Herefordshire Preliminary Flood Risk Assessment

Preliminary Assessment Report

May 2011

Herefordshire Council

amey

Working together for the people of Herefordshire

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Revision History

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2nd Draft / 18th April 2011		Martin Jackson
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Contract

This report describes work commissioned by Martin Jackson, on behalf of Amey Herefordshire.

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Purpose

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Acknowledgments

JBA Consulting wishes to record our thanks to Martin Jackson and Clare Brown at Amey Herefordshire for providing data and information and working in partnership to deliver this PFRA.

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References

Defra and WAG guidance on Flood Risk Areas 2010; Environment Agency (2010 and later amendments) Preliminary Flood Risk Assessment (PFRA) Final guidance and annexes and guidance notes associated with Environment Agency data as dated. Standard text on climate change and development in Sections 5.4 and 5.5 © Environment Agency

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Executive Summary

This Preliminary Assessment Report for Herefordshire has been prepared as part of the duties established under the Flood Risk Regulations 2009. It is due for submission to the Environment Agency (EA) by 22nd June 2011. The Regulations transpose and implement the requirements of the European Floods Directive, which aims to provide a consistent approach to managing flood risk across Europe. The first stage of the process is to undertake a Preliminary Flood Risk Assessment (PFRA). This involves the review of past floods and the potential for future floods, as well as determining and reviewing the presence of any "areas of significant flood risk", the so called Flood Risk Areas. Where such Flood Risk Areas have been determined, on the basis of national guidance issued by Defra and Welsh Assembly Government (WAG), Lead Local Flood Authorities (LLFAs) are required to review and if necessary propose amendments to the indicative areas using locally held information. No Flood Risk Areas have been proposed in Herefordshire.

Herefordshire Council, as a LLFA, has a responsibility under both the Flood Risk Regulations 2009 and the Flood & Water Management Act 2010 for managing local flood risk. To meet this duty, Herefordshire Council has completed the PFRA and assessed flood risk from local sources of flooding from surface water, groundwater and ordinary watercourses, together with any interaction with drainage systems, sewers and other sources. The EA is responsible for assessing the risk of flooding from main river, the sea and large reservoirs.

The assessment of local flood risk has involved the collection and review of readily available information held by Herefordshire Council and partners on past floods across Herefordshire. This has been considered in light of national datasets provided by the EA and informed by discussions with the local multi-agency partnership group involving other risk management authorities, including the EA, DCWW/Welsh Water, Severn Trent Water and the River Lugg and Lower Wye Internal Drainage Boards (IDBs). This review has then been supplemented by a detailed and objective assessment of the potential risks of future flooding across the county.

The PFRA has been undertaken using JBA Consulting's bespoke analytical GIS "Flood Risk Metrics" software (JFrism). This powerful graphical analysis has allowed a comprehensive study of the flood risk facing people, properties and critical infrastructure across Herefordshire. The exposure of these and other vulnerable receptors to a range of local flood sources has been assessed on a 1km grid square basis across the entire county. This has allowed the completion of the PFRA and provided the means to analyse and clearly display the risk from different flood sources on a Parish, Ward or entire County basis. Details of the critical infrastructure and properties at risk will also help inform the Herefordshire Multi-Agency Flood Plan (MFP) and assist in emergency planning.

The PFRA has shown there are 10,357 people, 4,426 residential properties, 5,107 non-residential properties and 241 critical infrastructure sites at risk from surface water flooding across Herefordshire. These figures are derived using the Flood Map for Surface Water (FMfSW) as the locally agreed surface water information. They do not meet the levels used to define areas of "significant flood risk" in the Defra/WAG Guidance and there are no proposals to suggest any amendments. Consequently Herefordshire Council is not required under the Regulations to prepare Flood Hazard and Risk Maps or Flood Risk Management Plans.

The PFRA process has helped strengthen and underline the importance of partnership working and the need for sharing information through the Herefordshire Partnership Group. A comprehensive archive of past floods has been compiled and a database structure now exists to record the mandatory information necessary for documenting all future floods. This will greatly ease the PFRA review process in 6 years time.

Understanding and communicating local flood risk in this way will provide the foundations for developing the Local Flood Risk Management Strategy. This will be developed over the next year as part of the duties under the Flood & Water Management Act 2010. It will define how flood risk is to be assessed and managed across Herefordshire in future years and the PFRA analysis will inform how this future strategy will be taken forward.

Contents

List of Figures

List of Tables

Abbreviations & Glossary

Term or Abbreviation	Definition
AONB	Area of Outstanding Natural Beauty
Assets	Structures, or a system of structures used to manage flood risk
AStGWF	Areas Susceptible to Groundwater Flooding
AStSWF	Areas Susceptible to Surface Water Flooding
Catchments	An area that serves a river with rainwater. Every part of land where the rainfall drains to a single watercourse is in the same catchment
CFMP	Catchment Flood Management Plan
Cultural heritage	Buildings, structures and landscape features that have an historic value. These are also known as heritage assets
DCWW	Dwr Cymru Welsh Water
Defences	A structure that is used to reduce the probability of floodwater or coastal erosion affecting a particular area (for example a raised embankment or sea wall)
Defra	Department for Environment, Food and Rural Affairs
EC	European Commission
EC Inspire Directive	Implemented by the 'Inspire Regulations 2009 . The main aim being to improve the quality, consistency and accessibility of spatial data sets and services for environmental data
FCERM	Flood and coastal erosion risk management
Flood	The temporary covering by water of land not normally covered with water
FMfSW	Flood Map for Surface Water
Flood Risk Area	An area determined as having a significant risk of flooding in accordance with guidance published by Defra and WAG
FWMA	Flood and Water Management Act
GHG	Greenhouse Gasses
GIS	Geographic Information Systems
Groundwater	Water which is below the surface of the ground and in direct contact with the ground or subsoil
HSWGW	Historic Surface Water and Groundwater
IDB	Internal Drainage Board
Indicative Flood Risk Areas	Areas determined by the Environment Agency as indicatively having a significant flood risk, based on guidance published by Defra and WAG and the use of certain national datasets. These indicative areas are intended to provide a starting point for the determination of Flood Risk Areas by LLFAs
Jfrism	JBA Consulting s bespoke 'Flood Risk Metrics' GIS tool
LLFA	Lead Local Flood Authority

Local flood risk	Flood risk from sources other than main rivers, the sea and reservoirs, principally meaning surface runoff, groundwater and ordinary watercourses
Main River	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers
MFP	Herefordshire Multi-Agency Flood Plan
NRD	National Receptor Dataset – a collection of risk receptors produced by the Environment Agency
Ordinary Watercourses	All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, IDBs
Preliminary Assessment Report	A high level summary of significant flood risk, based on available and readily derivable information, describing both the probability and harmful consequences of past and future flooding
Preliminary Assessment Spreadsheet	Reporting spreadsheet which LLFAs need to complete. The spreadsheet will form the basis of the Environment Agency's reporting to the European Commission
PFRA	Preliminary Flood Risk Assessment
PPS25	Planning Policy Statement 25
Receptor	Something that may be harmed by flooding
Regulations	The Flood Risk Regulations
Resilience	The ability of the community, services, area or infrastructure to withstand the consequences of an incident
Risk	Measures the significance of a potential event in terms of likelihood and impact
River basin district	There are 11 river basin districts in England and Wales, each comprising a number of contiguous river basins or catchments. The Environment Agency is responsible for collating LLFA reports at a river basin district level
SACs	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
Source	The origin of a hazard (e.g. heavy rainfall, strong winds, surge etc)
SPAs	Special Protection areas
SSSIs	Sites of Special Scientific Interest
Surface runoff	Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer
SWMP	Surface Water Management Plan
UKIP09	UK Climate Change Projections 2009
WAG	Welsh Assembly Government

1. Introduction

1.1 Scope of the Report

Herefordshire Council has new duties as a Lead Local Flood Authority (LLFA) to manage local flood risk across the county. The focus and responsibilities for the council in this new role are to assess and manage local flood risk from sources such as surface water, groundwater and ordinary watercourses. The Environment Agency (EA) is responsible for assessing the risk of flooding from main rivers (such as the River Wye and Lugg), the sea and from large reservoirs.

One of the first obligations is to complete a Preliminary Flood Risk Assessment (PFRA), required as part of the obligations under the Flood Risk Regulations 2009. These Regulations transpose and implement the requirements of the European Floods Directive. This aims to provide a consistent approach to managing flood risk across Europe and to manage and reduce the risks that floods pose to human health, the environment, economic activity and cultural heritage.

This report has been prepared by JBA Consulting for Amey Herefordshire, on behalf of Herefordshire Council. It presents the findings of an assessment of local flood risk and the past and potential future impacts of flooding across Herefordshire. It has to be provided to the Environment Agency (EA) by 22nd June 2011 as part of a national submission to be reviewed and then published and sent to the European Commission in December 2011.

The Flood Risk Regulations 2009 establish a flood risk management framework consisting of four stages that will be reviewed on a 6-yearly basis, namely:

- To prepare a Preliminary Assessment Report on past floods and potential future floods
- To identify Flood Risk Areas (FRAs) where flood risk is deemed nationally significant
- To produce appropriate Flood Hazard and Flood Risk Maps for FRAs
- To prepare Flood Risk Management Plans for FRAs

This Preliminary Assessment Report presents the outcomes of the first two stages that together make up the PFRA process, namely the assessment of local flood risk and the identification of any Flood Risk Areas, where the risk of flooding is considered significant.

The Defra and Welsh Assembly Government guidance sets out the criteria and thresholds for assessing whether a risk of flooding is of national significance. This has confirmed there are no indicative Flood Risk Areas in Herefordshire, based upon the nationally available information. This report includes a review of this determination in respect of any locally held information.

For any agreed Flood Risk Areas where flood risk is deemed significant, these will be subject to the further stages outlined above, namely the preparation of Flood Hazard and Risk Maps by 2013 and the production of Flood Risk Management Plans by 2015.

1.2 Objectives and Approach

The overall aim and objective of the PFRA process is to carry out a high level exercise designed to make use of all existing and readily available data, in order to review past floods and the potential for future floods across Herefordshire.

The key objectives are to:

- Identify partner organisations involved in local flood risk management and engage in the PFRA process through ongoing collaboration
- Establish agreed systems for future data management, sharing and storage

- Describe the adopted approach to the PFRA
- Undertake an assessment of past floods across Herefordshire from local sources of flooding and summarise the consequences and impacts of these events
- Assess the potential harmful consequences of future flood events within the county
- Review and update the county-wide system to enable the recording of all relevant information for future floods
- Review the provisional national assessment of indicative Flood Risk Areas provided by the EA and provide explanation and justification for any amendments required to the Flood Risk Areas.

The assessment of local flood risk has involved the collection and review of readily available information held by Herefordshire Council and partners on past floods across Herefordshire. This has been considered in light of national datasets provided by the EA and further informed by discussions with the Herefordshire Flood Risk Management Partnership group, involving other risk management authorities, including the EA, DCWW/Welsh Water, Severn Trent Water and the River Lugg, Lower Severn and Lower Wye Internal Drainage Boards (IDBs).

This review has then been supplemented by a detailed and objective assessment of the potential risks of future flooding across the county. This has been undertaken using JBA Consulting's bespoke GIS analytical "Flood Risk Metrics" software ("JFrism"), which allows a detailed assessment of the risk from local flood sources to a wide range of receptors and at differing threshold levels. This has helped with the consideration of significant flood risk and the identification of any Flood Risk Areas. It has also provided Herefordshire Council with a powerful graphical tool that helps understand and communicate a range of flood risks across the county, capable of being presented at a Parish, Ward or County-wide basis. The decision was taken to invest in and use these GIS tools in order to not only ensure the analysis delivered both the PFRA that is required now, but to also gain efficiencies and avoid duplication of efforts in the preparation of future flood management strategies across the county.

Understanding and communicating local flood risk in this way will provide the foundations for developing the Herefordshire Council's Local Flood Risk Management Strategy. Work on this will be commencing later this year, once the National FCERM Strategy has been published, as part of the duties under the Flood & Water Management Act 2010. The Local Flood Risk Management Strategy will define how flood risk is to be assessed and managed across Herefordshire in future years. The PFRA analysis has therefore also been used as an opportunity to inform how this future strategy will be taken forward.

The PFRA process is also an opportunity to review, strengthen and promote local partnership and information sharing arrangements between the local risk management authorities. It represents one of the first activities to be performed in accordance with the new requirements established under the Flood & Water Management Act 2010. A further outcome of this work is that there will be an improved data management system. Roles and responsibilities of operating authorities have now been clarified, as has the need for partner organisations to cooperate and share data and information in a spirit of partnership. This delivers on two of the central recommendations of the Pitt Review into the Summer 2007 floods.

A further objective and outcome of this work is for there to be an agreed data management system that will be used by Herefordshire Council for recording all the critical information relating to all future floods that occur across the county. Records of past floods held by the Council and others have been reviewed and consolidated into the attached spreadsheet contained in Annex 1. This includes a number of mandatory fields that are required and provide the template for the new system such that all flood events are thoroughly recorded in the future. This will ensure that comprehensive records are collected and recorded in the correct format, greatly simplifying the future revision of the PFRA and updating of "past floods" which will be required in 6 years time.

1.3 Study Area

The Unitary County of Herefordshire is located on the Welsh Borders, in the south westerly corner of the West Midlands region (Figure 1.1). It is an area known for its unspoilt countryside, with numerous Areas of Outstanding Natural Beauty (AONB) and Sites of Special Scientific Significance (SSSI) certifications throughout the county. It is bordered to the west by Wales and the Black Mountains, to the east by the Malvern Hills AONB and to the south by the Lower Wye Valley AONB.

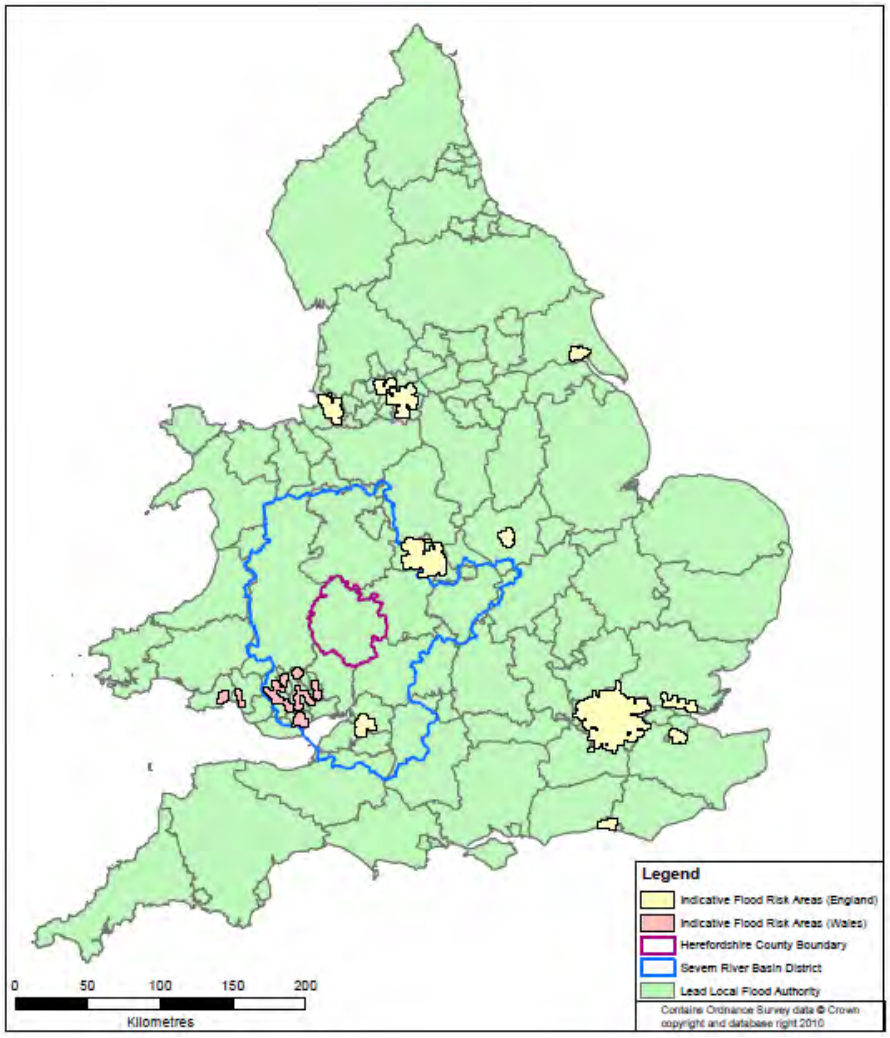

Figure 1.1 Location Plan Showing Indicative Flood Risk Areas and River Basin Boundary.

The county lies wholly within the Severn River Basin District as defined by the EC Water Framework Directive. The River Wye is the primary river which flows into and through the county from the west, before being joined by the River Lugg and River Arrow which flow from the north. The characteristic red sandy soil type in the area is derived from the extensive underlying Old Red Sandstone, although limestone and mudstone outcrops are also common.

