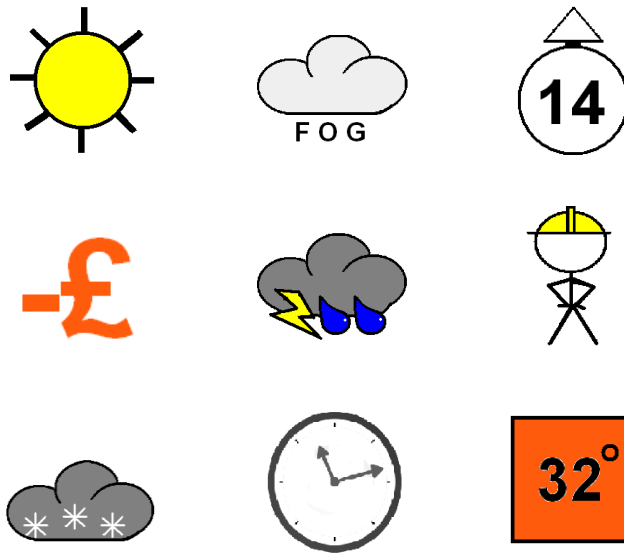


# Falkirk

## Local Climate Impact Profile



18<sup>th</sup> August 2010

# Falkirk Local Climate Impact Profile

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*“If we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more.”*

*Source: Sir Nicolas Stern - Stern Review on the Economics of Climate Change, 2006*

## 1. Executive Summary

### 1.1 Introduction

- LCLIP stands for Local Climate Impact Profile. It is a study of the impact of severe weather events on an area that looks at how services and lives are affected by any disruption. Almost 400 LCLIPs have been carried out across the UK, with 10 of them in Scotland.
- Whilst there is data available about past weather conditions and predictions have been produced about likely changes to climate in the future, these do not capture information about the impacts of weather events and climate.
- An LCLIP can help to identify and manage risks, bring forward policy responses and embed these into appropriate plans, policies and service delivery. It can also help to provide leadership and co-ordination, build adaptive capacity, reduce and manage uncertainty from severe weather events and educate the public and partner organisations.
- Climate change impacts – such as wetter winters, drier summers, increased flooding and extreme weather events – have implications for services including emergency planning; emergency services; waste collection; land-use planning; building control; estates & housing management; education services; leisure facilities and open spaces; transport infrastructure; flooding and social services.

### 1.2 Falkirk’s Joint Community Planning Approach

- Falkirk Strategic Community Planning Partnership established a sustainability group to work across its five key themes in order to embed sustainability throughout its work. In August 2009, the SCPP Management Group agreed to support a joint approach to climate change through a series of actions. The first step was agreeing to make a financial contribution towards the cost of the production of an LCLIP and agreeing to involve their staff in the data gathering. Partners that took part in the LCLIP include Falkirk Council, Scottish Ambulance Service, Central Scotland Fire Service, Central Scotland Police, NHSFV and Forth Ports.

### 1.3 Aims and Objectives

- **Aim** – to provide an overview of the impact of severe weather events on the Falkirk Council area to enable the Council and its partners to assess their vulnerability to climate change and consider options for improving service resilience.
- **Objectives:**
  - **Assess vulnerability / resilience** - examine the impact of severe weather events on Falkirk Council and its partners’ assets, infrastructure and service delivery, assessing their vulnerability/ resilience

- **Quantify resources** - gather information on the social, environmental and economic costs involved, the quality of data available and record keeping
- **Recommendations** - identify what measures Falkirk Council and its community planning partners should put in place to increase its adaptive capacity to climate change.
- **Climate change strategy** - raise awareness of members, council officers, community planning partners and local communities of climate change issues, stimulating work on a community wide climate change strategy.
- **Use findings of LCLIP to move forward** - provide a basis on which the local authority and its community planning partners can prepare for the climate change patterns anticipated by the UK Climate Change Scenarios 2009

#### 1.4 Methodology and scope

- The project focused on the period 1999-2009 and spanned the Falkirk Council area. It focused primarily on Falkirk Council operations but involved close working with SCP partner organisation. Media records were used to identify national and local severe weather events, highlighting key events and dates which were later used to ascertain the impacts that they had on organisations' operations. Two case studies were used to focus interviews: the cold weather spell of December 2009/January 2010 and an occasion where a secondary school experienced over heating problems during warm weather.

#### 1.5 Adapting to Falkirk's Future Climate

- Climate projections for the Falkirk Council area indicate that like most of Scotland, it will experience warmer and drier summers with increased short bursts of heavy precipitation as well as warmer, wetter winters. In general, there is an increased likelihood of the sporadic, heavy rainfall and resultant flooding that already affects the area. As the report demonstrates, long term changes in weather patterns mean that organisations need to change how they operate. Partners may consider how they design and manage their estates, how they may reduce vulnerability of their service delivery and how the social and business communities of the Council area might be better protected through advance planning.

#### 1.6 Project Findings

- In general, the Falkirk Council area has a moderate climate and is affected mainly by heavy rain, flooding and high winds, with partners satisfied with their coping and response mechanisms. In contrast to this, the Council area is recognised by the Scottish Environment Protection Agency as being the Scottish local authority with the highest percentage of homes at risk of flooding in the event of a one in two hundred year storm surge.
- Partners reported a number of common issues such as difficulties in staff commuting in poor weather, the threat of reputational damage, lack of data regarding impacts of events such as the costs incurred and the impact on staff time when coping with events.
- All partners acknowledged the impact that severe weather events can have on operations, however, very few were able to quantify them. Falkirk Council's Customer First Call Centre was an excellent source of data. It reported that between December 21st and Jan 10th, they received almost 11,000 additional calls compared to the same period 12 months earlier. This amounted to an 80% increase. The greatest relative increase was in calls about roads which saw 1,800 additional calls or a 600% increase.

- Continuity and resource planning are tested. The Falkirk Royal Infirmary saw a 36% increase in the amount of gas use during the cold spell in December 2009 which has obvious implications for gas costs and emerging skill of carbon budgeting. They also saw their gas supply interrupted due to peak demand and had to turn to their oil supply – this is because they are on an interruptable gas supply because they have an oil back up system.
- Falkirk Council's Emergency Planning Unit have found new partnership opportunities with community groups who have emerged as an organised and valuable asset, providing a variety of support services such as 4x4 transportation to hospital appointments and links with vulnerable residents.
- Various partners reported that contingency planning has been successfully tested. Falkirk Council's Social Work Services accounts for 46% of all of Falkirk Council's staff travel (1.4M miles p.a.), which leaves it particularly vulnerable to severe weather events. Despite this, Social Work service reported good results when its contingency planning was tested over the cold spell and attributed much of this the amount of effort that they put into communicating with the public.

## 1.7 Recommendations

- **Corporate Risk Group** – consideration of climate change should contribute to the corporate risk register and the work of Falkirk Council's Corporate Risk Strategy Group.
- **Training/capacity-building measures** - it will be important for key Council staff to become familiar with the new package of climate change modeling for the UK - UK 21st Century Climate Scenarios (UKCP09). Free training is available and can be tailored to groups such as the Falkirk SCP Partnership.
- **Embedding adaptation in project and policy development** - climate change adaptation and carbon management need to be embedded in the development of Council policy.
- **Data Recording** – Falkirk Council should more systematically record data on weather-related incidents and resulting service impacts.

## 1.8 Project Support

- This project has been supported by:
  - UK Climate Impact Partnership (UKCIP)
  - Scottish Climate Change Impacts Partnership (SCCIP)
  - Scotland & Northern Ireland Forum for Environmental Research (SNIFFER)
  - Scottish Environment Protection Agency
  - Scottish Government
  - Sustainable Scotland Network
  - Falkirk Strategic Community Planning Partnership

*“The average domestic losses from a flood in the UK are £28,000, compared to £7,300 for fire and £1,033 for a burglary. Yet only 6% of all households have taken steps to prepare for flood, compared to 80% for fire and 54% for burglary.*

*Source: Environment Agency*

## 2. Introduction

### 2.1 What is an LCLIP?

- LCLIP stands for Local Climate Impact Profile. It is a study of the impact of severe weather events on an area that looks at how services and lives are affected by any disruption. Almost 400 LCLIPs have been carried out across the UK, with 10 of them in Scotland.

### 2.2 Why carry out an LCLIP?

- It is widely accepted that climate change is already being felt in Scotland. Local authorities and their partners provide many services that will be affected by climate change. They also contribute to climate change through carbon emissions from running operations and services. By taking proper climate change adaptation measures, a local authority can help to avoid the worst impacts and costs of climate change on its community.
- Whilst there is data available about past weather conditions (from the Met. Office) and predictions have been produced about likely changes to climate in the future (UKCIP), these do not capture information about the **impacts** of weather events and climate.
- An LCLIP can help to identify and manage risks, bring forward policy responses and embed these into appropriate plans, policies and service delivery. An LCLIP can help to provide leadership and co-ordination, build adaptive capacity, reduce and manage uncertainty from severe weather events and educate the public and partner organisations.
- Climate change impacts – such as wetter winters, drier summers, increased flooding and extreme weather events – have implications for services including emergency planning; emergency services; waste collection; land-use planning; building control; estates & housing management; education services; leisure facilities and open spaces; transport infrastructure; flooding and social services.

### 2.3 Falkirk’s Joint Community Planning Approach

- Falkirk Strategic Community Planning Partnership established a sustainability group to work across its five key themes in order to embed sustainability throughout its work. In August 2009, the SCPP Management Group agreed to support a joint approach to climate change through 4 actions, by:
  - i. Producing a joint Scottish Climate Change Declaration
  - ii. Establishing a joint climate change staff resource
  - iii. Producing a joint climate change strategy
  - iv. Main partners making a financial contribution towards the cost of the production of an LCLIP and involving their staff in the data gathering
- Partners that took part in the LCLIP include Falkirk Council, Scottish Ambulance Service, Central Scotland Fire Service, Central Scotland Police, NHSFV and Forth Ports.

## 2.4 Why Community Planning Partnerships Need to Assess Climate Impacts

- Climate Change is one of the most serious threats facing Scotland and the world today. Due to past greenhouse gas emissions, a certain degree of climate change is now unavoidable. Effects of changing weather patterns on the Falkirk Council area will vary depending on the severity of global warming but, even if only a relatively modest increase in temperature is assumed, the impacts are likely to be significant.
- Local authorities and their partners provide many services that will be affected by climate change. Climate change impacts have implications for services including:
  - contingency planning;
  - emergency services;
  - waste collection and disposal;
  - strategic and land-use planning;
  - building control;
  - estates & housing management;
  - education services;
  - provision and management of leisure facilities and open spaces;
  - transport infrastructure;
  - flooding;
  - social services
- Apart from the fact that Strategic Community Planning (SCP) partners should lead local awareness of and responses to such challenges, there are three reasons why they should address climate change. These are:
  - mitigating risk from severe weather events (e.g. flooding from increased rainfall);
  - recognising potential benefits (e.g. reduced energy costs from milder winters);
  - accommodating national climate change policies.
- The Association of British Insurers has estimated that the extreme flooding events of summer 2007 cost £3 billion, with much of the damage caused by inadequate drainage. The costs to communities and organisations of the severe cold weather over Christmas 2009 are still being counted. By taking proper climate change adaptation measures, a community planning partnership can help to avoid the worst impacts and costs of climate change on its communities.

## 2.5 LCLIPs Scotland

- Local Climate Impacts Profiles is a project led by the UK Climate Impacts Partnership (UKCIP). The aim is to establish and prepare for the impacts of climate change and extreme weather events on the delivery of local authority services. The first LCLIP projects began in a number of English local authorities in 2007.
- The Scottish pilot project – LCLIPS phase 2 – ran from June 2009 to March 2010 with Falkirk Council being one of six Scottish local authorities taking part. The project was led in Scotland by the Scottish Climate Change Impacts Partnership (SCCIP), with support from the Scottish Environment Protection Agency, Sustainable Scotland Network and Scotland & Northern Ireland Forum for Environmental Research (SNIFFER) and the Scottish Government.



*“It is no longer possible to prevent the climate change that will take place over the next two to three decades, but it is still possible to protect our societies and economies from its impacts to some extent – for example, by providing better information, improved planning and more climate-resilient crops and infrastructure.*

*Source: Sir Nicolas Stern, Stern Review on the Economics of Climate Change, 2006*

### 3. Aims and Objectives

#### 3.1 Aim

- Provide an overview of the impact of severe weather events on the Falkirk Council area to enable the Council and its partners to assess their vulnerability to climate change and consider options for improving service resilience.

#### 3.2 Objectives:

- **Assess vulnerability / resilience** - examine the impact of severe weather events on Falkirk Council and its partners' assets, infrastructure and service delivery, assessing their vulnerability/ resilience
- **Quantify resources** - gather information on the social, environmental and economic costs involved, the quality of data available and record keeping
- **Recommendations** - identify what measures Falkirk Council and its community planning partners should put in place to increase its adaptive capacity to climate change.
- **Climate change strategy** - raise awareness of members, council officers, community planning partners and local communities of climate change issues, stimulating work on a community-wide climate change strategy.
- **Use findings of LCLIP to move forward** - provide a basis on which the local authority and its community planning partners can prepare for the climate change patterns anticipated by the UK Climate Change Scenarios 2009

*“29% of UK businesses said that they were affected by extreme weather in 2008.”*

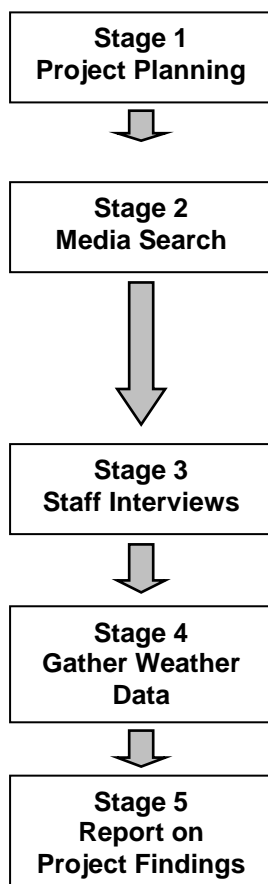
*Source: UK Climate Impact Programme*

## 4. Methodology

- The project focused on the period 1999-2009 and spanned the Falkirk Council area. It focused primarily on Falkirk Council operations but involved close working with SCP partner organisations.

### 4.1 Stages:

Work was carried out in five stages:



**Project Planning:** worked with Scottish Climate Change Impact Programme to establish methodology. Worked with Business Environmental Partnership to set up student placement.

**Media Search:** local newspaper archives from the last 10 years were examined to gather information on severe weather events nationally, which often tied in with severe local events. Newspaper articles provided dates and helped to capture information on the social, economic and environmental impacts of events. A number of these events were later focused on as case studies.

**Service Information:** interviews with staff from relevant council departments and other public service providers were carried out to establish the effects of specific types of weather events on services.

**Weather Data:** meteorological records were checked for correlation with reported weather, helping to identify ‘trigger points’ and key event dates.

**Project Findings:** information was collated into interview summaries, two case studies and a series of recommendations were drawn up based on these findings.

**“80% of businesses affected by a major event, such as a flood or a storm, never re-open or close within 18 months.”**

*Source: UK Climate Impact Programme*

## 5. Conclusions

### STAGE 1 – project planning

- Student placement was useful resource and the placement process was very efficient, however significant work was required to process the initial research work.

