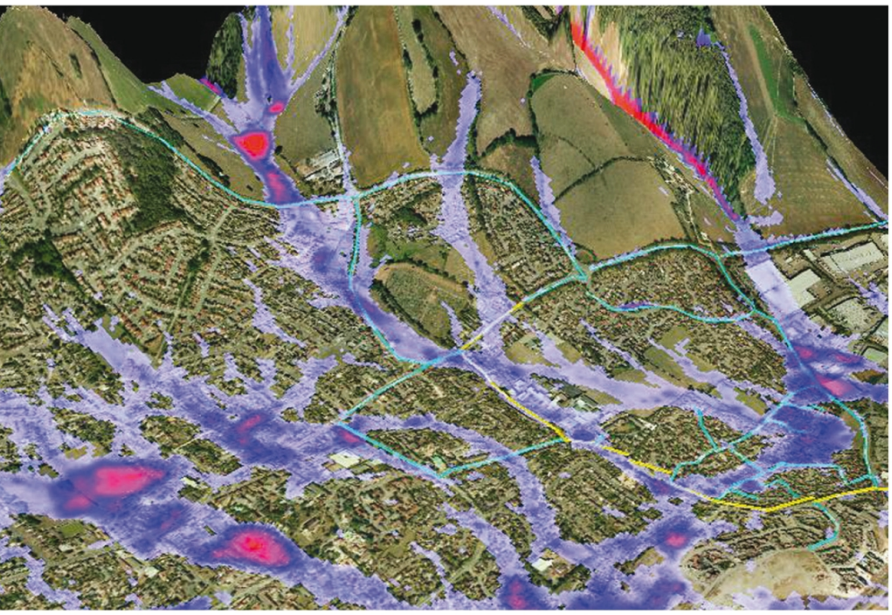
West Berkshire Council

Preliminary Flood Risk Assessment



Final Report

June 2011

West Berkshire Council

Revision Schedule

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03	June 2011	Final Report	**Stuart Clark** Principal Engineer	**Jon Winstanley** Projects Manager	**Overview and Scrutiny Management Commission**

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Abbreviations

Acronym	Definition
AStSWF	Areas Susceptible to Surface Water Flooding
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EC	European Commission
FMfSW	Flood Map for Surface Water
FWMA	Flood & Water Management Act 2010
LDF	Local Development Framework
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
PPS25	Planning and Policy Statement 25: Development and Flood Risk
PFRA	Preliminary Flood Risk Assessment
RFDC	Regional Flood Defence Committee
SAB	SuDS Approving Body
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TWU	Thames Water Utilities
WAG	Welsh Assembly Government
WBC	West Berkshire Council

Executive Summary

The Flood Risk Regulations 2009 implement the requirements of the European Floods Directive 2007, which aims to provide a consistent approach to managing flood risk across Europe. The Regulations establish four stages of activity within a six year flood risk management cycle to ensure that information is maintained and kept up to date for future use and to support other local flood risk assessments (such as the Strategic Flood Risk Assessment and Surface Water Management Plans) and as part of local strategies. The first two stages of the cycle are covered by a Preliminary Flood Risk Assessment (PFRA).

This Preliminary Flood Risk Assessment, comprising this report and separate data spreadsheets, provides a high level overview of flood risk across West Berkshire from local sources of flooding. These include surface water, groundwater, ordinary watercourses and canals. It also considers flooding from main rivers because of the interaction between main rivers and local sources of flooding. The methodology for producing the PFRA has been based on the Environment Agency's Final PFRA Guidance and Defra's Guidance on selecting Flood Risk Areas, published in December 2010.

The Environment Agency has used a national methodology, as set out by Defra, to identify indicative Flood Risk Areas across England. No national indicative Flood Risk Areas have been identified within West Berkshire. However, Thatcham was highlighted as being nationally important with regard to surface water flooding.

To gain an overall picture of flood risk across West Berkshire, records of past flooding from local sources was collected from Parish Councils, the Environment Agency, Thames Water Utilities, British Waterways, Berkshire Fire & Rescue and the West Berkshire Council reports into the flooding in 2000/2001 and July 2007. Details of the economic consequences of past flooding were for the most part unavailable. However, based on the evidence collected Thatcham is considered to have 'significant harmful consequences' under the criteria set by the Environment Agency.

For this reason, Thatcham is considered to be a locally significant Flood Risk Area. Newbury remains vulnerable to flooding from the River Kennet and because of the interaction between the River Kennet and the Kennet & Avon Canal, Newbury is also considered to be a locally significant Flood Risk Area.

It should be noted that there is a risk of flooding from local sources across the whole of West Berkshire, particularly from surface water. Based on national surface water modelling approximately 21,700 properties are at risk from flooding to a depth of 0.1m and 7,600 are at risk from flooding to a depth greater than 0.3m during a rainfall event with a 1 in 200 annual chance of occurring.

The preparation of this PFRA is just one of several new responsibilities for Lead Local Flood Authorities (LLFA) under the new legislation. West Berkshire Council has a number of new responsibilities and duties a LLFA under the Flood and Water Management Act 2010, which include the development of a local strategy for flood risk management, maintaining an asset register, investigating flooding incidents, and to approve and maintain sustainable drainage systems.

1. Introduction

1.1. Preliminary Flood Risk Assessment

The Flood Risk Regulations 2009 implement the European Floods Directive (Directive 2007/60/EC on the assessment and management of flood risk) and provide an approach to managing flood risk in England and Wales. The Regulations place a number of requirements on the Environment Agency and Lead Local Flood Authorities (LLFA), such as West Berkshire Council, to prepare a number of documents within a six year period as set out in Table 1. The first two stages of the Regulations are covered in the preparation of this Preliminary Flood Risk Assessment (PFRA) report.

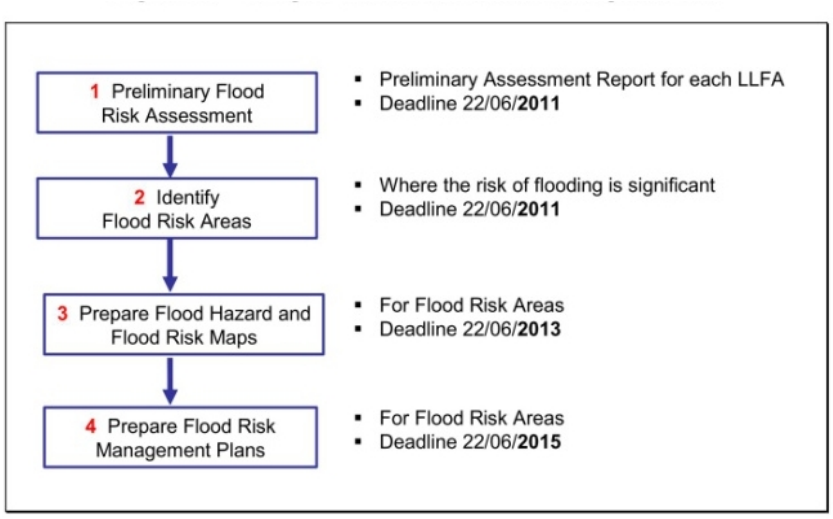


Table 1: Stages of the Flood Risk Regulations 2009

The scope of this PFRA is to consider the past flooding and possible future flooding from the following local sources:

- Surface water;
- Groundwater;
- Ordinary watercourses
- Canals

Although it is not a requirement under the Regulation the PFRA will also mention significant and harmful consequences of flooding from some main rivers because of the interaction between those main rivers and local sources of flooding. The PFRA does not include flooding from large ponds or raised reservoirs.

This document has been prepared by West Berkshire Council (WBC) in accordance with the Preliminary Flood Risk Assessment Final Guidance produced by the Environment Agency (EA) in December 2010.

1.2. Aims and Objectives

The PFRA is a high level screening exercise which involves collecting information on past (historic) flooding events and the potential consequences of future floods, and to indentify Flood Risk Areas. These are areas where the risk of flooding is significant and therefore requires further examination through the production of maps and management plans.

The aim of this PFRA is to provide an assessment of the local flood risk across the study area including information on past floods and the potential consequences of future floods.

The key objectives can be summarised as follows:

- Describe arrangements for partnerships and collaboration for the ongoing assessment of flood risk, data collection and means of public engagement.
- Summarise the methodology used for the PFRA and the scrutiny and review procedures.
- Assess historic flood events within West Berkshire from local sources and the consequences of these events.
- Assess the potential harmful consequences of future flood events within West Berkshire.
- Review the indicative Flood Risk Areas provided by the Environment Agency and identify locally significant flood risk areas

2. Overview of West Berkshire

The study area for this PFRA is defined by the administrative boundary of West Berkshire Council. The administrative area of West Berkshire Council covers approximately 700 km^2 and has a population of approximately 153,000 (source: 2011 West Berkshire District Profile) with an estimated 60,000 households (source: 2001 Census). West Berkshire's principal urban areas are Newbury, Thatcham, Hungerford and the areas of Tilehurst, Purley and Calcot to the west of Reading.

The topography of West Berkshire varies between the higher downlands in the north and north-west of the district and the low lying floodplains of the main rivers, principally the Kennet, Lambourn and the Pang. The River Kennet's floodplain is defined on either side by steep slopes, rising to the county boundary with Hampshire to the south and up to the Berkshire Downs to the north.

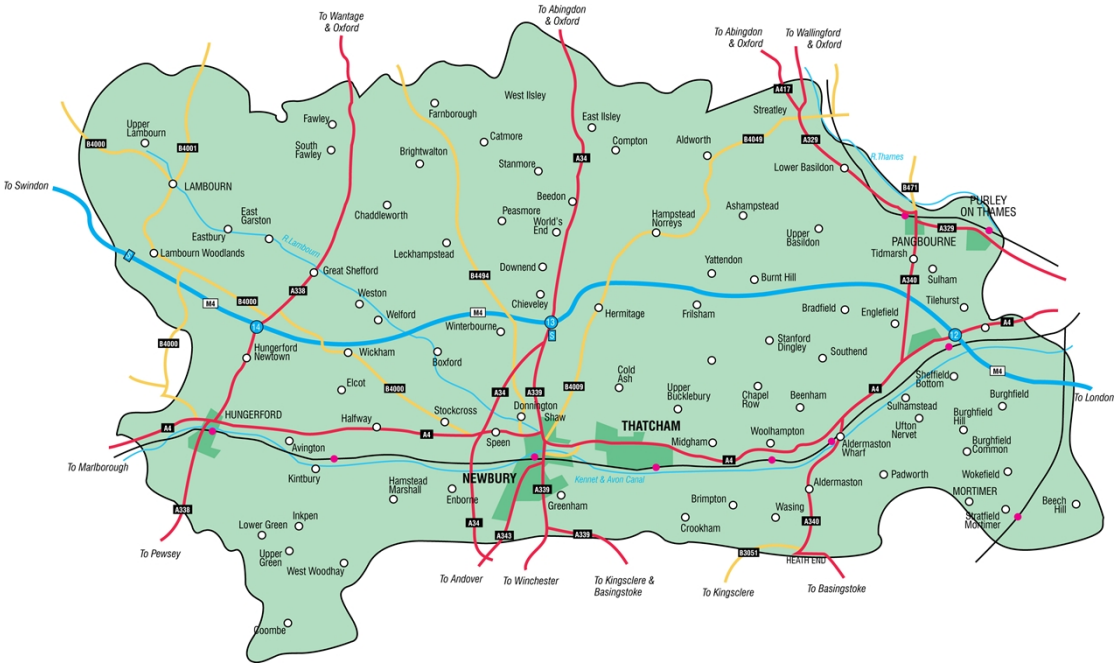


Figure 1-1: West Berkshire Council administrative area

Land use in West Berkshire is characterised by green space (which includes gardens and bodies of open water) and accounts for 95% of the land coverage within the district.