The county as a whole has a total land area of approximately 2,183 km^2, and has an estimated population of 179,100 people. The population density for the county is very low at 80 people per km^2. According to the Office for National Statistics, this is the 4th lowest found throughout England. Hereford City is the main economic hub of the county; it is the centre for education, health, shopping, employment and population with just under one third of all residences concentrated here. The historic market towns of Leominster, Ledbury, Ross, Bromyard and Kington follow Hereford City in size and between them account for around one

fifth of the population. The remaining 50% of people reside in smaller towns, villages and hamlets, as well as in isolated dwellings and farms throughout the county.

Principal risk management authority partners in the area, other than the EA, include the water companies and the local Internal Drainage Boards. Herefordshire Council already coordinate and chair periodic partnership meetings involving all the relevant local operating authorities. The area primarily falls within the Welsh Water/DCWW water supply and treatment area, although a small area in the north-eastern corner of the county is served by Severn Trent Water. The relatively flat area of the River Lugg floodplain north-east of Hereford is managed and operated by the River Lugg Internal Drainage Board (IDB).

2. Lead Local Flood Authority Responsibilities

2.1 Governance and Partnership

The Flood & Water Management Act 2010 has defined an enhanced role for local authorities so that they take on the responsibility for leading the co-ordination of flood risk management in their area. Herefordshire Council, as one such Lead Local Flood Authority (LLFA), is responsible for all local flood risk management within the County. This includes flooding which primarily originates from ordinary watercourses, surface water and groundwater sources, as well as any interactions between all sources of flooding, such as from main rivers, where these could impact upon local sources.

These new duties also define the EA as the responsible body for the management of flood risk from main rivers, large reservoirs and the sea. The EA is also responsible for providing a strategic overview on all flood risk matters.

Partnership working between all the risk management authorities has been recognised as of the upmost importance for effective flood risk management. Duties to co-operate and share information are now included in the Act and the Regulations. These responsibilities now form a central principal in the delivery of the PFRA and the future development of the Herefordshire Local Flood Risk Management Strategy.

It is recognised that it is essential for all stakeholders - such as neighbouring authorities, the EA, Internal Drainage Boards (IDBs), and Water Companies - to be fully engaged and working together to fully understand any flood risk issues that may impact upon the County. The council has already established the multi-agency Herefordshire Flood Risk Management Partnership and will be co-ordinating regular partnership meetings in the future within the County.

The Herefordshire Flood Risk Management Partnership will play a crucial role in the future delivery of local flood risk management services. It has been considered that such partnership working helps facilitate more effective communications with residents at flood risk, as well as provide more co-ordinated emergency response plans and longer term management strategies. It provides the integrated approach as originally recommended by the Pitt Review, helping to deliver the PFRA now and to prepare the foundations to the Local Flood Risk Management Strategy required in the future.

2.2 Communication

The Herefordshire Flood Risk Management Partnership provides the forum for regular liaison and communication with local risk management authorities. These meetings are chaired and co-ordinated by Herefordshire Council, helping to clarify roles and responsibilities as well as to plan for the effective future management of local flood risk. They provide an opportunity for partners to share data, information and knowledge, and to agree a co-ordinated plan of flood management and response. This partnership approach helps to optimise locally available resources and experience, as well as to identify funding opportunities and agree local flood risk management priorities

This forum provides the opportunity to communicate this shared understanding and the agreed management actions across the council and between partner organisations. It also enables the vital link to be made with local communities and members of the public directly affected and at flood risk.

Communication with the public can also be achieved through on-line feedback forms, particularly useful immediately after a flood event. There is the intention to increase dialogue with the public following flood event surveys aimed at gathering information from members of the public about either a very recent flood or perhaps capturing knowledge and experience of past floods.

3. Methodology and Data Review

3.1 Information from EA

The methodology for undertaking this PFRA is based upon the national guidance prepared by the EA and the Ministerial Guidance produced by Defra and WAG. The latter provides the thresholds and criteria used for determining Flood Risk Areas where the risk of flooding is identified as significant. The EA guidance has explained the technical detail behind the PFRA, the form of the report and how to apply the Defra/WAG guidance on significant risk.

The EA has also provided CDs containing supporting information and made available national datasets distributed via DataShare. This information has included:

- Maps, spreadsheets and GIS layers of all places above local flood risk thresholds (Figure 3.1 - the "blue squares" map) and the clusters then created in determining Flood Risk Areas
- Details on the consequences of flooding to historic assets and Pollution, Prevention & Control (PPC) sites

Two national datasets showing surface water flooding extents have been made available by the EA to LLFAs, namely:

- Areas Susceptible to Surface Water Flooding map (AStSWF) - derived from one rainfall event with three susceptibility bandings: less, intermediate and more.
- Flood Map for Surface Water (FMfSW) - derived from two rainfall events dividing into two depth bandings: 1:200 rainfall and 1:200 rainfall deep, as well as 1:30 rainfall and 1:30 rainfall deep.

There are also four national datasets on groundwater flooding detailed in the EA guidance, including the Areas Susceptible to Groundwater Flooding broad-scale map.

In addition, there are details on DataShare of information on past floods, including the Historic Flood Map and Flood Event Outlines, although primarily focussing on flooding from main river and the sea. The Historic Surface Water and Groundwater (HSWGW) Geodatabase has not been available, although this does contain some records originally submitted by local authorities.

Whilst the information above all relates to differing flood sources and records of past events, another key dataset provided by the EA and used in the PFRA is the National Receptor Dataset (NRD). This relates to receptor vulnerability to flooding and provides details of social, economic, environmental and cultural receptors including residential properties, hospitals, schools, electricity sub-stations and critical transport infrastructure.

It can be seen from Figure 3.1 that the places where the national thresholds for residential, non-residential and critical infrastructure are exceeded include Hereford City, Ledbury, Bromyard, Ross-on-Wye and Leominster together with other local hotspots.

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PFRA Analysis
County of Herefordshire

Places Above Flood Risk Threshold

Based on the Flood Map for Surface Water (200 year Deep) which indicates the chance of land flooding to a depth greater than 0.3m during a 1 in 200 year rainfall event.

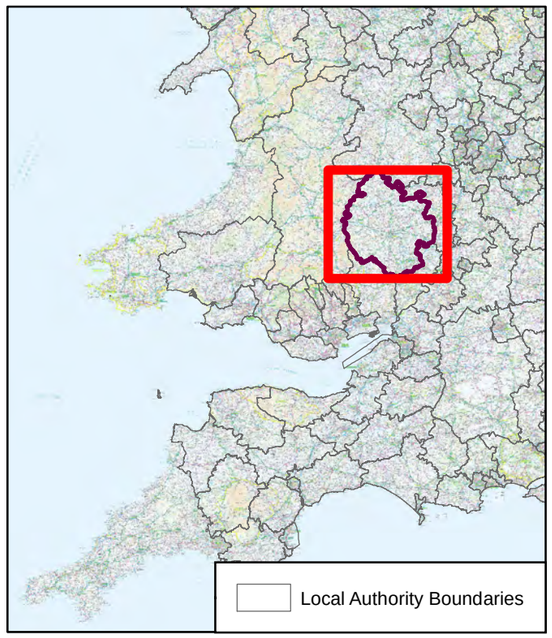
Legend

- Herefordshire County Boundary
- Hotspots

Hotspots are1km grid squares where at least one of the following flood risk indicators is above the threshold given below (using NRD v1.0):

1. Number of People > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EnvironmentAgency's detailed method of counting (based on property outlines).



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Date:	25/05/2011
Status:	Final
Drawing Number:	Figure 3.1
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0 4.5 9 18 KM

3.2 Information from Herefordshire Council

Locally held data and information on past flooding has been collected over the years and has now been consolidated into an archive of flood records. The most comprehensive source of information was contained within the Herefordshire Councils' database of past flood events, drawn from reports received from members of the public, from records held by the Highways Department and within Amey Herefordshire. In addition, some records held by the Fire Service have also been incorporated into the database.

This database has provided the primary resource for the PFRA. However these records had some limitations and were often incomplete so they have been further refined and consolidated into the revised spreadsheet.

This main source of flood event information has been supplemented where possible with records and information from Welsh Water/DCWW, Severn Trent Water and the River Lugg and the Lower Wye IDBs. The Water Companies hold records of historic sewer flooding incidents in each area on their respective DG5 Registers, made available to Amey Herefordshire under the terms of a confidentiality agreement. Although these records have not been used in the production of this PFRA, they will provide additional useful information for the Herefordshire Flood Risk Management Partnership to consider in the preparation of the Local Flood Risk Management Strategy.

In addition, reference has been made to the comprehensive Strategic Flood Risk Assessment (SFRA) prepared for Herefordshire in 2009.

3.3 Data Availability, Quality and Limitations

Much of the data provided by the EA has been made available under licence to the LLFAs. This data has, in turn, been licensed for use by both Amey Herefordshire and by JBA Consulting in preparing the PFRA.

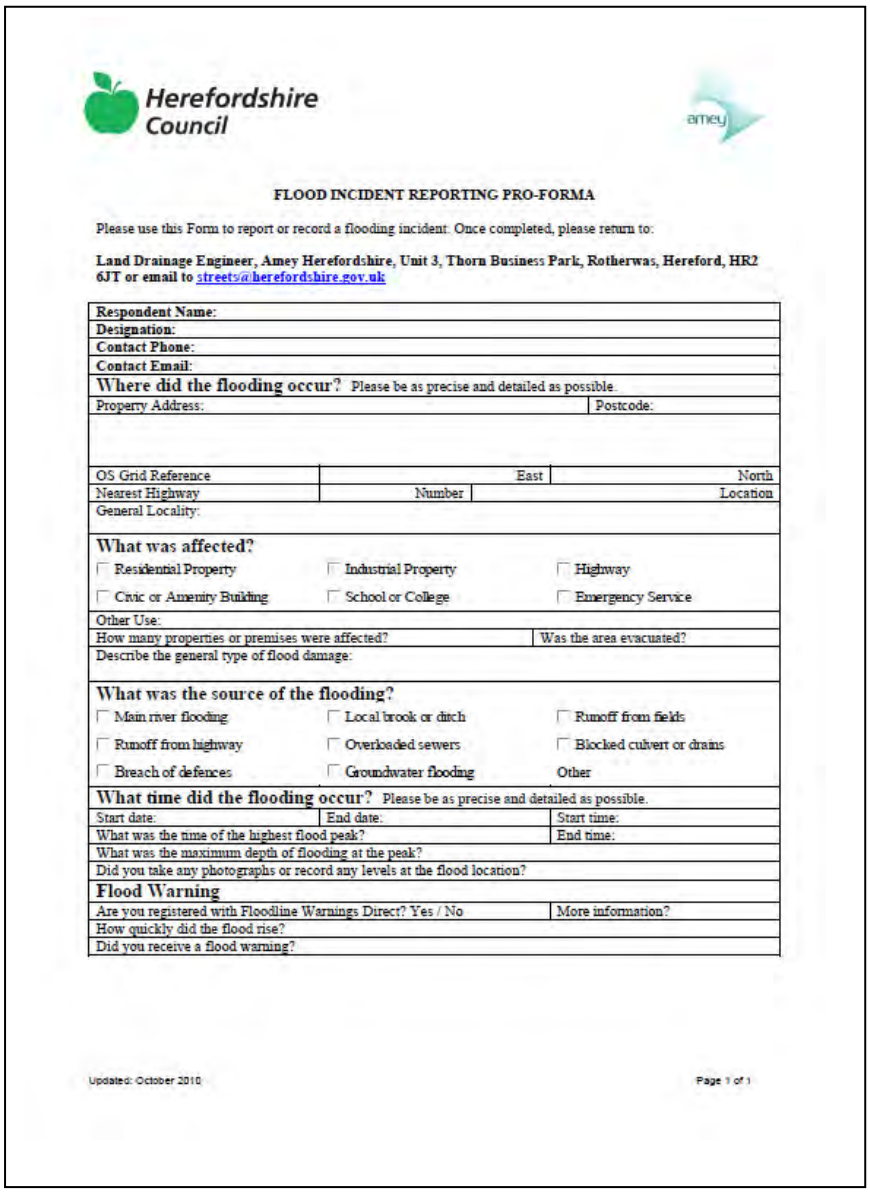
The council's flood events database provided the main source of information on past floods. Quality assurance checks have been carried out on the archive of past floods, in order to exclude inaccurate or incomplete records. This was found to contain many entries for events with only partial information included and many with numerous fields marked as "unknown". Often the source of flooding was unattributed and frequently the location was too imprecise to be able to be included in the analysis. Of the 158 entries, around 40 were excluded on the grounds of these limitations. This has improved the quality and reliability of our information on past floods, helping to better inform our response to future floods.

Further analysis of the remaining records revealed that many could be aggregated into common events that appear related to the same flooding episode. This process helped consolidate the 118 remaining entries down to 14 identified flood event dates. These are summarised in Section 4.3 below.

3.4 Data Management Systems

The process of collecting and consolidating information and records on past floods has allowed the flood event and data storage system established by the council to be reviewed. This will allow the existing Herefordshire Council database to be modified, to ensure consistency with the PFRA reporting template set out by the EA in Annex 1 to this Preliminary Assessment Report. Mandatory fields within the PFRA reporting template are included as well as some of the additional fields that are likely to be required in the future.

A Flood Incident Reporting Pro-forma has been produced by Herefordshire Council, reproduced in Table 3.1.



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FLOOD INCIDENT REPORTING PRO-FORMA

Please use this Form to report or record a flooding incident. Once completed, please return to:

Land Drainage Engineer, Amey Herefordshire, Unit 3, Thorn Business Park, Rotherwas, Hereford, HR2 6JT or email to streets@herefordshire.gov.uk

Respondent Name:		
Designation:		
Contact Phone:		
Contact Email:		
Where did the flooding occur? Please be as precise and detailed as possible.		
Property Address:		Postcode:
OS Grid Reference	East	North
Nearest Highway	Number	Location
General Locality:		
What was affected?		
☐ Residential Property	☐ Industrial Property	☐ Highway
☐ Civic or Amenity Building	☐ School or College	☐ Emergency Service
Other Use:		
How many properties or premises were affected?		Was the area evacuated?
Describe the general type of flood damage:		
What was the source of the flooding?		
☐ Main river flooding	☐ Local brook or ditch	☐ Runoff from fields
☐ Runoff from highway	☐ Overloaded sewers	☐ Blocked culvert or drains
☐ Breach of defences	☐ Groundwater flooding	Other
What time did the flooding occur? Please be as precise and detailed as possible.		
Start date:	End date:	Start time:
What was the time of the highest flood peak?		End time:
What was the maximum depth of flooding at the peak?		
Did you take any photographs or record any levels at the flood location?		
Flood Warning		
Are you registered with Floodline Warnings Direct? Yes / No		More information?
How quickly did the flood rise?		
Did you receive a flood warning?		

Updated: October 2010

Page 1 of 1

Table 3.1: Herefordshire Council Flood Incident Pro-Forma

This will ensure all the required information on flood events is captured in the future, recorded in the correct format for direct input to future PFRA reviews. This will greatly simplify and make for a more efficient means of submitting the required information on past floods. It will also ensure all local flood events are captured and assessed. This system will be shared both right across the various council departments and within the Herefordshire Flood Risk Management Partnership, enabling interchange of data and the recording of all flood events, regardless of responsibility or source. At its heart is the agreement for sharing data and information and recording flood event information in a consistent and complete manner, providing an invaluable archive of quality assured flood records.

Information from the sewer flooding register maintained by the water companies has not as yet been added or used in the PFRA. This will be considered as local issues are investigated as part of the Local Flood Risk Management Strategy to be progressed later in the year.

4. Past Flood Risk

4.1 Introduction

This section summarises the relevant information collected and analysed on past floods within the county from local flood sources. This has been derived from the records described in Section 3 above and is presented in the required format in Annex 1 of this report.

The Flood Risk Regulations refer to past floods which had "significant harmful consequences". However, while "significant" has been defined in terms of national risk used to identify Flood Risk Areas, there is no such definition in terms of past floods from local sources. The guidance leaves this for individual LLFAs to determine as circumstances and approaches vary.

4.2 Significant Harmful Consequences

The information provided by the EA shows there are numerous "blue squares" across Herefordshire where flood risk from surface water in any 1km^2 grid square exceeds the nationally defined thresholds. However, the subsequent clustering process described in the Defra/WAG Guidance results in there being no Flood Risk Areas within Herefordshire.

Whilst there may not be any areas of *nationally* significant flood risk, there are many areas where *local* flood risk has been an issue in the past and remains a risk in the future. The PFRA analysis has therefore been carried out focussing on these areas, utilising the JBA Consulting "Flood Risk Metrics" (JFrism) GIS tools to replicate the national analysis and to consider remaining areas across the county.

In considering thresholds for local flood risk across Herefordshire, emphasis has been placed upon ensuring the PFRA process is used to also inform and provide a consistent basis and foundation for the forthcoming Local Flood Risk Management Strategy. There are efficiencies to be gained from dovetailing the two processes and ensuring one consistent approach. This will also avoid any unnecessary duplication of effort.

Consequently the approach adopted for the PFRA reflects this integrated approach. The information requested in the Herefordshire Council "Flood Incident Reporting Pro-forma" shown in Table 3.1 provides a consistent and comprehensive template that helps populate the spreadsheet included in Annex 1. This will help capture the important information for all future flood events and form the basis for *all* future flood event recording. The information can then be transferred to a single archive database system, to provide a comprehensive data source for future PFRA revisions. Comprehensive flood records will also inform and help the development and ongoing maintenance of the Local Flood Risk Management Strategy.