### STAGE 2 – media search

- Media search did not reveal unknowns in terms of severe weather events but was useful in giving a direction to the project.
- Events are often sensationalised in the media and reports may not actually reflect the true nature or impact of a weather event.
- Media articles were often rather general in nature drawing on events in other parts of Scotland or repeating previously published reports of old events.
- Reporting of severe weather events seems to be becoming more frequent but this may reflect the increasing profile of climate change issues rather than an increased frequency of events themselves.
- Possible lack of consistency regarding terminology used in media reports – what was meant by “severe”, “extreme” or “significant” weather.
- Falkirk and surrounding towns are covered by weekly local papers. A significant event that occurs shortly after publication may well not be reported as it has been overtaken by later news
- A media search can be a blunt instrument that may not necessarily identify important underlying weather/climate trends. Media reports are often reliant on headline events.

### STAGE 3- service information/ interviews

- Anecdotal comments from long-standing members of staff were important sources of information on the past service impacts of severe weather events. Institutional memory is extremely valuable in this field of study but is at risk from retirement which results in sudden loss of long term information, and from short term recollection because the impact of an event recedes once a more recent one occurs
- Data regarding the wide ranging impacts arising from severe weather events is not collated by Falkirk Council or SCP partners as standard. Some council services and partner organisations would have been able to identify severe weather impacts on their service areas by interrogating their comprehensive data sources if they had been in a position to expend considerable time and effort.

#### STAGE 4 – weather data

- The timescale for the project was adequate. Difficulties can be encountered at the interview stage due to work commitments of service colleagues, holiday commitments during the peak summer holiday period and resource implications in gathering or interrogating data.
- Data readily available on the service and staff costs was limited, possibly due to the project timing and resource implications in disaggregating financial data where costs may either be absorbed within existing budgets or shared across service and partner organisation budgets.
- Weather data collection was hampered by lack of access to Met Office data as this would have incurred a cost which was deemed non negotiable by the Met Office – a common problem to all LCLIPs.

#### STAGE 5 – project findings

- Detailed analysis of Health Board records would be required to identify health issues related to severe weather events or emerging climate trends. However, climate change is now generally acknowledged as a significant emerging threat to public health, and this has implications for the way in which the Council and its partners look at protecting and supporting vulnerable populations.
- The phenomenon of climate change continues to move up the local authority agenda. As it does, councils are becoming increasingly aware of the potential impacts of a changing climate and the need to develop adaptation responses. But, is it a changing climate or changing weather events to which local councils must adapt? Climate scientists define *climate* as 'the average weather in a particular location over a thirty year period'. The *weather* is what it is doing outside your window now.
- While weather data recorded over time can predict changing climate trends, weather events themselves are unpredictable in the long-term.
- The importance and scale of the climate change that we have already experienced, and future climatic changes, mean that all sectors of the Council and its partners need to assess the impact that such changes may have on activities and services, now and in the future, in order to increase the resilience of their estate and service provision.

*“Our actions now and over the coming decades could create risks of major disruption to economic and social activity, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century. And it will be difficult or impossible to reverse these changes.”*

*Source: Sir Nicolas Stern, Stern Review on the Economics of Climate Change, 2006*

## 6. Falkirk’s Future Climate

### 6.1 The Recent Past

- In 2008, the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) published a report on climate change trends that had been measured across Scotland, mainly over the period 1961-2004. Its findings clearly show changes to Scotland’s climate. In summary:

#### Period 1961- 2004

Element	Change
Growing season	Increased across Scotland by 33 days (by 60 days in some areas such as Shetland)
Frost	27% fewer frost days
Snow	32% fewer days when snow falls (50% coverage of ground), 75% fewer snow days in autumn
Rain	Scotland has become 20% wetter across the whole year. Winter has seen the biggest increase East = 36% more in winter North/South/West = 60-70% more in winter

*Based on A Handbook of Climate Change Trends Across Scotland 1961-2004, SNIFFER, 2008.*

### 6.2 Modelling for the Future

- In 2009, the UK Climate Impact Programme published an improved series of climate modeling tools called UKCP09. The UK climate projections (UKCP09) provide information on how the UK’s climate is likely to change in the 21st century, as it responds to rising levels of greenhouse gases in the atmosphere. Products include key findings, pre-prepared maps and graphs as well as science reports covering observed and future projections. The tools are designed to be used by a wide variety of organisations to help them to prepare and adapt to climate change.

### 6.3 Falkirk’s Future Climate

- UKCP09 projections for the Falkirk Council area indicate that like most of Scotland, it will experience warmer and drier summers with increased short bursts of heavy precipitation as well as warmer, wetter winters. In general, there is an increased likelihood of the sporadic, heavy rainfall and resultant flooding that already affects the area.

### 6.4 Adapting to a Changing Climate

- As the following sections of this report demonstrate, long term changes in weather patterns mean that organisations need to change how they operate. Partners may consider how they design and manage their estates, how they may reduce vulnerability of their service delivery and how the social and business communities of the Council area might be better protected through advance planning.
- UKCP09 are keen to work with community planning partners to help them build climate change consideration into their everyday work and future planning. The service is free. For further information, contact: [www.sccip.org.uk](http://www.sccip.org.uk)

***“Developing a well-adapting Scotland is a huge challenge, one that will require the active participation of everyone – individual households, businesses, community groups, the voluntary, public and private sector.”***

*Source: Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change, 2008*

## 7. Project Findings

### 7.1 Overview

- The Falkirk LCLIP media trawl identified 25 apparent severe weather incidents that affected the area but did not reveal anything of which the Council and its partners had not been aware. For the most part, the project found anecdotal rather than data-based evidence of impacts on services. Over the 10-year period, incidents of flooding and high winds were the most regularly reported weather events with their associated impact on infrastructure, property damage and transport movement.
- The Falkirk LCLIP concluded that there are three types of weather events that have consequences for council services:
  - more frequent intense rainfall;
  - high winds;
  - warming trend;

#### Key facts

- Most frequent threat to the area is heavy rain and the services generally cope
- The greatest weather related threat to the area is a storm surge combined with fluvial flooding, with an estimated return period of 1:200 years
- 8533 = number of homes at risk of flooding (3<sup>rd</sup> highest no. in Scotland)
- 13.25 % of homes at risk of flooding (highest in Scotland with Stirling 2<sup>nd</sup> at 8.3% Scottish average = 4.3%)
- Requirement for additional coastal flood protection is highlighted in the National Planning Framework 2.
- Gritting budgets have largely become flooding budgets
- The snow/ice event of Dec 09/Jan 2010 saw a 607% increase in Falkirk Council call centre contacts relating to roads
- NHS Forth Valley - heating in Falkirk Royal Infirmary premises is largely gas. Meter readings show a 36% increase in the amount of gas used over the cold period 21/12/09-10/01/2010) compared with the same time last year. They also had to turn to oil supply for heat when the gas supply was interrupted to cope with peak demand, as NHSFV is on an interruptible gas supply contract (due to its back up oil system).
- Total cost of weather related insurance claims to Falkirk Council Jan 2004-Sept 2009 = £1.183M.
- Weather related claims as a percentage of total insurance claims = 23%

### 7.2 General findings

- **Limited impact in general**

The Falkirk Council area is generally protected from the most severe Scottish weather due to the sheltering effect of surrounding hills and the moderating effect of the North Sea on temperatures.

- **Flooding**

The Falkirk Liaison Action Group feels that the systems that Falkirk Council and its partners have in place, generally deal adequately with the small to medium scale flooding that regularly occurs. The main threat to the Falkirk Council area comes from what used to be classed as a 1 in 200 year storm or tidal surge (although the return period may have been reduced as the expected frequency of severe weather events increases).

- **False alarm resource implications**

Approximately 20% of severe weather warnings turn out to be false alarms. All warnings have to be heeded and can result in significant preparation involving capital and revenue costs. A severe weather false alarm can use the same resources as an actual flood event.

- **Contingency planning**

Falkirk Council and its SCP partners have contingency plans in place to deal with weather-related incidents which are tested regularly and have generally been found to cope well with the challenge. *See case study B relating to snow and ice event December 2009/Jan 2010.*

- **Community & voluntary role**

The severe snow and ice of Dec 2009/ Jan 2010 highlighted the important role that communities and the voluntary sector can play during severe weather events. Falkirk Council's emergency planning team is working with the groups through SCVO to develop their role.

- **No routine recording of the impacts of the weather on service delivery –**

Although most services were clear that there are impacts, Services do not routinely record or report on the impact of weather events. The costs of such events are typically absorbed by general budgets and are not coded or identified separately. Knock on effects like delays for work programmes or patient treatments are generally not captured as impacts but may be significant.

- **Emergency services**

Emergency services generally do not record weather associated with call outs and in the case of the police, reports must be sensitive about speculating about the contribution of weather to incidents. Emergency service vehicles often have to operate in adverse weather conditions although most are not specially designed for this.

- **True costs and impacts of weather events are grossly underestimated –**

Only very limited financial figures relating to weather events were found to be available. Typically, services suggest that these figures represent only a fraction of the true cost of how the weather impacts on service delivery work and that the use of storm damage budgets is limited. Increased man hours/overtime payments arising from increased workload from weather events and loss of income through damaged properties would also be excluded from any figures.

- **Staff resource**

A great deal of time is spent reacting to the impacts of weather events - services report that responding to problems caused by severe weather events and jobs arising from them often leads to delays in planned work. In some cases temporary repairs may be required which cost money and delay other planned activities.

- **Localised events**

Localised impacts can be very severe for the service and public - there are incidents of very localised severe weather events, typically flooding, that can have a large impact on service staff although they do not get widely reported.

- **Collation of data**



Data on resources used to deal with severe weather events is often lost – departments do not quantify it, save the information or send it to a centralised unit where the overall impact on the council or SCP can be assessed. Services and organisations focus their efforts on dealing with the event in hand and if they do produce any reports, these can take a long time to emerge due to delays in data filtering through, back log of work load on officers, sensitivity of findings etc.

- **Implementation of previous lessons learnt**

Case study work showed that in a number of instances, Falkirk Council services such as housing and utilities management took lessons learnt from previous severe weather events and translated this into infrastructure and management improvements. This work has paid off, most markedly during recent prolonged cold weather events where damage to Council housing and buildings was significantly reduced due to preventative measures and contingency planning.

- **Impact of changing building design**

Sustainable design and changing building regulations are resulting in a change to how buildings are designed. This means higher levels of insulation, improved air tightness and greater use of natural light. Unfortunately, these same measures can result in temperature increases as building management systems are not always managed to best utilise these innovations - see case study on Graeme High School).

- **Call centre data**

This is one of the very few sources of data which can serve as an indicator of requirement for action by Falkirk Council as a result of a severe weather event. It is basic but is consistently recorded, is available and can be released quickly. It will not capture all calls as some will go directly to departments and officers. It also captures the numbers of hang ups which might be a useful indicator of how the call centre copes with levels of calls.

- **Housing stock**

As the sixth largest housing stock owner in Scotland, Falkirk Council has responsibility for approximately 16,155 homes. This has implications for direct responsibility for repairs and re-housing in the event of severe weather events, with the associated risk implications. Weather events do not have to be extensive or severe in order to have a significant impact on communities or Housing Services.

- **Institutional memory**

In light of the limited data capture regarding weather events, anecdotal evidence has played a key role in this study and will do so in risk management. Institutional memory is extremely valuable in this field of study but is at risk from:

Retirement – sudden loss of long term information

Short term recollection – the impact of an event recedes once a more recent one occurs

Personal interpretation – also accuracy and nostalgia

- **Staff access to work**

An issue reported as common to many SCP partners and council services was staff access to work during severe weather events. Weather events themselves are compounded by the relatively high percentage of staff that commute to the Falkirk area from across the Central Belt.

- **Weather related school closures**

These appear to be very rare compared with other local authority areas - in the period January 2006 to February 2010, a total of 28 occasions were reported where schools closed for a day.

***“Tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries.”***

*Source: Sir Nicolas Stern, Stern Review on the Economics of Climate Change, 2006*

## 8. Case Studies

- Interviews with officers revealed that little data or records exist that formally or accurately capture the impacts of severe weather events on Falkirk Council or partner organisations' operations. As a result, this LCLIP depends heavily on the recollections of individuals and it was found that the most detailed accounts tended to be of incidents that occurred within the last few years. Interviews also revealed how particular events could involve more than one council department or community planning partner.
- Two severe weather events were chosen as case studies to demonstrate their impacts on partners' activities. The following two case studies were chosen as they reflect UKCP09 projections which suggest that in future, Falkirk Council might expect to see warmer, drier summers and increased precipitation which is likely to fall in more concentrated bursts, both as rain and snow:

**Study 1:** Warm weather impacts on Graeme High School, June 2006

**Study 2:** Impact of prolonged cold weather on Falkirk Council & partners –Dec 09/Jan 10

### 8.1 Case Study 1: Overheating at Graeme High School

- 8.1.1 **Background:** in 2000, Falkirk Council was the first local authority in Scotland to open a series of new PFI type secondary schools. In line with energy efficiency principles, the school was designed with large windows to optimise use of natural light and heat, with employment of natural (non electric) ventilation systems where possible.
- 8.1.2 **Event:** June 2006 was an exceptionally warm and sunny month with some areas such as Aberdeen experiencing their highest monthly temperatures since records began in 1914. Falkirk Council Environmental Health data units recorded temperatures of up to 30 degrees. Graeme High School was one of three new secondary schools to struggle with the heat as some class room temperatures reached further up into the 30s.
- 8.1.3 **Problem:** approximately 20 class rooms on the south facing side of the high school were found by staff and pupils to be uncomfortable to work in. This was due to a combination of high external temperatures, long hours of sun, south facing aspect, large areas of window, inefficient natural ventilation system and limited extension scope for windows. The problem persisted for a number of days and the result was disruption to teaching whilst classes had to be rescheduled and moved to cooler rooms. The cost was loss of teaching time whilst solutions were sought, with the potential risk of heat stroke/related illness.
- 8.1.4 **Short term action taken:** pedestal fans bought by the school in previous years were employed but were found to be ineffective in the circumstances. As a precaution against adverse effects of the heat, the school purchased bulk orders of bottled water for staff and pupils and distributed them.
- 8.1.5 **Longer term action:** the building management company found that the natural ventilation system had not been working properly and repaired it. Three trials have since been carried out to reduce the effect of solar gain: installation of blinds and two types of tinted

films. The school retains a supply of bottled water which is available to staff and pupils on request.

## 8.2 CASE STUDY 2 - Heavy & Prolonged Snow & Ice 20/12/2009 – 10/01/2010

8.2.1 **Background:** A period of cold weather hit Scotland, lasting from December 20th 2009 until January 10th 2010 – the coldest December and January for 30 years. Considerable amounts of snow fell across the Falkirk Council area and continuous low temperatures and frost meant that it consolidated into ice in many areas.

### Impacts on the area:

8.2.2 **Customer First Call Centre** - this is one of the few sources of data available, although links with severe weather events are indirect. It can also be issued quickly. Records over the period 21<sup>st</sup> Dec 09 – 10<sup>th</sup> Jan 2010 show that almost 11,000 additional calls were received compared to the same period 12 months earlier. This amounted to around an 80% increase. The greatest relative change related to roads related calls, where 6 times as many calls were received, which translates to over 1,800 additional calls.

8.2.3 **Roads Maintenance** - the unit had to deal with an unusually testing combination of factors that presented a challenge over a prolonged period. Factors included malfunction of salt level monitoring equipment, rail line seasonal closure which coincided with the severe weather period, the weather kicked in at the most difficult time of the day, week and year in terms of getting contractors. Staff demands were considerable while numbers were limited over the holiday period; however the unit was able to tap into additional staff resources from other services. Budget implications will arise from the considerable amount of staff overtime involved and supply of additional grit . These will be met in part through an emergency budget. The volume of enquiries from the public was overwhelming at times and meant that staff were having to deal with these, rather than with work on the ground. The unit reported regularly to Development Services, issued communications to the public and dealt with enquiries from councillors. There was a significant amount of damage to roads, particularly in terms of potholes. Full costs are not apparent yet but it is expected that the £1.3 million roads maintenance budget will not be enough.

