

2012

Kirklees Local Flood Risk Management Strategy

A strategy which defines the Councils approach to the management of flood risk from local sources with proposals for measures and actions which will help to manage the risk

Kirklees Council

Kirklees Council

07/02/2013



Kirklees Local Flood Risk Management Strategy

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Use of the Information in the Report

As Lead Local Flood Authority (LLFA), Kirklees Council has a duty to develop, maintain, apply and monitor a strategy for local flood risk management. The local strategy will complement and support the national strategy, published by the Environment Agency, which outlines a national framework for flood and coastal risk management, balancing the needs of communities, the economy and the environment. The LLFA must specify objectives to manage flood risk and suggest measures to achieve those objectives. The LLFA has a responsibility to consider the flood risk management functions that it may exercise to reduce risk.

In support of the aim of a general reduction of flood risk across the district, the Council will prioritise investigations and works identified in this Strategy to the best of its abilities, based on perceived and evidenced risk and within limited resources.

The indications of flood risk in the report are high level and based on incomplete information. A level of subjectivity has been used in assessing relative flood risk and the results will be used to prioritise future, more robust, investigations and assessments which will, hopefully, lead to reliable measures of risk. Consequently, it is not appropriate to apply the information and recommendations in this report at a local, property level.

The Strategy assumes that the new SuDS duties and responsibilities have been implemented in line with the processes indicated in Schedule 3 of the Flood and Water Management Act 2010. However, at the date of publication of the Strategy, Schedule 3 has still to be formally implemented and, therefore, the SuDS responsibilities outlined in the Strategy are not yet in force.

Chapter summaries are highlighted in blue text boxes

Key information is highlighted in yellow text boxes

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1 Executive Summary

The risk of flooding in England is predicted to increase as a result of climate change and new development in areas at risk. It is not possible to prevent all flooding but there are actions that can be taken to manage these risks and reduce the impacts on communities. The Flood and Water Management Act (FWMA) 2010 requires the Environment Agency to publish a **National Strategy for Flood and Coastal Erosion Risk Management** and Lead Local Flood Authorities a **Local Strategy for Flood and Coastal Erosion Risk Management**. Kirklees Council, as Lead Local Flood Authority for the district, has developed this Local Strategy in partnership with its two main Flood Risk Management partners, Yorkshire Water and the Environment Agency, reflecting the needs and priorities of the local community.

Nationally, flood management has been organised and managed disparately with indistinct responsibilities across a variety of organisations. There has been an historic failure to provide clear and co-ordinated management of flood risk and local communities have been let down by poor communication, unclear responsibilities and uncoordinated actions in the local management of flood risk.

The risk of flooding is increasing. Development pressures in urban centres and the prediction of more severe rainfall events as a result of climate change combine to increase the risk in existing communities and offer challenges in managing the risk in new developments. The district has avoided the devastating floods across the country in the last decade at Boscastle, Cornwall (2004), Carlisle (2005), Yorkshire (2007), Cumbria (2009) and, more recently, at Calderdale and York (2012). Whilst the district has escaped recent area-wide flooding, it has suffered several near misses and the predicted risk from future rainfall events is high. Out of 150 LLFAs in the country, excluding London Boroughs and County Councils, Kirklees ranks 7th in terms of overall flood risk behind cities such as Hull, Birmingham and Leeds. It is predicted that up to 27,000 properties in the district (15% of households) could be at risk from an extreme rainfall event creating flooding from all sources.

The new legislation has made responsibilities clearer with the roles of the various organisations set out as follows:

The Environment Agency –

- Managing flood risk from designated “main” rivers
- Regulating the safety of large reservoirs
- Developing the National Strategy for Flood and Coastal Erosion Risk

The Lead Local Flood Authority (Kirklees Council) –

- Developing the Local Flood Risk Management Strategy (LFRMS)
- Managing the risk of flooding from surface water, groundwater and smaller watercourses

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- Investigating significant flood incidents
- Maintaining a register of significant drainage assets
- Approving, adopting and maintaining Sustainable Drainage Systems (SuDS) on new development sites

The Water Company (Yorkshire Water) -

- Effectually draining their area
- Maintaining a register of properties at risk from hydraulic sewer overload, carrying out improvements where resources allow

The Highway Authority (Kirklees Council) –

- A duty to drain surface water from the public highway

The LLFA has the responsibility to co-ordinate the management of local flood risk and the Kirklees LFRMS provides the framework to ensure that the type and scale of local flooding is understood and explained, appropriate objectives have been set, measures to achieve the objectives have been determined and funding arrangements, including value for money for the measures, has been considered.

Historically, the Council has provided only a limited, reactive response to local flood risk management resulting in incomplete records of drainage infrastructure and previous flood incidents, a poor understanding of flood mechanisms and little strategic planning to manage future flood risk. The Kirklees LFRMS will define the Councils approach to managing flood risk in both the short and longer term.

The **Objectives** of the Kirklees LFRMS include statutory requirements from legislation, complementary objectives from other relevant plans and preferences expressed by local communities. The objectives include:

- Improving the level of understanding of local flood risk
- Ensuring that local communities understand their responsibilities
- Actively managing flood risk from new developments
- Balancing economic, environmental and social benefits in managing local flood risk
- Improving the capacity of existing drainage systems through targeted maintenance
- Encouraging responsible maintenance of privately-owned drainage assets
- Identifying affordable improvement programmes, maximising external funding contributions
- Aligning local flood risk management knowledge with the Councils emergency planning procedures

The **Measures** identified in the Kirklees LFRMS provide a long term programme of works and initiatives, such as planning controls, community engagement and improvement and maintenance work, which will be prioritised and programmed to deliver affordable reductions in local flood risk.

32 measures have been developed to address the objectives identified in the strategy. The measures are varied in nature, ranging from simple data recording to complex flood modelling, community information to changing community behaviour/perceptions. The measures include:

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- Recording/mapping flood incidents
- Developing an information strategy to improve stakeholder knowledge
- Publishing and distributing information explaining flood risk responsibilities to local communities
- Establishing the SuDS Approval Body (SAB)
- Developing an affordable cyclical maintenance regime based on risk
- Developing a pragmatic programme of schemes and initiatives which are likely to be funded through the national funding programme
- Developing and implementing a policy on de-culverting

The **Funding** of the measures is outlined in the Strategy. Central government has provided additional funding to ensure that the new legal duties under the FWMA Act are carried out. Therefore, many of the measures detailed in the Strategy are funded and can be carried out within existing Council resources. However, some of the measures, particularly those around capacity improvements and improved maintenance, require additional funding, which will be the subject of future funding bids as projects are identified.

Flood risk across the district is complex with interactions between river, surface water and sewer flooding. It is difficult to determine absolute measures of flood risk but numerous studies and assessments carried out in the last 5 years have helped to highlight where the highest risk areas in the district are. It is clear that a minimum of 20-25,000 properties are at risk of flooding from a “once in a lifetime” rainfall event ie with 0.5% chance of happening in one year. **A more realistic scenario could be such an event affecting 10% of the district, flooding 2,000 properties, causing damage estimated at £70 million.**

The main areas in the district at higher risk of flooding are:

Huddersfield (Leeds Rd/Aspley)	6800 properties
Huddersfield (Dalton)	500
Holme Valley	2500
Dearne Valley	600
Batley	1600
Marsden	700
Dewsbury	2500
Thornhill	700
Spenn Valley	3000
Mirfield	500

The focus in the Kirklees LFRMS is to reduce flood risk from local sources where it threatens property and public infrastructure. The Council is also committed to maximising opportunities to carry out flood risk reduction in ways which are sustainable in terms of affordability, environmentally and socially.

The Kirklees LFRMS is a “living document” which will develop as new evidence, expertise and resources influence the measures outlined in the strategy. The Councils Overview and Scrutiny Committee will assess progress against the Strategy and its continuing validity in managing local flood risk.

2 Glossary

Annual Exceedance Probability (AEP)	The chance of a flood of a given size happening in any one year eg 1 flood with a 1% AEP will happen, on average, once every 100 years
Catchment	A surface water catchment is the total area that drains into a river or other drainage system
Catchment Flood Management Plan (CFMP)	A strategic planning 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.
Chance of flooding	The 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)
Climate Change	A long term change in weather patterns. In the context of flood risk, climate change will 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	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. It also has a new strategic overview role for all forms of inland flooding.
Environment Agency Flood Zones	Flood zones on the maps produced by 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 the underground drainage system is exceeded
Flood Risk Management Plan	A plan for the management of a significant flood risk. The plan must include details of – a) objectives set by the person preparing the plan for the purpose of

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managing the flood risk, and
b) the proposed measures for achieving those objectives

Flood Risk Regulations

Legislation that transposed the European Floods Directive in 2009

Flood and Water Management Act

The Flood and Water Management Act clarifies the legislative framework for managing surface water 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 folder of documents which includes all the local planning authority's Local Development Documents (LDDs). The local development framework will also comprise the statement of community involvement, the local development scheme and the annual monitoring report.

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 in critical locations.

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.

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

Resistance measures

Resistance measures are designed to keep flood water out of properties and businesses, and could include flood guards, air brick covers etc.

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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 his land freely.
Risk	In flood risk management, risk is defined as the probability of a flood occurring x consequence of the flood
Strategic Flood Risk Assessment (SFRA)	An SFRA provides information on areas at risk from all sources of flooding.
Surface water flooding	In this context, surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.
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 management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate and by attenuating and conveying surface water runoff slowly compared to conventional drainage.
Urban Creep	The change of permeable areas within the urban environment to impermeable areas. Typical types of urban creep are the creation of patios, paving the front gardens to create hard standing parking areas or house extensions.
Water Framework Directive (WFD)	A European Community Directive (2000/60/EC) of the European Parliament and Council designed to integrate the way water bodies are managed across Europe. It requires all inland and coastal waters to reach “good status” by 2015 through a catchment-based system of River Basin Management Plans.

3 Introduction

The risk of flooding in England is predicted to increase due to climate change and new development in areas at risk. It is not possible to prevent all flooding but there are actions that can be taken to manage these risks and reduce the impacts on communities. This flood management strategy for Kirklees aims to use a variety of techniques, measures and initiatives to provide a co-ordinated mitigation plan that balances the needs of communities, the economy and the environment.

3.1 Background

Nationally, flood management has been organised and managed in a disparate way. Management of fluvial flooding from major rivers has passed between a variety of successive government agencies. Responsibility for general land drainage and flooding from the public sewer system has been managed in a variety of combinations of local authorities and public and private waterworks companies. The result has been an historic failure to provide consistent and coordinated management of flood risk and an absence of leadership in the investigation and resolution of local flood events. Local communities have been let down by poor communication, unclear responsibilities and uncoordinated actions in the local management of flood events.

