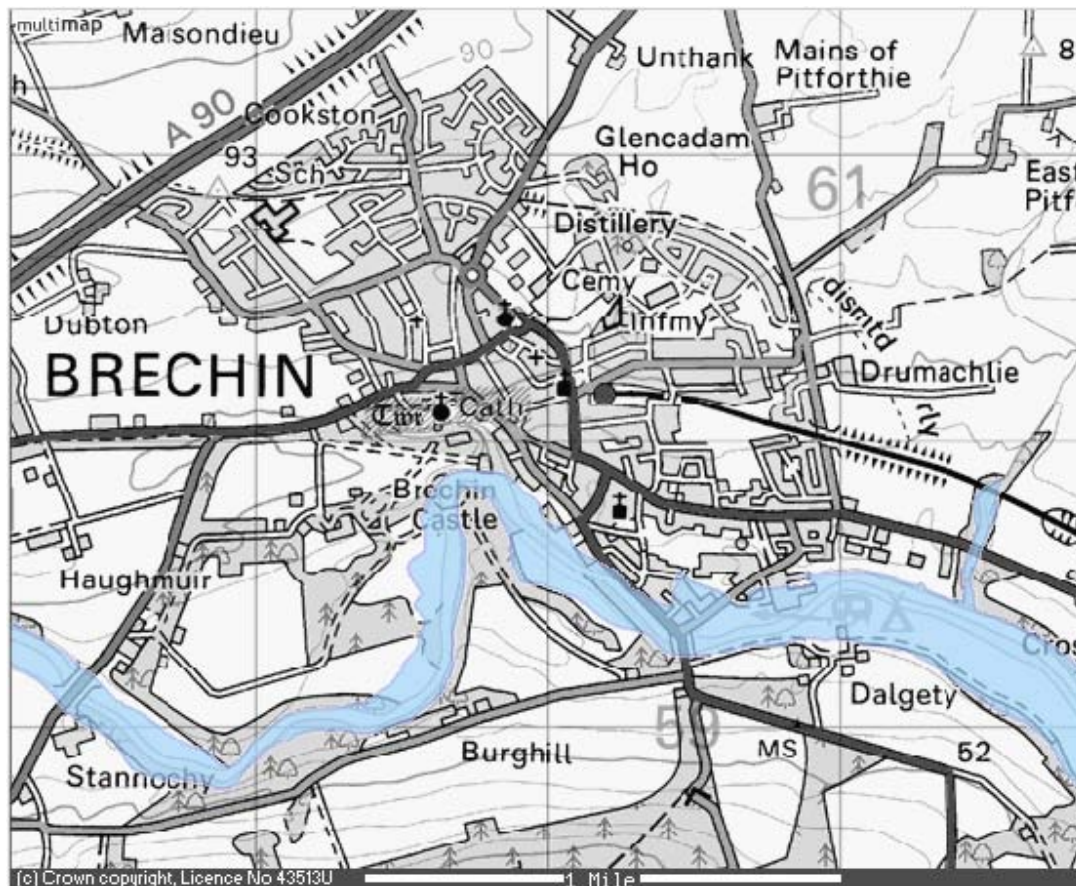
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## APPENDIX A: LOCATION OF HOUSEHOLDS SAMPLED IN QUESTIONNAIRE SURVEY

The flood outlines on these maps (except Glasgow-Shettleston) are those from the Indicative River & Coastal Flood Map (Scotland) published by SEPA in November 2006. This was not available at the time of the household survey (March - June 2006) but it does provide a general indication of the sampled communities within the flood-risk areas. The actual areas surveyed were based on the earlier IH 130 indicative flood risk map plus more recent flood outlines held by some local authorities.

### BRECHIN



**Figure B.1 Approximate survey area: Brechin (extracted from Indicative River & Coastal Flood Map (Scotland))**

Some features of the flooding map are based on digital spatial data licences from the Centre for Ecology and Hydrology ©CEH, ©MO, ©NSRI, ©MLURI, ©OSNI, ©DARD(NI), ©DEFRA and includes material based on Ordnance Survey 1:50 000 maps with permission of the controller of Her Majesty's Stationery Office ©Crown Copyright.

Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.



## EDINBURGH

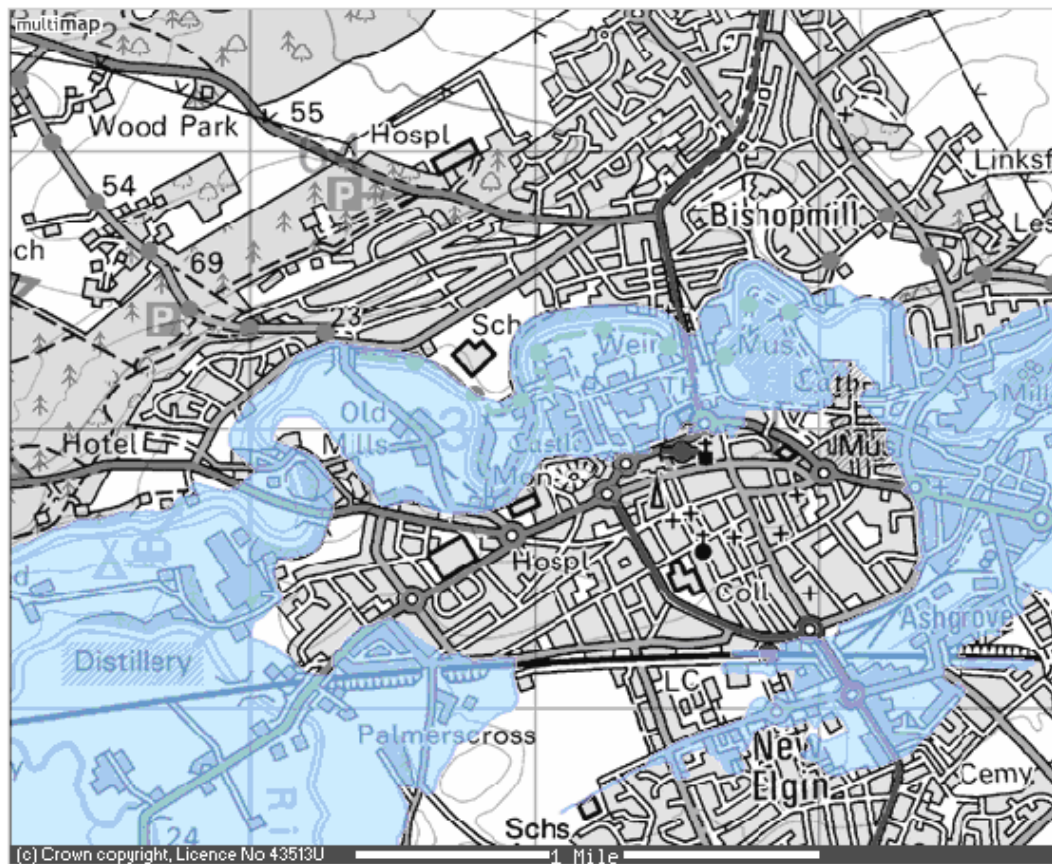


**Figure B.2 Approximate survey area: Edinburgh (Water of Leith) (extracted from Indicative River & Coastal Flood Map (Scotland))**

Some features of the flooding map are based on digital spatial data licences from the Centre for Ecology and Hydrology ©CEH, ©MO, ©NSRI, ©MLURI, ©OSNI, ©DARD(NI), ©DEFRA and includes material based on Ordnance Survey 1:50 000 maps with permission of the controller of Her Majesty's Stationery Office ©Crown Copyright.

