



Sheffield Flood Risk Management Strategy

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1. About the Strategy

1.1 Why Do We Need a Strategy?

1.1.1 In 2008, Sir Michael Pitt published his final report, 'Lessons Learnt from the 2007 Floods', which called for fundamental changes in the way the country is adapting to the increased risk of flooding. The report states that local authorities should play a major role in the management of local flood risk, taking the lead in tackling problems of local flooding and co-ordinating all relevant agencies.

1.1.2 The Flood and Water Management Act 2010 (F&WMA) is an important part of the Government's response to the Pitt Report. The Act is intended to create a more integrated, comprehensive and risk-based regime for managing the risk of flooding, including identifying clear lines of responsibility.

1.1.3 The F&WMA gives county councils and unitary authorities a new leadership role in local flood risk management in partnership with a new national leadership role for the Environment Agency (EA). As a unitary authority, Sheffield City Council (SCC) is now the Lead Local Flood Authority (LLFA) for its administrative area and has developed this first edition of the Sheffield Flood Risk Management Strategy (SFRMS) to help meet the challenges of its new role.

1.2 What is the Sheffield Flood Risk Management Strategy?

1.2.1 The SFRMS is a legal document which provides a framework for addressing the risk of flooding across the city. It offers a clear

understanding of the main forms of flooding in Sheffield and provides a blueprint for the co-ordination of flood risk management activity. The SFRMS will be used to help secure and prioritise the investment required for delivery.

1.2.2 As LLFA, SCC has been given certain duties and powers under the F&WMA and is required to implement and maintain a strategy for managing local flood risk. This is defined as flooding from ordinary watercourses, surface water and groundwater. The EA has implemented a national flood risk management strategy for England - Understanding the risks, empowering communities, building resilience. The national strategy outlines the EA's responsibilities for managing the risk of flooding from main rivers and from reservoirs.

However, SCC and the EA are committed to working in partnership to address all key sources of flood risk in Sheffield, especially the risk from main river flooding. The SFRMS is, therefore, an integrated strategy that manages both local and main river flood risks.

1.2.3 The F&WMA designates other agencies as flood risk management authorities (RMAs) and the SFRMS specifies their flood risk management functions. The RMAs operating in the Sheffield area are:

- SCC as LLFA and the Highway Authority;
- The EA as the authority for main rivers;
- Yorkshire Water as the sewerage undertaker.

These RMAs form the Sheffield Flood Risk Management Partnership.

1.2.4 SCC and the EA have developed the SFRMS in conjunction with the RMAs and other stakeholders as listed in section six of this document.

1.3 What Does the SFRMS Do?

1.3.1 Flooding is a natural process, and the SFRMS does not seek to prevent it happening entirely. If, however, steps are not taken to manage the risk of flooding then the problem will worsen as the effects of climate change take hold.

We aim to reduce the likelihood of flooding and its impact on Sheffield's people, businesses and visitors and also to take the opportunity to improve the city's environment.

1.3.2 The SFRMS is a living document that will evolve over time to provide a comprehensive framework for addressing flood risk and:

- explains the latest understanding of flood risk in the city.
- signposts key documents which promote our understanding and support the management of flood risk in Sheffield
- provides a key source of information on flood risk management.
- outlines the legislative framework for managing risk
- specifies the responsibilities and functions of the RMAs operating in Sheffield
- helps co-ordinate flood risk management activities

- contributes to securing and prioritising investment
- explains how flood risk management contributes to achieving wider environmental objectives

What do We Want to Achieve?

1.3.3 The SFRMS sets out seven results that we are working towards. These are:

1. A greater role for communities in managing flood risk
2. Well-managed rivers and watercourses that can cope better.
3. Property and transport routes better prepared against flooding.
4. Sustainable and appropriate development
5. Help keep Sheffield's river valleys open for business
6. Regenerated waterways and water bodies that consider the needs of local plants and wildlife.
7. Areas downstream of Sheffield are not disadvantaged by our actions.

An initial action plan of measures has been developed setting out how we plan to deliver the strategy. The action plan is laid out in section six of this document.

1.4 Next Steps

1.4.1 The final strategy document will be presented to SCC's Cabinet in November 2013 to obtain approval for publication

and implementation. The strategy is subject to scrutiny by SCC's Economic and Environmental Wellbeing Scrutiny and Policy Development Committee. The Committee covers the full range of flood risk management activities carried out within the Council's administrative area and has statutory powers to scrutinise the activities of all RMAs operating in Sheffield.

1.4.2 As mentioned above, the SFRMS is a living document which will evolve as flood events occur, as new technical information becomes available and as new laws are enacted. The Sheffield Flood Risk Management Partnership will review the strategy on an annual basis taking into account new technical information, flood studies, new legislation and financing. The Partnership will consider whether the strategy requires revision and, if necessary, will recommend the publication of an edited version to SCC's Cabinet Member for the Environment, Recycling and the Streetscene.

The Partnership's ability to deliver the measures outlined in the action plan is dependant on securing the required funds and the continued investment in flood risk management by Government.

1.4.3 The SFRMS will fall within the governance structure of the Competitive City Strategic Outcome Board. Clearly, the Partnership will need to outline how it intends to measure the success of the strategy in achieving its results. In the first two years of implementation, the Partnership will establish baseline figures and set outcome targets, for example, the reduction of properties at a high

risk of flooding. Performance will be reported through the Outcome Board's governance structure.

1.4.4 Public engagement is essential to success and the Partnership plans to develop and implement a community engagement framework as part of the SFRMS. SCC published a summary document of the strategy on its flood management web pages in February 2013. The summary outlines 'what we want to achieve' and 'how we're planning to deliver' and invites feedback on the planned actions.

SCC has now published the full strategy document in draft form and invites further feedback on the Partnership's plans.

Glossary

Annual Exceedance Probability (AEP)	The chance of a flood of a given size happening in any one year eg a flood with a 1% AEP will happen, on average, once every 100 years.
Catchment	A catchment is the total area that drains into a river or other drainage system.
Catchment Flood Management Plan (CFMP)	A strategic tool through which the Environment Agency works with other key decision-makers within a river catchment to identify and agree policies for sustainable flood risk management.
Climate Change	A long term change in weather patterns. In the context of flood risk, climate change is predicted to produce more frequent and more severe rainfall events.
Critical infrastructure	Infrastructure which is considered vital or indispensable to society, the economy, public health or the environment, and where the failure or destruction would have large impact. This would include emergency services such as hospitals, schools, communications, electricity sub-stations, Water and Waste Water Treatment Works, transport infrastructure and reservoirs.
Department for Environment, Food and Rural Affairs (Defra)	The UK government department responsible for policy and regulations on the environment, food and rural affairs.
DG5 Register	A Water and Sewerage Company (WaSC) held register of properties which have experienced sewer flooding (either internal or external flooding) due to hydraulic overload, or properties which are at risk of sewer flooding more frequently than once in 20 years.
Environment Agency (EA)	<p>The Environment Agency was established under the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England and Wales today and for future generations. The organisation is responsible for wide ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and Navigation of inland waterways.</p> <p>It also has a new strategic overview role for all forms of inland flooding.</p>
Environment Agency Flood Zones	Flood zones on the maps produced by the Environment Agency providing an indication of the probability of flooding (from rivers and the coast) within all areas of England and Wales.
Exceedance flows	Excess flow that appears on the surface once the capacity of an underground drainage system is exceeded.

Flood map for surface water (FMfSW)

Environment Agency maps that give a broad indication of the areas that are likely to be at risk from surface water flooding – ie areas where surface water would be expected to flow or pond.

Flood Risk Regulations

Legislation that transposed the European Floods Directive in 2009.

Flood and Water Act 2010 (F&WMA)

The Flood and Water Management Act clarifies the Management legislative framework for managing flood risk in England.

Floods Directive

The EU Floods Directive came into force in November 2007 and is designed to help Member States prevent and limit the impact of floods on people, property and the environment. It was transposed into English law in December 2009 by the Flood Risk Regulations.

Fluvial Flooding

Resulting from excess water leaving the channel of a river and flooding adjacent land.

Lead Local Flood Authority (LLFA)

The authority, either the unitary council, or county council, with responsibility for local flood risk management issues in its area, as defined in the Flood and Water Management Act.

Local Development Framework (LDF)

A non-statutory term used to describe a folder of documents which includes all the local planning authority's Local Development Documents (LDDs) such as the Sheffield Local Plan. The local development framework will also comprise the statement of community involvement, the local development scheme and the annual monitoring report.

Local Flood Risk

The risk of flooding from ordinary watercourses, surface water and groundwater.

Local Resilience Forums (LRF)

LRFs are multi-agency forums, bringing together all organisations which have a duty to co-operate under the Civil Contingencies Act, and those involved in responding to emergencies. They prepare emergency plans in a co-ordinated manner.

Main River

Main Rivers are watercourses marked as such on a main river map. Generally main rivers are larger streams or rivers, but can be smaller watercourses.

Ordinary watercourse

An ordinary watercourse is any other river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River. The local authority has powers to manage such watercourses.

Pitt Review

An independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.

Pluvial flooding	Pluvial flooding (or surface runoff flooding) is caused by rainfall and is that flooding which occurs due to water ponding on, or flowing over, the surface before it reaches a drain or watercourse.
Probability of flooding	The probability or chance of flooding is used to describe the frequency of a flood event occurring in any given year, e.g. there is a 1 in 100 chance of flooding in this location in any given year. This can also be described as an annual probability, e.g. a 1% annual probability of flooding in any given year. (See AEP).
Preliminary Flood Risk Assessment (PFRA)	A high level screening exercise that brings together information on significant local flood risk taken from readily available information.
Resilience measures	Resilience measures are designed to reduce the impact of water that enters property and businesses, and could include measures such as raising electrical appliances, concrete floors etc.
Riparian owners	A riparian owner is someone who owns land or property adjacent to a watercourse. A riparian owner has a duty to maintain the watercourse and allow flow to pass through their land freely.
Risk	In flood risk management, risk is defined as the probability of a flood occurring combined with the consequence of the flood.
Risk Management Authority (RMA)	An authority that is able to exercise functions for managing flood risk as defined in the Flood and Water Management Act 2010.
Strategic Flood Risk Assessment (SFRA)	A planning tool that provides information on areas at risk from all sources of flooding.
Surface water flooding	Flooding that takes place from the 'surface runoff' generated by rainwater or snowmelt which is on the surface of the ground and has not yet entered a watercourse, drainage system or public sewer.
Surface Water Management Plan (SWMP)	A tool to understand, manage and coordinate surface water flood risk between relevant stakeholders.
Sustainable Drainage Systems (SuDS)	A sequence of physical measures for managing rainwater that are designed to mimic natural drainage processes by attenuating and conveying surface water runoff slowly compared to conventional drainage.
Water Framework Directive (WFD)	The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. It provides an opportunity to plan and deliver a better water environment, focussing on ecology. The WFD sets environmental and ecological objectives for all inland and coastal waters in the UK.

2. The Risk of Flooding in Sheffield

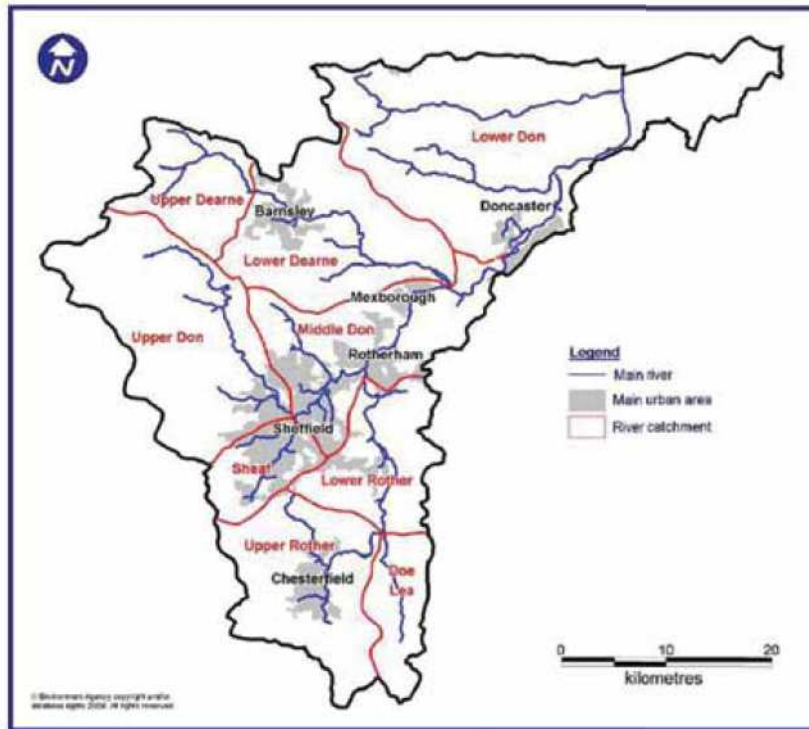


Figure A : The Don Catchment (Don Catchment Flood Management Plan) July 2010

2.1 Introduction

2.1.1 The city of Sheffield lies at the foot of the Pennines in the upper reaches of the Don catchment. Its location is at a point where fast flowing rivers such as the River Don, Loxley, Sheaf and Porter, meet. Sheffield's location in the Don catchment is shown in figure A.

2.1.2 The area's unique and complex hydrology and topography combined with the city's historical development and urbanisation influence the nature of flood risk within the Sheffield area.

2.1.3 Climate change projections indicate that the region will experience warmer, wetter winters and hotter, drier summers along with more extreme rainfall events. The implications are that flooding will become more frequent and of greater magnitude.

2.1.4 The Sheffield Flood Risk Management Strategy (SFRMS) takes a catchment wide approach to addressing the risks of flooding facing the city. The strategy covers the high risk of flooding from the River Don and its main tributaries as well as addressing the local flood risk from smaller watercourses, surface water and sewers.

2.1.5 This chapter gives an overview of the main sources of flood risk facing the city and their interaction. It does not provide a detailed assessment of risk but draws on and signposts documents that currently inform our understanding and provide the evidence base for the strategy such as the Don Catchment Flood Management Plan (DCFMP), July 2010, the Sheffield Strategic Flood Risk Assessment (SFRA) and the Sheffield Surface Water Management Plan (SWMP).

