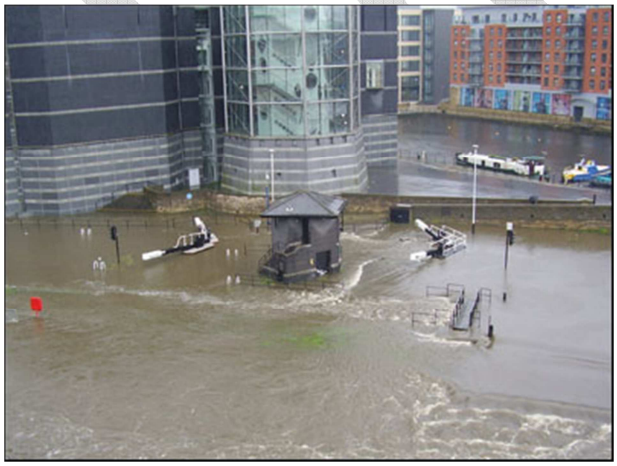
Leeds City Council

Local Flood Risk Management Strategy

Draft - V1.8
December 2013



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Revision Schedule

Local Flood Risk Management Strategy - 2013

Rev	Date	Details	Prepared by	Reviewed by	Approved by
1.0	22 August 2012	**Draft** (for Internal Distribution)	**Simon Gilliland** Engineer	**Ian Hope** Group Engineer	
1.1	03 July 2013	**Draft** (for Internal Distribution)	**Ian Hope** Group Engineer	**Ian Hope** Group Engineer	
1.2	05 July 2013	**Draft** (for Internal Distribution)	**Ian Hope** Group Engineer	**Ian Hope** Group Engineer	
1.3	24 July 2013	**Draf**t (for public consultation)	**Ian Hope** Group Engineer	**Peter Davis** Flood Risk Manager	
1.4	5th Aug 2013	**Draft** (following CDD)	**Peter Davis** Flood Risk Manager	**Peter Davis** Flood Risk Manager	
1.5	27 Aug 2013	**Draft** (for Internal Distribution)	**Ian Hope** Group Engineer	**Peter Davis** Flood Risk Manager	
1.6	30 Aug 2013	**Draft** (for external Consultation)	**Peter Davis** Flood Risk Manager	**Peter Davis** Flood Risk Manager	
1.7	4 Sept 2013	**Draft** (Equality Assessment added)	**Peter Davis** Flood Risk Manager	**Peter Davis** Flood Risk Manager	
1.8	5 Dec 2013	**Draft** (after Public Consultation)	**Peter Davis** Flood Risk Manager	**Peter Davis** Flood Risk Manager	

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1. Executive Summary

As Lead Local Flood Authority, Leeds City Council is required under Section 9 of the Flood and Water Management Act, which came into effect on the 12th April 2010, to develop, maintain, apply and monitor a strategy for local flood risk management – a "Local Flood Risk Management Strategy".

The scope of this Local Flood Risk Management Strategy covers all sources of flooding including Main River flooding, although this is primarily the Environment Agency's responsibility, but it focuses more specifically on 'local flooding' that originates from ordinary watercourses, surface water, sewers (rainfall only) and groundwater.

The purpose of this strategy is to guide the flood risk management activities undertaken by Risk Management Authorities operating in the metropolitan district of Leeds; namely, Leeds City Council, the Environment Agency, Yorkshire Water Services, Ainsty Internal Drainage Board and the Highways Agency.

This strategy has been developed with regard to current legislation and guidance. The strategy builds on the significant work that has already been undertaken to assess the risk of flooding in Leeds district, most recently the Preliminary Flood Risk Assessment in September 2011, by providing the following: -

- An outline of the roles and responsibilities of Risk Management Authorities in relation to flooding in the area;
- The local objectives for managing flood risk in Leeds that all Risk Management Authorities and stakeholders should have regard to;
- A 'List of Measures' (included in Appendix C) which identifies short, medium and longer term measures to improve flood risk management in Leeds, together with the benefits and timescales for implementation. The 'List of Measures' is a 'living document' which will be monitored and updated on a regular basis, at least annually, when measures are completed or new ones added.

It is proposed that this strategy will be reviewed once every 6 years. This will link the LFRMS review with the cycles for reviewing the Preliminary Flood Risk Assessment as outlined in the Flood Risk Regulations Part 2, Regulation 17.4. The first review is scheduled to be completed by April 2018.

2. Legislative Context

2.1. Introduction

This Strategy has been developed with regard to all current legislation and guidance relating to flood risk management in the Leeds district. The key legislation and guidance influencing this strategy are outlined in the following sub-chapters.

A complete list of all legislation, guidance, reports, strategies and studies relating to flood risk management in the Leeds District, which have been referred to in the development of this strategy are listed in Chapter 9.

2.2. Flood Risk Regulations & Flood and Water Management Act

The European Union Flood Directive (2007/60/EC) is consolidated into British law in the Flood Risk Regulations (FRR) 2009, which came into force on 10th December 2009. Under these regulations Leeds City Council (as a unitary authority) is designated a 'Lead Local Flood Authority' (LLFA) for the area.

As a LLFA, the Council is required under Section 9 of the Flood and Water Management Act (FWMA), which came into effect on the 12th April 2010, to develop, maintain, apply and monitor a strategy for local flood risk management – a "Local Flood Risk Management Strategy" (LFRMS).

Section 9 of the FWMA states that the LFRMS must specify the following: -

(a) The risk management authorities in the Leeds LLFA area,
(b) The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area,
(c) The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009),
(d) The measures proposed to achieve those objectives,
(e) How and when the measures are expected to be implemented,
(f) The costs and benefits of those measures, and how they are to be paid for,
(g) The assessment of local flood risk for the purpose of the strategy,
(h) How and when the strategy is to be reviewed, and
(i) How the strategy contributes to the achievement of wider environmental objectives.