Transport, buildings and other, non-specified, land uses account for the remaining 5%. There are numerous SSSI's within West Berkshire and four International Designated Environmental Sites, namely, the Kennet and Lambourn Floodplain, the River Lambourn, Hartslock Wood and the Kennet Valley Alderwoods. There are no World Heritage Sites within West Berkshire.

West Berkshire has two nuclear installation sites, which are AWE near Aldermaston and AWE near Burghfield. The world headquarters of Vodafone is located to the north of Newbury near to Junction 13 of the M4 motorway.

3. Lead Local Flood Authority Responsibilities

The Flood and Water Management Act 2010 (FWMA) aims to address the threat of flooding and water scarcity, both of which are predicted to increase with climate change. It gives the Environment Agency a strategic responsibility for supervising the management of flood and coastal erosion in England and places local leadership on local authorities who are designated under the Act as Lead Local Flood Authorities. West Berkshire Council will undertake the role of LLFA for West Berkshire.

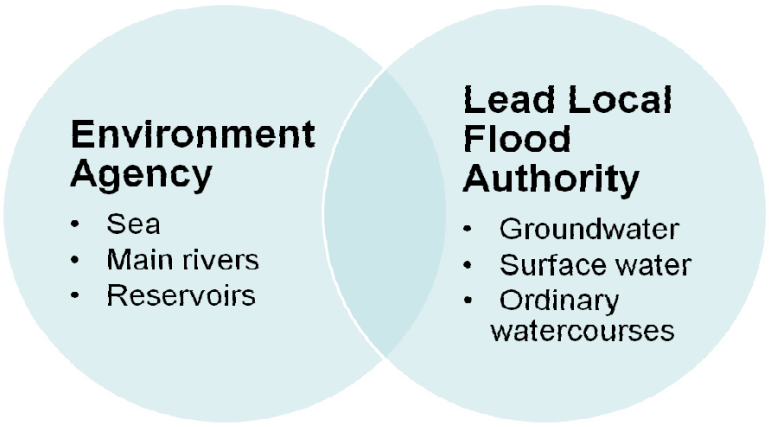


Figure 1-2: Diagram of roles and responsibilities for flooding under the FWMA

The FWMA requires the Environment Agency to produce a national strategy for Flood and Costal Erosion Risk Management (FCERM) and the LLFA to produce Local Flood Risk Management strategies. As the LLFA, West Berkshire Council will be required to develop and implement a strategy for local flood risk management in West Berkshire. The local strategy will be based on an assessment of risk and will incorporate evidence from the PFRA process. The Local Government Group is writing a guidance document for LLFAs on how to develop local strategies. This document is expected to be published later in 2011.

There are a number of other key responsibilities for LLFA's under the FWMA and the Flood Risk Regulations. These responsibilities include:

- **Investigating flood incidents** – LLFAs have a duty to investigate and record details of significant flood events within their area and to publish the results.

- **Asset Register** – LLFA's also have a duty to maintain a register of structures or features which are considered to have an effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection.

- **SuDS Approval Body** – LLFAs are designated as the SuDS Approval Body (SAB) for any new drainage system, and therefore must approve, adopt and maintain any new sustainable drainage systems (SuDS) within their area.

- **Local Strategy for Flood Risk Management** – LLFA's are required to develop maintain, apply and monitor a local strategy for flood risk management in its area. The local strategy will build upon information such as national risk assessments and will use consistent risk based approaches across different local authority areas and catchments.

- **Works powers** – LLFAs have powers to undertake works to manage flood risk from surface runoff and groundwater, consistent with the local flood risk management strategy for the area.

- **Designation powers** – LLFAs, as well as the Environment Agency, have powers to designate structures and features that affect flooding in order to safeguard assets that are relied on for flood risk management.

4. Partnership Arrangements

The importance of partnership working is reflected in the Flood Regulations and the Flood and Water Management Act which requires relevant authorities to cooperate with one another. As the LLFA, it is the role of West Berkshire Council to establish effective partnerships with other flood risk management authorities. In order to achieve this, an officer-led Flood Action Group has been set up, with officers from Highways & Transport, Planning, Countryside Services and Civil Contingencies Team together with representatives from the Environment Agency and other agencies as necessary. A flow chart of the scrutiny, review and partnership structures is shown in Figure 2.

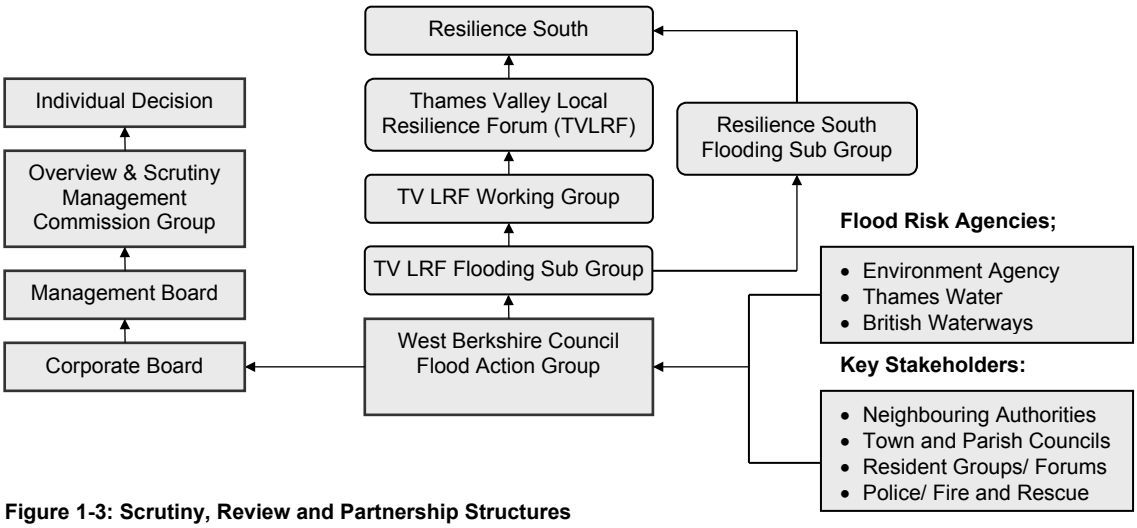


Figure 1-3: Scrutiny, Review and Partnership Structures

West Berkshire Council recognises the importance of public consultation when formulating local flood risk management plans, as was shown when producing the Surface Water Management Plan for Thatcham. West Berkshire Council intend to follow the guidance outlined in the Environment Agency's 'Building Trust with Communities' document which provides a helpful process of how to communicate flood risk to the general public and local flood forums.

5. Methodology and Data Collection

5.1. Overview

The PFRA is a high-level screening exercise used to identify areas where the risk of flooding is considered to be significant and necessitates further consideration and management through the production of flood risk and flood hazard plans and flood management plans.

The following partner organisations were contacted; the Environment Agency, Parish and Town Councils; British Waterways; Thames Water; Berkshire Fire and Rescue. The information collected is summarised in Table 2 as follows:

	Dataset	Description
Environment Agency	Areas Susceptible to Surface Water Flooding	The first generation national mapping, outlining areas of risk from surface water flooding across the country with three susceptibility bandings (less, intermediate and more)
	Flood Map for Surface Water	The updated (second generation) national surface water flood mapping which was released at the end of 2010. This dataset includes two flood events (with a 1 in 30 and 1 in 200 chance of occurring) and two depth bandings (greater than 0.1m and greater than 0.3m).
	Flood Map	Shows the extent of flooding from rivers with a catchment of more than 3km² and from the sea.
	Areas Susceptible to groundwater Flooding	Coarse scale national mapping showing areas which are susceptible to groundwater.
	Indicative Flood Risk Areas	Nationally identified flood risk areas, based on the definition of 'significant' flood risk described by Defra and the Welsh Assembly Government.
West Berkshire Council	Strategic Flood Risk Assessment (SFRA)	SFRA contains information on historic flooding, including flooding from surface water, groundwater and canals.
	Flooding in West Berkshire 2007	Parish Flood Reports, for each Parish affected by the Flooding and Flood Survey Plans showing the affected properties and flow paths.
	Flooding in West Berkshire 2000/01	Detailed account of the flooding at each location, problems identified and recommended actions.
	Thatcham Surface Water Management Plan	A comprehensive study of the flooding at Thatcham in 2007, containing historical flooding records and 2D models.
Town and Parish Councils	Anecdotal information from Parish Councils within West Berkshire	Anecdotal information on local flood history and flooding hotspots
Thames Water	DG5 Register	DG5 Register logs and records of sewer flooding incidents in the West Berkshire Area
British Waterways	Records of canal breaches and overtopping events	Records of historical canal breaches and canal overtopping events across West Berkshire
Berkshire Fire and Rescue	Historical flooding records	Records of historical flooding events for the Fire Service call out history records

Table 2: Sources of Historic Flooding Information and Datasets

The information provided was made up of reports and anecdotal evidence. This information has been reviewed; however, limited information for some past events has made an accurate assessment of the consequences not possible.

5.2. Assessing Future Flood Risk

The identification of Flood Risk Areas through the PFRA must take into account future floods, defined as any flooding that could potentially occur in the future. This definition includes predicted floods using known facts from current conditions with an allowance for climate change. The assessment of future flood risk will be based on a review of the Environment Agency's Flood Map for Surface Water which was recently circulated to Lead Local Flood Authorities. The Flood Map for Surface Water predicts the extent of surface water flood risk from two events (1 in 30 annual chance and 1 in 200 annual chance)

The following factors were considered when assessing future flood risk in West Berkshire: topography and geology, location and characteristic of ordinary watercourses, the location of flood plains, the location of populated areas, areas of concentrated economic activity, the predicted impact of climate change and long-term developments that might affect both the amount and significance of flooding.

5.3. Identifying Flood Risk Areas

Information regarding historic and future flood risk will be used to identify Flood Risk Areas. To achieve this, flood risk indicators will be used to determine the impacts of flooding on human health, economic activity, cultural heritage and the environment. The key flood risk indicators are summarised in Table 3.

Impact of flooding on:	Flood Risk Indicators
Human Health	Number of residential properties Critical services (Hospitals, police/ fire/ ambulance stations schools, nursing homes)
Economic Activity	Number of non-residential buildings Length of road or rail Area of agricultural land.
Cultural Heritage	Cultural heritage sites, listed buildings
Environment	Designated SSSI's, Nature reserves

Table 3: Flood Risk Indicators

The national flood risk indicators have been selected by Defra and the Environment Agency in order to identify areas that exceed a pre-determined threshold. The areas that have been identified using this methodology are in excess of 30,000 people at risk have been identified as Flood Risk Areas. Further details of the methodology are contained in Defra's Guidance for LLFAs on selecting and reviewing Flood Risk Areas for local sources of flooding (Dec 2010).

5.4. Potential Consequences of Future Flooding

The Environment Agency has used the Flood Map for Surface Water mapping and the National Receptors Database to identify a number of areas across the country that exceed a given threshold, as shown in Table 4.

Significant harmful consequences defined as greater than;	Description
200 people or	Flooded to a depth of 0.3m during rainfall event with a 1 in 200 chance of occurring
20 business or	
1 critical service	

Table 4: - Flood risk threshold used to identify future consequences of flooding.

The assessment was carried out based on 1km^2 national grid squares, and the grid squares that exceed this criterion were identified. The grid squares within West Berkshire where flood risk is considered to exceed this threshold is at Thatcham, as illustrated on Figure 2.

