Reading Borough Council

Local Flood Risk Management Strategy

On behalf of

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Contents

Non-Technical Summary **1**
Report Overview 1
Report Structure and Contents 1
1 Introduction **3**
1.1 Purpose of the Strategy 3
1.2 Production of the Strategy 3
2 Roles and Responsibilities **5**
2.1 The Environment Agency 5
2.2 Lead Local Flood Authority 5
2.3 Risk Management Authorities 7
3 Flood Risk Management Strategy **9**
3.1 National Flood Risk Management Strategy 9
3.2 Local Flood Risk Management Strategy 10
4 Action Plan **15**
5 Local Flood Risk **21**
5.1 Background 21
5.2 Local Flood Risk 20
5.3 Historic Flooding 21
5.4 Asset Maintenance 22
6 Sustainable Development **23**
6.1 Climate Change 23
6.2 Implication on Flood Risk 23
6.3 Adapting to Climate Change 24
6.4 Sustainable Drainage Systems (SuDS) 24
7 Environmental Assessment **25**
7.1 Strategic Environmental Assessment 25
7.2 The Natural Environment and Rural Communities Act 2006 29
7.3 Trees and landscaping 30
7.4 Water Framework Directive 30
8 Funding Options **31**
9 Next Steps **35**
9.1 Consultation Process 35
9.2 Ongoing review and Scrutiny 35

Figures

Figure 2.1: Main Rivers across Reading Borough 5
Figure 3.1: Departments within Reading Borough Council that may be impacted by this strategy and local flood risk. 13
Figure 4.1: Location of Local Flood Risk Areas 19
Figure 5.1: Reading Borough Authority Boundary 21
Figure 5.3: Source-pathway-Receptor Model for Flood Risk Analysis (source: Foresight Flood and Coastal Defence Project, 2003) 20
Figure 7.1: SEA Processes 26

Tables

Table 2.1: Roles & Responsibilities of LLFA 6
Table 3.1: Reading Borough Objectives for Local Flood Risk Management 12
Table 4.1: Local Flood Risk Areas 15
Table 7.1: Example Assessment Table 29

Appendices

Appendix A Glossary
Appendix B Berkshire 5 Overarching Local Flood Risk Management Strategy
Appendix C Local Flood Risk Priority Areas
Appendix D Strategic Environmental Assessment

Non-Technical Summary

Report Overview

Following the flooding experienced across the UK in 2007 the Government gave local authorities new responsibilities and powers to manage and co-ordinate local flood risk. The Flood Risk Regulations 2009 and the Flood and Water Management Act 2010 require Reading Borough Council to lead the co-ordination of flood risk management for surface water, groundwater and ordinary (smaller) watercourses under the designation Lead Local Flood Authority. Flood risk from the sea, Main Rivers and reservoirs remains the responsibility of the Environment Agency.

A key component of the Flood and Water Management Act 2010 is for Lead Local Flood Authorities to 'develop, maintain, apply and monitor a strategy for local flood risk management in its area'. Reading Borough Council has therefore produced this Local Flood Risk Management Strategy to provide the vision and the direction required to enable local flood risk management in Reading in a manner that is consistent with the National Flood and Coastal Erosion Risk Management Strategy published by DEFRA and the Environment Agency.

This Strategy identifies the existing areas of flood risk in Reading, establishes priorities for managing local flood risk, and identifies how Reading Borough Council will work with other neighbouring authorities, stakeholders, and local communities to manage flood risk. The report aims to provide an overview of on-going flood risk mitigation work underway across Reading and set out the long term strategy for flood risk management.

The Strategy also brings together relevant information contained within other reports and plans to ensure a consistent approach to addressing flood risk in Reading. In doing so Reading Borough Council aim to help communities understand the risks, how they can help to manage them and also the role of other Risk Management Authorities.

Managing flood risk is an ongoing activity which will see continual improvements over time as a better understanding of local flood risk is developed. As such, this Strategy and the Action Plan it contains are live documents and will be reviewed and updated by Reading Borough Council to ensure that it continues to reflect the Councils work to reduce flood risk across Reading.

Report Structure and Contents

Sections 1 and 2 - Introduction and Roles and Responsibilities: Introduce the requirements and purpose of a Local Flood Risk Management Strategy, the associated legislation and the roles and responsibilities of the various Risk Management Authorities. These include the Environment Agency and Thames Water Utilities Limited for the Reading area.