Flooding is a traumatic, damaging and potentially life threatening event. Flood events will vary in scale according to the extent and intensity of the rainfall. Whilst the major events will capture the media headlines, smaller events are also important to understand as these could be pointers and an early alarm of problems with the drainage infrastructure, such as asset condition, blocked or collapsing culverts etc.

Information on all past flood events has been scrutinised and assessed. Unreliable or incomplete records have been omitted, to ensure the archive contains the best available information and to provide increased confidence in the record of past floods.

4.3 Past Flood Events

The list of past flood events and details of associated consequences is presented in Annex 1.

From the many individual entries contained in the original database, an archive of 14 distinct flood events has been prepared dating back to 1965. For each event, details have been provided of the source, location and extent of the flooding. For each event, the human health, economic, environmental and cultural heritage impacts and consequences are detailed where known.

These events record flooding that, for the most part, was caused by natural exceedance from either excessive surface water runoff, or from ordinary watercourse flooding often in combination with flooding from main rivers. The events were generally short lived (around one day) as is characteristic with surface water flooding, although periods of river flooding lasted longer.

Some of the most notable events are listed below in Table 4-1, with the July 2007 floods as the most extensive and damaging.

Date	Location	No. Of Residential Properties Affected	Source of Flooding
Dec 1979	North West Herefordshire	18	Ordinary Watercourse
Jan 1986	Eardisland	42	Ordinary Watercourse
Oct 1998	County-wide	70	Main River and Ordinary Watercourse
Aug 2006	Ross-on-Wye	20	Main River
July 2007	County-wide	309	Main River, Ordinary Watercourse ad Surface Water

Table 4-1: Notable Past Flood Events in Herefordshire

Further details of these and other past floods and their consequences are summarised in Table 4-2 below and contained in Annex 1 in full. In compiling this record, full reference was made to the Herefordshire SFRA, to ensure consistency and completeness.

The SFRA has also researched and listed the main or notable flood events across the county. However, most of these relate to flood events on main rivers, in particular the River Wye and the tributary Rivers Lugg and Teme and have therefore been excluded from this assessment. However there are some events affecting ordinary watercourses, such as the River Arrow at Titley Mill, Eardisland in January 1986. Widespread surface water flooding also occurred across the county during the July 2007 floods although often in conjunction with main river flooding as well.

Date	Flood Details	Consequences
19/01/1965	Details surrounding event are limited. 6 properties located along Millbrook lane were flooded due to fluvial discharge from the Mill Brook.	6 residential properties.
26/12/1979	Details of the event are limited however it is understood that an extreme rainfall event continued for a number of days, causing flooding across the county. Increased levels of surface water runoff combined with fluvial discharge, surcharging drains and groundwater to cause flooding to at least 18 properties and various roads, mainly affecting the villages of Peterchurch and Pontrilas in the south and Canon Pyon, Eardisland, Eardisley and Richards Castle located in the North west of the County. Wellington Brook and River Arrow named as sources of flood.	18 residential properties; road flooding to C1033, A4111/U90633 and B4361.
05/06/1985	Details surrounding event are limited. 2 properties flooded due to discharge from Cage Brook combined with increased surface water runoff and poor drainage.	2 residential properties.
10/01/1986	Details of the event are limited, however it is understood that fluvial discharge from the River Arrow combined with surface water runoff to cause flooding to 42 properties in the Eardisland, Hentland and Pembridge areas. The village of Eardisland is located on the natural flood plain of the River Arrow.	42 residential properties; road flooding to the U93012.
19/05/1986	Details of the event are limited. It is understood that fluvial discharge from the River Wye caused flooding to 1 property located in the village of Hoarwithy. A tributary of the River Wye, Wriggles Brook flows past the property called the Old Mill. This may in fact be the cause of flooding.	1 residential property.
28/12/1994	Event details are limited. Flooding of 3 properties and numerous roads due to main river discharge (River Wye) as well as increased surface water runoff which caused storm and surface water drains to backflow.	3 residential properties; road flooding to the A49, U82323/U82345 and A438.
08/04/1998	On the 08th of April 1998 heavy rain caused flooding to the centre of Ledbury and neighbouring Bosbury. Several roads were closed, although it is not clear for how long. Flooding occurred as a result of increased surface water runoff which exceeded the drainage capacity in some places and also fluvial flooding due to the River Leadon overtopping its banks. Numerous other villages affected, including Wellington, Withington Marsh, Bodenham and Moreton Camp.	3 residential properties; road flooding to the B4220, C1152 and C1308.
28/10/1998	Details surrounding the event are limited however during October 1998 a number of rainfall events occurred in close succession. Soil moisture deficits were greatly reduced as a result of these events, with the continued rain causing river levels to rise also. It is known that on the 28/10/1998 the River Wye reached its peak and overtopped its banks. Flood incident reports have been obtained which state that the centre of Hereford was flooded at this time, as well as properties in the village of Stapleton. The village of Stapleton reported to have been flooded by the River Lugg, a tributary of the River Wye.	70 residential properties; 2 non-residential properties; road flooding to the C1004.
16/01/1999	Details surrounding flood event are limited. It is understood that on the 16th January 1999 flooding occurred in the area of Hoarwithy Road, affecting 1 property and the road itself. Flooding originated from Withy Brook as well as surface water runoff and groundwater.	1 residential property; road flooding to Hoarwithy Road.

14/02/2000	Details surrounding this event are limited. It is understood that Ashburton Industrial Estate located in Ross on Wye suffered from fluvial flooding originating from the Rudhall Brook on the 14th of February 2000. There were no reports of residential flooding however a number of non residential, business units were affected within the Industrial Estate.	An unknown number of non-residential business units located on Ashburton Industrial Estate.
08/12/2000	Details surrounding this event are limited however on this date there was widespread flooding throughout the south of the UK due to an intense storm. Within Herefordshire, the areas of Peterchurch and Ross on Wye were affected.	7 residential properties; 1 non-residential property.
23/08/2006	Details surrounding this event are limited however it is understood that a very heavy storm event took place on the 23rd August 2006 which was the cause of flooding to Brookend Street located in Ross on Wye. 20 properties are thought to have flooded during this event. News reports indicated that a number of businesses also flooded however this is not clear from the information in the flood reports.	20 residential properties.
20/07/2007	The period between May and July of 2007 is reported to have been the wettest since records began, with a number of heavy rainfall events occurring in close succession. On the 20th of July an active frontal system moved across southern England, bringing with it heavy rainfall which inundated the already saturated ground. River networks were overloaded and overtopping occurred from various main rivers and ordinary watercourses which combined with extremely high levels of surface water runoff and groundwater, resulting in drainage systems to back up and flooding to occur throughout the County of Herefordshire.	309 residential properties; 4 Primary Schools; 16 non-residential properties; 1 Caravan Park.
20/07/2010	Details surrounding this flood event are limited. On the 20th of July 2010, Moor Brook exceeded its capacity and overtopped its banks which caused flooding to 2 roads and 1 property. Land drainage capacities were also exceeded.	1 residential property; road flooding to the U93001 and U93003.

Table 4-2: Summary of Past Flood Events

5. Future Flood Risk

5.1 Introduction

This section of the report summarises all relevant information on future floods and provides an essential foundation for informing future flood risk strategies across the county.

The national guidance issued by Defra and WAG sets out the criteria used for defining significant flood risk and the Flood Risk Areas. In developing the methodology for assessing flood risk, threshold levels were defined for the key Flood Risk Indicators as follows:

- Number of People > 200,
- Non-Residential Properties > 20,
- Critical Infrastructure > 1

This process resulted in maps of 'Hotspots' or places above the thresholds, defined where 1 km grid squares meet the significance level set for at least one of the key Flood Risk Indicators shown above. These Hotspots are shown in Figure 5.1 for Herefordshire.

Where 5 or more "hotspots" are touching within a $3km^2$ roving grid, they are deemed to form a cluster. Where the number of people at risk within a cluster is greater than 30,000 in England, this has then been classed as an "indicative Flood Risk Area". Ten such indicative FRAs have been so defined in England and eight in Wales (see Figure 1.1). The criteria in Wales are set at lower levels of 5000 people within clusters formed where 4 or more blue squares touch. This reflects the extensive rural nature and lower population density in Wales.

No indicative Flood Risk Areas have been identified for the County of Herefordshire; however local future flood risk must still be assessed as part of the PFRA process.

Some differences have been observed between the nationally supplied data shown in Figure 3.1 and that of the data recalculated for the purposes of this PFRA in Figure 5.1. These arise primarily due to the version of the National Receptor Dataset (NRD) used. At the time that the national calculations were completed, NRD Version 1.0 was the most up to date. However, since this time, Version 1.1 has been released which includes a greater amount of properties within it, along with a more accurate representation of building classification. The number of properties affected by surface water flooding has therefore naturally increased.

In addition to this, the Environment Agency classification of critical infrastructure specified that the following building types should be removed from the data before analysis begins:

- Electricity Sub Station,
- Sewage Filtration,
- Sewage Outfall,
- Sewage Pump House,
- Sewage Recycling,
- Sewage Storage,
- Sewage Treatment.

This was discussed with Amey Herefordshire and it was decided that these features are of local importance and should remain and be counted as part of the critical infrastructure. The outcome will prove important when considering local strategies as well as in preparing and responding to flood emergencies.

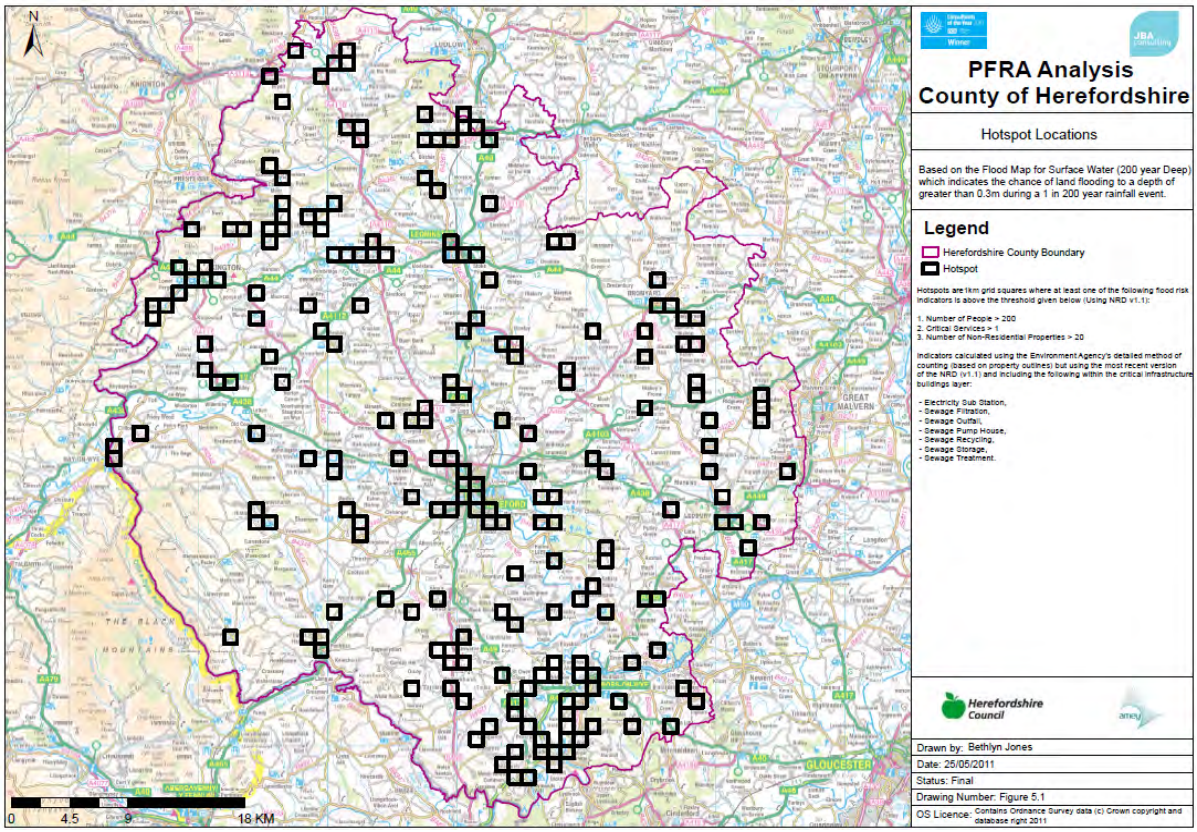


Figure 5.1 Hotspot Locations within Herefordshire

5.2 Locally Agreed Surface Water Information

In order to determine the 'locally agreed surface water information', known areas of surface water flooding and local knowledge have been considered and comparisons made with the surface water flood maps available.

Whilst these maps are indicative and are not for determining individual property risks, it was concluded that the more recent FMfSW map provides the most detailed and informative picture of risk. This has therefore been used in the analysis of future flood risk as the locally agreed surface water information. However the AStSWF map will also be retained and considered in future flood risk assessments as well, in particular as it is deemed to provide a more accurate representation of risk in the flat, low-lying areas such as the River Lugg IDB floodplain areas.

5.3 Future Floods and Consequences

Annex 2 has been completed after a thorough analysis of future flood risk. It contains extensive details of future flood risk, possible adverse consequences and impacts across Herefordshire.

Future flood risk has been assessed predominantly using NRD data (version 1.1), supplied to JBA Consulting by Herefordshire Council. To replicate the nationally provided data, flood risk indicators have been calculated using building outlines where appropriate. To derive the number of people at risk of flooding within a given area, building outline counts were then multiplied by a factor of 2.34, which is the nationally agreed average occupancy per household.

Flood risk indicators have then been assessed using "JFrism" for each of the principal sources of mapped flood risk information, in particular for surface water flood risk. Table 5-1 summarises information in Annex 2 and shows the key flood risk indicators and the counts derived for both the Areas Susceptible to Surface Water Flooding (1st Generation Surface Water Map - AStSWF) and the Flood Map for Surface Water Flooding (2nd Generation Surface Water Map) - FMfSW).

Flood Outline	Residential Properties at Flood Risk	No. of People at Flood Risk	Critical Infrastructure at Flood Risk	Non Residential Properties at Flood Risk
ASTSWF - Less	12,800	30,000	500	10,400
ASTSWF - Intermediate	5,700	13,300	300	5,400
ASTSWF - More	900	2,100	100	1,000
FMFSW - 30 year	6,400	15,000	300	7,900
FMFSW - 30 year Deep	1,800	4,200	100	2,700
FMFSW - 200 year	14,200	33,200	500	13,200
***FMFSW - 200 year Deep**	**4,400**	**10,300**	**200**	**5,100**
ASTGWF	-	-	-	-
Flood Zone 3	6,100	14,300	300	4,600
Flood Zone 2	8,200	19,200	300	5,800

Table 5-1: Assessment of Key Flood Risk Indicators

*Locally agreed surface water information - rounded to nearest 100

As Table 5-1 illustrates, the key flood risk indicators have also been assessed in respect of the Areas Susceptible to Groundwater Flooding map (AStGWF). However this information is both very broad scale and only really addresses locations of alluvial drift. It is known that there are very few instances of groundwater flooding and that these are in general also associated with areas of surface water flooding. It is therefore important to note that the results that have to be reported in Annex 2 provide an unreliable and inaccurate picture, reporting incorrectly in excess of 150,000 people are apparently at risk. This is nearly the entire population of the county and therefore clearly incorrect. Consequently it is recommended these counts are not taken forward in any future assessment until more detailed local assessments are available.

The assessment of future flood risk was also extended to include the EA main river Flood Zones 2 and 3. These were considered to help the understanding of any interactions that may take place between local flood sources of risk and main river. However the EA is responsible for main river assessments rather than the LLFA, so this has not been considered further other than to determine possible interactions.

This detailed analysis has been derived using JBA Consulting's bespoke analytical GIS software (JFRiSM). This powerful graphical analysis tool has allowed a comprehensive study of the risk facing people, properties and critical infrastructure across Herefordshire. The exposure of these and other vulnerable receptors to a range of local flood sources has been assessed on a 1km grid square basis across the entire county, also allowing for in depth analysis and interrogation of the data.

As has been stated, the PFRA stage of the Regulations has also been used to provide the basis for a flood assessment for the local strategy. Whilst national thresholds have been established for the key flood risk indicators to define significance (see Section 5.1 above), LLFAs are encouraged to consider the *full* range of local flood risk across their area in addition to any areas of "significant risk". In view of the flooding issues across the county, a

further set of thresholds for residential properties - and therefore people - at risk of surface water flooding has been established. This provides additional categories of "low", "medium" and "high" risk below that of "significant". In this way, the scale of risk and consequence can be assessed and prioritised in an inclusive way right across Herefordshire.

CATEGORY	NUMBER OF PEOPLE	NUMBER OF PROPERTIES
LOW RISK	>1 – 20 people	1 - 9 properties
MEDIUM RISK	21-99 people	10 - 42 properties
HIGH RISK	100-199 people	43 - 85 properties
SIGNIFICANT RISK	>200 people	>85 properties

Table 5-2: Categories of Flood Risk for Local Assessment

Using these locally applied thresholds, it is possible to analyse and produce an extensive suite of maps, to illustrate a range of flood sources affecting different indicators. Furthermore, these can be presented at any scale and on a Parish, Ward or County-wide basis. This will be of value in taking the management of flood risk forward in preparing the local strategy.