2.3. National Flood and Coastal Erosion Risk Management Strategy

The Environment Agency (EA) and the Department for Environment Food and Rural Affairs (Defra) jointly developed and published their National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England on the 19th July 2011 pursuant to section 7 of the FWMA. The National FCERM Strategy sets out six high-level principles ('The Guiding Principles') to guide LLFAs in their risk management activities. These are: -

1. Community focus and partnership working
2. A catchment and coastal "cell" based approach
3. Sustainability
4. Proportionate, risk-based approaches
5. Multiple benefits
6. Beneficiaries should be encouraged to invest in risk management

The LFRMS must be consistent with this National FCERM Strategy and these six high-level principles. Therefore, the objectives for managing local flood risk in Chapter 6 of this LFRMS and the specific measures in the 'List of Measures' in Appendix C have been aligned with these high-level guiding principles to ensure consistency with National FCERM Strategy and its related strategies and plans as shown by the diagram in Figure 2.1.

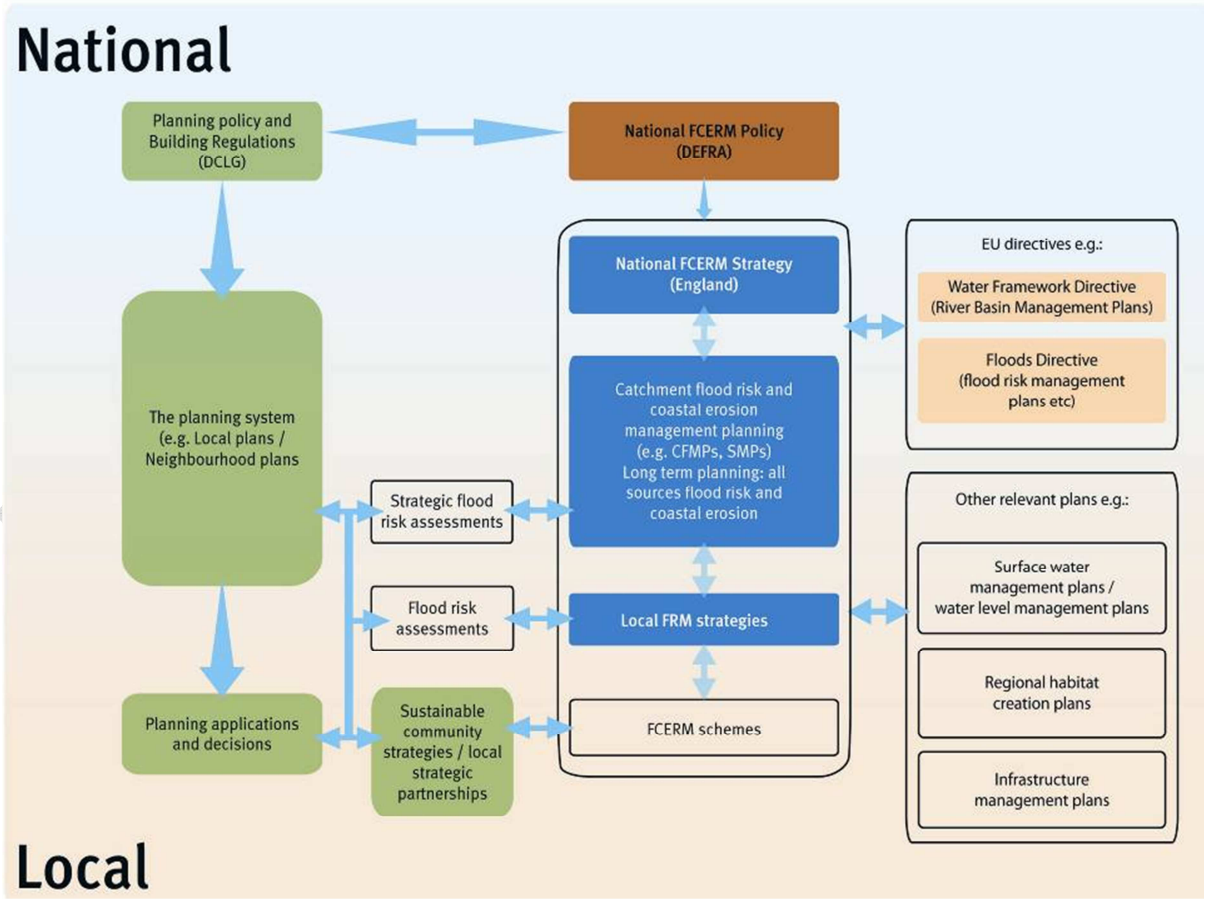

Figure 2.1 – FCERM Strategies and plans and their relationship with other planning initiatives (extracted from National FCERM Strategy, EA/ Defra, page 20)

2.4. Water Framework Directive

This strategy has been prepared under the Water Framework Directive (WFD). The WFD requires all countries throughout the European Union to manage the water environment to consistent standards.[1] Each country has to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least good status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
- Meet the requirements of Water Framework Directive Protected Areas;
- Promote sustainable use of water as a natural resource;
- Conserve habitats and species that depend directly on water;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- Contribute to mitigating the effects of floods and droughts.

2.5. Environmental Assessment of Plans and Programmes Regulations

A Strategic Environmental Assessment (SEA) has been undertaken in parallel to the production of this strategy in accordance with The Environmental Assessment of Plans and Programmes Regulations 2004. The Leeds Sustainability Appraisal Framework has been used to appraise the LFRMS, with particular focus on the 'Objectives for managing flood risk' in Chapter 6 of this strategy and the associated 'List of Measures in Appendix C'. This framework promotes sustainable development: development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987).

The SEA process established eight monitoring indicators to assess the implementation of the LFRMS; these are presented in Chapter 8. The SEA Report is included in Appendix E.

2.6. National Planning Policy Framework

To ensure consistency with national planning guidance the LFRMS has been produced with reference to the National Planning Policy Framework (NPPF) which replaced Planning Policy Statement 25: Development and Flood Risk (PPS25) in March 2012.

[1] Leeds LLFA has successfully bid for catchment restoration funding with the Aire Rivers Trust.