The risk of flooding is increasing. Development pressures in our urban centres and fringes and the prediction of more severe rainfall events as a result of climate change combine to increase the risk in existing communities and offer challenges in managing the risk in new developments.

The last decade has witnessed a number of devastating floods across the country. York (2000), Boscastle, Cornwall (2004), Carlisle (2005), Yorkshire (2007), Morpeth, Northumberland (2008), Cumbria (2009) and Calderdale and York (2012) have destroyed local communities, highlighting the vulnerability of the country's infrastructure to flooding. Severe flood events in continental Europe during the same period, has resulted in European Legislation being published. The Flood Risk Regulations (FRR) 2011 requires member states to manage "significant" flood risk. The regulations operate on a 6 year cycle, with the "significance" threshold in this first cycle being set at such a high level that only 10 areas across England have emerged as areas requiring further investigation. Kirklees is not a significant flood risk area in terms of the FRR.

The flooding in summer 2007 was particularly severe, affecting a large number of communities spread across the country. The government-commissioned Pitt review of the flooding summarised the historic failings of flood management, resulting in an extensive set of recommendations which were eventually transposed into a new piece of legislation, the Flood and Water Management Act 2010. The FWMAct created, for the first time, a general responsibility for Lead Local Flood Authorities, or LLFAs, (County and Unitary Councils) to take leadership for the coordination and management of local flood risk. A number of duties, powers and tools have been created or developed to allow local flood management to be more effective. The manner in which LLFA's choose to manage local flood risk is defined by Section 9 of the FWMAct, where they are required to **"develop, maintain, apply and monitor a strategy for local flood risk management in its area"**

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The FWMAct is not prescriptive in what the Strategy should deliver. The intention is to allow local discretion as to the type and timing of programmes and initiatives chosen and the level of resources available to meet the expectations in the strategy. Statutory guidance on how to produce the strategy has not been published although informal guidance has been produced by the Local Government Group through its “**Preliminary Framework for Local Flood Risk Management Strategy**”¹ to assist LLFA’s in the process.

Historically, Kirklees has provided a limited, reactive response to local flood risk management resulting in relatively poor records of previous flood incidents and drainage records. Understanding of flood mechanisms is limited and little strategic planning for the mitigation of future flood risk has been carried out. A Flood Management Team is now established to fulfil the various duties and responsibilities required by the recent legislation and a structured and resourced programme has been developed to provide a methodical and prioritised assessment of local flood risk.

This strategy will define the Councils approach to managing flood risk in both the short and longer term.

3.2 The Scale and Type of Flood Risk in Kirklees

3.2.1 Characteristics of the Area

Kirklees is a unitary council in West Yorkshire bounded by Calderdale, Bradford, Leeds, Wakefield, Barnsley, Derbyshire and Oldham. In terms of size, it is the 11th largest district council out of 348 (Population of around 400,000) and 3rd largest metropolitan council in area (400km²). The main population centres are Huddersfield (125,000), Dewsbury (57,000) and Batley (45,000), with a further 10, or so, small towns (5-20,000). Around 40% of the area is heavily urbanised with 60% rural in character, of which half is in the Pennine hills.²

With respect to water resources, Kirklees has 27 large reservoirs in the Pennines, operated by the local Water and Sewerage Company, Yorkshire Water, with the associated emergency planning aspects managed by the Environment Agency. There are approximately 100km of enmained river, managed by the Environment Agency, and unrecorded, but substantial, lengths of culverted and open minor watercourses. The main rivers in the district are the rivers Colne and Calder flowing to the river Aire, which drains around 85% of the area, and the river Dearne flowing to the river Don, draining the remaining 15%. Average annual rainfall figures for the district range from 1800mm at the Pennine headwaters to 800mm in Huddersfield, compared with an average across England of 950mm.³

¹ http://www.local.gov.uk/web/guest/flood/-/journal_content/56/10171/3487627/ARTICLE-TEMPLATE

² Kirklees Council, *Factsheets 2010*,
<http://www.kirklees.gov.uk/community/statistics/factsheets/factsheets.shtml>

³ Environment Agency, *Calder Catchment Flood Management Plan July 2010*, page 54

3.2.2 Flooding Characteristics

Fluvial Flooding from Designated Main Rivers

Kirklees is dominated by 2 main river systems, the River Calder to the North of the district and the River Dearne to the South, both rivers having their headwaters in the Pennines and both ultimately flowing to the Humber estuary.

In the upper reaches of the **Calder's** tributaries, valleys are generally narrow and steep-sided and consequently, flood zones are narrow. Existing development is mostly housing, commercial or small areas of light industry. Flood defences are typically discontinuous with flood walls in a mixed condition, offering low standards of flood protection.

In the downstream catchment between Huddersfield and Dewsbury, the floodplain broadens and land-use includes large areas of heavy industry and housing within the high flood risk zone. Flood defences generally offer a higher level of protection. Substantial lengths of main river tributaries to the River Calder, such as Grimescar Dyke, Batley Beck and Chickenley Beck are culverted through urban areas

The upper reaches of the **Dearne** above Clayton West are fairly steep and respond quickly to rainfall. The industrial textile heritage of the area, resulting in recent residential conversions of riverside mills, and the general high density of residential development in the valley bottom leave a sizeable part of the local community at risk of flooding. There is little historical evidence of river flooding from breached defences or overtopping but the main issue appears to be flooding resulting from submerged outfalls to the river.

The Environment Agency has powers for managing the flood risk from main rivers. The hydraulic characteristics of the main rivers are generally well understood and substantial computer modelling of the flood risk has been carried out.

Minor Watercourse Flooding

Many thousand km's of minor watercourses drain surface water across the district. The condition and capacity of the open watercourses has not historically been recorded and only limited information is available on the sections which have been culverted. Riparian responsibility means that standards of maintenance vary greatly, ranging from well-maintained lengths in private gardens and public parks, to fly-tipped, polluted lengths in undeveloped industrial land.

The industrial heritage of the larger settlements as textile centres has left an historical legacy of stone culverts carrying watercourses through areas of high residential occupation. Information on the location, condition and connectivity of the culvert systems is piecemeal but is a significant factor in understanding and reducing flood risk in those locations.

Surface Water Flooding

Surface water flooding is generally more prevalent in the hillier, rural, less developed south side of the district. The settlements along the Dearne, Holme, Colne and Woodsome Valleys are concentrated along the rivers and suffer the consequences of rapid surface water runoff from the uplands and fields on the steep valley sides. The flooding experienced in 2007 demonstrated the risks from overland surface water flows to rural communities and those on the urban fringe. The public sewer record is relatively well recorded but information on other

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formal drainage systems is sparse, they are often unrecorded and consequently, poorly maintained.

The large settlements to the centre and north of the district, Huddersfield, Dewsbury and Batley, have significant networks of public sewers, owned and maintained by Yorkshire Water, with less evidence of smaller culverted watercourses remaining in those areas. It is likely that the traditional means of draining surface water via watercourses has been gradually replaced by the developing public sewer system carrying rainwater in both surface water and combined sewers.

Groundwater Flooding

Groundwater flooding occurs as a result of water rising to the surface from underlying ground or abnormal springs, usually as a result of sustained increased rainfall raising natural groundwater levels. Groundwater flooding is usually more prevalent in low-lying areas where normal water tables are high and underground aquifers are present. In Kirklees, it is very unusual to see groundwater breaking through the surface of the ground but the high number of basements in older properties in Kirklees, a product of its industrial heritage, means that groundwater flooding to “below ground” rooms is increasingly common.

Sewer Flooding

Yorkshire Water owns much of the combined and surface water sewers in the region. Sewer systems are currently designed not to flood in a 1:30 year return period design storm. This does not include accommodating flows from exceptional and high magnitude rainfall events. During extremely wet weather, the rainfall may exceed current design criteria. Such events can result in exceedance of the hydraulic capacity of the sewer thus increasing the risk of flooding. One of the most recent occurrences of this type of event was the flooding experienced in June 2007.

There are some known sewer related flooding issues within the Kirklees catchment. However, overall sewer performance is satisfactory. Yorkshire Water is working with Kirklees Council, the Environment Agency and other parties to better understand the interaction of the networks and provide improvements that will help further reduce the risk of flooding.

Recent Flood Events

Kirklees has been relatively unaffected by severe, community-wide flooding compared to other areas in the country, however, there have been a number of flood incidents where damage to property and infrastructure has occurred.

- There has been recent significant local flooding in the summers of 2002 (Holmfirth), 2004 (Milnsbridge, Ravensthorpe), 2007 (Various Locations), January 2008 (Holmfirth) and June 2012 (Various Locations)
- The 2007 floods flooded up to an estimated 500 properties across the district and were described by many residents as the worst in living memory. The flooding was widespread across the district but hotspots occurred around Ravensthorpe, Liversedge, Cleckheaton, Chickenley, Mirfield, Milnsbridge, Brockholes, New Mill, Denby Dale, Scissett and Clayton West.

2007 Floods

Two significant rainfall events occurred on Friday 15 June and Monday 25 June 2007, exacerbated by previous, generally high, May and June rainfall. In Kirklees, a wet May was followed by the wettest June on record – May rainfall was 30% above average and total June rainfall was 325% above average (nearly 300mm falling at Emley Moor during the month). The River Don was recorded running at 650% above the monthly average flow and also recorded the highest peak flow on record.

A fifth of Hull's average yearly rainfall fell in a single day.

Yorkshire received more than 3 times the monthly average rainfall – a third of the average annual rainfall fell in the 3 week period preceding 25 June.

The effect of the above was unprecedented rainfall run-off from saturated fields onto undrained rural roads and very high river and watercourse levels. Few watercourses in Kirklees breached their banks but many surface water outfalls were submerged. Restricted discharge, resulted in surcharge of highway drains, YW surface water sewers and culverted watercourses causing much of the surface flooding in the area. The design capacity of YW combined sewers was exceeded which exacerbated the problem with Combined Sewer Overflows (CSO's) operating and sewage mixing with floodwater.

The post-analysis of the flooding by the Environment Agency identified that approximately 70% of the flooding in the region was due to surface water rather than fluvial flooding ie rain water unable to enter drainage systems due to design capacity being exceeded, rather than rivers breaking their banks or over-topping flood defences. The rainfall event was estimated to have a return period of around 1 in 200 ie a 0.5% chance of occurring annually.

The interactions between different sources of flooding

Whilst the Catchment Flood Management Plans for the area direct policies and initiatives for the management of flood risk resulting from designated main rivers and this local strategy considers the risks from smaller watercourses, overland surface water and groundwater, it is inevitable that some flooding will result from many sources of water, including that carried in the public sewer system. The general public, understandably, care little where the floodwater comes from but the LLFA has a responsibility to determine, where possible, which risk management authority is responsible. Where there are complicated interactions of different sources, the LLFA will take a lead to ensure that investigation, assessment and appropriate mitigation measures are carried out.