The potential consequences of the key flood risk indicators have been assessed by the Environment Agency; this information has been included in Annex 2 of the Preliminary Assessment Spreadsheet.

6. Historic Flood Risk

Existing databases, reports and anecdotal information for historic flooding in West Berkshire was collected from the stakeholders listed in Table 2. A summary map highlighting the locations of these past flood events is illustrated in Figure 10. The recorded flood events came from a range of flood sources. In many cases the cause and source of the flooding was not recorded. The following paragraphs provide a summary of information relating to each source of flooding considered in the PFRA.

6.1. Surface Water Flooding

The most recent and significant flooding to affect West Berkshire was in July 2007. The flooding occurred primarily as a result of the heavy rainfall experienced during the storm event on 20th July 2007. Heavy and prolonged rainfall over previous weeks had caused a rise in the degree of saturation of the surrounding land, resulting in less water being infiltrated through the soil during the storm, causing much higher than normal rates of surface water run-off. Out of the 62 parishes within West Berkshire, only 18 avoided flooding. The worst affected areas were those primarily along the line of each of the three river valleys that span West Berkshire where flooding was caused by water running off from surrounding rural areas and flowing through residential areas, as opposed to rivers over-topping their banks. The parishes that did not experience property flooding were all situated on higher ground at the edge of the main valleys. However, a number of these experienced minor flooding along roads, mainly at low points due to local topography and the distribution of houses.

In August 2007, West Berkshire Council commissioned an investigation into the flooding. Detailed drawings were produced showing the extent of the flooding and the flow paths taken by the flood waters. The study area was divided into parish areas, the causes of the flooding were gathered from anecdotal evidence provided by local residents and supported by consultation with Town and Parish Councils. The worst affected were Thatcham (1107 residential properties), Newbury (151 residential properties), Pangbourne (123 residential properties), Woolhampton (56 residential properties) and Lambourn (46 residential properties). Within a number of parishes the flooding lasted for three days causing major property damage. Other parishes were subject to flash flooding of between half an hour and three hours.

In many cases it was found that the flooding was exacerbated by blocked culverts, pipes and poorly maintained watercourses. The flooding at Pangbourne was principally caused by the Sulham Brook over-topping its banks. However, it was noted that there was an interaction between the river and surface water in the area that ultimately caused the river to over-top.

In addition to residential property flooding, several key services and infrastructure were flooded during the 2007 floods:

- The nuclear site at AWE Burghfield experienced on-site flooding, but it did not pose a risk to the public or interfere with operations. The headquarters of Vodafone were badly flooded causing considerable disruption to business operations. The railway lines at Newbury Station and Aldermaston Station were flooded resulting in the main line between London and Penzance being closed for 24 hours.

- A small number of commercial buildings were badly flooded in Thatcham and Newbury, although there is no exact information on the resulting economic losses. Similarly, there is no information regarding the economic losses caused by the widespread flooding on agricultural land across West Berkshire.

- Two schools were flooded within the District. Aldermaston Primary School in Aldermaston suffered internal flooding to a depth of 600mm, and Trinity Secondary School in Newbury, where the playing fields and car park was flooded by fast moving surface water flows of up to 300mm in depth.

6.1.1. Thatcham Surface Water Management Plan

The Thatcham Surface Water Management Plan (SWMP) was undertaken in 2010 as a Defra national pilot study following the flooding in 2007. Initial estimates from the original survey indicated approximately 1100 houses within Thatcham were flooded, resulting in economic losses to both residents of the area and businesses. The flooding was caused by a combination of runoff from the rural catchment to the north of the town which overwhelmed the surface water sewer inlets leading to large overland flows. Modelling undertaken as part of the SWMP indicated that the number of properties flooded was probably nearer 1700. During the 2007 flood event, Thatcham did not experience any flooding from the River Kennet however and the flooding must therefore be considered within this PFRA process. The modelling confirmed that the rate of surface water flows in Stoney Lane, adjacent to the main entrance into Kennet School, was potentially life threatening, which concurs with anecdotal and photographic evidence. The flooding caused large-scale economic and social impacts not only to Thatcham itself, but also the wider community. The option of constructing detention basins around Thatcham was the main engineering intervention identified in the SWMP. These would be designed to store and control the discharge of water into the surface water sewers to prevent them becoming overwhelmed.

6.2. Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from underlying aquifers or from water flowing from abnormal springs. This tends to occur after long periods of sustained rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth. The solid geology of West Berkshire is characterised predominantly by chalk to the north and west of the District, and clay to the south (i.e. south east of Thatcham). This geology will heavily influence the susceptibility of the area to groundwater flooding.

Most of the reports of groundwater flooding in West Berkshire have come from communities in the Berkshire Downs. The permeable beds of chalk within the Downs are aquifers and are capable of storing and transporting groundwater flow. In these areas, not only can normally dry areas of land flood due to locally high water tables, but intermittent streams or bournes can activate, causing flooding in locations remote from the permanent head of the stream. Flooding at Great Shefford and Hampstead Norreys from groundwater sources were experienced in 2000/2001 when sustained periods of heavy rainfall were experienced. Landscaping and culverting of watercourses running through Great Shefford and Compton exacerbated the problems, and blockages and general lack of maintenance of the river bed made matters worse in Hampstead Norreys. Groundwater flooding also occurred in Pangbourne in 2000 from the Sulham Brook which is also groundwater fed.

6.3. Canals and Ordinary Watercourse Flooding

The Kennet and Avon Canal flows from west to east through the District. It is classified as a ‘main river’ because the canal and river are combined in its lower reaches before entering the River Thames. In many locations the canal is perched, which poses a potential risk of flooding should a structural failure of its banks occur. British Waterways have a monitoring and management regime in place to reduce the risk of overtopping. British Waterways have provided details of past overtopping events that have occurred in West Berkshire.

7. Future Flood Risk

7.1. Surface Water Flooding

No local information is currently available on future surface water flood risk in West Berkshire. However, the Surface Water Management Plan for Thatcham provides comprehensive modelling results which can used to inform the second cycle of the PFRA process and if required the production of flood hazard and flood risk plans.

The Environment Agency has produced a national assessment of surface water flood risk in the form of a national mapping database. The national methodology was used to produce the Areas Susceptible to Surface Water Flooding Maps and Maps for Surface Water Flooding for two flood events (1in 30 annual chance, Figure 5, and 1 in 200 annual chance, Figure 6) and two depth bandings (greater than 0.1m and greater than 0.3m), highlighting areas at risk of surface water flooding in the future. A review of these maps confirmed that the Flood Map for Surface Water Flooding for a 1 in 200 year event provides a better representation of what is known to have occurred generally in West Berkshire. Using this database the number of properties at risk of surface water flooding within West Berkshire for a rainfall event with a 1 in 200 year chance of occurring has been estimated as 21,700 flooding to a depth greater than 0.1m and 7,600 flooding to a depth greater than 0.3m. This includes 15,700 residential properties flooding to a depth greater than 0.1m and 5,300 residential properties flooding to a depth greater than 0.3m. Further details are included in the Annex 3 of the Preliminary Assessment Spreadsheets.

7.2. Groundwater Flooding

There is no local information available which provides evidence on future flood risk in West Berkshire. The Environment Agency's national dataset, Areas Susceptible to Groundwater Flooding has been used to assess future flood risk from groundwater. The dataset is illustrated in Figure 7 and shows areas at risk of future groundwater flooding.

Following the 2000/2001 event, a groundwater monitoring network was set up by the Environment Agency to predict groundwater flooding from chalk aquifers. When groundwater levels in the boreholes reach a given depth, warnings are triggered and these are issued to WBC and other agencies. The Environment Agency can use these levels to calculate how many days it will take before the known flood level is reached. Groundwater abstraction was used successfully in 2003 and 2007 to lower groundwater tables at key locations to alleviate problems in Lambourn, Great Shefford, East Ilsley and Compton, but despite groundwater flood warning and management procedures being in place for locations with a history of groundwater, there is still some uncertainty about the effectiveness and standards of protection offered across West Berkshire.

7.3. Canals and Ordinary Watercourses

7.3.1. Canals

British Waterways are currently working on a study to determine the future flood risk from canals and this will be available to inform the second cycle of the PFRA. Information on future flood risk from canals or local information on future flooding from ordinary watercourses has been identified to be improved upon in conjunction with other professional partners to obtain a greater understanding from this source of flooding.

Large areas of Newbury are at risk of flooding from the River Kennet and the Kennet and Avon Canal. Both share a perched channel which sits above the surrounding floodplain in places. The raised channel means that flood water could not drain back into the river easily; therefore the potential flooding could last for a long time. In addition the River Kennet and Kennet and Avon canal are fed by groundwater from the surrounding chalk which may further

exacerbate the river flooding. The predicted long flooding duration and the raised channel banks mean that even a small amount of overspill into the adjacent floodplain would have the potential to cause flooding to large areas and to affect many properties.

7.3.2. Kennet Flood Risk Management Strategy

In 2005 the Environment Agency produced the Kennet Flood Risk Management Strategy, which identified options to reduce the risk of flooding from the River Kennet in Newbury. The Newbury Flood Alleviation Scheme is designed to protect areas at risk in Newbury with a 1% chance of flooding in any one year. It aims to protect about 374 residential and 78 commercial properties. The study report was completed in 2010. The Environment Agency aims to secure funding for the scheme but this cannot be guaranteed as the decision will be based on national priorities.

7.3.3. Ordinary Watercourses

In many cases the flooding that occurred in the summer of 2007 was later found to be caused or exacerbated by blocked culverts and poorly maintained ordinary watercourses. West Berkshire Council has since become an active member of the Association of Drainage Authorities and has adopted a land drainage policy which is based on the provisions of the Land Drainage Act 1991. West Berkshire Council work closely with riparian landowners to ensure that they undertake periodic maintenance and improvement works to watercourse at locations known to be at risk of flooding. A leaflet explaining the responsibilities of Riparian Owners has been produced and distributed to Parish Councils and is also published on the Council's website.

In view of the complex interactions between main rivers and local sources of flooding recorded in some areas, it is essential that West Berkshire Council continues to work with the Environment Agency and other professional partners to identify common issues and cooperate in the management of flood risk.

7.4. Sewer Flooding and Highway Drainage

Within West Berkshire Council there are a number of urbanised towns including Newbury, Thatcham and Hungerford. This urbanisation gives rise to localised flooding issues from surface water drainage and/or sewer systems with insufficient capacity to cope with increasing heavy rainfall events associated with climate change. Moreover, urban drainage systems are generally designed to cater for a 1 in 30 year storm, and highway drainage systems are designed for only a 1 in 10 year storm in accordance with Government guidance. Future storms over and above these design events will exceed the capacity of the drainage system, resulting in overland flows and localised flooding.

8. Review of Indicative Flood Risk Areas

Defra have undertaken a national selection and review of Flood Risk Areas for local sources. Within West Berkshire, the only 'cluster of places' above the flood risk threshold which has been identified is Thatcham, which has been ranked as number 95 in the country in terms of the number of people at risk from the Flood Map for Surface Water 1in 200 years deeper than 0.3m. The actual number of people at risk in Thatcham is 3,882, which is below the threshold value of 30,000 people. As a result, no areas in West Berkshire have been indentified as national Indicative Flood Risk Areas. This is supported by locally agreed surface water information.

Nevertheless, the flooding experienced across West Berkshire in recent years has been locally significant with Thatcham and Pangbourne, in particular, having significantly harmful consequences in relation to the number of people flooded to a depth of 0.3 metres. It is estimated that approximately 1700 properties flooded from surface water in Thatcham in 2007 and the Surface Water Management Plan for Thatcham identified potentially life-threatening flows in part of the town, which is supported by photographic and anecdotal evidence. Given

the social and economic impact of the 2007 floods, Thatcham is considered to be a locally adverse Flood Risk Area.