2.7. Local Development Framework

To ensure consistency with local planning guidance the LFRMS has been produced with reference to the Leeds Local Development Framework (LDF). The key LDF Development Plan Documents (DPD) reviewed were the Core Strategy DPD and Natural Resources and Waste DPD. Leeds City Councils Policy EN5 on managing flood risk is presented below and embodied in the six 'Objectives for managing local flood risk' listed in this strategy in Chapter 6.

POLICY EN5: MANAGING FLOOD RISK

The Council will manage and mitigate flood risk by: -

(i) Avoiding development in flood risk areas by applying the sequential approach and where this is not possible, by mitigating measures, in line with the NPPF, both in the allocation of sites for development and in the determination of planning applications.

(ii) Protecting areas of functional floodplain as shown on the Leeds SFRA from development (except for water compatible uses and essential infrastructure).

(iii) Requiring flood risk to be considered for all development commensurate with the scale and impact of the proposed development and mitigated where appropriate.

(iv) Reducing the speed and volume of surface water run-off as part of new build developments.

(v) Making space for flood water in high flood risk areas.

(vi) Reducing the residual risks within Areas of Rapid Inundation.

(vii) Encouraging the removal of existing culverting where practicable and appropriate.

(viii) The development of the Leeds Flood Alleviation Scheme.

2.8. Equality Impact Assessment

A screening exercise has been carried out into the impact of this strategy on Equality, Diversity, Cohesion and Integration. The finding of this was that a full Assessment was not required at this time – however further assessment will be carried out as each measure is considered.

It should be noted that by carrying out these works the Council will be ensuring the safety of the local community and particularly those residents that have children and members of the families have a disability, where these benefits will be greater – as currently these individuals may struggle to get to safety if flooding occurred.

Introduction

2.9. Physical Characteristics

The Administrative Area of Leeds covers an area of approximately 560 square kilometres. This includes approximately 360 square kilometres of countryside designated as Green Belt. The district encompasses the major city of Leeds as well as number of smaller settlements including: Wetherby, Otley, Guiseley, Yeadon, Horsforth, Garforth, Rothwell, Pudsey and Morley. The population of Leeds is approximately 750,000 - in around 320,000 households (figures from 2011 Census).

The general topography of the district is undulating and varies in level from 10m Above Ordnance Datum (AOD) at Fairburn on the River Aire and Thorp Arch on the River Wharfe to more than 340m AOD at Hawksworth Moor. The rocks underlying the district date from the Upper Carboniferous period: with sandstones and grits of the older Millstone Grit Series in the north of the district and alternating shales, mudstones, coal seams and sandstones of the Lower Coal Measures in the south of the district. The overlying soils in the district mainly comprise clays and loams and are relatively impermeable. However, sands and gravels are predominant adjacent to the River Aire.

2.10. Drainage Features

The majority of the district is drained naturally via a series of watercourses, some of which are culverted in urban areas; these typically run in steep sided valleys towards the major/ strategic watercourses (Main Rivers) which generally travel in an easterly direction eventually discharging in to the River Ouse and Humber. The major watercourses in the district are: -

- The River Aire which traverses the district from the north-west to south-east and drains approximately two thirds of the district;
- The River Wharfe which drains an area to the north and east of the district. This drains to the River Ouse – with small areas draining to the River Nidd and direct to the River Ouse;
- The River Calder which forms part of the southern boundary of the district and flows from the west to east to join the River Aire at Castleford;

In urban areas the drainage of the district is facilitated by a sewer system. Leeds was initially served by 'Combined Sewers' (carrying both foul and surface water), however, it has been the policy since the 1950's to ensure that new developments and redevelopments incorporate separate foul and surface water systems. As a consequence, a significant part of the city now has separate or partially-separate sewers, with the surface water sewers connected in many cases directly to watercourses.

The majority of the combined sewers in the district drain to the Knostrop Waste Water Treatment Works which is located to the south-east of Leeds and adjacent to the River Aire.

2.11. Local Flood Risk

The scope of this LFRMS covers all sources of flooding but it focuses specifically on 'local flooding'. Flooding which originates from Main Rivers such as the River Aire, is not categorised as 'local flooding' and risk management responsibility for these watercourses sits principally with the EA. However, all flooding in Leeds is of concern to the residents and businesses and to Leeds City Council. Therefore, this strategy promotes a collaborative approach to flood risk management in Leeds, between all RMAs, and incorporates specific measures to alleviate Main River flooding such as the River Aire Flood Alleviation Scheme.

For further information on how flood risk from Main Rivers is managed by the EA refer to the Leeds Strategic Flood Risk Assessment (SFRA), the Aire and Ouse Catchment Flood Management Plans (CFMP), the Humber River Basin Management Plan (RBMP) and the EA's National FCERM Strategy.

The 5 main sources of flooding in Leeds are outlined below: -

- **Main Rivers** - This type of flooding typically occurs when a watercourse cannot cope with the water draining into it from surrounding land. Main Rivers are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance – not categorised as 'local flooding'.
- **Ordinary watercourses** – this includes lakes, ponds or other areas of water which flow into an ordinary watercourse (non Main River). This type of flooding typically occurs when a watercourse cannot cope with the water draining into it from surrounding land.
- **Surface water** – this type of flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground, but lies on or flows over the ground surface instead.
- **Sewers** – this strategy only covers sewer flooding where it is wholly or partially caused by rainwater. This type of flooding occurs when sewers are overwhelmed by heavy rainfall or they become blocked. The chance of flooding depends on the capacity of the local sewer system and amount of rain that falls.
- **Groundwater** – this type of flooding occurs when levels of water in the ground rise above the surface. It is most likely to happen in areas where the ground contains aquifers. These are permeable rocks that water can soak into or pass through easily.

2.12. Flooding Issues in Leeds

Leeds district is susceptible to flooding from a variety of sources and every year Leeds experiences flooding incidents that affect residential and business properties and city wide infrastructure. These result from severe weather and from issues with the design and maintenance of the built environment. The risks to the city of a significant flooding event, other than the physical damage are disruption, financial and reputational.