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Public Perception of Flood Risk

Households and businesses which have suffered from disruptive and damaging flooding generally understand the risks involved but many still rely on the various agencies and organisations to manage future risks. Agencies, particularly the newly created LLFAs, have a role to play but an important outcome from this strategy will be a programme of awareness-raising with affected property owners to give them the knowledge and tools to take measures to protect themselves. There will always be extreme events that place people and property beyond economically viable protection and warning and evacuation may be the only solution. The future availability of affordable house insurance against flooding will inevitably drive property owners towards providing their own flood protection and resilience measures to help reduce premiums.

Local Flood Risk

This Strategy, outlining the responsibilities of Kirklees Council, deals with flood risk from “local” sources of flooding, namely:

- Surface Water
- Minor Watercourses
- Groundwater

The National Strategy, produced by the Environment Agency, deals with fluvial flood risk from designated “main rivers”

However, the local strategy considers the risk from main rivers in the district to provide a comprehensive and integrated approach to managing the risk from all sources of flooding.

3.3 The Size of Flood Risk in the District

Presenting a simple indication of the risk from flooding in the district is difficult. The risk comes from many sources and there are many methods of calculating predicted risk. The Council holds limited records of previous flood incidents but significant, area-wide flooding from future, high – intensity or prolonged rainfall provides the greatest risk for residents in the district. A variety of studies and calculations have been made in the past 5 years which contribute to an understanding of the size of the flood risk in Kirklees.

- The comparative figures shown below⁴ give an indication of how Kirklees sits locally and nationally with other Councils (LLFAs).
- The figures for number of properties at risk⁵ from flooding should be viewed as properties that may flood as a result of the type of rainfall event that may occur “once in a lifetime”.

⁴ Defra, December 2010 – LLFA Funding Allocations

⁵ Defra, August 2009 - National Rank Order of Settlements Susceptible to Surface Water Flooding

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Comparison across other Councils/LLFAs

Kirklees ranks **55th out of 150** LLFAs in England, in terms of general flood risk.

Excluding larger Counties and London Boroughs, **Kirklees ranks 7th behind Hull, Birmingham, Brighton, Doncaster, Leeds and Leicester.**

Number of properties at risk from flooding

If a rainfall event with a 0.5% chance of happening in any year occurred in Kirklees the number of properties at risk of flooding are:

12,000 from river flooding, and

15,000 from other local sources (surface water, minor streams and groundwater)

ie a total of 27,000 properties or 15% of households in the district

Section 7 of the Strategy provides further information on the scale of local flood risk.

3.4 What will the Strategy do?

Flood risk in Kirklees **will** increase in the future as a result of climate change and new development pressures. Funding is limited to address the increased risk through traditional flood defence or drainage capacity improvement works but opportunities are available to flood risk management authorities and property owners to manage the risk in a structured and affordable way.

The Kirklees Local Flood Risk Management Strategy will explain how the Council, as Lead Local Flood Authority, will determine the location and size of flood risk, develop a co-ordinated, resourced and diverse action plan to mitigate the risk, presenting the objectives and measures in an understandable and accessible way.

The general principles of the Strategy are that:

- Flooding will always occur. It is uneconomic to totally prevent it and flood management will always be a balance of preventing flooding and managing the consequences of flooding.
- Flood risk management will be a compromise between managing today's problems and reducing the risk from future, larger, catastrophic flooding.
- More and better information on drainage systems and flood risk will result in more effective schemes and initiatives.
- Various authorities have flood risk management responsibilities but, ultimately, householders and businesses are best placed to protect their own properties.
- New developments offer the best opportunity to reverse the mistakes made by previous generations in building developments in high flood risk locations.
- The Strategy will pay due regard to the local, natural environment maximising opportunities for enhancement.

3.5 Who has produced the Strategy?

The Strategy has been developed with key partners from the Kirklees Flood Partnership. The Partnership is a collection of agencies and organisations with responsibilities for flood risk management in the district. The Partnership is fundamental to the delivery of effective, co-ordinated flood risk management across Kirklees and the Strategy embodies the responsibilities and aspirations of partners in managing flood risk.

Kirklees Flood Partnership is made up the following organisations:

Kirklees Council (LLFA, Highways, Planning and Emergency Planning)

Environment Agency

Yorkshire Water

Key points: Introduction

- Kirklees combination of rural and urban areas creates a variety of flood risk related issues
- The district has a relatively high level of flood risk compared to other similar sized authorities
- Climate change means that flood risk will increase in the future unless we do something to mitigate the risk
- The Local Strategy will explain the priorities for flood risk management in the district and provide a delivery plan to manage the risk

4 Responsibilities

4.1 Context

The Pitt Review identified inadequate and unclear responsibilities in those agencies and organisations with roles to play in flood management, as a significant factor in our historically poor response to flooding. The FWMA Act clarifies responsibilities and creates the new role of Lead Local Flood Authority to coordinate the local response to flood management and mitigation. In Kirklees, the Risk Management Authorities (RMA's) with legal responsibilities for local flood management are:

- The Environment Agency
- The Lead Local Flood Authority (**Kirklees Council**)
- The Water Company (**Yorkshire Water Services**)
- The Highway Authority (**Kirklees Council**)

4.2 Roles, Responsibilities and Functions

The main roles, responsibilities and functions to be exercised by the RMA's are as follows:

The Environment Agency

- Strategic overview of all forms of flooding
- Risk-based management of flooding from “main rivers”
- Regulation of the safety of higher-risk reservoirs
- Development of the National Strategy for Flood and Coastal Erosion Risk Management
- Coordination of Regional Flood and Coastal Committees
- Powers to request a person for any information relating to its flood management responsibilities
- Powers to designate structures and features relating to “main rivers”
- A duty to report to ministers on flood risk management
- Statutory consultees to the SUDS approving body
- Is a Competent Authority for the Water Framework Directive

The Lead Local Flood Authority

- Development of the strategy for local flood risk management
- Strategic leadership of local risk management authorities
- Reducing the risk of flooding from surface water, groundwater and ordinary watercourses
- Powers to request a person for any information relating to its flood management responsibilities
- A duty to investigate significant flood incidents and determine and allocate responsibilities
- A duty to maintain a register of structures or features likely to have a significant effect on flood risk
- Powers to designate structures and features relating to flood risk, other than from “main river”

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- Advise on land use planning processes to mitigate flood risk resulting from new or re-development of land
- Responsibility as SuDS Approval Body (SAB) to approve, adopt and maintain SuDS on new development sites
- A duty to ensure local flood risk management functions are consistent with the national strategy

The Water Company

- Where appropriate, assist the LLFAs in meeting their duties in line with the national strategy and guidance.
- Where appropriate, assist the LLFAs in meeting their duties in line with local strategies in its area.
- Where appropriate, sharing of information and data with RMAs, relevant to their flood risk management functions.
- A duty to effectually drain their area, in accordance with section 94 of the Water Industry Act 1991.
- A duty to register all reservoirs with a capacity greater than 10,000m³ with the Environment Agency
- An agreement with Ofwat to maintain a register of properties at risk from hydraulic overloading in the public sewerage system (DG5 register).
- The appropriate management of surface water in combined systems.
- Encouraging the use of SuDS.
- Creating a detailed understanding of flood risk from the public sewer system.
- Explore and implement multi benefit/agency schemes.
- A duty to ensure local flood risk management and drainage works are consistent with environmental regulations (including the Water Framework Directive)

The Highway Authority

- A duty to act in a manner which is consistent with the local and national strategies and guidance
- A duty to share information with other RMA's relevant to their flood risk management functions
- A duty to drain the adopted highway of surface water

In addition to the role of RMA's, individual landowners owning land adjacent to watercourses, known as riparian owners, have important rights and responsibilities relating to flood risk management from natural watercourses. They have

- A right to receive flow in its natural quantity and quality. Water may only be abstracted from a watercourse with the formal approval of the Environment Agency.
- A right to protect their land and property from flooding and erosion. Any associated works must be approved by the Environment Agency and/or LLFA.

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- A responsibility to allow water to flow through their land without obstruction, diversion or pollution.
- A responsibility to receive flood flows through their land
- A responsibility to keep the watercourse bed and banks free of litter and debris.

4.3 The Powers and Duties of Kirklees Council

The Flood and Water Management Act 2010 identified Kirklees Council as the Lead Local Flood Authority for the district. The main responsibilities from the Act have been summarised in the previous section but the main effect of the Act will be to provide, for the first time, the means for the Council to coordinate and manage local flood risk. The Council has a number of duties, powers and responsibilities from other legislation which assist the Council in providing a comprehensive approach to the management of local flood risk.

It is important to understand that a **duty** is something the Council is legally obliged to do; a **power** can be used at the Council's discretion

The Council's powers and duties relating to the management of local flood risk are as follows:

4.3.1 As Lead Local Flood Authority

- **A duty to produce a local flood risk management strategy** – develop, maintain, apply, monitor and publish a local strategy. The strategy will provide a framework to deliver a prioritised programme of works and initiatives to manage flood risk in the area.
- **A duty to co-operate with other risk management authorities** – healthy and constructive arrangements have been in place for a number of years via *West Yorkshire LLFA Liaison Group, Yorkshire and Humber Action and Learning Alliance* and the more recent *Kirklees Flood Risk Management Partnership* where partners can share best practice and develop joint initiatives. The Council will be an active contributor to the regional Strategic Flood Partnership and the Regional Flood and Coastal Committee.
- **A power to arrange for a flood risk management function to be transferred to another risk management authority** - Kirklees Council does not currently anticipate transferring any functions and will deliver the requirements of the Act within its existing resources.
- **A power to request information in connection with its flood management functions from another person** – reciprocal arrangements are in place with the Council's principal partners, Yorkshire Water and the Environment Agency, to

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exchange relevant information. The Council will continue to expand its knowledge base by requesting relevant information from other key agencies and landowners.

- **A duty to investigate flooding** – the LLFA will act as the co-ordinator for the investigation of flood incidents, determining responsibility for any further action from risk management authorities. The LLFA has local discretion to determine which flood incidents it investigates. The results of any investigation will be published on the Councils website and any relevant risk management authorities informed of the results.

Kirklees Council will formally investigate flood incidents which meet the following criteria:

- *Where one or more residential or business properties suffer internal flooding*
- *Where there is a risk to life as a result of the depth and/or velocity of floodwater*
- *Where critical infrastructure (eg emergency services buildings, utility company infrastructure, schools, day centres, hospitals and main transport routes) suffer flooding or obstruction, or were in imminent danger of flooding*
- *Where 5 properties or more were in imminent danger of flooding, or*
- *Where local democratic pressures from elected members, committees, or other elected bodies, might be considered as a factor in determining whether a formal investigation should be carried out*

Whilst the principal purpose of formal flood investigation is to identify cause and responsibility for further action and provide a single point of contact for the householder, business or community, the information gathered will be invaluable in extending the Councils knowledge of drainage infrastructure and local flood risk.