Newbury has been identified as being at high risk of flooding from the River Kennet. Major flooding occurred in the past affecting the town centre and residential areas to the south. Flooding has occurred more recently in 2000 and 2003 on a smaller scale, highlighting Newbury's continuing vulnerability. Because of the potentially large-scale economic impact on Newbury and all other communities in West Berkshire it is also considered to be a locally adverse Flood Risk Area, however, it is acknowledged that the flood risk management of Newbury with respect to flooding from the River Kennet rests with the Environment Agency.

9. The Impact of Climate Change

9.1. 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%.

9.2. Key Projections for Thames 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 15% (very likely to be between 2 and 32%)
- Precipitation on the wettest day in winter up by around 15% (very unlikely to be more than 31%)
- Relative sea level at Sheerness 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 8 and 18%

9.3. Implications for Flood Risk

Climate changes 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 in both rural and heavily urbanised catchments. 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. Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. There is a risk of flooding from groundwater-bearing chalk and limestone aquifers across the district. Recharge may increase in wetter winters, or decrease in drier summers.

The effects of climate change have significant implications for Thatcham and Newbury and would exacerbate localised flooding that has occurred in the past as well as increasing flood risk in other locations within West Berkshire.

10. Long Term Developments

Long term developments need to be considered carefully to ensure local flood risk is not increased. However, current planning policy aims to prevent new development from increasing flood risk.

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. However, 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).

The West Berkshire Core Strategy is the first development plan document within West Berkshire's Local Development Framework. It sets out a long term vision for West Berkshire to 2026 and translates it into spatial terms, setting out proposals as to where development will go and how this development will be built. The Core Strategy was submitted to the Secretary of State in July 2010 and is currently being examined by a Planning Inspector.

Within the Core Strategy, provision will be made for the delivery of 10,500 net additional dwellings and associated infrastructure over the period 2006 to 2026. Most new development will take place in Newbury, Thatcham and in the settlements in the east of the District close to Reading. Within the Newbury and Thatcham areas, two strategic urban extensions are proposed: the first to be developed will be the site at Newbury Racecourse to the east of Newbury for up to 1,500 dwellings, and the second will be at Sandleford, to the south of Newbury where up to 2,000 homes could be developed, with delivery commencing in the second half of the plan period extending beyond 2026.

The Core Strategy recognises that the risk of flooding within West Berkshire is widespread, arising not only from rivers, but also from surface water and groundwater flooding and contains a flooding policy which aims to achieve a planning solution to flood risk management wherever possible, steering vulnerable development away from areas affected by flooding. As such, development within areas of flood risk from any source of flooding, including Critical Drainage Areas (identified in the SFRA) and areas with a history of groundwater or surface water flooding, will only be acceptable if it is demonstrated that it is appropriate at that location and that there are no suitable and available alternative sites at a lower flood risk. The policy also sets out which developments will be required to do a Flood Risk Assessment, what a development will have to demonstrate, and how surface water should be managed.

11. Next Steps

11.1. Future Management of Flood Risk

No indicative Flood Risk Areas have been identified within West Berkshire, therefore West Berkshire Council as the Lead Local Flood Authority is not required to prepare a Flood Hazard or a Flood Risk Management Plan as outlined in the Flood Risk Regulations. However, there is still a requirement under the Flood and Water Management Act to undertake a Local Flood Risk Management Strategy for West Berkshire, which will be informed by the PFRA.

The Flood Risk Regulations require West Berkshire Council to review the PFRA every 6 years. Any work that is undertaken on flood risk management within this 6 year cycle will need to be included in the updated PFRA. It is anticipated that Defra and the Environment Agency will provide an update of the maps currently used for this PFRA. Any other relevant data that will be generated over the next 6 years needs to be reviewed and included in the updated PFRA.

In order to comply with its duties under the FWMA, West Berkshire Council is required to investigate future flood events and ensure the continued collection, assessment and publication of flood risk data and information. The proposed method of flood event data collection and management will include a flood report with photographs describing the event and its consequences, and suggested measures to mitigate future flooding. The report will be accompanied by a flood survey plan showing the flood-paths and the properties affected by the flooding. A simple spreadsheet has been created to record all flood event data, which will be available on the Council's website together with the flood reports and flood survey plans.

11.2. Scrutiny and Review Procedures

The scrutiny and review procedures for the PFRA are set out by the European Commission to ensure that the appropriate information has been used to determine flood risk and the most significant flood risk areas are identified. The review procedure comprises two parts. The first part of the review is through an internal Overview and Scrutiny Management Commission to ensure the PFRA meets the required quality standard before it is submitted to the Environment Agency.

Under the Flood Risk Regulations, the Environment Agency has been given a role in reviewing, collating and publishing all of the PFRAs once submitted. The Environment Agency will undertake a technical review and ensure that the guidance has been applied consistently. The PFRA will then be submitted to the relevant Regional Flood Defence Committee (RFDC). Once the RFDC has approved the PFRA, the Environment Agency Regional Director will collate, publish and submit all the PFRAs to the European Commission. The first review cycle of the PFRA will be led by West Berkshire Council and must be submitted to the Environment Agency by 22 June 2011.

References

1. Preliminary Flood Risk Assessment (PFRA) Final Guidance (Report GEHO1210 BTGH-E-E), Environment Agency, 2010. Available from http://publications.environment-agency.gov.uk/pdf/GEHO1210BTGH-e-e.pdf

2. Preliminary Flood Risk Assessment (PFRA) Annexes to the final guidance (Report GEHO1210BTHF-E-E), Environment Agency 2010. Available from http://publications.environment-agency.gov.uk/pdf/GEHO1210BTHF-e-e.pdf

3. Selecting and reviewing Flood Risk Areas for local sources of flooding – Guidance to Lead Local Flood Authorities, Defra/WAG, 2010. Available from http://www.defra.gov.uk/environment/flooding/documents/research/flood-risk-method.pdf

4. Flood Risk Regulations 2009, HMSO. Available from http://www.legislation.gov.uk/uksi/2009/3042/contents/made

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

6. Flood and Water Management Act – Explanatory Notes, HMSO. Available from http://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpgaen_20100029_en.pdf

7. 2011 West Berkshire District Profile, West Berkshire Council, 2011. Available from www.westberks.gov.uk/research

8. 2001 Census, Office for National Statistics, 2001. Available from http://www.ons.gov.uk

9. West Berkshire District Strategic Flood Risk Assessment (SFRA), Jacobs, 2008. Available from http://www.westberks.gov.uk/index.aspx?articleid=16930

10. Highway & Transport Flooding in West Berkshire July 2007, West Berkshire Council, 2007. Available from http://www.westberks.gov.uk/index.aspx?articleid=14242

11. Thatcham Surface Water Management Plan, West Berkshire Council, 2010

12. Flooding in West Berkshire 2001/02, West Berkshire Council, 2002. Available from http://www.westberks.gov.uk/index.aspx?articleid=18552

13. Newbury Flood Alleviation Study Consultation Briefing Paper (version 5), Doc No WNEWBF003, Environment Agency Thames Region, 2010 Available from http://www.environment-agency.gov.uk/static/documents/Leisure/Newbury_FAS_Briefing_paper_v5_1_1_CURRENT.pdf

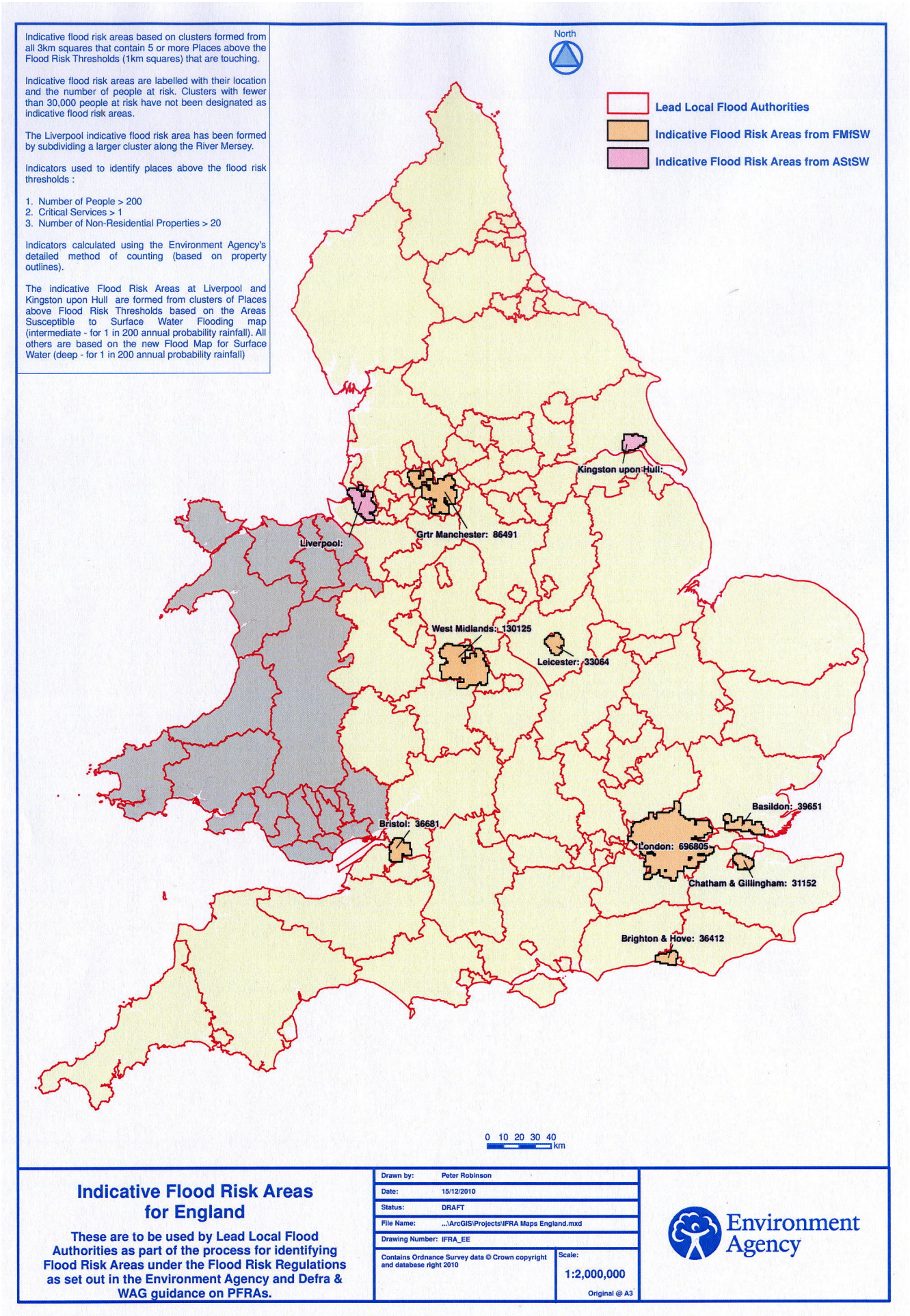
14. Summary for Policymakers. Climate Change 2007: The Physical Science Basis. Contribution of Working Group to the Forth Assessment Report of the Intergovernmental Panel on Climate Change, Miller, H.L., Cambridge University Press, Available for download from http://www.ipcc/ipccreports/ar4-wg1.htm