The city centre remains at significant risk from fluvial flooding from the River Aire and the Council are working in collaboration with the EA to design and promote a flood alleviation scheme for 19km of the river from Kirkstall, through the city centre to Woodlesford.

The most notable flooding incidents in Leeds have been: -

- River Aire: major floods in 1775, 1866 and 1946 and minor ones in 2000, 2002 and 2007;
- River Wharfe: Otley 1935, 1965, 1975, 1982 (near miss 2000);
- River Calder: Methley 1960 (homes up to 13 feet underwater);
- Wyke Beck: 2004, 2005 and 2007 (70 houses flooded);
- Wortley Beck: 1946, 2002, 2005 and 2007;
- Highways Drainage: Armley Gyratory (regularly);
- 14/15 June 2007: 100mm rainfall in 48 hours caused flooding in City, Wortley, Beeston, Pudsey, Swillington, Methley and Guiseley;
- 19-20 June 2007: intense rainfall caused flooding in City, Halton, Pudsey and Methley;
- 25 June 2007: over 100mm of rainfall in 24 hours flooded 250+ properties city-wide (Halton, Collingham, Wortley, Rothwell, Mabgate, Meanwood, Kippax etc). River Aire at highest levels for years, causing flooding to East Street, The Calls and Dock Street.
- 10 June 2012: heavy rainfall caused flooding to south-east Leeds (Austhorpe, Garforth, Swillington and Woodlesford), Swillington being worst affected;
- 21 & 23 June 2012: heavy rainfall caused flooding in Allerton Bywater, Seacroft & Gipton, Bardsey, Collingham, Garforth, Wetherby and Woodlesford, Allerton Bywater being worst affected.

It is imperative that plans and measures are put in place to mitigate against flood risk particularly in light of the predicted effects of climate change in the region.

Significant work has already been undertaken in Leeds by RMAs to assess the risk of flooding in the district. Most recently a Preliminary Flood Risk Assessment (PFRA) was produced, which was approved following scrutiny in September 2011. The PFRA began the process of identifying the areas at risk from 'local flooding' by collating information on historic floods, localised flooding incidents, areas of potential (future) flood risk and by also identifying measures for reducing flood risk. This was supplemented by culvert, watercourse and asset condition assessments and the EA's Flood Map for Surface Water (FMfSW).

As a result of the FWMA work is also in progress to improve cooperation between RMAs, promote sustainable development and adapt to climate change, raise awareness, respond and recover from flood events and engage with local communities.

A complete list of the reports, strategies and studies relating to flooding in the Leeds District and the guidance referred to in the production of this strategy are listed in Chapter 9.

3. Risk Management Authorities

3.1. Introduction

Flood risk in the district is managed by the Risk Management Authorities (RMAs) as defined in the FWMA. In the Leeds District these are: -

- The Lead Local Flood Authority – Leeds City Council;
- The Environment Agency (EA);
- The Water and Sewerage Company (WaSC) – Yorkshire Water Services (YWS);
- The Internal Drainage Board (IDB) – Ainsty IDB;
- The Highway Authority – Leeds City Council as Unitary Authority,
- And the Highways Agency, who have responsibility for motorways and major trunk roads.

As RMAs each of the above authorities has specific responsibilities in relation to FCERM and must also coordinate their activities with each other. The key responsibilities of each of the above authorities are outlined in the following sub-chapters; some of these responsibilities are still to be enacted.

3.2. Leeds City Council

Leeds City Council's principal responsibilities as LLFA under the FWMA and FRR are summarised below. These supplement any existing duties under the Land Drainage Act 1991: -

- Local Flood Risk Management Strategy (LFRMS) – Develop, maintain, apply and monitor a strategy for managing local flood risk in the Leeds Metropolitan District.

- Preliminary Flood Risk Assessment (PFRA) - Prepare a PFRA report in relation to flooding in the Leeds metropolitan District. Review the report at intervals of 6 years with the first review completed before the 22nd June 2017.

- Co-operation & Arrangements – Co-operate with other Risk Management Authorities in exercising their flood risk management functions under both the FWMA and the FRR.

- Power to Request Information – Request a person to provide information in connection with the authority's risk management functions.

- Duty to Maintain a Register – Establish and maintain a register of structures and features, including ownership which are believed to have a significant effect on a local flood risk.

- General Powers: Flood Risk Management Works – Undertake works to manage flood risk from surface runoff, groundwater and ordinary watercourses (but all works must be consistent with the Local Flood Risk Management Strategy).

- Investigations – Investigate flooding incidents in the District, to the extent that it is considered necessary or appropriate, in cooperation with other RMAs.

- Sustainable Development – contribute towards sustainable development through flood risk management activities.

- Incidental Flooding – Plan erect, maintain, alter or remove buildings or other structures (including those used for flood defence purposes) in a way that will or may cause flooding, an increase in the amount of water below ground, or coastal erosion.

- Designation of Features – Powers to designate a structure or a natural or man-made feature of the environment that is considered to have an effect on flood risk; in order to prevent the alteration or removal of the structure or feature without consent.

- Sustainable Drainage – The Regulations for this are expected to commence in April 2014 and will establish a Sustainable Drainage System (SuDS) Approval Body (SAB) to approve drainage systems in developments seeking planning permission, together with a duty to adopt and maintain approved SuDS, which serves more than one property.

3.3. The Environment Agency

The EA is an executive, non-departmental public body responsible to the Secretary of State for Environment, food and rural affairs. Its principal aims are to protect and improve the environment, and to promote sustainable development. The EA take lead responsibility for risk-based management of flooding from Main Rivers and the sea and regulation of the safety of reservoirs with a storage capacity greater than 25,000m^3 (expected to be reduced to 10,000m^3 once the relevant parts of the FWMA have been commenced).