Section 3 - Flood Risk Management Strategy: Discusses how the Local Flood Risk Management Strategy complies with both national and regional objectives, and introduces the Berkshire 5 Partnership (Bracknell Forest Council, The Royal Borough of Windsor and Maidenhead, West Berkshire Council, Wokingham Borough Council and Reading Borough Council). This section also explains how records of flooding within Reading have been used to define Local Flood Risk Priority Areas, depicted on the plan contained within Appendix C, and considers how these can be mitigated. These mitigation measures have then be put into an Action Plan (Section 4) which Reading Borough Council will use to promote and programme the work.

Sections 5 and 6 - Local Flood Risk and Sustainable Development: Provide background on flood risk in the area, explain where the data used to inform the Strategy and identify Local

Flood Risk Priority Areas has been taken from, and explains how Reading Borough Council are looking to mitigate the effects of climate change through the promotion and use of sustainable development.

Section 7 - Environmental Assessment: Explains that in accordance with European Union Directive 2001/42/EC the initial stages of a Strategic Environmental Assessment (steps 1 to 4) have been undertaken to identify, describe and evaluate the likely environmental effects of implementing the Strategy and that this will need to be further developed (steps 5 to 7) as items of proposed work are taken forward. A copy of the Strategic Environmental Assessment Scoping Report is contained in Appendix D.

Sections 8 and 9 - Funding Options and Next Steps: Discuss the potential funding sources for the various mitigation measures put forward within the Action Plan (Section 4) and confirm the next steps with regards to promoting the Strategy and its ongoing review and security. Section 9 also confirms that the Strategy will be reviewed following any severe local flooding events in the Reading area.

1 Introduction

Flooding is a naturally occurring phenomenon, and will occur despite best efforts to prevent it. Appropriate management of the flood risk however can help reduce the consequences of flooding.

Reading Borough is susceptible to both Fluvial (River) and Pluvial (Surface Water) flooding, In 2007 extreme rainfall caused significant flooding in multiple areas throughout the UK including Reading Borough. In 2007 all property flooding in Reading Borough occurred from Surface Water, and whilst the Fluvial Floodplains did flood, no fluvial property flooding occurred on that occasion. In January and February 2014 an exceptionally warm and wet winter caused significant fluvial property flooding within Reading Borough, and on this occasion no surface water flooding of properties occurred.

The Government has given local authorities new responsibilities and powers to manage and coordinate local flood risk through the Flood Risk Regulations 2009 (FRR), which transpose the EU Floods Directive 2007/60/EC into UK law, and the Flood and Water Management Act 2010 (FWMA). Both the FRR and FWMA introduce the concept of Lead Local Flood Authorities (LLFA), which are either County Councils or Unitary Authorities, who are now responsible for local flood risk management. These new responsibilities relate to 'local' flood risk sources which consist of ordinary watercourses, surface water and ground water. Under the FWMA Flood Risk from coastal, 'Main' Rivers and reservoirs remains the responsibility of the Environment Agency (EA).

This report has been prepared on behalf of Reading Borough Council (RBC) as the LLFA in accordance with the requirements of the FRR and the FWMA.

A key component of the FWMA is for LLFA's to *'develop, maintain, apply and monitor a strategy for local flood risk management in its area'*. The RBC Local Flood Risk Management Strategy (Local Strategy or LFRMS) provides the vision and direction to enable local flood risk management in Reading, and must be consistent with the National Flood and Coastal Erosion Risk Management Strategy (NFCERMS) published by DEFRA and the EA.

1.1 Purpose of the Strategy

The RBC Local Strategy aims to; increase awareness of local flood risk issues; provide an overview of the on-going flood risk mitigation work underway across Reading; and set out the long term strategy for flood risk management. It identifies the extent of flood risk in Reading, establishes priorities for managing local flood risk, and identifies how RBC will work together with other Risk Management Authorities, stakeholders, and local communities to manage local flood risk.

1.2 Production of the Strategy

The Strategy has been produced in accordance with the requirements of the FWMA, which are specified within section 9 of the Act.

