BRADFORD DISTRICT

Local Flood Risk Management Strategy

December 2016

City of Bradford MDC
www.bradford.gov.uk

Executive Summary

Adverse weather is a national concern and the risk of flooding in England is predicted to increase as a result of climate change and development in areas at risk. The Environment Agency's (EA) 2008 National Flood Risk Assessment showed 2.4 million properties are at risk of flooding from rivers and sea, with one million of those also susceptible to surface water flooding. A further 2.8 million properties are susceptible to surface water flooding alone. This equates to 1 in 6 at risk properties with expected annual damage costs of more than £1 billion to residential and non-residential properties.

Flood risk across the Bradford District is varied but caused in the main by overland flow following short, high intensity, or heavy, prolonged rainfall events and/or overtopping rivers and watercourses. There is a history of land and property flooding, the most recent and severe flooding in the district in 15 years being a consequence of Storms Desmond and Eva in 2015.

It is important to realise that it is not possible to prevent all flooding, it is inevitable and can occur at any time, however, there are actions that can be taken to manage risk and reduce impact.

As Lead Local Flood Authority, the City of Bradford Metropolitan District Council is required under Section 9 of the Flood and Water Management Act 2010, to develop, maintain, apply and monitor a strategy for local flood risk management – a "Local Flood Risk Management Strategy". The strategy must detail the risk management authorities and the functions that they can exercise within the Bradford Lead Local Flood Authority area, assess local flood risk, the objectives for managing that risk and measures proposed to implement those objectives.

This local Flood Risk Management Strategy provides Bradford Council's approach for managing flood risk from all sources throughout the District and has been developed to align with current legislation and guidance. It builds on work that has already been undertaken to assess the risk of flooding in the district, most recently the draft Strategic Flood Risk Assessment (amended February 2014), and aims to:-

- **Ensure increased understanding of local flood risk to enable investment in flood management activities to be appropriately prioritised.**
- **Engage and enable all Risk Management Authorities, residents, communities and businesses to manage flood risk in partnership.**
- **Ensure emergency plans and responses to flood incidents are effective and communities are facilitated to recover quickly and effectively after flood events.**
- **Guide local spatial planning and prevent inappropriate development.**

It is important that flood risk management activities are targeted effectively. Bradford Council is utilising information from all available sources, including national flood maps, historic records and information shared with other Risk Management Authorities, to increase understanding of district wide flood risk and to effectively prioritise resources.

The Local Flood Risk Management Strategy is developed and maintained by Bradford Council. It sets out the Council's objectives and measures for managing local flood risk and aims to guide effective flood risk management activities undertaken by the Risk Management Authorities operating within the District.

A summary of the Local Flood Risk Management Strategy will be made available on Bradford Council's website to provide residents, businesses and communities with the Council's strategic aims and objectives for managing flood risk. It is proposed that this strategy will be reviewed once every six years.

Contents

1.0 Introduction

National flood management has previously been managed in a disjointed way. Flooding from rivers (fluvial) has passed between successive government agencies, whilst land drainage and sewer flooding has been managed in a variety of combinations of local authorities and public and private water companies. The blurring of boundaries for responsibilities and uncoordinated actions of different risk management authorities has resulted in a failure to provide consistent and coordinated actions in response to local flooding events.

Development pressures and more severe rainfall (pluvial) events due to climate change mean that flood risk is increasing. Since 2000 the deleterious impact of floods in York (2000), Boscastle, Cornwall (2004), Carlisle (2005), Yorkshire (2007), Morpeth, Northumberland (2008), Cumbria (2009), Calderdale and York (2012) and Cumbria and Yorkshire (2015) have been well publicised and have highlighted the negative impact of flooding on communities and the vulnerability of the country's infrastructure. A flood event affects people's wellbeing and security, impacts on health and, in extreme events, can result in the loss of life. Flooding also has consequences for the economy and the environment that can extend well beyond the immediate duration of the event.

It must be noted that flooding is a natural occurrence and it is universally recognised that it is neither physically nor economically possible to prevent flooding altogether. Public organisations have a duty to inform households and businesses of their risk and to advise them of what steps they can take to make their property more resilient, but flooding is inevitable, can occur at any time and the primary responsibility for the protection of land, property, infrastructure and businesses rests with the owner.

Severe flooding events in continental Europe during the same time period resulted in European legislation being published. The European Union Flood Directive (2007/60/EC) was consolidated into British law in the Flood risk Regulations (FRR, 2009) and, following the UK floods of 2007, the government-commissioned Pitt Review summarised the historic failings of flood management and an extensive set of recommendations were transposed into new legislation as the Flood and Water Management Act (FWMA) which came into effect on the 12th April 2010.

The FWMA created a general responsibility for Lead Local Flood Authorities (LLFA's: County and Unitary Councils) to take leadership for the coordination and management of flood risk and to exercise flood risk management (FRM) functions.

To exercise these functions and deliver the requirements of the FWMA, CBMDC is to develop, maintain and apply a Local Flood Risk Management Strategy (LFRMS) for the District and the LFRMS is developed to align with current legislation relating to FRM. The principal regulations being:-

- Flood Risk Regulations, 2009 (FRR)
- National Flood and Coastal Erosion Risk Management Strategy, 2011 (FCERM)
- National Planning Policy Framework, 2012 (NPPF)

- Emerging Core Strategy and Local Development framework for Bradford MDC area (to supersede Replacement Unitary Development plan, 2008)
- Environmental Assessment of Plans and Programmes Regulations, 2004
- Water Environments (Water Framework Directive (WFD)) Regulations 2003

2.0 The City of Bradford Metropolitan District Council Powers and Duties

Under the FWMA, 2010 the CBMDC is identified as the LLFA and is given powers and duties in order to enable it to exercise its FRM function. These powers and duties are:-

- A duty to produce a LFRMS
    - Section 9 of the FWMA sets out the statutory requirements for LFRMS's. It states that LLFA's must "develop, maintain, apply and monitor a strategy for local flood risk management in its area". The LFRMS must be consistent with the Environment Agency's (EA) FCERM for England, other Risk Management Authorities (RMA's) that may be affected by the strategy must be consulted and a summary of the LFRMS must be published.
- A duty to co-operate with other RMA's.
- Powers to request information from other RMA's in connection with local FRM function.
- A duty to appropriately investigate flooding within the district.
- A duty to maintain a register of structures or features that have a significant effect on flood risk.
- A duty to make a contribution to sustainable development.
- A power to formally consent works within ordinary watercourses.

3.0 Risk Management Authorities within Bradford District

The FWMA places a duty on all RMA's (see table 1 below) to co-operate with each other. Within the CBMDC there are a number of different sections that are either directly or indirectly involved in managing flood risk and flooding within the District. Whilst neighbouring LLFA's have separately defined political and administrative

areas, local FRM is a cross boundary issue as land topography and river catchments determine where flooding is likely to occur.

The Neighbouring LLFA's of North Yorkshire County Council, Calderdale Council, Kirklees Council, Leeds City Council and Wakefield Council adopt a partnership approach and co-operate in knowledge sharing and the delivery of FRM responsibilities through the West Yorkshire Flood Risk Management Partnership (WYFRMP) and LLFA meetings.

Table 1. Flood Risk Management Authorities

The Environment Agency

Strategic overview role for all sources of flooding and coastal erosion; the delivery of flood and coastal erosion risk management activities on main rivers (usually larger rivers and streams as designated on a main river map) and the coast.

Lead Local Flood Authority (CBMDC)

Drainage Section: Manage the LLFA function for the district in accordance with the FRR and FWMA. Performs duties of LLFA as specified in Section 9 of FWMA. Responsible authority for ordinary watercourses.