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## ELGIN



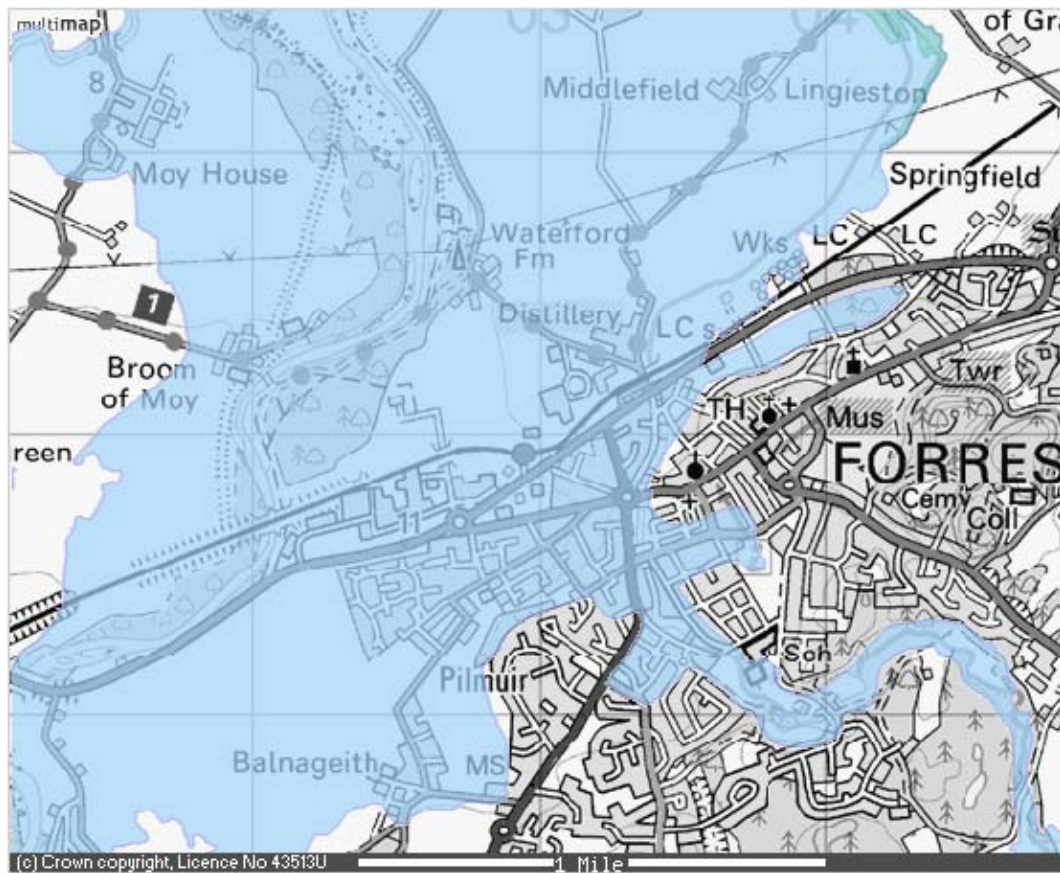
**Figure B.3 Approximate survey area: Elgin (extracted from Indicative River & Coastal Flood Map (Scotland))**

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Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.



## FORRES



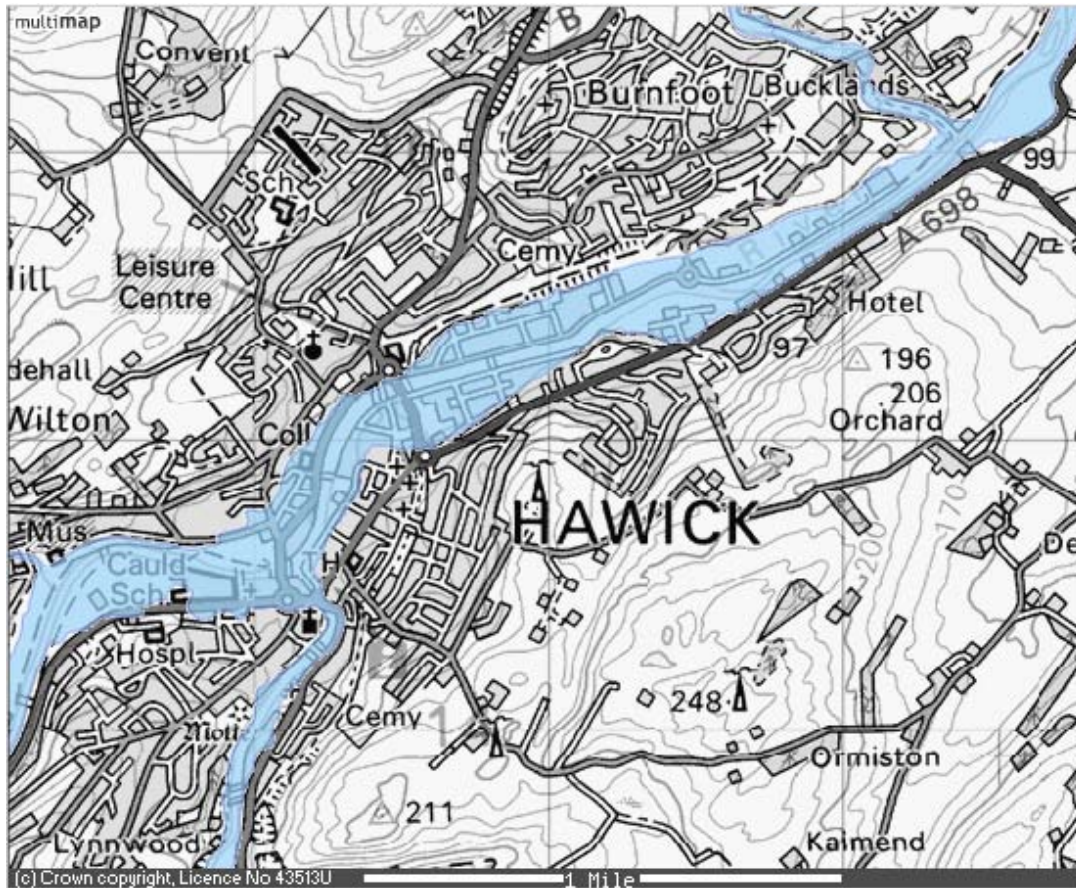
**Figure B.4 Approximate survey area: Forres (extracted from Indicative River & Coastal Flood Map (Scotland))**

Some features of the flooding map are based on digital spatial data licences from the Centre for Ecology and Hydrology ©CEH, ©MO, ©NSRI, ©MLURI, ©OSNI, ©DARD(NI), ©DEFRA and includes material based on Ordnance Survey 1:50 000 maps with permission of the controller of Her Majesty's Stationery Office ©Crown Copyright.

Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.