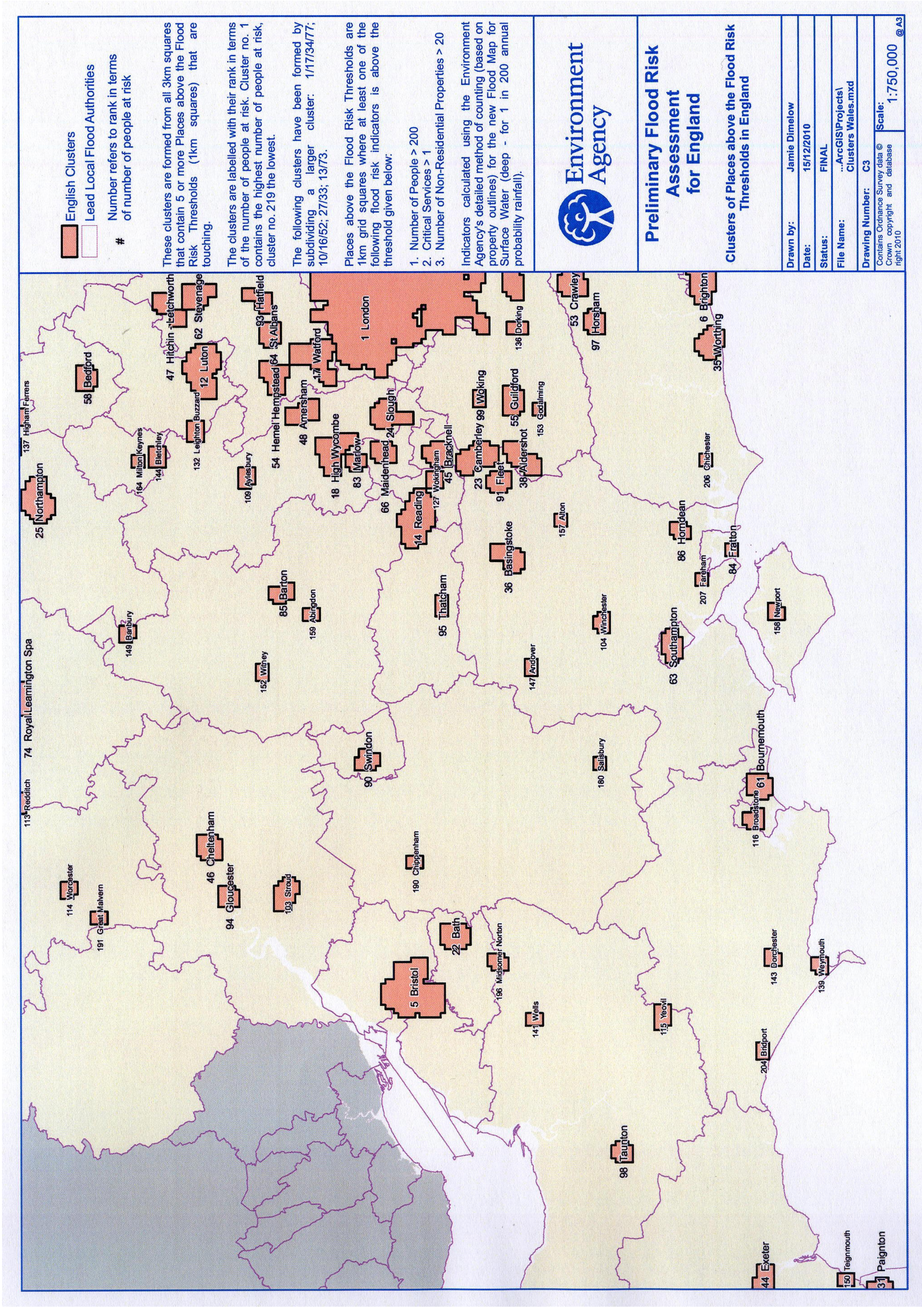
15. West Berkshire Submission Core Strategy Incorporating Changes: Examination Proposed Changes, West Berkshire Council, February 2011, Available from http://www.westberks.gov.uk/index.aspx?articleid=22168

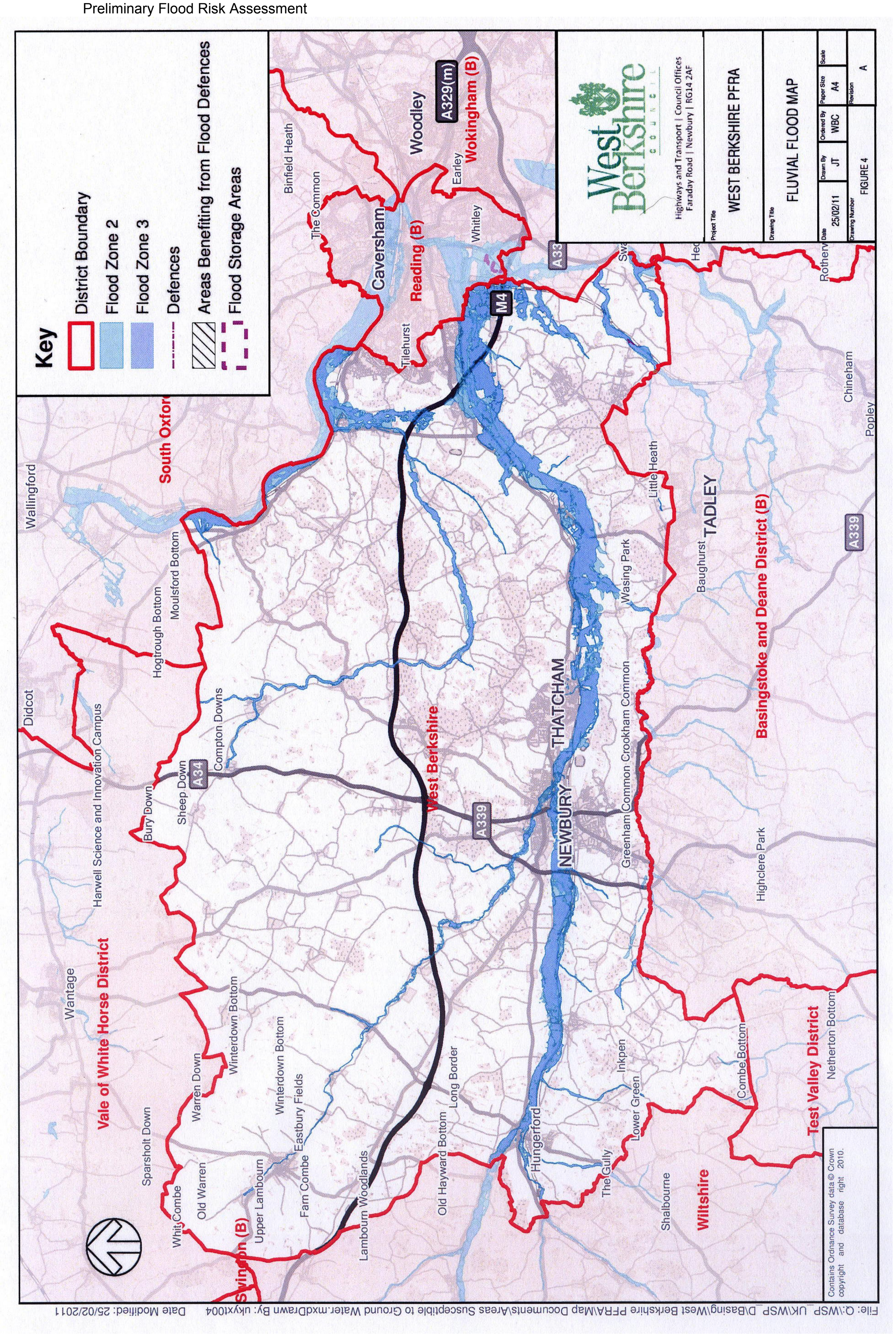
16. Local Flood Warning Plan for Berkshire, Environment Agency, 2010

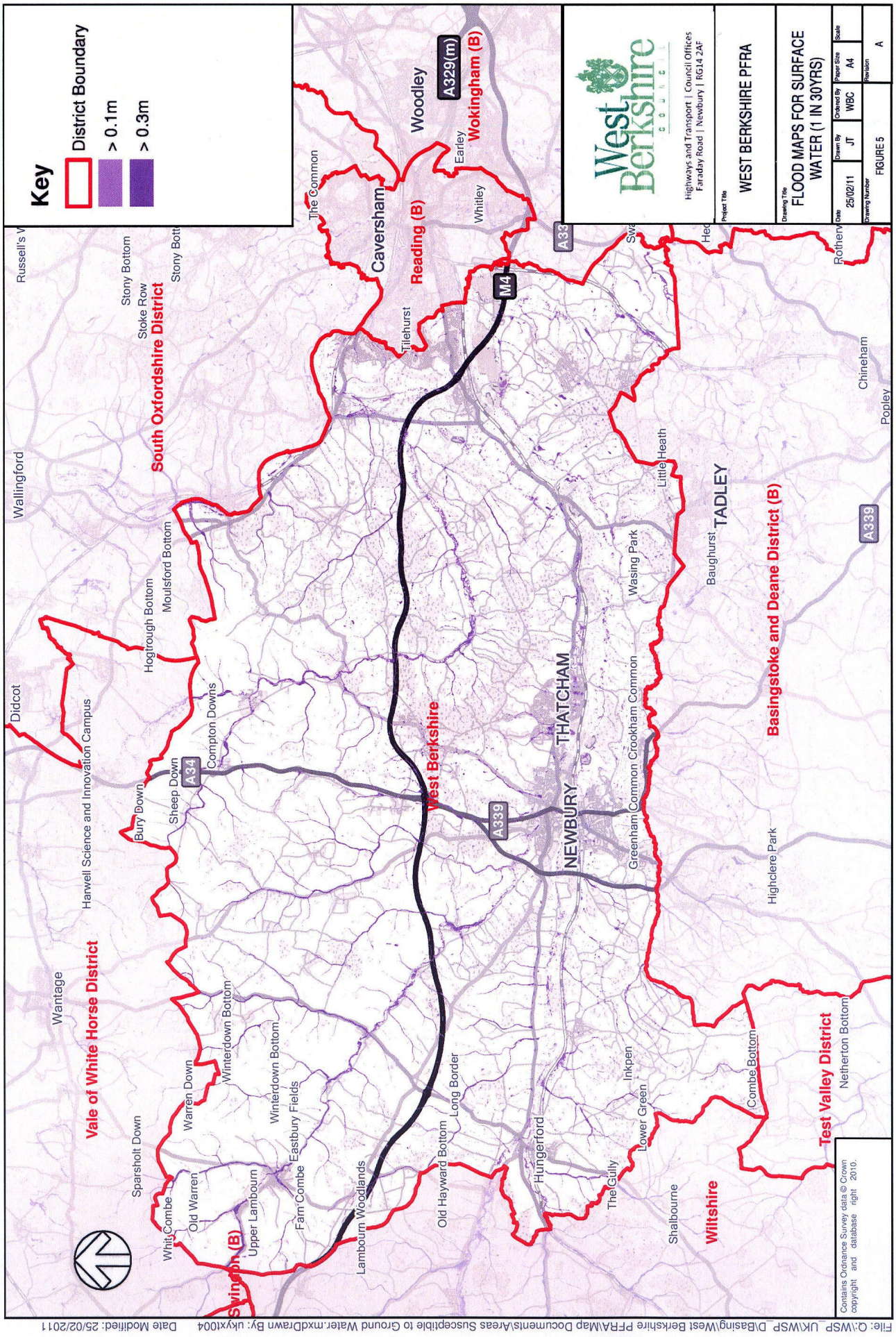
Resilience South formally GOSE Regional Resilience Team
Government Liaison teams focusing on the resilience for the south of England
Resilience South Flooding Sub Group
Sub Group of Resilience South Focusing on Flooding
Thames Valley Local Flood Resilience Forum (TVLFR)
A Partnership comprising representatives from local authorities, Police, Fire and Rescue, Ambulance Service, Environment Agency, NHS, Military, Public Utilities and Transport companies. The forum is represented by the Chief Executives and Senior Officers of the agencies and focuses on strategic resilience issues for the Thames Valley.
TVLFR Working Group
A partnership group of the TVLFR comprising practitioners who chair associated sub groups. The group ensures the coordination of sub group activities and manage the strategic objectives set by the TVLRF
TVLFR Flooding Sub Group
A sub group of the TVLFR working group focusing on all issues relating to flooding in the Thames Valley
Full Council
All elected Councillors of West Berkshire Council.
Executive
The main decision-making board of West Berkshire Council. Comprising Councillors from the ruling political party.
Corporate Board
West Berkshire Council's senior corporate management team comprising the Chief Executive and corporate directors provides management leadership, formal responses to the Executives policy direction, initiative for consideration by the Executive, co-ordination and commissioning of Council wide activities
Overview and Scrutiny Management Commission
Comprises elected Members of the West Berkshire Council, reflecting the political composition of the Council. The Commission examine or reviews the policies and services of West Berkshire Council and in some cases than of other organisations and partners to improve the lives of local people.