2.2 Catchment Overview

2.2.1 The catchment's response to rainfall has an important influence on flood risk and its management.

2.2.2 The topography of Sheffield is dominated by the Pennine hills to the west with steep sided, well contained river valleys. These valleys respond very quickly to rainfall, and during intense rainfall, runoff moves rapidly through the catchment. Towards the east of the city centre the topography flattens and river valleys widen.

2.2.3 The geology of the area also plays a crucial role in the hydrological characteristics of the catchment and contributes to the rapid response with water running off predominantly poorly draining soils. The peaty soils found in the North Western upland areas of the catchment can absorb and store large amounts of water when dry, slowing movement into the rivers. However once saturated, these soils become impermeable and surface runoff increases.

2.2.4 The Don and its tributaries therefore react very quickly to rainfall with times to peak as short as 2 hours or less above Sheffield. This flashy nature of the catchment places added importance on flood planning and incident management with the requirement for comprehensive and effective warning systems.

2.2.5 River valleys in the upper catchment are narrow offering little natural attenuation and the steepness limits options for creating new storage areas. Several of the rivers from the north and west pass through large

reservoirs upstream of the city. These 23 reservoirs cause a buffering effect on river flow, with a minimal compensation flow paid out most of the time. The reservoirs can reduce the effect of heavy rainfall upstream, but when they are full, flow may enter the watercourses very rapidly as spill occurs. A component of the SFRMS will be to investigate the effect that upstream reservoir operation and flow management may have in reducing flood risk in the Don Valley.

2.2.6 The Don Catchment Flood Management Plan 2010 (DCFMP) is available from the Environment Agency's website and provides further detailed information relating to the characteristics of the Sheffield and upper Don catchments.

2.3 Flooding from Main Rivers

2.3.1 Fluvial or river flooding occurs when a river or watercourse cannot hold the volume of storm water draining into it from the surrounding land and spills flood waters onto the adjacent flood plain.



Figure B : Fluvial flooding from the River Don in the Wicker, Sheffield in 2007

2.3.2 Sheffield has experienced significant fluvial flooding in its history, including most recently, the devastating events of June 2007 when 1200 homes and 1,000 businesses were flooded mainly in the Don Valley.

The risks faced by this type of flooding are well understood and the EA has developed a comprehensive warning system for the various river sub-catchments within the city. Details can be found on the EA's website at [/www.environment-agency.gov.uk/homeandleisure/floods](http://www.environment-agency.gov.uk/homeandleisure/floods)

2.3.3 The Environment Agency (EA) manage the risk of flooding from the city's main rivers which are listed in table C.

Table C: Sheffield's Main Rivers

Name	Length (km)
River Don (Sheffield and Rotherham boundaries)	37.21
Little Don	4.25
River Loxley	6.50
River Rivelin	1.31
Clough Dike	0.67
River Sheaf	9.87
Porter Brook	7.00
Abbey Brook	1.42
Meers Brook	1.09
Totley Brook	0.85
Oldhay Brook	1.01
Blackburn Brook	11.23
Kirkbridge Dike	2.34
Bagley Dike	3.21
Charlton Brook	0.64
Whitley Brook	1.04
Hartley Brook	0.15
Ecclesfield Brook	0.66
Car Brook	4.74
River Rother (shared length)	8.00
Ochre Dike	1.47
Shirtcliffe Brook	0.88

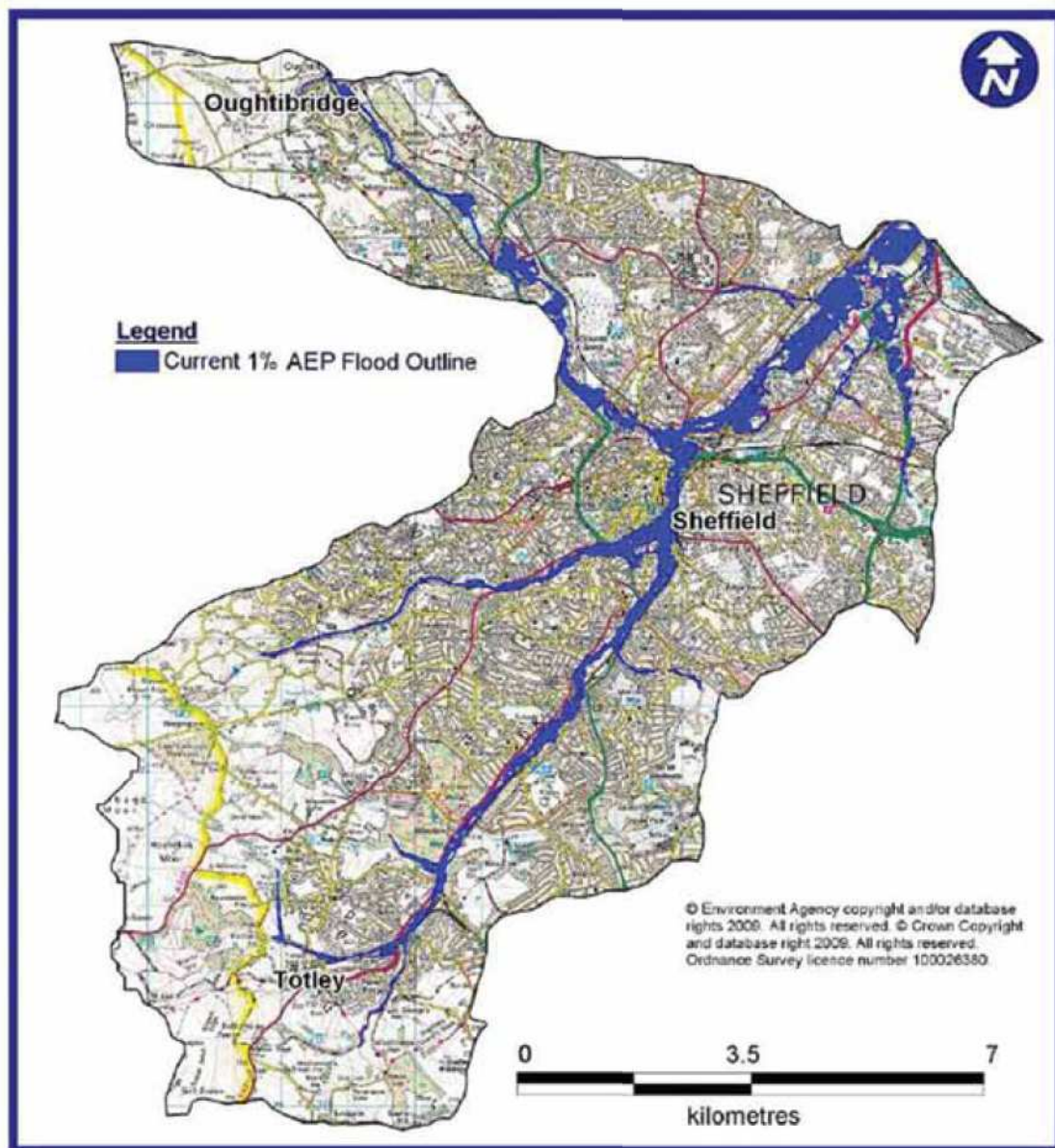


Figure D: Fluvial Flood Risk in Sheffield (Middle Don and Sheaf sub catchments) (source : DCFMP)

2.3.4 In order to understand flood risk, it is important that the concept of flood probability is understood. A 100 year flood event is a flood which has a 1% chance of being equalled or exceeded every year. This is called the 1% Annual Exceedance Probability (AEP) and is used as a measure of the chance of a flood event occurring.

Using hydraulic modelling techniques, Sheffield's fluvial flood risk zones have been mapped and flood outlines show the spatial extent of fluvial flooding for a range of probability flood events, namely:

- 1:20 year flood (5% AEP) defining the extent of the functional floodplain.

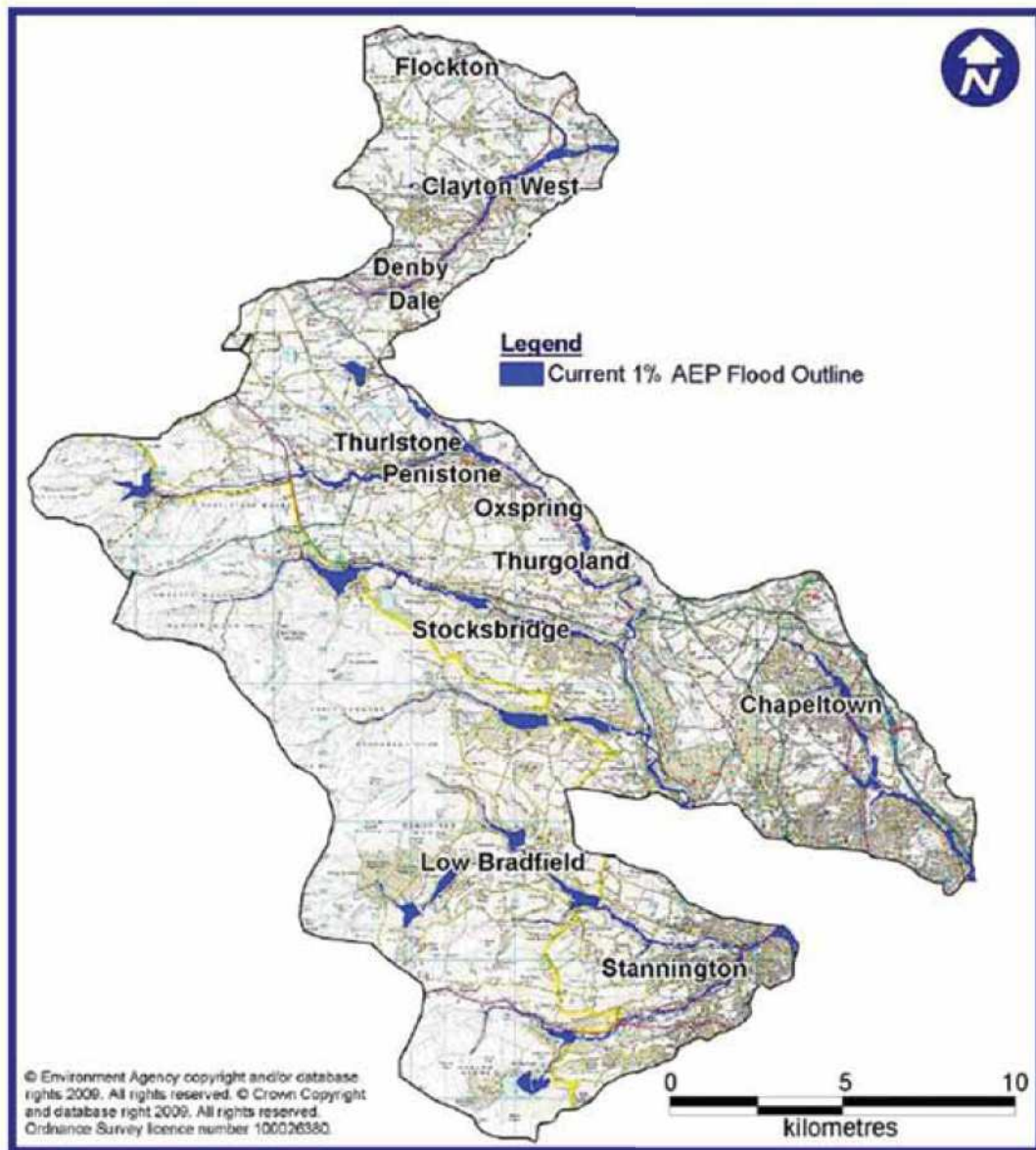


Figure E : Fluvial flood risk in the Upper Don Catchment (source DCFMP)

- 1:100 year flood event (1% AEP) outlining the benchmark flood level for assessing risk.
- 1:1000 year event (0.1% AEP) giving the extreme flood level outline.

2.3.5 As mentioned, the 1% AEP flood outline is the benchmark level for defining the risk of fluvial flooding within the city's river valleys. Figures D and E show the current 1% AEP flood outline for the Sheffield and

Upper Don catchment areas. The DCFMP (2010) estimates the area at risk to be 5.5 square kilometres containing 2278 residential and 2290 commercial properties - table F summarises the risk for Sheffield. The EA plans to revise this flood risk data as part of their Sheffield Comprehensive Flood Review in 2013. Further details of the flood zone maps for Sheffield are available on the EA's website.

Table F: Summary of the Fluvial Flood Risk in Sheffield (1% AEP Flood Event) Source: DCFMP

	Current	Future
Property (number)		
Residential	2778	3315
Commercial	2290	2725
Total properties	5068	6040
Listed buildings	87	102
Property Damages (Sheffield Policy Unit)	£269,097,875	£343,954,085
Infrastructure (Sheffield Policy Unit)		
Main roads (km)	15.45	18.22
Railway (km)	7.55	8.72
Hospitals, surgeries and health care centres	9	10
Fire, Ambulance and Police Stations	1	1
Schools and colleges	5	5
Electricity and Gas assets	64	75

2.3.6 Although the proportion of properties at risk of fluvial flooding is low for a city of Sheffield's size, the location of this risk is critical with major transport links and key infrastructure at risk.

2.3.7 Floodplains in the city are not extensive and urbanisation, particularly industrial, has taken place right up to the banks of rivers. In many urban areas, including the city centre, rivers have been culverted to allow development and therefore the natural river system is significantly restricted increasing the risk of flooding. The SFRMS will support the work of the Sheffield Waterways Strategy, City of Rivers, in regenerating the city's main rivers by opening up culverts and reforming natural banks where appropriate and beneficial.

2.3.8 Sheffield's river system is susceptible to blockage, particularly at culvert inlets and bridge structures, due to the high proportion of vegetation and debris that can be washed down by high velocity flow. This has played a significant role in past flood events on the rivers Don, Sheaf, Porter and Blackburn Brooks. On the River Don, this largely took the form of debris blockage at bridge parapets in the 2007 flood event. On the River Sheaf, blockage to the debris screen at Granville Square caused considerable flood damage in 1991. This screen has since been replaced to give an improved standard of maintenance and protection. The SFRMS plans to continue the considerable work of the EA over the last few years in working with riparian owners to keep the main river channels clear of debris and invasive vegetation and controlling the build up of siltation in main rivers.

**Figure G : Nursery Street, Sheffield –
New flood defences and a pocket park
built in 2012**



2.4 Flood Defences

2.4.1 Sheffield has few formal main river defences that can provide an increased standard of protection (SoP) against flooding.