Development Control: Local planning authority of CBMDC. Consult Drainage and the EA in determining development appropriateness and impact where drainage requirements are concerned. They have a key function in the implementation of sustainable development.

Parks and Landscapes: Responsible for public open spaces and as a riparian owner and reservoir undertaker, they are responsible for maintenance of watercourses and reservoirs in public open spaces under the Land Drainage Act 1991 and the Reservoirs Act 1975 respectively.

Emergency Management Team: Category 1 responder under Civil Contingencies Act, 2004. Responsible for planning for and responding to flood risk. They prepare and test emergency plans to ensure the District is prepared to respond and help to reduce the consequences of an event. Emergency Planning Co-ordinate activities between CBMDC, Emergency Services and other agencies during an event and assist in recovery following an event.

The Highway Authority (CBMDC)

Responsible for maintaining the public highway network including highway drainage and assets such as bridges, culverts and retaining walls.

The Highways Agency England

Responsible for maintaining the motorway network, including its drainage, within the district. Acts as the Highway Authority for the M606 and M62 in Bradford.

Yorkshire Water Services (YWS) Limited

The sole water and sewerage company operating in the CBMDC district, YWS are responsible for maintaining an effective public sewerage and sewage treatment system throughout the district.

Airedale Internal Drainage Board

Responsible for maintaining effective land drainage within the low lying areas along the River Aire between Eastburn and Steeton Ings.

Other authorities and stakeholders, whilst having no designated role under the FWMA, have a responsibility for FRM within their own areas of discipline. These include infrastructure providers such as Northern Gas Networks, Northern Powergrid, Network Rail and The Canal and River Trust; the North west section of which is responsible for the maintenance (and historically, for the FRM) of the Leeds and Liverpool Canal within Bradford District.

The Met Office; the United Kingdom's weather service, Natural England; the government's adviser for the natural environment in England, the Association of British Insurers (ABI) and local flood risk partnerships, forums and community groups all have a role to play.

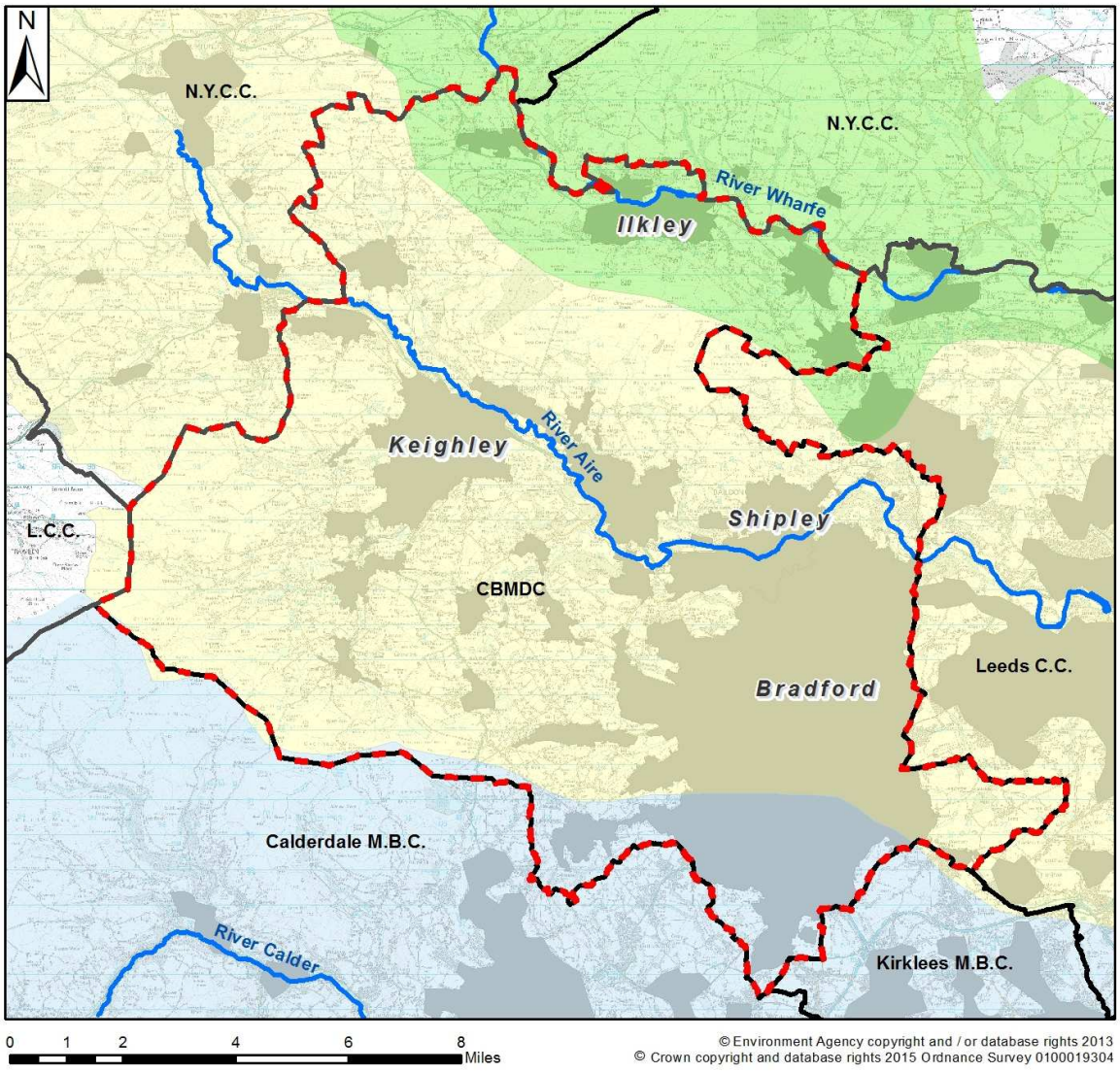
Riparian owners are people who own land with a watercourse passing through it or whose property abuts its bank(s). If your land boundary is next to a watercourse it is assumed that you own the land up to the centre of the watercourse; if you own land with a watercourse running through or underneath it, it is assumed you own the stretch of watercourse and any associated structures that run through your land. Riparian ownership is a common law function of the land and includes rights and responsibilities which are detailed in the EA's Living on the Edge guide (See Appendix D for link details). As such, riparian owners have a duty to manage flood risk.

4.0 Spatial Extent of Strategy

For the purposes of this strategy the spatial extent is defined by the administrative boundary of the CBMDC and this is illustrated in Figure 1. Bradford is the fourth largest metropolitan district (in terms of population) in England and covers an area of approximately 370 km^2 stretching across Airedale, Wharfedale and the Worth Valley. Over 70% of the district is clean, green open space and the population is estimated at 528,200 (Office of National Statistics (ONS), 2015). Communities in the Bradford district area include the City of Bradford, Keighley, Ilkley, Bingley, Shipley and Silsden. There are a number of smaller settlements in the more rural parts of the area.

CBMDC is located within the River Aire & Calder and River Wharfe & Lower Ouse catchments which are also shown in Figure 1. Flood processes and flood risk issues across the Council area are inextricably linked by the Rivers Aire, Worth and Wharfe plus their many tributaries. In addition, 24 km^2 of Bradford District drains to the River Calder. This area includes the M606 motorway and major employment sites. The purpose of this document is not to duplicate information that has been reported in depth. Full details of Bradford Districts Drainage Area can be viewed in the draft Strategic Flood Risk Assessment, 2014 (SFRA, see Appendix D for link details). The risk of flooding from rivers, surface water, sewers, groundwater, canals and reservoirs has been explored for the CBMDC area as part of the SFRA.

Figure 1. Bradford Districts Administrative Area and River Catchments



5.0 Sources of Flooding

Flooding can occur from one source or a combination of sources. The scope of this LFRMS covers local flood risk from all sources. These sources are detailed in Table 2 and to give a better understanding, examples are provided within the context of Bradford District.