Table 5: Scrutiny and Review Groups


Indicative flood risk areas based on clusters formed from all 3km squares that contain 5 or more Places above the Flood Risk Thresholds (1km squares) that are touching.
Indicative flood risk areas are labelled with their location and the number of people at risk. Clusters with fewer than 30,000 people at risk have not been designated as indicative flood risk areas.
The Liverpool indicative flood risk area has been formed by subdividing a larger cluster along the River Mersey.
Indicators used to identify places above the flood risk thresholds :
1. Number of People > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20
Indicators calculated using the Environment Agency's detailed method of counting (based on property outlines).
The indicative Flood Risk Areas at Liverpool and Kingston upon Hull are formed from clusters of Places above Flood Risk Thresholds based on the Areas Susceptible to Surface Water Flooding map (intermediate - for 1 in 200 annual probability rainfall). All others are based on the new Flood Map for Surface Water (deep - for 1 in 200 annual probability rainfall)
North
Lead Local Flood Authorities
Indicative Flood Risk Areas from FMfSW
Indicative Flood Risk Areas from AStSW
Kingston upon Hull:
Grtr Manchester: 86491
Liverpool:
West Midlands: 130125
Leicester: 33064
Basildon: 39651
Bristol: 36681
London: 696805
Chatham & Gillingham: 31152
Brighton & Hove: 36412
0 10 20 30 40
km
Indicative Flood Risk Areas for England
These are to be used by Lead Local Flood Authorities as part of the process for identifying Flood Risk Areas under the Flood Risk Regulations as set out in the Environment Agency and Defra & WAG guidance on PFRAs.
Drawn by: Peter Robinson
Date: 15/12/2010
Status: DRAFT
File Name: ...\ArcGIS\Projects\IFRA Maps England.mxd
Drawing Number: IFRA_EE
Contains Ordnance Survey data © Crown copyright and database right 2010
Scale: 1:2,000,000
Original @ A3
Environment Agency


English Clusters
Lead Local Flood Authorities
Number refers to rank in terms of number of people at risk
These clusters are formed from all 3km squares that contain 5 or more Places above the Flood Risk Thresholds (1km squares) that are touching.
The clusters are labelled with their rank in terms of the number of people at risk. Cluster no. 1 contains the highest number of people at risk, cluster no. 219 the lowest.
The following clusters have been formed by subdividing a larger cluster: 1/17/34/77; 10/16/52; 27/33; 13/73.
Places above the Flood Risk Thresholds are 1km 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 Environment Agency's detailed method of counting (based on property outlines) for the new Flood Map for Surface Water (deep - for 1 in 200 annual probability rainfall).
Environment Agency
Preliminary Flood Risk Assessment for England
Clusters of Places above the Flood Risk Thresholds in England
Drawn by: Jamie Dimelow
Date: 15/12/2010
Status: FINAL
File Name: ...ArcGIS\Projects\Clusters Wales.mxd
Drawing Number: C3
Contains Ordnance Survey data © Crown copyright and database right 2010
Scale: 1:750,000 @ A3
1 London
5 Bristol
6 Brighton
12 Luton
14 Reading
17 Watford
18 High Wycombe
22 Bath
23 Camberley
24 Slough
25 Northampton
31 Paignton
35 Worthing
36 Basingstoke
38 Aldershot
44 Exeter
45 Bracknell
46 Cheltenham
47 Hitchin - Letchworth
48 Amersham
52 Guildford
53 Crawley
54 Hemel Hempstead
58 Bedford
61 Bournemouth
62 Stevenage
63 Southampton
64 St Albans
66 Maidenhead
74 Royal Leamington Spa
83 Marlow
84 Fratton
85 Barton
86 Horndean
90 Swindon
91 Fleet
93 Hatfield
94 Gloucester
95 Thatcham
97 Horsham
98 Taunton
99 Woking
103 Stroud
104 Winchester
109 Aylesbury
113 Redditch
114 Worcester
115 Yeovil
116 Broadstone
127 Wokingham
132 Leighton Buzzard
136 Dorking
137 Higham Ferrers
139 Weymouth
141 Wells
143 Dorchester
144 Bletchley
147 Andover
149 Banbury
150 Teignmouth
152 Witney
153 Godalming
157 Alton
158 Newport
159 Abingdon
164 Milton Keynes
180 Salisbury
190 Chippenham
191 Great Malvern
196 Midsomer Norton
204 Bridport
206 Chichester
207 Fareham


Key
District Boundary
Flood Zone 2
Flood Zone 3
Defences
Areas Benefiting from Flood Defences
Flood Storage Areas
West Berkshire Council
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
Project Title
WEST BERKSHIRE PFRA
Drawing Title
FLUVIAL FLOOD MAP
Date 25/02/11
Drawn By JT
Ordered By WBC
Paper Size A4
Drawing Number FIGURE 4
Revision A
Contains Ordnance Survey data © Crown copyright and database right 2010.
File: Q:\WSP_UK\WSP_D\Basing\West Berkshire PFRA\Map Documents\Areas Susceptible to Ground Water.mxdDrawn By: ukyx1004
Date Modified: 25/02/2011
West Berkshire
NEWBURY
THATCHAM
TADLEY
Caversham
Reading (B)
Woodley
Wokingham (B)
Earley
Whitley
Tilehurst
Vale of White Horse District
South Oxfordshire
Basingstoke and Deane District (B)
Test Valley District
Wiltshire
Swindon (B)
Wallingford
Didcot
Wantage
Harwell Science and Innovation Campus
Hungerford
M4
A34
A339
A33
A329(m)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District Boundary
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> 0.3m
West Berkshire
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
Project Title
WEST BERKSHIRE PFRA
Drawing Title
FLOOD MAPS FOR SURFACE WATER (1 IN 30YRS)
Date 25/02/11
Drawn By JT
Ordered By WBC
Paper Size A4
Drawing Number FIGURE 5
Revision A
Scale
Contains Ordnance Survey data © Crown copyright and database right 2010.
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Date Modified: 25/02/2011
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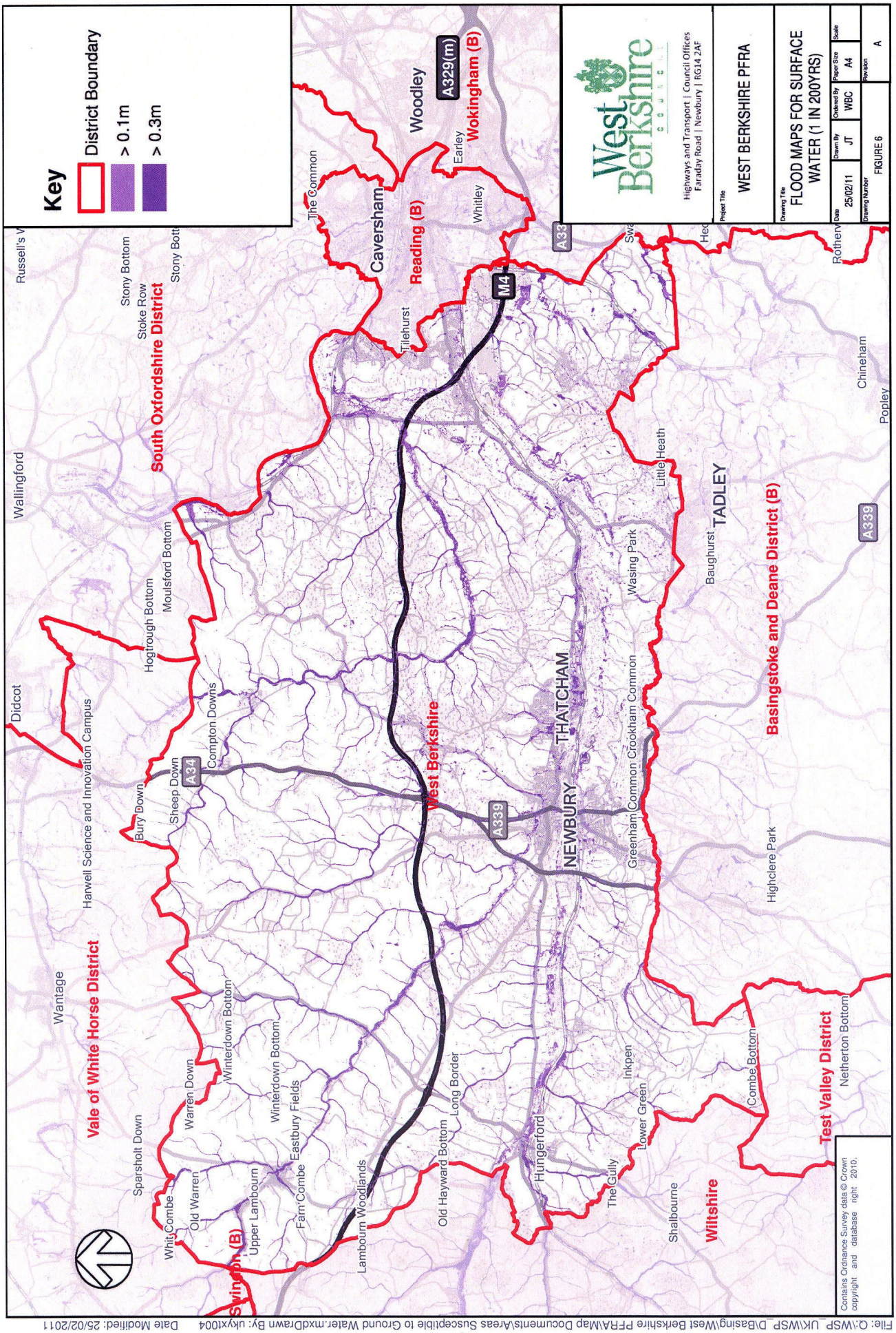
South Oxfordshire District
West Berkshire
Reading (B)
Wokingham (B)
Basingstoke and Deane District (B)
Test Valley District
Wiltshire
Swindon (B)
NEWBURY
THATCHAM
TADLEY
Caversham
Woodley
Earley
Whitley
Tilehurst
The Common
Wallingford
Didcot
Harwell Science and Innovation Campus
Wantage
Sparsholt Down
White Combe
Old Warren
Warren Down
Winterdown Bottom
Upper Lambourn
Farm Combe
Eastbury Fields
Lambourn Woodlands
Old Hayward Bottom
Long Border
Hungerford
The Gully
Inkpen
Lower Green
Shalbourne
Combe Bottom
Netherton Bottom
Highclere Park
Greenham Common
Crookham Common
Wasing Park
Little Heath
Baughurst
Chineham
Popley
Rotherwick
Hogtrough Bottom
Moulsford Bottom
Stoke Row
Stony Bottom
Bury Down
Sheep Down
Compton Downs
A34
A339
A329(m)
M4