New roles and responsibilities contained within the FWMA include: -

- Strategic overview for all forms of flooding;

- Development of a National Strategy for FCERM to cover all forms of flooding;

- The conversion of Regional Flood Defence Committees into Regional Flood and Coastal Committees with a new remit to include coastal erosion issues;

- Powers to request information from any person in connection with the Environment Agency's flood and coastal erosion risk management functions;

- Power to designate structures and features that affect flooding or coastal erosion;

- Powers to cause flooding and erosion for nature conservation and cultural heritage reasons, and people's enjoyment of these;

- A duty to have regard to FCERM in carrying out other work that may affect FCERM;

- A duty to have regard to LFRMS;

- A duty to report to Ministers about FCERM including application of the national strategies for England and Wales;

- Statutory consultee to the SuDS approving body on sustainable drainage that impacts water quality or strategic flood risk;

3.4. Yorkshire Water Services

YWS are the sole WaSC operating in the Leeds district. As a provider of water infrastructure services YWS have existing responsibilities in relation to FCERM in the Leeds district, which have been supplemented by the FWMA. YWS's assessment of their responsibilities are summarised below: -

- Where appropriate assist the LLFA's in meeting their duties in line with the National FCERM Strategy and guidance;

- Where appropriate assist the LLFA's in meeting their duties in line with local strategies in its area;

- Where appropriate share 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.

YWS's priorities in the West Yorkshire region are: -

- Appropriate management of surface water from the combined sewer system;
- Encourage the use of Sustainable Urban Drainage Systems (SuDS);
- Where appropriate sharing of information and data with RMAs;
- Create a detailed understanding of flood risk from the public sewer system;
- Explore and implement multi agency/multi benefit schemes to resolve issues within the companies appointed business.

3.5. Ainsty Internal Drainage Board

Ainsty IDB are the sole IDB operating in the Leeds district and cover only a very small percentage of Leeds district (in the Wetherby area) and as such its role is limited. Under the FWMA Ainsty IDB have new duties and responsibilities supplementing their existing powers. Key responsibilities include: -

- Power to designate structures and features that affect flooding or coastal erosion;
- Powers to cause flooding and erosion for nature conservation and cultural heritage reasons, and people's enjoyment of these;
- A duty to exercise their functions in a manner consistent with local and national strategies;
- A duty to be subject to scrutiny from lead local flood authorities democratic processes;
- The ability to work in consortia with other IDBs;
- A statutory consultee to the SuDS approving body on sustainable drainage that impacts land drainage;
- Power to do works on ordinary watercourses flooding within their boundary and, with the Environment Agency's consent, the sea.

3.6. The Highways Agency

As a highway authority the Highways Agency manage a number of major trunk roads and motorways in the Leeds district including the M621, M62, M1 & A1. Their sole responsibility in relation to flood risk management is to: -

- Provide and manage highway drainage and roadside ditches under the Highways Act 1980.

- A duty to exercise their functions in a manner consistent with local and national strategies;

3.7. Other Risk Management Authorities

Other authorities and stakeholders, with no designated role under the FWMA, also have a key responsibility for flood risk management in their own areas of discipline. These include: -

- Network Rail
- Canal and River Trust
- Met Office
- Natural England
- English Heritage
- Association of British Insurers
- Local flood partnerships, forums and community groups

It is expected that these authorities will undertake their activities in a manner which is consistent with this strategy.

4. Local Flood Risk Management

4.1. Introduction

The management of flooding in Leeds is the responsibility of the principal RMAs listed in Chapter 4 of this strategy; a list of the key local flood risk management contacts at each of the RMAs are included in Appendix D of this strategy. Management of flooding is a collaborative effort between RMAs, including the Council's Peacetime Emergency Planning Unit (PEPU), but the key activities and responsibilities involved can be split down into 3-stages: before, during and after a flood as shown in Figure 5.1. These 3-stages incorporate the '3 P's' (Prevention, Protection and Preparedness) as defined by the EA in their flood resilience guidance.

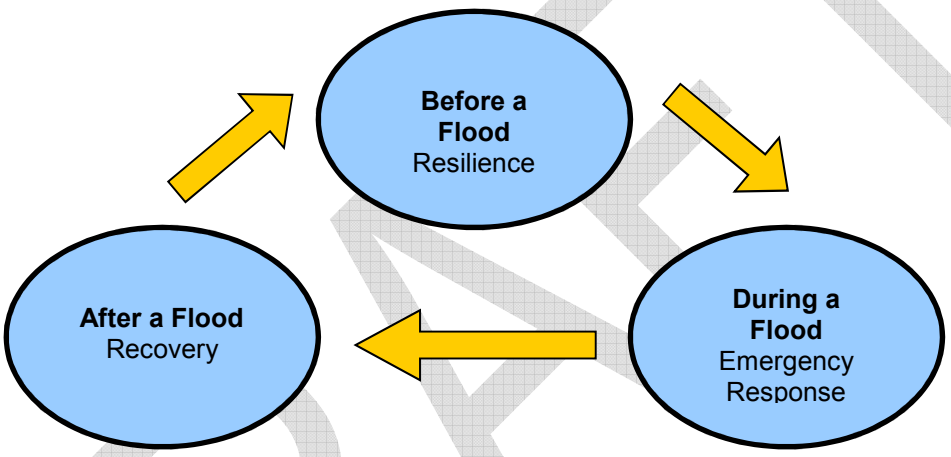

Figure 5.1 – Before, during and after flood management activities

Before a Flood – Resilience: This phase involves activities to reduce but not necessarily eliminate the likelihood of flooding. This could include for example: capital schemes, asset maintenance, flood warning, preparedness, planning and strategising.

During a Flood – Emergency Response: This phase involves activities and responsibilities during a flooding emergency. This could include for example: mobilising emergency services, rapid response, evacuation and sand bagging.

After a Flood – Recovery Phase: This phase involves activities and responsibilities to get Leeds back on its feet following an emergency. This could include for example: reconstruction of physical infrastructure and restoration of social, economic, physical and emotional well-being.

4.2. Priority Areas and Funding

There is a limited amount of funding available to progress the 'List of Measures' in Appendix C. The available funding comes from a number of different sources, the largest proportion coming from central government. A summary of all the funding sources available is summarised in Table 1.