Table 2. Flooding Sources and their Context in Regard to Bradford District

<table>
<tr><th>Source
Exceedance of any source can impact on another source leading to combination flood events.</th><th colspan="2">Bradford District
The nature of flood risk across the CBMDC district is varied due to the different flood sources.</th></tr>
<tr><td rowspan="2">Main River Flooding
Rivers are usually larger watercourses or strategic watercourses for which the EA is the RMA. Flooding from main river occurs when the capacity of the river channel is exceeded causing banks to overtop and adjacent areas to flood.</td><td colspan="2">Main Rivers within Bradford District</td></tr>
<tr><td>Aire & Calder Catchment
• River Aire
• River Worth
• North Beck (part)
• Silsden Beck
• Bridgehouse Beck
• Eastburn Beck
• Providence Lane
• Nab Wood Beck</td><td>Wharfe & Lower Ouse Catchment
• River Wharfe
• Town Beck
• Backstone Beck</td></tr>
<tr><td>Ordinary Watercourse Flooding
An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river. Flooding from an ordinary watercourse occurs when the capacity of the watercourse is exceeded (open or piped) causing banks to overtop and adjacent areas to flood.</td><td colspan="2">Ordinary watercourses in the Aire catchment from Steeton Ings to the Craven Boundary are managed by both the Airedale IDB and CBMDC.

The vast network of ordinary watercourses in Bradford District, many of which are unmapped. Most notably, Bradford Beck which traverses Bradford City Centre and the many tributaries such as Pitty Beck, Chellow Dene Beck, Eastbrook, Westbrook and Bowling Beck.</td></tr>
<tr><td>Surface Water Flooding
Occurs when rainwater does not soak away into the ground or drain away through local drainage systems such as surface water sewers, combined sewers and highway drains. As a result, water ponds and flows above ground.</td><td colspan="2">Surface water and drainage related issues are known to cause flood risk in Idle, Apperley Bridge, Addingham, Silsden, Cross Hills on Skipton Road and Bradford City Centre, Mill Hey, Haworth, Keighley, Castlefields industrial estate, Bingley. (Final Draft SFRA, 2014)</td></tr>
</table>

Table 2 continued. Flooding Sources and their Context in Regard to Bradford District

Source	Bradford District
Groundwater Flooding Occurs when ground water levels rise and reach the surface as a consequence of storm events. It can affect properties and structures above and below ground.	Bradford has a high proportion of properties with cellars compared to many other cities in the UK and has recorded between 550 and 725 calls per year regarding flooded cellars. Possible flood sources include groundwater.
Sewer Flooding Occurs when the capacity of a sewer or sewer network is exceeded, resulting in area and property flooding. Public sewers are the responsibility of YWS Ltd.	Within many areas of CBMDC surface water runoff is channelled into the combined sewer system. During wet weather, the capacity of the system is often exceeded or affected by blockage and this is managed through Combined Sewer Overflows (CSOs) which discharge to watercourses and exist in considerable numbers within the Bradford District.
Reservoir Flooding A reservoir is an enlarged natural or artificial lake, storage pond or impoundment created using a dam or lock to store water. Reservoirs can be a major source of flood risk and whilst the probability of dam failure or breaching is very small, the consequence of such an event can be devastating presenting a risk of flooding that must be considered.	There are a number of reservoirs within the Bradford District. These are the responsibility of either YWS Ltd or in the case of Upper and Lower Chellow, Harold Park and Park Dam, the CBMDC.
Canal Flooding Canals are human-made channels for water. A navigation canal parallels a river and shares its drainage basin. Canal flooding may occur either as a result of its channel being overwhelmed or as a result of dam or bank failure.	The Leeds and Liverpool canal runs through Bradford District and is managed by the Canal and River Trust.

6.0 Historic Flooding within Bradford District

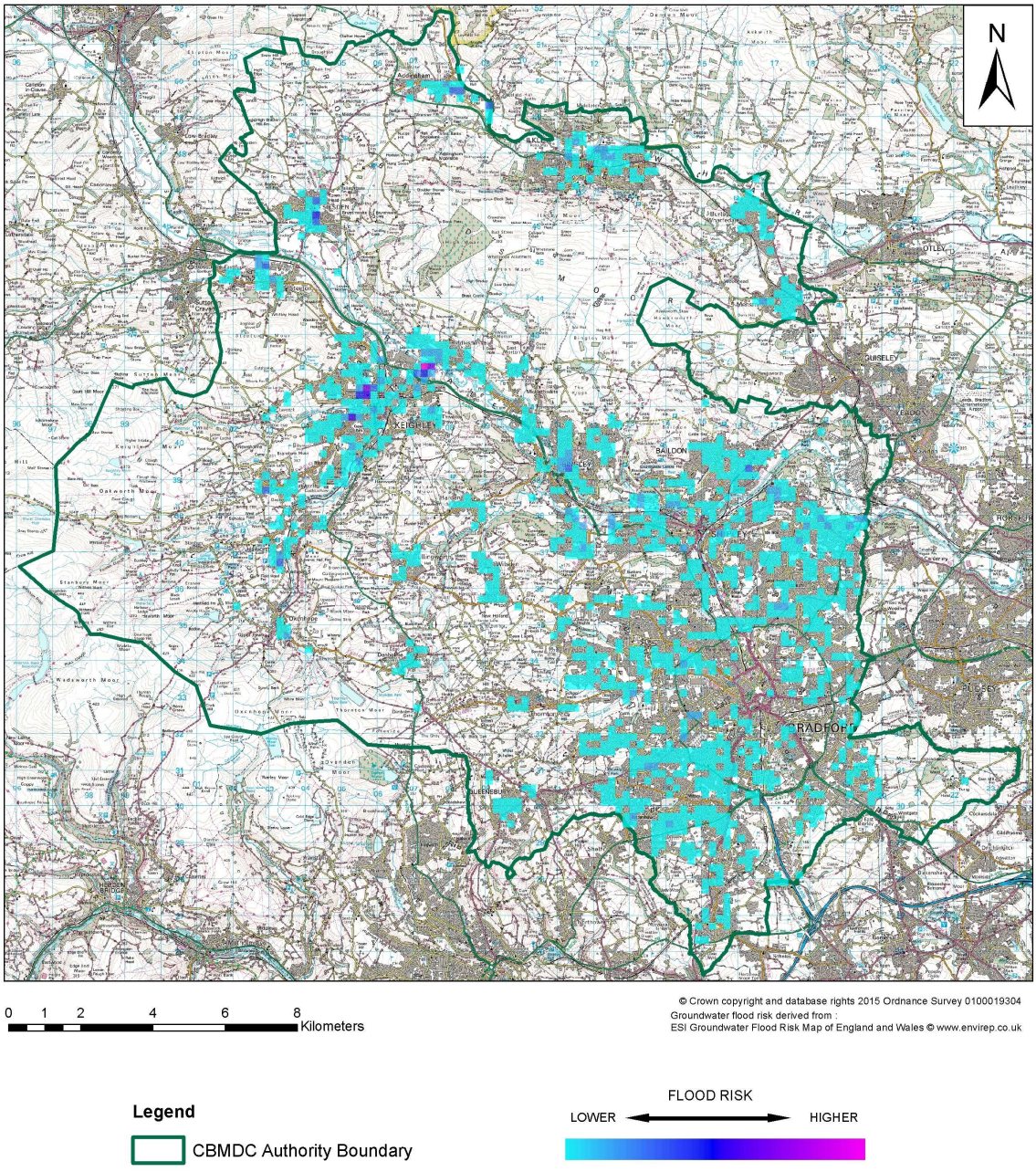
Bradford district has experienced significant flooding. Flooding has been caused by a combination of high river and watercourse levels, excessive surface water runoff, saturated ground, groundwater fluctuations and exceeded capacity in sewer and highway drainage systems. Some records of flooding go back over 300 years and records of many incidents have been collated, though it is not a complete record. In particular, historically, records from more localised events have not always been captured. This has led to a limited understanding of the interaction of the different sources of flooding.