2.4.2 The city's main formal defences maintained by SCC and the EA are located on:

- The River Don at Kelham Island, Nursery Street and The Wicker (SoP=1% or 1:100 years).
- The lower reaches of the River Sheaf from Heeley to the city centre (SoP=2% or 1:50 years).

Private defences are located at:

- The Meadowhall Shopping Centre including a flood barrier at Meadowhall Drive (SoP=0.5% or 1:200 years).

2.4.3 Of particular importance is the need to improve defences and increase the SoP on the River Don close to Sheffield's city centre and in Sheffield's lower Don valley - areas badly affected in 2007 and essential to the economic growth of the city.

2.5 Future Flood Risk

2.5.1 The Don Catchment Flood Plan states that the major factor influencing flood risk in the future is climate change. Future urban expansion is not considered to make a significant difference to flood flows.

2.5.2 The impact of climate change is a major challenge to flood risk management authorities. The national overview is that changing rainfall patterns will result in hotter, drier summers and milder wetter winters with more extreme rainfall and flooding events.

2.5.3 The implications are that flooding becomes more frequent and of greater magnitude thereby increasing the risks to life, property and the environment. This means that the current standard of protection of defences will reduce over this century.

2.5.4 The chosen scenario for future flood risk that is used in the Don Catchment Flood Plan is that climate change will increase flood flows by 20%.

2.6 Main River Flood Risk Management

2.6.1 To ensure risk management options are sustainable and integrated, the SFRMS is to further develop the partnership between the Environment Agency, as main river authority, and SCC as LLFA leading to a more comprehensive strategy for managing main river flood risk within the city.

2.6.2 This approach has seen close liaison between the EA and SCC on the Sheffield Comprehensive Flood Review (SCFR) scheduled for completion in 2013, and two key projects that utilise a new 2D hydraulic river model developed as part of the SCFR:

- The Lower Don Valley Flood Defence Scheme, scheduled for completion in 2015, that aims to provide a standard of flood protection of 1:100 (1% AEP) in Sheffield's lower Don Valley.
- The Upper Don Reservoir Storage Study scheduled for completion in 2013 that is assessing the potential for upstream management of flows.

2.6.3 The Sheffield Flood Risk Management Strategy will build on the work of the SCFR and the SFRA (Level 1) to address the risk of main river flooding. SCC is committed to working with the EA to further develop a comprehensive main river strategy in five flood risk management areas:

1. Flood Defence – to increase the standard of protection against fluvial flooding.
2. Upstream management of flows with particular emphasis on investigating the role of the Upper Don reservoirs.

3. River Stewardship – work with riparian owners to keep river channels clear of debris and invasive vegetation which can lead to blockage and controlling the build up of siltation and shoals to maintain capacity,

4. Community Resilience – working with community groups and businesses to plan for emergencies and to improve incident management and protection.

5. Spatial planning policy – section three of this document explains how Sheffield's Local Plan manages development in the city's main river floodplains and points to the range of policies designed to manage flood risk and ensure appropriate development.

2.6.4 The Action Plan in section six outlines specific main river flood risk management measures which are planned as part of the SFRMS.

2.7 Local Flood Risk

2.7.1 Local flood risk is defined as flooding from ordinary watercourses, surface water and groundwater. SCC as Lead Local Flood Authority is responsible for managing the risk of flooding from these sources.

Sheffield's Preliminary Flood Risk Assessment (PFRA) into local flood risk was undertaken in 2011 under the Flood Risk Regulations 2009. The PFRA concluded that Sheffield is not noted as exceeding the national flood risk threshold and that there is no local flood risk area identified for further investigation under the regulations.

2.7.3 The PFRA undertook a high level screening exercise compiling information

on significant local flood risk from past and predicted future floods and further concluded that:

- Future local flood risk is estimated to be low in the city.
- Based on local knowledge and records, significant local flood incidents are not commonplace.
- Watercourse blockages do however present a risk from flooding during more frequent events particularly at culvert inlets.

2.7.4 Following on from the PFRA, we are using two more detailed assessments to understand and support our actions in managing local flood risk. These are:

- The Sheffield Surface Water Management Plan (SWMP)
- The national Flood Maps for Surface Water (FMfSW).

2.8 Flooding from Ordinary Watercourses

2.8.1 Sheffield has a substantial network of smaller ordinary watercourses, which are not classified as main rivers. Generally they follow natural valleys or ditches in the landscape originating at a spring or point of surface water discharge. Some are well known and named, others take the form of small underground pipes. This network, together with the public sewer system, forms the city's local drainage system.

2.8.2 Landowners, including SCC, are responsible for the upkeep of ordinary

watercourses and for maintaining the flow within them, as riparian owners

2.8.3 SCC has built up a register of recorded ordinary watercourses in GIS format using information from historic maps, plans and records and uses this to support investigations into local flooding incidents. Information from the register is available to the public on request and SCC is developing an edited version to be placed on its website.

2.8.4 As Sheffield has developed over the last century, many watercourses have been culverted over with culvert sizes varying from 150 mm to 1.5 metres in places. Many of the culverts are old and are considered to be in poor condition. Generally, the larger culverts contain screens at the inlet to stop debris entering the culvert or to prevent unauthorised access.

2.8.5 From an understanding of past flood events, carried out as part of the SWMP, it is clear that there is a risk of culverts becoming blocked and, occasionally, partially collapsing during storms resulting in surcharge and overland flow. In June 2009, the Jervis Lumb culvert, located in the Norfolk Park area of the city, collapsed causing flooding to property, schools and roads. SCC subsequently managed the replacement of the collapsed section on behalf of riparian owners. Blockage generally occurs, however, at culvert inlets particularly where poorly designed screens have been installed.

2.8.6 As well as assessing past flooding history, the SWMP carried out broad scale 2D modelling to identify areas at risk of culvert surcharge. The results are summarised in

Figure H: Ordinary watercourse culverts in Sheffield showing surcharge risk (source: Sheffield SWMP)

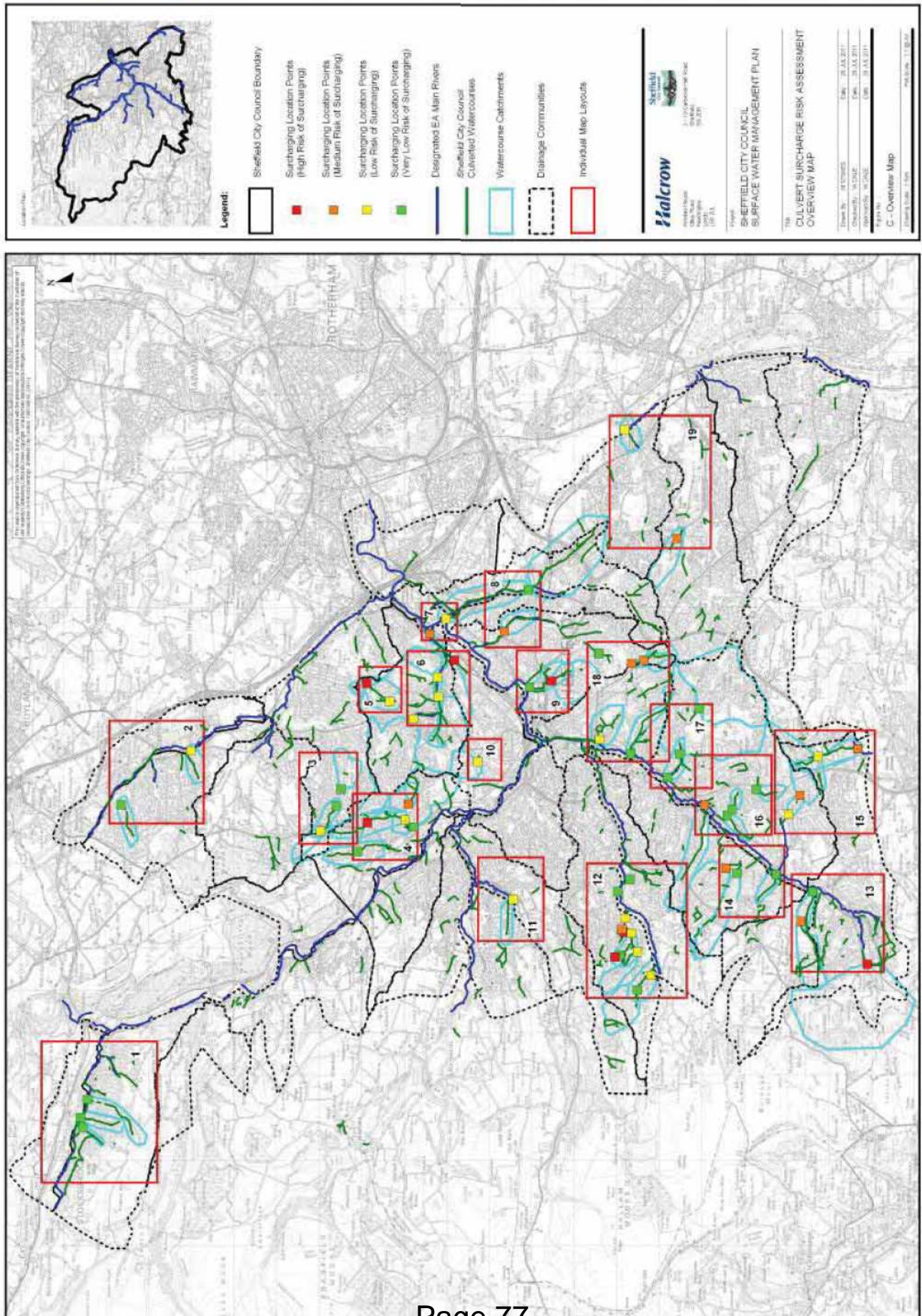


figure H with locations ranked on a scale from very low to high risk.

2.8.7 The SFRMS will address the risk of flooding from ordinary watercourses by developing asset systems and by working with riparian owners to reduce the risk of blockage.

2.9 Surface Water Flooding

2.9.1 Surface water flooding occurs when high intensity rainfall, typically in excess of 30mm/hour, cannot soak into the ground or enter the local drainage system either because of insufficient capacity or blockage. In heavily urbanised areas, such as Sheffield, storm water flow passes overland along flow routes generally following the road network and ponds in depressions in the topography.

2.9.2 Due to its localised nature, this type of flooding is very difficult to predict with certainty and warning systems are not fully reliable. The Flood Forecasting Centre, established following the 2007 floods, does provide extreme rainfall event forecasting (<http://www.ffc-environment-agency.metoffice.gov.uk/services/era.html>) and is now supporting partner agencies in planning emergency responses for such events.

2.9.3 Technological improvements have been made in modelling techniques to estimate areas at risk of surface water flooding, but, historic flooding evidence shows that there remains uncertainty in the results.

2.9.4 As mentioned earlier as well as using information provided by the Flood Forecasting Centre, we are using two assessment studies to understand and support our actions in

managing the risk of surface water flooding – the Sheffield SWMP and the national FMfSW.

2.9.5 The FMfSW is the second generation of national surface water flood mapping released by the EA to authorities in 2010. This database maps two flood events (with a 3.33% AEP and 0.5% AEP) for deep and shallow flood depths. The maps for the Sheffield area for the higher probability deep zone indicate a wide scatter across the city with no concentration of risk in a specific area and a total of 1,400 properties at risk citywide (outside the 1% fluvial flood risk zone). The EA is updating the national FMfSW using new data and modelling techniques. New draft mapping data was released to LLFAs in April 2013 as part of a review process prior to publication later in 2013.

2.9.6 Based on past flooding history, the Sheffield SWMP concludes that there are relatively few properties at risk of surface water flooding. The risk is considered to be low due to the city's hilly topography and extensive drainage network.

2.9.7 The SWMP recommends that surface water flood risk is managed by spatial planning, development management and asset management measures. The SFRMS action plan provides further details of the measures planned to manage this form of flooding.

2.10 Sewer Flooding

2.10.1 As in most large cities, rainwater from developed impermeable surfaces generally drains into separate surface water sewers or into combined sewers (surface runoff and waste water). Flooding can result when the

sewer is overwhelmed by intense rainfall, becomes blocked or is of inadequate capacity. The main public system is relieved by combined sewer overflows (CSOs) discharging flow to rivers and streams.

2.10.2 The Sheffield sewer system is a complex network which has been developed over the last century and is managed by Yorkshire Water Services. The majority of the combined sewer network drains into the Don Valley trunk sewer system for passage to the primary waste water sewage treatment works at Blackburn Meadows to the east of the city. Significant investment took place in the 1980s and 1990s to provide a deep, large diameter (up to 5 metres) Don Valley Intercepting Sewer to receive and store storm flows from the trunk sewer system.

2.10.3 Yorkshire Water has commissioned the development of a comprehensive hydraulic model for Sheffield's sewerage system to identify future capacity issues and to support capital investment as part of the next sewerage asset management programme. Yorkshire Water plan to complete this project in March 2015 and to make results available to the Sheffield FRM partnership.

3. Legislative Framework and Context of the Strategy

3.1 Introduction

3.1.1 This chapter explains the legislative and corporate context within which the Sheffield Flood Risk Management Strategy (SFRMS) sits, outlining:

- the legal and regulatory framework governing flood risk management both nationally and locally, and how this has evolved

- how the SFRMS brings together catchment-wide and local FRM plans and assessments
- where the SFRMS sits in relation to Sheffield City Council's (SCC) Corporate Plan and related strategies

3.1.2 Figure I below shows the main factors influencing flood risk management in Sheffield and how these are brought together in the SFRMS.

Figure I: Factors Influencing the Sheffield Flood Risk Management Strategy



The Legal and Regulatory Framework

3.2 The Pitt Flooding Review (June 2008)

3.2.1 Following the significant floods of June and July 2007 the Government asked Sir Michael Pitt to conduct a thorough and independent review of the risk posed by flooding, and to make recommendations as to what might be done differently in the future. The review made 92 recommendations, of which ten relate directly to local government. Of particular importance are its views on oversight and scrutiny.

3.2.2 The Pitt Review gave rise to the Flood and Water Management Act (2010), which now forms the key piece of legislation overseeing flood risk management in England.