## HAWICK

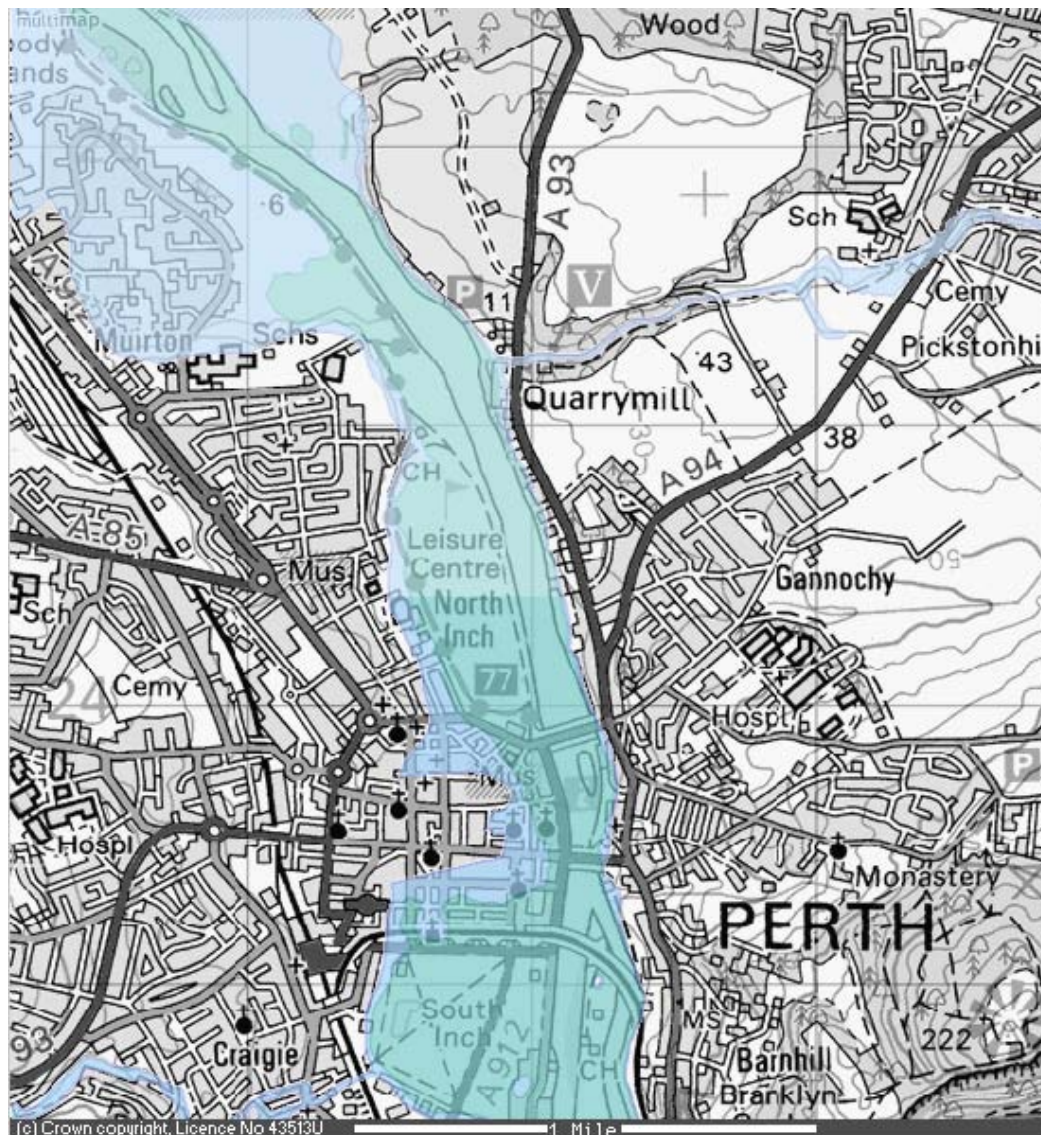


**Figure B.5 Approximate survey area: Hawick (extracted from Indicative River & Coastal Flood Map (Scotland))**

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Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.

## PERTH



**Figure B.6 Approximate survey area: Perth (extracted from Indicative River & Coastal Flood Map (Scotland))**

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Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.



## GLASGOW-SHETTLESTON



**Figure B.7** Approximate survey area: Glasgow-Shettleston (sampled households located within shaded ellipses)

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Neither the presence or the absence of shading on this map can be taken to indicate the presence or absence of flood risk affecting any individual property.



**APPENDIX B: TABLES (RESULTS FROM THE QUESTIONNAIRE HOUSEHOLD SURVEY)**

Tables from Chapter Four listed sequentially.

**CHARACTERISTICS OF THE SAMPLE**

**Table 1 Response rates by survey location**

<b>Survey Location</b>	<b>Properties visited</b>	<b>Returned Questionnaires</b>	<b>Response Rate (%)</b>
Brechin	67	46	68.7
Edinburgh	539	316	58.6
Elgin	412	237	57.5
Forres	444	261	58.8
Glasgow-Shettleston	262	113	43.1
Hawick & Newcastleton	115	55	47.8
Perth	246	126	51.2
Scattered rural & coastal (by post)	236	69	29.2
<b>TOTAL</b>	<b>2,321</b>	<b>1,223</b>	<b>52.7</b>

**Table 2 Extent of flooding within the sample**

<b>Extent of flooding</b>	<b>Number of Respondents</b>	<b>Per cent of respondents</b>
<i>Flooded properties:</i>	<i>633</i>	<i>51.8</i>
Home flooded	593	48.5
Communal stair flooded, but not home	24	2.0
Home, communal stair, garden, outhouse or garage flooded (Brechin pilot study flooded respondents)	16	1.3
<i>Properties not flooded:</i>	<i>590</i>	<i>48.2</i>
Garden only flooded	110	9.0
Outhouse or garage flooded, but not communal stair or home	91	7.4
Not flooded at all	389	31.8
<b>TOTAL</b>	<b>1,223</b>	<b>100.0</b>

**Table 3 Age of household members**

<b>Age group</b>	<b>Number of households with age group represented</b>	<b>Per cent of households with age group represented</b>
Child under 10 years	160	13.1
Child 10-15 years	129	10.5
Adult 16-24 years	168	13.7
Adult 25-69 years	891	72.9
Adult 70+ years	271	22.2

**Table 4 Occupational group of highest earner in household**

<b>Occupational group</b>	<b>Number of households</b>	<b>Per cent of households</b>
Managers and senior officials	74	8.8
Professional	144	17.2
Associate professional and technical	153	18.3
Administrative and secretarial	91	10.9
Skilled trades	135	16.1
Personal services	44	5.3
Sales and customer services	30	3.6
Process, plant and machine operatives	83	9.9
Elementary occupations	83	9.9
<b>TOTAL</b>	<b>837</b>	<b>100.0</b>

**Table 5 Housing tenure**

<b>Housing tenure</b>	<b>Number of households</b>	<b>Per cent of households</b>
Owned with mortgage	467	40.7
Owned outright	400	34.9
Rented from council	181	15.8
Rented from a housing association	36	3.1
Rented from a private landlord or employer	56	4.9
Other	7	0.6
<b>TOTAL</b>	<b>1,147</b>	<b>100.0</b>

**Table 6 Type of housing**

Housing type	Number of households	Per cent of households
Detached	206	19.0
Semi-detached	177	16.3
Terraced/end terrace	427	39.4
Tenement or other flat	257	23.7
Caravan	1	0.1
Other	15	1.4
TOTAL	1,083	100.0

**Table 7 Ground and upper floors in property**

Floors of property	Number of households	Per cent of households
Ground-floor only (bungalows and flats)	448	43.1
Ground and upper floors (houses)	511	49.2
Upper-floors only (flats)	80	7.7
TOTAL	1,039	100.0

**Table 8 Types of area**

Type of area	Number of households	Per cent of households
Urban	555	45.4
Small town	599	49.0
Rural	69	5.6
TOTAL	1,223	100.0

## CHARACTERISTICS OF THE FLOODS

**Table 9 Types of flood**

Type of flood	Number of households	Per cent of households
Fluvial	1,045	85.4
Pluvial	121	9.9
Coastal	57	4.7
TOTAL	1,223	100.0

**Table 10 Depth of flood water by type of flood (per cent of respondents)**

Depth of flood water	Type of flood			TOTAL n=592
	Fluvial n=513	Pluvial n=68	Coastal n=11	
Under 2.5cm	6.6	4.4	-	6.3
2.5-30cm	34.7	27.9	27.3	33.8
Over 30cm	58.7	67.6	72.7	60.0
TOTAL	100.0	100.0	100.0	100.0

Chi-squared = 3.235; df=4; p>0.01

**Table 11 Mud, silt or sediment deposits by type of flood (per cent of respondents)**

Mud, silt or sediment deposited?	Type of flood			TOTAL n=617
	Fluvial n=533	Pluvial n=73	Coastal n=11	
Yes	80.9	86.3	72.7	81.4
No	12.0	9.6	27.3	12.0
Don't know	7.2	4.1	-	6.6
TOTAL	100.0	100.0	100.0	100.0