8.2.4 **Community groups** - the role of community volunteers in contingency planning became apparent as the Red Cross co-ordinated local community groups and volunteers. The Council's Emergency Planning Unit worked with the Red Cross, utilising their volunteer network which played a key role in transporting people to hospital, helping with essential health and care services.

8.2.5 **Housing Services** – they received over 4,000 calls, most of which were made safe or completed at the time with any outstanding work prioritised. The section reported that the severe weather event's impact had not been remarkable in terms of damage to housing stock or impact on staff resources. This is largely due to an extensive investment programme that took place as a result of a heavy snow event in 1999. In response to the 2009/10 incident, an emergency response team was established to co-ordinate efforts. Their role was to deal with tenants, capture information about damage, prioritise repairs, commission repairs and instigate tenant support where necessary. Repairs were carried out by the Council's direct labour organisation which meant that it did not have to compete with the general public for emergency repair trades people.

8.2.6 **Utilities** - prolonged snow and ice did result in much higher numbers of burst pipes etc. than usual, however, the unit frequently tests and uses contingency plans which meant that the situation was manageable. Many of the managers and senior staff have worked in

this section for years and many have had direct experience of another severe snow/ice event in 1999. A series of system improvements and procedures was implemented following that event which resulted in a significant reduction in damage this time. A noticeable improvement compared with 1999 is much greater communication between staff on the ground and in the control room, thanks largely to mobile phones. This technology aided co-ordination and helped with staff morale.

- 8.2.7 **Refuse collection** - prolonged snow and ice had a significant impact on the delivery of waste management services over the Christmas/New Year period. The main problem was access to properties to collect waste due to icy road surfaces. Waste management is a high profile Council service and can generate a high level of press coverage and reputational damage for the Council. Full staff attendance helped.
- 8.2.8 **Social Work** - contingency planning kicked in and worked as practiced and planned, with staff under pressure; however the unit is satisfied with its performance. Improved communication with hospitals ensured full awareness of discharged patients in need of seasonal support. Snow/ice makes it difficult for carers to reach clients or to leave their own homes. Services were prioritised, with calls to Mobile Emergency Care teams fielded by Customer First. Clients had previously said that they could cope with change if advised in advance. Clients were phoned where possible to advise of delays, Central FM was used to deliver public messages and information was put onto the Falkirk Council website. A new strategy was successfully trialed to ensure that senior home help staff were based in the office to provide support and deal with allocating resources. Meals on Wheels and shopping deliveries rely heavily on the road network. School canteens managed to open and supply food. Some staff resorted to more travel on foot e.g. food and shopping deliveries.
- 8.2.9 **Schools** - brought in additional staff from other services, ensuring that the majority of schools were open during the bad weather. Out of the council's 71 schools and nurseries, only 3 closed for 1 day each. Access for staff and pupils was the main issue rather than problems with heating and water
- 8.2.10 **Scottish Ambulance Service** - between the 28th of December 2009 and 3rd of January 2010, ambulances responded to 1,037 cases of falls related to weather – an increase of 38% on the same period last year. The extraordinary conditions had an adverse effect on response times. By the 6th of January, ambulances responded to 65.3% of life threatening calls within 8 minutes.
- 8.2.11 **NHSFV** - heating in Falkirk Royal Infirmary premises is largely gas. Meter readings show a 36% increase in the amount of gas used over the cold period compared with the same time last year. In addition to this, they had to turn to oil supply for heat when the gas supply was interrupted to cope with peak demand, as NHSFV is on an interruptible gas supply contract (due to its back up oil system).

*Full details of interviews and those interviewed can be found in the appendices*

***“UK summer floods 2007***

*Average cost for a flooded household was £23K - ££30K, with a quarter of affected households affected not fully covered by insurance.*

*The average cost per flooded business was £75K- £112K with 5% of affected firms not adequately covered by insurance.*

*Source: Environment Agency*

## **9. General Service Interviews**

- Staff in a selection of Falkirk Council and SCP partner departments were interviewed about the impact of severe weather events on their areas of work. A copy of the questionnaire is included in the appendices.

### **Falkirk Council**

1. Housing & Fuel Poverty
2. Emergency Planning
3. Insurance
4. Education Services
5. Flooding
6. Roads
7. Social Work
8. Planning Policy & Flooding Liaison

### **Community Planning Partners**

9. Scottish Ambulance Service
10. Central Scotland Fire Service
11. Central Scotland Police Service
12. Forth Ports

*Full details in Appendices*

### **9.1 Housing & Fuel Poverty-**

#### **Background issues**

- Falkirk Council has the sixth largest public housing stock in Scotland, and its Housing section has responsibility for approximately 16,155 homes. Weather events do not have to be severe or extensive in order to have a large impact on communities or the operations of Housing Services. Minor damage to a large number of properties impacts on resources such as housing officers, assessors, contractors, insurance claims, vehicles and budget. Major events such as the recent snow and ice mean increased demand on the Council's capital budget.

**Table no. 1**

<b>Aspects of Operations</b>	<b>Detail</b>
<b>Forecasts</b>	Met Office severe weather warnings

<b>Resources</b>	Staff, vehicles, contracts, budget
<b>Records</b>	Information on the resource and community implications of severe weather events currently depend on officer recollection therefore information is limited.
<b>Specific Events</b>	Snow 1999 Floods in November 2009 Ice and snow December 2009/January 2010

<b>Weather Event</b>	<b>Severity</b>	<b>Responsibilities</b>	<b>Issues</b>	<b>Continuity</b>
<b>Rain and Flooding</b>		Assessing damage Damage limitation Commissioning repairs Submitting insurance claims Liaison with Social Work	<ul style="list-style-type: none"> <li>• Access for tenants, housing officers, contractors.</li> <li>• Damage to foundations</li> <li>• Dampness, includes impacts on health – dehumidifiers required.</li> <li>• May have to decant tenants to alternative accommodation.</li> <li>• Some vulnerable groups may be reluctant to relocate e.g. elderly or disabled.</li> <li>• Redecoration may be needed after repairs</li> </ul>	
<b>Snow, Cold and Ice</b>			<ul style="list-style-type: none"> <li>• Weight of snow brings down gutters and minor damage to roofs</li> <li>• Frozen pipes followed by bursts and flooding during the thaw.</li> <li>• Tenants become more aware of need for insulation, leads to increased requests</li> <li>• Increase in fuel poverty especially in light of increasing fuel prices</li> <li>• Recent continued low temperatures led to failure of many condensing gas boilers due to build up of ice in air vents.</li> </ul>	
<b>Heat and Drought</b>			<ul style="list-style-type: none"> <li>• Few reported impacts. Extended growing season could lead to untidy gardens</li> </ul>	
<b>Wind</b>			<ul style="list-style-type: none"> <li>• Flats can lose roofs which can be compounded by rain damage.</li> <li>• Chimney damage &amp; falling masonry</li> <li>• Area wide impact leads to problems in getting contractors out to repair</li> <li>• High winds delay repair time due to safety concerns over roof work.</li> </ul>	
<b>Fog, Mist and Low Visibility</b>			<ul style="list-style-type: none"> <li>• No impact reported</li> </ul>	

### **Adaptation Responses**

- Building regulations are changing to take into consideration changing temperatures so new builds will always be built to this standard as a minimum.
- Schools and other premises would be encouraged to install energy efficient boilers etc but often costs are prohibitive.

## **9.2 Emergency Planning**

### **Background issues:**

- Contingency and emergency planning are the responsibility of the Central Scotland Strategic Co-ordination Group. A series of contingency plans is in place and the Emergency Planning Unit will be contacted if critical thresholds or warning triggers are met for particular incidents and they, in turn, will inform relevant Council services and co-ordinate responses. The group comprises Falkirk, Clackmannanshire and Stirling Councils, SEPA, police, fire and ambulance services (cat 1 members) Other members include utility companies: gas, electricity, Scottish Water, transport infrastructure and providers.
- Each co-ordination group takes a risk assessment based approach and produces risk assessments relevant to their area. Contingency plans recognise the potential contribution that severe weather event features might have. Potential impacts include:
  - Estuarine flooding/tidal surge
  - Rainfall induced flooding
  - High winds
  - Drought
  - Overheating of buildings
  - Impact of heat wave on vulnerable groups
  - Snow/ice – impacts on higher level communities such as Slamannan
  - Fog/mist /poor visibility

Aspects of Operations	Detail
<b>Forecasts</b>	Met Office weather warnings are the main source. SEPA and Scottish water may highlight potential threats.
<b>Resources</b>	The Falkirk Council team comprises a Civil Contingencies Officer and two assistants.
<b>Records</b>	Centralised records of severe weather events are not held by the group. Events and responses to larger events are reviewed for continuous improvement.
<b>Specific Events</b>	Severe weather events have not led to any major civil contingency issues in recent years.

- Whilst Falkirk Council and most major community planning partners have access to 4 wheel drive vehicles, many find that staff can be significantly delayed or be unable to reach their place of work due to blocked roads or public transport disruption. In Falkirk Council's case, this is compounded by the relatively high proportion of staff that live outwith the area and are able to regularly commute thanks to otherwise strong transportation links with the rest of central Scotland. Housing Services encourage staff to work from other Falkirk Council housing offices whilst an increasing number of staff across the council have the facility to work from home (433 have ITC set up & unknown number work from home on an ad hoc basis).

**Adaptation responses:**

- In light of lessons learnt during the cold weather event of Dec 2009/Jan 2010, the Emergency Planning Team is working more closely with the local Red Cross branch which played a vital role in co-ordinating community and volunteer support for vulnerable groups.

### 9.3 Insurance

#### Background issues:

- The Insurance Unit is housed within Finance Services works across all services. The work is retrospective in nature and largely reactive although it may have a role in future risk management work in anticipating solutions to recurring or potentially avoidable problems. Due to the nature of the work, details of all claims are stored in spreadsheets and are categorised. Although some of these categories suggest a direct link with severe weather events, such as 'flash flooding' and 'storm damage', others suggest a possible indirect link e.g. 'burst pipes' and 'pot holes'. There is currently no system for tagging weather related claims so it is extremely difficult to quantify the financial cost to the council.
- On damage cases, Falkirk Council self insures up to £100,000 and has an insurance policy thereafter. Claims relating to footways and potholes can account for around 28% of total 3rd party non-roads claims. Anecdotal evidence from other local authority insurance staff and claims handlers suggests that decreases in the amounts spent on footpath works and gritting can be counterbalanced by increased claims for slips, trips and falls.
- The Association of British Insurers has previously been party to an agreement with the UK Government to offer insurance cover to those homes in flood-prone areas as long as the government invests in bolstering and maintaining flood defences. However, as this is unlikely to ever be agreed, insurers are now indicating that they may remove flood cover from the schedule of most household and commercial insurances which could have a significant impact on Falkirk Council communities as over 8,500 properties are considered to be at risk of flooding by SEPA (see appendix). Nationally, higher premiums will be inevitable, with many households foregoing flood cover altogether unless they use specialist insurers who take account of a householder's defences and claims track record. Even then, premiums could be significantly more expensive than they are in today's markets.
- From the records and categories that do exist, the following data can be extrapolated for the period January 2004 to September 2009:
  - Total cost of insurance claims to Falkirk Council = £5,109,601
  - Total cost of weather related claims = £1,183,305
  - Weather related claims as % of total = 23%

**Table no. 2**

Aspects of Operations	Detail
Forecasts	Largely irrelevant - insurance work is reactive by nature.
Resources	
Records	All claims details are held in a data base.
Specific Events	Severe events remembered – snow event in 1999

Weather Event	Severity	Responsibilities	Issues	Continuity
Rain and Flooding			• None	



<b>Snow, Cold and Ice</b>			<ul style="list-style-type: none"> <li>Burst pipes have a wide ranging impact, with business continuity affected for Falkirk Council. Damage to council housing and leased properties can further lead to loss of income and the cost of temporary re-homing. Pipe damage can account for up to 10% of all claims value for damage to council buildings in an average year. Contractors can be difficult to come by during peak events due to general high demand.</li> </ul>	
<b>Heat and Drought</b>			<ul style="list-style-type: none"> <li>Little/no experience to date</li> </ul>	
<b>Wind</b>			<ul style="list-style-type: none"> <li>None</li> </ul>	
<b>Fog, Mist and Low Visibility</b>			<ul style="list-style-type: none"> <li>None</li> </ul>	

**Adaptation responses:** potential for development in conjunction with Insurance Unit

## 9.4 Education Services

### Background issues:

- Falkirk Council is responsible for about 70 school and nurseries, 11,000 pupils and 3,000 school staff. Roughly 27% or 18,610 of households in the Falkirk Council area have children of school age (under 16). Education Service properties vary greatly in terms of age and condition, ranging from early 20th century stone buildings, through 1960s concrete structures to 9 high schools which are all 10 years old or less.
- School closures due to severe weather events are relatively rare, with only 28 notifications received from individual schools from January 2006 to late January 2010. In the event that a head teacher judges conditions to be unsuitable for a school to operate, they submit an Emergency School Closure form to Education Services headquarters as quickly as possible. Detailed procedures are in place containing information on triggers for school closures and other actions.

**Table no.3**

<b>Aspects of Operations</b>	<b>Detail</b>
<b>Forecasts</b>	Severe weather warnings issued by Education Services HQ using Met Office alerts
<b>Resources</b>	Mobile heating units available if required. Education Services HQ involved in key decision making.
<b>Records</b>	Education Services HQ retain copies of emergency school closure notification forms that are submitted by head teachers. One of the sections receives information about damage to schools which is then passed onto the Falkirk Council insurance claims section.
<b>Specific Events</b>	Flooding event at Dunipace from the Carron around 2008 St Francis' Primary 3-4 years ago, part of the roof blown off. 18th January 2007 – 25 schools closed due to snow Dec 09/ Jan 10 – 3 schools closed for 1 day each due to prolonged period of snow & ice

<b>Weather Event</b>	<b>Severity</b>	<b>Responsibilities</b>	<b>Issues</b>	<b>Continuity</b>
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Rain and Flooding			<ul style="list-style-type: none"> <li>• Quite localised, not a major problem.</li> <li>• Schools opening late due to teachers being delayed by blocked roads - increasingly teachers live outside catchments and transportation problems can lead to late starts for schools. This can be caused by flooding. Skinflats, Airth and Denny are all vulnerable to some flooding.</li> </ul>	
Snow, Cold and Ice			<ul style="list-style-type: none"> <li>• Snow days are fairly rare. 25 schools did have to close due to an unexpected heavy fall of snow in January 2007 which prevented access, however, only 3 closures were announced over Dec 09/Jan10. Access- areas around schools are gritted as a priority to address the main problem of access to the building.</li> <li>• Most schools have frost settings to prevent pipes freezing. Heating systems are controlled remotely which allows remote and widespread action to address temperature drops e.g. over Christmas 2008 heating hours were increased to deal with a particularly cold few days.</li> </ul>	
Heat and Drought			<ul style="list-style-type: none"> <li>• Limited impact. This may change as building design evolves- many of the newer schools have greater areas of glass to optimise natural daylight. In some warm weather conditions this can lead to over heating e.g. experience of Graeme High School in July 2006.</li> </ul>	
Wind			<ul style="list-style-type: none"> <li>• St Francis' Primary school was badly affected by wind damage in an event 3-4 years ago, with part of the roof blown off.</li> </ul>	
Fog, Mist and Low Visibility			<ul style="list-style-type: none"> <li>• Limited impact</li> </ul>	

#### Adaptation responses:

- Warm weather – improved ventilation systems/ understanding of. Some of newer high schools have applied solar film to reduce excess solar heat gain. Post occupancy evaluations of new buildings could pick up on climate & weather related issues.