3.3 Flood and Water Management Act (2010)

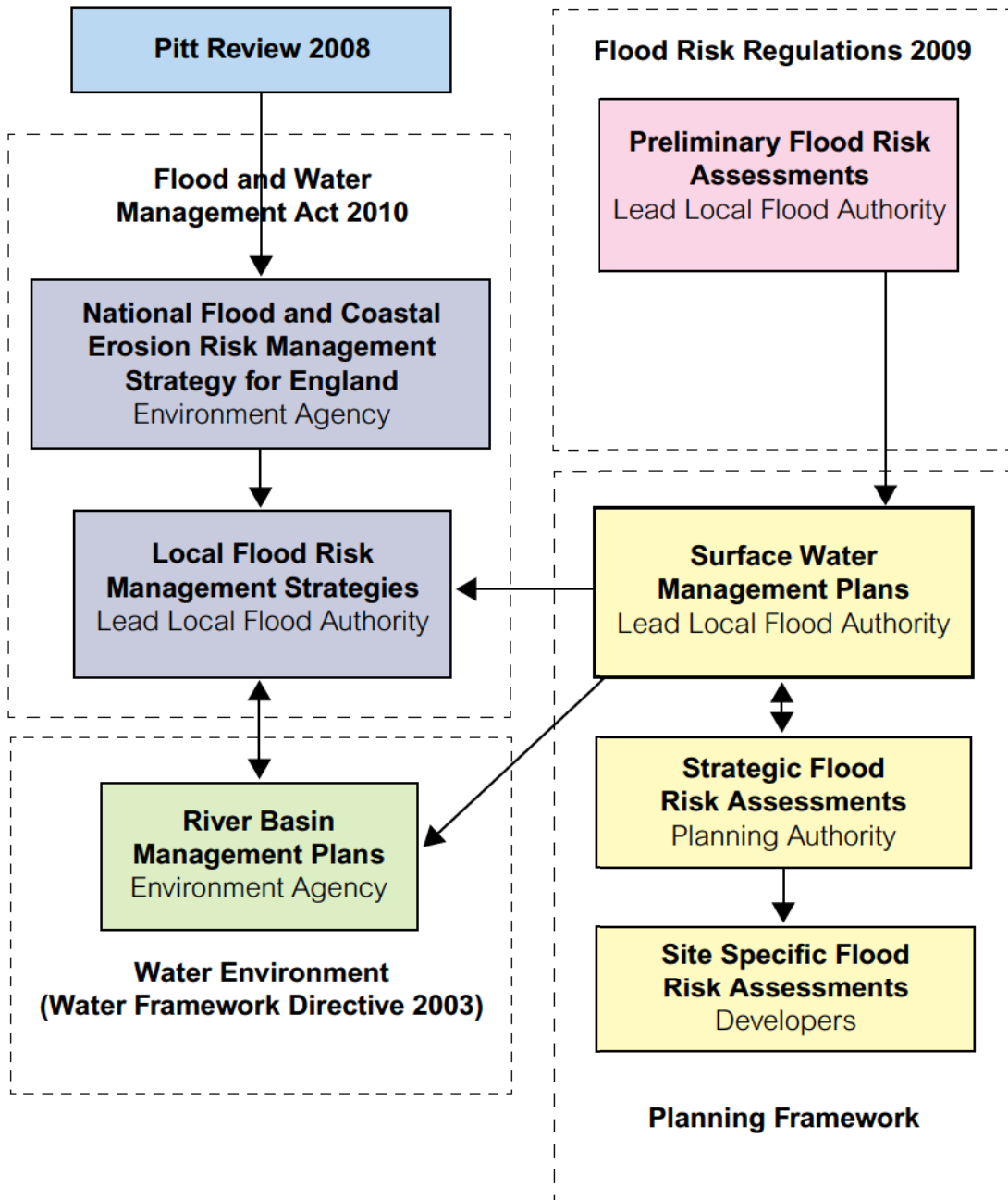
3.3.1 The Flood and Water Management Act 2010 (F&WMA) determines that flood risk will be managed by a combination of National Strategies for England and Wales and a series of local strategies.

3.3.2 The F&WMA gives local authorities significant new roles and responsibilities to help manage flood risk in a more co-ordinated way. It helps to reduce flood risk by:

- defining who is responsible for managing the various sources of flood risk
- enabling effective partnerships to be formed
- encouraging more sustainable forms of drainage in new development

3.3.3 Figure J overleaf shows the relationship between the various laws, directives and regulations relating to flood risk management.

Figure J: Relationships between Laws, Directives and Regulations Concerning Flood Risk Management



3.4 The National Flood Risk Management Strategy for England (2011)

3.4.1 The F&WMA requires the Environment Agency to “develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England”. Accordingly, the Agency has written the National Flood and Coastal Erosion Risk Management Strategy for England 2011 (the National Strategy).

3.4.2 The National Strategy sets out principles for how flood risk should be managed. It provides strategic information about the various kinds of flood risk and the organisations responsible for their management. The Strategy’s guiding principles are:

- community focus and partnership working
- an approach based on catchment cells, working with neighbouring authorities
- sustainability - taking into account potential future risks and remaining adaptable to climate change
- proportionate, risk-based approaches which allot resources where they have the greatest effect
- added benefits including regeneration and socio-environmental benefits as well as reducing the risk to people and property
- beneficiaries should be encouraged to invest in local risk management

3.4.3 The F&WMA requires risk management authorities (local authorities, internal drainage boards, sewerage companies and highway authorities) to act consistently with the National Strategy in carrying out their flood and coastal erosion risk management functions. The national strategy is available to view on the Environment Agency’s website at: <http://environment-agency.gov.uk/research/policy/130073.aspx>

3.5 Local Flood Risk Management Strategies

3.5.1 The Act designates SCC as the Lead Local Flood Authority (LLFA) for its area, with duties and powers to lead the co-ordination of flood risk management in the city, as well as to carry out a specific role in managing flood risk from local sources. The key sources of flood risk identified as local by the Act include

- Surface Water
- Ordinary Watercourses
- Groundwater

3.5.2 The Environment Agency is responsible for managing the risk of flooding from the city’s main rivers and larger reservoirs. Yorkshire Water owns and manages the public sewer network in Sheffield, and is responsible for managing flooding from this network. Other agencies have a defined statutory role in managing flooding as risk management authorities. Further details are provided in Section Four.

3.5.3 The F&WMA places a duty on all risk management authorities operating in an area to act in accordance with the relevant local flood risk management strategy when carrying out their flood risk management functions. These functions are subject to scrutiny in accordance with the LLFA's democratic processes.

3.5.4 The F&WMA gives SCC new responsibilities as LLFA, as explained in Section Four and as listed below:

- maintain a register of drainage and flood assets
- investigate flooding incidents
- prepare a local flood risk management strategy
- establish an approval body for sustainable drainage systems (SuDS)
- power to designate flood risk management structures
- power to undertake works
- consenting to works on ordinary water-courses

3.5.5 The powers listed above are defined as permissive and their use is at the discretion of the LLFA.

3.6 The EU Floods Directive and the Flood Risk Regulations (2009)

3.6.1 The Flood Risk Regulations came into force in December 2009. They complement the F&WMA, transposing the EU Floods

Directive into British law. The EU Floods Directive aims to provide a consistent approach to flood risk management across the whole of Europe. The regulations require the Environment Agency to assess, map and manage flood risk from the sea, from main rivers and from reservoirs, and require Lead Local Flood Authorities to do so for all other flood risks. Key provisions and timescales in the regulations include:

- Preliminary Flood Risk Assessments (PFRAs) to be prepared by the Environment Agency and Lead Local Flood Authorities by December 2011. These assessments should identify areas of significant flood risk.

Where such areas are identified and agreed:

- LLFAs to publish flood hazard and risk maps for local sources by December 2013.
- LLFAs to publish flood risk management plans for local sources by December 2015. These plans should set objectives for flood risk management and should outline measures for achieving those objectives.
- All assessments, maps and plans to be reviewed and updated every six years.
- The Environment Agency to publish flood risk management plans for main river and reservoirs by December 2015.

3.6.2 The Preliminary Flood Risk Assessment is a high-level screening exercise that brings together information on significant local flood risk (any flood risk that does not originate from main rivers, the sea or large reservoirs) from both past and future floods, based upon readily available information. The PFRA also

identifies flood risk areas where the final two stages of the Flood Risk Regulations apply; stage three delivers Flood Risk Maps while stage four delivers Flood Risk Management Plans.

3.6.3 Sheffield's PFRA is available to view at www.environment-agency.gov.uk/research/planning/135526.aspx#21. The PFRA concludes that Sheffield is not noted as exceeding national flood risk thresholds and, therefore, no local flood risk area is identified for the purposes of undertaking stages three and four of the regulations.

3.7 Spatial Planning and Flood Risk Management

3.7.1 The spatial planning and development management process has a critical role to play in managing the risk of flooding by directing development to areas of lowest risk, by managing land uses, by allocating the most suitable sites and by ensuring development is sustainable.

3.7.2 The planning process handles the delicate balance between the economic regeneration and development of the city and the potential risks of flooding in the future. If climate change makes extreme weather and flooding more likely, floodplains will be needed more and more. It is, therefore, essential that these are protected and, where possible, increased by taking flood risk into account at all stages of the planning process.

3.7.3 Developers have a key role to play in managing and mitigating flood risk in new developments and should have regard

to this strategy. Developers should also make a positive contribution to reducing the overall flood risk in the surrounding area and contribute to achieving environmental benefits as defined by the Water Framework Directive.

3.8 National Planning Policy on Development and Flood Risk

3.8.1 In March 2012 the Government introduced the National Planning Policy Framework (NPPF). On matters of flood risk, the NPPF replaces the earlier Planning Policy Statement 25: Development and Flood Risk (March 2010) with a technical guidance document.

3.8.2 The NPPF policy on flood risk states that:

“Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Local Plans should be supported by Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- applying the Sequential Test;

- if necessary, applying the Exception Test;
- safeguarding land from development that is required for current and future flood management;
- using opportunities offered by new development to reduce the causes and impacts of flooding; and
- where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.”

3.8.3 The Government requires that the NPPF be taken into account in the preparation of local plans and is a material consideration in planning decisions. In accordance with this, when considering development proposals, SCC takes a positive approach that reflects the presumption in favour of sustainable development contained in the NPPF.

3.9 The Sheffield Local Plan

3.9.1 The city’s Local Plan comprises the development plan documents drawn up under earlier regulations for the Sheffield Development Framework. It is prepared in accordance with the Planning and Compulsory Purchase Act 2004, amended by the Planning Act 2008 and the Localism Act 2012. It shows up to 2026 how:

- the city will develop spatially
- different land uses will be allocated

- the environment will be protected and enhanced
- areas and buildings will be designed
- places in the city will be connected through the location of new development and transport provision

The Sheffield Local Plan is available on SCC’s website at <https://www.sheffield.gov.uk/planning-and-city-development/planning-documents/local-plan.html>.

3.9.2 The primary document of Sheffield’s Local Plan is the Core Strategy. This was formally adopted by the City Council in March 2009. It sets out the vision and objectives for the whole Local Plan, and sets out the city’s planning policies. The Core Strategy policies that have a bearing on the management of flood risk are outlined in Table K. Collectively, these policies define how the planning process manages flood risk in new development by safeguarding open space and riversides, protecting the strategic green network, responding to climate change and promoting sustainable design.

3.9.3 The City Policies and Sites document forms the second of the two citywide local plan documents. It supplements the policies of the Core Strategy by:

- informing the development management process by securing development which is appropriate and sustainable and which enhances the built environment, with policies to help answer the question, ‘What do I need to do to get planning permission?’

- showing the implications of the Core Strategy's spatial policies through policy areas and site allocations that can be presented on a proposals map.

3.9.4 The document provides greater detail, in the form of guidance and criteria, on achieving the policy objectives of the Core Strategy. Policies relating to the management of flood risk are given in Table L.

Table K: Core Strategy Spatial Policies Relating to Flood and Water Management

Policy Reference	Policy
Chapter 9 - Providing for Opportunities, Wellbeing and Quality of Life for All	
CS46	Quantity of Open Space
CS47	Safeguarding Open Space
CS48	Open Space and Riversides in the City Centre
Chapter 11 - Global Environment and Natural Resources	
CS63	Responses to Climate Change
CS64	Climate Change, Resources and Sustainable Design of Developments
CS67	Flood Risk Management
Chapter 12 - Prizing, Protecting and Enhancing Sheffield's Natural Environment and Distinctive Urban Heritage	
CS71	Protecting the Green Belt
CS73	The Strategic Green Network
CS74	Design Principles

Table L: City Policies and Sites Document – Policies Relating to Flood and Water Management

Policy Reference	Policy
D2	Open Space in Large New Housing Developments
F1	Pollution Control
G1	Safeguarding and Enhancing Biodiversity and Features of Geological Importance
G2	The Green Network
G4	Water in the Landscape

3.9.5 All the above policies have a bearing on how SCC manages and will manage the present and future risk of flooding through the planning process. However, actions designed specifically to address flood risk and adapt to expected climate change are contained in CS63, CS64 and CS67.

3.9.6 In addition, SCC has published a Climate Change and Design Supplementary Planning Document (SPD) and Practice Guide. The purpose of the SPD is to provide information and guidance on ways to meet the requirements of the SCC's policies and guidelines, as well as advice on how to design environmentally sustainable buildings. The practice guide provides design guidance on sustainable drainage systems and techniques, green roofs, rainwater harvesting and greywater recycling.

3.10 Emergency Flood Planning

3.10.1 Emergency planning and incident management are vital to reducing the consequences of flooding on people. Swift action to minimise these consequences is the most effective way of limiting the long-term impact on the wellbeing of individuals and the economic resilience of communities.

3.10.2 The Civil Contingencies Act 2004 is the main piece of legislation governing emergency planning for flooding. It formalises duties on local authorities, the emergency services and other organisations.

3.11 South Yorkshire Local Resilience Forum

3.11.1 The South Yorkshire Local Resilience Forum (SYLRF) brings together all agencies with a significant role to play in responding to and recovering from the impacts of emergencies in the county. It was formed to meet the requirements of the Civil Contingencies Act 2004.

3.11.2 The Civil Contingencies Act defines emergencies as 'any event or situation which threatens serious damage to human welfare in a place in the United Kingdom, the environment of a place in the United Kingdom, or war or terrorism which threatens serious damage to the security of the United Kingdom'.

3.11.3 The agencies involved in the SYLRF are the four South Yorkshire local authorities, the police, the fire and rescue service, the ambulance service, the Environment Agency, NHS England and Public Health England. These are known as category one responders. There are also other organisations who are classified as category two responders, such as transport operators, airports, and utility companies who are all involved in the SYLRF as and when required. In addition, the military and voluntary agencies are also represented at the forum. These organisations work together under the remit of the SYLRF to minimise community risk and, where emergencies occur, respond collectively in the most appropriate manner.