Key
District Boundary
> 0.1m
> 0.3m
West Berkshire Council
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
Project Title
WEST BERKSHIRE PFRA
Drawing Title
FLOOD MAPS FOR SURFACE WATER (1 IN 200YRS)
Date 25/02/11
Drawn By JT
Ordered By WBC
Paper Size A4
Scale
Drawing Number FIGURE 6
Revision A
Contains Ordnance Survey data © Crown copyright and database right 2010.
File: C:\WSP_UK\WSP_D\Basing\West Berkshire PFRA\Map Documents\Areas Susceptible to Ground Water.mxd Drawn By: ukyx1004 Date Modified: 25/02/2011
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South Oxfordshire District
West Berkshire
Basingstoke and Deane District (B)
Test Valley District
Wiltshire
Reading (B)
Wokingham (B)
Swindon (B)
NEWBURY
THATCHAM
TADLEY
Caversham
Woodley
Earley
Whitley
Tilehurst
The Common
Wallingford
Didcot
Wantage
Harwell Science and Innovation Campus
Russell's W
Stony Bottom
Stoke Row
Stony Bott
Hogtrough Bottom
Moulsford Bottom
Bury Down
Sheep Down
Compton Downs
Sparsholt Down
Warren Down
Winterdown Bottom
Winterdown Bottom
Eastbury Fields
Farm Combe
Upper Lambourn
Old Warren
White Combe
Lambourn Woodlands
Old Hayward Bottom
Long Border
Hungerford
The Gully
Lower Green
Inkpen
Shalbourne
Combe Bottom
Netherton Bottom
Highclere Park
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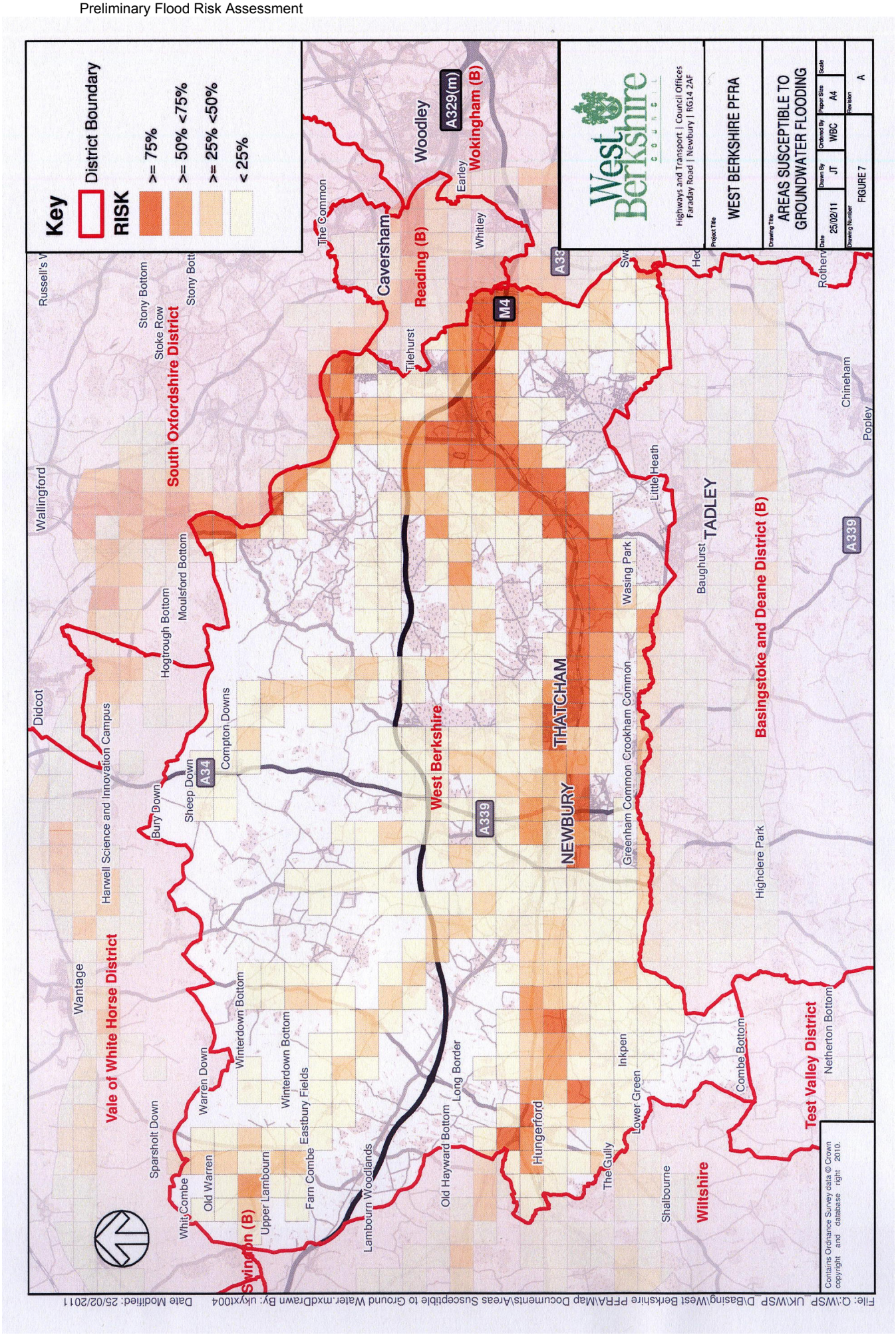
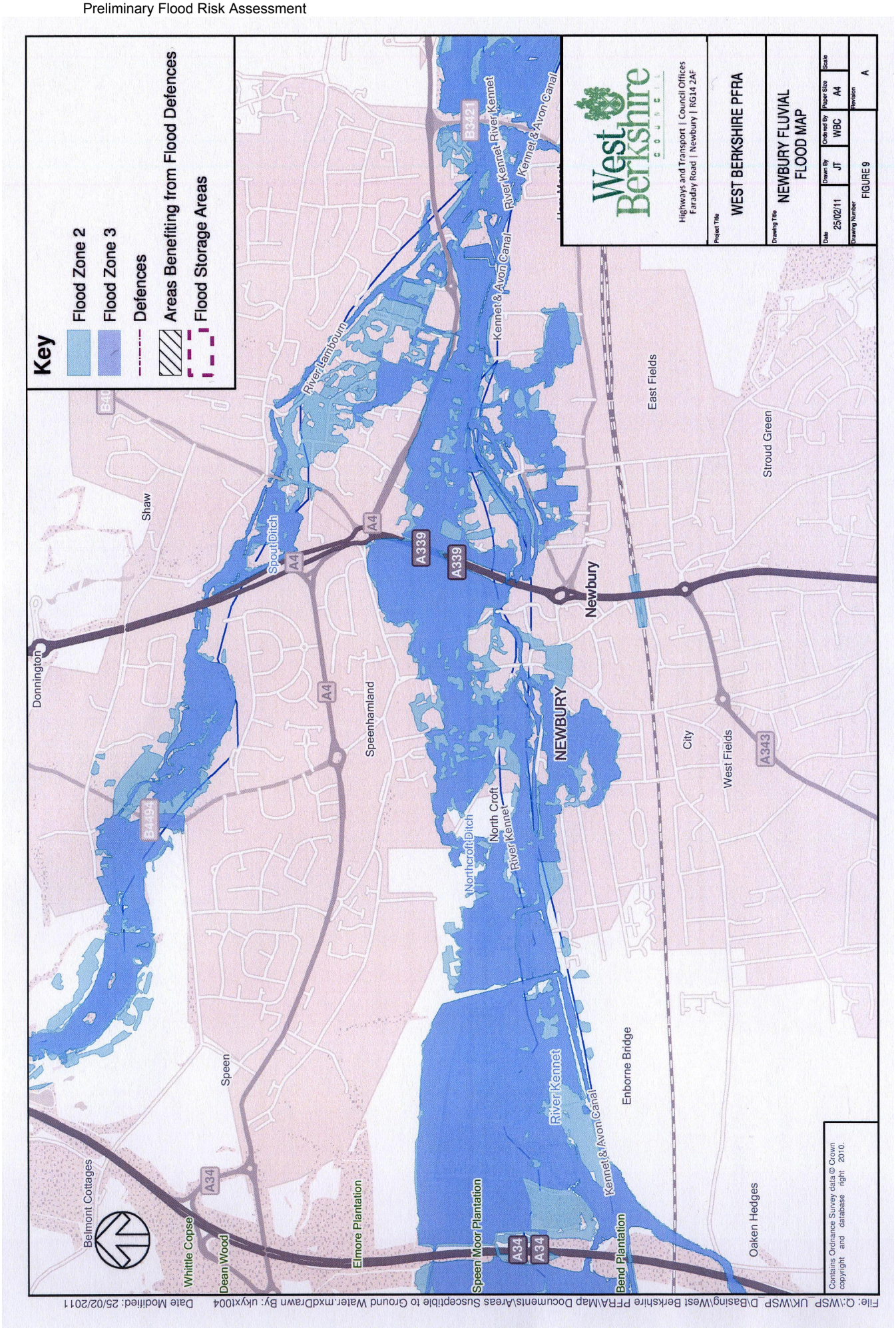
Wasing Park
Baughurst
Little Heath
Chineham
Popley
A34
A339
M4
A329(m)


Key
District Boundary
RISK
>= 75%
>= 50% <75%
>= 25% <50%
< 25%
West Berkshire Council
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
WEST BERKSHIRE PFRA
AREAS SUSCEPTIBLE TO GROUNDWATER FLOODING
25/02/11
JT
WBC
A4
FIGURE 7
A
Contains Ordnance Survey data © Crown copyright and database right 2010.
Vale of White Horse District
South Oxfordshire District
West Berkshire
Basingstoke and Deane District (B)
Test Valley District
Wiltshire
Swindon (B)
Reading (B)
Wokingham (B)
Wallingford
Didcot
Wantage
Harwell Science and Innovation Campus
Caversham
Woodley
Earley
Whiteley
Tilehurst
Tile Common
Stony Bottom
Stoke Row
Hogtrough Bottom
Moulsford Bottom
Sheep Down
Bury Down
Compton Downs
Sparsholt Down
Warren Down
Winterdown Bottom
Eastbury Fields
Farn Combe
Upper Lambourn
Old Warren
Whitcombe
Lambourn Woodlands
Old Hayward Bottom
Long Border
Hungerford
The Gully
Lower Green
Inkpen
Shalbourne
Combe Bottom
Netherton Bottom
NEWBURY
THATCHAM
Greenham Common
Crookham Common
Wasing Park
Little Heath
Baughurst
TADLEY
Highclere Park
Chineham
Popley
Rotherwick
A34
A339
A329(m)
M4
File: O:\WSP_UK\WSP_D\Basing\West Berkshire PFRA\Map Documents\Areas Susceptible to Ground Water.mxdDrawn By: ukyx1004
Date Modified: 25/02/2011