To provide a more consistent basis for future FRM activities, an authority wide mapping analysis of flood risk has been carried out to show those areas where a flooding event is likely to affect residential properties. To ensure consistency in data quality and coverage across the district, national datasets produced by the EA were used to identify the areas at risk of flooding from watercourses and surface water run off. Information on potential groundwater flooding produced by the ESI (Earth Science Information) and based on British Geological Survey mapping with additional historic data was also used. The data sets were used to identify high level district-wide risk (as opposed to property specific risk) and show the *relative* flood risk to residents. Figure 2 shows the relative risk throughout the district of flooding from all sources. It should be noted that the lack of colour in non-residential areas is *not* indicative of *no* risk. All areas could be regarded as potentially at risk to varying degrees but the map is concerned with risk to residential areas. Evidence of historic flooding events has been produced in detail in the SFRA. For the purposes of the LFRMS, Table 3 provides details on recorded major flood events that have occurred in the past 16 years.

As previously mentioned, historic data on flooding from ordinary watercourses is incomplete. Limited data is only available for Bradford Beck. Flood risk from Bradford Beck has been a problem in the past due to increased urbanisation and the resulting unusually large proportion of hard surfaces that produce large quantities of surface water runoff. These are drained to Bradford's combined sewer system which has been unable to cope with the rapid increase in population. A large number of CSO's were constructed to relieve the system during heavy rainfall. These reduced the effects of flooding directly from the sewer system; however, the untreated flows were directed into the culverted Bradford Beck and its tributaries, which did not have sufficient capacity to deal with them. This resulted in significant flooding from the Bradford Beck, which affected the City Centre on average once every ten years.

The Bradford Beck Flood Alleviation Scheme was constructed in the early 1990s. It is a diversion tunnel designed to allow storm flows to bypass the City Centre and prevent flooding for up to a 1 in 50 annual probability event (the national standard at that time). The risk of flooding from the Bradford Beck has been significantly reduced by the diversion tunnel, and CBMDC have confirmed that no flooding has been reported in the city centre since the works were undertaken.

Figure 2. Relative Flood Risk to Residential Properties from all Sources in Bradford District



Although the number of registered calls in relation to cellar flooding has been ascertained it has only been possible to confirm groundwater as the source of flooding for a limited number of these events. For example, between 2005 and 2010, 130 events were confirmed with groundwater as the source. Due to the geology of the area (clay stratum) and the lack of records of confirmed cases, groundwater has not historically been identified as a major problem.

Table 3. Major Flood Events in Bradford District 2000 to Current.

Date	Source of Flooding	Area Affected
October-November 2000	River	Flooding from the River Aire and Silsden Beck saw 370 properties flood and people evacuated in Stockbridge, 7 at Shipley, 58 at Bingley and 6 at Apperley Bridge.
November 2000	River	Ilkley, 3 properties affected
February 2002	River	Flooding reported in Bingley and Goose Eye.
July- August 2002	River	Properties flooded in Gargrave, Bingley, Apperley Bridge.
	Surface Water	Properties flooded in Bingley.
August 2004, July 2005	River and Surface Water	Mill Hey, Haworth
September 2008	River	Between 5th and 8th September, 14 flood watches and 9 flood warnings were issued. Flooding to 2 properties at Castlefields on the River Aire at Shipley.
November – December 2015	River and surface water flooding	Eastburn Beck suffered as a result of high water levels in the Aire leading to internal property flooding and inundated highways within the Steeton Area. Silsden Beck overtopped along Silsden Main Street leaving informal flood walls damaged and local businesses flooded. Keighley was affected mainly due to the large proportion of the rainfall in the catchment falling here. Bridgehouse Beck the River Worth caused widespread disruption with flooding experienced in Haworth, Ingrow, the Worth Village and Stockbridge areas of Keighley. Numerous areas in Bingley such as Castlefields, Ireland Bridge, Wagon Lane, Ash Grove and Branksome Drive were heavily flooded. Areas of Saltaire were victim to the flooding with damages caused to residential areas and large parcels of public open space. Shipley and Baildon suffered significantly with Otley Road closed for sometime and large clusters of residential and business properties inundated. Esholt Village was overcome by ordinary watercourse flooding and main river flooding from the Aire. The main highway link From the City to Leeds Bradford Airport was severed in Apperley Bridge and a number of businesses and residential properties were inundated. Property and road flooding was recorded in Addingham, Burley-in-Wharfedale and Ilkley. Further up catchments smaller tributaries and local drainage networks were completely consumed causing localised flood incidents across the district.

6.1. October - November 2000 Floods

The Aire catchment was already fully saturated following a sustained summer of wet weather. This precondition led to high river levels caused by the widespread and heavy rainfall across the whole catchment. The events were triggered by abnormally high rainfall sustained over a period of hours in the upper part of the main Aire valley. The high rainfall led to flows and levels in the upper Aire that were higher than any on record with return periods perhaps in excess of 100-years. As the flood peaks moved downstream they were still amongst the largest ever observed, with evidence that in the middle and lower reaches of the river only the 1946, and possibly the 1866 flood events exceeded them. As well as residential and commercial properties being flooded, roads were significantly affected in the upper and middle Aire valley and in Bradford. The East Coast mainline was severely disrupted and damaged, with the main line to Keighley and Skipton being flooded for several days.

6.2. July – August 2002 Floods

The flooding of late July / early August was caused by intense and localised rainfall generated by a series of convective rainfall events. The first storms caused relatively limited flooding problems but critically, saturated the upland parts of a number of catchments. During the second period of storms, a number of locations experienced the equivalent of two months average rainfall in two days. Due to the intensity of the rainfall the result was rapid runoff that caused flooding in the upper reaches of some catchments. A further two periods of rainfall occurred on the 7 and 10 August, when flooding was caused by surface water. Within the Aire catchment area a number of properties were flooded. However, the main impact of this event was on roads and railways. Several roads were closed on both Tuesday 30 July and Friday 2 August, due to surface water flooding.

6.3. November – December 2015 Floods

Flooding problems started due to prolonged heavy rainfall from a succession of Atlantic storms during November and December. Records of flooding were received over this period, and most notably on Christmas Day and Boxing Day 2015. Unprecedented severe flooding stretched over the extremities of the district from the Western to Eastern boundaries. For the first time**,** to our knowledge, all four large main rivers (Aire, Wharfe, Worth and Silsden Beck) surcharged simultaneously. Flooding occurred from a number of additional sources in combination. Roads were closed and there was significant damage to properties and infrastructure in a wide number of areas across Bradford District. Over 1000 homes and businesses were flooded and the major impact of the flooding estimated in financial terms at £18 million to residential properties and £15.5 million to businesses. The personal impact on Bradford residents and communities is still being felt and long-term health impacts cannot yet be quantified.

7.0. Climate Change and Flood Risk

Global warming is predicted to cause significant changes to the world's climate in the coming decades. The precise nature of those changes remains uncertain, especially at a regional or local level. Climate change research suggests that such changes may include more frequent short-duration, high intensity rainfall or more periods of long duration rainfall, resulting in an increase in peak storm flows to contend with, whether that be in rivers, watercourses or surface water.

The National Planning Policy Framework (NPPF) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. Making allowances for climate change in flood risk assessments is a way of achieving this. NPPF and supporting practice guidance on flood risk and coastal change explain when and how flood risk assessments should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime taking climate change into account. Local planning authorities refer to the published guidelines when preparing local plans and considering planning applications.