3.12 Emergency Flood Planning in Sheffield

3.12.1 As explained in Section Two, Sheffield's location in the upper reaches of the Don catchment places additional importance on making a swift and effective response to potential and / or actual flooding incidents affecting the city.

3.12.2 The Emergency Planning Shared Service for Rotherham and Sheffield (EPSS) has produced the Sheffield City Council Major Incident Plan and the Sheffield Multi-Agency Flood Plan (SMAFP). Between them, these document the response and recovery arrangements of relevant agencies within the city.

3.12.3 In a major flooding emergency, South Yorkshire Police will normally assume overall co-ordination of operations supported by all category one responders and, where appropriate, category two responders. The SMAFP is activated by the EPSS on notification from the Environment Agency, Met Office, emergency services or members of the public of a potential or serious flooding incident affecting Sheffield. Activation relies heavily on warning systems provided by the EA and the Met Office flood forecasting centre. Further details of these systems are available at the following link:<http://metoffice.gov.uk/public/weather/flood-warnings/ea#?tab=floodWarningsDetail>

Land Drainage and Water Quality

3.13 Land Drainage Law and Regulation

3.13.1 The Land Drainage Acts 1991 and 1994 give SCC permissive powers to maintain the flow in ordinary watercourses and to ensure they are free from obstruction. The Council can require landowners to carry out work to remove any obstruction and maintain the flow. It can also carry out works on ordinary watercourses and undertake drainage work on private land to prevent flooding. The Environment Agency has similar land drainage powers in relation to main rivers.

3.13.2 It should be emphasised that, although SCC and the EA have permissive powers relating to the maintenance of flow in watercourses, these organisations are only legally responsible for the physical maintenance of watercourses where they themselves are the landowners.

3.14 Riparian Ownership

3.14.1 Persons or organisations owning land or buildings next to or over a watercourse, or with a watercourse running through their land or buildings, are defined as riparian owners in common law. The Environment Agency's publication, Living on the Edge, (available on the EA's website at www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx) gives a guide to riparian

owners' rights and responsibilities. In general, these responsibilities relate to the upkeep of watercourses and allowing water to flow unhindered and free from pollution.

3.15 The Water Framework Directive (2000)

3.15.1 The EU Water Framework Directive (WFD) came into effect in 2000. It was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The Directive requires that objectives be set for all surface and ground waters to protect and restore clean water throughout Europe to ensure its long-term sustainable use.

3.15.2 The objectives of the WFD include:

- preventing deterioration in the status of surface water bodies, protecting them and improving their ecological status
- achieving at least 'good' status for all waters by 2015, 2021 or 2027 depending on the criteria set out in the WFD
- promoting the sustainable use of water as a natural resource, balancing abstraction and recharge
- conserving aquatic ecosystems, habitats and species
- progressively reducing or phasing out the release of pollutants which present a significant threat to the aquatic environment

- progressively reducing the pollution of groundwater and preventing or limiting the entry of pollutants
- contributing to mitigating the effects of floods and droughts on surface water bodies

3.15.3 The Directive sets a target for all surface and groundwater bodies to reach 'good' status by 2015. However, it recognises that some water bodies are artificial or heavily modified in order to provide water supply, flood protection or navigation, or to support built infrastructure, and sets lower targets accordingly. Artificial or heavily modified water bodies need to reach 'good' ecological potential by 2027.

3.15.4 All new activity in the water environment needs to take the Directive into account. The WFD requires that any proposal affecting the water environment be assessed to identify potential impacts which could cause deterioration in a water body or could hinder the water body from meeting its WFD objectives.

3.15.5 The Environment Agency is the competent authority in England and Wales responsible for delivering the Directive. The WFD establishes an approach to water management based upon river basins and natural geographical and hydrological areas.

3.15.6 River Basin Districts are used in the WFD to manage water environments. A management plan has been produced for each River Basin District in the UK. These plans tell us, at a local level, which actions

and measures we all need to implement in order to achieve the objectives of the WFD. Sheffield is part of the Don / Rother catchment which is included in the Humber River Basin Management Plan.

3.15.7 Clearly, the functions of LLFAs and RMAs, together with measures identified to reduce flood risk, can contribute to achieving WFD targets and objectives. The following are examples of flood risk management activities which can have a bearing on Water Framework Directive objectives:

- consenting works on watercourses
- maintaining flow in watercourses
- promoting the use of SuDS with developers and the highway authority
- approving and adopting SuDS which comply with agreed standards of design and construction
- planning policies relating to Sheffield's strategic green network
- working with communities and riparian owners to improve watercourse management
- where possible, opening up watercourses to reinstate their natural beds and banks
- identifying and removing unlawful foul sewage connections to the surface water sewer network
- modifying poorly operating combined sewer overflows and sewage treatment works

- reviewing highway maintenance regimes
- enforcing the Environmental Permitting Regulations 2010

3.15.8 The Environment Agency provides a range of material on the Water Framework Directive on the following webpage:

<http://environment-agency.gov.uk/research/planning/33362.aspx>

3.15.9 Section 8.2 discusses how WFD is incorporated into the strategy and how delivery of measures will take the objectives of WFD into account.

3.16 Flood Risk Management Plans and Assessments

3.16.1 The SFRMS is the definitive document for managing flood risk in the city bringing together all other plans and assessments that improve our understanding of and make recommendations for addressing the key forms of flood risk. Table M summarises the current range of plans and assessments relating to the Sheffield area, outlining what they do and their recommended actions.

Title	Body	Date	Context	Purpose	Key Recommendations, Conclusions and Outputs	Applying SFRMS Actions (Refer Plan in section 6)
Strategic Flood Risk Assessment – Level 1	Sheffield City Council (SCC)	July 2008	Mainly fluvial main river flood risk	The SFRA Level 1 informs the spatial and emergency planning processes and planning policy on flood risk. Undertaken in accordance with National Planning Policy Statement 25.	<ul style="list-style-type: none"> Planning solution to flood risk management Guidance on the application of the sequential and exception tests. Review SCC emergency plans. 	3a – Review emergency plans 4b – Development management 4c – SFRA review
Water for Life and Livelihoods - Humber River Basin Management Plan	Environment Agency (EA)	December 2009	Pressures facing the Water Environment in the Humber River Basin District.	Prepared under the Water Framework Directive (WFD), the plan gives targets and key actions for the improvement of surface water bodies relating to water quality and physical modification.	<ul style="list-style-type: none"> The plan identifies 78 water bodies and 18 lakes in the Don catchment with 8% assessed at 'good' status. Specific objectives for the Don catchment are to remove pollutants from urban sources and to control the physical modification of water bodies. The plan is for all water bodies in the Sheffield area to achieve 'good' status by 2027. 	3f – Highway drainage improvements 4a – SuDS 6a, 6b – Watercourse regeneration
Don Catchment Flood Management Plan	EA	December 2010	All sources of flood risk in the Sheffield and Upper Don Policy Units	<ul style="list-style-type: none"> Helps us to understand flood risk now and in the future. Provides a high level long term plan for sustainable flood risk management. Identifies flood risk management policies to assist key decision makers in the catchment. 	<ul style="list-style-type: none"> Policy 5 applies to the Sheffield Policy Unit – take further action to reduce existing and future flood risk. Recommends multiple approaches to managing flood risk including: <ul style="list-style-type: none"> - partnership working - development management - upstream management 	1c – Community engagement/partnership working 4b – Development management 5a – 5d – main river flood risk management strategy
Preliminary Flood Risk Assessment (PFRA)	SCC	June 2011	Local flood risk	<p>Prepared in accordance with the Flood Risk Regulations 2009.</p> <p>The PFRA is a high level screening exercise that compiles information on significant local flood risk from past and future floods. The PFRA also includes the identification of flood risk areas where the final two stages of the Flood Risk Regulations apply.</p>	<p>The Sheffield PFRA does not identify a significant local flood risk area for the purposes of undertaking further assessment stages of the Flood Risk Regulations.</p> <p>Future local flood risk is estimated to be low. Based on local knowledge and records, flood incidents are not commonplace. Watercourse blockages do however present a risk of flooding during more frequent events.</p> <p>Recommends a systematic approach to the management of flood data and the recording of flood incidents.</p> <p>The SWMP assesses the risk of surface water flooding within the city to be low and recommends that the risk is managed through planning, development control and asset maintenance.</p> <p>A new 2D hydraulic model providing baseline information and improved scenario testing.</p> <p>Assesses standard of protection provided by current defences.</p> <p>Revised fluvial flood maps to be published.</p>	1b, 2a and 3e – asset and recording systems 2a - 2c, 3f – asset management 4a and 4b development management
Surface Water Management Plan	SCC	March 2012	Local flood risk – surface water and ordinary water-courses	Increased understanding of local flood risk from surface water and ordinary watercourses.		
Sheffield Comprehensive Flood Review (SCFR)	EA	2013	Fluvial main river	The SCFR reviews the definition of fluvial flood risk for Sheffield and the Upper Don.		5a – main river flood risk management strategy

Table M: Flood Risk Management Plans and Assessments for the Sheffield Area

3.17 Strategic Alignment with Sheffield's Corporate Plan

3.17.1 The Sheffield Corporate Plan for the period 2011 to 2014, Standing Up for Sheffield, sets out the City Council's aims for the next three years and how they will be achieved.

3.17.2 The SFRMS will be delivered within the context of the corporate plan and is essential to the achievement of two strategic corporate outcomes - 'Competitive City' and 'A Great Place to Live'. Within these outcome groups, the SFRMS aligns with declared priorities of

'Environmental Responsibility and Resilience' and 'Desirable Homes and Neighbourhoods'. These priority areas recognise changing weather patterns and the need to make the city resilient to climate change by improving the city's strategic infrastructure and built environment and by delivering quality sustainable housing.

Figure N outlines the wider corporate alignment of the SFRMS under the governance of the Competitive City Strategic Outcome Board where it will sit alongside the developing Sheffield Climate Change Adaptation Strategy.

Figure N: Competitive City Strategic Outcome Board – Vision and Benefits



4. Who Does What: Risk Management Authorities and their Functions

4.1 Partnership Working and the Functions of Risk Management Authorities

4.1.1 The Flood and Water Management Act 2010 (F&WMA) defines certain organisations operating in Sheffield as 'risk management authorities' (RMAs) to work with the Lead Local Flood Authority (LLFA) in managing flood risk.

4.1.2 This chapter describes the legal responsibilities and functions assigned to the four flood RMAs operating in Sheffield, who are:

- the Lead Local Flood Authority (Sheffield City Council)
- the Highways Authority (also Sheffield City Council)
- the Environment Agency
- Yorkshire Water, as the sewerage undertaker

4.2 Flood Risk Management Partnership

4.2.1 As well as having specific responsibilities and functions relating to flooding, the RMAs have shared duties and powers under the Act, which are:

- a duty to act consistently with the Local Flood Risk Management Strategy when carrying out their flood risk management functions

- a duty to work in partnership to manage flood risk in the Sheffield area and to co-ordinate flood management activities
- a duty to share information and data relating to their flood risk management activities
- a duty to be subject to the scrutiny of the LLFA's democratic processes in respect of their flood risk functions
- the power to delegate flood risk management functions to other RMAs subject to mutual agreement

4.2.2 The Sheffield Flood Risk Management Partnership has been formed to manage and co-ordinate activities across the city and to share information and data. Its core membership comprises the four RMAs with extended membership when required taken from external partners and other SCC service areas. Figure O sets out the partnership and governance arrangements that are in place to manage flood risk both locally and regionally.

- Other Partners**
- South Yorkshire Resilience Forum
 - Sheffield Waterways Steering Group
 - Sheffield River Stewardship Company
 - South Yorkshire Forest
 - Canal and River Trust
 - Sheffield Chamber of Commerce
 - South Yorkshire Land Drainage Group
 - Rotherham MBC
 - Barnsley MBC
 - Derbyshire CC
 - Doncaster MBC
 - Community Flood Groups

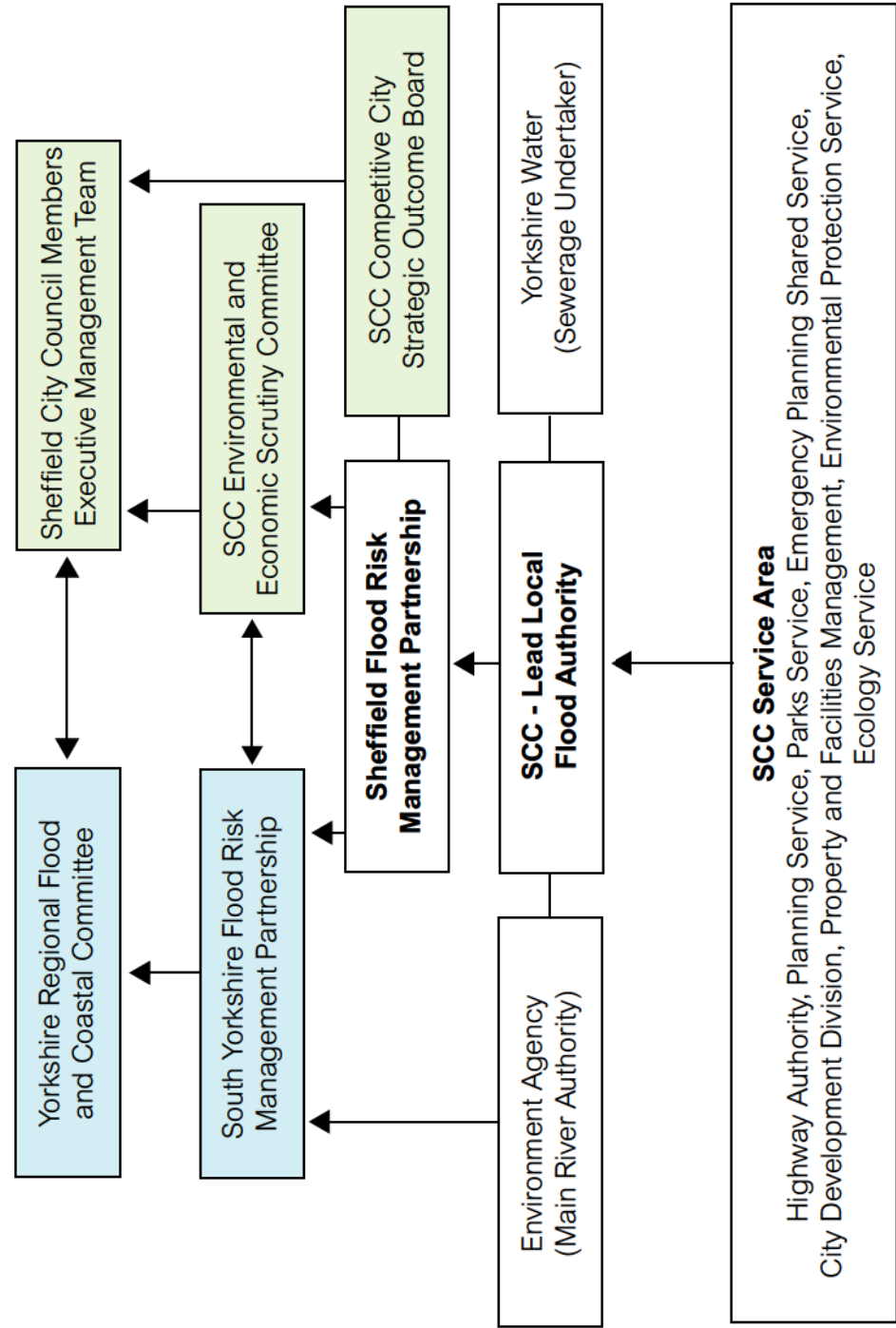


Figure O: Flood Risk Management Partnership and Governance

4.3 Sheffield City Council as Lead Local Flood Authority

4.3.1 Sheffield City Council (SCC) recognises that it has an important and challenging role to play as Lead Local Flood Authority in delivering local flood risk management in its area and in co-ordinating the activities of all relevant agencies.