## 9.5 Flooding

### Background issues:

- Whilst individual home owners and businesses are responsible for their properties in terms of flooding, Falkirk Council works closely with other public bodies to provide assistance, should flooding occur. The principal partners are the Fire Service but others who may be involved are the members of the Central Scotland Strategic Co-ordination Group. Risk assessments for both flooding and severe weather events have been carried out and are included in the Central Scotland Community Risk Register. Certain parts of the Falkirk Council area are included in these and work is currently being progressed in a review of emergency planning arrangements.

- Falkirk Council works in close partnership with a large number of other parties to do this with the formal mechanism being the Flooding Liaison Action Group. This includes police, fire service, SEPA, Scottish Water, Stirling Council, various Falkirk Council departments, the Association of British Insurers, British Waterways and Network Rail. Communicating with groups like this can be complex, with many changing staff and lengthy processes for approving work.

**Table no. 4**

<b>Aspects of Operations</b>	<b>Detail</b>
<b>Forecasts</b>	Met Office
<b>Resources</b>	Falkirk Council works with police and fire services to deal with flooding events. It would co-ordinate reception centres for people who need to be evacuated, would deal with road closures except for trunk roads and has a role for co-ordinating action in the aftermath of a flood.
<b>Records</b>	Detailed records held. Public reporting leaflet produced on biannual basis.
<b>Specific Events</b>	Bothkennar Road, Banknock, water on carriage way (50m), Jan 2008 Shore Inn, Carronshore, extensive flooding of commercial property, Jan 2008 Checkbar junction, road closure, various Burnbank Road, Falkirk, 4 industrial units flooded, Dec 2008

<b>Weather Event</b>	<b>Severity</b>	<b>Responsibilities</b>	<b>Issues</b>	<b>Continuity</b>
<b>Rain and Flooding</b>	High		<ul style="list-style-type: none"> <li>• The River Carron has a notably large catchment area and so is prone to flooding.</li> <li>• Flooding tends to recur, so hotspots are known to flood teams who can anticipate the problem and response. Mitigation works target problems areas to reduce flooding occurrences.</li> <li>• Pressure to implement sustainable technologies such as attenuation ponds, however, these require continual maintenance.</li> <li>• The new flooding act has strong emphasis on natural flood management.</li> <li>• Scottish Water will not adopt structures with flood resilience that is greater than 1 in 30 years.</li> <li>• It is not uncommon for heavy local rainfall to result in localised and/or temporary flooding which may cause problems at service level and for communities but may not be recorded or receive a response.</li> </ul>	
<b>Snow, Cold and Ice</b>	Med		<ul style="list-style-type: none"> <li>• Difficult to measure snow fall – need update</li> </ul>	
<b>Heat and Drought</b>	Low		<ul style="list-style-type: none"> <li>• Lack of water is not handled by flooding unit.</li> <li>• Can it have any impact on the infrastructure?</li> </ul>	
<b>Wind</b>	Low		<ul style="list-style-type: none"> <li>•</li> </ul>	
<b>Fog, Mist and Low Visibility</b>	Low		<ul style="list-style-type: none"> <li>•</li> </ul>	

- The response from the flooding team is that the systems which Falkirk Council and its partners have in place generally deal adequately with the small to medium scale flooding that occurs. The main threat to the Falkirk Council area comes from what used to be classed as a 1 in 200 year storm or tidal surge, although the return period for this may have reduced.

## 9.6 Roads

### Background issues

- The unit concentrates on roads but does get involved in land flooding where that impacts on roads. Although designated as being responsible for roads, Falkirk Council cannot prevent people from accessing flooded roads without specific orders. In practice though, they frequently close roads, using experience and judgement rather than triggers. Complaints about roads come through the 'Clarence' system and are handled and logged through Falkirk Council's Customer First system. Severe weather events will result in post event assessment and expenditure which will probably impact on the maintenance budget. Falkirk Council recognises the reputational risk that is associated with any weather related disruption to road travel.

**Table no. 5**

Aspects of Operations	Detail
Forecasts	A Birmingham company provides their severe weather warning data. Around 20% of severe weather warnings are false alarms. Additionally, as there has to be significant preparation for flood events e.g. moving materials, a severe weather warning false alarm can be almost as resource intensive as an actual flood event, in terms of staff hours, disruption to services, cost etc.
Resources	<p>There are 30 staff available to deal with regular maintenance, with another 40 available to call upon in the event of severe emergencies. In land or housing emergencies these staff can also be called upon to help. This, along with other interruptions to service, can be expensive as some road building materials have a limited life, e.g. materials which set over time, and can lead to wasted resources. This cost is not monitored. In emergencies, the Roads Dept can supply pumps.</p> <p>Officers reported that "the gritting budget is becoming a flooding budget", although there is no exclusive gritting budget. Instead, roads staff allocate resources as required to various projects and, where spending on floods and gritting costs is unusually high, other maintenance work may suffer indirectly.</p> <p>1,000 sandbags are kept filled in stock. 3,000 empty bags were bought two years ago and these have just been used up, so it is assumed that 1,500 are used per year. Some of the stock is used and not returned and some is returned for re-use. No numbers available for this.</p>
Records	<p>Events are categorised with codes depending on the type of job. One of these is flooding although this work may be mistakenly put under another category. As the records are on paper they are cumbersome to research and were only available from 2005.</p> <p>When a weather event's intensity and duration are considered "beyond the norm" it is declared a weather emergency and costed separately. These costs were available from 2006 onwards.</p> <p>Although the requirement for gritting has decreased in recent years, the service still requires staff to be on standby for short notice action.</p>
Specific Events	The worst event noted was flooding in the week of 10th December 2006, which cost £36,000, with additional funding from elsewhere. There was a flood at Camislow in 2008, and there are frequent floods near Checkbar in Denny.

Weather Event	Severity	Responsibilities	Issues	Continuity
Rain and Flooding	High	<ul style="list-style-type: none"> <li>• Clearing Flooding</li> <li>• Closing roads</li> <li>• Mostly Road Flooding/ some land flooding (not responsible for trunk roads)</li> </ul>	<ul style="list-style-type: none"> <li>• Many floods are caused by faulty drainage and cannot be cleared until the water has dispersed. In many cases time is spent on notifying the public on what is happening.</li> <li>• Coastal surges from the Forth – in the case of inundation at the height of tide, water may be retained in areas after the tide recedes. There may be a considerable period of time before this can be carried away through the drainage network.</li> <li>• Two or three days of work can be required post-flood to clear a blocked drain.</li> <li>• Traffic management may need to be undertaken where persistent flooding continues and affects traffic management.</li> <li>• Wet conditions contribute to the deterioration of road and pavement surfaces. Potholing more often caused by rain than ice.</li> <li>• Perception of the public to how Falkirk Council deals with the event.</li> <li>• Impact of increased calls to call centre possibly at expense of other types of enquiry.</li> <li>• Any increase in the occurrence of flash flooding does and will impact on the safety of road users.</li> </ul>	Rain costs around ten lost working days per year
Snow, Cold and Ice	Med.	<ul style="list-style-type: none"> <li>• Gritting</li> <li>• Clearing Roads</li> <li>• Closing Roads</li> </ul>	<ul style="list-style-type: none"> <li>• Requests for increased gritting of roads and footpaths</li> <li>• Public perception of Falkirk Council response &amp; requests for information regarding gritting policy</li> </ul>	Snow has a similar impact to rain
Heat and Drought	Med.	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• In high temperatures, road surfaces may deteriorate – melting tarmac, surface rutting, road surfaces cracking &amp; pavements buckling.</li> <li>• Some drains rely on sufficient water to block smells – drought leads to odour complaints</li> <li>• Future flooding can be caused by drought - sediment settles in drains, plants grow and blocks them.</li> </ul>	Surfaces take longer to set - longer road closures.
Wind	Low	<ul style="list-style-type: none"> <li>• Fallen trees on roads</li> <li>• Fallen road signs</li> </ul>	<ul style="list-style-type: none"> <li>• Clearance of debris from roads</li> <li>• Increased calls form public reporting damage</li> </ul>	-
Fog, Mist and Low Visibility	None	<ul style="list-style-type: none"> <li>• No noted effects of low visibility</li> </ul>	-	-

## 9.7 Social Work Services

### Background issues:

- Social Work Services provides care services for vulnerable people throughout the Falkirk Council area. Their work focuses mainly on older people but also includes disabled

people and other vulnerable groups. The majority of work is through 9-5 care which is delivered through carers, home helps and Meals on Wheels. The nature of the work requires extensive travel by Social Work Services staff (46% of total staff travel or approx 1,410,000 miles p.a.), which leaves the service vulnerable to weather related road problems. In the case of an emergency, Social Work's function could extend to include people left vulnerable as a result of the severe weather event.

**Table no.6**

Aspects of Operations	Detail
Forecasts	Some notice of extreme weather through council weather warnings – source Met Office
Resources	There are two Freelander 4x4s owned by social services which can be used for emergency access however these may be downgraded due to cost. There is a clothing budget which is used to buy anoraks and uniforms for employees  Local school kitchens are normally used to provide “meals on wheels”, however in emergencies hotels or fish and chip shops can be used. The target is for at least one hot meal a day for clients/patients.
Records	Some records of calls may be available in the future
Specific Events	There have been floods at Dunmore and Denny, both reducing access to clients/patients

Weather Event	Severity	Responsibilities	Issues	Continuity
All weathers	Various	<ul style="list-style-type: none"> <li>• Care services for vulnerable people within Falkirk.</li> <li>• Largely for older people but includes disabled people and others.</li> <li>• Regular 9-5 care includes carers, home carers and meals on wheels and shoppers.</li> <li>• 24hr Mobile Emergency Care System (MECS) provides out-of-hours care</li> <li>• Care for people made vulnerable by severe weather events e.g. can't get access to homes due to building damage.</li> <li>• Find alternative accommodation/ open up rest centres.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant level of care relies on vehicles so adverse weather can impact on delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• General service contingency plans in place</li> </ul>

<b>Rain and Flooding</b>	Med.	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Flooding can reduce staff access to work.</li> <li>• Issues with social services denied access to sites in flooding situations</li> <li>• In wet weather employees can get through 2-3 sets of dry clothes</li> </ul>	<ul style="list-style-type: none"> <li>• General service contingency plans in place</li> </ul>
<b>Snow, Cold and Ice</b>	High	<ul style="list-style-type: none"> <li>• Winter warmth information campaign.</li> </ul>	<ul style="list-style-type: none"> <li>• In general more clients/patients die in winter, which can lead to an impact on council services.</li> <li>• Ice leads to more slips for clients/patients which increases work for MECS.</li> </ul>	<ul style="list-style-type: none"> <li>• Snow blocks many roads, especially around Slamannan, Whitecross and Bonnybridge</li> <li>• Main roads are generally quickly cleared; less frequently used roads can be blocked for longer</li> <li>• Ice leads to car accidents which reduce services as employees rely on their own transport</li> <li>• Carers are often emotionally close to clients/patients; may require absence if a client/patient dies.</li> </ul>
<b>Heat and Drought</b>	None	<ul style="list-style-type: none"> <li>• No noted effects of heat</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>
<b>Wind</b>	Low	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• High winds occasionally blow down trees and block roads, limiting access</li> </ul>
<b>Fog, Mist and Low Visibility</b>	None	<ul style="list-style-type: none"> <li>• No noted effects of low visibility</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>

## 9.8 Scottish Ambulance Service

### Background issues:

- The Scottish Ambulance Service's role as a road based emergency service means that severe weather events can become peak call out times whilst their staff have to deal with worsened road conditions.

**Table no.7**

Aspects of Operations	Detail
Forecasts	Notices come from the Met Office. Road blockages are reported to the service through Local Authority and Police, and occasionally are discovered by ambulances which then report them to the police.

Resources	<p>In conditions where an air ambulance cannot be used, the RAF may be able to assist. The police co-ordinate press releases and messages regarding advice to the public, to ensure a consistent message.</p> <p>There are around 1400 SAS vehicles, 200 of which are non-standard and designed for specific situations such as off-road emergencies. These are spread strategically across the rural areas of Scotland. Special Operations Response Team vehicles are predominantly held in the central belt and can be in Falkirk in under an hour. This includes 4x4s such as Honda CR-Vs, Landrovers and the 6wd Polaris. Many of these are new and are part of a move towards increased access by the ambulance service in response to the Pitt review and current thinking. This includes extensive emergency practice.</p>
Records	Electronic records exist, and these record incident type. There may be some restrictions on their use.
Specific Events	No recorded specific events

Weather Event	Severity	Responsibilities	Issues	Continuity
All weathers		<ul style="list-style-type: none"> <li>Emergency responses within 8 minutes 75% of the time, flexible in remote locations.</li> <li>1.6m patient transports every year, 600,000 emergency calls.</li> </ul>	<ul style="list-style-type: none"> <li>When non-urgent cases turned away this impacts on wider health system, treatments postponed up to six months, impact on social services</li> </ul>	<ul style="list-style-type: none"> <li>Overworked hospitals have longer ambulance turnaround</li> <li>Less slack in rural areas</li> </ul>
Rain and Flooding	High	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Rain causes more accidents</li> </ul>	<ul style="list-style-type: none"> <li>Busy roads delay ambulances</li> </ul>
Snow, Cold and Ice	High	<ul style="list-style-type: none"> <li>In many cases someone discovering a person who has died will call an ambulance – this is more common in cold weather.</li> </ul>	<ul style="list-style-type: none"> <li>More calls due to slips and falls</li> <li>Hypothermia</li> <li>More road accidents</li> </ul>	<ul style="list-style-type: none"> <li>Busy roads delay ambulances</li> <li>More staff illness in cold weather</li> <li>Minor roads/estates can be blocked</li> </ul>
Heat and Drought	Med	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>People come together in large groups which can lead to</li> <li>Drinking</li> <li>Fights</li> <li>Accidents</li> <li>Heatstroke</li> </ul>	<ul style="list-style-type: none"> <li>There may be more cars on the road</li> </ul>
Wind	Low	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>In high winds larger ambulances cannot cross the Forth Bridge</li> <li>In some cases the bridge is closed entirely.</li> </ul>
Fog, Mist and Low Visibility	None	<ul style="list-style-type: none"> <li>No noted effects of low visibility</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>



## 9.9 Central Scotland Fire & Rescue Service

### Background issues:

- A significant proportion of call outs in general are false alarms, however, all call outs are resource intensive.

**Table no.8**

Aspects of Operations	Detail
Forecasts	New flood modelling software is in development to add to the Fire Service GIS. This should improve efficiency.
Resources	The Fire Service has recently acquired a high volume pump which can be used in flooding emergencies. It has previously been sent to other parts of Scotland for use, which can limit availability to Falkirk.
Records	
Specific Events	Heavy rains November 20 <sup>th</sup> 2009 – assisted in search for person lost on River Carron. False alarm.