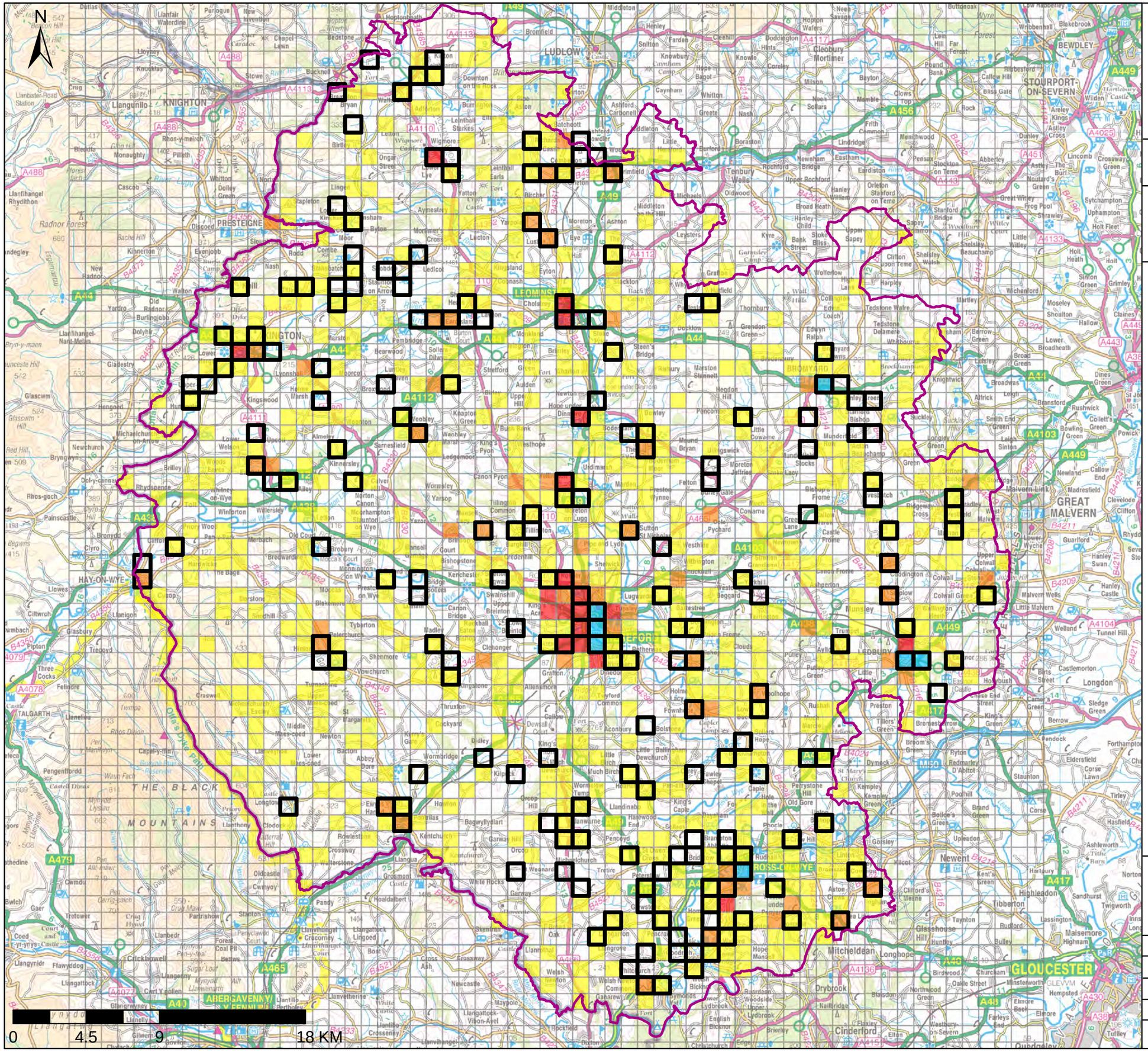
Figures 5.2 to 5.5 illustrate the range of maps produced as part of the PFRA process, using the Flood Map for Surface Water 200 year Deep scenario.

Figure 5.2 (Residential Properties at Risk of Surface Water Flooding), identifies that there is significant risk of surface water flooding to residential properties located within Hereford City as well as the market towns of Ledbury, Ross-on-Wye and Bromyard. Bromyard is in fact at greatest risk of surface water flooding, with 197 residential properties at risk within a single kilometre grid square. The greatest risk to non-residential properties is however located within Ledbury, (Figure 5.3), with significant risk of surface water flooding again perceived within Hereford City, Ross-on-Wye and Bromyard; as well as Leominster and Kington.

Figure 5.4 shows a fairly even distribution of critical infrastructure sites at risk of surface water flooding throughout the county. The grid square containing the greatest number of critical infrastructure features at risk is located in the north-east of Herefordshire where a number of communication masts are focussed within 1 km grid square. Greater details of the infrastructure thought to be at risk are included in Annex 2. This provides the basis to verify the actual features at risk in more detail and undertake a ground survey exercise to confirm and manage these risks. The resulting information can then be used to inform the Herefordshire Multi-agency Flood Plan and any protective works necessary to reduce the risk.

On a Ward basis, Figure 5.5 shows that Ledbury, Bromyard, Three Elms, Aylestone and St. Martins & Hinton Wards are all deemed to be at significant risk of surface water flooding to residential properties. Detailed analysis is possible for any Ward or Parish: for example within the Ledbury Ward, there are 331 residential properties at flood risk, with 217 of these properties concentrated within the centre, around the Ledbury Park area.

The range of maps and analyses possible illustrate how flood risk can be assessed and represented at differing scales across the county. Such localised assessment will be helpful when developing the Local Flood Risk Management Strategy and managing the risks identified.



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PFRA Analysis
County of Herefordshire

Residential Buildings At Risk Of Surface Water Flooding

Based on the Flood Map for Surface Water (200 year Deep) which indicates the chance of land flooding to a depth of greater than 0.3m during a 1 in 200 year rainfall event.

Legend

- Herefordshire County Boundary
- Hotspot

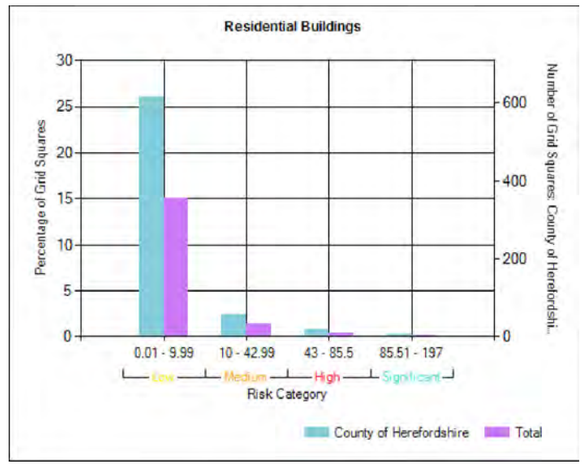
Human Health:
Residential Buildings

- None
- Low Risk (0.01 - 9.99)
- Medium Risk (10 - 42.99)
- High Risk (43 - 85.5)
- Significant(85.51 - 197)

Hotspots are1km grid squares where at least one of the following flood risk indicators is above the threshold given below:

1. Number of People > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EnvironmentAgency's detailed method of counting (based on property outlines).



Herefordshire Council

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Date: 25/05/2011

Status: Final

Drawing Number: Figure 5.2

PFRA Analysis
County of Herefordshire

Non Residential Buildings At Risk Of Surface Water Flooding

Based on the Flood Map for Surface Water (200 year Deep) which indicates the chance of land flooding to a depth of greater than 0.3m during a 1 in 200 year rainfall event.

Legend

- Herefordshire County Boundary
- Hotspot

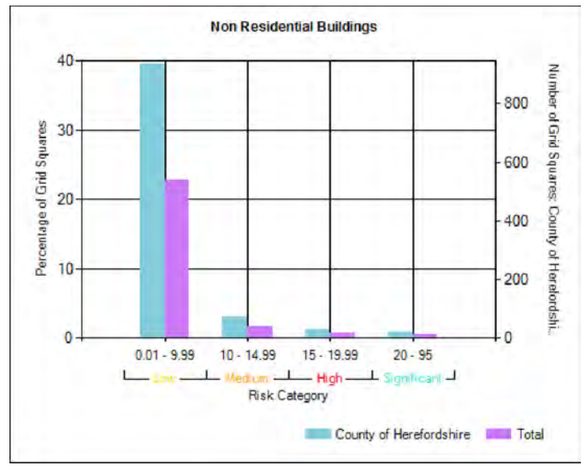
Economic:
Non Residential Buildings

- None
- Low Risk (0.01 - 9.99)
- Medium Risk (10 - 14.99)
- High Risk (15 - 19.99)
- Significant(20 - 95)

Hotspots are1km grid squares where at least one of the following flood risk indicators is above the threshold given below:

1. Number of People > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EnvironmentAgency's detailed method of counting (based on property outlines).



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Status:	Final
Drawing Number:	Figure 5.3
OS Licence:	Contains Ordnance Survey data (c) Crown copyright and database right 2011

0 4.5 9 18 KM

PFRA Analysis
County of Herefordshire

Critical Infrastructure At Risk Of Surface Water Flooding

Based on the Flood Map for Surface Water (200 year Deep) which indicates the chance of land flooding to a depth of greater than 0.3m during a 1 in 200 year rainfall event.

Legend

- Herefordshire County Boundary
- Hotspot

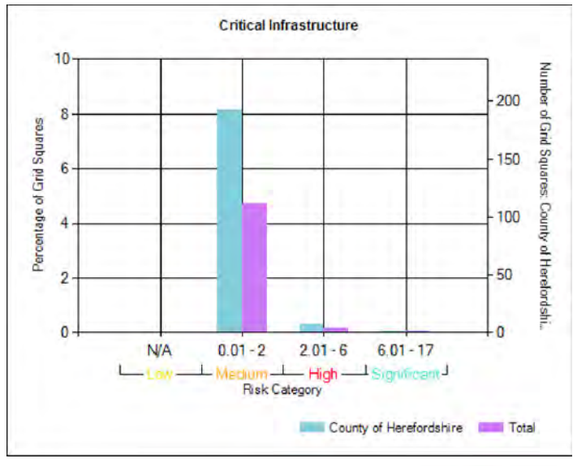
Human Health:
Critical Infrastructure

- None
- Low Risk (0.01 - 0.97)
- Medium Risk (0.98)
- High Risk (0.99)
- Significant(1 - 17)

Hotspots are1km grid squares where at least one of the following flood risk indicators is above the threshold given below:

1. Number of People > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EnvironmentAgency's detailed method of counting (based on property outlines).



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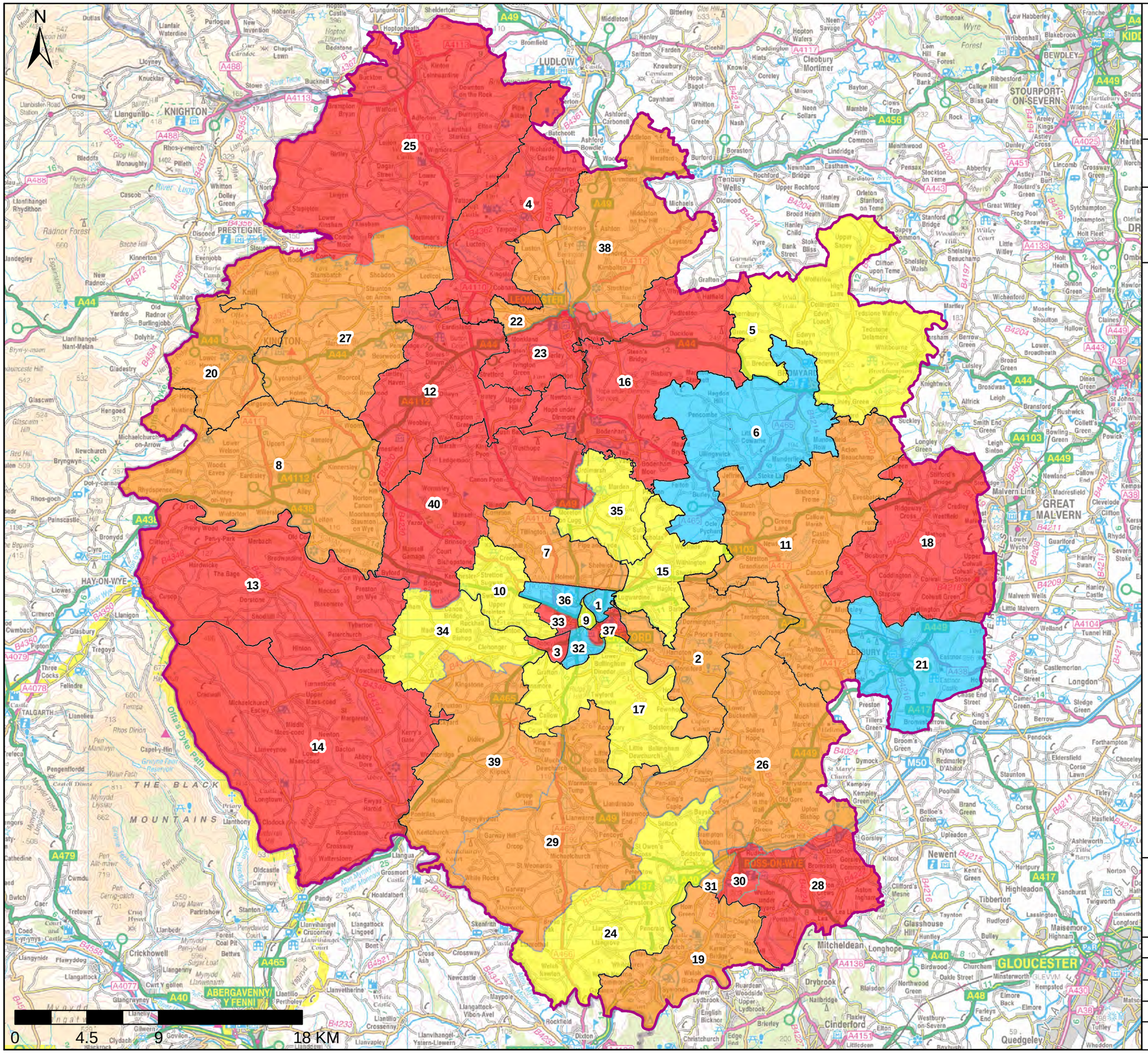

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PFRA Analysis
County of Herefordshire

Residential Buildings At Risk Of Surface Water Flooding

Based on the Flood Map for Surface Water (200 year Deep) which indicates the chance of land flooding to a depth of greater than 0.3m during a 1 in 200 year rainfall event.

Legend

- Herefordshire County Boundary
- Ward Boundaries

Human Health:
Residential Buildings at Risk of Surface Water Flooding

- None
- 0.01 - 49.99
- 50 - 99.99
- 100 - 199.99
- 200 - 331

Indicators calculated using the EnvironmentAgency's detailed method of counting (based on property outlines).

ID Number	Ward	ID Number	Ward
1	Aylestone	21	Ledbury
2	Backbury	22	Leominster North
3	Belmont	23	Leominster South
4	Bircher	24	Llangarron
5	Bringsty	25	Mortimer
6	Bromyard	26	Old Gore
7	Burghill, Holmer & Lyde	27	Pembridge & Lyonshall with Titley
8	Castle	28	Penyard
9	Central	29	Pontrilas
10	Credenhill	30	Ross-on-Wye East
11	Frome	31	Ross-on-Wye West
12	Golden Cross with Weobley	32	St. Martins & Hinton
13	Golden Valley North	33	St. Nicholas
14	Golden Valley South	34	Stoney Street
15	Hagley	35	Sutton Walls
16	Hampton Court	36	Three Elms
17	Hollington	37	Tupsley
18	Hope End	38	Upton
19	Kerne Bridge	39	Valletts
20	Kington Town	40	Wormsley Ridge

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Date: 25/05/2011

Status: Final

Drawing Number: Figure 5.5

5.4 The Impacts of Climate Change

The Evidence

There is clear scientific evidence that global climate change is happening now. It cannot be ignored.

Over the past century around the UK we have seen sea level rise and more of our winter rain falling in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation however the broad trends are in line with projections from climate models.

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

We have enough confidence in large scale climate models to say that we must plan for change. There is more uncertainty at a local scale but model results can still help us plan to adapt. For example we understand rain storms may become more intense, even if we can't be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could increase locally by 40%.

Key Projections for Severn River Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s relative to the recent past are:

- Winter precipitation increases of around 12% (very likely to be between 2 and 26%)
- Precipitation on the wettest day in winter up by around 9% (very unlikely to be more than 22%)
- Relative sea level at Bristol very likely to be up between 10 and 40cm from 1990 levels (not including extra potential rises from polar ice sheet loss)
- Peak river flows in a typical catchment likely to increase between 9 and 18%

Increases in rain are projected to be greater at the coast and in the south of the district.