- **A duty to maintain a register of drainage assets/ features** – the Council must establish and maintain a register of structures or features which it considers are likely to have a significant effect on local flood risk. Information on ownership and state of repair will also be held on the register. The register will be available for inspection. The LLFA has discretion to set a local indication of “significance” to determine which assets it records on the register.

The Councils register of drainage assets will include the following structures or features

For pipes/ culverts

- *The diameter is greater than 600mm or cross sectional area is greater than 0.3m² or*
- *The pipe/culvert has a recorded history of flooding or*
- *The pipe/culvert is within 20m of a cluster of 5 or more recorded flood incidents (non-cellar) – excluding pipes of 225mm diameter or less*

For trash grilles

- *The grille is council-maintained and is on the monthly clearance programme or*
- *The grille is privately-maintained and total blockage would cause flooding of adjacent infrastructure*

For surface water pumping stations

- *All pumping stations to be included*

For SuDS

- *All new SuDS adopted by the LLFA*

The register is available on the Councils website and allows local residents, communities and businesses to better understand where the significant drainage and flood management features are located.

- **A power to designate features that affect flood risk** – if the LLFA considers a structure or feature affects a flood risk and it is not owned by the LLFA or the Environment Agency, it may formally “designate” the structure/feature. Designation places legal responsibilities on the owner of the asset to manage it with due regard to its function as a flood risk feature. The owner may not alter, remove or replace a designated structure or feature without the consent of the LLFA. Structures or features meriting designation could include culverts, garden/building walls, flood banks etc where there is evidence that their location affects flood risk. The Council intends to use the powers in a proportionate manner, determining an appropriate measure of significance for the flood risk. Any proposal to designate a structure or feature will be fully evidenced and justified.
- **A power to formally consent works within Ordinary Watercourses** – the FWMA Act transfers legal powers from the Environment Agency to the Council to manage works proposed in ordinary watercourses. The Environment Agency will continue to consent works in designated main rivers and the Council will consent those works in all other (ordinary) watercourses. Works which may need approval by the Council include new and replacement culverts, provision and removal of weir structures, construction of river walls and temporary support works for permanent structures which interfere with the flow of water in the watercourse. The Council will actively manage works

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proposed by riparian owners to ensure that flood risk does not increase as a result of their actions.

- **A duty to promote and manage Sustainable Drainage** – the FWMA Act creates a responsibility for the Council to approve, adopt and maintain all newly-constructed SuDS which serve more than one property. *There are currently some uncertainties as to how and when this duty will be delivered but the principle of SuDS being the drainage solution of first resort, owned and maintained by the Council, has been widely accepted.* The Council, as the SuDS Approval Body (SAB), will have significant influence as to how surface water is managed on new development sites. There are great opportunities to remove the burden on currently over-loaded drainage systems through the development of more natural systems of water management. SuDS also offer numerous opportunities for environmental improvement and socio-economic benefits. The responsibilities of the Council for sustainable drainage are detailed in Section 4.3.5.

4.3.2 As a Category 1 Responder (Emergency Planning)

- A duty to assess risk of emergencies occurring and use this to inform contingency planning
- A duty to put in place emergency plans
- A duty to put in place Business Continuity Management arrangements
- A duty to put in place arrangements to make information available to the public about civil protection matters and maintain arrangements to warn, inform and advise the public in the event of an emergency
- A duty to share information with other local responders to enhance co-ordination
- A duty to Co-operate with other local responders to enhance co-ordination and efficiency
- A duty to provide advice and assistance to businesses and voluntary organisations about business continuity management

4.3.3 As Highway Authority

- **A duty to maintain the public highway network (excluding motorways)** – the Highways Act requires the Council, as Highway Authority, to ensure that highways are drained of surface water and, where necessary, maintain all drainage systems ensuring there is no pollution of the wider environment. In particular, the Council carries out regular maintenance of road gullies and their connections to the carrier drain. The carrier drain will generally be an adopted public sewer, maintainable by the local water company but, in some instances, it may be a dedicated highway drain maintainable by the Council. Culverts, carrying watercourses, crossing public highways may have trash grilles installed at the upstream end of the culvert, protecting the culvert from blockages. The highway authority has a responsibility to ensure these grilles operate efficiently, achieved by clearing them on a regular maintenance cycle.
- **A duty to adopt and maintain SuDS draining new roads** – The SuDS Regulations requires Highway Authorities to adopt SuDS which drain a newly-constructed road.

4.3.4 As Planning Authority

- **A responsibility to consider flood risk in Local Plans** – the Planning Authority must prepare, publish and use a Local Development Framework (LDF) which directs how land can be used. The LDF considers flood risk from both fluvial (main river) and local sources (surface water) of flooding, paying due regard to available Strategic Flood Risk Assessments, Preliminary Flood Risk Assessments and Surface Water Management Plans.
- **A responsibility to consider flood risk when assessing applications for development** – The Planning Authority should only approve development where it can be demonstrated that the proposal doesn't increase the overall risk of flooding in the area and is adequately protected from flooding itself. A sequential approach should be taken to ensure development sites are chosen which offer the lowest possible flood risk.
- **Working with the SAB (See Section 4.3.5)** – The Planning Authority should highlight at the Master Planning stage or during any early pre-planning enquiries the need to discuss drainage and flood management requirements with the SAB.

4.3.5 As SuDS Approval Body (SAB)

- **A duty to establish a SuDS Approval Body (SAB)** – The Council as LLFA has to establish an approving body for new drainage systems in its area.
- **A duty to receive applications for, and approve all construction work associated with, construction work which has drainage implications** – The SAB will receive all applications for construction where there are drainage implications, assess their compliance with any national and/or local standards and approve or decline the application as appropriate. Some drainage applications will approve SuDS which will become adopted by the Council and some will approve connection to public sewers where SuDS are deemed by the SAB to be inappropriate.
- **A duty to adopt SuDS which serve more than one property** – The SAB will adopt all drainage systems constructed in accordance with the SuDS regulations where they drain more than one property. SuDS draining public roads will be adopted by the Highway Authority.
- **A duty to maintain adopted SuDS** – The SAB must maintain all adoptable SuDS in accordance with the national standards for sustainable drainage.

4.3.6 As a Riparian Owner

- **A duty to pass on flow in a watercourse without obstruction, pollution or diversion affecting the rights of others** – The Council, as a landowner, has a duty to pass on the flow in a natural watercourse from its land to another.
- **A duty to accept flow** – The Council has a responsibility to accept normal flow onto its land and even flood flow which may be caused by under-capacity downstream. There is no duty for a landowner to increase the capacity of a watercourse crossing his land.
- **A duty to maintain the bed and banks of the watercourse** – The Council must clear obstructions in the watercourse which affect the flow of water in the channel, including vegetation, artificial obstructions and heavy siltation. The Council is responsible for protecting its own property from natural seepage through natural river and flood banks. There is also a duty to control alien invasive species, such as Japanese Knotweed and Himalayan Balsam.

Key points: Responsibilities

- Responsibility for Flood Risk is clear: The Environment Agency manage the risk from main rivers, Yorkshire Water manage the risk from public sewers and Kirklees Council, as LLFA, manage the risk from all other sources
- The Council has additional FRM responsibilities as Highway Authority, Landowner, Planning and Emergency Planning Authority

5 The Objectives for Managing Local Flood Risk

Objectives, or outcomes to be achieved, will be strategic in nature but it is important that the process, measures and actions to achieve the outcomes are pragmatic, deliverable and supported by both partners and stakeholders.

The Strategy sets out objectives which delivers statutory requirements and supports complementary objectives from other plans and strategies.

5.1 Complementary Plans and Strategies

Several, mainly high-level, strategic plans have been developed recently which provide a strong evidence-base and direction for local flood risk management. They include, in chronological order:

- **Calder Valley Strategic Flood Risk Assessment (SFRA) November 2008** – Provides a general assessment of flood risk across the Calder catchment in Kirklees, Calderdale and Wakefield, focussing on risk from the river Calder. The SFRA is a tool to help direct planned development towards those areas of lowest flood risk.
- **Humber River Basin Management Plan (RBMP) December 2009** – The delivery mechanism for the Water Framework Directive objectives. The plan focuses on the protection, improvement and sustainable use of the water environment.
- **Calder Flood Management Plan (CFMP) July 2010** – Prepared by the Environment Agency, proposing catchment-wide, long-term measures, the CFMP considers all types of flooding and sets the context and direction for more local, detailed plans.
- **Kirklees Surface Water Management Plan (SWMP) January 2011** – An evidenced plan for the reduction of risk from surface water flooding across the district.
- **Preliminary Flood Risk Assessment (PFRA) November 2011** – Required under The Flood Risk Regulations 2011. Quantifies the level of flood risk from all sources across the district, highlighting areas at significant risk.
- **The National Flood and Coastal Erosion Risk Management Strategy for England 2011** – Sets out the Environment Agency's overview role in flood and coastal erosion risk management encouraging more effective partnership working between national and local agencies and local communities.

5.2 Main Policies and Measures relating to Flood Management

Policy/Measure	Strategy/Plan					National Strategy
	SFRA	RBMP	CFMP	SWMP	PFRA	
Enhance/improve existing knowledge base of flood risk	✓		✓	✓	✓	✓
Improve understanding of surface water flood risk	✓			✓	✓	✓
Provide information on flood risk to enable appropriate land allocations	✓			✓		✓
Ensure the Councils Flood Emergency Plan is comprehensive and up to date			✓			✓
Carry out asset inspections and action deficiencies		✓	✓	✓		✓
Assess the flood risk to transport links			✓	✓	✓	
Improve knowledge of drainage infrastructure			✓	✓		✓
Removal/improvement of culverts		✓	✓	✓		
Increase community awareness		✓	✓	✓		✓
Reduce the rate of run-off from open land in the higher catchment		✓	✓	✓		
Understand and manage the interaction between canal, river and minor watercourse systems			✓			
Determine priority locations for surface water flood risk	✓			✓	✓	
Encourage SuDS/Source Control solutions		✓		✓		✓
Improve Capacity in Drainage Systems			✓	✓		✓
Improve property resistance and resilience				✓		
Understand the relative flood risk in the district (compared to other districts)				✓	✓	
Better coordination of FRM						✓
Sustainable approach – balancing social, economic and environmental needs		✓				✓
A partnership approach to funding						✓

- ✓ Main measure from plan
 - ✓ Supported measure

The Strategy will be consistent with the main policies and measures outlined above. It will include all current policies and measures which have been adopted in current flood management-related plans, which are relevant to the management of local flood risk. The two key documents which guide and support the Strategy are the **PFRA** and **SWMP**.