Weather Event	Severity	Responsibilities	Issues	Continuity
Rain and Flooding	High	•	<ul style="list-style-type: none"> <li>• Overflowing rivers can limit pumping as there is nowhere for water to be pumped to. When commercial or domestic properties are leaking they may give false fire alarms due to poor electrics.</li> </ul>	
Snow, Cold and Ice	Med	•	<ul style="list-style-type: none"> <li>• Flooding normally takes place in domestic properties which are flooded through burst pipes. When commercial or domestic properties are leaking they may give false fire alarms due to poor electrics.</li> <li>• Staff access to the fire stations can be reduced through blocked or icy roads</li> <li>• Poor road conditions may make access to incidents difficult. In poor conditions tend to work closely with police to provide access.</li> </ul>	
Heat and Drought	Low		<ul style="list-style-type: none"> <li>• There is a slight increase in fires started in summer due to schools being out and warm conditions.</li> </ul>	
Wind	Low	•	<ul style="list-style-type: none"> <li>• Can fan winds e.g. fire at Maddiston Primary School where wind exacerbated problems in November 2007.</li> <li>• May be called out to deal with fallen tree related problems.</li> </ul>	
Fog, Mist and Low Visibility	Low		<ul style="list-style-type: none"> <li>• No effect</li> </ul>	

## 9.10 Central Scotland Police

### Background issues:

- The Central Scotland Police area covers the three local authorities of Falkirk, Stirling and Clackmannanshire. Between April 1 2008 and March 31 2009, it handled almost 30,000 calls via the 999 system. Officers deal directly with the impacts of severe weather events and work closely with ambulance and fire services.

**Table no. 9**

Aspects of Operations	Detail

Forecasts	The Police get their information from their Flood Warning Dissemination Service.
Resources	The police have their own Landrovers and can call on the RAF for assistance if required. They often work closely with the Fire and Rescue Service.
Records	Electronic records of callouts have been provided to 2006. More may be available in future.
Specific Events	Heavy rains November 2009. Snow & ice Dec 2009/ Jan 2010

Weather Event	Severity	Responsibilities	Issues	Continuity
<b>Rain and Flooding</b>	Med	<ul style="list-style-type: none"> <li>The police have a well rehearsed response to flooding</li> </ul>	<ul style="list-style-type: none"> <li>Increased road accidents</li> </ul>	<ul style="list-style-type: none"> <li>Dealt with through general continuity plans</li> </ul>
<b>Snow, Cold and Ice</b>	High	<ul style="list-style-type: none"> <li>Snowball throwing is treated as assault and the police are responsible for responding as such</li> </ul>	<ul style="list-style-type: none"> <li>Snow and ice can increase response times</li> <li>Increased road accidents</li> <li>Snow in particular can limit access</li> <li>Can be difficult for staff to get to work.</li> </ul>	<ul style="list-style-type: none"> <li>Dealt with through general continuity plans</li> </ul>
<b>Heat and Drought</b>	Med	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Hot weather leads to people spending more time outside</li> <li>In general people drink more</li> <li>This leads to more injuries</li> <li>Increased road accidents</li> </ul>	<ul style="list-style-type: none"> <li>Dealt with through general continuity plans</li> </ul>
<b>Wind</b>	Med	<ul style="list-style-type: none"> <li>Fallen trees on roads</li> <li>Fallen road signs</li> </ul>	<ul style="list-style-type: none"> <li>High winds can set off burglar alarms, causing more work for the police through false alarms</li> <li>Increased road accidents</li> <li>Closures on Forth Road Bridge can lead to significant flow of additional vehicles diverting through Falkirk Council area for access to the Kincardine Bridges resulting in congestion.- waiting on information from Forth Road Bridge managers.</li> </ul>	<ul style="list-style-type: none"> <li>Dealt with through general continuity plans</li> </ul>
<b>Fog, Mist and Low Visibility</b>	Low	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Increased road accidents</li> </ul>	<ul style="list-style-type: none"> <li>Dealt with through general continuity plans</li> </ul>

## 9.11 Forth Ports Authority

### Background issues:

- Forth Ports is both a statutory authority dealing with navigation in the Firth of Forth and a commercial cargo handler. Grangemouth is Scotland's largest container port and approximately 9 million tonnes of cargo, or 30% of Scotland's GDP are handled here. It is the largest feeder port in the UK with further future development likely.
- Due to the quantity of goods and vehicles handled, strict timetabling is used. Disruption to this can result in storage issues, traffic queuing and possibly in loss of stock to transporters due to the impact of delays on condition of time sensitive goods.

- Within Scotland, Grangemouth is the main point for transferring goods from ships to trains and trucks. It has 2 key junctions to the M9. Grangemouth contains major operations in terms of oil refineries, chemical plants and supermarket distribution – probably the national distribution point for each of these industries in Scotland. As a result, local severe weather events could potentially have national impacts.
- Some major industries in Grangemouth already have some sort of individual flood protection barriers but additional work is needed, with costs expected to be around £60M-£70M. This is reflected through the National Planning Framework 2 where the Grangemouth Freight Hub National Development includes an element “Any measures to protect the area from coastal flooding”.

**Table no. 10**

<b>Aspects of Operations</b>	<b>Detail</b>
<b>Forecasts</b>	Forecasts come from the Swedish Met Office.
<b>Resources</b>	
<b>Records</b>	Irrelevant
<b>Specific Events</b>	None

<b>Weather Event</b>	<b>Severity</b>	<b>Responsibilities</b>	<b>Issues</b>	<b>Continuity</b>
<b>Rain and Flooding</b>	Low	•	<ul style="list-style-type: none"> <li>• Flooding affects roads, reducing access to work for staff as well as cargo deliveries by road.</li> <li>• Rainfall and flooding inland have very little impact on Forth Ports. Most of the water swell is affected by rain on the North Sea and high tides.</li> <li>• Storm surges have the obvious potential for flooding which could impact heavily on dock operations, however, the 1 in 200 year storm surges require a combination of very specific conditions – tides, winds and lunar cycles - that Forth Ports feel can be predicted to a certain extent.</li> </ul>	
<b>Snow, Cold and Ice</b>	Low	•	<ul style="list-style-type: none"> <li>• Heavy snow may stop work but this is unlikely</li> <li>• Frost forecast triggers gritting in port area</li> </ul>	
<b>Heat and Drought</b>	Low	•	<ul style="list-style-type: none"> <li>• There is a chance that lightning may cause a petrochemical fire.</li> <li>• In prolonged heat wave conditions, must pay particular attention to clearance height under Forth Road Bridge – heat causes metal to expand resulting in a sagging effect which reduces clearance height for taller vessels. Also factor in weight of traffic.</li> </ul>	
<b>Wind</b>	Low	•	<ul style="list-style-type: none"> <li>• Grangemouth is largely protected from wind due to its location which makes it much less vulnerable than more exposed ports such as Felixstowe. Winds greater than 40mph can interrupt cargo handling. This can have an impact on business. It is possible that contracts could be breached due to these delays, but due to slack in the system it is generally a cause of nuisance rather than loss.</li> <li>• In heavy seas containers can be damaged in transit, which can lengthen transportation time.</li> <li>• Winds are a greater problem for larger ships and may prevent them from berthing.</li> </ul>	
<b>Fog, Mist and Low Visibility</b>		•	<ul style="list-style-type: none"> <li>• Trigger - if visibility is reduced to less than ¼ mile work must stop. This happens 12-15 times a year.</li> </ul>	•

***“Climate change is one of the most serious threats we face. Urgent action is needed to cut emissions which cause climate change. The Scottish Climate Change Bill will introduce a target to reduce emissions by 80 per cent by 2050, and a statutory framework to support delivery. ”***

*Source: Alex Salmond, First Minister September 2008*

## **10. Recommendations**

### **10.1 Sustainable Falkirk Strategy & Corporate Risk Group**

- Data gathered, staff interviews and case studies have confirmed growing experience of increased frequency and severity of largely precipitation-based severe weather events. It is important that the Council and its partners pick up on these emerging trends and put mechanisms in place to identify changes in climate and to adjust service provision accordingly. The LCLIP approach may provide an appropriate early warning system which might contribute to the corporate risk register and the work of Falkirk Council's Corporate Risk Strategy Group.

### **10.2 Training/capacity-building measures**

- It will be important for key Council staff to become familiar with the new package of climate change scenarios for the UK - *UK 21st Century Climate Scenarios (UKCP09)*. An understanding of how the information provided by UKCP09 can be used to assess the potential impacts of climate change will enable Council and partner staff to make robust climate change adaptation decisions. Free training is available and can be tailored to groups such as the Falkirk SCP Partnership.

### **10.3 Embedding adaptation in project and policy development**

- Climate Change adaptation and carbon management need to be embedded in the development of Council policy. A natural starting point is the incorporation of the findings of this report into the revision of the council's sustainability strategy and action plan and also into the programme of joint climate change actions agreed to by the Falkirk Strategic Community Partnership. These commitments should be reflected in the Strategic Outcome Agreement.

### **10.4 Data Recording**

- This project showed that the Council should more systematically record data on weather-related incidents and resulting service impacts. Partners' corporate risk management groups should consider how best to develop a longer term approach to recording and monitoring local weather conditions and impacts in order that:
  - Service monitoring to identify activities which result from weather events are fed into a risk based assessment approach.
  - More accurate costing of the impacts of weather events is enabled.
  - The requirements of the Scottish Climate Change Declaration are met
  - The requirements of the Climate Change (Scotland) Act 2009 are met
  - Climate change considerations are built into the Corporate Risk Register

## 11. Appendices

### 10a Table 1 - List of organisations & staff interviewed & sources of data:

Falkirk Council	Add Job Titles
1. Customer First Call Centre –	Lorna Bryce, Customer First Co-Ordinator
2. Housing & Fuel Poverty –	Allyson Allison, Home Energy Strategy Officer Carole Glass, Home Energy Strategy Officer Kenny Gillespie, Facilities Manager (Maintenance)
3. Emergency Planning –	Malcolm Wilson, Civil Contingencies Co-Ordinator Margaret Lee, Assistant Emergency Planning Officer
4. Insurance –	Hugh Coyle, Insurance Supervisor
5. Education Services –	Alan Wylie, Health & Safety/Risk Assess Co-Ordinator Dennis Harkins, Ilc Resource Manager
6. Flooding –	Hamish McPhee, Roads Development Officer Sharon Smith, Flood Prevention Officer Colin Hemfrey, Development Plan Co-Ordinator
7. Roads –	Brian Cochrane, Area Roads Engineer Raymond Smith, Roads Manager Findlay Brown, Roads & Development Manager
8. Social Work –	Liz McGhee, Service Manager
9. Waste Management -	Carl Bullough, Waste Manager
Community Planning Partners	
10. Scottish Ambulance Service –	Neil Gilles, Tripartite Programme Manager
11. Central Scotland Fire Service –	Paul French, Group Manager, Risk Management
12. Central Scotland Police Service –	Sergeant Gordon Dunbar
13. Forth Ports	Derek McGlashan, Environment Manager & Capt Graham Vale
14. NHSFV	Gary Sanderson, Energy Manager

**Table 2 – Calls received by Customer First Call Centre 21/12/09 to 10/01/2010**

21 Dec 2009 - 10 Jan 2010	Total No of Calls Received	Compared With Same Time 12 Months Previously	Change as %	Answered	Average Wait To Answer - secs.	Average Call – secs.	No. Hung Up	% Hung Up *4
Clarence / roads *1	2101	+ 1804	+607%	1748	83	103	353	17%
Refuse Collection	4284	+ 1829	+75%	3397	73	97	887	21%
Recycling	1380	+ 642	+87%	1079	77	91	301	22%
Litter Line	24	- 20	-45%	19	71	98	5	21%
Grounds Maintenance *2	120	+ 36	+43%	74	86	73	46	38%
Housing Repairs	2876	+ 691	+32%	2379	53	105	497	17%
Control (3050) *2	7838	+ 3559	+83%	6024	63	79	1814	23%
Switchboard (Ext) *3	5684	+2353	+71%	5204	19	29	480	8%
<b>Totals</b>	<b>24307</b>	<b>+ 10894</b>	<b>+81%</b>	<b>19924</b>			<b>4383</b>	<b>18%</b>

\*1 – calls regarding roads

\*2 – out of hours number – various topics

\*3 – general number – various topics

**Properties at risk within inland floodplain and coastal areas by Local Authorities**

Impact of Flooding in Scotland - August 2007											
SEPA No.	Local Authorities	Area (km2)	Flood Maps	Coastal Map	Fluvial Map	Data copied from 2002 spreadsheet in absence of 2006 data	Extrapolated	Combined Total of Both Maps	Breakdown of Figures		
			Total Number of Properties at Risk	Total Number of Properties at Risk	Total Number of Properties at Risk	Total Number of Properties	% of properties at risk		At Risk (Coastal Flooding Only)	At Risk (Fluvial Flooding Only)	At Risk from Both Fluvial & Coastal Flooding
1	Aberdeen City	186	1042	74	1,041	104543	1.00%	1,115	1	968	73
2	Aberdeenshire	6,318	2,463	446	2,117	95,174	2.59%	2,563	346	2,017	100
3	Angus	2,185	1,849	908	1,021	49,828	3.71%	1,929	828	941	80
4	Argyll and Bute	7,008	2,014	1,443	602	45,191	4.46%	2,045	1,412	571	31
5	City of Edinburgh	263	7,850	1,871	6,664	222,246	3.53%	8,535	1,186	5,979	685
6	Clackmannanshire	159	1149	21	1,128	21,170	5.43%	1,149	21	1,128	0
7	Dumfries and Galloway	6,437	1,975	398	1,641	65,939	3.00%	2,039	334	1,577	64
8	Dundee City	60	1,461	1,147	314	74,032	1.97%	1,461	1,147	314	0
9	East Ayrshire	1,270	3,417	0	3,417	52,497	6.51%	3,417	0	3,417	0
10	East Dunbartonshire	175	1,879	0	1,879	45,966	4.09%	1,879	0	1,879	0
11	East Lothian	679	3,233	2,438	887	39,505	8.18%	3,325	2,346	795	92
12	East Renfrewshire	174	851	0	851	36,075	2.36%	851	0	851	0
20	Eilean Siar Comhairle nan	3,098	484	442	74	13,540	3.57%	516	410	42	32
13	<b>Falkirk</b>	<b>297</b>	<b>8,533</b>	<b>6,215</b>	<b>4,289</b>	<b>64,382</b>	<b>13.25%</b>	<b>10,504</b>	<b>4,244</b>	<b>2,318</b>	<b>1,971</b>
14	Fife	1,325	3,888	1,531	2,392	162,013	2.40%	3,923	1,496	2,357	35
15	Glasgow City	175	11,749	1,452	11,749	302,065	3.89%	13,201	0	10,297	1,452
16	Highland	26,162	3,428	1,300	2,276	110,068	3.11%	3,576	1,152	2,128	148
17	Inverclyde	162	1,040	540	620	40,479	2.57%	1,160	420	500	120
18	Midlothian	355	351	0	351	33,193	1.06%	351	0	351	0
19	Moray	2,238	3,602	117	3,507	54,967	6.55%	3,624	95	3,485	22
21	North Ayrshire	885	4,176	732	3,531	62,951	6.63%	4,263	645	3,444	87
22	North Lanarkshire	472	1190	5	1,190	136,935	0.87%	1,195	0	1,185	5
23	Orkney Islands	1,012	341	326	16	9,269	3.68%	342	325	15	1
24	Perth and Kinross	5,384	4,034	72	3,992	64,882	6.22%	4,064	42	3,962	30
25	Renfrewshire	262	5,723	1,380	4,993	86,749	6.60%	6,373	730	4,343	650
26	Scottish Borders	4,739	4,774	70	4,705	50,649	9.43%	4,775	69	4,704	1
	Shetland Islands	1,467	141	126	15	9,891	1.43%	141	126	15	0
28	South Ayrshire	1,224	2,257	1,479	804	50,112	4.50%	2,283	1,453	778	26
29	South Lanarkshire	1,774	1,153	97	1,153	129,386	0.89%	1,250	0	1,056	97
30	Stirling	2,253	3,000	251	2,996	36,228	8.28%	3,247	4	2,749	247
31	West Dunbartonshire	177	2,334	1,300	2,326	43,890	5.32%	3,626	8	1,034	1,292
32	West Lothian	429	772	0	772	65,647	1.18%	772	0	772	0
	Undefined					6597	0.00%				
								18,840	65,972	2,293,906	
Totals			92,153	26,181	73,313	2,386,059	1		2,378,718		

**Table 3** - Source: SEPA (red text = total no. of properties in each council area was not supplied in the 2006 table. As this data is essential to work out the percentage of properties at risk, data from the earlier 2002 table was inserted and extrapolated to produce a percentage figure).