Advice on climate change was previously set at a national level however research suggested that future guidelines for changes to peak river flows as a result of climate change might be more appropriate if considered on a regional scale. New allowances were produced by the Environment Agency in April 2016 (Flood Risk Assessments: Climate Change Allowances) and there are different allowances for different periods of time over the coming century. Bradford District lies within the Humber river basin district and allowances for changes to peak river flows range from 10 to 50%. Peak rainfall intensity is set nationally at a range of 5 to 40%.

It is imperative that the effects of more extreme flooding in Bradford District are mitigated against and plans and schemes are being developed to better manage and adapt to any increased risk of local flooding as a result of climate change. This affects the functions of all RMA's and all council departments.

8.0. Objectives and Measures for Managing Local Flood Risk

The LFRMS is developed and maintained by the CBMDC. It sets out CBMDC's objectives and measures for managing local flood risk and aims to guide effective FRM activities undertaken by RMA's operating within Bradford District. As LLFA, the CBMDC's objectives for managing district wide flood risk, subject to resources, are to:

- Improve understanding of flood risk
- Reduce the impact of flooding on a priority basis
- Communicate flood risk to partners and stakeholders
- Carry out targeted maintenance on a priority basis

- Ensure appropriate development
- Improve flood response and post flood recovery

8.1. Improve Understanding of Flood Risk within Bradford District

To improve the understanding of flood risk from watercourses, surface water, groundwater and other sources, the CBMDC proposes to utilise flood risk information from all available sources (local historic flood records, local flood incident reports, flood investigations, external Risk Management Authority asset and flood incident records, national flood maps, etc.). In addition, the CBMDC has a statutory duty to maintain a register of all structures and features likely to have a significant effect on flood risk. To improve understanding of flooding from all sources, the CBMDC is required to:

- Maintain a statutory register of significant obstructions to flow within the District's watercourses, based on flood risk (recording the location, capacity, condition, ownership, etc.) Significant obstructions to flow include bridges, culverts, trash screens, flumes, weirs, etc.
- Maintain a statutory register of other watercourse structures and features (walls, embankments, etc.) that are deemed to act as flood defences.
- Ensure that future reports of watercourse, surface water and groundwater flooding are responded to by carrying out appropriate site investigations to capture relevant flood detail, including the mechanisms of flooding and resulting impact.
- Maintain effective communication links with external FRM authorities to share information on flood risk and arrive at effective flood responses.

In addition, the CBMDC proposes to:

- Capture all available recorded and reported information on significant flooding incidents caused by watercourses, surface water run off and groundwater.
- Maintain open communication with internal risk management teams and ensure that relevant flooding records are held in order to improve overall understanding of flood risk.

8.2. Reduce the Impact of Flooding (Subject to Available Resources)

To reduce the impact of significant flooding within the District, the CBMDC proposes to:

- Utilise potential funding sources to undertake necessary investigations which will identify risk areas where there are capital needs. Investigations will utilise local flood risk information and, where appropriate, employ computer modelling analysis to accurately assess flooding mechanisms within each of these areas to arrive at cost effective flood management solutions, subject to available resources. Structural and non-structural solutions will be considered and measures which will achieve multiple benefits, such as water quality, biodiversity and amenity benefits will be encouraged and promoted where possible.

- Maintain engagement with riparian owners and significant land owners to negotiate the effective use of watercourses and open land for flood storage, subject to available resources.

8.3. Communicate Flood Risk to Partners and Stakeholders

To effectively communicate information on managing flood risk the CBMDC is required to publish the summary of its LFRMS and maintain open communication with other FRM authorities, including neighbouring LLFA's. The Council will continue to liaise with the West Yorkshire Flood Risk Management Partnership (WYFRMP) and attend and hold LLFA meetings.

In addition, the CBMDC proposes to enhance published information regarding local flood risk, responsibilities, property protection, resilience and Flood Re (promoting availability and affordability of flood insurance for affected individuals) on the Council's website. The CBMDC also proposes to communicate directly with communities, businesses, organisations, landowners and the general public and contribute to community forums in identified risk areas to raise awareness and provide guidance on FRM.

In producing the LFRMS the council have consulted internally, with other RMA's 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.

8.4. Targeted Maintenance

To ensure watercourse systems effectively serve the district's drainage, the CBMDC proposes to:

- Continue targeted investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by the CBMDC. The frequency of works based on flood risk and available resources.

- Ensure private riparian owners are contacted when maintenance works are required to maintain unimpeded flow within privately managed watercourses.

8.5. Ensure Appropriate Development in Bradford District

The FWMA 2010 and National Planning Policy Framework (NPPF) 2015 have significantly changed the focus on FRM. The importance of sustainable development is central to both and influences flood risk, spatial planning policy and development management. Planning can influence flood risk measures though strategic policy allocations, policy measures and requirements of sustainable drainage systems (SuDS), master planning, design and enforcement.

From April 2015 the LLFA became a statutory consultee for all major development applications (10 dwellings or more) under the NPPF to ensure robust SuDS are provided wherever appropriate. A list of national non-statutory technical standards was issued by DEFRA to back this change to legislation.

The FWMA transferred the Section 23 powers of the Land Drainage Act 1991 to LLFAs. The new legislation underpins the regulation of ordinary watercourses. As part of this updated legislation, we will seek to preserve, enhance and promote conservation, recreation and public access in regard to Ordinary Watercourses. By consenting or rejecting works on Ordinary Watercourses, we will have another tool to manage flood risk. We can do this by ensuring that works on or near to a watercourse do not increase flood risk. We will also be able to reduce the negative impact works and development has on the environmental and amenity value of the watercourse in question. The Council will consent and enforce works that will impact on Ordinary Watercourses.

In addition the CBMDC proposes to:

- Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for sites that become allocated for development through the Local Plan process. This will be actioned according to the SFRA and Bradford's core strategy.
- Develop a process with Bradford Council's Planning Department to create clear guidance for developers to manage local flood risk arising from, and in relation to, their development proposals of less than 10 properties.
- Engage with significant developers to raise awareness of catchment wide FRM initiatives and potentials for aligning with and benefiting from them.
- Seek to secure developer contributions where appropriate.

- Offset the environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.

8.6. Improve Flood Response and Post Flood Recovery

To improve flood response and post flood recovery, the CBMDC proposes to:

- Maintain effective communication links with the Met Office and the EA to ensure the most accurate forecast information on rainfall and anticipated flood impact is received.
- Maintain regular liaison with flood risk partners, emergency services, Bradford Council's Emergency Planning team, other service areas and Bradford Council's Contact Centre before, during and after significant rainfall events.
- Provide clear messages and regular updates via an internal indicative flood forecast and the media.
- Maintain the use of on the ground observers to feedback and record information on flood extents and impact during and post event.
- Works with partners to Investigate opportunities to establish volunteer flood wardens within the district.
- In conjunction with other Council Departments and the EA, develop Community Emergency and Flood Plans for Parish and Town Councils within Bradford District.
- Ensure Council departments inspect all Council watercourses and structures for debris and damage post event and take appropriate action.

9.0. Funding for Strategic Measures

The enormous economic, personal, health and wellbeing costs associated with flooding make the argument for investment in flood defences and other measures to reduce risk a persuasive one. Despite this, raising finances to fund improvements is a huge challenge.

Funding for FRM works and activities to achieve LLFA objectives is limited and the available funding comes from a number of different streams; the largest proportion coming from central government. Funding for flood risk mitigation favours areas where the concentration of risk is high (e.g. large numbers of residential properties and individuals at risk in any given area) and is weighted by other indicators such as poverty and deprivation. Furthermore, contributions from the beneficiaries of defence schemes are also sought, in particular significant

business interests. Obtaining funding when risks and benefits are widely distributed is difficult but CBMDC is working to secure both internal and external streams of funding. A summary of funding sources is shown in Table 4.