Note:
1) No flooding is shown with a depth below 50mm.
Legend
(Depth in m)
0.05 to 0.25
0.25 to 0.50
0.50 to 0.75
0.75 to 1.00
Greater than 1.0 m
DRAWING STATUS:
FOR INFORMATION ONLY
WSP
Mountbatten House, Basing View, Basingstoke, Hampshire RG21 4HJ
Tel:+44 (0) 1256 318800 Fax: +44 (0)1256 318700
http://www.wspgroup.com
CLIENT:
WEST BERKSHIRE COUNCIL
PROJECT:
THATCHAM SURFACE WATER MANAGEMENT PLAN
TITLE:
FLOOD DEPTH AND EXTENT MAP (Option 1: 1 IN 237 YEAR EVENT)
PROJECT NO:
11012465
FIGURE NO:
16
REV:
A
© WSP Group plc
Upper Bucklebury
Harts Hill Road
Hart's Hill
Stoney Lane
Allotment Garden
Kennet School
Commercial Area
London Road (A4)
Aldermoor Water
Depot
Electricity Sub Station
Thatcham Train Station
Pipers Way Balancing Pond
Kennet Lea Estate
Kennet Heath Estate
Station Road
Brown Field Road
Dunston Park
Cold Ash
Ashmore Green
Tull Way
Hermitage Sport Field
Hospital
Bath Road
Lower Way
London Road (A4)
Sewage Works
The Moors
Moor Ditch
Kennet and Avon Canal
River Kennet
0
0.5
1
kilometers


Key
Flood Zone 2
Flood Zone 3
Defences
Areas Benefiting from Flood Defences
Flood Storage Areas
West Berkshire Council
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
WEST BERKSHIRE PFRA
NEWBURY FLUVIAL FLOOD MAP
Date 25/02/11
Drawn By JT
Ordered By WBC
Paper Size A4
Scale
Drawing Number FIGURE 9
Revision A
Contains Ordinance Survey data © Crown copyright and database right 2010.
Donnington
Shaw
Speen
Belmont Cottages
Whittle Copse
Dean Wood
Elmore Plantation
Speen Moor Plantation
Bend Plantation
Oaken Hedges
Speenhamland
NEWBURY
Newbury
North Croft
Northcroft Ditch
River Kennet
Kennet & Avon Canal
River Lambourn
Spout Ditch
East Fields
City
West Fields
Stroud Green
Enborne Bridge
A4
A34
A339
A343
B4494
B3421
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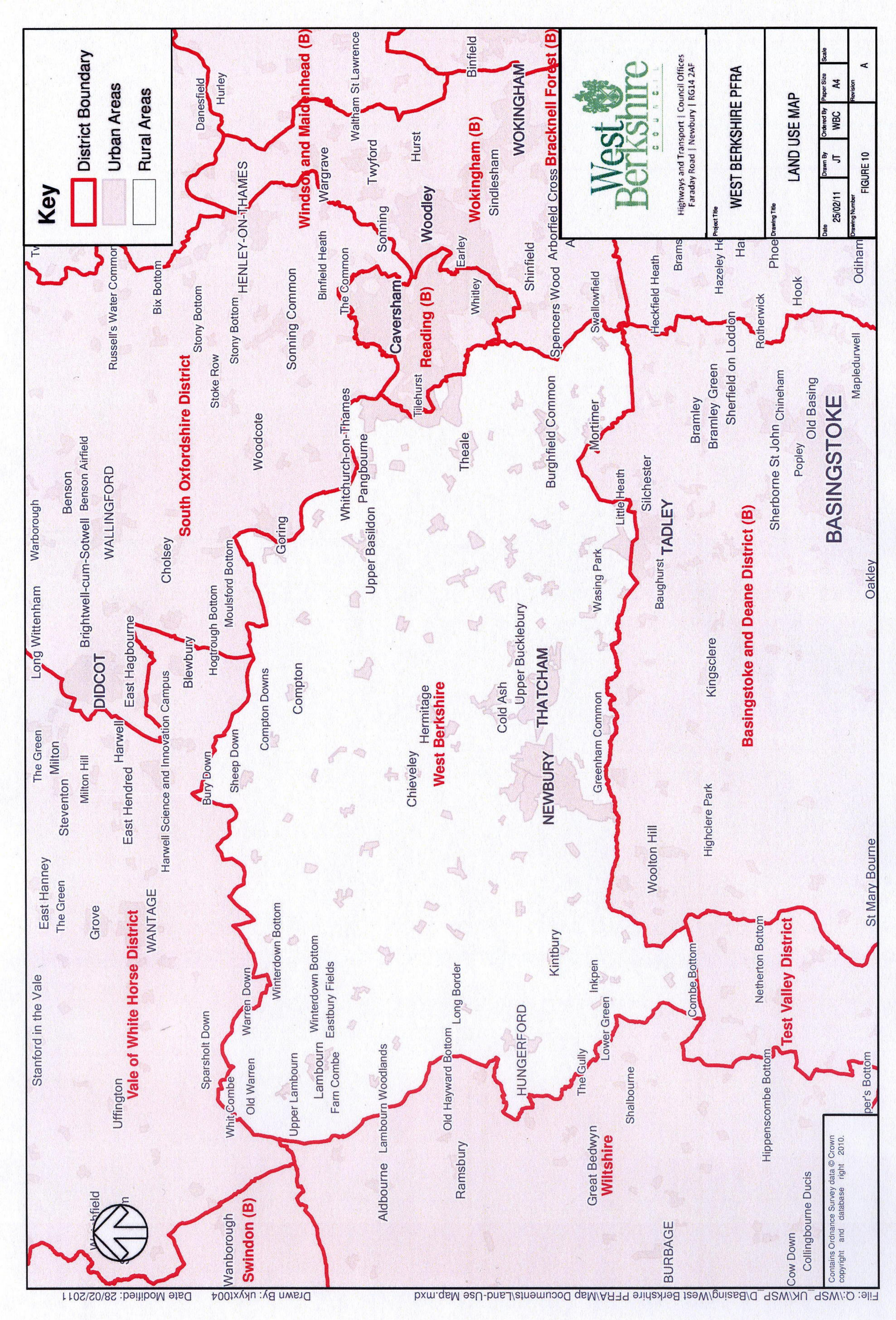
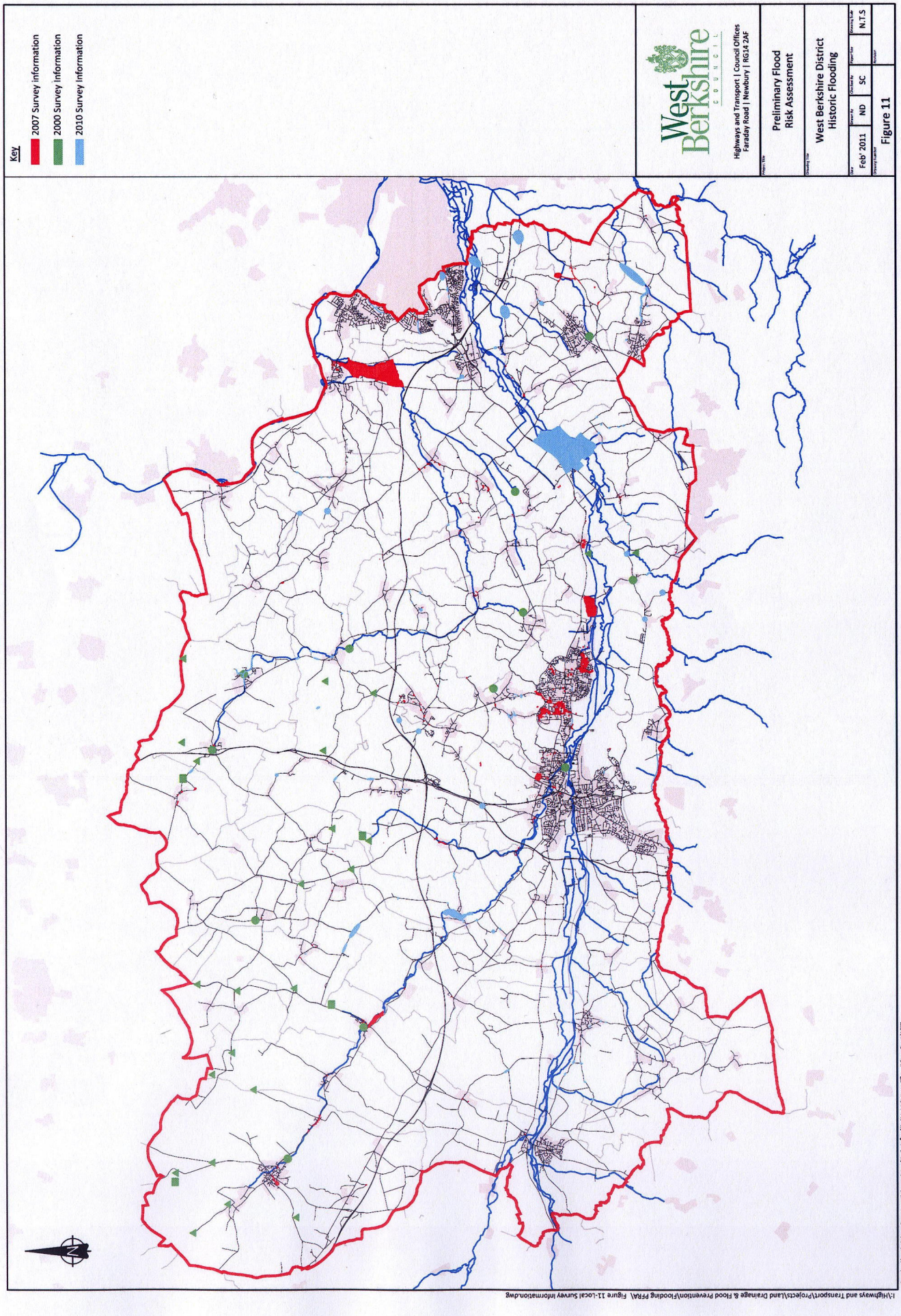
Date Modified: 25/02/2011


Key
District Boundary
Urban Areas
Rural Areas
West Berkshire Council
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
WEST BERKSHIRE PFRA
LAND USE MAP
25/02/11
JT
WBC
A4
A
FIGURE 10
Contains Ordnance Survey data © Crown copyright and database right 2010.
File: Q:\WSP_UK\WSP_D\Basing\West Berkshire PFRA\Map Documents\Land-Use Map.mxd
Drawn By: ukyx1004
Date Modified: 28/02/2011
West Berkshire
NEWBURY
THATCHAM
HUNGERFORD
Vale of White Horse District
South Oxfordshire District
Windsor and Maidenhead (B)
Wokingham (B)
Bracknell Forest (B)
Reading (B)
Basingstoke and Deane District (B)
Test Valley District
Wiltshire
Swindon (B)
DIDCOT
WANTAGE
WALLINGFORD
HENLEY-ON-THAMES
WOKINGHAM
TADLEY
BASINGSTOKE
BURBAGE


Key
2007 Survey information
2000 Survey information
2010 Survey information
West Berkshire COUNCIL
Highways and Transport | Council Offices
Faraday Road | Newbury | RG14 2AF
Preliminary Flood Risk Assessment
West Berkshire District Historic Flooding
Feb' 2011
ND
SC
N.T.S
Figure 11
N
I:\Highways and Transport\Projects\Land Drainage & Flood Prevention\Flooding PFRA\ Figure 11-Local Surrey information.dwg

Annex 5: Section of Flood Risk Photos.

The following photos were acquired from a number of sources; these photos represent the issues relating to surface water flooding across West Berkshire.

Station Road, Thatcham

Betteridge Road, Thatcham

Stoney Lane, Thatcham

Newbury Railway Station

Kennet School, Thatcham

Vodafone UK Headquarters north of Newbury

The following photos were acquired from a number of sources; these photos represent the issues relating to surface water flooding across West Berkshire.

Bourne Road, Pangbourne

Trinity School, Love Lane, Shaw, near Newbury

Aldermaston Railway Station

Evacuation of Aldermaston Primary School, Aldermaston

A34 Chieveley south of M4 Junction 13

Oak End Way, Lower Padworth