4.3.2 As well as this general responsibility, the F&WMA assigns specific management functions to SCC relating to local flood risk. This is defined as flooding from surface water, groundwater and ordinary watercourses.

4.3.3 Risk management functions are expressed as duties or permissive powers. A duty is something that SCC is legally obliged to do; a power can be used at SCC's discretion but does not have to be used.

4.3.4 SCC's risk management duties are:

- to develop, maintain and apply a Local Flood Risk Management Strategy
- to develop and maintain information on flooding from ordinary watercourses, surface water and groundwater
- to investigate incidents of flooding in its area where appropriate and necessary, and to publish reports
- to maintain a register of structures and features which have a significant effect on flood risk
- to establish and operate an approval body for sustainable drainage systems (SuDS) serving new development of more than one property (expected to become effective in 2014).

SCC's permissive powers are:

- the power to designate any structure or feature that affects flooding
- to decide whether third party works on ordinary watercourses can take place and, where appropriate, consent to those works
- the power to carry out works to manage flood risk from surface water and from groundwater

4.3.5 SCC has powers under the Land Drainage Act 1991 to:

- maintain and improve ordinary watercourses and build new works
- serve notice on any person or body requiring them to carry out necessary works to maintain flow in ordinary watercourses.

The consent of the Environment Agency is required before the exercise of these powers.

4.3.6 Although SCC has powers to work in ordinary watercourses, it is only responsible for the maintenance of watercourses where it is the riparian owner.

4.4 Investigation of Flooding Incidents

4.4.1 SCC understands the importance of good flooding intelligence and understanding. It is committed to improving its flood reporting systems and procedures and will endeavour to record all incidents of flooding. On becoming aware of a flood in its area, the Council will decide whether to formally investigate the incident under section 19 of the Flood and Water Management Act.

The following threshold criteria relating to the flooding incident will apply in making this decision:

- six or more properties are internally flooded during a single incident.
- a major transport route is closed during a peak period or for more than a specified number of hours.
- flooding to critical infrastructure occurs.

4.4.2 Other factors that will be taken into account in deciding whether to investigate incidents of flooding formally are:

- the depth and speed of floodwater presents a risk to life or serious injury
- the frequency of flooding at the location
- a request to investigate is received from democratically elected persons or bodies.

4.4.3 The investigation will identify those authorities with relevant flood risk management functions, what actions they have taken and what actions they are planning to take. The results will be published on SCC's website together with any flood risk management recommendations deemed necessary. Depending on the extent and severity of the flood, SCC will endeavour to publish the results within three months of the date it becomes aware of the incident.

4.5 Maintaining a Register of Assets

4.5.1 The register of assets will contain details of all structures and features which have a significant impact on flood risk. As a

minimum, this will include the ownership and condition of the asset. The criteria outlined in section 4.4 will be used to decide which assets should be included in the register. The register will include those assets which defend against flooding, such as an earth embankment, as well as those which form a key part of the drainage system such as a local watercourse, culvert or sewer. Obviously, building up such a register will require the input of many agencies and landowners, and will continue over many years. The intention is to publish the first edition of the register in GIS format on the Council's website in 2013. The purpose of such a register is to:

- inform the public and raise awareness of important flood risk structures and features within the city
- help identify suitable maintenance regimes
- inform investigations into flooding incidents

4.6 Approval Body for Sustainable Drainage Systems (SuDS)

4.6.1 The Government consulted on its proposals for the future drainage of surface water from new developments at the beginning of 2012, and is now in the process of evaluating new legal and technical requirements. The core proposal will see a major change in the responsibility for new surface water infrastructure from the sewerage undertaker to the LLFA, with the adoption of more natural forms of drainage. SCC promotes the use of SuDS as part of the Sheffield Local Plan and recognises

their benefits in managing flood risk and enhancing the urban environment. SCC has begun preparations to form a SuDS Approval Body (SAB) linked to the planning process in advance of an expected implementation in 2014. SCC looks forward to working in partnership with developers to bring in new arrangements for the SAB and to agree drainage and flood risk management proposals as early as possible in the development process.

4.7 Sheffield City Council as Highway Authority

4.7.1 SCC has a duty to maintain Sheffield's public highway network (excluding motorways and trunk roads). The Highways Act (1980) places a responsibility on the City Council to drain the highway of surface water and to maintain highway drainage systems. To exercise this responsibility, the Highway Authority may undertake works on the highway or land adjoining it for the purpose of draining the highway, or to prevent surface water flowing onto it and causing flooding.

4.7.2 In Sheffield, surface water from the highway traditionally drains into the public sewer network maintained by Yorkshire Water or, occasionally, into separate highway carrier drains maintained by the highway authority. In the future this system of drainage may change, with surface water from new development being drained and treated by sustainable drainage systems (SuDS) infiltrating to the ground or draining directly to watercourses or, as a last resort, to the sewer network. It is expected that government will require the LLFA to form a SuDS Approval

Body (the SAB) to approve SuDS serving new development for adoption by the LLFA or the highway authority.

4.8 The Streets Ahead Project

4.8.1 In August 2012, SCC started a 25-year contract with a strategic partner for the provision of Highways Services - Amey. This citywide project, called Streets Ahead, will transform Sheffield's highway network and will include the maintenance of highway drainage infrastructure.

4.9 Sheffield City Council as Emergency Flooding Responder

4.9.1 As a category One responder under the Civil Contingencies Act, SCC will respond to flooding incidents in accordance with the Sheffield Multi-Agency Flood Plan (SMAFP). The response includes the provision of emergency assistance by SCC's Streets Ahead partner, Amey, in accordance with an Emergency Plan for Dealing with Flooding.

4.9.2 The SMAFP is activated by SCC's Emergency Planning Shared Service (EPSS) when the service receives one or more of the following:

- an Environment Agency flood warning for main river catchments in the Sheffield area.
- a Met Office amber or red warning of rainfall for the Sheffield area
- a request from emergency services
- a report of serious flooding in the Sheffield area.

4.10 Sheffield City Council as Planning Authority

4.10.1 The Sheffield Local Plan sets out:

- at a strategic level, what is going to happen where and how is it going to happen
- the preferred and acceptable uses for land in the city
- criteria and policies for determining planning applications

4.10.2 The role of the planning authority in flood risk management is:

- to avoid inappropriate development in areas designated as being at risk of flooding
- to mitigate the surface water run-off impacts of new development on downstream areas

4.10.3 SCC's Planning Service takes a risk-based approach when determining planning applications in accordance with the National Planning Policy Framework. An assessment of both the probability of the site to flood and the vulnerability of the use is taken into account. The process is documented in the Sheffield Strategic Flood Risk Assessment Level 1. The Environment Agency's flood maps are used to determine the probability of a site to flooding from main rivers.

4.10.4 The Core Strategy policies for mitigating surface water run-off impacts from new development are supported in more detail by the Climate Change and Design Supplementary Planning Document and Practice Guide. Core Strategy policy CS67 deals with flood risk management, and requires the use of Sustainable Drainage

Systems or sustainable drainage techniques on all sites where feasible and practicable.

4.11 Sheffield City Council as Riparian Owner

4.11.1 As a landowner in the city, SCC is the riparian owner of watercourses passing through or adjoining its land. SCC's duties as riparian owner are:

- to let water flow over its land without any obstruction, pollution or diversion which would affect the rights of others
- to accept flood flows through its land, even if these are caused by inadequate capacity downstream
- to maintain the bed and banks of the watercourse and the trees and shrubs growing on the banks
- to keep the bed and banks free from any artificial obstructions that may affect the flow of water. This includes clearing litter, heavy siltation or any invasive species of vegetation, such as japanese knotweed.

4.12 The Functions of the Environment Agency

4.12.1 The Environment Agency (EA) and the Department of the Environment, Food and Rural Affairs (DEFRA) have jointly developed and implemented a National Flood and Coastal Erosion Risk Management Strategy for England entitled 'Understanding the risks, empowering communities, building resilience'. The EA has a strategic overview role for all

sources of flooding as well as an operational role in managing flood risk from main rivers and reservoirs.

4.12.2 The National Strategy outlines the EA's strategic functions as:

- ensuring that catchment flood management plans (CFMPs) are in place and are monitored to assess progress. The plans will set out high-level and current and future risk management measures across catchments
- publishing and regularly updating its programme for implementing new risk management schemes and maintaining existing assets
- supporting risk management authorities' understanding of local flood risk by commissioning studies and sharing information and data
- supporting the development of local plans and ensuring their consistency with strategic plans
- managing and supporting Regional Flood and Coastal Committees and allocating funding

4.13 The Agency's Operational Role

4.13.1 The EA's operational functions are:

- risk-based management of flooding from main rivers (Table C lists the main rivers in Sheffield) including permissive powers

to carry out works in main rivers including building new flood defences

- regulation of works in main rivers through the consenting process
- regulation of reservoirs with a capacity exceeding 10,000m³
- emergency planning – working with the Met Office to provide forecasts and warnings of flooding from main rivers
- the maintenance and operational management of main river assets including flood defences
- statutory consultee to the development planning process
- the power to serve notice on any person or body requiring them to carry out necessary works to maintain the flow in main rivers

4.14 Functions of Yorkshire Water

4.14.1 The ten water companies in England and Wales are both water supply service providers and sewerage undertakers. The water and sewerage industry is regulated by Ofwat, through the Water Industry Acts 1991 and 1999 and the Water Act 2003, to ensure that consumers' interests are protected. The water companies' flood risk management responsibilities relate to their operations as sewerage undertakers, reservoir owners and providers of infrastructure to new development.

4.15 Yorkshire Water Sewerage Services

4.15.1 Most rainwater falling onto properties and roads drains into the public sewer network owned by the water companies. Rainwater enters either:

- a) the combined sewer network and passes to sewage treatment works or
- b) surface water sewers and is discharged to rivers and streams.

4.15.2 Yorkshire Water is the sewerage undertaker for Sheffield and is responsible for managing the risk of flooding from combined or surface water sewers due to stormwater entering them. As such, Yorkshire Water operates in Sheffield as a risk management authority under the Flood and Water Management Act.

4.15.3 The legal framework outlines a general duty to provide, improve and extend the system of sewers in the city with a requirement to provide new sewers for domestic purposes. The drainage of highways to public sewers is by agreement.

4.15.4 In 2011, the Government took the decision to transfer ownership of private sewers to water companies in order to give customers greater clarity and peace of mind should a problem occur like a blocked or collapsed drain. Yorkshire Water gives advice and guidance on this 'big transfer' on its website, using interactive diagrams to illustrate sewer responsibility.

4.16 Yorkshire Water's Flood Risk Management Functions

4.16.1 Yorkshire Water has the following flood risk management functions in relation to its sewerage services in Sheffield:

- to operate, maintain and upgrade the sewer system to agreed standards advised by Ofwat and DEFRA
- to assess the vulnerability of assets to flooding and to prioritise investment accordingly
- to maintain a register of properties affected by, or at risk of, sewer flooding, known as the DG5 Register
- to enhance the sewer system in accordance with asset management plans approved by Ofwat
- to respond to flooding from sewers
- to co-operate with the LLFA in investigating significant flooding incidents
- to adopt private sewers
- to be subject to scrutiny from LLFAs as part of their democratic process
- to act consistently with the national flood risk management strategy and have regard to the local strategy

4.17 Yorkshire Water as Reservoir Owner and Operator

4.17.1 Sheffield is served by a series of water supply reservoirs located in the upper river catchments to the north and west of the city. The supply reservoirs linked to Sheffield's hydrology are owned and operated by Yorkshire Water.

4.17.2 The legal framework requires that reservoir owners:

- appoint a supervising engineer
- commission regular inspections of the reservoir by an inspecting engineer
- undertake essential works needed in the interests of safety as soon as practicable under the supervision of a qualified civil engineer (from an inspecting engineer panel)
- produce an emergency flood plan for each reservoir

4.18 Yorkshire Water's Role in New Development

4.18.1 Yorkshire Water has an important role to play in the drainage of new development and, in particular, new housing development.

4.18.2 New developments in Sheffield drain rainwater to separate surface water sewers that are installed or adopted by Yorkshire Water using powers conferred by the Water Industry Act 1991 with discharge rates controlled.

4.18.3 The government is expected to introduce new requirements for managing surface water from new development with the creation of new approval bodies for sustainable drainage systems (SuDS). Yorkshire Water will be a statutory consultee to this process.

5. What Do We Want to Achieve?

5.1 Outcomes

5.1.1 We want to reduce the impact of flooding on Sheffield's people, visitors and businesses and to take the opportunity to improve our city's environment.

5.1.2 The increasing risk of flooding combined with challenging financial times means that we need to look at different ways of working and funding. Where suitable and appropriate, we plan to continue to deliver flood protection, however a key theme of the strategy is to work with local communities to help individuals and groups protect themselves.