Chi-squared = 3.121; df=4; p>0.01

**Table 12 Sewage deposits by type of flood (per cent of respondents)**

Sewage deposited?	Type of flood			TOTAL n=623
	Fluvial n=537	Pluvial n=75	Coastal n=11	
Yes	57.0	73.3	81.8	59.4
No	15.1	17.3	18.2	15.4
Don't know	27.9	9.3	-	25.2
TOTAL	100.0	100.0	100.0	100.0

Chi-squared = 16.038; df=4; p<0.01

**Table 13 Number of times flooded by type of flood (per cent of respondents)**

Number of times flooded	Type of flood			TOTAL n=629
	Fluvial n=541	Pluvial n=76	Coastal n=12	
One	70.2	81.6	75.0	71.7
Two	24.8	9.2	16.7	22.7
Three+	5.0	9.2	8.3	5.6
TOTAL	100.0	100.0	100.0	100.0

Chi-squared = 10.808; df=4; p>0.01



## RESPONSES TO THE FLOODS

**Table 14 Sources of flood warnings**

Source of warning	Number of responses	Per cent of responses	Per cent of respondents
Neighbour	118	31.8	43.2
Radio announcement	36	9.7	13.2
Television announcement	16	4.3	5.9
Automatic telephone message	8	2.2	2.9
Telephone cascade system	3	0.8	1.1
Floodline	22	5.9	8.1
An official knocking at the door	102	27.5	37.4
Loud hailer in the street	22	5.9	8.1
Text message	4	1.1	1.5
Phone call from an official	1	0.3	0.4
Other	39	10.5	14.3
TOTAL – responses	371	100.0	
TOTAL - respondents	273		135.9

**Table 15 Time between warning and flood**

Time between warning and flood	Number of households	Per cent of households
Under one hour	86	31.6
1-3 hours	95	34.9
4-6 hours	48	17.6
Over six hours	43	15.8
TOTAL	272	100.0

**Table 16 Actions taken prior to the flood**

Action	Number of responses	Per cent of responses	Per cent of respondents
Deployed sandbags, flood guards or other defence	216	23.0	37.4
Removed possessions from ground floor	227	24.2	39.3
Household members vacated the house	123	13.1	21.3
Moved car to higher ground	196	20.9	33.9
Other	18	1.9	3.1
No action taken	158	16.8	27.3
TOTAL – responses	938	100.0	
TOTAL - respondents	578		162.3

**Table 17 Actions taken prior to the flood, by whether received flood warning**  
(per cent of respondents)

Action	Received flood warning?	
	Yes n=242	No n=333
Deployed sandbags, flood guards or other defence	45.9	31.2
Removed possessions from ground floor	49.2	32.4
Household members vacated the house	28.9	15.9
Moved car to higher ground	39.7	30.0
Other	2.9	3.0
No action taken	13.2	37.5

**Table 18 Actions taken prior to the flood, by time between warning and flood**  
(per cent of respondents)

Action	Time between warning and flood			
	<1 hr n=82	1-3 hrs n=90	4-6 hrs n=44	>6 hrs n=43
Deployed sandbags, flood guards or other defence	39.0	46.7	50.0	44.2
Removed possessions from ground floor	37.8	43.3	56.8	67.4
Household members vacated the house	23.2	25.6	25.0	32.6
Moved car to higher ground	28.0	41.1	40.9	53.5
Other	3.7	2.2	-	2.3
No action taken	23.2	12.2	9.1	11.6

**Table 19 Sources of assistance received**

<b>Source of assistance</b>	<b>Number of respondents receiving</b>	<b>Per cent of respondents</b>
Friends/neighbours in the locality	334	55.8
Friends outside the locality	167	27.9
Family members outside your household	319	53.3
Community group	26	4.3
Local church	42	7.0
Local businesses	30	5.0
Local council	126	21.0
Police Service	75	12.5
Fire Service	118	19.7
Landlord	17	2.8
Other	34	5.7
No assistance received	63	10.5

**Table 20 Temporary accommodation**

<b>Temporary accommodation</b>	<b>Number of responses</b>	<b>Per cent of responses</b>	<b>Per cent of respondents</b>
Evacuation centre	22	3.6	4.8
Homeless shelter	6	1.0	1.3
Hotel or B&B	78	12.9	16.9
Friends or relatives	204	33.6	44.2
Rented from council or housing association	59	9.7	12.8
Rented from private landlord	183	30.1	39.6
Other	55	9.1	11.9
TOTAL – responses	607	100.0	
TOTAL - respondents	462		131.4

## IMPACTS OF FLOODING

**Table 21 Length of time unable to stay in home**

Length of time unable to stay in home	Number of households	Per cent of households
1-7 nights	44	9.5
8-28 nights	18	3.9
1-3 months	47	10.2
4-6 months	143	31.0
6+ months	207	44.8
Still out of home	3	0.6
<b>TOTAL</b>	<b>462</b>	<b>100.0</b>

**Table 22 Financial damage to building and contents**

	Mean Damage (£)	N
Buildings	31,980	184
Contents	13,552	260

**Table 23 Work days lost**

Type of leave	Mean work days lost by those affected	Mean work days lost per household
Compassionate leave or sick leave <i>(cost borne by employer)</i>	9.8 (n=169)	1.4
Annual leave <i>(cost borne by employee)</i>	6.3 (n=133)	0.7
Unpaid leave <i>(cost borne by employee)</i>	10.4 (n=142)	1.2

**Table 24 Flood impacts**

Impact	Overall impact on population*		Intensity of impact on those affected**	
	Mean	N	Mean	N
<b><i>Tangible:</i></b>				
Financial loss	1.53	563	1.69	508
Loss of house value	1.36	557	1.70	443
Disruption to electricity supply	1.33	550	1.63	449
Damage to car or van	0.76	534	1.40	292
Used holiday entitlement	0.65	530	1.19	288
<b>AVERAGE SCORE</b>	<b>1.12</b>		<b>1.52</b>	
<b><i>Intangible – immediate:</i></b>				
Discomfort/inconvenience	2.20	586	2.31	556
Stress of flood itself	2.03	601	2.09	582
Having to leave home	1.91	575	2.33	471
Dealing with insurers	1.67	590	1.88	524
Living in temporary accommodation	1.62	585	2.03	467
Dealing with builders	1.62	578	1.97	474
Being stranded in/out of home	1.62	556	1.88	478
<b>AVERAGE SCORE</b>	<b>1.81</b>		<b>2.07</b>	
<b><i>Intangible – lasting:</i></b>				
Time and effort to return to normal	2.21	591	2.33	560
Worry about future flooding	2.14	601	2.21	581
Irreplaceable/sentimental items	1.53	585	1.85	484
Strains between family	1.02	570	1.29	449
Loss of community spirit	0.97	552	1.17	457
Deterioration to mental health	0.94	560	1.21	438
Deterioration to physical health	0.82	579	1.06	450
Loss or distress to pets	0.71	564	1.45	278
<b>AVERAGE SCORE</b>	<b>1.29</b>		<b>1.57</b>	

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

\*\* 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 25 Flood impacts, by whether received warning (mean score\*)**

Impact	Received warning?	
	Yes min n=214	No min n=309
<i>Tangible:</i>		
Average score	1.11	1.13
<i>Intangible - immediate:</i>		
Average score	1.79	1.83
<i>Intangible - lasting:</i>		
Average score	1.29	1.29

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 26 Flood impacts, by whether has contents insurance (mean score\*)**