Implications for Flood Risk

Climate change can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability.

Wetter winters and more of this rain falling in wet spells may increase river flooding along the Severn and its tributaries. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected.

Drainage systems in the district have been modified to manage water levels and could help in adapting locally to some impacts of future climate on flooding, but may also need to be managed differently. Rising sea or river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

Where appropriate, we need local studies to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help us adapt to climate change and manage the risk of damaging floods in future.

Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can prepare by understanding our current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is key to achieving long-term, sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions against deeper uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

5.5 Significant Local Developments

It is possible that long term developments might affect the occurrence and significance of flooding. However current planning policy aims to prevent new development from increasing flood risk. There are therefore important links between the Herefordshire SFRA and this PFRA, with additional abilities to now analyse and identify areas of local flood risk on a consistent basis across the county.

In England, Planning Policy Statement 25 (PPS25) on development and flood risk aims to "ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

Adherence to Government policy ensures that new development does not increase local flood risk. Herefordshire Council has no plans to approve development that will contribute to flood risk and the SFRA was commissioned specifically to help achieve this objective, by steering future development away from flood prone areas. However, it is recognised that in exceptional circumstances the Local Planning Authority may accept that flood risk can be increased contrary to Government policy, usually because of the wider benefits of a new or proposed major development. Any exceptions would not be expected to increase risk to levels which are "significant" (in terms of the Government's criteria).

6. Identification of Flood Risk Areas

6.1 Indicative Flood Risk Areas

As has been explained, no indicative FRAs have been defined by applying the national guidance in Herefordshire.

6.2 New Flood Risk Areas

Herefordshire is a largely rural county with one of the lowest population densities in England. It is therefore no surprise that Herefordshire falls a long way short of the FRA threshold.

It could be argued that the national approach adopted in Wales might be more appropriate given the rural nature of the county. However, no amendments or proposed changes to the indicative Flood Risk Areas are recommended as a result of this PFRA analysis.

As a result, Annex 3 has not been required.

7. Next Steps

7.1 Review

This Preliminary Assessment Report forms a part of the PFRA process that addresses the requirements defined by the Flood Risk Regulations. These place a duty for LLFAs to assess both the impacts of past floods and the consequences of future floods. They are also required to identify whether flood risk is significant, by applying national guidance to define Flood Risk Areas. For these areas, there are further duties to prepare Flood Hazard and Risk Maps by 2013 which in turn inform the Flood Risk Management Plans that will be required by 2015.

Herefordshire Council's Environment Scrutiny Committee was consulted during the preparation of this PFRA. They agreed that the indicative assessment of flood risk in Herefordshire was not amended and also supported the preparation of the PFRA in accordance with the Guidance provided to all Lead Local Flood Authorities by Defra. This PFRA has been developed with advice from members of the Herefordshire Flood Risk Management Partnership, as well as from members of an internal officers working group, prior to being laid before the lead Cabinet Member for final approval ahead of the EA's deadline of 22nd June 2011.

The EA is required to review, collate and publish all PFRA submissions, in time to meet the 22nd December 2011 deadline for final submission to the European Commission. LLFAs will also publish PFRAs on their websites in accordance with the requirements of the EC Inspire Directive.

While Herefordshire Council has no requirements under the Regulations to undertake Flood Hazard and Risk Mapping, or the subsequent Flood Risk Management Plans, it will review the PFRA again in 2016 as part of the 6 yearly cycle of flood risk planning.

7.2 Local Flood Risk Management Strategy

In preparing the PFRA, the opportunity has been taken to establish the foundations for preparing the Local Flood Risk Management Strategy for Herefordshire. This will commence later this year under duties contained in the Flood & Water Management Act 2010.

Detailed analysis of local flood risk across the county has been undertaken as part of this study and is now available to inform and communicate the issues and priorities to help prepare the future strategy. The JBA Consulting GIS software tools have allowed the completion of the PFRA and provided the means to analyse and clearly display the risk from a range of different flood sources on a Parish, Ward or entire County basis.

The PFRA process has also helped strengthen and underline the importance of partnership working between the risk management authorities and the need for sharing information through the Herefordshire Flood Risk Management Partnership. A comprehensive archive of past floods has been compiled and a database structure now exists to record the mandatory information necessary for documenting all future flood events. This will be of benefit and greatly simplify the PFRA review process due in 6 years time.

The details of critical infrastructure and properties at risk of flooding will also help inform the Herefordshire Multi-Agency Flood Plan (MFP) and assist in emergency planning and response.

The PFRA analysis will be used to inform the Local Flood Risk Management Strategy that will be developed over the next year.

Appendices

A.1 - Records of past floods and their significant consequences (Preliminary Assessment Report spreadsheet)

ANNEX 1: Records of past floods and their significant consequences (preliminary assessment report spreadsheet)

Field:		Flood ID	Summary description	Name of Location	National Grid Reference	Location Description	Start date	Days duration	Probability	Main source of flooding	Additional source(s) of flooding	Confidence in main source of flooding	Main mechanism of flooding	Main characteristic of flooding	Significant consequences to human health	Human health consequences - residential properties	Property count method	Other human health consequences
Mandatory / optional:		Mandatory	Mandatory	Mandatory	Mandatory	Optional	Optional for first cycle	Optional for first cycle	Optional for first cycle	Optional for first cycle	Optional	Optional	Optional for first cycle	Optional for first cycle	Mandatory	Optional	Optional	Optional
Format:		Unique number between 1-9999	Max 5,000 characters	Max 250 characters	12 characters: 2 letters, 10 numbers	Max 250 characters	'yyyy' or 'yyyy-mm' or 'yyyy-mm-dd'	Number with two decimal places	Max 25 characters	Pick from drop-down	Max 250 characters, same source terms	Pick from drop-down	Pick from drop-down	Pick from drop-down	Pick from drop-down	Number between 1-10,000	Pick from drop-down	Max 250 characters
Notes:		A sequential number starting at 1 and incrementing by 1 for each record.	Description of the flood and its adverse or potentially adverse consequences. Where available, information from other fields (Start date, Days duration, Probability, Main source, Main mechanism, Main characteristics, Significant consequences) should be repeated here.	Name of the locality associated with the flood, using recognised postal address names such as streets, towns, counties. If the flood affected the whole LLFA, then record the name of the LLFA.	National Grid Reference of the centroid (centre point, falls within polygon) of the flood extent, or of the area affected if there is no extent information.	A description of the general location that was flooded.	The date when the flood commenced - when land not normally covered by water became covered by water.	The number of days (duration) of the flood - that land not normally covered by water was covered by water. Values should be within the range 0.01 - 999.99 (permitting records to the nearest quarter of an hour, where appropriate).	The chance of the flood occuring in any given year - record X from "a 1 in X chance of occurring in any given year". Where this is difficult to estimate, a range can be recorded.	Pick the source from which the majority of flooding occurred. Refer to the PFRA guidance for definitions of sources.	If flooding occurred from, or interacted with, any other sources (other than the Main source of flooding), report the source(s) here, using the same source terms.	Pick a broad level of confidence in the Main source of flooding from; 'High' (compelling evidence of source - about 80% confident that source is correct), 'Medium' (some evidence of source but not compelling - about 50% confident that source is correct) 'Low' (source assumed - about 20% confident that source is correct) or 'Unknown'.	Pick a mechanism from; 'Natural exceedance' (of capacity), 'Defence exceedance' (floodwater overtopping defences), 'Failure' (of natural or artificial defences or infrastructure, or of pumping), 'Blockage or restriction' (natural or artificial blockage or restriction of a conveyance channel or system), or 'No data'.	Pick a characteristic from; 'Flash flood' (rises and falls quite rapidly with little or no advance warning), 'Natural flood' (due to significant precipitation, at a slower rate than a flash flood), 'Snow melt flood' (due to rapid snow melt), 'Debris flow' (conveying a high degree of debris), or 'No data'. Most UK floods are 'Natural floods'.	Were there any significant consequences to human health when the flood occurred, or would there be if it were to re-occur?	Record the number of residential properties where the building structure was affected either internally or externally by the flood, or that would be so affected if the flood were to re-occur.	Where residential or non-residential properties have been counted, it is important to record the method of counting, to aid comparisons between counts. Choose from; 'Detailed GIS' (using property outlines, as per Environment Agency guidance), 'Simple GIS' (using property points), 'Estimate from map', or 'Observed number'.	If there were other Significant consequences to human health, describe them including information such as the number of critical services flooded.
Example:	1		On the 14 April 1998 an intense storm system produced surface water flooding across Essex, concentrated in the west of the county. The flooding lasted about 6 hours, and 23 residential properties were recorded as suffering internal flooding, in Epping and North Weald. The surface runoff exceeded the drainage capacity in several places, and so probably had a 1 in 30 to 1 in 50 chance of occuring in any given year.	Essex	SX1234512345	Several towns and villages across west Essex	1998-04-15	0.25	20-50	Surface runoff		High	Natural exceedance	Natural flood	Yes	23	Observed number	
Records begin here:	1		Details surrounding event are limited. 6 properties located along Millbrook lane were flooded due to fluvial discharge from the Mill Brook.	Orleton	SO4899767000	Centrered around Orleton village	19/01/1965	1		Main rivers	Surface Water and Ground Water	Unknown	Natural exceedance	Natural flood	Yes	6	Observed number	
	2		Details of the event are limited however it is understood that an extreme rainfall event continued for a number of days, causing flooding across the county. Increased levels of surface water run off combined with fluvial discharge, surcharging drains and groundwater to cause flooding to at least 18 properties and various roads, mainly affecting the villages of Canon Pyon, Eardisland, Eardisley and Richards Castle located in the North west of the County. Wellington Brook and River Arrow named as sources of flood.	Canon Pyon, Eardisland, Eardisley and Richards Castle.	SO4181558670	North West Herefordshire	26/12/1979	3		Ordinary watercourses	Main Rivers, Surface Water and Ground Water		Natural exceedance	Natural flood	Yes	18	Observed number	
	3		Details surrounding event are limited. 2 properties flooded due to discharge from Cage Brook combined with increased surface water runoff and poor drainage.	Kingstone	SO6350024500	Barrow Common, Kingstone	05/06/1985	1		Surface runoff	Ground water		Natural exceedance	Natural flood	Yes	2	Observed number	
	4		Details of the event are limited, however it is understood that fluvial discharge from the River Arrow combined with surface water runoff to cause flooding to 42 properties in the Eardisland, Hentland and Pembridge areas. The village of Eardisland is located on the natural flood plain of the River Arrow.	Eardisland, Kington and Pembridge	SO3765058605	Centered on the village of Eardisland	10/01/1986	1		Ordinary watercourse	Main rivers, Surface Water run-off		Natural exceedance	Natural flood	Yes	42	Observed number	
	5		Details of the event are limited. It is understood that fluvial discharge from the River Wye caused flooding to 1 property located in the village of Hoarwithy. A tributary of the River Wye, Wriggles Brook flows past the property called the Old Mill. This may infact be the cause of flooding.	Hentland	SO5445029200	Centered around Hoarwithy	19/05/1986	1		Surface runoff	Land drainage		Natural exceedance	Natural flood	Yes	1	Observed number	
	6		Event details are limited. Flooding of 3 properties and numerous roads due to main river discharge (River Wye) as well as increased surface water runoff which caused storm and surface water drains to backflow.	Hereford City	SO5320538590	The towns of Letton and Preston on Wye, as well as the Hereford city road	28/12/1994	1		Main rivers	Surface Water		Natural exceedance	Natural flood	Yes	3	Observed number	
	7		On the 08th of April 1998 heavy rain caused flooding to the centre of Ledbury and neighbouring Bosbury. Several roads were closed, although it is not clear for how long. Flooding occured as a result of increased surface water runoff which exceeded the drainage capacity in some places and also fluvial flooding due to the River Leadon overtopping its banks.	Ledbury and Bosbury	SO7050037500	Centred on the town of Leadbury and village of Bosbury	08/04/1998	1		Main rivers	Surface Water and Ground Water		Natural exceedance	Natural flood	Yes	3	Observed number	
	8		Details surrounding the event are limited however during October 1998 a number of rainfall events occured in close succession. Soil moisture deficits were greatly reduced as a result of these events, with the continued rain causing river levels to rise also. It is known that on the 28/10/1998 the River Wye reached its peak and overtopped its banks. Flood incident reports have been obtained which state that the centre of Hereford was flooded at this time, as well as properties in the village of Stapleton. The village of Stapleton reported to have been flooded by the River Lugg, a tributary of the River Wye.	Hereford City, Stapleton, Ewyas Harold, Leintwardine and Lower Bullingham.	SO5320538590	Centered on the city of Hereford, the village of Ewyas Harold, Stapleton, Lower Bullingham and Leintwardine also affected by this flood event.	28/10/1998	1		Main rivers	Ordinary Watercourses, Surface Water and Ground Water		Natural exceedance	Natural flood	Yes	70	Observed number	
	9		Details surrounding flood event are limited. It is understood that on the 16th January 1999 flooding occured in the area of Hoarwithy Road, affecting 1 property and the road itself. Flooding originated from Withy Brook as well as surface water run off and groundwater.	Hereford City	SO5320538590	Hoarwithy Road	16/01/1999	1		Ordinary watercourses	Surface and Ground Water		Natural exceedance	Natural flood	Yes	1	Observed number	
	10		Details surrounding this event are limited. It is understood that Ashburton Industrial Estate located in Ross on Wye suffered from fluvial flooding originating from the Rudhall Brook on the 14th of February 2000. There were no reports of residential flooding however a number of non residential, business units were affected within the Industrial Estate.	Ross on Wye	SO6000024004	Ashburton Industrial Estate	14/02/2000	1		Ordinary watercourses	Rudhall Brook		Natural exceedance	Natural flood	No			
	11		Details surrounding this event are limited. It is understood that Ashburton Industrial Estate located in Ross on Wye suffered from fluvial flooding originating from the Rudhall Brook on the 14th of February 2000. There were no reports of residential flooding however a number of non residential, business units were affected within the Industrial Estate.	Ross on Wye	SO6000024004	Ashburton Industrial Estate	14/02/2000	1		Ordinary watercourses	Rudhall Brook		Natural exceedance	Natural flood	No			
	12		Details surrounding this event are limited however on this date there was widespread flooding throughout the south of the UK due to an intense storm. Within Herefordshire, the areas of Peterchurch and Ross on Wye were affected.	Peterchurch and Ross on Wye	SO6000024004	Church Lane in Peterchurch, Mill Pond Lane and Station Street in Ross on Wye.	08/12/2000	1		Ordinary watercourses			Natural exceedance	Natural flood	Yes	7	Observed number	
	13		Details surrounding this event are limited however it is understood that a very heavy storm event took place on the 23rd August 2006 which was the cause of flooding to Brookend Street located in Ross on Wye. 20 properties are thought to have flooded during this event. News reports indicated that a number of businesses also flooded however this is not clear from the information in the flood reports.	Ross on Wye	SO6000024004	Brookend Street	23/08/2006	1		Main rivers			Natural exceedance	Natural flood	Yes	20	Observed number	
	14		The period between May and July of 2007 is reported to have been the wettest since records began, with a number of heavy rainfall events occuring in close succession. On the 20th of July an active frontal system moved across southern England, bringing with it heavy rainfall which inundated the already saturated ground. River networks were overloaded and overtopping occured from various main rivers and ordinary watercourses which combined with extremely high levels of surface water runoff and groundwater, resulting in drainage systems to back up and flooding to occur throughout the County of Herefordshire.	Various towns and villages throughout the County of Herefordshire.	SO5320538590	Centred on the County of Herefordshire	20/07/2007	1		Main rivers	Ordinary Watercourses, Surface Water, Groundwater and Land Drainage Issues	High	Natural exceedance	Natural flood	Yes	309	Observed number	At least 4 Primary Schools reported to have flooded including Holmer and Ledbury Primary Schools.
	15		Details surrounding this flood event are limited. On the 20th of July 2010, Moor Brook exceeded its capacity and overtopped its banks which caused flooding to 2 roads and 1 property. Land drainage capacities were also exceeded.	Monkland	SO4499857000	Centred on the village of Monkland	20/07/2010	1		Ordinary watercourses	Land drainage		Natural exceedance	Natural flood	Yes	1	Observed number	