Source of Funding	Description	Indicative budget 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	Leeds City 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	Yorkshire Water Services	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	Leeds City 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. Leeds City 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	Leeds City Council	All measures outlined in the Strategy
Developer Schemes	Where a developer, as part of their proposals, construct works for flood alleviation. These can be separate schemes, part of a larger scheme or contributions in kind i.e. land.	Unknown	Leeds City Council	Development
SuDS Approval Body (SAB) Income	Application and inspection fees from developers in support of the approval and inspection of new development related SuDS.	14/15 (£100k) 15/16 (£600k)	Leeds City Council	Development drainage approval and FRM issues

Source of Funding	Description	Indicative budget 2012/13	Administered By	Appropriate For
Council Tax	A "ring-fenced" provision within the annual council tax for the specific purpose of addressing FRM.	Unknown	Leeds City Council	Key measures in the Strategy
Business Rates Supplements	Agreement from local businesses to raise rates for specified purposes.	Unknown	Leeds City 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	Leeds City 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 (£200k) Flood Risk Management Team (£300k)	Leeds City Council	Measures requiring officer time and/or maintenance activity

Table 1 – Sources of funding for flood risk management

In order to allocate funding effectively a priority ranking (high, medium, low) has been assigned to all of the measures in the 'List of Measures' (Appendix C) depending on the timescale within which the measure is expected to be implemented. Measures ranked as high priority will be progressed in the current LFRMS review cycle, by 2018. Measures ranked as medium priority will be progressed in the next LFRMS review cycle, by 2024. Measures ranked as low priority will be progressed in the LFRMS review cycle after that; by 2030. Where the measure is ongoing and not subject to a completion date the priority ranking has been left blank.

The measures with the highest priority are where the Council and its partner organisations available resources will be prioritised to better investigate, manage and reduce flood risk. The choice of priority ranking is based on local knowledge of flood risk in Leeds held by the Council and its partner organisations. The measures identified in the 'List of Measures' as high priority are: -

- Leeds City Centre – River Aire flood alleviation scheme;
- Morley - Cotton Mill Beck culvert renewal scheme;
- Otley - Culvert headwall repair scheme;
- Mickletown - Victoria Place flood alleviation scheme.

4.3. Climate Change Adaptation

A key factor impacting on the ability of RMAs to manage local flood risk is climate change. There is clear scientific evidence that global climate change is happening now. The effects of climate change can be seen in the UK and around the world. UK temperatures and sea levels, including those of British coastal waters, have risen over the past three decades. There has also been a documented global increase in the frequency of extreme weather events such as floods, droughts and tropical storms. It is predicted that these extreme weather events will become more severe during coming decades.

In light of this, it is imperative that the affects of more extreme flooding in the Leeds district are mitigated against and that plans and schemes are developed to better manage and adapt to any increased risk of local flooding. This affects the functions of all RMAs and all council departments. The EA have provided guidance for all FCERM authorities on adapting to climate change entitled *"Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities"*.

The latest UK climate projections (UKCP09) from the UK Climate Impacts Programme (UKCIP) have also been provided by the EA for use by LLFAs in developing the LFRMS. An output from the data provided for the Humber River Basin District is shown in Figure 5.2. The complete UKCP09 climate projection data for the Leeds district is presented in Appendix A. All RMAs and stakeholders should have regard to this climate change data in undertaking their flood risk management activities.

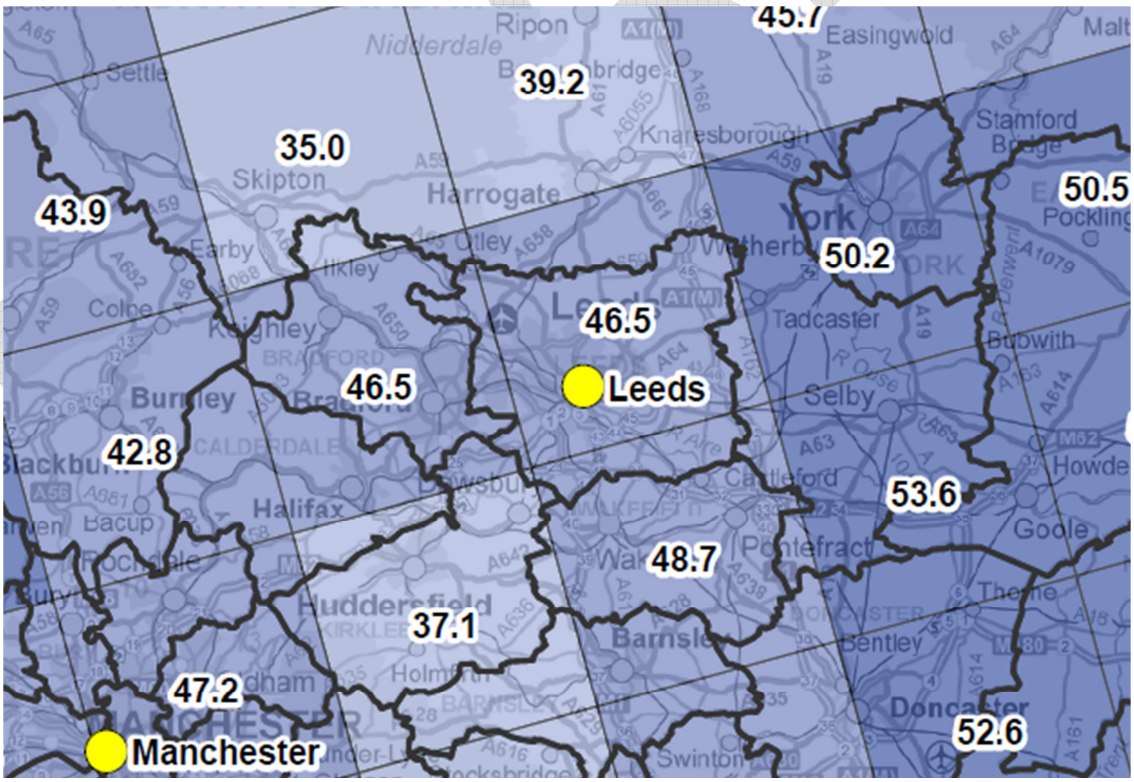

Figure 5.2 – UKCP09 Upper end estimate for % change in winter precipitation beyond 2055

4.4. Sustainable Development

Sustainable development as defined by the United Nations (Brundtland Commission, 1987) is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The promotion of sustainable development is a key part of climate change adaptation and will help mitigate against any increase in flood risk arising as a result of climate change.