Table 4. Summary of Available Funding

Source	Description	Administered By	Appropriate For
Flood & Coastal Erosion Risk Management Grant-in-Aid (FCRMGiA)	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	Environment Agency	Any capital FRM projects
Local Levy	An annual contribution 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.	Environment Agency	Smaller FRM projects or as a contribution to FDGiA projects
Community Infrastructure Levy (CIL)	A local levy applied by the Planning Authority on developers to contribute to a general infrastructure fund. The CBMDC 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.	CBMDC	All measures outlined in the Strategy
Council Tax	A "ring-fenced" provision within the annual council tax for the specific purpose of addressing FRM.	CBMDC	All measures outlined in the Strategy
Private Contributions	Voluntary, but funding from beneficiaries of projects could make contributions from national funding viable. Contributions could be financial or "in kind" e.g. land, volunteer labour	CBMDC	All projects
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	CBMDC	Larger development sites
European Union	CBMDC has been successful in the past in securing EU match funding for FRM Projects i.e. UWC, FRC, NoRIS and SKINT.	EU/CBMDC	All projects

10.0 Wider Environmental Objectives

The LFRMS offers an opportunity to work with the natural environment to reduce flood risk and enhance the environment (Natural Flood Management – NFM). We intend to use the LFRMS to further promote these opportunities. FRM is just one benefit of managing catchments in an environmentally sensitive way. For example; using blue and green corridors for flood flow pathways, upstream attenuation and land management can deliver other environmental amenity and economic benefits.

Schemes that offer multiple benefits in catchments upstream of problem locations include NFM through upland attenuation, small wetlands, farmland management, large scale upstream wetlands and attenuation basins. Multiple benefits in urban areas close to problem locations can be achieved through strategic large scale SuDS for new developments, the use of blue/green corridors for flood flow pathways and the use of urban green space to redirect flood flow paths and for storage. Allowing space for surface water flood flows (and SuDS) during development planning and river restoration or daylighting problem culvert watercourses are further examples.

To ensure that the LFRMS contributes to wider environmental objectives required under the WFD and the Strategic Environmental (SEA) Directive, the LFRMS has been produced to align with the Sustainability Appraisal of the Bradford Core Strategy (Draft) and a Strategic Environmental Assessment (SEA) of the LFRMS was undertaken (Appendix F).

The SEA framework was used to identify and evaluate the potential environmental issues associated with the implementation of the LFRMS. The framework comprises a set of SEA objectives that have been developed to reflect the key environmental issues identified through the baseline information review. These objectives are supported by a series of indicators, shown in Table 5, which are used as a means to measure the potential significance of the environmental issues and can also be used to monitor implementation of the LFRMS objectives. The LFRMS objectives were tested against the SEA assessment framework to identify whether each option will support or inhibit achievement of each objective. The full Environmental Assessment Report is provided in Appendix F.

Assessment of the LFRMS objectives and underpinning actions against the SEA objectives was undertaken. No negative environmental effects were identified from the LFRMS objectives. Many of the proposed LFRMS objectives have the potential for both direct and indirect environmental benefits. There is opportunity through the LFRMS to achieve a range of biodiversity benefits including new habitat creation, enhancement of existing habitats and greater habitat connectivity.

In addition, as expected of a strategy for managing flood risk, the majority of the objectives within the LFRMS will contribute to achievement of the SEA objectives that seek to reduce flood risk to people, property and infrastructure. As a result, the LFRMS is likely to have a significant positive effect on reducing flood risk to local communities.

Some of the LFRMS objectives are also likely to assist with climate change adaptation. In particular, measures that reduce flood risk, promote better use of water resources, seek to deliver new habitat creation and better connection between existing habitats (such as de-culverting), could make a significant positive contribution to achievement of SEA objective 12 (Table 5.).

A detailed assessment of the potential cumulative effects of the LFRMS actions should be undertaken when further details regarding specific project level measures and their implementation are known.

The SEA Regulations require CBMDC to monitor the significant environmental effects (positive and negative) upon implementation of the LFRMS. Key potential environmental effects that require monitoring have been identified together with the monitoring indicators that can be applied to track whether such effects occur.

A Habitats Regulations Assessment (HRA) Test of Likely Significant Effect (TLSE) has also been prepared in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to have a significant effect on sites designated for their nature conservation interest at an international level (known as European sites, which include Special Areas of Conservation (SAC), Special Protection Areas (SPA), and by UK Government policy, Ramsar sites). The TLSE concluded that the LFRMS is not likely to have a significant effect on any of the European sites lying partially or wholly within 15km of the CBMDC administrative area.

Table 5. SEA Objectives and Indicators

Receptor	Objective		Indicator
Landscape	**1**	Protect the integrity of the District's urban and rural landscapes, and promote the key characteristics of the NCA's, LCA's, the Green Belt and the World Heritage Site in Saltaire.	Changes in the condition and extent of existing characteristic elements of the landscape. The condition and quality of new characteristics introduced to the environment. Percentage of open countryside, Green Belt or Green Infrastructure.
Biodiversity, flora and fauna	**2**	Protect and enhance designated and BAP habitats and species in the district.	Area of designated sites adversely affected by flooding. Monitoring of reported status of designated nature conservation sites. Percentage of land designated as nature conservation sites as a result of LFRMS measures. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat). Review of maintenance regimes annually. Number of habitat improvement projects delivered through flood risk management projects.
	3	Maintain and enhance habitat connectivity and wildlife corridors within the district.	
	4	Maintain existing, and where possible create new, riverine and wetland habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.	

Table 5 continued. SEA Objectives and Indicators

Receptor	Objective		Indicator
Water environment	**5**	Improve the quality and quantity of the water in the District's rivers.	Water quality of the District's watercourses. Number of pollution incidents. Number of SuDS schemes installed as part of the LFRMS and registered on the asset register. Number and volume of Environment Agency licensed abstractions. Numbers of sites with high pollution potential (e.g. landfill sites, waste water treatment works) at risk from flooding. Number of ordinary watercourse consents and main river permits within the district.
	6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.	Achievement of WFD objectives. Percentage of water bodies achieving 'Good' ecological status/potential. Number of physical modifications approved by other consent processes Number of enforcement cases on physical modifications affecting land drainage No deterioration in WFD status.
Soils and geology	**7**	Reduce the risk of soil erosion and pollution.	Area of agricultural, rural and greenfield land affected by flooding or LFRMS measures. Numbers of sites with high pollution potential (e.g. landfill sites, waste water treatment works) at risk from flooding.
Historic environment	**8**	Preserve and, where appropriate enhance historic, environmental and cultural sites in the district	Number of historic assets at risk from flooding, and assessment of impact. Number of vulnerable historic assets protected from flooding by implementation of the LFRMS. Number of heritage assets whose significance has been harmed through flood defence works
Population	**9**	Minimise the risk of flooding to communities and social infrastructure.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Number of property level protections schemes per year. Number of community flood plans in place. Number of exercises completed annually on flood response plans.
	10	Increase the use of SuDS, particularly in all new developments.	Number of SuDS schemes installed as part of the LFRMS.
Material assets	**11**	Minimise the impacts of flooding to the district's transport network and key critical infrastructure.	Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding. Number of reviewed and existing flood warning systems in the district.
Climate	**12**	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).

Appendix A – Flood Re

Flood Re launches in April 2016 and will promote the availability and affordability of flood insurance for up to 350,000 homeowners across the UK who are at risk of flooding.

This leaflet explains more about how Flood Re will work as well as providing general advice to homeowners on managing flood risk.

What is Flood Re?