Impact	Has contents insurance?	
	Yes min n=460	No min n=46
<i>Tangible:</i>		
Average score	1.15	1.01
<i>Intangible - immediate:</i>		
Average score	1.87	1.55
<i>Intangible - lasting:</i>		
Average score	1.31	1.33

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 27 Flood impacts, by whether household has someone aged over 70**  
(mean score\*)

Impact	Household member aged over 70?	
	Yes min n=108	No min n=415
<b><i>Tangible:</i></b>		
Average score	0.94	1.17
<b><i>Intangible - immediate:</i></b>		
Average score	1.76	1.82
<b><i>Intangible - lasting:</i></b>		
Average score	1.23	1.31

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 28 Flood impacts, by income (mean score\*)**

Impact	Income	
	Under £20,000 pa min n=151	Over £20,000 pa min n=133
<b><i>Tangible:</i></b>		
Average score	1.08	1.08
<b><i>Intangible - immediate:</i></b>		
Average score	1.77	1.72
<b><i>Intangible - lasting:</i></b>		
Average score	1.30	1.12

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 29 Flood impacts, by occupational group (mean score\*)**

Impact	Occupational group		
	Professional, managerial and associated occupations min n=162	Skilled occupations min n=128	Semi-skilled and unskilled min n=91
<b><i>Tangible:</i></b>			
Average score	1.10	1.10	1.19
<b><i>Intangible - immediate:</i></b>			
Average score	1.79	1.88	1.82
<b><i>Intangible - lasting:</i></b>			
Average score	1.16	1.31	1.37

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 30 Flood impacts, by number of times flooded (mean score\*)**

Impact	Number of times flooded		
	Once min n=374	Twice min n=120	Three times+ min n=28
<b><i>Tangible:</i></b>			
Average score	1.05	1.34	1.21
<b><i>Intangible - immediate:</i></b>			
Average score	1.74	2.06	1.72
<b><i>Intangible - lasting:</i></b>			
Average score	1.20	1.55	1.53

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3



**Table 31 Flood impacts, by type of flood (mean score\*)**

Impact	Type of flood		
	Fluvial min n=463	Pluvial min n=56	Coastal min n=10
<i>Tangible:</i>			
Average score	1.12	1.18	1.01
<i>Intangible - immediate:</i>			
Average score	1.80	1.85	1.70
<i>Intangible - lasting:</i>			
Average score	1.27	1.53	1.06

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 32 Flood impacts, by depth of flood (mean score\*)**

Impact	Depth of flood		
	Under 2.5cm min n=31	2.5-30cm min n=164	Over 30cm min n=303
<i>Tangible:</i>			
Average score	0.88	0.90	1.31
<i>Intangible - immediate:</i>			
Average score	1.38	1.58	2.05
<i>Intangible - lasting:</i>			
Average score	0.93	1.06	1.50

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 33 Flood impacts, by housing tenure (mean score\*)**

Impact	Housing tenure				
	Owned with mortgage min n=192	Owned outright min n=208	Council min n=66	Housing association min n=10	Private landlord min n=13
<i>Tangible:</i>					
Average score	1.23	1.11	0.96	0.76	0.77
<i>Intangible - immediate:</i>					
Average score	1.91	1.70	1.92	1.54	1.49
<i>Intangible - lasting:</i>					
Average score	1.32	1.17	1.61	1.26	0.96

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 34 Flood impacts, by location (mean score\*)**

Impact	Location							
	Brechin	Edin-burgh	Elgin	Forres	Glasgow-Shettleston	Hawick	Perth	Scattered rural & coastal
	min n=15	min n=131	min n=125	min n=89	min n=49	min n=36	min n=61	min n=19
<b>Tangible:</b>								
Average score	0.74	1.02	1.32	1.03	1.25	0.81	1.27	0.87
<b>Intangible – immediate:</b>								
Average score	0.91	1.71	2.14	1.67	1.92	1.20	1.98	1.58
<b>Intangible – lasting:</b>								
Average score	0.80	1.07	1.67	1.07	1.60	0.98	1.35	1.11

\* 'N/A' or 'No impact'=0; 'Mild impact'=1; 'Serious impact'=2; 'Extreme impact'=3

**Table 35 Impact of flood on sense of community**

Since the flood the sense of community has...	Number of responses	Per cent of respondents
Improved	106	17.1
Remained the same	366	59.0
Deteriorated	97	15.6
Don't know	51	8.2
TOTAL	620	100.0

**Table 36 Reasons for moving house or considering moving house**

Reason	Number of respondents citing reason	Per cent of respondents
Reasons unrelated to the flood	34	15.5
House will/would never be the same again	59	26.8
Living in the house brings/brought back negative feelings about the flood	64	29.1
Fear of another flood	183	83.2
Friends/family have moved out of the area	12	5.5
Property has become a poor investment	97	44.1
Other reasons related to the flood	18	8.2

## LIVING WITH FLOODS

### *Perception of risk*

**Table 37 Perception of flood risk, by whether flooded (per cent of respondents)**

Perceived likelihood of being flooded in the next 10 years	Flooded n=610	Not flooded n=575	TOTAL n=1,185
Very likely	30.0	11.5	21.0
Likely	33.6	29.7	31.7
Unlikely	23.9	36.3	30.0
Very unlikely	10.7	16.2	13.3
Zero or negligible likelihood	1.8	6.3	4.0
TOTAL	100.0	100.0	100.0

Chi-squared = 86.532; df=4; **p<0.001**

**Table 38 Perception of flood risk, by location (percent of respondents)**

Perceived likelihood of being flooded in the next 10 years	Location							
	Brechin n=45	Edin- burgh n=302	Elgin n=233	Forres n=256	Glasgow- Shettleston N=106	Hawick n=52	Perth n=122	Scattered rural & coastal n=69
Very likely	20.0	10.3	55.8	10.2	23.6	26.9	4.9	11.6
Likely	24.4	33.8	32.2	37.9	36.8	40.4	18.0	13.0
Unlikely	22.2	41.7	8.6	36.3	30.2	19.2	35.2	30.4
Very unlikely	20.0	11.6	3.0	13.3	8.5	5.8	36.1	24.6
Zero or negligible likelihood	13.3	2.6	0.4	2.3	0.9	7.7	5.7	20.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Chi-squared = 413.123; df=28; **p<0.001**

**Table 39 Knowledge about flood risk, by whether flooded**  
(per cent of respondents)

<b>Self-reported level of knowledge about flood risk</b>	<b>Flooded</b> n=588	<b>Not flooded</b> n=543	<b>TOTAL</b> n=1,131
Very well informed	6.8	5.7	6.3
Well informed	25.3	27.4	26.3
Not very well informed	41.3	40.9	41.1
Not at all informed	26.5	26.0	26.3
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Chi-squared = 1.058; df=3; p>0.01

**Table 40 Information sources on flood risk, by whether flooded**  
(per cent of respondents)

<b>Information source</b>	<b>Flooded</b> n=582	<b>Not flooded</b> n=542	<b>TOTAL</b> n=1,124
Neighbours, friends or relatives	40.0	36.0	38.1
Local radio	29.7	27.3	28.6
Local press	20.6	34.3	27.2
National media coverage	29.9	26.9	28.5
Floodline	33.2	19.4	26.5
Local council	35.6	38.0	36.7
Other	14.8	10.7	12.8

**Table 41 Frequency of worry about flooding, by whether flooded**  
(per cent of respondents)

<b>How often worry about flooding</b>	<b>Flooded</b> n=624	<b>Not flooded</b> n=583	<b>TOTAL</b> n=1,207
Most of the time	22.9	4.1	13.8
Often	38.1	24.2	31.4
Rarely	32.9	54.9	43.5
Never	6.1	16.8	11.3
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Chi-squared = 160.075; df=3; p<0.001