A number of principal ways in which local flood risk management can contribute to sustainable development are identified below: -

- Working with natural processes to reduce flood risk e.g. by restoring the natural capacities of soil and vegetation to intercept rainfall;
- Promoting greater use of SuDS;
- Developing flood resilient infrastructure and buildings which perform satisfactorily without suffering permanent loss of functionality during extreme flood events;
- Developing flood defences that are adaptable and flexible and take account of the projected longer term impacts of climate change;
- Sustainable procurement of energy supplies and materials to reduce the impact on the wider environment;
- Carbon counting and offsetting with the aim of decreasing greenhouse gas emissions;
- Improving engagement with local communities to ensure that people affected by flooding are empowered to take appropriate actions to reduce flood risk;
- Improving health and wellbeing of communities through environmental improvement and a reduction in flood risk;
- Developing the knowledge, skills and awareness to improve our understanding of flood risk and the effects of climate change;
- Supporting flood response and recovery through better management of the risk of flooding to people, property, the economy and the environment;
- Benchmarking good environmental performance using environmental performance tools such as the Building Research Establishment Environmental Assessment Method (BREEAM) and the Civil Engineering Environmental Quality Assessment and Awards Scheme (CEEQUAL).

The methods and approaches identified above have been embodied in the local flood risk management objectives listed in Chapter 6 of this strategy and are drawn out more specifically via the measures included in the ‘List of Measures’ in Appendix C.

4.5. Engagement with Partners

Another key aspect of this strategy for local flood risk management is to ensure that there is effective communication between all stakeholders particularly between the LLFA and other RMAs in responding to flood events; and also with the public to raise awareness and involve local communities in decision making. As such, a stakeholder communication and engagement plan has been developed, which has been followed in the production of this strategy and is included in Appendix B.

The main themes in stakeholder communication and engagement plan are outlined below: -

1. **Make Initial Contact** – Identify and contact the individuals, originations, communities affected;

2. **Introduce LFRMS** – Introduce strategy, objectives for managing local flood risk and approach to flood risk management;

3. **Communicate** – Establish core team and devise approach to effective ongoing communication;

4. **Develop LFRMS** – Provide ongoing opportunity for input from stakeholders into the development of LFRMS. Two way communication required;

5. **Review** – Review draft LFRMS (particularly objectives for managing local flood risk and 'List of Measures') with all interested/affected parties;

6. **Scrutiny** – Review of LFRMS by Scrutiny Committee;

7. **Publish** – Publish LFRMS and a summary with guidance on the availability of further information;

8. **Future** – Plan and agree future activities and schedule next review of 'List of Measures'.

In producing the LFRMS the council have consulted internally, with other RMAs that may be affected by the strategy, the public and also other LLFA's to ensure that the LFRMS is consistent with the catchment "cell" approach set out in the National FCERM Strategy.

5. Objectives for managing local flood risk

In order to effectively manage flood risk six high-level objectives have been created to provide a strategic context and steer the flood risk management activities undertaken by all RMAs. These objectives embody the six high-level guiding principles in the EA's National FCERM Strategy listed in Chapter 2. All RMAs should have regard to these objectives when undertaking their flood risk management activities. Short, medium and longer term measures and aspirations for local flood risk management, based on these objectives, are outlined in the 'List of Measures' in Chapter 7 and presented in Appendix C of this strategy.

1. Improve co-operation between LLFA and other RMAs, in terms of procedure, to meet the requirements of new legislation and achieve holistic (catchment wide) solutions to identified risks and problems – emergency planning;

2. Promote sustainable flood risk management through: WFD compliance, climate change adaptation (UKCIP), land management, habitat protection and creation;

3. Develop a consistent, affordable and sustainable approach to planning and investment in flood risk management: land allocation, SuDS, SABs;

4. Increase internal skills and ultimately capacity for flood risk management;

5. Increase community awareness of flood risk and the work of the LLFA in managing this risk; engage with local communities and involve them in decision making – localism agenda;

6. Improve understanding of local flood risk and seek to decrease local flood risk through implementation of affordable, high quality measures to alleviate flooding where practicable.

6. List of Measures

A List of Measures has been developed for the LFRMS which is based upon the six objectives for managing local flood risk listed in Chapter 5. The List of Measures sets out a broad range of schemes, actions, initiatives, plans and strategies for managing local flood risk in the Leeds district. Some of the measures are localised and relate to a very specific part of the district, whereas other measures are higher level district wide proposals. Where appropriate each measure has been assigned a priority ranking (high, medium, low) based on the expected timescale to implement the measure, the associated costs and benefits of the measure have also been assigned where available.

The Action Plans for the Leeds Policy Units contained in the River Aire and Ouse CFMP's have been reviewed and the relevant actions incorporated within the LFRMS 'List of Measures'.

The 'List of Measures' is designed to be a 'living document' which will be monitored and updated on a regular basis when measures are completed or new ones added and is found in Appendix C of this strategy. The 'List of Measures' form the basis of the Council's Medium Term Plan (MTP).

The List of Measures has been split into the four categories outlined below: -

- **Flood awareness, response and recovery** - this includes initiatives to improve engagement with internal and external partners, raise awareness of the LFRMS, involve local communities in decision making, improve cooperation between RMAs and plans for emergency response and recovery.

- **Spatial planning and development control** – this includes proposals for the creation of a SuDS Approval Body (SAB), promoting sustainability and climate change adaptation.