The **PFRA**, submitted under the Flood Risk Regulations 2011, states the overall flood risk across the district.

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The district-wide **SWMP**, presenting the priorities for delivering better local flood risk management will form the main delivery and control mechanism for achieving better flood risk management across the district.

5.3 Public Expectations from Flood Risk Management

A two stage consultation exercise with the general public was carried out to inform the Strategy.

The first stage involved an online questionnaire, promoted through local media, which sought the opinions of Kirklees residents on their experiences and perceptions of flood risk, their priorities for how to manage the risk and their preferred measures to achieve those priorities. Approximately 150 questionnaires were completed.

General views expressed as a result of the first public questionnaire

- The availability of house insurance is already a serious concern for households who have been flooded before
- The public are keen to see something more than a “Do minimum” approach in the Strategy. Most favour initiatives which address existing flooding problems but many support work to avoid flooding from future, more severe rainfall
- There is a clear indication that flooding to properties and businesses should be prioritised over flooding to “amenity” land
- There is a strong feeling that new development activity will provide opportunities to reduce flood risk to the “occupiers” and adjacent properties
- There is little appetite from the public to contribute financially to flood mitigation works
- The public are keen to understand more about the location, type and, in particular, the size of the flood risk they might face

The second stage again involved an online questionnaire which asked stakeholders how clear the Strategy was and asked for preferences on how the identified measures should be prioritised. Approximately 25 questionnaires were completed.

General views expressed as a result of the second public questionnaire

- The risk management authorities for the area are identified and their roles are clear
- It is not clear how the Council will fund the actions identified in the Strategy
- The Strategy offers a clear direction for the Council
- There is a preference for addressing existing flooding problems ahead of future, predicted flooding
- There is a preference for maintenance of existing drainage systems ahead of increasing the capacity of those systems
- There is a preference for working closely with private landowners rather than carrying out works on private land
- There is support to persuade developers to carry out additional flood mitigation and drainage works outside the development site area

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- The general public consider maintenance and improvement of drainage systems to be the most important general action, ahead of the management of new development

5.4 The Objectives of the Strategy

The Strategy needs to provide a clear vision as to how local flood risk will be managed by the Council and its partners. The objectives in the Strategy will include statutory requirements from legislation, complementary objectives stated in relevant plans and strategies and preferences expressed, or known, within local communities.

The objectives are:

- Improve the level of understanding of local flood risk within the LLFA
- Improve the level of understanding of local flood risk amongst partners and stakeholders
- Ensure that local communities understand their responsibilities in relation to local flood risk management
- Maximise the benefits from partnership working with flood risk partners and our stakeholders
- Actively manage flood risk associated with new development proposals
- Take a sustainable approach to FRM, balancing economic, environmental and social benefits from policies and programmes
- Improve and/or maintain the capacity of existing drainage systems by targeted maintenance
- Encourage proactive, responsible maintenance of privately-owned flood defence and drainage assets
- Influence planning policies and land allocations in Local Plans to take account of flood risk
- Maximise opportunities to reduce surface water run-off from the upper catchments
- Identify projects and programmes which are affordable, maximising capital funding from external sources
- Ensure local FRM knowledge is aligned with the Councils emergency planning procedures

The Strategy has been written at a time when some aspects of the new legislation and national funding mechanisms are still to be implemented or developed. The Strategy is a living document and will be updated regularly to ensure it is relevant and is informed by the developing knowledge base on local flood risk.

Key Points: Objectives

- Objectives have been chosen that are affordable and deliverable and reflect the communities aspirations and priorities
- The objectives include similar aspirations from complementary plans and strategies

6 The Measures Proposed to Achieve the Objectives

The SWMP provides a methodology to identify the most appropriate measures to use in locations identified as being at risk of flooding. The methodology has been adapted from best practice that has emerged from the SWMP Pilot projects completed in 2009, promoting a suite of flood mitigation measures and initiatives to be considered in areas of identified flood risk. Measures can be “non-structural” such as planning controls and improved community engagement, or “structural” such as physical improvement or maintenance works. It is impractical and unaffordable to carry out every measure for every situation. The Strategy will help to determine which measures are most appropriate for Kirklees, which measures offer best value for money and how a blend of structural and non-structural measures can be used to give a balanced approach to mitigating risk.

The Strategy objectives and the measures required to achieve them are summarised in the following table:

	Objective Reference	Objective	Measures
Information and Communication	1	Improve the level of understanding of local flood risk within the LLFA	1.1. Record drainage and flood assets 1.2. Maintain a public asset register 1.3. Designating flood/ drainage assets 1.4. Recording/ mapping flood incidents 1.5. Carry out flood investigations 1.6. Assessment of high flood risk locations in SWMP 1.7. Improve skills and knowledge of FRM officers 1.8. Information from stakeholder engagement
	2	Improve the level of understanding of local flood risk amongst partners and stakeholders	2.1. Publish a clear strategy and communicate it 2.2. Develop information strategy to improve partner and stakeholder knowledge 2.3. Improve and maintain the Councils FRM web pages
	3	Ensure that local communities understand their responsibilities in relation to local flood risk management	3.1. Publish and distribute information explaining responsibilities, local flood risk, property protection/resilience etc 3.2. Involve local communities in local initiatives and schemes
	4	Maximise the benefits from partnership working with flood risk partners and our stakeholders	4.1. Continue to develop the Kirklees Flood Partnership and contribute to the Yorkshire LLFA Liaison Group and Yorkshire Action and Learning Alliance 4.2. Ensure that policies and programmes promoted through the Strategy complement and support works across the rest of the Calder and Don catchments
Policies and Work Programmes	5	Actively manage flood risk associated with new development proposals	5.1. Develop and apply a robust local policy on FRM and drainage solutions on new development sites 5.2. Develop a process with the Planning Department to create clear advice and direction to developers on FRM and Drainage 5.3. Establish the SuDS Approval Body (SAB)
	6	Take a sustainable approach to FRM, balancing economic, environmental and social benefits from policies and programmes	6.1. Ensure the environmental consequences of implementing the LFRMS are considered against the technical, economic and social benefits 6.2. Work with the Environment Agency to embed policies from local River Basin Management Plans, local environmental policies and “European “ protected sites into FRM procedures and programmes
	7	Improve and/or maintain the capacity of existing drainage systems by targeted maintenance	7.1. Identify highest risk open and culverted watercourses, highway drains and other drainage/flood features 7.2. Develop an affordable cyclical maintenance regime based on risk 7.3. Implement a responsive, reactive maintenance regime based on risk

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Policies and Work Programmes	8	Encourage proactive, responsible maintenance of privately-owned flood defence and drainage assets	8.1. Identify highest risk private flood defence and drainage assets 8.2. Develop technical advice for owners to guide them in preparing local maintenance plans 8.3. Establish risk-based consenting and designation processes
	9	Establish a robust policy on water management and use available information on flood risk to assess the suitability of the allocation of sites for different land uses through the Local Development Framework process.	9.1. Use available information on flood risk to identify appropriate development potential
	10	Maximise opportunities to reduce surface water run-off from the upper catchments	10.1. Develop proposals to engage with significant landowners to employ land management techniques and initiatives which help to reduce the rate of surface water run-off
	11	Identify projects and programmes which are affordable, maximising capital funding from external sources	11.1. Develop a pragmatic programme of schemes and initiatives which are likely to be funded through the National Programme or Local Levy 11.2. Develop and implement a policy on de-culverting, consistent with the LDF Core Strategy using evidence in the SWMP and RBMP to aid prioritisation 11.3. Determine all other funding sources, Council, partners and other external, and maximise “match-funding”
	12	Ensure local FRM knowledge is aligned with the Councils emergency planning procedures	12.1. Embed the LFRMS into flood response and recovery plans and use developing knowledge on flood risk to “tune” emergency procedures

Key Points: Measures

- Measures have been chosen which allow a comprehensive and varied approach to managing local flood risk
- The measures build on existing initiatives, balancing ambition with available resources

7 Proposals, Timescales and Funding to Implement the Measures

Some of the measures outlined in the previous section have been core activities for the Council for a number of years and processes are in place to deliver those measures. Other measures, however, relate to new responsibilities or activities, often requiring a new set of skills and experience that may take some time to develop or acquire.

7.1 Affordability and Funding of the Measures

The Government commits significant funding every year to flood management activities across the country. Funding for investigation, co-ordination and local management of flood risk issues has been allocated to LLFA's with a long term commitment to support this foundation work. Capital funding for mitigation works (such as flood defences, property resilience schemes, flood storage etc) is generally allocated on the basis of risk and, inevitably, areas where high density populations co-exist with high risk from river flooding tend to attract much of the available funding. However, a more-flexible funding arrangement has recently been introduced which encourages community and business contributions to the funding of schemes which improves their chance of being supported through the national funding allocation. Essentially, the success of an FRM proposal will be improved if the cost burden is shared amongst as many contributors as possible, the share from the national allocation is as low as possible and the outcomes from the proposal are evidenced as clearly as possible. The new national funding scheme has also been extended to include proposals which address risk from surface water flooding as well as from main river-related fluvial flooding.

The Strategy has identified a range of measures to improve how flood risk is managed across the district – some measures can be delivered quickly with existing council resources but others need external funding support. The challenge for the council is to maximise the benefit from limited (council and external) funds through creative and innovative scheme development, mobilising community and business support for projects and initiatives and preparing sound and evidenced cost-benefit justifications.

The Strategy will explain the sources of funding available for FRM, the resources and funding required for the measures described in Section 6 and where any shortfalls in funding for the measures may be found.