**Table 4: Police Callouts – Weather Related**

Date	Callouts	Event Code	Details
20070616	2	WEATHER	
20070616	1	FALLEN TREE	
20070818	4	ROAD FLOODED	
20070818	1	TREE ON ROAD	
20080109	22	WEATHER	
20080109	1	TREE ACROSS ROAD	
20080125	10	WEATHER	
20080126	4	WEATHER	
20080428	2	FLOODING ON ROAD	
20080428	1	HEAVY RAIN AND HAIL/FLOODING	
20080801	3	SEVERE FLOODING	
20080801	1	WEATHER	
20080819	1	ROAD FLOODED	
20080822	1	ROADS FLOODED	
20080830	1	FLOOD WATCH	
20080906	1	WEATHER	
20081007	1	WEATHER	LIGHTNING
20081025	8	WEATHER	
20081025	1	WEATHER	
20081027	1	ICE ON ROAD	
20081110	1	TREE IN DANGER OF COLLAPSE	WIND
20081111	1	WALL BLOWN DOWN	WIND
20081218	1	FLOODING	
20090202	2	WEATHER	
20090202	1	WEATHER	SNOW
20090323	1	WEATHER	
20090615	1	WEATHER	
20090820	1	FLOODING	

**CASE STUDY 2 (Interview details)-  
Heavy & Prolonged Snow & Ice 20th December 2009 – 10th January 2010.**

- A period of cold weather hit Scotland, lasting from December 20th 2009 until January 10th 2010 – apparently the coldest December and January in about 30 years. Considerable amounts of snow fell across the Falkirk Council area and continued low temperatures and frost meant that it consolidated into ice in many areas.

**11.1.1 Customer First Call centre**

- **Data** - this is one of the few sources of data available although links with severe weather events are indirect. It can also be issued quickly. Records over the period 21 Dec 09 – 10 Jan 2010 show that almost 11,000 additional calls were received compared to the same period 12 months earlier. This amounted to around an additional 80% increase. The greatest number of calls was to the general switchboard number although this will have dealt with many calls relating to issues such as roads and housing. The greatest relative change related to specific roads related calls, where 6 times as many calls were received, which translates to over 1,800 additional calls. About 18% or 4,383 calls resulted in callers hanging up.
- **Service level** - Customer First, the Falkirk Council call centre provider, reported that they felt that they dealt adequately with the increased number of calls.

21 Dec 2009 - 10 Jan 2010	Total No of Calls Received	Compared With Same Time 12 Months Previously	Change as %	Answered	Average Wait To Answer - secs.	Average Call – secs.	No. Hung Up	% Hung Up *4
Clarence / roads *1	2101	+ 1804	+607%	1748	83	103	353	17%
Refuse Collection	4284	+ 1829	+75%	3397	73	97	887	21%
Recycling	1380	+ 642	+87%	1079	77	91	301	22%
Litter Line	24	- 20	-45%	19	71	98	5	21%
Grounds Maintenance *2	120	+ 36	+43%	74	86	73	46	38%
Housing Repairs	2876	+ 691	+32%	2379	53	105	497	17%
Control (3050) *2	7838	+ 3559	+83%	6024	63	79	1814	23%
Switchboard (Ext) *3	5684	+2353	+71%	5204	19	29	480	8%
<b>Totals</b>	<b>24307</b>	<b>+ 10894</b>	<b>+81%</b>	<b>19924</b>			<b>4383</b>	<b>18%</b>

**11.1.2 Transport**

- The unit had to deal with an unusually testing combination of factors that presented a challenge over a prolonged period. Factors included malfunction of salt level monitoring equipment, rail line seasonal closure which coincided with severe period, the weather kicked in at the most difficult time of the day, week and year in terms of getting contractors.
- **Staff:** demands were considerable, however, because the event took place over a holiday period, the number of staff available was restricted. They were able to tap into additional staff resources from Building Maintenance and Grounds Maintenance. The unit was constantly gritting from 5a.m. to 9p.m. for over 2 weeks. This was achieved by using 2 shifts end to end. Work was prioritised with primary routes kept clear/gritted



- **Budget implications** will arise from the considerable amount of staff overtime involved and grit supplies. These will be met in part through an emergency budget
- **Communications** to the unit put considerable pressure on management & admin resources – volume of calls and emails was overwhelming at times and meant that staff were having to deal with them rather than work on the ground. The unit reported regularly to Development Services, issued communications to the public and dealt with enquiries from councillors.
- **Damage to roads** – significant amount of damage to roads, particularly potholes. Damage is picked up by inspectors checking all roads. These will be dealt with initially through temporary repairs. Can't quantify the number of potholes, possibly later in the year by looking at road repair expenditure. Full costs won't become apparent as lot of costs will have to filter through e.g. recharging for use of staff from other units but it is expected that the £1.3 million roads maintenance budget will not be enough.

### 11.1.3 Community groups

- The role of community volunteers in contingency planning became apparent as the Red Cross co-ordinated local community groups and volunteers. The Council's Emergency Planning Unit worked with the Red Cross, utilising their volunteer network which played a key role in transporting people to hospital, helping with essential health and care services.

### 11.1.4 Housing

- Received over 4,000 calls – most of which were made safe or completed at the time with any outstanding work prioritised. The Housing section reported that the severe weather event's impact had not been remarkable in terms of damage to housing stock or impact on staff resources. This is largely a result to an extensive investment programme that took place as a result of a heavy snow event in 1999. The programme of insulation of pipes, location of stop cocks and installation of trace heating for frost protection played a result in reducing the impact of this recent cold spell. Inevitably, there was still damage to some housing, however, figures on this are not yet available.
- An **emergency response team** was established to co-ordinate efforts. Their role was to deal with tenants, capture information about damage, prioritise repairs, commission repairs and instigate tenant support where necessary. Repairs were carried out by the council's direct labour organisation which meant that it didn't have to compete with the general public for emergency repair trades people. Access to some properties was hindered by poor road conditions. Tenants whose properties were not fit to be returned to were classified as temporarily homeless and were supplied with alternative accommodation such as B&B or hotel rooms.

### 11.1.5 Utilities

- Prolonged snow and ice did result in much higher numbers of burst pipes etc. than usual, however, the unit frequently tests and uses contingency plans which meant that the situation was manageable.
- **Triggers** – duty managers decide when certain thresholds are met and the system is starting to struggle to cope. They contact the control room which puts continuity plans into action. Updates were sent to directors and the chief executive on a 6 hourly basis.
- **Experience** – many of the managers and senior staff have worked in this section for years and many have had direct experience of another severe snow/ice event in 1999. A series of system improvements and procedures were implemented following that event which resulted in a significant reduction in damage this time. Experienced ground level staff also helped with prioritisation of work and redeployment of resources e.g. job assessment resulting in more than one skilled contractor attending a site to speed up the job such as plumber and builder.

- **Communications**- a noticeable improvement compared with 1999 is much greater communication between staff on the ground and in the control room. Staff have mobile phones as standard and in some cases have access to more than one. This also helps with staff morale.
- **Insurance** – the full cost of the damage to property will take a few months to emerge. It will cover materials, damage to tenants' property, direct labour costs.

#### 11.1.6 Refuse collection

- Prolonged snow and ice had a significant impact on delivery of waste management services over the Christmas/New Year period, primarily due to icy road conditions. Full staff attendance did help.
- **Access** - the main problem was access to properties to collect waste due to icy road surfaces. Large vehicles such as bin lorries are particularly difficult to manoeuvre in icy conditions and run the risk of sliding and causing significant damage. Drivers face legal action and implications if found guilty of negligence and are told to use their discretion. Vehicles were driven on primary, cleared roads with refuse collectors carrying out most of the remaining work on foot – this had its own slip hazards.
- **Public profile** – waste management is a high profile council service. It can generate a high level of press coverage and reputational damage for the council. It is one of the visible services that is delivered to all Falkirk Council residents.
- **Staff levels** – virtually all staff were in attendance over the bad weather period. This is the case every year over the holiday period as some members of the public thank refuse collectors at this time of year.

#### 11.1.7 Social Work

- Contingency planning kicked in and worked as practiced and planned, with staff under pressure but the unit is satisfied with its performance. Improved communication with hospitals ensured full awareness of discharged patients in need of seasonal support.
- **Access** - snow/ice makes it difficult for carers to reach clients or to leave their own homes – dual problem – getting to work and getting out again. Some staff resorted to more travel on foot e.g. food and shopping deliveries. There were a number of incidents of carers/home helps slipping whilst working.
- **Prioritised services** - calls to Mobile Emergency Care teams were prioritised with calls fielded by Customer First who advised service users of the temporary prioritisation and suggested alternatives. Managers prioritised services provided e.g. bathing or housework may have been delayed.
- **Communicated with clients** - phoned clients where possible to advise of delays, used Central FM for the first time to advise that they were doing their best to deliver the service but that there would be delays, also put info on Falkirk Council website. In broadcast they asked family, friends and neighbours to keep an eye on vulnerable people. This was in response to previous feedback from clients where they said that they could cope with changes/delays as long as they were informed.
- **Successfully trialed a new strategy** to ensure that senior home help staff were based in the office to provide support and deal with allocating resources whilst their regular work load was allocated to home helps with capacity or by using agency staff. Staff reported back through their union that they had found this procedure very useful.
- **Meals on Wheels** and shopping deliveries rely heavily on the road network. School canteens managed to open and supply the food. Some staff resorted to more travel on foot e.g. food and shopping deliveries.

### 11.1.8 Schools

- **Brought in additional staff** from other services so that they were able to ensure that the majority of schools were open during the bad weather.
- **Centralised records** of school emergency closures are held by Education Services. Out of the council's 71 schools and nurseries, only 4 closed - 2 because of access to the villages being difficult generally, 1 because of burst pipes and 1 due to heating problems.
- **Access** - rather than problems with heating and water, the main difficulties were access to buildings, with staff and parents' car parks being unused for two weeks prior to the schools reopening. Head teachers undertook risk assessments before deciding whether or not to let pupils out to play. Most kept pupils in on the first few days. Parental response to this has been overwhelmingly one of acceptance with only 2 formal complaints.

### Emergency Services

#### 11.1.9 Scottish Ambulance Service

- Between 28th of December 2009 and 3rd January 2010, ambulances responded to 1,037 cases of falls related to weather – an increase of 38% on the same period last year. The extraordinary conditions have had an adverse effect on response times however this is improving and ambulances responded to 65.3% of life threatening calls within 8 minutes yesterday (Wednesday 6th January).

#### 11.1.10 NHSFV

- Heating in Falkirk Royal Infirmary premises is largely gas. Meter readings show a 36% increase in the amount of gas used over the cold period compared with the same time last year. In addition to this, they had to turn to oil supply for heat when the gas supply was interrupted to cope with peak demand, as NHSFV is on an interruptible gas supply contract (due to back up oil system).

**Table 5: Five Worst Weather Days 1999-2009**

	Five Worst Days 1999-2009				
	Rain	Flood	Heat	Drought	Cold
1	13/12/2006	13/12/2006	18/06/2000	08/08/2005	28/02/2001
2	25/05/2005	25/01/2008	19/06/2000	09/08/2005	01/03/2001
3	06/02/2001	01/02/2000	11/07/2005	21/07/2005	06/01/2003
4	18/08/2007	09/01/2005	12/07/2005	26/04/2004	07/01/2003
5	11/10/2002	25/10/2008	25/07/2006	20/07/2005	14/01/2001

**Table 6: Number of Severe Weather Events 1999-2009**

Events							
	Rain	Flood	Heat	Drought	Cold		
Events	56	41	25	27	26		
Days	317	408	366	370	301		
Days with more than 45mm of rain		Days above 30 degrees C		Days below -6 degrees C		Days with River Carron flow above 50	Days with River Carron flow below 0.4
4		6		12		9	19

**Table 7:**

Weather Events (Ten Worst in Blue)

<b>RAIN</b>			
Date	Total	Days	Mean
28/02/1999	50.5	4	12.63
29/03/1999	38.9	1	38.90
17/09/1999	63.9	7	9.13
02/11/1999	49	4	12.25
27/11/1999	118.5	11	10.77
10/07/2000	34.7	1	34.70
01/09/2000	101.2	11	9.20
05/12/2000	81.9	9	9.10
01/01/2001	39.1	2	19.55
06/02/2001	88.2	6	14.70
25/05/2002	24.6	1	24.60
08/06/2002	120.5	10	12.00
12/10/2002	44.5	1	44.50
22/10/2002	96.3	6	16.05
02/11/2002	86.2	12	7.18
20/12/2003	67.3	7	9.61
09/01/2004	84.1	6	14.02
04/08/2004	128.2	9	14.24
02/10/2004	38	3	12.67
28/12/2004	216.3	16	13.52
15/03/2005	41.1	2	20.55
18/04/2005	31.2	1	31.20
19/05/2005	37.8	1	37.80
26/05/2005	48.3	1	48.30

22/08/2005	49.1	3	16.37
29/08/2005	28.5	1	28.50
20/09/2005	71.7	8	8.96
11/10/2005	54.2	2	27.10
24/10/2005	64.4	4	16.10
25/03/2006	99.5	8	12.44
03/09/2006	61.1	4	15.28
26/10/2006	78.3	6	13.05
11/11/2006	232.7	15	15.51
01/12/2006	86.1	5	17.22
11/12/2006	169.2	5	33.84
30/12/2006	388.7	23	16.90
27/02/2007	147.5	14	10.54
24/04/2007	35.3	2	17.65
06/05/2007	70.5	5	14.10
14/07/2007	52.7	3	17.57
06/08/2007	23.3	1	23.30
12/08/2007	23.6	1	23.60
18/08/2007	58.7	2	29.35
24/12/2007	450.2	24	18.76
24/01/2008	96.8	3	32.27
22/02/2008	68.5	5	13.70
01/03/2008	27.9	1	27.90
22/06/2008	67.5	4	16.88
10/07/2008	24.4	1	24.40
01/08/2008	33.3	1	33.30
06/08/2008	129.4	8	16.18
20/08/2008	39.5	2	19.75
16/09/2008	39.1	2	19.55
04/10/2008	112.5	8	14.06
20/10/2008	143.4	7	20.49
04/05/2009	100.8	7	14.40

<b>FLOOD</b>		
Date	Max	DAYS
02/01/1999	23.44	4
13/01/1999	23.95	14
28/02/1999	28.34	4
28/03/1999	25.1	2
27/11/1999	33.28	30
02/01/2000	18.74	10
29/01/2000	65.32	8
21/02/2000	55.79	18
25/10/2000	51.04	21
06/02/2001	25.659	7
20/01/2002	37.192	25
19/02/2002	27.26	9
05/03/2002	22.845	6
09/06/2002	20.938	8
21/10/2002	27.01	7
01/11/2002	15.576	6
15/01/2003	24	13
01/02/2004	20.751	5
09/08/2004	22.548	4
16/09/2004	24.033	5

15/10/2004	27.809	15
22/12/2004	61.826	22
17/01/2005	22.206	4
08/02/2005	27.373	5
25/05/2005	32.871	9
11/10/2005	24.542	2
24/10/2005	32.343	3
25/03/2006	25.697	8
15/11/2006	143.603	32
31/12/2006	38.475	22
27/02/2007	32.474	2
18/08/2007	30.732	1
28/12/2007	23.211	22
23/01/2008	78.174	9
21/02/2008	32.984	10
07/03/2008	19.369	6
06/08/2008	25.307	4
04/10/2008	30.951	8
19/10/2008	61.042	8
18/12/2008	35.152	4
11/01/2009	26.977	6