5.1.3 Using this community engagement approach, and the evidence outlined in section two, the Sheffield Flood Risk Management Partnership has developed a framework for delivery in the areas of flood protection, asset management, development management and incident management.

5.1.4 We have set out seven results that we are working towards which are carefully aligned with Sheffield's Corporate Plan priority of Environmental Responsibility and Resilience. These are:

1. A greater role for communities in managing flood risk
2. Well-managed rivers and watercourses that can cope better.
3. Property and transport routes better prepared against flooding.
4. Sustainable and appropriate development
5. Help keep Sheffield's river valleys open for business
6. Regenerated waterways and water bodies that consider the needs of local plants and wildlife.
7. Areas downstream of Sheffield are not disadvantaged by our actions.

5.1.5 The seventh result is important to our commitment to work with our South Yorkshire partners and to take a catchment-wide approach to managing flood risk. The upstream management of flows is an area that the Partnership are committed to exploring in delivering benefits throughout the Don catchment.

5.2 Objectives

5.2.1 Our objectives in achieving these results are to:

- i. Work with people and communities to develop a clearer understanding of the risks of flooding, set realistic expectations and share our information.
- ii. Work in partnership with risk management authorities and emergency planning services to manage the risk of flooding
- iii. Ensure that Sheffield's rivers, brooks and streams are well managed and make landowners aware of their responsibility to do this
- iv. Ensure planning decisions are properly informed by flooding issues and that surface water from new developments is managed and controlled in a sustainable manner.
- v. Identify hotspots where flooding is likely to occur and to work to secure and prioritise investment

6. How Are We Planning to Deliver?

6.1 Planning for Action

6.1.1 The Sheffield Flood Risk Management Strategy (SFRMS) has an action plan developed during a series of stakeholder workshops held in June and September 2012. Figure P lists the participating stakeholder organisations. The workshops reviewed the strategy's objectives and explored a series of measures planned to deliver the results. Participants assigned a priority rating and timescale to the measures and explored how the action's might be delivered and funded.

6.1.2 The action plan is set out in Section 6.2 and is central to delivering and financing the strategy. It explains:

- What we plan to do.
- How we are planning do it.
- When action is likely to happen
- Who is likely to take the lead on each task.
- How tasks might be funded with the main sources of potential funding explained in Section 7.

6.1.3 We plan to carry out some of the actions quickly but others will take time and will be dependant on securing the required funds. The action plan will be reviewed and, where necessary, revised in line with actual funding secured. The planned timetable for completion is:

- short - up to two years.
- medium - two to five years
- long - over five years

Figure P : Organisations participating in stakeholder workshops at Sheffield City Council in 2012

Environment Agency Incident Management
Environment Agency Partnership and Strategic Overview
Yorkshire Water Flood Risk Management
Street Force (now Streets Ahead Contractor, Amey LG)
Sheffield River Stewardship Company
South Yorkshire Forest Partnership
Sheffield Waterways Strategy Steering Group

Sheffield City Council

Cabinet Member for the Environment, Recycling and the Streetscene
Highway Maintenance
Highway Adoptions
Planning Service
Emergency Planning Shared Service
City Regeneration Division
Parks Service
Property and Facilities Management
Sustainable Development
Environmental Planning Service
EcologyService

6.2 Action Plan of Measures

6.2.1 Glossary to Funding Streams

UC	Sheffield City Council Streets Ahead Annual Unitary Charge
SCC - LLFA	Sheffield City Council Defra Grant for LLFA responsibilities
SCC Rev	Sheffield City Council – Other Revenue Funds
EA Rev	Environment Agency Revenue Funds
YRFCC Levy	Yorkshire Regional Flood and Coastal Committee - Local Levy Funds
Pathfinder	Defra Pathfinder Grant
FDGiA	Defra Flood Defence Grant in Aid
Growth	Defra growth grant
ERDF	European Regional Development Fund
BID	Business Improvement District Levy
PR14	Water Industry Periodic Review 2014 Funds
CIL	Sheffield City Council Community Infrastructure Levy
TBC	To be confirmed

6.2.2 Section seven explains the potential funding streams listed in the action plan.

Result 1. A greater role for communities in managing flood risk

We shall work with people and communities to develop a clearer understanding of the risk of flooding, set realistic expectations and share our information.

How we plan to deliver

Sheffield City Council (SCC) and the Environment Agency (EA) are planning to develop and implement a Community Engagement Project (CEP) in the medium term. A communications strategy will form the framework for how the project will engage with 'at risk' communities and riparian owners and will cover all relevant sources of flooding. Plans are to deliver a pilot of the CEP to the Hillsborough and Wynn Gardens areas.

The CEP will apply a partnership funding approach and encourage volunteers to become involved in working to address the risks of flooding in their community.

What will be the benefits?

- Improved understanding of flood risk and the ability to make informed decisions on personal flood plans and action.
- Increased awareness of riparian owner responsibilities for managing watercourses.
- Better flooding intelligence.
- Incident management – a quicker response to flooding emergencies.

Measure	Priority	Timescale	Lead Organisation	Est Cost £	Potential Funding Stream	Funding Allocation		
						Not Started	Ongoing	Allocated
1a	High	Short	Sheffield City Council	4,000	SCC - LLFA			X
1b	High	Short	Sheffield City Council	5,000	SCC - LLFA			X
1c	Medium	Medium	Sheffield City Council Environment Agency	TBC	Pathfinder/YRFCC Levy/ SCC-LLFA/ SCC Rev/ EA Rev		X	
1d	Medium	Medium		TBC			X	
1e	Medium	Long	TBC	TBC			X	

Result 2. Well-managed rivers and waterways that can cope better

We will work to ensure that Sheffield's rivers, brooks and streams are well managed and will make landowners aware of their responsibility to do this.

How we plan to deliver

Good stewardship of our watercourses is essential in reducing the significant risk of fluvial flooding caused by blockage due to the build up of debris, vegetation or siltation.

We will work with owners of public watercourse assets to:

- identify and survey the condition of key assets;
- review existing maintenance regimes;
- where necessary, look to invest in publically owned watercourses;
- prioritise investment at flooding hotspots.

We will engage with riparian owners of key watercourse assets to ensure that those assets are well managed and kept free flowing.

What are the benefits?

- Reduce the risk of fluvial flooding due to blockage.
- Better management of watercourse assets.
- Increased public awareness of key flood risk assets.

Measure	Priority	Timescale	Lead Organisation	Delivery Components	Est Cost £	Potential Funding Stream	Funding Allocation		
							Not Started	Ongoing	Allocated
2a	High	Short to Medium	Sheffield City Council	a) GIS system development.	a) 5,000	a) SCC – LLFA		X	X
2b	Medium	Medium	Sheffield City Council Environment Agency	TBC	TBC	SCC and EA Rev	X		
2c	Medium	Short to Medium	Sheffield City Council	Watercourse culvert survey programme at flooding hotspots. (Following completion of the programme, the surveys will be assessed to determine the level of remedial works required and possible sources of investment).	120,000	SCC - LLFA		X	X
2d	Medium	Medium	Environmental Agency Sheffield City Council	Part of the Sheffield Lower Don Valley Flood Defence Scheme	500,000	BID*		X	
2e	Medium	Short	Environment Agency	EA maintenance programme	TBC	EA Rev - Maint			X

*Action 2d and BID funds are subject to a positive ballot result in August 2013

Result 3. Property and transport routes better prepared against flooding

We will work in partnership with risk management authorities and emergency planning services to manage the risk of flooding.

How we plan to deliver

The risk of flooding cannot be removed entirely. When flooding occurs, its impact can be reduced by planning for emergencies, building community resilience and acquiring adequate insurance.

We will review and support the development of flood plans at multi-agency, community and individual levels taking into account the current understanding of all forms of flood risk, flooding intelligence, key asset information and guidance on property level resilience measures and insurance.

Working with SCC's Streets Ahead project:

- We will review and update SCC's emergency plan for dealing with flooding and sandbag policy.
- We will deliver a programme of works over a three year period to 2015 to rectify a number of known highway drainage problems.

- Highway drainage inspection frequencies will be increased at certain surface water flooding hotspots and, in particular, following the receipt of flood warnings and after flood events.

We will increase our understanding of overland exceedance flow paths using the upgraded Flood Maps for Surface Water.

What are the benefits?

- Properties more resilient to flooding.
- Better incident management.
- Less surface water flooding on and from the public highway.

Measure	Priority	Timescale	Lead Organisation	Delivery Components	Est Cost £	Potential Funding Stream	Funding Allocation		
							Not Started	Ongoing	Allocated
3a	High	Short	Sheffield City Council Environment Agency	Sheffield Multi Agency Flood Plan Review	4,000	SCC Rev			X
3b	High	Medium	Environment Agency Sheffield City Council	Community Engagement Project (CEP)	Part of CEP costs	Pathfinder/ YRFCC Levy/SCC-LLFA SCC Rev/ EA Rev.		X	
3c	High	Medium							
3d	Medium	Medium							
3e	Medium	Medium	Sheffield City Council Environment Agency Yorkshire Water	GIS based system linked to Flood Reporting System	8,000	SCC Rev			X
3f	Medium	Medium	Sheffield City Council, Streets Ahead Partner, Arney	SCC Streets Ahead Project	Part of UC	UC			X
3g	High	Short	Yorkshire Water	YW's Drainage Area Planning Programme.	TBC	YW Rev			X

Result 4. Sustainable and appropriate development

We shall ensure planning decisions are properly informed by flooding issues and that surface water from new developments is managed and controlled in a sustainable manner.

How we plan to deliver

We will assess applications taking into account the latest understanding of flood risk in the city and the requirements of the new National Planning Policy Framework. To inform this process, we plan to review the Sheffield Strategic Flood Risk Assessment Level 1 and identify areas for level 2 assessment.

We shall take into account the recommendations of the Sheffield Surface Water Management Plan and standards for sustainable drainage systems (SuDS) when assessing planning applications for new developments.

We have started work to establish a SuDS approval body (SAB) by building capacity in this area and by starting the development of SAB policies, systems, processes and documentation. We will apply SuDS principles to determining applications.

What are the benefits?

- New development contributing to reduce the risk of flooding in a sustainable manner.
- Expanding the use of natural rainwater in the urban environment for enhanced amenity, environmental and educational benefits.
- Enhanced biodiversity.
- Better water quality and reduced pollution of watercourses.

Measure	Priority	Timescale	Lead Organisation	Delivery Components	Est Cost £	Potential Funding Stream	Funding Allocation		
							Not Started	Ongoing	Allocated
4a	High	Short	Sheffield City Council	Establish the Sheffield SAB Review SuDS planning policies and standards in line with the Sheffield SWMP	80,000	SCC-LLFA SCC Rev			X
4b	High	Short	Sheffield City Council						
4c	Medium	Medium	Sheffield City Council	Review SFRA Level 1 Identify Level 2 assessments	TBC	TBC	X		

Result 5. Help keep Sheffield's river valleys open for business

We shall identify hotspots where flooding is likely to occur and shall work to secure and prioritise investment

How we plan to deliver

Building on the work of the Environment Agency's Sheffield Comprehensive Flood Review (SCFR) and river stewardship programme, the Environment Agency and Sheffield City Council will develop a strategy for addressing fluvial flood risk in the city's main river valleys. The main components of the strategy will be:

- Provide flood defences where appropriate.
- Upstream management of flows
- River stewardship.
- Community resilience.
- Development Management

What are the benefits?

- Reduce the risk of fluvial flooding to properties and infrastructure in Sheffield's main river valleys
- Supports the economic regeneration of Sheffield's river valley corridors to stimulate growth and investment.

Measure	Priority	Timescale	Lead Organisation	Delivery Components	Est Cost £	Potential Funding Stream	Funding Allocation		
							Not Started	Ongoing	Allocated
5a	High	Short	Environment Agency Sheffield City Council	SCFR	TBC	EA Rev SOC Rev		X	
5b	High	Short	Sheffield City Council Environment Agency	Capital scheme	7,750,000	YRFCC Levy/FDGiA FDGiA/Growth/ BID *		X	
5c	High	Short to Medium	Environment Agency Sheffield City Council	Study into the suitability and benefits of upstream reservoirs in managing peak flows.	50,000	YRFCC Levy			X
5d	Medium	Medium	Yorkshire Water	Drainage Area Plans studies and sewerage network modelling for Sheffield.	TBC	YW Rev PR14		X	
5e	Medium	Long	Environment Agency	TBC	5,000,000	FDGiA/YRFCC Levy/ Partnership	X		
5f	Medium	Long	Environment Agency	TBC	1,000,000	FDGiA/YRFCC Levy/ Partnership	X		

1. FDGiA funds are subject to the national selection process as defined in section 7.2.
2. BID funds are subject to a positive ballot result in October 2013 as defined on page 68.

Result 6. Regenerated waterways and water bodies taking into account the needs of the natural environment

How we plan to deliver

The Sheffield Waterways Strategy Group (SWSG) has set out the vision for Sheffield's rivers and waterways in the 'City of Rivers' document.

The SWSG plans to establish and maintain a catchment restoration fund based on the partnership financing model. Strategic regeneration plans for the City will be used to target investment.

Our developing SAB policy will promote watercourse regeneration in planning for new development and in determining applications. This policy will build on current planning policies for the city's strategic green network as defined in the Sheffield Local Plan.

What are the benefits?

- Restoring naturalised flood plains reducing the risk of fluvial flooding downstream.
- Regeneration of the city's waterways and water bodies providing increased recreational and tourism potential.
- Enhanced biodiversity.
- Realise the economic potential of the city's waterscapes to stimulate growth and investment.
- Contributes to achieving Water Frame Directive benefits.

Measure	Priority	Timescale	Lead Organisation	Delivery Components	Est Cost £	Potential Funding Stream	Funding Allocation		
							Not Started	Ongoing	Allocated
6a	Medium	Medium to Long	Sheffield City Council Environment Agency Developers	Sheffield Waterways Strategy SCC planning process SCC SAB process	TBC	TBC		X	
6b	Medium	Short	Sheffield City Council	Feasibility studies and pre-tender preparatory work. Design and construction	50,000 TBC	YRFCC Levy YRFCC Levy/ Developer contributions		X	X

7. Financing the Strategy

- Potential Funding Streams

7.1 Introduction

7.1.2 The following section explains the main sources of funding for flood risk management work.

7.1.3 There are significant resource pressures facing local authorities and, in the foreseeable future, there will be less direct public funding available to finance flood risk management projects. Therefore, a new partnership approach, involving more innovative financing solutions, is needed.