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7.2 Sources of Funding for Flood Risk Management

Source of Funding	Description	Indicative budget in 2012/13	Administered By?	Appropriate For?
Flood Defence Grant-in-Aid (FDGiA)	Central government funding for flood (and coastal) defence projects – recently revised to encourage a partnership approach to maximise match-funding, work towards achieving specified outcomes with a requirement to evidence a reduction in flood risk to properties	£30million (Yorkshire)	Environment Agency	Medium to large capital FRM projects
Local Levy	Annual contributions from Councils to a regional “pot”, smaller than the FDGiA budget but offers more flexibility on the type and size of project it can fund.	£2million (Yorkshire)	Environment Agency	Smaller FRM projects or as a contribution to FDGiA projects
Private Contributions	Voluntary, but funding from beneficiaries of projects could make contributions from national funding viable. Contributions could be financial or “in kind” eg land, volunteer labour	Unknown	Kirklees Council	All projects
Water Company Investment	Investment heavily regulated by Ofwat but opportunities for contributions to area-wide projects which help to address sewer under-capacity problems	Unknown	Water Company	Projects which help to remove surface water from combined sewers
Section 106 contributions (Town & Country Planning Act)	Contributions from developers, linked to specific development sites where off-site improvements to drainage infrastructure are required to make the developers proposals acceptable	Unknown	Kirklees Council	Larger development sites
Community Infrastructure Levy (CIL)	A local levy applied by the Planning Authority on developers to contribute to a general infrastructure fund. Kirklees Council has not yet implemented a CIL scheme. A bid for CIL would have to be made for flood management/drainage improvements against other competing council priorities.	Unknown	Kirklees Council	All measures outlined in the Strategy
SAB Income	Application and inspection fees from developers in support of the approval and inspection of new development related SuDS.	12/13 (0) 13/14 (£100k) 15/16 (£400k)	Kirklees Council	Development drainage approval and FRM issues
Council Tax	A “ring-fenced” provision within the annual council tax for the specific purpose of addressing FRM.	Unknown	Kirklees Council	Key measures in the Strategy
Business Rates Supplements	Agreement from local businesses to raise rates for specified purposes.	Unknown	Kirklees Council	Measures which address flood risk to businesses
Council Capital Funding	The Councils infrastructure programme prioritising capital improvement projects. The programme has included funding for drainage capacity improvements for a number of years which is targeted at the highway drainage systems	£250k	Kirklees Council	Measures which are small to medium capital projects
Council Revenue Funding	The Council has a number of revenue streams to support technical and admin processes and to maintain council infrastructure. Existing revenue budgets include Highway Drainage Maintenance, Highway Gully Maintenance, Watercourse Maintenance and funding for the Flood Management Team discharging the LLFA duty for the Council.	Drainage Maintenance (£300k) Gully Maintenance (£450k) Watercourse Maintenance (£100k) Flood Management Team (£300k)	Kirklees Council	Measures requiring officer time and/or maintenance activity

Kirklees Local Flood Risk Management Strategy

7.3 Delivery of the Measures

Each measure outlined in Section 6 has been developed into a set of activities, policies and procedures which have been described below. Funding is critical to the delivery of the strategy and whilst the Council has a legal responsibility to deliver many of the actions required to deliver the measures, the funding made available to do so is limited. **The delivery timescales indicated below reflect current levels of funding, existing commitments and preferences expressed through the consultation process for the Strategy.**

7.3.1 Objective 1 - Improve the level of understanding of local flood risk within the LLFA

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
1.1	Record drainage and flood assets	Identifying the location, capacity and condition of drainage assets is key to understanding how local flood risk is managed and sharing the information with partner organisations to inform their work. The Council places a high priority on asset recording, taking opportunities through flood incident investigation, planned maintenance programmes, new highway works and 3 rd party information to build up a picture as to how surface water is drained via both underground and surface systems. Drainage and flood assets include pipes, culverts, open watercourses, mill-ponds, small reservoirs, informal flood banks and flood walls. The aim is expand the quantity and quality of information on the record to provide a comprehensive, linked network of drainage systems across the district which can be shared with partner organisations.	Ongoing	Council Revenue	✓
1.2	Maintain a public asset register	Although legislation only requires the Council to make the Register available for inspection, the Kirklees Register of Drainage Assets and Features is available as a GIS-based record on the Councils website. The first edition of the Register was posted in October 2012.	Register published, updating ongoing	Council Revenue	✓
1.3	Designating flood/ drainage assets	The Councils current knowledge of 3 rd party drainage features or structures is limited. Work carried out to deliver Measure 1.1 will allow the Council to judge the merits of designating such assets. The Council is obliged to designate new SuDS created by the SAB (See Measure 5.3). The Council will formulate criteria for the designation of non-SuDS features and apply the criteria as Measure 1.1 delivers more information on assets.	April 2014	Council Revenue	✓
1.4	Recording/ mapping flood incidents	The Council will investigate, to some degree, all reported flood incidents. Locations and detail of causes/solutions are recorded on the Councils GIS which allows all relevant flooding and asset data to be reviewed at the same time. All known historic flood incidents are recorded and all future incidents will be recorded.	Process in place	Council Revenue	✓
1.5	Carry out flood investigations	The Council has published its approach to carrying out formal flood investigations where significant flooding has occurred. The outcomes of the investigations and the full reports will be published on the Council's website within 6 weeks of the date of the incident.	Process in place, investigations ongoing	Council Revenue	✓

Kirklees Local Flood Risk Management Strategy

1.6	Assessment of high flood risk locations in SWMP	Locations of higher flood risk have been identified in the Kirklees SWMP which will be investigated in detail to determine whether mitigation measures are required. The level of risk has been determined from an assessment of available flood mapping/ recorded flood incidents and flood receptors such as residential/business properties, critical utility and social infrastructure, including schools, residential care facilities and key transport links. The interaction between river and surface water flooding is particularly complex and needs to be better understood by the Environment Agency and the LLFA if flood risk is to be accurately assessed and responsibility allocated. 50 locations have been highlighted initially and the Council will assess them in accordance with the method described in Section 8.3 of the SWMP.	Resource needed	Council Revenue/ Local Levy	Partial
1.7	Improve skills and knowledge of FRM officers	Develop a local centre of expertise on general FRM issues, providing a "one-stop shop" for residents, businesses and developers. Encourage officers to develop a wide range of FRM skills rather than relying on specialists.	Ongoing	Council Revenue	✓
1.8	Information from stakeholder engagement	Develop initiatives to "tap into" local knowledge of historic drainage systems and flood incidents. Produce a communication plan to encourage sharing of local information.	October 2013	Council Revenue	✓

7.3.2 Objective 2 - Improve the level of understanding of local flood risk amongst partners and stakeholders

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
2.1	Publish a clear strategy and communicate it	The Kirklees LFRMS provides the framework to manage local flood risk and mitigate any risks which are considered to be too high. It is by nature, a technical document with complex issues but it is imperative that the main priorities in the strategy are understandable by all stakeholders and can be delivered in reasonable timescales.	February 2013	Council Revenue	✓
2.2	Develop information strategy to improve partner and stakeholder knowledge	The Council needs to translate the technical information on flood risk into simple, readily understandable terms. Text and graphics should be used to allow partners and stakeholders to understand the risk relevant to their interests. Innovative means of conveying complex information will be investigated, sharing best practice from other LLFA's.	April 2013	Council Revenue	✓
2.3	Improve and maintain the Councils FRM web pages	The Council is committed to ensuring it communicates the message on flood risk as effectively and widely as possible and will use a number of methods to achieve this. However, the Councils website will become increasingly important as the most useful and flexible method of displaying both policies and graphical demonstrations of flood risk. The Flood Management pages on the website will be comprehensive and maintained as an up to date record of local flood risk.	Initial upgrade complete. Maintenance ongoing	Council Revenue	✓

Kirklees Local Flood Risk Management Strategy

7.3.3 Objective 3 - Ensure that local communities understand their responsibilities in relation to local flood risk management

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
3.1	Publish and distribute information explaining responsibilities, local flood risk, property protection/ resilience etc	The Council and its partner agencies are limited by legislation and resources in how much they can do to manage local flood risk. An essential part of the work of LLFA's is to share its developing knowledge with stakeholder to allow them to take appropriate responsibility for their own land and property. A number of techniques and measures are available to property owners to reduce the level of flood risk (Resistance measures) or to recover quickly and economically from flooding (Resilience measures). The Council will develop a template for a standard information pack explaining the rights and responsibilities of landowners, an indication of the kind and size of flood risk they might face and advice as to the measures they could use to manage the risk.	April 2013	Council Revenue	✓
3.2	Involve local communities in local initiatives and schemes	The current national capital funding arrangements for FRM encourages a partnership approach to maximise outcomes and funding contributions. In general terms, FRM projects stand the best chance of national funding if they are community led and supported. A key task for the Council is to engage with local communities to fully involve them in the process to develop affordable schemes, encourage community ownership of the scheme at inception, project development, funding and delivery.	October 2013	Council Revenue	✓

7.3.4 Objective 4 - Maximise the benefits from partnership working with flood risk partners and our stakeholders

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
4.1	Continue to develop the Kirklees Flood Partnership and contribute to the Yorkshire LLFA Liaison Group and Yorkshire Action and Learning Alliance	The Council will continue to be an active participant in the Liaison Group and the Learning Alliance. The Kirklees Flood Risk Partnership will be developed to provide a strong voice for the Council, the Environment Agency and Yorkshire Water in pursuit of better local flood risk management.	Ongoing	Council Revenue	✓
4.2	Ensure that policies and programmes promoted through the Strategy complement and support works across the rest of the Calder and Don catchments	Strategies and plans identified in Section 5.2 of the Strategy provide actions which complement many of the measures identified in the Strategy. A checklist will be developed to ensure that strong links between plans are developed, checked and maintained.	April 2013	Council Revenue	✓

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7.3.5 Objective 5 - Actively manage flood risk associated with new development proposals

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
5.1	Develop and apply a robust local policy on FRM and drainage solutions on new development sites	The development of new sites and redevelopment of existing sites gives the Council an opportunity to reduce flood risk within the sites and upstream and downstream of the sites. National planning guidance exists which encourages the Council to adopt a consistent approach when recommending appropriate flood risk measures for new development sites. The national guidance is currently under review but the Council is committed to adopting a similar, local approach in the future which will replicate the national guidance. The council will continue to set stretching targets for developers in relation to permitted discharges from new or redeveloped sites, reassessing the targets as the council acquires more evidence of local flood risk. The Councils current advice note on flood risk and drainage for new development sites, based on the national guidance, will be reviewed against the developing legislation and strengthened to give clear and robust advice to developers.	April 2013	Council Revenue	✓
5.2	Develop a process with the Planning Department to create clear advice and direction to developers on FRM and drainage	Flood management and drainage solutions for development sites can be space-intensive and it is vital that early discussions with developers and planning officers take place to allow appropriate provision to be designed into the development. It is essential that the local guidance to be produced in Measure 5.1 forms part of an internal council procedure that integrates technical advice with the planning application process. Agreement and application of FRM and Drainage advice has to be translated into appropriate conditions attached to planning approvals. The Council will develop a procedure to ensure that appropriate and timely advice is given to planners and developers and that planning approvals and conditions are clear and enforceable.	April 2013	Council Revenue	✓
5.3	Establish the SuDS Approval Body (SAB)	The Council will maximise the future benefits from SuDS by setting up a SAB that is knowledgeable, well-resourced and committed to working effectively with developers. The SAB will be integrated into existing Council activities to provide links between the development planning, environment/biodiversity, highways and grounds maintenance processes. Existing relationships with the Councils main partners, Yorkshire Water and the Environment Agency, will be strengthened and focused on developing clear and strong policies and working arrangements for SuDS. Details on SuDS/SAB implementation still to be determined nationally but establish a draft SAB asap.	Awaiting advice	Unfunded, awaiting national decision on new funding	X