HEAT			
Date	Max	Days	Mean
09/05/2000	25.9	7	21.01
17/06/2000	31	10	24.25
15/07/2000	27.9	54	23.42
21/05/2001	29	8	25.25
24/06/2001	26.1	16	23.94
24/07/2001	26.3	15	23.21
22/08/2001	24.1	16	22.46
14/07/2002	24.6	15	22.35
29/05/2003	24.8	5	23.98
02/07/2003	29.3	20	24.36
04/08/2003	29.3	15	26.63
23/08/2003	26.2	2	26.20
30/05/2004	24.4	15	22.52
25/07/2004	25.6	16	23.66
14/08/2004	26.3	9	23.61
31/08/2004	24.2	11	22.22
18/06/2005	31	37	24.28
31/07/2005	27.8	24	24.14
30/08/2005	26.2	15	22.61
06/06/2006	25.1	7	23.14
01/07/2006	26.8	6	22.72
14/07/2006	30.5	23	24.12
22/07/2008	25.2	11	22.68
30/05/2009	26.2	4	24.48
02/07/2009	30.5	5	24.98
DROUGHT			
Date	Min	Days	Mean
12/07/1999	0.55	5	0.57
20/08/1999	0.675	5	0.69
11/05/2000	0.647	5	0.68
24/06/2000	0.485	15	0.56

27/07/2000	0.598	5	0.62
20/05/2001	0.698	7	0.72
05/06/2001	0.592	21	0.76
28/07/2001	0.647	14	0.72
13/07/2003	0.651	7	0.68
24/08/2003	0.618	25	0.69
15/10/2003	0.625	9	0.69
06/11/2003	0.594	5	0.64
24/04/2004	0.375	7	0.52
23/05/2004	0.662	5	0.69
08/05/2005	0.538	5	0.67
04/07/2005	0.346	50	0.50
01/09/2005	0.428	15	0.64
06/10/2005	0.546	4	0.60
29/01/2006	0.535	13	0.77
19/04/2006	0.552	6	0.63
13/07/2006	0.492	49	0.66
10/09/2006	0.614	8	0.81
13/04/2007	0.688	8	0.70
29/05/2007	0.587	21	0.72
13/05/2008	0.559	39	0.67
20/07/2008	0.577	9	0.65
19/04/2009	0.659	8	0.72

<b>COLD</b>		
Date	MIN	DAYS
20/01/2000	-2	7
14/02/2000	-2.8	9
14/12/2000	-4.9	4
25/12/2000	-5.8	7
08/01/2001	-6.5	10
06/02/2001	-4.7	13
23/02/2001	-7.5	12
04/12/2001	-6.4	31
16/12/2002	-3.4	5
02/01/2003	-7.1	10
29/01/2003	-6.4	21
12/03/2003	-1.7	17
17/02/2004	-5.2	22
18/11/2004	-4.2	4
27/11/2004	-2	6
18/12/2004	-3.8	9
12/01/2005	-3.1	31
16/11/2005	-5.4	10
05/12/2005	-2.7	14
24/12/2005	-3.6	6
27/02/2006	-3.7	10
16/12/2007	-3.3	6
10/01/2008	-4.3	2
28/11/2008	-3.8	14
27/12/2008	-3.7	11
03/02/2009	-4.1	10

**Table 8: Highest Rainfall 1999-09**

RAIN			
Date	Total	Days	Mean
28/02/1999	50.5	4	12.63
29/03/1999	38.9	1	38.9
17/09/1999	63.9	7	9.13
02/11/1999	49	4	12.25
27/11/1999	118.5	11	10.77
10/07/2000	34.7	1	34.7
01/09/2000	101.2	11	9.2
05/12/2000	81.9	9	9.1
01/01/2001	39.1	2	19.55
06/02/2001	88.2	6	14.7
25/05/2002	24.6	1	24.6
08/06/2002	120.5	10	12
12/10/2002	44.5	1	44.5
22/10/2002	96.3	6	16.05
02/11/2002	86.2	12	7.18
20/12/2003	67.3	7	9.61
09/01/2004	84.1	6	14.02
04/08/2004	128.2	9	14.24
02/10/2004	38	3	12.67
28/12/2004	216.3	16	13.52
15/03/2005	41.1	2	20.55
18/04/2005	31.2	1	31.2
19/05/2005	37.8	1	37.8
26/05/2005	48.3	1	48.3
22/08/2005	49.1	3	16.37
29/08/2005	28.5	1	28.5
20/09/2005	71.7	8	8.96
11/10/2005	54.2	2	27.1
24/10/2005	64.4	4	16.1
25/03/2006	99.5	8	12.44
03/09/2006	61.1	4	15.28
26/10/2006	78.3	6	13.05
11/11/2006	232.7	15	15.51
01/12/2006	86.1	5	17.22
11/12/2006	169.2	5	33.84
30/12/2006	388.7	23	16.9
27/02/2007	147.5	14	10.54
24/04/2007	35.3	2	17.65
06/05/2007	70.5	5	14.1
14/07/2007	52.7	3	17.57
06/08/2007	23.3	1	23.3
12/08/2007	23.6	1	23.6
18/08/2007	58.7	2	29.35
24/12/2007	450.2	24	18.76
24/01/2008	96.8	3	32.27
22/02/2008	68.5	5	13.7
01/03/2008	27.9	1	27.9
22/06/2008	67.5	4	16.88
10/07/2008	24.4	1	24.4
01/08/2008	33.3	1	33.3
06/08/2008	129.4	8	16.18
20/08/2008	39.5	2	19.75
16/09/2008	39.1	2	19.55
04/10/2008	112.5	8	14.06
20/10/2008	143.4	7	20.49
04/05/2009	100.8	7	14.4

**Table 9: Highest Flood Levels 99-09**

FLOOD		
Date	Max	DAYS
02/01/1999	23.44	4
13/01/1999	23.95	14
28/02/1999	28.34	4
28/03/1999	25.1	2
27/11/1999	33.28	30
02/01/2000	18.74	10
29/01/2000	65.32	8
21/02/2000	55.79	18
25/10/2000	51.04	21
06/02/2001	25.659	7
20/01/2002	37.192	25
19/02/2002	27.26	9
05/03/2002	22.845	6
09/06/2002	20.938	8
21/10/2002	27.01	7
01/11/2002	15.576	6
15/01/2003	24	13
01/02/2004	20.751	5
09/08/2004	22.548	4
16/09/2004	24.033	5
15/10/2004	27.809	15
22/12/2004	61.826	22
17/01/2005	22.206	4
08/02/2005	27.373	5
25/05/2005	32.871	9
11/10/2005	24.542	2
24/10/2005	32.343	3
25/03/2006	25.697	8
15/11/2006	143.6	32
31/12/2006	38.475	22
27/02/2007	32.474	2
18/08/2007	30.732	1
28/12/2007	23.211	22
23/01/2008	78.174	9
21/02/2008	32.984	10
07/03/2008	19.369	6
06/08/2008	25.307	4
04/10/2008	30.951	8
19/10/2008	61.042	8
18/12/2008	35.152	4
11/01/2009	26.977	6

*Highest levels demarked by blue shading*



**Table 10: Highest Temperatures 1999-09**

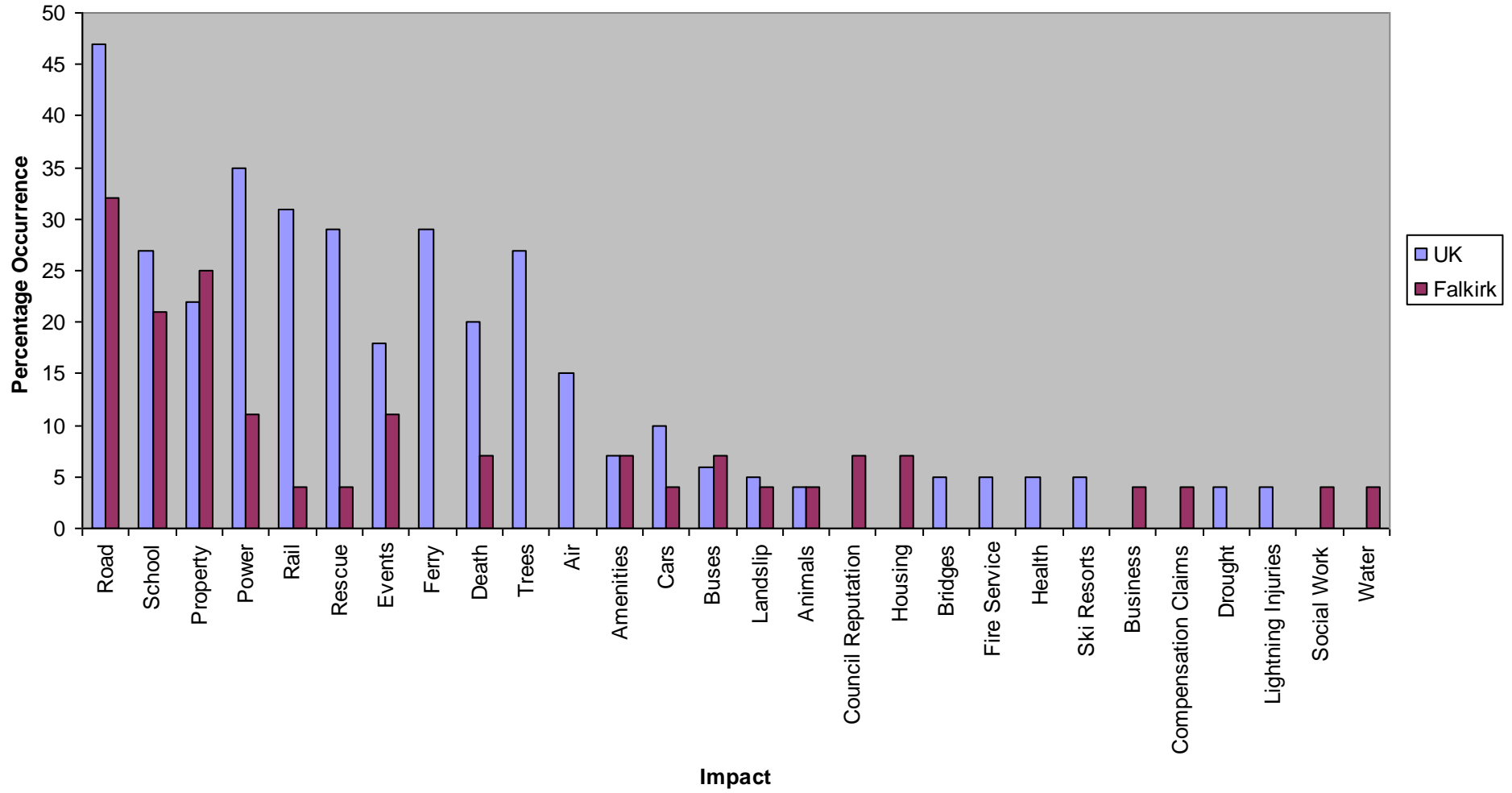
HEAT			
Date	Max	Days	Mean
09/05/2000	25.9	7	21.01
17/06/2000	31	10	24.25
15/07/2000	27.9	54	23.42
21/05/2001	29	8	25.25
24/06/2001	26.1	16	23.94
24/07/2001	26.3	15	23.21
22/08/2001	24.1	16	22.46
14/07/2002	24.6	15	22.35
29/05/2003	24.8	5	23.98
02/07/2003	29.3	20	24.36
04/08/2003	29.3	15	26.63
23/08/2003	26.2	2	26.2
30/05/2004	24.4	15	22.52
25/07/2004	25.6	16	23.66
14/08/2004	26.3	9	23.61
31/08/2004	24.2	11	22.22
18/06/2005	31	37	24.28
31/07/2005	27.8	24	24.14
30/08/2005	26.2	15	22.61
06/06/2006	25.1	7	23.14
01/07/2006	26.8	6	22.72
14/07/2006	30.5	23	24.12
22/07/2008	25.2	11	22.68
30/05/2009	26.2	4	24.48
02/07/2009	30.5	5	24.98

**Table 11: Lowest Temperatures 99-09**

COLD		
Date	MIN	DAYS
20/01/2000	-2	7
14/02/2000	-2.8	9
14/12/2000	-4.9	4
25/12/2000	-5.8	7
08/01/2001	-6.5	10
06/02/2001	-4.7	13
23/02/2001	-7.5	12
04/12/2001	-6.4	31
16/12/2002	-3.4	5
02/01/2003	-7.1	10
29/01/2003	-6.4	21
12/03/2003	-1.7	17
17/02/2004	-5.2	22
18/11/2004	-4.2	4
27/11/2004	-2	6
18/12/2004	-3.8	9
12/01/2005	-3.1	31
16/11/2005	-5.4	10
05/12/2005	-2.7	14
24/12/2005	-3.6	6
27/02/2006	-3.7	10
16/12/2007	-3.3	6
10/01/2008	-4.3	2
28/11/2008	-3.8	14
27/12/2008	-3.7	11
03/02/2009	-4.1	10

Figure 1: Occurrence of Impacts by Percentage for All Events 1999-2009

Occurrence of Impacts by Percentage for All Events



**Table 12: Media Trawl Severe Weather Events Log**

Source	Nat'l Local	Headline	Date	Weather	Flood	Wind	Events	Summary
BBC	N	Floods hit roads as rain continues	05/01/1999	Rain	Flood		Road, Property, death, rail, power	Weather
BBC	N	Severe flooding as rain batters Scotland	28/11/1999	Rain	Flood		Rail, Ferries, Roads	Weather
BBC	N	Two die in gales	13/06/2000			Wind	Deaths, Oil Rig Adrift, rescue, power, roads, trees, ferries, air	Weather
BBC	N	Big freeze expected to last	28/12/2000	Snow, Cold, Ice			Road, Rail, Air, Rescue, Ferry accident	Weather
BBC	N	Snow causes havoc for Scots	28/12/2000	Snow, Cold, Ice			Air, Road, Rail, Post	Weather
BBC	N	Snow freezes fixture list	29/12/2000	Snow, Cold, Ice			Events	Heavy snow cancels football matches
BBC	N	Cold snap brings road dangers	29/12/2000	Snow, Cold, Ice			Roads, Air, Refuse collections	Weather
BBC	N	Snow trouble: How is it for you?	04/01/2001	Snow, Cold, Ice				Review of experiences of snow
BBC	N	Icy spell brings smog warning	20/01/2001	Snow, Cold, Ice			Football	Health risks of cold
BBC	N	Two die in blizzards	05/02/2001	Snow, Cold, Ice			Roads, Deaths, Rescue, Power, Schools, Ski Resorts	Weather
BBC	N	Motorists warned over snow and floods	05/02/2001	Snow, Cold, Ice	Flood		Deaths, Roads, Power, Schools, Ski Resorts	Weather
BBC	N	Blizzards hit UK	05/02/2001	Snow, Cold, Ice				Pictures of Snow
BBC	N	More rain, snow, gales approaching	06/02/2001	Snow, Cold, Ice			Deaths, Power, Schools, Roads	Weather
BBC	N	Snow and ice misery continues	06/02/2001	Snow, Cold, Ice		Wind	Power, Schools, Train, Rescue, road, rail, air, events, ferries	Weather
BBC	N	Warning of blizzards and heavy snow	06/02/2001	Snow, Cold, Ice			Roads, Power, Schools, Air	Weather
BBC	N	No respite from icy weather	07/02/2001	Snow, Cold, Ice	Flood		Deaths, Cars, Power, Ski Resorts	Weather
BBC	N	Health services hit by severe weather	07/02/2001	Snow, Cold, Ice			Ambulance, Social Work	Health Service Impacts
BBC	N	Cold snaps at Scotland yet again	26/02/2001	Snow, Cold, Ice			Schools, Roads, Rescue	Weather
BBC	N	Heatwave to continue in south of England	30/07/2001	Heat				Weather
BBC	N	Scotland hit by wintry weather	08/11/2001	Snow, Cold, Ice			Roads	Weather
BBC	N	Cold snap spreads south	09/11/2001				Roads, Racing	Weather
BBC	N	Wintry conditions cause major disruption	28/12/2001	Snow, Cold, Ice		Wind	Power, Roads, Ferries, Trees, Ski Resorts, Air, Rail, Construction damaged	Weather