**Table 42 Triggers of worry about flooding, by whether flooded**  
(per cent of respondents)

<b>Trigger</b>	<b>Flooded</b> n=604	<b>Not flooded</b> n=552	<b>TOTAL</b> n=1,156
Visiting places that remind me of the flood	6.1	2.5	11.9
Talking about the flood	15.4	9.6	4.4
Reports about flooding in the media	37.9	26.4	12.6
Forecasts of heavy rainfall	62.3	34.1	32.4
Heavy rainfall	76.8	55.3	48.8
Seeing the river in spate and/or rising	73.5	58.0	66.5
Other	6.1	4.3	66.1
Never worries about flooding	6.0	18.5	11.9

***Managing flood risk***

**Table 43 Contents insurance, by whether flooded** (per cent of respondents)

<b>Contents insurance</b>	<b>Flooded</b> n=486	<b>Not flooded</b> n=495	<b>TOTAL</b> n=981
Yes	94.7	87.1	90.8
No	4.1	10.5	7.3
Don't know	1.2	2.4	1.8
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Chi-squared = 17.085; df=2; **p<0.001**

**Table 44 Whether flooding covered by contents insurance, by whether flooded**  
(per cent of respondents)

<b>Flooding covered by contents insurance</b>	<b>Flooded</b> n=456	<b>Not flooded</b> n=435	<b>TOTAL</b> n=891
Yes	84.0	59.8	72.2
No	3.9	8.3	6.1
Don't know	12.1	32.0	21.8
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Chi-squared = 65.441; df=2; **p<0.001**

**Table 45 Higher flooding excess on contents insurance, by whether flooded**  
(per cent of respondents)

<b>Higher excess for flooding on contents insurance</b>	<b>Flooded</b>	<b>Not flooded</b>	<b>TOTAL</b>
	n=438	n=397	n=835
Yes	36.8	17.1	27.4
No	33.8	32.0	32.9
Don't know	29.5	50.9	39.6
TOTAL	100.0	100.0	100.0

Chi-squared = 53.588; df=2; p<0.001

**Table 46 Contents insurance at time of flood and at time of survey, by housing tenure**

<b>Housing tenure</b>	<b>Per cent with contents insurance at time of flood</b>	<b>Per cent with contents insurance at time of survey</b>
Being bought with a mortgage	95.8 n=214	98.2 n=383
Owned outright by household	94.9 n=236	96.9 n=322
Rented from council	69.0 n=87	75.2 n=145
Rented from a housing association or trust	42.9 n=14	65.5 n=29
Rented from a private landlord or employer	68.8 n=16	47.9 n=48

**Table 47 Knowledge of 'Pay-with-rent' schemes among council tenants, by whether flooded** (per cent of respondents)

<b>Heard of 'Pay-with-rent'</b>	<b>Flooded</b>	<b>Not flooded</b>	<b>TOTAL</b>
	n=64	n=58	n=122
Yes	39.1	34.5	36.9
No	60.9	65.5	63.1
TOTAL	100.0	100.0	100.0

Chi-squared = 0.274; df=1; p>0.01

**Table 48 Uptake of 'Pay-with-rent' schemes among council tenants, by whether flooded** (per cent of respondents)

<b>Has insurance through 'Pay-with-rent'</b>	<b>Flooded</b>	<b>Not flooded</b>	<b>TOTAL</b>
	n=51	n=36	n=87
Yes	13.7	11.1	12.6
No	78.4	75.0	77.0
Don't know or N/A	7.9	13.9	10.3
TOTAL	100.0	100.0	100.0

Chi-squared = 0.925; df=2; p>0.01



**Table 49 Reasons for not having contents insurance**

<b>Reason</b>	<b>Number of responses</b>	<b>Per cent of responses</b>	<b>Per cent of respondents</b>
Possessions of insufficient value	12	15.8	18.8
Insufficiently likely to be required	9	11.8	14.1
Could afford to replace items	4	5.3	6.3
Could not afford the premium	30	39.5	46.9
Could not get contents insurance	14	18.4	21.9
Other	7	9.2	10.9
TOTAL – responses	76	100.0	
TOTAL – respondents	64		118.8

**Table 50 Flood alleviation measures taken, by whether flooded (per cent of respondents)**

<b>Flood alleviation measure</b>	<b>Flooded</b> n=560	<b>Not flooded</b> N=533	<b>TOTAL</b> n=1,093
Installed non-return valves on drains	2.0	0.8	1.4
Keep ditches and drains around the property clean	18.0	9.0	13.6
Built walls around the property	12.0	3.6	7.9
Purchased water pumps	3.2	0.2	1.7
Purchased removable flood guards or sandbags	19.3	6.6	13.1
Received removable flood guards or sandbags from the council	12.9	8.1	10.5
Avoid keeping sentimental or irreplaceable items downstairs	22.5	6.2	14.5
Avoid having expensive furniture or floor coverings downstairs	8.4	2.8	5.7
Replaced plasterboard with plaster	1.8	0.2	1.0
Installed concrete floors	7.0	1.3	4.2
Replaced carpets with rugs	5.5	2.6	4.1
Moved power sockets	9.3	0.9	5.2
Moved electrical appliances	4.3	0.9	2.7
Other	10.0	6.2	8.1
Not taken any flood alleviation measures	39.3	68.9	53.7

**Table 51 Reasons for not undertaking any flood alleviation measures**

Reason	Number of responses	Per cent of responses	Per cent of respondents
Did not know about these measures	123	7.6	14.4
Could not afford these measures	121	7.5	14.1
Have not got round to organising these measures	44	2.7	5.1
Adequate flood defences and/or improvements in the local drains have been or will be put in place	230	14.3	26.9
Planning to move house soon	21	1.3	2.5
Do not think they would be effective	127	7.9	14.8
It is the landlord's responsibility	133	8.2	15.5
The government or council should provide flood alleviation measures	313	19.4	36.6
A flood of such magnitude is unlikely to occur again	159	9.9	18.6
Have been unable to procure the necessary equipment	17	1.1	2.0
Have been unable to hire the appropriate expertise	8	0.5	0.9
Have insurance	198	12.3	23.1
Could not reach agreement with neighbours	5	0.3	0.6
Other	114	7.1	13.3
TOTAL – responses	1,613	100.0	
TOTAL – respondents	856		188.4

**Table 52 Awareness of Floodline, by whether flooded (per cent of respondents)**

Heard of Floodline	Flooded	Not flooded	TOTAL
	n=597	n=544	n=1,141
Yes	74.2	59.4	67.1
No	25.8	40.6	32.9
TOTAL	100.0	100.0	100.0

Chi-squared = 28.369; df=1; **p<0.001**

**Table 53 Use of Floodline, by whether flooded (per cent of respondents)**

Used Floodline	Flooded	Not flooded	TOTAL
	n=501	n=397	n=898
Yes	37.5	13.1	26.7
No	62.5	86.9	73.3
TOTAL	100.0	100.0	100.0

Chi-squared = 67.483; df=1; **p<0.001**

**Table 54 Helpfulness of Floodline, by whether flooded (per cent of respondents)**

Helpfulness of Floodline	Flooded	Not flooded	TOTAL
	n=184	n=53	n=237
Very helpful	25.5	17.0	23.6
Helpful	52.2	62.3	54.4
Unhelpful	17.4	13.2	16.5
Very unhelpful	4.9	7.5	5.5
TOTAL	100.0	100.0	100.0

Chi-squared = 3.013; df=3; p>0.01

**Table 55 Receipt of a formal flood warning, by whether flooded (per cent of respondents)**

Received formal flood warning	Flooded	Not flooded	TOTAL
	n=590	n=561	n=1,151
Yes	51.0	34.4	42.9
No	49.0	65.6	57.1
TOTAL	100.0	100.0	100.0