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7.3.6 Objective 6 - Take a sustainable approach to FRM, maximising environmental and social benefits from policies and programmes

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
6.1	Ensure the environmental consequences of implementing the LFRMS are considered against the technical, economic and social benefits	The Council considers that the LFRMS is a significant local strategy and, consequently requires appraisal under the Strategic Environmental Assessment (SEA) Regulations. Specialist, independent advice has been sought to ensure a robust assessment of environmental effects are considered as the strategy is developed and implemented. Every opportunity will be taken to maximise biodiversity benefits in the delivery of the various measures outlined in the Strategy. Monitoring against the SEA will continue as the Strategy is implemented.	Ongoing	Council Revenue	✓
6.2	Work with the Environment Agency to embed policies from local River Basin Management Plans, local environmental policies and “European” protected sites into FRM procedures and programmes	Where there are significant and predictable environmental risks from schemes and initiatives promoted by the strategy, the council will commit to carrying out formal Environmental Impact Assessments for the proposals. When implementing the measures set out in the LFRMS, due regard will be given to the need to identify and avoid potential adverse effects on the integrity of European sites in and around Kirklees, in particular the South Pennine Moors SAC/SPA (Phases 1 and 2). An Environmental Management Plan will be developed to encourage a consistent approach in all FRM activities carried out across the district, and European designated sites will be fully referenced in the Plan. The Council's Climate Change Adaptation Plan identifies specific measures which are targeted at managing the consequences of more frequent severe rainfall events. These measures have been addressed by complementary measures in this Strategy.	October 2013	Council Revenue	✓

7.3.7 Objective 7 - Improve and/or maintain the capacity of existing drainage systems by targeted maintenance

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
7.1	Identify highest risk open and culverted watercourses, highway drains and other drainage/flood features	The Council has a statutory duty to maintain highway drains but only a riparian responsibility to keep watercourses within its ownership clear of obstructions. Some watercourses create a high flood risk for nearby communities and would benefit from a more structured and targeted maintenance regime. The council will carry out a comprehensive, methodical survey of all known, non-Environment Agency or Water Company assets to determine those lengths of watercourse and drains which offer a significant flood risk. Some of this information will be used to inform Measures 1.1 to 1.3, detailed earlier in this section.	October 2013	Council Revenue	✓
7.2	Develop an affordable cyclical maintenance regime based on risk	Maintenance budgets are limited and need to be targeted at those areas where the risk of flooding is highest. The extent of flood risk and the asset type, condition and vulnerability to temporary blockage will influence the type and frequency of maintenance required. Open watercourses contribute to a network of green corridors across the district, linking larger areas of open space. The	October 2013	Council Revenue	✓

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		<p>maintenance of the watercourses to maximise the drainage of surface water will be balanced with sensitive treatment of the biodiversity elements. Maintenance plans will incorporate appropriate direction on responsible management of the local water environment. Cyclical maintenance plans will be developed for trash grilles protecting council-owned culverts, highway gullies and open watercourses where regular clearance would be beneficial in protecting downstream properties and infrastructure. Plans will be adapted as new information is collected.</p>			
7.3	Implement a responsive, reactive maintenance regime based on risk	<p>The Council cannot afford to carry out planned, preventative maintenance to all the drainage assets it is responsible for. There will be some situations where the Council may have to respond reactively to situations which arise suddenly or are reported directly by the public. The speed and type of response will be determined by the level of flood risk and the resources available. Existing council systems for receipt of, and response to, requests for maintenance work will be reassessed to ensure a risk-based approach is followed.</p>	October 2013	Council Revenue and Capital budgets	✓

7.3.8 Objective 8 - Encourage proactive, responsible maintenance of privately-owned flood defence and drainage assets

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
8.1	Identify highest risk private flood defence and drainage assets	<p>The vast majority of watercourses are in private, rather than council ownership. Whilst riparian owners have a general responsibility to keep watercourses free of obstruction, a higher level of maintenance, which might help in maximising capacity, will need support and encouragement for private landowners. More often than not, landowners will be unaware of the level of flood risk associated with their watercourse. The Council will filter information collected under Measure 7.1 to identify private assets. The assets will be allocated a flood risk significance level to highlight the private assets of greatest concern. A database of higher-risk private assets, with details of the risk and suggested maintenance regimes will be compiled.</p>	April 2014	Council Revenue	✓
8.2	Develop technical advice for owners to guide them in preparing local maintenance plans	<p>Improving knowledge of the location and condition of private drainage assets, acquired through Measures 1.1 and 1.3, will allow the Council to suggest appropriate proactive maintenance measures to reduce the risk of flooding to themselves and adjacent landowners. Maintenance plans will manage and maintain both the efficient flow of water in the watercourse and a healthy and attractive bio diverse environment in all water bodies in private ownership. A general advice note on riparian rights and responsibilities will be produced with bespoke advice produced for individual owners of assets with high flood risk.</p>	October 2013	Council Revenue	✓
8.3	Establish risk-based consenting and designation processes	<p>The council will need to consider how it uses the powers available to it to formally "designate" (See Measure 1.3). The council will need to determine how it uses the powers available to formally "consent" works in ordinary watercourses, which may have an effect on the flow of water in the watercourse. The council does not currently propose to carry out legal consenting of such works and will manage applications for works in watercourses</p>	Process to be published	Council Revenue	✓

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		via an “informal” approval process. The process will be reviewed annually to assess its suitability and effectiveness.		
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7.3.9 Objective 9 - Establish a robust policy on water management and use available information on flood risk to assess the suitability of the allocation of sites for different land uses through the Local Development Framework process

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
9.1	Use available information on flood risk to identify appropriate development potential	The council, as Planning Authority, has a responsibility to direct development towards areas where flood risk is lowest and any proposed development is appropriate to the flood risk present at the site. An increasing amount of evidence is available to identify and quantify the flood risk that exists across the district. The evidence base for flood risk will be used alongside environmental, social and financial factors to determine sustainable solutions for local issues. The relevant previous and developing plans and strategies are referenced in Section 5.1 of this strategy. The Councils Core Strategy for the Local Development Framework (LDF) is progressing towards completion with the intention to adopt the Core Strategy late in 2013, following independent examination. This contains a water management policy and flood risk is presented in broad terms. The aspirations of this strategy, and the related plans and policies, will be embedded in the future land allocation processes required by the LDF.	Ongoing	Council Revenue	✓

7.3.10 Objective 10 - Maximise opportunities to reduce surface water run-off from the upper catchments

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
10.1	Develop proposals to engage with significant landowners to employ land management techniques and initiatives which help to reduce the rate of surface water run-off	The south-western side of the district lies in the foothills of the South Pennines, providing substantial parts of the upper catchments for the rivers Colne and Dearne. Much of the Colne catchment is managed to provide a regular water supply to several large reservoirs, operated by Yorkshire Water, but significant areas provide opportunities through different land management practices to retain rainwater where it falls, delaying its entry to, or reducing the rate it enters, the river system. Innovative initiatives and supportive landowners are vital to achieving worthwhile reductions in surface water run-off rates. A significant part of the upper Calder catchment lies within the South Pennines Moors SAC/SPA and due regard will be paid to the particular requirements for any proposal having an effect on the water environment in the area. The Yorkshire Peat Partnership is carrying out complementary work and may be a useful source of information. The council will work with landowners and partners to develop specific proposals.	Jan 2014	Council Revenue	✓

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7.3.11 Objective 11 - Identify projects and programmes which are affordable, maximising capital funding from external sources

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
11.1	Develop a pragmatic programme of schemes and initiatives which are likely to be funded through the National Programme or Local Levy	The strategy describes a suite of measures which can be taken to manage local flood risk. Some measures are more affordable than others with larger capital improvement schemes offering the greatest challenges for funding. The national funding administered by the Environment Agency targets schemes with evidenced high risk of property flooding, preferably with contributory funding from partners and stakeholders benefiting from the scheme. The council's immediate priorities, using the outputs from the SWMP work carried out under Measure 1.6 , are to establish an evidence base for the location and the extent of the risk of local flooding, quantify the size and potential effect of the risk and then identify costed options for appropriate and affordable mitigation measures. A programme of suitable projects which may attract capital funding will gradually develop over time. The council will deliver the actions detailed in the SWMP to help identify projects for the higher priority areas in the district.	October 2013 (Develop), April 2015 onwards (Deliver)	Council Revenue (Develop), Local Levy/ FDGiA (Deliver)	Partial
11.2	Develop and implement a policy on de-culverting, consistent with the LDF Core Strategy using evidence in the SWMP and RBMP to aid prioritisation	The district has a high proportion of natural water courses carried in stone culverts as a result of its industrial legacy and the gradual urbanisation of its settlements. The condition, limited capacity and location can combine to create local sources of flood risk. The LDF core strategy will contain a policy relating to water management encouraging re-opening of culverts. The Council will look for opportunities to de-culvert and return culverted watercourse back to open channel, reducing flood risk and re-establishing biodiversity benefits.	October 2013 (policy), April 2014 onwards (Deliver)	Council Revenue	✓
11.3	Determine all other funding sources, Council, partners and other external, and maximise "match-funding"	The funding of proposals set out in this strategy is covered in detail in Section 7. The council will develop a maintained list of funding sources applicable to the mitigation measures identified in the strategy.	April 2013	Council Revenue	✓

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7.3.12 Objective 12 - Ensure local FRM knowledge is aligned with the Councils emergency planning procedures

Measure	Actions Proposed	Description and Benefits of Carrying out the Measure	Timescales	Funding	
				Source	In Place
12.1	Embed the LFRMS into response and recovery plans and use developing knowledge on flood risk to “tune” emergency procedures	The Corporate Safety and Resilience team have responsibility for the council's management of flood incidents affecting Kirklees communities. Any action required to manage the incident and its aftermath is co-ordinated through the council's Major Incident Plan. The new responsibilities outlined in the LFRMS will create an improving evidence base to target where council resources may be best deployed if a severe area-wide flooding event occurs. Post-flooding feedback will add to the information held by the Flood Management team to provide an ever-improving record of local flood risk. The Council's new responsibilities and current records will be embedded in the Major Incident Plan where appropriate and updated when necessary.	October 2013	Council Revenue	✓

8 What is the Flood Risk in Kirklees?

The topography and hydrological characteristics of the area have been described in Section 3.2 and it is clear that flood risk across the district is complex and varied. It is imperative that the Strategy explains in simple terms the source and size of flood risk in Kirklees. An increasing amount of evidence is available to explain the general levels of risk from a variety of sources, some of which are managed by the Council and some by others. This section of the Strategy will bring together available information on local flood risk, summarise the main issues across the district and explain how the information will be used to help in a wider understanding of risk.