BBC	N	Blizzards hit Scotland and Northern England	28/12/2001	Snow, Cold, Ice		Wind	Power, Amenities, Trees	Weather
BBC	N	Snow and Ice cause more disruption	29/12/2001	Snow, Cold, Ice		Wind	Power, Events, Roads, Ferries, Amenities damaged	Weather
BBC	N	Power restored after storms	30/01/2002	Rain		Wind	Power, Deaths, Trees, Rail	Weather
BBC	N	Stormy weather hits Scotland	01/02/2002	Rain		Wind	Rail, Landslide, Rescue, Property, power, ferries,	Weather
BBC	N	Fierce storms batter Britain	01/02/2002		Flood	Wind	Rail, property, road, ferry, power	Weather
BBC	N	Severe weather on cards for NI	22/02/2002			Wind	Power, Ferries, Rail, Road, Air, Trees	High Winds
BBC	N	Weather turns roads treacherous	24/02/2002	Snow, Cold, Ice		Wind	Rail, power, rescues, air, ferries, road, football	Weather
BBC	N	Severe weather causes disruption	22/10/2002	Rain	Flood	Wind	Roads, Rail, Ferries, Schools, Cars Destroyed, Firefighters hindered, football	Weather
BBC	N	Power cuts' compensation row	27/10/2002			Wind	Power	Power cuts caused by wind
BBC	N	Gales wreak havoc	28/10/2002			Wind	Property, Power, Deaths, Trees, Roads, Rail, Air, Ferries	Weather
BBC	N	Heatwave causes rail disruption	04/08/2003	Heat			Rail	Heat causes rail delays
BBC	N	Helping workers keep their cool	05/08/2003	Heat				Workers advised on how to cool down
BBC	N	Commuters face more heatwave delays	05/08/2003	Heat			Rail	Weather
BBC	N	Sizzling temperatures break UK record	11/08/2003	Heatwave			Lightning Injuries	Weather
BBC	N	Heatwave starts to cool off	12/08/2003	Heat			Power demands	Weather
BBC	N	Scotland's cold snap	29/01/2004	Snow, Cold, Ice			Roads	Weather
BBC	N	Snow shuts down schools and roads	26/02/2004	Snow, Cold, Ice			Power, Roads, Schools	Weather
BBC	N	Snow shuts down schools and roads	26/02/2004	Snow, Cold, Ice			School, Roads, Power	Weather
BBC	N	Rain and winds causing problems	07/01/2005	Rain		Wind	Roads, rail	Weather
BBC	N	Stranded families flown to safety	08/01/2005		Flood		Rescues	Flood, 6ft of water
BBC	N	Severe weather batters Scotland	08/01/2005	Rain	Flood	Wind	Trees, Roads, Rescue, Rail, Ferry	Weather
BBC	N	A very stormy spell	08/01/2005	Rain	Flood	Wind	Property, Rescue, Trees, Roads, Ferries, Power	Weather
BBC	N	Three dead, two missing in floods	09/01/2005		Flood		Property, Power, Schools damaged, Buses damaged, Fire stations damaged, Police Stations damaged, schools, operations cancelled, rescues	Weather

BBC	N	Chances of flooding 'rising fast'	10/01/2005	Rain	Flood		Road, Rail, Property	Floods predicted to increase
BBC	N	Storm-force gales batter North	11/01/2005		Flood	Wind	Drought, Electricity, Schools, Power station damaged, Council Rep	Weather
BBC	N	Storm havoc continues	12/01/2005		Flood		Power, Property	Weather
BBC	N	Third body found in family search	12/01/2005			Wind	Deaths, Power, Power station damaged, rescue, ferries, trains, schools, water, trees, pier swept away	Weather
FH	L	There's more snow to come	24/02/2005	Snow, Cold, Ice			Schools, Roads, Buses	Weather
BBC	N	Britain braced for latest freeze	28/02/2005	Snow, Cold, Ice				Weather
BBC	N	Bitter cold snap continues	01/03/2005	Snow, Cold, Ice			Accidents, Schools, events	Weather
BBC	N	Storm-damaged forests re-opened	05/03/2005			Wind	Trees	Forest Reopens
BBC	N	The World Is A Great Big Snowball	07/04/2005	Snow, Cold, Ice				Weather
BBC	N	Pupils' day off as snow sweeps in	23/04/2005	Snow, Cold, Ice			Schools, roads, amenities	Schools closed
BBC	N	Ice warning after fresh snowfalls	24/04/2005	Snow, Cold, Ice			Roads, Schools, Accidents	Weather
BBC	N	Scotland battered by high winds	12/11/2005	Rain		Wind	Trees, Power	Weather
BBC	N	Sea lane concerns after grounding	21/12/2005			Wind	Tanker grounded	Article on grounding
BBC	N	Weather warning amid winter snap	30/01/2006	Snow, Cold, Ice				Weather
BBC	N	Heavy snow expected across Wales	28/02/2006	Snow, Cold, Ice			Accidents, School	Weather
BBC	N	Hottest July day ever in England	20/07/2006	Heat			Health, Schools, Drought, Trains, Animals, Walkers, Ambulance	Weather
FH	L	Shops closed after window smash	31/10/2006			Wind	Property	Window Smashed
BBC	N	Flood warnings follow heavy rain	03/12/2006	Rain	Flood	Wind	Trees, Rescue	Weather
BBC	N	Scotland hit by severe flooding	04/12/2006	Rain	Flood	Wind	Power, Ferries	Weather
BBC	N	Village evacuated amid flooding	14/12/2006	Rain	Flood		Property	Weather
BBC	N	Chaos as Forth Road Bridge closes	31/12/2006			Wind	FRB	Weather
BBC	N	Snowfall brings road disruption	18/01/2007	Snow, Cold, Ice			Roads, Air, Schools,	Weather
BBC	N	Nine dead as UK struck by storms	18/01/2007	Rain		Wind	Deaths, Power, Air, Rail, Roads, Trees, Property, Cars, Ferries, Ship Damaged, Rescue	Weather
BBC	N	Ten killed as gales sweep Britain	19/01/2007		Flood	Wind	Death, Power, Trees, Cars, Rail, Roads, Accidents, Trees, Property, Air	Weather
BBC	N	Cold spell set to follow storms	20/01/2007	Snow, Cold, Ice, Rain	Flood	Wind	Deaths, Power, trees, property, cars, ship destroyed, rescue	Weather
FH	L	Winter wake-up	25/01/2007	Snow, Cold, Ice			Schools, Buses	Weather
BBC	N	Diary of a Deckhand	08/11/2007			Wind	Power	Web Journal
BBC	N	Hermit Life	26/11/2007			Wind		Web Journal

FH	L	No snow for Christmas, but icy conditions prevail	18/12/2007	Snow, Cold, Ice			Events	Weather
BBC	N	Cold snap brings snow to Scotland	03/01/2008	Snow, Cold, Ice			Death, Ferries	Weather
BBC	N	Country hit by fresh snow showers	04/01/2008	Snow, Cold, Ice, Rain		Wind	Roads, Harbours, Ferries, Rescue, Ski Resorts	Weather
BBC	N	Stormy weather	09/01/2008			Wind	Property, Schools, Trees	Weather
BBC	N	Chaos as Forth Road Bridge closes	09/01/2008			Wind	FRB	Weather
BBC	N	Gale-force winds cause disruption	09/01/2008			Wind	Trees, Rescue, FRB, Power, Rail, Property, Schools, Day care centre,	Weather
BBC	N	High winds cause major problems	09/01/2008			Wind	Power, TRB, Property Damaged, Car damaged, Trees	Weather
BBC	N	Scotland battered by bad weather	09/01/2008	Rain		Wind	Power, Schools, Trees, Bridges	Weather
FH	L	Snow set to ease but strong winds and rain on the way	25/01/2008	Snow, Cold, Ice			Accidents	Weather
BBC	N	Weather causes hazards on roads	25/01/2008	Rain	Flood	Wind	Road, rail, landslip, ferries	Weather
BBC	N	Bad weather scrubs ferry sailings	31/01/2008			Wind	Ferries	Ferries Stopped
BBC	N	Hundreds of homes without power	31/01/2008			Wind	Power, Trees	Weather
BBC	N	Ferry aground as storms batter UK	01/02/2008	Snow, Cold, Ice		Wind	Ferry destroyed, rescue, deaths, power, roads, trees	Weather
BBC	N	UK braced for more storm weather	11/03/2008			Wind	Power, Air, Rail, Property, trees, ferries, bridges	Weather
BBC	N	UK battered by more severe gales	11/03/2008		Flood	Wind	Trees, Property, Roads	Weather
BBC	N	Hot weather across the UK sparks off heavy thunderstorms	10/05/2008	Heat				Weather
BBC	N	Was Wednesday's washout a monsoon?	09/07/2008	Rain				Weather
BBC	N	Clean-up begins in flood-hit town	01/08/2008	Rain	Flood		Cars Destroyed	Weather
BBC	N	Rain causes more flood problems	07/08/2008	Rain	Flood		Attractions, Road, Rail, Landslide,	Weather
BBC	N	Clear up after rain lashes Fife	09/08/2008	Rain	Flood		Fire Service, Property, Roads	Weather
BBC	N	Heavy rain brings flooding damage	10/08/2008	Rain	Flood		Roads, Property, Fire Service, Landslide	Weather
BBC	N	Three rescued from flooded cars	13/08/2008	Rain	Flood		Rescues, property, roads, cars destroyed, crops lost	Weather
BBC	N	Flooding follows torrential rain	14/08/2008	Rain	Flood		Property, Roads, Landslides, Fire Service, Schools, Power, Gas, Historic Building damaged	Weather
BBC	N	Unsettled weather causes flooding across the UK	14/08/2008	Rain	Flood	Wind	Trees, Rail, Property	Weather
BBC	N	Flash flooding sparks call-outs	20/08/2008	Rain	Flood		Rescues, property	Weather

BBC	N	Floods in Scotland	22/08/2008	Rain	Flood		Property	Weather
BBC	N	Clear-up after gales hit Scotland	26/10/2008	Rain	Flood	Wind	Trees, Ferries, Rescue, Property	Weather
BBC	N	Cold snap blamed on Arctic air	28/10/2008	Snow, Cold, Ice			Football	Weather
FH	L	Arctic weather brings snow and coldest October in years	29/10/2008	Snow, Cold, Ice		Wind	Schools, Roads, Power	Weather
BBC	N	A Wintry chill grips Scotland	30/11/2008	Snow, Cold, Ice				Weather
BBC	N	Torrential rain causes flooding	19/12/2008	Rain	Flood		Roads, rescue	Weather
BBC	N	Flash floods close major routes	19/12/2008	Rain				Weather
BBC	N	Cold snap payments cost millions	20/12/2008	Snow, Cold, Ice				Payments made to those on benefits in cold weather
BBC	N	Cold snap continues across the UK	05/01/2009	Snow, Cold, Ice				Weather
BBC	N	Icy roads as temperatures plummet	06/01/2009	Snow, Cold, Ice			Accidents, School	Weather
BBC	N	Summary of current UK weather	06/01/2009	Snow, Cold, Ice				Weather
FH	L	Heavy snow and ice trigger road warning	02/02/2009	Snow, Cold, Ice			Roads, Schools	Weather
FH	L	Flood warnings as rain follows snow	10/02/2009	Snow, Cold, Ice			Accidents, Deaths	Weather
BBC	N	Heather's weather - a summer of two halves	01/07/2009	Heat				Meteorology
BBC	N	Heatwave alert level increases	01/07/2009	Heat	Flood			Weather
BBC	N	Heatwave to continue until Friday	01/07/2009	Heat			Animals, Lightning Deaths	Weather
BBC	N	Heather's weather - a summer of two halves	02/07/2009	Rain	Flood			Meteorology
BBC	N	Heather's weather - a summer of two halves	03/07/2009	Rain	Flood			Meteorology
BBC	N	Heavy rain storms cause flooding	06/07/2009	Rain	Flood		Roads, Rescued, Fire Service, Property	Weather
FH	L	Rain fails to wash away Battle of Falkirk memorial service	23/07/2009	Rain				Battle Commemoration
BBC	N	Heather's weather - a summer of two halves	19/08/2009	Rain	Flood			Meteorology

**Figure 2: Interview Questionnaire Template**

<b>LCLIP Questionnaire</b>	
<b>1.0</b>	<b>Flooding and Rainfall</b>
1.1	What additional responsibilities does your department take on during severe flooding and rainfall events?
1.2	Can flooding or rainfall cause limitations or interruptions to your department?
1.3	Can you recall any specific events of flooding or rainfall that your department was involved in during the last ten years?
1.4	What notification do you receive of imminent flooding and rainfall events?
1.5	What strengths do you have relating to flooding and rainfall?
1.6	Which areas could be improved?
1.7	How could this be achieved?
<b>2.0</b>	<b>High Winds</b>
2.1	What additional responsibilities does your department take on during severe high wind events?
2.2	Can high winds cause limitations or interruptions to your department?
2.3	Can you recall any specific events of high winds that your department was involved in during the last ten years?
2.4	What notification do you receive of imminent high winds events?
2.5	What strengths do you have relating to high winds?
2.6	Which areas could be improved?
2.7	How could this be achieved?
<b>3.0</b>	<b>Snow, Ice and Cold Temperatures</b>
3.1	What additional responsibilities does your department take on during severe snow, ice and cold temperature events?
3.2	Can snow, ice and cold temperatures cause limitations or interruptions to your department?
3.3	Can you recall any specific events of snow, ice or cold temperatures that your department was involved in during the last ten years?
3.4	What notification do you receive of imminent snow, ice and cold temperature events?
3.5	What strengths do you have relating to snow, ice and cold temperatures?
3.6	Which areas could be improved?
3.7	How could this be achieved?
<b>4.0</b>	<b>High Temperatures and Drought</b>
4.1	What additional responsibilities does your department take on during severe high temperature and drought events?
4.2	Can high temperatures and drought cause limitations or interruptions to your department?
4.3	Can you recall any specific events of high temperatures or drought that your department was involved in during the last ten years?
4.4	What notification do you receive of imminent high temperatures or drought events?
4.5	What strengths do you have relating to high temperatures and drought?
4.6	Which areas could be improved?
4.7	How could this be achieved?
<b>4.0</b>	<b>Fog, Mist and Low Visibility</b>
4.1	What additional responsibilities does your department take on during severe fog, mist and low visibility events?
4.2	Can fog, mist and low visibility cause limitations or interruptions to your department?
4.3	Can you recall any specific events of fog, mist or low visibility that your department was involved in during the last ten years?
4.4	What notification do you receive of imminent fog, mist or low visibility events?
4.5	What strengths do you have relating to fog, mist or low visibility?
4.6	Which areas could be improved?
4.7	How could this be achieved?
<b>5.0</b>	<b>Do you keep records of individual callouts, events or daily activities?</b>
<b>6.0</b>	<b>Do you record costs and resource use relating to individual events?</b>