Chi-squared = 32.400; df=1; p<0.001

**Table 56 Frequency of receipt of formal flood warning, by whether flooded (per cent of respondents)**

Number of formal flood warnings received	Flooded	Not flooded	TOTAL
	n=241	n=155	n=396
One	52.7	51.6	52.3
Two	27.8	27.1	27.5
Three +	19.5	21.3	20.2
TOTAL	100.0	100.0	100.0

Chi-squared = 0.188; df=2; p>0.01

**Table 57 Confidence of sufficient warning of a future flood, by whether ever received a warning and whether flooded (per cent of respondents)**

Level of confidence	Flooded*		Not Flooded**	
	Has received a warning n=292	Has never received a warning n=280	Has received a warning n=188	Has never received a warning n=348
Very confident	9.9	2.9	9.6	6.6
Confident	36.3	18.2	51.1	33.6
Not very confident	38.4	45.0	34.6	40.2
Not at all confident	15.4	33.9	4.8	19.5
TOTAL	100.0	100.0	100.0	100.0

\*Chi-squared = 49.637; df=3; p<0.001

\*\*Chi-squared = 30.262; df=3; p<0.001

**Table 58 Confidence of knowing what to do in a future flood, by whether flooded** (per cent of respondents)

Level of confidence	Flooded	Not flooded	TOTAL
	n=585	n=550	n=1,135
Very confident	18.3	10.5	14.5
Confident	47.0	42.2	44.7
Not very confident	25.1	37.1	30.9
Not at all confident	9.6	10.2	9.9
TOTAL	100.0	100.0	100.0

Chi-squared = 26.401; df=3; p<0.001

**Table 59 Preferred means of receiving a flood warning, by whether flooded** (per cent of respondents)

Means of receiving flood warning	Flooded	Not flooded	TOTAL
	n=573	n=528	n=1,101
Neighbour	23.2	20.5	21.9
Radio announcement	32.1	35.2	33.6
Television announcement	36.5	36.0	36.2
Automatic telephone message	22.0	19.7	20.9
Telephone 'cascade' system	14.7	12.5	13.6
Floodline	31.4	21.4	26.6
An official knocking on your door	59.7	57.8	58.8
Loud hailer in the street	38.0	32.8	35.5
Text message	13.6	16.3	14.9
Phone call	35.1	38.1	36.5
Observe the river yourself	46.9	37.1	42.2
Other	2.3	2.1	2.2

**Table 60 Whether received a formal flood warning, by age** (per cent of respondents)

Household has a member aged over 70 years?	Received flood warning?	
	Yes n=262	No n=365
Yes	20.6	26.3
No	79.4	73.7
TOTAL	100.0	100.0

Chi-squared = 2.714; df=1; p>0.01

**Table 61 Whether received a formal flood warning, by income group** (per cent of respondents)

Income group	Received flood warning?	
	Yes n=137	No n=184
Less than £20,000 per annum	58.4	56.5
More than £20,000 per annum	41.6	43.5
TOTAL	100.0	100.0

Chi-squared = 0.113; df=1; p>0.01

**Table 62 Whether received a formal flood warning, by occupational class**  
(per cent of respondents)

Occupational class	Received flood warning?	
	Yes n=173	No n=251
Professional, managerial and associated occupations	41.0	40.6
Skilled occupations	34.1	33.9
Semi-skilled and unskilled occupations	24.9	25.5
TOTAL	100.0	100.0

Chi-squared = 0.023; df=2; p>0.01

**Table 63 Whether received a formal flood warning, by housing tenure**  
(per cent of respondents)

Housing tenure	Received flood warning?	
	Yes n=237	No n=346
Being bought with a mortgage	35.9	37.9
Owned outright by household	39.2	43.6
Rented from council	19.0	13.0
Rented from a housing association or trust	1.7	2.9
Rented from a private landlord or employer	3.8	2.0
Other	0.4	0.6
TOTAL	100.0	100.0

Chi-squared = 7.988; df=6; p>0.01

**Table 64 Acceptability of flood management policies, by whether flooded**  
(per cent of respondents indicating policy is acceptable)

Flood management policy	Per cent indicating policy is acceptable		
	Flooded min n=473	Not flooded min n=440	TOTAL min n=922
Structural flood defences	92.6	89.4	91.1
Valves fitted to sewers and/or storm drains	89.5	88.4	89.0
Upstream reservoirs	88.2	83.6	86.0
Sustainable urban drainage systems	80.2	77.1	78.7
Flood warning service	90.3	86.6	88.5
Demolition of the most threatened properties and relocation of the occupants	45.1	33.3	39.2
Pay farmers and land managers upstream to undertake practices that increase the water-holding capacity of the ground	76.0	67.9	72.1

**Table 65 Views of where responsibility for flood protection SHOULD lie**

Where responsibility for flood protection SHOULD lie	Number of responses	Per cent of responses	Per cent of respondents
Yourself	93	5.9	8.3
Landlord	51	3.2	4.6
Local council	654	41.4	58.4
Scottish Executive	357	22.6	31.9
SEPA	211	13.4	18.9
Scottish Water	184	11.6	16.4
Other	30	1.9	2.7
TOTAL – responses	1,580	100.0	
TOTAL – respondents	1,119		141.2

**Table 66 Views of where responsibility for flood protection SHOULD lie, by age (per cent of respondents)**

Where responsibility for flood protection should lie	Household has member over 70 years?	
	Yes n=248	No n=871
Yourself	7.7	8.5
Landlord	4.8	4.5
Local council	64.5	56.7
Scottish Executive	26.2	33.5
SEPA	19.4	18.7
Scottish Water	18.5	15.8
Other	4.0	2.3

**Table 67 Views of where responsibility for flood protection SHOULD lie, by income group (per cent of respondents)**

Where responsibility for flood protection should lie	Income group	
	Below £20,000pa n=349	Above £20,000pa n=290
Yourself	8.9	7.9
Landlord	4.9	1.7
Local council	63.6	47.9
Scottish Executive	29.2	38.6
SEPA	18.9	15.2
Scottish Water	16.9	8.6
Other	1.7	4.8

**Table 68 Views of where responsibility for flood protection SHOULD lie, by occupational class (per cent of respondents)**

Where responsibility for flood protection should lie	Occupational class		
	Professional, managerial and associated prof n=366	Skilled occupations n=262	Semi-skilled and unskilled occupations n=193
Yourself	8.5	11.1	6.7
Landlord	1.4	4.2	5.7
Local council	53.6	61.5	61.1
Scottish Executive	35.0	25.2	33.7
SEPA	19.9	19.8	14.0
Scottish Water	12.3	12.2	19.2
Other	3.6	2.7	2.6

**Table 69 Views of where responsibility for flood protection SHOULD lie, by housing tenure (per cent of respondents)**

Where responsibility for flood protection should lie	Housing tenure				
	Owned with mortgage n=447	Owned outright n=383	Council n=153	Housing association n=33	Private landlord n=51
Yourself	8.1	10.7	3.3	9.1	5.9
Landlord	0.7	0.3	13.7	33.3	19.6
Local council	53.5	58.7	71.9	60.6	54.9
Scottish Executive	36.5	33.7	19.0	15.2	25.5
SEPA	16.8	23.5	14.4	9.1	11.8
Scottish Water	14.1	18.5	14.4	30.3	9.8
Other	2.0	4.2	0.7	6.1	2.0

**Table 70 Views of where responsibility for flood protection DOES lie**

Where responsibility for flood protection DOES lie	Number of responses	Per cent of responses	Per cent of respondents
Yourself	257	18.6	22.9
Landlord	29	2.1	2.6
Local council	508	36.7	45.4
Scottish Executive	188	13.6	16.8
SEPA	119	8.6	10.6
Scottish Water	114	8.2	10.2
Other	14	1.0	1.3
Don't know	154	11.1	13.8
TOTAL – responses	1,383	100.0	
TOTAL – respondents	1,120		123.6