Here in the UK, our standard buildings and contents insurance policies usually cover us against damage from flooding, along with other problems like fire or theft. In recent years, we have had several very serious floods, and this has meant the cost of flood insurance rates has been increasing. Many people who live in places that have flooded, or are very likely to flood in the future, are already struggling to find more affordable home insurance – **your household may have experienced this problem already**.

Insurance companies and the Government have been working together to develop a different way of dealing with flood insurance. They have decided on a scheme that will:

- Enable flood cover to be more affordable for the households at highest risk of flooding
- Increase the availability and the choice of insurers for customers
- Allow time for the Government, local authorities, insurers and communities to become better prepared for flooding.

This scheme will be in operation for the next 25 years, which may sound like a long time, but there is a lot that has to be done during this period. There is more about this later in this leaflet.

How does Flood Re work and what does it mean for you?

Flood Re makes no difference to the way you buy your home insurance. Any claims you need to make will continue to be handled by the insurance company you've chosen. As a result of the creation of the Flood Re scheme, you should have greater choice of insurance policies and they should be more competitively priced.

You won't have to pay anything directly to Flood Re, because your insurance company will be dealing with that for you. All insurance companies contribute to the costs of the scheme, as they pay a special 'levy' to Flood Re.

Your insurance company will continue to be responsible for setting the premiums they charge to you, after taking into account all the things they already look at (like the risks of fire, theft, or subsidence).

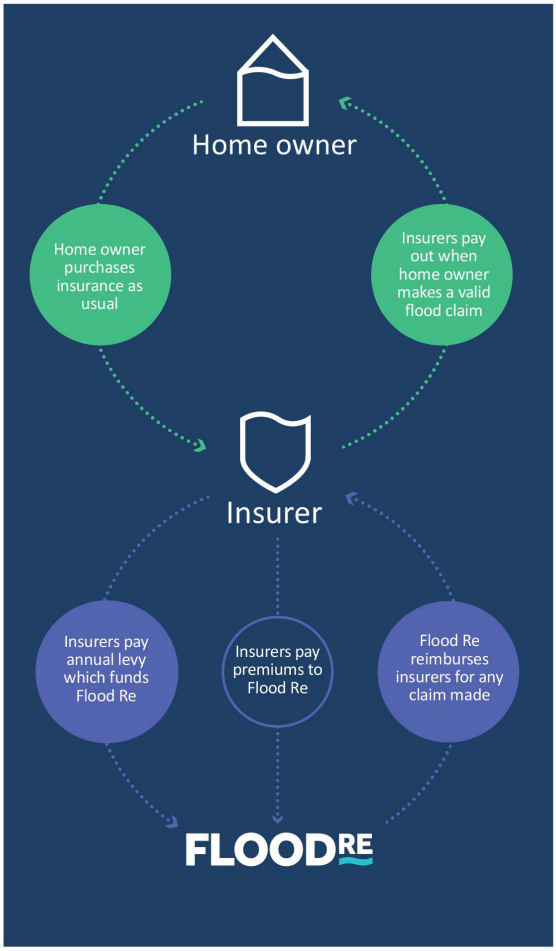
Why will Flood Re only be in place for 25 years?

Flood Re has another important role to play, as well as helping to enable home insurance to be more widely available and affordable in areas at risk of flooding. Part of the Flood Re scheme means offering help to people to increase their understanding of their level of flood risk and explaining how, where possible, they can take action to reduce that risk. There is more information about this on Flood Re's own website: www.floodre.co.uk

By the end of the 25 years of Flood Re, we should be able to return to a system for home insurance prices that will be based more accurately on the kind of flood risks each household actually faces. This will work rather like motor insurance does today, where those who run the highest risks of needing to claim on their policies will usually pay more than those who are only at low risk.

While Flood Re is in force, there will be a review at least every five years, to check how much progress has been made on managing this return to pricing flood cover according to risk. These reviews could mean looking again at the premiums charged for each policy, as well as the 'levy' charged by Flood Re to UK home insurers.

Appendix A – Flood Re



General advice on flood risk, and how you can protect your property

You can find out about the level of flood risk in your area and how to take precautions to help minimise the impact of flooding on your property here:

www.gov.uk/prepare-for-a-flood

Information on any flood warnings that have been issued can be found on the following sites.

England
www.gov.uk/check-if-youre-at-risk-of-flooding

Wales (available in English and Welsh)
www.naturalresources.wales/flooding/alerts-and-warnings

Scotland
www.floodlinescotland.org.uk

Northern Ireland
www.nidirect.gov.uk/flooding-in-your-area

For information about the kind of things you can do to reduce the damage a flood might do to your home and belongings (for example, you can get flood doors, airbrick covers and have electrical sockets moved higher up on the wall) or to explain how to commission a property-level flood risk survey, the following sites will be of help:

Property-level flood risk surveys (Association of British Insurers)
www.abi.org.uk/insurance-and-savings/topics-and-issues/flooding/assessing-your-flood-risk

The Chartered Institution of Water and Environmental Management (CIWEM)
Maintains a professionals directory, including a list of flood risk consultants
www.ciwem.org

The Royal Institution of Chartered Surveyors (RICS)
Publishes a guide to flooding for property owners, and also maintains a list of chartered surveyors
www.rics.org/uk

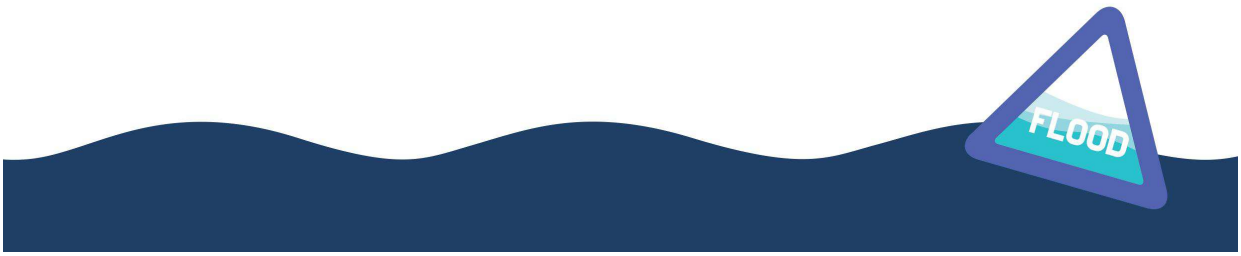
Information and advice on finding the right kind of flood protection for your home is available from the following sites:

The National Flood Forum: www.nationalfloodforum.org.uk

The Scottish Flood Forum: www.scottishfloodforum.org

The Blue Pages: www.bluepages.org.uk

Flood Protection Group (Part of The Property Care Association): www.property-care.org/homeowners/flood-protection



Appendix B - CBMDC Required and Proposed Objectives

Improve Understanding of Flood Risk	Reduce the Impact of Flooding	Communicate Flood Risk to Partners and Stakeholders	Target Maintenance	Ensure Appropriate Development	Improve Flood Response and Recovery
Maintain statutory register of watercourses / structures based on flood risk	Secure external funding streams to undertake investigation to identify risk areas where there are capital needs.	Produce, publish and review LFRMS	Targeted investigation and clearance works of watercourses and associated assets managed by the CBMDC to reduce flood risk	Confirm land allocation for development LDF: Policy and strategy responses to core documents / development site and site specific development policies and plans	Maintain communication links with Met Office and EA to ensure the most accurate forecast information on rainfall and anticipated flood impact is received.
Maintain statutory register of other watercourse structures deemed to act as flood defences.	Secure internal and external match funding	Enhance publicly available information relating to riparian responsibilities	Ensure private riparian owners are contacted to address maintenance/ flood issues.	Consult on Planning Applications Negotiate commuted sums/S106/CIL/pre-application enquiries Check designs, ensure condition compliance and enforcement	Regular liaison with flood risk partners, emergency services, Emergency Planning and other service areas before, during and after significant rainfall events.
Continued site investigations of reports of flooding	Maintain engagement with riparian owners.	Enhance publicly available information relating to flood risk and resilience	Apply legislation to guide residents regarding their flood risk	Manage applications for consent of watercourse works	Provide clear messages and regular updates via an internal indicative flood forecast and the media.
Effective communication links with internal and external RMA's		Produce community flood and emergency plans		Engage with developers to raise awareness of flood risk and risk management activities	Maintain use of on the ground observers to feedback and record information on flood extents and impact.
Capture all available recorded and reported information on flooding incidents		Ensure ongoing communication with all internal and external RMA's		Actively encourage use of sustainable drainage systems in developments	
Ensure relevant records are held.		Plan/Attend community forums to raise awareness			
Complete and publish SFRA					