- **Studies, schemes, assessments and plans** – this includes investigating flooding incidents, assessing flood risk and developing and promoting schemes to alleviate flood risk.

- **Asset management and maintenance** – this includes developing a register for recording flood risk assets, planning routine inspection and maintenance of assets and undertaking asset maintenance works.

7. Reviewing and Monitoring the Strategy

It is proposed that this strategy will be reviewed once every 6 years. This will link the LFRMS review with the cycles for reviewing the PFRA as outlined in the FRR. The first review is scheduled to be completed by April 2018. The 'List of Measures' in Appendix C is a living document and will be reviewed and updated on a more regular basis.

In order to monitor the implementation of the LFRMS and its success in managing flood risk in Leeds eight key monitoring indicators will be used; these were identified as part of the SEA process. The monitoring indicators are listed below; additional monitoring indicators will be added as appropriate: Reviews of the eight monitoring indicators will be undertaken concurrently with reviews of the 'List of Measures'.

1. The number of measures in the 'List of Measures' which have been completed?

2. Are there active measures in the 'List of Measures' which cover each of the six 'Objectives for managing flood risk'?

3. Improving engagement on flood risk - How many public engagement events have taken place? School events, flood fairs, flood action group meetings.

4. The number of new developments where SuDS have been installed? Include SuDS, green corridors, rainwater harvesting, green roofs, land management (tree planting).

5. Are property level flood protection (PLP) schemes reducing flood risk – Number of properties where PLP schemes have been installed and operated successfully in a flood event?

6. Number of Leeds City Council staff engaged in flood risk management activities?

7. Reliability of public transport – Number of Metro bus and train routes disrupted by flooding/drainage problems?

8. Is the LFRMS consistent with the plans and actions of partner organisations? Review and incorporate relevant actions from the Aire and Ouse CFMP's in the 'List of Measures'?

8. Relevant Guidance and Information

Framework to assist the development of the Local Strategy for Flood Risk Management, 'A Living Document', 2nd Edition, LGA, November 2011.

National Flood and Coastal Erosion Risk Management Strategy for England, EA and Defra, July 2011.

Flood and Water Management Act (FWMA), HMSO, 2010.

Flood Risk Regulations (FRR), HMSO, 2009.

Water Framework Directive (WFD), European Parliament, 2010.

Preliminary Flood Risk Assessment (PFRA), Leeds City Council, September 2011.

Strategic Flood Risk Assessments (SFRA), Leeds City Council, October 2007.

Environmental Assessment of Plans and Programmes Regulations, HMSO, 2004.

Building Trust with Others – a guide for staff, Environment Agency.

National Planning Policy Framework (NPPF), DCLG, March 2012

Planning Policy Statement 25: Development and Flood Risk (PPS25), DCLG, March 2010.

Aire Catchment Flood Management Plan (CFMP), Environment Agency, July 2010.

Ouse Catchment Flood Management Plan (CFMP), Environment Agency, July 2010.

Humber River Basin District, River Basin Management Plan (RBMP), December 2009.

Draft Lower Aire Flood Risk Management Strategy, Environment Agency, January 2012.

Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities, Environment Agency, August 2011.

Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions, Defra, October 2011.

Leeds Local Development Framework, Core Strategy, Development Plan Document, Publication Draft, February 2012.

Leeds Local Development Framework, Natural Resources and Waste, Development Plan Document, Publication Draft, January 2010.

9. Glossary

Groundwater flooding	This occurs when levels of water in the ground rise above the surface. It is most likely to happen in areas where the ground contains aquifers. These are permeable rocks that water can soak into or pass through easily.
Local flood risk	Refers to flood risk from surface runoff, groundwater, sewer flooding (attributable to rainwater) and ordinary watercourses - this includes lakes, ponds or other areas of water which flow into an ordinary watercourse.
Main River	These are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. The EA have primary responsibility for managing flood risk from these watercourses.
Ordinary watercourse flooding	This occurs when a watercourse cannot cope with the water draining into it from surrounding land. This includes lakes, ponds or other areas of water which flow into an ordinary watercourse.
Sewer flooding	This occurs when sewers are overwhelmed by heavy rainfall or when they become blocked. The chance of flooding depends on the capacity of the local sewer system and amount of rain that falls.
Surface water flooding	This occurs when rainwater does not drain away through the normal drainage system or soak into the ground, but lies on or flows over the ground surface instead.

10. Acronyms

AOD	Above Ordnance Datum
BREEAM	Building Research Establishment Environmental Assessment Method
CEEQUAL	Civil Engineering Environmental Quality Assessment and Awards Scheme
CFMP	Catchment Flood Management Plan
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DG5	Director General 5 Register
DPD	Development Plan Document
EA	Environment Agency
FCERM	Flood and Coastal Erosion Risk Management
FDGiA	Flood Defence Grant in Aid
FMfSW	Flood Map for Surface Water
FRMP	Flood Risk Management Plan
FRR	Flood Risk Regulations (2009)
FWMA	Flood and Water Management Act (2010)
HMSO	Her Majesty's Stationery Office
IDB	Internal Drainage Board
LDF	Local Development Framework
LFRMS	Local Flood Risk Management Strategy
LGA	Local Government Association
LLFA	Lead Local Flood Authority
MTP	Medium Term Plan
Ofwat	Office of Water Regulation
PEPU	Peacetime Emergency Planning Unit
PFRA	Preliminary Flood Risk Assessment
PLP	Property Level Flood Protection
RBMP	River Basin Management Plan
RMA	Risk Management Authority
SAB	SuDS Approval Body
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
UK	United Kingdom
UKCIP	UK Climate Impacts Programme
UKCP09	UK Climate Projections (latest)
WaSC	Water and Sewerage Company
WFD	Water Framework Directive
YWS	Yorkshire Water Services

11. Appendices

APPENDIX A – UKCP09 Climate Projections for Leeds

APPENDIX B – Communication Plan

APPENDIX C – List of Measures

APPENDIX D – Key Local Flood Risk Management Contacts

APPENDIX E – Strategic Environmental Assessment Report