**Table 71 Willingness to pay extra Council Tax per annum for flood protection, by whether flooded (per cent of respondents)**

Extra Council Tax per annum	Flooded	Not flooded	TOTAL
	n=558	n=530	n=1,088
Not willing to pay any extra	58.4	51.5	55.1
Under £20	12.2	17.4	14.7
£20-£49	13.4	17.4	15.3
£50-£99	5.7	7.2	6.4
£100+	10.2	6.6	8.5
TOTAL	100.0	100.0	100.0

Chi-squared = 15.085; df=4; **p<0.01**

**Table 72 Willingness to pay extra Council Tax per annum for flood protection, by income (per cent of respondents)**

Extra Council Tax per annum	Income	
	Under £20,000 pa n=345	Over £20,000 pa n=290
Not willing to pay any extra	55.7	37.2
Under £20	16.5	14.1
£20-£49	15.1	21.7
£50-£99	5.8	11.0
£100+	7.0	15.9
TOTAL	100.0	100.0

Chi-squared = 32.347; df=4; **p<0.01**

**Table 73. Willingness to pay extra Council Tax per annum for flood protection, by housing tenure (per cent of respondents)**

Extra Council Tax per annum	Housing tenure				
	Owned with mortgage n=443	Owned outright n=359	Council n=163	Housing association n=31	Private landlord n=50
Not willing to pay any extra	47.2	57.7	65.6	64.5	58.0
Under £20	14.9	12.8	16.6	19.4	22.0
£20-£49	17.6	16.2	11.7	9.7	14.0
£50-£99	7.9	5.0	3.7	6.5	4.0
£100+	12.4	8.4	2.5	-	2.0
TOTAL	100.0	100.0	100.0	100.0	100.0

Chi-squared = 41.292; df=16; **p<0.01**



## **APPENDIX C: INTERVIEW PRO FORMAS**

### **Local Authority**

Thank you for agreeing to provide your views on aspects of flood emergency management and flood preparedness in your council (interviewee is assured as to personal confidentiality).

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#### **Flood emergency planning and warning dissemination – planning stage**

How are the responsibilities divided both between council and emergency services and within council departments in flood preparation (eg roads, emergency planning etc)?

How is emergency planning organised on a supra-council level?

What recent experience has there been of initiating the emergency plan or exercises based on it?

What are the procedures for warning dissemination?

What is your experience with warning dissemination?

Do you have systems in place to warn householders, landowners, businesses, directly? If so, how do they work?

Are there any areas of concern about warning coverage in your area (also directed to SEPA for a national perspective)?

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#### **Flood emergency planning and warning dissemination – operational and post-flood stage**

In what ways do you use sandbags and/or other temporary flood prevention measures?

How are local contacts in the community involved at the operational stage?

What are the procedures for evacuation?

What is your experience with evacuation?

How are social tenants re-housed? What are the arrangements for others?

What are the responsibilities of council and other emergency service after a flood?

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#### **Flood preparedness – social aspects**

What measures do you take to draw householders' attention to the council's flood initiatives outwith flood events?

How successful do you think these have been?

How are local stakeholders involved in formulating the emergency plans? E.g. Flood groups, community councils, landowners?

Have you any permanent flood alleviation schemes planned? What stage are these at?

What are the social aspects of the planning procedures for these schemes? How do you involve landowners, those affected directly and other stakeholders?

## **Insurance Industry representative**

### **Assessing a particular property**

Could you please recap the company's method for assessing the level of flood risk facing a particular property?

What is the typical level of uncertainty?

If a property is deemed to be at high risk of flooding, is the householder over obliged under your terms to put in place flood alleviation measures (e.g. build a wall around the property, keep sandbags, pumps, etc)?

If so, what flood prevention and alleviation measures are required, and under what circumstances?

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### **Managing flood risk**

If increasing or decreasing, what are the reasons for this?

Is, or has, the company engaged in any research, analysis or information gathering in relation to better understanding current flood risk? If so, does it relate to individual properties or overall risk management?

Is, or has, the company engaged in any research, analysis or information gathering in relation to better understanding future flood risk? If so, does it relate to individual properties or overall risk management?

Does the company have any information on the reduction in risk or damage associated with:

- a) flood defences?
- b) flood warning schemes?
- c) flood alleviation measures around the home?
- d) awareness-raising initiatives (e.g. SEPA Flood Awareness Fortnight, Local Authority Biennial Reports)?

Is the company doing anything to raise the awareness of its policy holders living in flood risk areas? If so, what? Do you know of any competitors doing so?

Do you know of any data or reports that could shed light on the social impacts of flooding and flood risk? Is it possible that the research team might be able to get access to these data?

Any miscellaneous comments on management of flood risk?

## SEPA

### Flood warning coverage

What is the current state of flood warning coverage nationally?

Is there room for improvement in

- areal coverage
- warning accuracy
- lead times?

In extending warning systems to new areas, what is SEPA's approach in relation to local authorities and the Executive (cost/benefit, funding issues, etc)?

Do the methods differ between catchments/ warning areas, e.g. are there differences in approach to warning when lead times are short – say 3-6 hours?

How does the information cascade operate in those catchments where it is used and does this affect the amount of warning time that can be given?

What arrangements exist for coastal flood warning?

What information does SEPA give to others during a flood alert– e.g. the local authority, the emergency services, etc. To what extent is the practical role of advising individuals affected by the emergency then delegated to these bodies?

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### Social aspects

What are SEPA's plans for engaging

- the community
- emergency planners
- the emergency services

Outwith flood events, to try to maximise the effectiveness of flood warnings and *Floodline* in a given area?

How would SEPA engage with these (and any other) bodies post-flood event?

How aware do SEPA feel the public are of role in flood warning and flood prevention vis-à-vis the role of local authorities, emergency services, etc?

Based on experience with the flood awareness campaigns how have SEPA's plans for improving community knowledge of flood risk changed, if at all?

## **Scottish Executive Environment and Rural Affairs Department**

### **National policy on flood prevention**

What measures are in place to raise public and stakeholder awareness of flooding on a national level?

In what ways is the executive SE directing Local Authorities' approaches toward flood alleviation?

How will the Executive smooth out interaction between the planning system and other statutory procedures for future flood prevention schemes?

What is the current degree of take-up of the budget for flood alleviation schemes?

How will the CAR regulations impact on new schemes?

\*Can you anticipate how decisions will be made on flood alleviation schemes in the future as regards sustainability? Can you anticipate how far social costs of flood risk might be factored in to such decisions?

For pluvial flooding, what is the current strategy on reducing flood risk?

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### **Assistance to those affected by flooding**

What assistance is presently offered to those unable to obtain/ afford flood insurance?

What other assistance is available from the Executive to those at risk of flooding?

What is the Executive's view on the current state of emergency planning, especially in the light of the Civil Contingency Act?

### **General**

How far does the legislative framework (particularly the 1961 and 1997 Acts) inhibit the newer WEWS duties to promote sustainable flood management.

## **Scottish Water**

### **Pluvial flooding**

What are the main issues you are facing currently with regards to emergency management of sewer and drain flooding?

Can you outline for us the emergency procedures that SW follows when there is a flooding incident causing drain/ sewer backup of households?

How are your registers of households at risk of flooding drawn up?

Do you operate any warning systems and/ or procedures for these households and/or advice and information lines?

If so, can you explain how those operate?

How would your emergency procedures operate when there are a large number of households phoning in all needing assistance at the same time?

How far has the provision of drainage for new developments exacerbated problems of drainage/ sewer flooding?

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### **Maintenance and renewal in urban areas**

What measures have been taken in areas known to be at risk of drain/ sewer flooding to reduce the risk?

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