'The strategy must specify-

- *the risk management authorities in the authority's area,*
- *the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area,*
- *the objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009),*
- *the measures proposed to achieve those objectives,*
- *how and when the measures are expected to be implemented,*
- *the costs and benefits of those measures, and how they are to be paid for,*

- *the assessment of local flood risk for the purpose of the strategy,*
- *how and when the strategy is to be reviewed, and*
- *how the strategy contributes to the achievement of wider environmental objectives.'*

(FWMA 2010)

The first step in the production of the RBC Local Strategy was the completion of an Overarching Flood Risk Management Strategy for the wider Berkshire area. This report was produced for the 'Berkshire 5' group, which comprises five of the unitary authorities and hence the LLFAs within Berkshire. The Berkshire 5 Strategy highlights priority areas within the county which should be investigated further within the individual authorities' local strategies (Refer to **Appendix B**).

To develop the RBC Local Strategy an initial workshop was held with multiple RBC Departments that may be influenced by flooding to ensure that their knowledge and experiences are incorporated into the Strategy. This approach of collaboration and coordination between departments and stakeholders was taken to ensure consistent management of flood risk within the borough.

2 Roles and Responsibilities

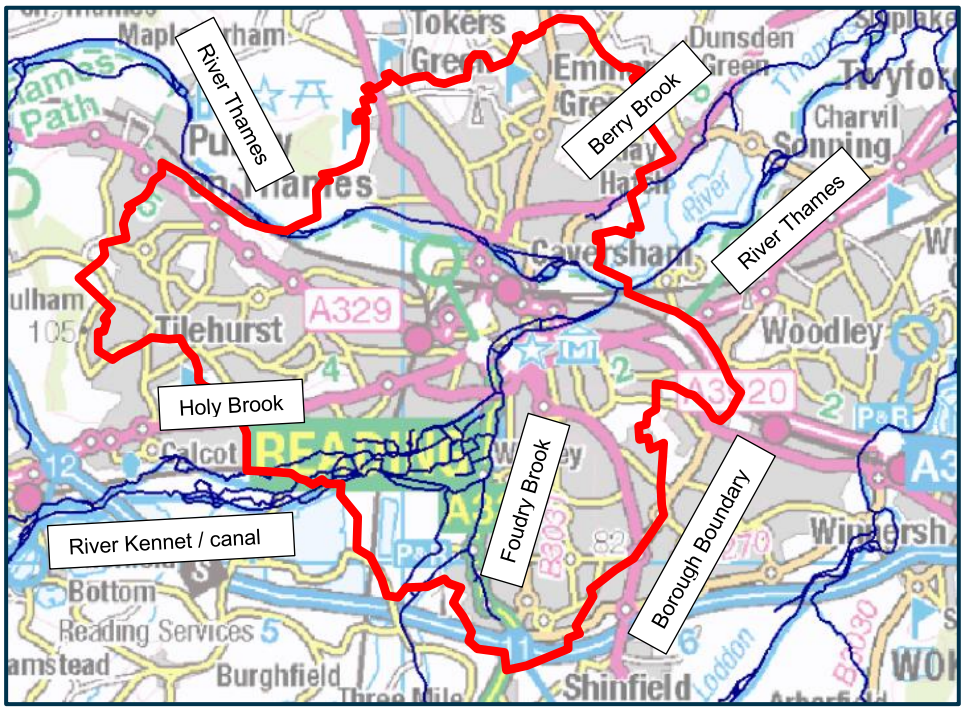
2.1 The Environment Agency

Within Reading Borough the EA remains responsible for managing fluvial river flood risk from all 'Main Rivers' and reservoirs. The 'Main Rivers' in Reading Borough are defined as follows:

- The River Thames
- The River Kennet
- The Kennet and Avon Canal
- The Foudry Brook
- The Holy Brook
- The Berry Brook

Many of the associated tributaries to these rivers are also classified as Main River and are highlighted in dark blue on figure 2.1 below.

Figure 2.1: Main Rivers across Reading Borough



2.2 Lead Local Flood Authority

In accordance with Section 6 of the FWMA the LLFA role is performed by the unitary authority for the area, or, if there is no unitary authority, the County Council. Reading Borough is a unitary authority and in its new role as LLFA it is responsible for local flood risk management from sources which consist of ordinary watercourses, surface water and ground water. Table 2.1 below contains details of RBC's new responsibilities as a LLFA.