Significant economic consequences	Number of non-residential properties flooded	Property count method	Other economic consequences	Significant consequences to the environment	Environment consequences	Significant consequences to cultural heritage	Cultural heritage consequences	Comments	Data owner	Area flooded	Flood event outline confidence	Flood event outline source	Survey date	Photo ID	Lineage	Sensitive data	Protective marking descriptor	European Flood Event Code
Mandatory Pick from drop-down Were there any significant economic consequences when the flood occurred, or would there be if it were to re-occur?	Optional Number between 1-10,000,000 Record the number of non-residential properties where the building structure was affected either internally or externally by the flood, or that would be so affected if the flood were to re-occur.	Optional Pick from drop-down Where residential or non-residential properties have been counted, it is important to record the method of counting, to aid comparisons between counts. Choose from; 'Detailed GIS' (using property outlines, as per Environment Agency guidance), 'Simple GIS' (using property points), 'Estimate from map', or 'Observed number'.	Optional Max 250 characters If there were other Significant economic consequences, describe them including information such as the area of agricultural land flooded, length of roads and rail flooded.	**Mandatory** Pick from drop-down Were there any significant consequences to the environment when the flood occurred, or would there be if it were to re-occur?	Optional Max 250 characters If there were Significant consequences to the environment, describe them including information such as national and international designated sites flooded, and pollution sources flooded.	**Mandatory** Pick from drop-down Were there any significant consequences to cultural heritage when the flood occurred, or would there be if it were to re-occur?	Optional Max 250 characters If there were Significant consequences to cultural heritage, describe them including information such as the number and type of heritage assets flooded.	Optional Max 1,000 characters Any additional comments about the past flood record.	Optional Max 250 characters	Optional Number with two decimal places The total area of the land flooded, in km^2	Optional Pick from drop-down Choose from; 'High' (data includes one of: Aerial video, Aerial photos, Professional survey, Flood level information, EA flood data recording staff notes), 'Medium' (data includes one of: EA/LA ground video, EA/LA ground photos, EA/LA flood event outline map, LA/professional partner officer site records, Public ground video), 'Low' (not confident) or 'Unknown'	Optional Pick from drop-down	Optional 'yyyy' or 'yyyy-mm' or 'yyyy-mm-dd'	Optional Max 50 characters Provide references to relevant specific photographs, or to a set of relevant photographs. It may not be practical to reference all relevant photographs for each flood event.	Optional Max 250 characters Lineage is how and what the data is made from. Has this data been created by using data owned or derived from data owned by 3rd party (external) organisations? If yes please give details.	Optional Pick from drop-down Has the information been classified under the Government's Protective Marking Scheme? Include protective marking time limit where known. Note: If "Approved for Access" then report "Unmarked".	Optional Max 50 characters For use where organisations apply the Government's Protective Marking Scheme.	Auto-populated Max 42 characters This field will autopopulate using the LLFA name provided on the "Instructions" tab, and the Flood ID. It is an EU-wide unique identifier and will be used to report the flood information. Format: UK<ONS Code><P or F><LLFA Flood ID>. "ONS Code" is a unique reference for each LLFA. "P or F" indicates if the event is past or future. "LLFA Flood ID" is a sequential number beginning with 0001.
No				No		No			Epping Forest District Council		Medium	Site survey	1998-04-20		Ordnance Survey AddressPoint; CEH 1:50k River Centreline; NextMap DTM.	Unmarked	Private	UKE10000012P0001
No				No	Unknown	No	Unknown	Source - Mill brook affecting properties in Millbrook Way	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0001
Yes			The C1033 (105), A4111(210) / U90633 and B4361 flooded.	No	Unknown	No	Unknown	Flooding originating from the Wellington Brook, the River Arrow and as a result of inadequate land drainage.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0002
				No	Unknown	No	Unknown	Source Cage Brook, land drainage	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0003
Yes			U93012 School Lane Surface drains	No	Unknown	No	Unknown	Source of main river flooding River Arrow	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0004
No				No	Unknown	No	Unknown	1 Cottage flooded.	Herefordshire Council		Unknown	Unknown				Unknown		
Yes			Major/minor roads, A49, U82323/U82345 and A438 Flooded	No	Unknown	No	Unknown	Main source of flooding from the River Wye as welll as storm sewers and	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0006
Yes			B4220 105 and C1152 305 Flooded as well as the C1308 in Ledbury.	No	Unknown	No	Unknown	Cause of flooding is River Leadon and its affects on the surface water drains.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0007
Yes	2	Observed number	The Village store in Ewyas Harold, the Lion Hotel in Leintwardine and the Black Lion PH in Hereford City. C1004 also flooded.	No	Unknown	No	Unknown	Main source of flooding the River Wye, River Lugg and River Clun as well as the Red Brook and Dulas Brooks	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0008
Yes			Hoarwithy Road	No	Unknown	No	Unknown	Source of flooding identified as Withy Brook	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0009
Yes			A number of business units affected on the Ashburton Industrial Estate.	No	Unknown	No	Unknown	Main source of flooding from the Rudhall Brook.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0010
Yes			A number of business units affected on the Ashburton Industrial Estate.	No	Unknown	No	Unknown	Main source of flooding from the Rudhall Brook.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0011
Yes	1	Observed number	Safeway (possibly now Sommerfield) located along Station Road.	No	Unknown	No	Unknown	Main sources of flooding, the River Dore in Peterchurch and Redhull Brook in Ross on Wye.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0012
No				No	Unknown	No	Unknown	20 properties located along Brook Street flooded in 2006/07 from the Wye or from Rudhall Brook?	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0013
Yes	16	Observed number	A number of main and minor roads flooded throughout the County. 1 report of a Public House and also a Caravan Park (Linton Caravan Park). Various Business units	Yes	2 sewage pumping stations flooded which could have caused flood water to become contaminated.	Yes	1 Listed building (Builth House known to have flooded)	This was an extreme flood event. Flooding occured via various main rivers and ordinary watercourses such as The Rivers Wye, Arrow, Lugg and Frome to name a few.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0014
Yes			U93001 & U93003 roads flooded	No	Unknown	No	Unknown	Moor Brook flooded and land drains were exceeded.	Herefordshire Council		Unknown	Unknown				Unknown		UKE06000019P0015

A.2 - Records of future floods and their consequences (Preliminary Assessment Report spreadsheet)

ANNEX 2: Records of future floods and their consequences (preliminary assessment report spreadsheet)

Field:	Flood ID	Description of assessment method	Name of Location	National Grid Reference	Location Description	Name	Flood modelled	Probability	Main source of flooding	Additional source(s) flooding	of Confidence in main source of flooding	Main mechanism of flooding	Main characteristic of flooding	Adverse consequences to human health	Human health consequences - residential properties	Property count method	Other human health consequences
Mandatory / optional:	**Mandatory**	**Mandatory**	**Mandatory**	**Mandatory**	Optional	Optional	Optional	**Mandatory**	**Mandatory**	Optional	Optional	**Mandatory**	**Mandatory**	**Mandatory**	Optional	Optional	Optional
Format:	Unique number between 1-9999	Max 1,000 characters	Max 250 characters	12 characters: 2 letters, 10 numbers	Max 250 characters	Max 250 characters	Max 250 characters	Max 25 characters	Pick from drop-down	Max 250 characters, same source terms	Pick from drop-down	Pick from drop-down	Pick from drop-down	Pick from drop-down	Number between 1-10,000,000	Pick from drop-down	Max 250 characters
Notes:	A sequential number starting at 1 and incrementing by 1 for each record.	Description of the future flood information and how it has been produced. Cover Regulation 12(6) requirements of (a) topography, (b) the location of watercourses, (c) the location of flood plains that retain flood water, (d) the characteristics of watercourses, and (e) the effectiveness of any works constructed for the purpose of flood risk management. Information from other relevant fields (Probability, Main source, Name) should be repeated here.	Name of the locality associated with the flood, using recognised postal address names such as streets, towns, counties. If the flood affects the whole LLFA, then record the name of the LLFA.	National Grid Reference of the centroid (centre point, falls within polygon) of the flood extent, or of the area affected if there is no extent information. If the flood affects the whole LLFA, then record the centroid of the LLFA.	A description of the general location that could be flooded.	Name of the model or map product or project which produced the future flood information	Background, or additional information on the probability of the flood modelled - such as whether Probability refers to probability of rainfall or water on the ground.	The chance of the flood occuring in any given year - record X from "a 1 in X chance of occurring in any given year".	Pick the source which generates the majority of flooding. Refer to the PFRA guidance for definitions of sources.	If the flood is generated by, or interacts with, any other sources (other than the Main source of flooding), report the source(s) here, using the same source terms.	Pick a broad level of confidence in the Main source of flooding from; 'High' (compelling evidence of source - about 80% confident that source is correct), 'Medium' (some evidence of source but not compelling - about 50% confident that source is correct) 'Low' (source assumed - about 20% confident that source is correct) or 'Unknown'.	Pick a mechanism from; 'Natural exceedance' (of capacity), 'Defence exceedance' (floodwater overtopping defences), 'Failure' (of natural or artificial defences or infrastructure, or of pumping), 'Blockage or restriction' (natural or artificial blockage or restriction of a conveyance channel or system), or 'No data'.	Pick a characteristic from; 'Flash flood' (rises and falls quite rapidly with little or no advance warning), 'Natural flood' (due to significant precipitation, at a slower rate than a flash flood), 'Snow melt flood' (due to rapid snow melt), 'Debris flow' (conveying a high degree of debris), or 'No data'. Most UK floods are 'Natural floods'.	Would there be any significant consequences to human health if the future flood were to occur?	Record the number of residential properties where the building structure would be affected either internally or externally if the flood were to occur.	Where residential or non-residential properties have been counted, it is important to record the method of counting, to aid comparisons between counts. Choose from; 'Detailed GIS' (using property outlines, as per Environment Agency guidance), 'Simple GIS' (using property points), 'Estimate from map', or 'Observed number'.	If there would be other Significant consequences to human health, describe them including information such as the number of critical services flooded.
Example:	1	See records below for examples of description of assessment method.	Essex	SX1234512345		Flood Map for Surface Water - 1 in 200 deep	Probability refers to the probability of the rainfall event, in this case producing flooding of greater than 0.3m depth.	200	Surface runoff		High	Natural exceedance	Natural flood	Yes	12000	Detailed GIS	
Records begin here:	1	• Topography is derived from LIDAR (in larger urban areas, on 1, 2 and 3m grids; original accuracy ± 0.15m) and Geoperspective data (original accuracy ± 1.5m), processed to remove buildings and vegetation, then degraded to a composite 5m DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; no allowance made for manmade drainage. The DTM may miss flow paths below bridges. • Areas that may flood are defined by dynamically routing a 6.5 hour duration storm with 1 in 200 chance of occurring in any year, over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 is used throughout, to allow broad scale effects of buildings and other obstructions to be approximated. • No allowance made for drainage, pumping or other works constructed for the purpose of flood risk management. • The 'less susceptible' layer shows where modelled flooding is 0.1-0.3m deep; you must not interpret this as depth of flooding, rather as indicative of susceptibility to flooding because of modelling uncertainties.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kington Goodrich and Ross on Wye suffering from clusters of flooding also.	Areas Susceptible to Surface Water Flooding (AStSWF) - Less	Probability refers to the probability of the rainfall event. This identifies areas which are 'less susceptible' to surface water flooding. For more information refer to "What are Areas Susceptible to Surface Water Flooding" Environment Agency December 2010.	200	Surface runoff		High	Natural exceedance	Natural flood	Yes	12800	Detailed GIS	500 Critical Infrastructure buildings, including: 1 Ambulance Station and Hospital within Central Ward as well as 1 Ambulance and 1 Fire Station in Ledbury Ward. Additional Fire Stations located in Bircher and Kerne Bridge Wards and Ambulance Stations located in Leominster South and Ross on Wye East Wards. 1 Hospital located in Central Wards, 3 buildings relating to Police Services, 25 Schools, 124 Electricity Sub Stations/Electricity Generating sites, 46 Sewage, 42 Telecommunication, 5 Water and over 200 Pumping Station sites throughout Herefordshire.
	2	• Topography is derived from LIDAR (in larger urban areas, on 1, 2 and 3m grids; original accuracy ± 0.15m) and Geoperspective data (original accuracy ± 1.5m), processed to remove buildings and vegetation, then degraded to a composite 5m DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; no allowance made for manmade drainage. The DTM may miss flow paths below bridges. • Areas that may flood are defined by dynamically routing a 6.5 hour duration storm with 1 in 200 chance of occurring in any year, over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 is used throughout, to allow broad scale effects of buildings and other obstructions to be approximated. • No allowance made for drainage, pumping or other works constructed for the purpose of flood risk management. • The 'intermediate susceptibility' layer shows where modelled flooding is 0.3-1.0m deep; you must not interpret this as depth of flooding, rather as indicative of susceptibility to flooding because of modelling uncertainties.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kington Goodrich and Ross on Wye suffering from clusters of flooding also.	Areas Susceptible to Surface Water Flooding (AStSWF) - Intermediate	Probability refers to the probability of the rainfall event. This identifies areas with 'intermediate susceptibility' to surface water flooding.	200	Surface runoff		High	Natural exceedance	Natural flood	Yes	5700	Detailed GIS	300 critical infrastructure buildings affected including: 3 Ambulance Stations and 2 Fire Stations, 2 buildings relating to Police Services, 7 Schools, 62 Electricity Sub Stations/Electricity Generating sites, 38 Sewage, 28 Telecommunication, 7 Telephone Exchange, 4 Water regulating, 4 Water Distributing, 1 Water Settling site, 127 Pumping Stations/Pump Houses throughout Herefordshire.
	3	• Topography is derived from LIDAR (in larger urban areas, on 1, 2 and 3m grids; original accuracy ± 0.15m) and Geoperspective data (original accuracy ± 1.5m), processed to remove buildings and vegetation, then degraded to a composite 5m DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; no allowance made for manmade drainage. The DTM may miss flow paths below bridges. • Areas that may flood are defined by dynamically routing a 6.5 hour duration storm with 1 in 200 chance of occurring in any year, over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 is used throughout, to allow broad scale effects of buildings and other obstructions to be approximated. • No allowance made for drainage, pumping or other works constructed for the purpose of flood risk management. • The 'more susceptible' layer shows where modelled flooding is >1.0m deep; you must not interpret this as depth of flooding, rather as indicative of susceptibility to flooding because of modelling uncertainties.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kington Goodrich and Ross on Wye suffering from clusters of flooding also.	Areas Susceptible to Surface Water Flooding (AStSWF) - More	Probability refers to the probability of the rainfall event. This identifies areas which are 'more susceptible' to surface water flooding.	200	Surface runoff		High	Natural exceedance	Natural flood	Yes	900	Detailed GIS	100 critical infrastructure buildings affected including: 1 building relating to Police Services located in St Nicholas Ward, 1 School and 1 Fire Station both located in Kerne bridge Ward, 3 Electricity Sub Stations, 10 Sewage Pumping/Treatment sites, 4 Telecommunications/Telephone Exchanges, 2 Water Distribution, 1 Water Regulation, 1 Water Settling site and 37 Pumping Station sites throughout Herefordshire.