7.1.4 Sheffield City Council (SCC), acting as the Lead Local Flood Authority (LLFA) in Sheffield, will play a significant role in developing this partnership approach to securing investment. In general, the accountable body will be SCC or the Environment Agency (EA), and public funding streams will require their active support and involvement. SCC will seek to form partnerships with community groups, riparian owners and businesses to maximise investment.

7.2 Flood and Coastal Resilience Partnership Funding

7.2.1 Since April 2012, large capital projects have been assessed under the new Government policy of Flood and Coastal Resilience Partnership Funding. Under this new policy every worthwhile scheme has the potential to be supported by national funding over time. Schemes will either be fully funded or partly funded depending on the benefit that scheme provides – the ‘Payment for Outcomes’ approach. The Government

considers that this approach will mean that more schemes will go ahead.

7.2.2 This policy determines how the primary source of capital funding, the national Flood Defence Grant in Aid (FDGiA), is allocated to eligible schemes. Proposals are given a partnership funding score related to a scheme’s benefits in terms of the number of households protected, the damages being prevented and the environmental, regeneration and economic benefits. If a proposal qualifies for partial funding, the scheme will only go ahead if other money can be found from stakeholders or if costs can be reduced. This approach is being applied to the Sheffield Lower Don Valley Flood Defence scheme, allowing other economic and regeneration benefits to be realised.

7.2.3 The partnership approach aims to provide improved transparency and greater certainty over potential funding levels. It also aims to allow local areas to have a bigger say in what is done to protect them, putting added emphasis on providing support to those most at risk and living in the most deprived areas.

7.3 Criteria for Growth Funding

7.3.1 In December 2012, the Government announced £60 million of accelerated funding to be targeted at areas where flood defences can unlock new opportunities for growth by lowering the risk of flooding. This funding will be strictly applied to those schemes that meet specific ‘growth’ criteria, can be demonstrated to deliver significant economic benefits and may have struggled to reach the required partnership funding score due to the emphasis on non-residential outcomes.

7.3.2 The Sheffield Lower Don Valley Flood Defence scheme has been allocated £5.5 million as one of nine national projects to receive Growth funding.

7.4 Yorkshire Regional Flood and Coastal Committee (YRFCC) Levy Funds

7.4.1 The EA levies precepts on all LLFAs in the YRFCC region on a yearly basis to fund a programme of flood risk management schemes and measures that the YRFCC considers to be regional priorities. The EA's regional office administers this budget on behalf of the YRFCC. The annual levy budget for the Yorkshire region in the 2013/14 financial year is £2 million with SCC contributing £189,000 to the budget.

7.4.2 In January 2012, the YRFCC approved a new selection process and criteria for the levy-funded programme. Under the new arrangements, and following YRFCC approval, levy funds can be used to:

- support schemes addressing local as well as main river flood risk.
- supplement schemes in the FDGiA funded programme
- support feasibility studies
- support priorities identified in the LLFA's local flood risk management strategies
- support innovation

7.5 Flood Resilience Community Pathfinder (FRCP)

7.5.1 The FRCP is a Defra initiative designed to support innovation by funding projects in England that demonstrate improved resilience in communities at risk of significant flooding. Defra plans to make £5 million available in three phases between 2013 and 2015.

7.5.2 Funding will be targeted specifically at innovative local initiatives that can be developed to complement the protection offered by flood defences at a community level. The FRCP is designed to complement the Partnership Funding approach and cannot be used to match fund Partnership-funded schemes.

7.6 European Regional Development Fund

7.6.1 The ERDF is a funding stream which is allocated to regions by the European Union to stimulate regional economies. Yorkshire and the Humber is one of nine regions to qualify for competitiveness and employment funding.

7.6.2 The ERDF is administered by the Department for Communities and Local Government (DCLG) and is aimed at economic regeneration projects promoted primarily by the public sector.

7.6.3 The current round of ERDF operational programmes in the Yorkshire and Humber region runs from 2007 to 2013, with bids for ERDF grants needing to be matched by other funding sources.

7.7 Sheffield City Council Funding

7.7.1 SCC receives annual funds for discharging its role as LLFA through the Department for Communities and Local Government (DCLG) Local Services Support Grant (LSSG). For the current spending review period to 31 March 2015 this amounts to £221,000 per year.

7.7.2 Other key service areas engaged in flood risk management activities and financed by SCC revenue funds include the Planning, City Regeneration, Highways, Parks, Environmental and Ecology services.

7.8 Environment Agency Revenue Funding

7.8.1 The YRFCC receives a revenue grant from Defra to finance the revenue-based activities and staff costs of the EA'S Yorkshire region. The proposed revenue funding allocation for the 2013/14 financial year is £13.5 million. The grant funds:

- maintenance programmes for the EA's regional assets and watercourse repairs
- revenue projects to cover legal requirements, investigations and studies in line with national guidelines
- the remaining revenue allocation covers EA's regional staff costs

7.9 The Streets Ahead Project

7.9.1 In August 2012, SCC embarked on the Streets Ahead Project with its highways strategic partner, Amey. Sheffield will benefit from a vast improvement in the condition of its roads over the project's 25 year lifetime, including better drainage.

7.9.2 For carrying out all the city's highway maintenance service functions, SCC pays Amey a standard amount each month. This is known as the Unitary Charge and is financed using a combination of SCC's own funding and PFI credits from the Government.

7.10 The Community Infrastructure Levy

7.10.1 The Community Infrastructure Levy (CIL) is a new way of securing contributions from developers towards infrastructure provision through the planning system. To a large degree it will replace previous payments negotiated individually as planning obligations (known as Section 106 Agreements).

7.10.2 In September 2011, SCC's Cabinet agreed to work towards implementing a CIL to ensure that major new development contributes to the provision of infrastructure improvements where viable. The money raised will be put towards providing essential infrastructure needed across the City as a result of new development.

7.10.3 SCC's Planning Service is drafting a CIL charging schedule. The proposed charges are based solely on the ability of development to pay, and must be financially viable. Independent consultants have carried out a CIL viability study and this has been used as the basis for setting the charges. SCC is aiming to have the final CIL adopted around April 2014.

7.11 Yorkshire Water Investment in Sewers and Flood Risk Management

7.11.1 Yorkshire Water, as the sewerage undertaker in Sheffield, invests in the sewerage network of foul water, surface water and combined sewers and sewage treatment works. This investment finances the operation, maintenance, reconditioning and enhancement of the network.

7.11.2 The industry operates a five-yearly investment cycle known as the Asset Management Period (AMP), with AMP5 continuing from 2010 to 2015 and the next period, AMP6, proceeding from 2015 to 2020.

7.11.3 The volume of investment is controlled by the regulator, Ofwat, which determines how much the company can charge its customers for sewerage services. This is managed through a periodic review of the company's business plan and AMP proposals.

7.11.4 The next periodic review is in 2014 and is referred to as PR14. Yorkshire Water

considers that the following flood risk management schemes in Sheffield could potentially receive PR14 contributions:

- A review of the Don Valley Intercepting Sewer in Sheffield.
- The upstream management of river flows utilising storage capacity in compensation reservoirs in the Upper Don Valley above Sheffield.

7.11.5 Yorkshire Water has commissioned the development of a comprehensive hydraulic model for Sheffield's sewerage system to identify future capacity issues and to support capital investment as part of AMP6. Yorkshire Water plan to complete this project in March 2015 and plan to make results available to the Sheffield Flood Risk Management partnership.

Case Study: Partnership Financing Solution for the Sheffield Lower Don Valley Flood Defence Scheme

Sheffield's industrial heartland in the city's Lower Don Valley (LDV) was badly affected by flooding in 2007, which impacted on business and jobs.

Since 2008, SCC officers have been working with a group of major businesses in the Don Valley, including Sheffield Forgemasters and British Land, to draw up plans for a comprehensive flood defence scheme that aims to protect the area to a 1:100 year standard and will embrace all forms of flood risk.

Developing a solution for financing the scheme has proved very challenging and is still fluid; however, the partnership funding approach has been applied with much success to date.

A funding profile has been put together that maximises contributions from wider regeneration and private sources.

The proposed funding profile (at June 2013) is:

	£ million
• YRFCC Levy	0.10
• FDGiA	1.25
• Defra Growth	5.50
• Business Improvement District	1.40
• Total	8.25

The private business contribution is proposed to be raised by way of a Business Improvement District (BID), a well-established mechanism for collecting business contributions to enhance services for an area following a ballot. These powers have not so far been used for flood defences; however this is considered to be an innovative approach which is fair, transparent and democratic. It has been enthusiastically supported by the EA, DEFRA and the Sheffield Chamber of Commerce.

The BID proposal effectively constitutes a percentage levy on the rateable value of businesses located in the area that benefits from new flood defences and planned channel maintenance. The BID requires a majority ballot of those businesses within this area and, if approved, the increased business rate payment will be collected over a five-year period. The BID ballot is scheduled to take place in Summer 2013.

Preliminary design of the LDV flood defence scheme is nearing completion and the partnership anticipates that construction will start in 2014.

8. Wider Environmental Objectives

8.1 Overview of Objectives

8.1.1 The aim of the Sheffield Flood Risk Management Strategy (SFRMS) is to reduce the risk of flooding whilst taking the opportunity to create a better environment.

8.1.2 Our climate is changing with the Sheffield region predicted to experience drier summers, wetter winters and more intense rainfall events. We need to continue our approach to a more natural and sustainable management of the water cycle in order to protect both Sheffield's and the region's ecology and heritage.

8.1.3 Flood risk management presents opportunities to contribute to the delivery of wider ecological and social benefits that are shared with other strategic initiatives.

8.1.4 The SFRMS will prioritise its contribution in two areas:

- Managing pressures on the water environment of Sheffield's watercourses and water bodies in accordance with the requirements of the Water Framework Directive.
- Improving well-being by enhancing and 'opening up' our waterways and green spaces to create pleasurable, sustainable and accessible landscapes at one with native vegetation and wildlife

8.2 The Water Framework Directive

8.2.1 The objectives of the Water Framework Directive (WFD) include:

- Prevent deterioration in the status of surface water bodies, protect them and improve their ecological status;
- Achieve at least good status for all waters by 2015, 2021 or 2027 depending on the criteria set out in the Directive;
- Promote the sustainable use of water as a natural resource, balancing abstraction and recharge;
- Conserve aquatic ecosystems, habitats and species;
- Progressively reduce or phase out the release of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- Contribute to mitigating the effects of floods and drought on surface water bodies;

8.2.2 The Humber River Basin Management Plan (HRBMP) has been prepared under the WFD for the region and is the first of a series of six-year planning cycles. The plan outlines 78 river water bodies and 18 lakes in the Don and Rother catchment with only 8% assessed at 'good status' (chemical and ecological) at December 2009. Most of the river water bodies in the catchment are designated 'moderate status' and are heavily modified which means that the overall plan objective is to improve to 'good status' by 2027.

8.2.3 The HRBMP calls for all related strategies and actions to contribute to the achievement of WFD objectives and,

specifically for the Don and Rother catchment, to remove pollutants from urban sources and to control the physical modification of water bodies.

8.2.4 The SFRMS action plan (section 6) references those actions that are targeted specifically at contributing to the achievement of WFD objectives.

8.3 The Sheffield Waterways Strategy – City of Rivers

8.3.1 The SFRMS has synergy with environmental action plans already underway as part of the Sheffield Waterways Strategy, SCC's Green and Open Space Strategy, the Sheffield Local Biodiversity Action Plan and through Sheffield's Local Development Plan. This is very much the case in our declared outcomes and actions relating to watercourse stewardship and regeneration; spatial planning and sustainable development.

8.3.2 The Sheffield Waterways Strategy (SWS) proposes a 10 year vision to regenerate the city's waterways and puts forward a 5 year action plan. The strategy does not relate solely to the environment, but aims to place residents, workers and visitors at the heart of Sheffield's efforts to promote waterways regeneration.

8.3.3 The SWS plans to support, or if necessary, initiate the following:

- Improved management of all waterways through stewardship and involving riparian owners and communities.

- Establishing a Don catchment level partnership on water quality, biodiversity and river corridor management; for instance through the Living Landscapes Project and the South Yorkshire Green Infrastructure Strategy.
- Promotion of recreational and tourism potential of the waterways
- Develop more sustainable fisheries.
- Change management of moorlands.
- Management of the upland catchment including reservoirs to improve stormwater retention and compensation flows.
- Extend plans for public access to all waterways working with local and catchment-wide partners.
- Seek Green Flag status for key waterways sites.
- Look for opportunities to share knowledge with universities, other UK cities and international partners.
- Develop new ways of communicating with the public such as social networking via the Riverlution website.
- Hold an annual 'State of the Rivers' conference to review progress and partnership.

8.4 Sustainable Surface Water Management

8.4.1 Sheffield's local development plan emphasises an approach to natural and

sustainable management of surface water through the use of sustainable drainage systems (SuDS).

8.4.2 As well as managing flood risk, SuDS contribute to reinstating natural drainage cycles and deliver a wealth of ecological and social benefits.

8.4.3 SCC has promoted the use of SuDS for many years and has started work in creating a SuDS approval body (SAB) in advance of its expected statutory duty to approve drainage proposals for new development scheduled to start in 2014.

Figure Q: SuDS detention basins serving social housing developments on the Manor Estate in Sheffield



8.5 SFRMS - Strategic Environmental Assessment

8.5.1 SCC commissioned the Halcrow Group to undertake a strategic environmental assessment (SEA) of the measures planned as part of the SFRMS and has made the SEA document available on its flood management web pages.

8.5.2 The Strategic Environmental Assessment (SEA) assesses the strategy's measures against a set of environmental objectives to determine the nature and significance of their impacts on the environmental baseline.

8.5.3 The majority of potentially significant impacts identified in the long term (>5years) are positive and are associated with reducing risks to human health, residential property, businesses and material assets. Further positive impacts on biodiversity, heritage, landscape, water quality and recreational assets are also identified.

8.5.4 The SEA identifies that there are potential negative environmental impacts on human health and ecosystems from the development of stormwater attenuation and storage facilities in public open spaces. The SEA recognises that good design and construction practice can mitigate this risk to acceptable levels.

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