Actual Flooding/ Predicted Flooding

Stakeholders who have experienced **previous flooding** to land or property readily understand the value of initiatives which mitigate the risk of flooding occurring again.

One of the challenges of local FRM is to find effective ways of explaining future, **predicted flood risk** ie flooding which hasn't happened yet but may happen if measures are not put into place now to prevent it.

8.1 Available Evidence/Assessments of Flood Risk

Various plans and risk assessments produced over the last 5 years present local flood risk in a variety of ways. The following table summarises the plans and evidence:

Plan/ Evidence Source	Date	Description of Evidence	Rainfall Probability (%)	Properties flooded or predicted to flood
Summer 2007 Flooding	2007	The severe flooding in 2007 was the worst in living memory. Around 200 flooded properties were reported to the Council but it is estimated that up to 500 across the district flooded. Most of the flooding was attributed to surface water.	0.5	500
Calder Valley SFRA	2008	River mapping of the Calder catchment in Kirklees, Wakefield and Calderdale to support land-use decisions in the Councils planning processes. Flooding predictions is from fluvial sources and excludes surface water.	1	16,500 (Calder Catchment) 4,500 (Kirklees – estimated)
Calder CFMP	2010	Most recent EA assessment of fluvial risk providing an overview of flood risk in the Calder catchment.	1	10,300
Don CFMP	2010	The Don CFMP includes assessment of fluvial flood risk in the Upper Dearne Valley which covers around 15% of the area of the district	1	250
Defra allocation of funding	2010	Defra used the available evidence on predicted flood risk to allocate funding for new FRM duties in a proportionate way. Kirklees ranked 55 th out of 149 LLFA's for overall flood risk. Excluding London Boroughs and Counties, Kirklees ranked 7 th behind Hull, Birmingham, Brighton, Doncaster, Leeds and Leicester.	0.5	15,000 (surface water) 12,000 (fluvial)
PFRA/ Surface Water Maps	2011	The PFRA produced under the European Flood Risk Regulations was a high level overview of surface water flood risk across the district.	0.5	15,900

The calculation of future flood risk is complex and approximate. However, it is reasonable to assume that **a minimum of 20 - 25,000 properties in Kirklees are at risk of flooding from a rainfall event with a 0.5% annual chance of occurring.** Other infrastructure such as roads, bridges and public utility buildings would also be affected. **With a conservative estimate of £25,000 recovery/repair costs per property, such a rainfall event could cost the local economy in excess of £700million.** In reality, the more realistic scenario is that a severe rainfall event would affect only part of the district. **However, an event affecting 10% of the district could still cause £70million of damage.**

Increasing economic and social pressures to develop previously undeveloped land, the progression of urban creep (the increase in impermeable paving around existing infrastructure) and the effect of climate change in increasing the chance of disruptive rainfall events occurring, will combine to create a worsening situation in the district unless we develop and implement measures to address flood risk.

The properties and infrastructure at risk from flooding are scattered across the district, albeit most will be located in the valley bottoms close to rivers and minor watercourses. The broad geographical areas of concern are listed in the following section.

8.2 Areas at Risk from Future Flooding (Fluvial and Surface Water)

Using the evidence from previous flood incidents and predicted future flooding, the areas which are most at risk are as follows:

Area	Area Description	Main Sources of Flooding	Estimated No. of Properties Affected (0.5% AEP)
Huddersfield	Leeds Road Corridor (Between Bradley Mills Rd and Whitacre St)	River Colne, Surface Water	5000
Huddersfield	Aspley (Wakefield Rd/ Firth St)	River Colne, Surface Water	1800
Huddersfield	Dalton, Fenay Bridge (Waterloo Rd to Albany Rd)	Fenay Beck, Surface Water	500
Holme Valley	Holmfirth, Honley, Brockholes, New Mill (Most centres near to River Holme and New Mill Dyke)	River Holme, Surface Water	2500
Dearne Valley	Denby Dale, Scissett, Clayton West (Adjacent to River Dearne and Clayton Dyke)	River Dearne, Surface Water	600
Batley	Bradford Road Corridor (Batley Beck)	Batley Beck, Surface Water	1600
Marsden	Town Centre	River Calder, Surface Water	700
Dewsbury	Ravensthorpe (Huddersfield Rd)	River Calder, River Spen	2000

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Dewsbury	Savile Town, (Savile Rd + commercial props)	River Calder, Surface Water	500
Thornhill	Thornhill Lees (Victoria Rd area)	Surface Water	400
Thornhill	Thornhill Rd	River Calder	300
Spennithorne			
Spennithorne	Liversedge, Cleckheaton, Oakenshaw	River Spennithorne, Surface Water	3000
Mirfield	Lower Hopton	River Calder, Surface Water	500
Kirkburton	Town Centre, Penistone Road	Dean Bottom Dike, Surface Water	200
Meltham	Town Centre	Meltham Dike, Surface Water	200
Slaithwaite	Town Centre	River Colne, Crimble Clough, Surface Water	200
		Total No. of Properties Affected in the Main Settlements	20000

8.3 Current Works Programme

Measure 11.1 outlined in Section 7 will eventually provide a rolling programme of affordable, funded schemes and initiatives which will help to reduce flood risk in the district. Initiatives based on recent flooding are already being developed and the table below shows the programme of work the Council is currently developing.

Initiative	Description	Number of properties at risk
Trash Grille Replacement	New or updated trash grilles to be installed to protect highway-maintained culverted watercourses. Total of 34 grilles identified.	200+
Ings Crescent/ Valley Rd, Liversedge	Flooding resulting from the interaction of river, surface water and sewer systems	50+
Dean Brook Rd, Armitage Bridge	Flooding from a minor watercourse. Potential for an upstream storage scheme	20+
Syke Ing Close, Chickenley	Flooding from culverted section of Chickenley Beck. Reculverting or day-lighting options	5+
Ex-Mill Ponds Survey	Detailed survey required to understand the flood risk associated with "orphaned" mill ponds. May result in maintenance work to address any identified risks.	300+

8.4 Explanation of the Risk

Numerical calculation of flood risk is important if resources are to be prioritised for those locations where the risk of flooding to properties is highest. The Environment Agency also expect risk calculations to support bids for capital funding for FRM projects, providing evidence for the benefits from the proposed works. However, risk probabilities do not easily convey the uncertainties around flooding and the vulnerability property owners and communities might face. **Measure 2.2 outlined in Section 7** will develop simpler definitions of “the chance of flooding” which are easily understood by the general public and highlight but don’t unnecessarily exaggerate the risk.

Key Points: Flood Risk in Kirklees

- A minimum of 20-25,000 properties in Kirklees are at risk from a flood event with a 0.5% annual chance of occurring
- The locations of potential flooding are widespread and the mechanisms varied
- Calculation of risk is complex and imprecise. Simpler representations of flood risk will be developed

9 How and When will we Review the Strategy?

The Strategy will provide the framework for the Council's delivery of its flood risk management responsibilities. It will be formally approved by the Council's cabinet and adopted as a Council strategy. It is a "living document" which will develop as new information, expertise and resources influence the delivery of the measures outlined in the strategy. The strategy will be monitored by officers at the regular **Kirklees Flood Partnership Meetings** and progress against the measures assessed by local members through an annual report to the Council's **Development and Environment Overview and Scrutiny Panel**. The Strategy has been developed to deliver a short to medium term (3-5 years) improvement plan to establish a sound evidence and knowledge base to develop a longer-term investment programme for FRM measures across the district.

It is anticipated that the Strategy will become more focussed on the delivery of an affordable and funded capital programme of FRM works in the longer term (5-10 years).

10 A Sustainable Approach – Balancing Social, Economic and Environmental Needs

The focus on the Kirklees LFRMS is to reduce flood risk from local sources where it threatens private property and public infrastructure. The Council is also committed to maximising opportunities to carry out sustainable flood risk reduction in ways which complement national and council environmental priorities, are affordable and recognise social demographic differences across the district, delivering flood risk reduction across all its vulnerable communities. Measures which explicitly use a sustainable approach include:

- **Assessment of high flood risk locations in SWMP (Measure 1.6)** – The SWMP uses a balanced approach to develop appropriate site-specific solutions by using a standard template offering a suite of FRM approaches and solutions
- **Publish and distribute information explaining responsibilities, local flood risk, property protection/resilience etc (Measure 3.2)** – Advice on measures that could be taken will be sensitive to the local environment
- **Establish the SuDS Approval Body (SAB) (Measure 5.3)** – The Kirklees SAB will embrace national guidance on the encouragement, adoption and maintenance of SUDS. The guidance offers clear advice on the balance of managing surface water run-off with the maintenance and improvement of the local water environment.
- **Ensure the environmental consequences of implementing the LFRMS are considered against the technical, economic and social benefits (Measure 6.1)** – The Strategy has undergone a thorough assessment against the Strategic Environmental Assessment (SEA) and Habitats Regulations
- **Embed policies from local River Basin Management Plans, local environmental policies and “European” protected sites into FRM procedures and programmes (Measure 6.2)** – A Kirklees environmental management plan for FRM measures will be developed to ensure a consistent and comprehensive approach across all measures
- **Develop an affordable cyclical maintenance regime based on risk (Measure 7.2)** – Watercourses will be maintained as “green corridors” as well as surface water drains
- **Develop technical advice for owners to guide them in preparing local maintenance plans (Measure 8.2)** – Advice will be provided to riparian owners to allow them to maintain their watercourses in a way that is sensitive to the local water environment
- **Use available information on flood risk to identify appropriate development potential (Measure 9.1)** – The increasing evidence base for flood risk will allow the Planning Authority to make informed judgements on appropriate land allocations which are sensitive to all environmental, social and economic issues
- **Develop proposals to engage with significant landowners to employ land management techniques and initiatives which help to reduce the rate of surface water run-off (Measure 10.1)** – The Council has a responsibility as an LLFA located within the upper catchment to investigate how the undeveloped rural/moorland areas can be managed to retain/ infiltrate rainfall at source
- **Develop and implement a policy on de-culverting (Measure 11.2)** – Every opportunity will be taken to return culverted watercourses to open watercourse where there are clear environmental and hydraulic benefits

11 Consistency with the National Strategy

Recent legislation implies strong partnership working as a prerequisite in delivering more effective flood risk management. The National Strategy sets out the Environment Agency's priorities and it is vital that the Kirklees LFRMS supports those aspirations with complementary measures. Section 5 of this strategy references the main policies and measures suggested in the National Strategy ensuring that they are included within the general objectives for the Local Strategy.

The Environment Agency is represented on the steering group for the Kirklees LFRMS and is a statutory consultee. Following the approval and adoption of the Strategy as a Council plan it is intended to check continuing adherence of the LFRMS with the National Strategy at the regular Kirklees Flood partnership meetings.