Appendix C – CBMDC Action Plan

Priority	
High	H
Medium	M
Low	L

Timescales	
Long (L)	Over 5 years
Medium (M)	2 to 5 years
Short (S)	0 to 2 years

Status	Description
Continue (C)	Continue to carry out existing role in future
Develop (D)	Develop and expand upon existing roles or increase existing service area
Establish (E)	Establish a new role or service area
Achieved (A)	Action is already achieved

Note: The CBMDC is undergoing review and the delivery of FRM activities will be guided by the outcomes of the review. The LFRMS is a living document and will be updated to reflect any changes that occur as a result of the Council review*

Measure	Reference to Section	Proposed Delivery	Priority	Timescales	Status
Improve Understanding of Flood risk	8.1	The drainage section will maintain and update statutory register of known watercourse structures deemed to act as flood defences.	M	L	C
	8.1	The drainage section will investigate flooding within Bradford District as and when flooding occurs.	H	L	C
	8.1/8.3	Ensure effective communication links with internal and external RMA's within Bradford District.	M	L	C
	8.1	Capture all available recorded and reported information on flooding incidents as and when flooding occurs. All internal RMA's record and report flood events.	M	L	C
	8.1	Complete and publish level 1 SFRA.	H	S	C
Reduce the Impact of Flooding	8.2	Secure external funding streams (Defra, Local Levy funding) to undertake investigation to identify risk areas where there are capital needs.	H	L	D
	8.2	Secure internal match funding for FRM activities	H	S	D
	8.2	Secure external match funding for FRM activities (European Union Funding)	H	L	D
	8.2/8.3	The drainage section will maintain engagement with riparian owners in regards to consent to watercourses and ensuring that riparian responsibilities are upheld.	M	L	C
Communicate Flood Risk to Partners and Stakeholders	8.3	Produce, publish and review LFRMS in accordance with FRR 2009.	H	S	A
	8.3/8.1	Enhance publicly available information relating to riparian responsibilities.	M	S	C
	8.3/8.1	Enhance and update publicly available information relating to flood risk and resilience.	M	S	C
	8.3/8.1	Produce community flood and emergency plans in liaison with Emergency Planning, Neighbourhoods and the Environment Agency.	H	S	E
	8.3/8.1	Ensure ongoing communication with all internal and external RMA's to share knowledge and ensure the effective delivery of FRM activities.	M	L	C
	8.3/8.1	Hold and/or Attend RMA meetings and LLFA meetings on FRM. Engage with North Yorkshire County Council in addition to neighbouring LLFA's.	M	L	C
	8.3/8.1	Plan/Attend community forums to raise awareness of flood risk and provide flood risk guidance.	M	L	C
Target Maintenance	8.4/8.2	Targeted investigation and clearance works of watercourses and associated drainage assets managed by all RMA's in the CBMDC to reduce flood risk.	H	S	D
	8.4/8.1/8.3	Ensure other riparian owners are contacted to address maintenance/ flood issues.	M	L	C
Ensure Appropriate Development	8.5	Confirm land allocation for development. Ensure appropriate policies and guidance within the Local Plan are followed and in accordance with relevant Flood Risk Legislative documentation.	H	M	C
	8.5	Consult on Planning Applications. Negotiate commuted sums/S106/CIL/pre-application enquiries. Check designs; ensure condition compliance and enforcement through the planning process.	M	L	C
	8.5/8.1 -8.4	Manage applications for consent of watercourse works.	M	L	C
	8.5/8.1 – 8.3	Engage with developers to raise awareness of flood risk and risk management activities for major developments through Property and developer forums. Engage with developers for small and large-scale developments at the pre-application stage of the Planning process.	M	L	C
	8.5	Actively encourage use of sustainable drainage systems in all suitable developments through the planning process.	M	L	C
	8.5	Strategic Environmental Assessment of LFRMS.	H	S	C
Improve Flood Response and Recovery	8.6	Maintain communication links with Met Office and EA to ensure the most accurate forecast information on rainfall and anticipated flood impact is received. Led by Emergency Planning.	M	L	C

Appendix D - Relevant Guidance and Information

Water Framework Directive (WFD), European Parliament, 2010.
http://ec.europa.eu/environment/water/index_en.htm

Flood Risk Regulations (FRR), HMSO, 2009.
http://www.legislation.gov.uk/uksi/2009/3042/pdfs/uksi_20093042_en.pdf

Flood and Water Management Act (FWMA), HMSO, 2010.
http://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf

National Flood and Coastal Erosion Risk Management Strategy for England, EA and Defra, July 2011.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/2898/9780108510366.pdf

National Planning Policy Framework, 2012.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Planning Policy Statement 25: Development and Flood Risk (PPS25), DCLG, March 2010.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7772/pps25guideupdate.pdf

Aire Catchment Flood Management Plan (CFMP), Environment Agency, July 2010.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289346/River_Aire_Catchment_Flood_Management_Plan.pdf

Ouse Catchment Flood Management Plan (CFMP), Environment Agency, July 2010.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289228/River_Ouse_Catchment_Flood_Management_Plan.pdf

Strategic Flood Risk Assessment, Level 1 (SFRA), City of Bradford metropolitan District Council, Final Draft Report amended February 2014.
http://www.bradford.gov.uk/bmdc/the_environment/planning_service/local_development_framework/evidence_base_assessment

Planning Policy Statement 25: Development and Flood Risk (PPS25), DCLG, March 2010.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7772/pps25guideupdate.pdf

Flood Risk Assessments: Climate Change Allowances, EA, 2016.
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions, Defra, 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69447/pb13640-sdg-guidance.pdf

Living on the Edge: A Guide to Your Rights and Responsibilities of Riverside Ownership, 5th Edition, Environment Agency, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_7114.pdf

Yorkshire Water https://www.yorkshirewater.com/about-us

Environment Agency https://www.gov.uk/government/organisations/environment-agency

Bradford Council Drainage http://www.bradford.gov.uk/bmdc/the_environment/environmental_health/water_management

Flood Re http://www.floodre.co.uk/

Appendix E

Acronyms

CBMDC	City of Bradford Metropolitan District Council
CIL	Community Infrastructure Levy
EA	Environment Agency
FCERM	Flood and Coastal Erosion Risk Management
FRC	Flood Resilien City
FRR	Flood Risk Regulations
FWMA	Flood and Water Management Act
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
NoRIS	No Rainwater In Sewers
NPPF	National Planning Policy Framework
RMA	Risk Management Authority
SEA	Strategic Environmental Directive
SFRA	Strategic Flood Risk Assessment
SKINT	Skills, Integration and New Technologies
UWC	Urban Water Cycle
WFD	Water Framework Directive
YWS	Yorkshire Water Services

Appendix F – Bradford Local Flood Risk Management Strategy: Strategic Environmental Assessment , Environmental Report, December 2016. Attached document.