Adverse economic consequences	Number of non-residential properties flooded	Property count method	Other economic consequences	Adverse consequences to the environment	Environment consequences	Adverse consequences to cultural heritage	Cultural heritage consequences	Comments	Data owner	Area flooded	Confidence in modelled outline	Model date	Model Type	Hydrology Type	Lineage	Sensitive data	Protective marking descriptor	European Flood Event Code
Mandatory Pick from drop-down Would there be any significant economic consequences if the future flood were to occur?	Optional Number between 1-10,000,000 Record the number of non-residential properties where the building structure would be affected either internally or externally if the flood were to occur.	Optional Pick from drop-down Where residential or non-residential properties have been counted, it is important to record the method of counting, to aid comparisons between counts. Choose from; 'Detailed GIS' (using property outlines, as per Environment Agency guidance), 'Simple GIS' (using property points), 'Estimate from map', or 'Observed number'.	Optional Max 250 characters If there would be other Significant economic consequences, describe them including information such as the area of agricultural land flooded, length of roads and rail flooded.	Mandatory Pick from drop-down Would there be any significant consequences to the environment if the future flood were to occur?	Optional Max 250 characters If there would be Significant consequences to the environment, describe them including information such as national and international designated sites flooded, and pollution sources flooded.	Mandatory Pick from drop-down Would there be any significant consequences to cultural heritage if the future flood were to occur?	Optional Max 250 characters If there would be Significant consequences to cultural heritage, describe them including information such as the number and type of heritage assets flooded.	Optional Max 1,000 characters Any additional comments about the future flood record.	Optional Max 250 characters	Optional Number with two decimal places The total area of the land flooded, in km^2	Optional Pick from drop-down Pick a broad level of confidence in the modelled flood outline from; 'High' (good match to past flood extents - about 80% confident that outline is correct), 'Medium' (reasonable match - about 50% confident that outline is correct), 'Low' (poor match, sparse data - about 20% confident that outline is correct) or 'Unknown'.	Optional 'yyyy' or 'yyyy-mm' or 'yyyy-mm-dd'	Optional Max 250 characters Type of software used to create future flood information.	Optional Max 250 characters Type of hydrology method used to create future flood information.	Optional Max 250 characters Lineage is how and what the data is made from. Has this data been created by using data owned or derived from data owned by 3rd party (external) organisations? If yes please give details.	Optional Pick from drop-down Has the information been classified under the Government's Protective Marking Scheme? Include protective marking time limit where known. Note: If "Approved for Access" then report "Unmarked".	Optional Max 50 characters For use where organisations apply the Government's Protective Marking Scheme.	Auto-populated Max 42 characters This field will autopopulate using the LLFA name provided on the "Instructions" tab, and the Flood ID. It is an EU-wide unique identifier and will be used to report the flood information. Format: UK<ONS Code><P or F><LLFA Flood ID>. "ONS Code" is a unique reference for each LLFA. "P or F" indicates if the event is past or future. "LLFA Flood ID" is a sequential number beginning with 0001.
No				No		No			Epping Forest District Council		Medium-Low	2008-08	2D-TuFlow	FEH (Revised Rainfall Runoff)	Ordnance Survey AddressPoint; CEH 1:50k River Centreline; NextMap DTM.	Unmarked	Private	UKE10000012F0001
Yes	10,400	Detailed GIS	18.88 km of railways are expected to flood, along with 547km of roads. Central Ward located at the centre of Herefordshire appears to be the worst affected by road flooding. 256.96 km2 of agricultural land will be flooded, with 14.38km2 of grade 1 and 87.29km2 of grade 2 land included within this.	Yes	8.43km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 25.81km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 3.68km2 of ancient woodland/FENS are flooded as well as 35 IPPC and 43 Waste Licence sites which could cause pollution.	Yes	1300 Listed Buildings affected by flooding with the greatest concentration affected in Ledbury.	• 333 Hotspots (14% of Study Area) • Greatest risk of flooding to the Centre of Hereford City (637 residential properties at risk in Putson and 162 non-residential properties also at risk within a different 1km grid square within the City). • Greatest flood extent in Mortimer Ward (19.5km2) • Greatest percentage cover located in Three Elms Ward (33% or 1.9km2)	JBA Consulting (distributed by Environment Agency under licence)	264.78 km2	High-Medium	2009-07	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 6.5 hr, 1:200 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile.		Unmarked	Commercial	UKE06000019F0001
Yes	5,400	Detailed GIS	10.82 km of railways are expected to flood, along with 274.09km of roads. Central Ward located at the centre of Herefordshire appears to be the worst affected by road flooding. 149.26 km2 of agricultural land will be flooded, with 8.35km2 of grade 1 and 45.82km2 of grade 2 land included within this.	Yes	6.84km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 16.85km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 1.94km2 of ancient woodland/FENS are flooded as well as 20 IPPC sites and 35 Waste Licence sites which could cause pollution.	Yes	700 Listed Buildings affected by flooding with the greatest concentration affected in the village of Wellington.	• 222 Hotspots (9.4% of Study Area) • Greatest risk of flooding to the Centre of Hereford City (292 residential and 162 non-residential properties at risk within 1 grid square). • Greatest flood extent in Mortimer Ward (11.9km2) • Greatest percentage cover located in Three Elms Ward (19.1% or 1.1km2)	JBA Consulting (distributed by Environment Agency under licence)	153.93km2	High-Medium	2009-07	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 6.5 hr, 1:200 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile.		Unmarked	Commercial	UKE06000019F0002
Yes	1,000	Detailed GIS	1.32 km of railways are expected to flood, along with 49.89km of roads. Central Ward located at the centre of Herefordshire appears to be the worst affected by road flooding. 34.84 km2 of agricultural land will be flooded, with 1.39km2 of grade 1 and 10.33km2 of grade 2 land included within this.	Yes	3.32km2 of internationally designated sites which tend to follow the courses of the River Wye and the upper River Lugg. 5.14km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 0.66km2 of ancient woodland/FENS are flooded throughout the area as well as 3 IPPC sites and 13 Waste Licence sites which could cause pollution.	Yes	200 Listed Buildings greatest concentration affected in the village of Wellington.	• 62 Hotspots (2.6% of Study Area) • Greatest risk of flooding to Ross-on-Wye (89 residential and 69 non-residential properties at risk within 1 grid square. • Greatest flood extent in Mortimer Ward (3km2 or 1.9%) • Greatest percentage cover located in St Nicholas Ward (5.7% or 0.15km2)	JBA Consulting (distributed by Environment Agency under licence)	36.27km2	High-Medium	2009-07	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 6.5 hr, 1:200 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile.		Unmarked	Commercial	UKE06000019F0003

4	• Topography is derived from 64.5% LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m) and 35.5% NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation, then combined on a 2m grid; buildings added with an arbitrary height of 5m based on OS MasterMap 2009 building footprints, then resampled to a 5m grid DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; a uniform allowance of 12mm/hr has been made for manmade drainage in urban areas. Infiltration allowance reduces runoff to 39% in rural areas and 70% in urban areas. • Areas that may flood are defined by dynamically routing a 1.1 hour duration storm with 1 in 30 chance of occurring in any year over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 in rural areas; 0.03 in urban areas, to reflect explicit modelling of buildings in urban areas. • No allowance made for local variations in drainage, pumping or other works constructed for the purpose of flood risk management. • The '>0.1m' layer shows where modelled flooding is greater than 0.1m deep.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kingtton Goodrich and Ross on Wye suffering from clusters of flooding also.	Flood Map for Surface Water (FMfSW) - 1 in 30	Probability refers to the probability of the rainfall event, in this case producing flooding of greater than 0.1m depth.	30	Surface runoff	High	Natural exceedance	Natural flood	Yes	6400	Detailed GIS	300 Critical Infrastructure buildings including: 3 Ambulance Stations, 2 Fire Stations as well as 1 Fire Tower, 2 buildings relating to Police Services, 20 Schools, 32 Electricity Sub Stations/Electricity Generating sites, 1 Gas Regulating, 36 Sewage, 33 Telecommunication, 5 Water Distribution, 5 Water Regulating, 1 Water Settling and 158 Pumping Stations/Pump House sites throughout Herefordshire.
5	• Topography is derived from 64.5% LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m) and 35.5% NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation, then combined on a 2m grid; buildings added with an arbitrary height of 5m based on OS MasterMap 2009 building footprints, then resampled to a 5m grid DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; a uniform allowance of 12mm/hr has been made for manmade drainage in urban areas. Infiltration allowance reduces runoff to 39% in rural areas and 70% in urban areas. • Areas that may flood are defined by dynamically routing a 1.1 hour duration storm with 1 in 30 chance of occurring in any year over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 in rural areas; 0.03 in urban areas, to reflect explicit modelling of buildings in urban areas. • No allowance made for local variations in drainage, pumping or other works constructed for the purpose of flood risk management. • The '>0.3m' layer shows where modelled flooding is greater than 0.3m deep.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kingtton Goodrich and Ross on Wye suffering from clusters of flooding also.	Flood Map for Surface Water (FMfSW) - 1 in 30 deep	Probability refers to the probability of the rainfall event, in this case producing flooding of greater than 0.3m depth.	30	Surface runoff	High	Natural exceedance	Natural flood	Yes	1800	Detailed GIS	100 Critical Infrastructure buildings including:5 Schools, 11 Electricity Sub Stations/Electricity Generating sites, 23 Sewage, 16 Telecommunication, 2 Water Distribution, 4 Water Regulating and 80 Pumping Stations/Pump House sites throughout Herefordshire.
6	• Topography is derived from 64.5% LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m) and 35.5% NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation, then combined on a 2m grid; buildings added with an arbitrary height of 5m based on OS MasterMap 2009 building footprints, then resampled to a 5m grid DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; a uniform allowance of 12mm/hr has been made for manmade drainage in urban areas. Infiltration allowance reduces runoff to 39% in rural areas and 70% in urban areas. • Areas that may flood are defined by dynamically routing a 1.1 hour duration storm with 1 in 200 chance of occurring in any year over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 in rural areas; 0.03 in urban areas, to reflect explicit modelling of buildings in urban areas. • No allowance made for local variations in drainage, pumping or other works constructed for the purpose of flood risk management. • The '>0.1m' layer shows where modelled flooding is greater than 0.1m deep.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kingtton Goodrich and Ross on Wye suffering from clusters of flooding also.	Flood Map for Surface Water (FMfSW) - 1 in 200	Probability refers to the probability of the rainfall event, in this case producing flooding of greater than 0.1m depth.	200	Surface runoff	High	Natural exceedance	Natural flood	Yes	14200	Detailed GIS	500 Critical Infrastructure buildings including: 3 Ambulance Stations, 3 Fire Stations as well as 1 Fire Tower, 2 Hospitals located in Aylestone and Central Wards, 4 buildings relating to Police Services, 41 Schools, 86 Electricity Sub Stations/Electricity Generating sites, 5 Gas Regulating, 41 Sewage, 45 Telecommunication, 2 Retirement Homes, 1 Rest Home, 5 Water Distribution, 6 Water Regulating, 1 Water Settling and 213 Pumping Stations/Pump House sites throughout Herefordshire.
7	• Topography is derived from 64.5% LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m) and 35.5% NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation, then combined on a 2m grid; buildings added with an arbitrary height of 5m based on OS MasterMap 2009 building footprints, then resampled to a 5m grid DTM. Manual edits applied where flow paths clearly omitted e.g. below bridges. • Flow routes dictated by topography; a uniform allowance of 12mm/hr has been made for manmade drainage in urban areas. Infiltration allowance reduces runoff to 39% in rural areas and 70% in urban areas. • Areas that may flood are defined by dynamically routing a 1.1 hour duration storm with 1 in 200 chance of occurring in any year over the DTM using JBA's JFLOW–GPU model. • Manning's n of 0.1 in rural areas; 0.03 in urban areas, to reflect explicit modelling of buildings in urban areas. • No allowance made for local variations in drainage, pumping or other works constructed for the purpose of flood risk management. • The '>0.3m' layer shows where modelled flooding is greater than 0.3m deep.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kingtton Goodrich and Ross on Wye suffering from clusters of flooding also.	Flood Map for Surface Water (FMfSW) - 1 in 200 deep	Probability refers to the probability of the rainfall event, in this case producing flooding of greater than 0.3m depth.	200	Surface runoff	High	Natural exceedance	Natural flood	Yes	4400	Detailed GIS	200 Critical Infrastructure buildings including: 2 Ambulance Stations, 1 Fire Station, 1 building relating to Police Services, 11 Schools, 35 Electricity Sub Stations/Electricity Generating sites, 5 Gas Regulating, 26 Sewage, 29 Telecommunication, 5 Water Distribution, 4 Water Regulating, 1 Rest Home, 1 Water Settling and 129 Pumping Stations/Pump House sites throughout Herefordshire.

Yes	7,900	Detailed GIS	6.14 km of railways are expected to flood, along with 286.19km of roads - distributed fairly evenly throughout the area. 80.66 km2 of agricultural land will be flooded, with 4.79km2 of grade 1 and 30.53km2 of grade 2 land included within this.	Yes	3.98km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 8.55km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 1.68km2 of ancient woodland/FENS are flooded as well as 29 IPPC sites and 28 Waste Licence sites which could cause pollution.	Yes	1100 Listed Buildings affected by flooding with the greatest concentration in the village of Ledbury.	• 280 Hotspots (11.9% of Study Area) • Greatest risk to Bromyard (196 residential and 86 non-residential properties at risk within 1 grid square. • Ledbury, Ross-on-Wye, Leominster and Kington also identified as being at significant risk. • Greatest flood extent in Mortimer Ward (3km2 or 1.9%) • Greatest percentage cover located in Ross-on-Wye East Ward (5.5% or 0.34km2).	Environment Agency	90.11km2	High-Medium	2010-11	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 1.1 hr, 1:30 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile. See "Description of assessment method" for allowances for infiltration and drainage.	Rainfall Hyetograph, EA 2m Composite DTM, OSMM Topography	Unmarked		UKE06000019F0004
Yes	2,700	Detailed GIS	1.66 km of railways are expected to flood, along with 69.86km of roads - distributed fairly evenly throughout the area. 23.33km2 of agricultural land will be flooded, with 1.22km2 of grade 1 and 8.14km2 of grade 2 land included within this.	Yes	1.87km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 2.8km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 0.61km2 of ancient woodland/FENS are flooded as well as 4 IPPC sites and 12 Waste Licence sites which could cause pollution.	Yes	500 Listed Buildings affected by flooding with the greatest concentration in the village of Ledbury.	• 133 Hotspots (5.6% of Study Area) • Greatest risk to Ledbury (86 residential and 62 non-residential properties at risk within 1 grid square). • Greatest clustering of flood extent in Mortimer Ward (2.08km2) • Greatest percentage cover located in Ross-on-Wye East Ward (2.1% or 0.13km2)	Environment Agency	26.94 km2	High-Medium	2010-11	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 1.1 hr, 1:30 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile. See "Description of assessment method" for allowances for infiltration and drainage.	Rainfall Hyetograph, EA 2m Composite DTM, OSMM Topography	Unmarked		UKE06000019F0005
Yes	13,200	Detailed GIS	10.33 km of railways are expected to flood, along with 521.21km of roads - distributed fairly evenly throughout the area. 146.81km2 of agricultural land will be flooded, with 8.94km2 of grade 1 and 54.9km2 of grade 2 land included within this.	Yes	6.37km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 15.01km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 2.74km2 of ancient woodland/FENS are flooded as well as 45 IPPC sites and 39 Waste Licence sites which could cause pollution.	Yes	1700 Listed Buildings affected by flooding with the greatest concentration in the village of Ledbury.	• 390 Hotspots (16.51% of Study Area) • Greatest risk of flooding to the Centre of Hereford (507 residential buildings at risk in 1 single grid square, and 163 non-residential properties at risk within another). • Greatest clustering of flood extent in Mortimer Ward (11.6km2) • Greatest percentage cover located in Three Elms Ward (13.5% or 0.79km2)	Environment Agency	163.56 km2	High-Medium	2010-11	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 1.1 hr, 1:200 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile. See "Description of assessment method" for allowances for infiltration and drainage.	Rainfall Hyetograph, EA 2m Composite DTM, OSMM Topography	Unmarked		UKE06000019F0006
Yes	5,100	Detailed GIS	3.23 km of railways are expected to flood, along with 158.21km of roads - distributed fairly evenly throughout the area. 52.43km2 of agricultural land will be flooded, with 2.88km2 of grade 1 and 18.62km2 of grade 2 land included within this.	Yes	4.14km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 6.3km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 1.25km2 of ancient woodland/FENS are flooded as well as 12 IPPC sites and 21 Waste Licence sites which could cause pollution.	Yes	800 Listed Buildings affected by flooding with the greatest concentration in the village of Ledbury.	• 211 Hotspots (8.9% of Study Area) • Greatest risk of residential flooding to Bromyard (197 residential buildings) • Greatest risk of non-residential flooding to Ledbury where 95 properties are at risk. • Greatest flood extent in Mortimer Ward (4.7km2) • Greatest percentage cover located in Belmont Ward (8.9% or 0.13km2)	Environment Agency	60.62 km2	High-Medium	2010-11	JFLOW-GPU	Depth-duration-frequency curves derived from FEH CD-ROM, from centre of each 5km model, with areal reduction factor applied to convert point rainfall estimate to more representative figure. Curve then used to derive 1.1 hr, 1:200 chance rainfall depth; this is converted to hyetograph, using summer rainfall profile. See "Description of assessment method" for allowances for infiltration and drainage.	Rainfall Hyetograph, EA 2m Composite DTM, OSMM Topography	Unmarked		UKE06000019F0007

8	• Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid • This data has used the top two susceptibility bands of the British Geological Society (BGS) 1:50,000 Groundwater Flood Susceptibility Map, which was developed on a 50m grid from: • NEXTMap 5m grid DTM. • National Groundwater Level data on a 50m grid • BGS 1:50 000 geological mapping, with classifications of permeability • It covers consolidated aquifers (chalk, limestone, sandstone etc.) and superficial deposits. • Flood plains are not explicitly identified; the mapping identifies where groundwater is likely to emerge, and not where the water is subsequently likely to flow or pond. • No allowance is made for engineering works, or for groundwater rebound or abstraction to prevent groundwater rebound. • Shows the proportion of each 1km grid square which is susceptible to groundwater emergence, using four area categories.	Herefordshire	SO5112540500	Various villages and towns throughout Herefordshire. The centre of Hereford appears to be the worst affected, with the greatest clustering of hotspots in this area. Areas such as Leominster, Ledbury, Bromyard, Kington Goodrich and Ross on Wye suffering from clusters of flooding also.	Areas Susceptible to Groundwater Flooding (AStGWF) Data developed specifically for PFRA, and is unlikely to be suitable for any other purposes.	Does not describe a probability, but shows places where groundwater emergence more likely to occur.	Unknown	Groundwater		High	Natural exceedance	Natural flood	Yes	69,100	Detailed GIS	1,400 Critical Infrastructure buildings
9	• Modelling developed from combination of national (2004) and local (generally 1998-2010) modelling. • Topography derived from LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m), NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation. For local modelling, topography may include ground survey. • Location of watercourses and tidal flow routes dictated by topographic survey. • Areas that may flood are defined for catchments >3km² by routing appropriate flows for that catchment through the model to ascertain water level and thus depth and extent. • Manning's n of 0.1 used for national fluvial modelling; variable (calibrated) values for national tidal modelling; appropriate values selected for local modelling. Channel capacity assumed as QMED for national fluvial modelling; local survey methods used for local modelling. • For the purpose of flood risk management, models assume that there are no raised defences.	Herefordshire	SO5112540500	Various towns and villages throughout Herefordshire. Predominantly following the course of the River Wye through Hereford centre and south towards Ross on Wye and the River Lugg which flow in a southerly direction through Leominster, confluencing with the River Wye to the South East of Herefordshire.	Flood Map (for rivers and sea) - flood zone 3 Data updated quarterly. To understand the likelihood of future flooding, taking account of defences, refer to Areas Benefitting from Defences and National Flood Risk Assessment (NaFRA) data. Marked 'Protect' for complete national dataset only.	Fluvial 1 in 100, tidal 1 in 200		100	Main rivers	Ordinary watercourses	Medium	Natural exceedance	Natural flood	Yes	6100	Detailed GIS	300 Critical Infrastructure buildings including: 2 Ambulance Stations located in Central and Leominster South Wards, 2 Fire Stations located in Leominster South and Kerne Bridge Wards, 1 Hospital located in Central Ward, 1 building relating to Police Services, 6 Schools, 80 Electricity Sub Stations/Electricity Generating sites, 3 Gas Regulating, 32 Sewage, 29 Telecommunication, 3 Water Distribution, 1 Water Regulating, 1 Water Settling and 94 Pumping Stations/Pump House sites throughout Herefordshire.
10	• Modelling developed from combination of national (2004) and local (generally 2004-2010) modelling. • Topography derived from LIDAR (on 0.25m-2m grids; original accuracy ± 0.15m), NEXTMap SAR (on 5m grid; original accuracy ± 1.0m), processed to remove buildings & vegetation. For local modelling, topography may include ground survey. • Location of watercourses and tidal flow routes dictated by topographic survey. • Areas that may flood are defined for catchments >3km² by routing appropriate flows for that catchment through the model to ascertain water level and thus depth and extent. • Manning's n of 0.1 used for national fluvial modelling; variable (calibrated) values for national tidal modelling; appropriate values selected for local modelling. Channel capacity assumed as QMED for national fluvial modelling; local survey methods used for local modelling. • For the purpose of flood risk management, models assume that there are no raised defences.	Herefordshire	SO5112540500	Various towns and villages throughout Herefordshire. Predominantly following the course of the River Wye through Hereford centre and south towards Ross on Wye and the River Lugg which flow in a southerly direction through Leominster, confluencing with the River Wye to the South East of Herefordshire.	Flood Map (for rivers and sea) - flood zone 2 Data updated quarterly. To understand the likelihood of future flooding, taking account of defences, refer to National Flood Risk Assessment (NaFRA) data. Marked 'Protect' for complete national dataset only.	Extreme flood outline is 1 in 1000, and includes some historic where judged that this gives an indication of areas at risk of future flooding.		1000	Main rivers	Ordinary watercourses	Medium	Natural exceedance	Natural flood	Yes	8200	Detailed GIS	300 Critical Infrastructure buildings including: 2 Ambulance Stations located in Central and Leominster South Wards, 2 Fire Stations located in Leominster South and Kerne Bridge Wards, 1 Hospital located in Central Ward, 4 buildings relating to Police Services, 9 Schools, 104 Electricity Sub Stations/Electricity Generating sites, 3 Gas Regulating, 37 Sewage, 32 Telecommunication, 2 Water Distribution, 1 Water Regulating, 1 Water Settling and 103 Pumping Stations/Pump House sites throughout Herefordshire.

Yes	51,300	Detailed GIS	8.27 km of railways are expected to flood, along with 359.6 km of roads - distributed fairly evenly throughout the area. 1583.9 km2 of agricultural land will be flooded, with 73.2 km2 of grade 1 and 651.6 km2 of grade 2 land included within this.	Yes	30.5 km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 99.15 km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and part of the Lower Wye Valley AONB, located to the south of Hereford. 93.4 km2 of ancient woodland/FENS are flooded as well as 61 IPPC sites and 66 Waste Licence sites which could cause pollution.	Yes	4,800 Listed Buildings affected by flooding with the greatest concentration in the Leominster area.	Data developed specifically for PFRA, and is unlikely to be suitable for any other purposes. • 1073 Hotspots (45% of Study Area) • If grid square poses a potential risk of groundwater flooding all NRD points within are calculated as being at risk, hence the resulting high values entered in the spreadsheet. • Data provides an inaccurate account of risk posed by this flood source.	Environment Agency	1643.9km2	Low	2010-11	ArcGIS	Uses data which is developed from published BGS groundwater level contours, groundwater levels in BGS WellMaster database and some river levels. No probability is associated with this data.	British Geological Society (BGS) DiGMapGB-50 [Susceptibility to Groundwater Flooding].	Unmarked		UKE06000019F0008
Yes	4,600	Detailed GIS	10.02 km of railways are expected to flood, along with 241.31km of roads - distributed fairly evenly throughout the area. 188.24km2 of agricultural land will be flooded, with 9.6km2 of grade 1 and 41.17km2 of grade 2 land included within this.	Yes	10.79km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 23.23km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 1.09km2 of ancient woodland/FENS are flooded as well as 7 IPPC sites and 26 Waste Licence sites which could cause pollution.	Yes	600 Listed Buildings affected by flooding with the greatest concentration in the Leominster area.	Data updated quarterly. To understand the likelihood of future flooding, taking account of defences, refer to Areas Benefitting from Defences and National Flood Risk Assessment (NaFRA) data. Marked 'Protect' for complete national dataset only. • 173 Hotspots (7.3% Study Area) • Greatest risk of residential flooding to Leominster (907 residential buildings) • Greatest risk of non-residential flooding to Hereford City where 170 properties are at risk. • Greatest flood extent in Castle Ward (18.9km2) • Greatest percentage cover located in Leominster Ward (34.9% or 2.5km2)	Environment Agency	194.22km2	Medium	2010-11	Varies but mainly JFLOW, ISIS, HEC-RAS, TUFLOW for fluvial, and HYDROF for tidal.	National methodology described in "National Generalised Modelling for Flood Zones - Fluvial & Tidal Modelling Methods - Methodology, Strengths and Limitations". A national dataset (for England and Wales) of fluvial flood peak estimates was derived from the Flood Estimation Handbook (FEH) to generate a 1 in 100 chance fluvial flood. Local fluvial modelling uses FEH methods. Peak tidal water levels from either Dixon & Tawn (DT3) or local data sets to derive 1 in 200 chance tide levels including surge from POL CSX model.	NextMap SAR DTMe, UKHO Admiralty Charts, 1:50K CEH River Centre Line, CEH FEH Q(T) Grids, POL CSX Peak Extreme Water Levels, POL CS3 Astronomical Tides, UKHO Admiralty Tide Time-Series Calibration Locations, OS 1:10 Boundary Line MHW	Unmarked	Commercial	UKE06000019F0009
Yes	5,800	Detailed GIS	14.18 km of railways are expected to flood, along with 311.15km of roads - distributed fairly evenly throughout the area. 209.52km2 of agricultural land will be flooded, with 11.17km2 of grade 1 and 48.34km2 of grade 2 land included within this.	Yes	10.96km2 of internationally designated sites which tend to follow the courses of the River Wye and the River Lugg. 25.29km2 of nationally designated areas are affected by flooding, including the Malvern Hills AONB to the east of Hereford and the Lower Wye Valley AONB, located to the south of Hereford. 1.26km2 of ancient woodland/FENS are flooded as well as 9 IPPC sites and 28 Waste Licence sites which could cause pollution.	Yes	700 Listed Buildings affected by flooding with the greatest concentration in the Leominster area.	Data updated quarterly. To understand the likelihood of future flooding, taking account of defences, refer to National Flood Risk Assessment (NaFRA) data. Marked 'Protect' for complete national dataset only. • 192 Hotspots (8.13% Study Area) • Greatest risk of flooding to the centre of Hereford City where 1108 residential buildings and 185 non-residential buildings are at risk. • Greatest flood extent in Castle Ward (20.7km2) • Greatest percentage cover located in St Martin's and Hinton Ward (36.7% or 1.4km2)	Environment Agency	216.67km2	Medium	2010-11	Varies but mainly JFLOW, ISIS, HEC-RAS, TUFLOW for fluvial, and HYDROF for tidal.	National methodology described in "National Generalised Modelling for Flood Zones - Fluvial & Tidal Modelling Methods - Methodology, Strengths and Limitations". A national dataset (for England and Wales) of fluvial flood peak estimates was derived from the Flood Estimation Handbook (FEH) to generate a 1 in 1000 chance fluvial flood. Local fluvial modelling uses FEH methods. Peak tidal water levels from either Dixon & Tawn (DT3) or local data sets to derive 1 in 1000 chance tide levels including surge from POL CSX model.	NextMap SAR DTMe, UKHO Admiralty Charts, 1:50K CEH River Centre Line, CEH FEH Q(T) Grids, POL CSX Peak Extreme Water Levels, POL CS3 Astronomical Tides, UKHO Admiralty Tide Time-Series Calibration Locations, OS 1:10 Boundary Line MHW, Historic Flood Map	Unmarked	Commercial	UKE06000019F0010

A.3 - Records of Flood Risk Areas and their rationale (Preliminary Assessment Report spreadsheet)

N/A

A.4 - PFRA Review Checklist

Preliminary Flood Risk Assessment Checklist					
LLFA Name:	**Herefordshire Council**				
	Checklist questions	**Notes for completion**	**LLFA**	**Environment Agency area review**	**Environment Agency national review**
Step 1	**Set up governance and develop partnerships**				
1.1	Have appropriate governance and partnership arrangements been set up?	Refer to section 2.3 of guidance. Governance and partnership arrangements should be to the satisfaction of the LLFA.	Yes		
1.2	Who in the LLFA reviewed the PFRA and when was it done?	Please state the review and approval process and when approval was gained e.g. Officer, Scrutiny Committee, Cabinet. Refer to Section 5 of the guidance.			
Step 2	**Determine appropriate data systems**				
2.1	Has a data management system been established and implemented?	See Annex 5 for information about data standards	Yes		
Step 3	**Collate information on past and future floods and their consequences**				
3.1	Has information been requested from all relevant partners?	See Flood Risk Regulations Part 6 Co-operation.	Yes		
3.2	Are there any gaps in available information? (This could include gaps which could have been filled but weren't, or gaps which couldn't be filled because the information wasn't available)	LLFAs - Are there gaps in certain locations, or for certain events that you are aware of, or for certain sources of flooding (such as groundwater). Respond with Yes/No and provide comments on any missing information. EA Review - Has all available information has been gathered and included?	Yes - some past flood records are incomplete and unreliable and have therefore been excluded		
Step 4	**Determining locally agreed surface water information**				
4.1	Which dataset (or combination of datasets) has been determined as "locally agreed surface water information"?	LLFAs - Select from drop down. Refer to "Locally agreed surface water information" text box in section 3.5.1 (p.17) of guidance. EA review - Has this been agreed?	Flood Map for Surface Water		
4.2	Has the locally agreed surface water information been clearly stated and presented (on a map) in the Preliminary Assessment Report?	LLFAs - Select Yes/No from drop down list. Refer to "locally agreed surface water information" text box in section 3.5.1 (p.17) of guidance.	Yes		
4.3	If available, what is the total property count for locally agreed surface water information in the LLFA?	If known, please enter the total number of properties at risk in the LLFA.	9500		
4.4	If applicable, has the method for counting properties been described in the Preliminary Assessment Report?	Refer to text box on page 17 of guidance	Yes		
4.5	Has available information on local drainage capacity (where used to inform the determination of locally agreed surface water information) been included in the report?	Refer to text box on page 17 of guidance. Information provided on drainage may inform options for any future improvements to the Flood Map for Surface Water.	N/A		

Preliminary Flood Risk Assessment Checklist					
LLFA Name:	**Herefordshire Council**				
	Checklist questions	**Notes for completion**	**LLFA**	**Environment Agency area review**	**Environment Agency national review**
Step 5	**Complete Preliminary Assessment Report Document**				
5.1	Does the Preliminary Assessment Report cover all the content described in Annex 1 of the Environment Agency's PFRA guidance?	LLFAs - If the Preliminary Assessment Report contains all the content described in Annex 2 of the PFRA guidance, respond with a 'Yes'. If there are some elements missing, please provide a brief explanation. EA Review - Include comments on any missing content.	Yes		
5.2	Has a summary table of flood events been produced?	Refer to section 3.4 and 3.5 of guidance	Yes		
5.3	Has a description of past flood events been included?	Refer to section 3.4 and 3.5 of guidance	Yes		
5.4	Has additional information been included on climate change and long term developments?	Refer to 3.6 of guidance. Standard text has been provided for Preliminary Assessment Reports which meets the minimum requirements of the Flood Risk Regulations. Please respond with Yes or No, and if additional information has been included, please state the information source(s)	Yes		
Step 6	**Record information on past and future floods with significant consequences in spreadsheet**				
6.1	Are records of past flooding with significant harmful consequences recorded on the Preliminary Assessment Report spreadsheet (Annex 1 of Prelminary Assessment Report) ?	LLFAs - past flooding should be recorded on the spreadsheet and included as Annex 1 of the Preliminary Assessment Report. EA review - Are all the mandatory fields complete?	Yes		
6.2	Are there any past floods with significant harmful consequences that have not been recorded? If so, please explain why not.	LLFAs - Respond with Yes or No. If No, provide additional information e.g. anecdotal information on flood, but not enough evidence to include EA review - Do you agree with LLFA response and comments?	Yes - some incomplete and unattributed records have been excluded due to uncertainty		
6.3	Have any additional records of future flooding (other than the national dataset information which is already completed) been recorded on the future flooding Preliminary Assessment Report spreadsheet (Annex 2 of Preliminary Assessment Report)	LLFAs - future flooding information should be recorded on the spreadsheet and included as Annex 2 of the Preliminary Assessment Report. EA review - Are all mandatory fields complete?	Yes		
Step 7	**Illustrate information on past and future floods**				
7.1	Have summary maps been produced for past and future floods?	Refer to section 3.4 and 3.5 of guidance	Yes		
Step 8	**Review indicative Flood Risk Areas**				
8.1	Is your LLFA within an indicative Flood Risk Area?	Indicative Flood Risk Areas were provided to LLFAs by the Environment Agency in December 2010.	No		
8.2	If the answer to 8.1 is yes, have you reviewed it using the locally agreed surface water information, and relevant local information in the Preliminary Assessment Report?	Refer to section 4 of guidance. LLFAs should identify whether they have reviewed against local information or just used the indicative Flood Risk Area information provided by the Environment Agency.	N/A		

Preliminary Flood Risk Assessment Checklist					
LLFA Name:	**Herefordshire Council**				
	Checklist questions	**Notes for completion**	**LLFA**	**Environment Agency area review**	**Environment Agency national review**
Step 9	**Identify Flood Risk Areas**				
9.1	Is a Flood Risk Area proposed?	LLFA - select a response from the drop down list and then complete the relevant questions 9.1.1 - 9.1.5. (NB. Indicative Flood Risk Areas can be amended due to Geography, past flooding and/or future flooding.)	No - no Flood Risk Area is proposed (go to question 9.3)		
9.1.1	If the proposed Flood Risk Area is exactly the same as the indicative Flood Risk Area, please confirm.	LLFA - please confirm that the boundary of the indicative Flood Risk Area has not been changed and no change has been made to the flood risk indicators. EA review - please confirm	N/A		
9.1.2	If changes have been made to the indicative Flood Risk Area because of geography, please identify what changes have been made.	Use the drop down list to identify the reasons for the change. Options are the same as the table on page 26 of the PFRA guidance. EA review - please confirm evidence supports change			
9.1.3	If changes have been made to the indicative Flood Risk Area because of past / historic flooding, please indicate the changes and the reasons why.	LLFA - identify the scale of the changes made e.g. major/minor increase or decrease in size of Flood Risk Area and the source of information used e.g. records of historic flooding. EA review - confirm scale of the changes made and provide indication of confidence in the evidence provided e.g. anecdotal evidence versus detailed report on flooding event.			
9.1.4	If changes have been made to the indicative Flood Risk Areas because of future flooding, please indicate the changes and the reasons why.	LLFA - identify the scale of the changes made e.g. major/minor increase or decrease in size of Flood Risk Area and the source of information used e.g. detailed modelling as part of SWMP. EA review - confirm scale of the changes made and indication of confidence in the evidence			
9.1.5	If a new Flood Risk Area is being proposed, does it meet the Defra / WAG thresholds?	Criteria and thresholds are set out in the Defra/WAG guidance on selecting and reviewing Flood Risk Areas for local sources of flooding EA review - identify the evidence provided to support this and indicate degree of confidence in the evidence.	N/A		
9.2	Does the proposed Flood Risk Area include flooding from interactions with main river, reservoirs or the sea?	LLFAs should respond with Yes or No. EA Review - Summarise the location and nature of interactions i.e. river or sea.	N/A		
9.3	Has an indicative Flood Risk Area been deleted?	LLFA - Respond with Yes/No and if an indicative Flood Risk Area has been deleted please provide a short description why. EA - confirm the evidence presented to support this is aligned to 'locally agreed surface water information'	No		
Step 10	**Record information including rationale - ONLY COMPLETE IF ANSWER TO 9.1 IS YES**				
10.1	If proposing Flood Risk Areas, have the mandatory fields in the spreadsheet been completed?	LLFAs - the spreadsheet indicates mandatory columns to be completed. EA Review - Are all mandatory fields complete?	N/A		
10.2	Has a rationale and evidence for amending/adding/deleting Flood Risk Areas been included in the Preliminary Assessment Report?	LLFAs - Refer to Table 5 on page 26 of the PFRA guidance and Annexes A-D of the Defra/WAG Guidance. Rationale should be included in "Identification of Flood Risk Areas" section of Preliminary Assessment Report. EA Review - Confirm that supporting evidence for any amendments/additions/deletions has been provided in the Preliminary Assessment Report and annexes	N/A		

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