Table 2.1: Roles & Responsibilities of LLFA

Legislation	Responsibility	Details
FWMA Section 9	**Prepare a Local Strategy for Flood Risk Management**	LLFAs are required to develop, maintain, apply and monitor a local flood risk management strategy for all local sources of flooding within their area, in consultation with other Risk Management Authorities and the public
FWMA Section 19	**Investigation of flood incidents**	LLFAs have a duty to co-ordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notify risk management authorities where necessary and publish the results of any investigations carried out.
FWMA Section 21	**Preparation of an asset register**	LLFAs have a duty to establish and maintain: (a) a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on a flood risk in its area, and (b) a record of information about each of those structures or features, including information about ownership and state of repair. The LLFA must ensure that the register is available for inspection at all reasonable times. In addition, the Secretary of State may, by regulations, make provision for specified contents to be added or removed from the register and record. RBC's Register of structures affecting flood risk and associated map showing the location of each structure can be viewed at all reasonable times at RBC's offices.]
FWMA Section 27	**Sustainable development**	In exercising its flood management function the LLFA must aim to make a contribution towards the achievement of sustainable development
FWMA Section 30 (Schedule 1)	**Power to designate flood management structures**	LLFAs, as well as other flood management authorities have powers to designate structures and features that affect flooding in order to safeguard assets that are relied upon for flood risk management.
FMWA Section 31 (Schedule 2 – Land Drainage Act 1991)	**Flood Risk Management Works**	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.
FMWA Section 31 (Schedule 2 – Land Drainage Act 1991)	**Consenting Changes to Ordinary Watercourses**	If riparian owners wish to culvert an ordinary watercourse or undertake works that will obstruct the flow, consent is required from the LLFA.
FWMA Section 32 (Schedule 3)	**Sustainable Drainage Systems (SuDS) Approval Body**	On the 18th of December 2014, Defra published a written statement [(1)] to parliament explaining how Defra will be strengthening existing planning policy so that sustainable drainage system will be provided in new developments wherever this is appropriate. This proposal is set to replace the implementation of Schedule 3 of the FWMA, which would have made the Council responsible for the approval and adoption of Sustainable Drainage Systems. Initially this decision will apply to major development - developments of 10 dwellings or more; or equivalent non-residential or mixed development). Planning Applications will need to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate. These changes will take effect on from 6th of April 2015.

		At the time of writing this report, Defra are consulting on a proposal[(2)] to make LLFAs a statutory consultee on planning applications for surface water management; and to makes changes to the statutory consultee role of the Environment Agency to better reflect the Agency's strategic expertise and reflect the new responsibilities for local flood management exercised by lead local flood authorities. The maintenance of SuDS Assets in perpetuity will need to be defined by the Developer and agreed with the LLFA and Planners. Each SuDS asset that is deemed to perform a flood defence function will need to be recorded on the LLFA's asset register.

[1] Defra (2014) Written statement to Parliament Sustainable drainage systems

[2] Defra (2014) Consultation on measures aimed at ensuring more effective provision of advice to local planning authorities in relation to surface water drainage management.

2.3 Risk Management Authorities

The FWMA sets out a risk based approach to the management of flood risk through the development of a National Strategy by the EA and Local Strategies by the LLFAs, with a partnership working principle with other Risk Management Authorities.

Definition of Risk Management

The FWMA defines Risk Management as *'anything done for the purpose of*

a) Analysing a risk

b) Assessing a risk

c) Reducing a risk

d) Reducing a component in the assessment of a risk

e) Altering the balance of factors combined in assessing a risk, or

f) Otherwise taking action in respect of a risk ore a factor relevant to the assessment of a risk (including action for the purpose of flood defence).

Risk Management Authorities are defined within the FWMA 2010 as:

- the EA,
- a Lead Local Flood Authority,
- a District Council for an area for which there is no Unitary Authority,
- an Internal Drainage Board,
- a Water and Sewerage Company (WaSC), and
- a Highway Authority.

The relevant Risk Management Authorities in Reading Borough are:

- RBC - LLFA and Highway Authority.
- The EA.
- Thames Water Utilities Limited - WaSC.
- Highways Agency - Highway Authority.

Table 2.2 sets out the Lead Organisation for each responsibility in relation to Flood Risk Management.

Table 2.2: Flood Risk Responsibilities and Lead Organisations

Responsibility	Lead Organisation
The strategic overview for all forms of flooding.	Environment Agency
Development of the National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England.	Environment Agency
Management of flood risk from main rivers	Environment Agency
Management of flood risk from ordinary watercourses	Reading Borough Council, riparian owners
Management of flood risk from surface water runoff	Reading Borough Council, land owners
Management of flood risk from groundwater	Reading Borough Council
Management of flood risk from highway drainage	The Highways Agency or Reading Borough Council
Management of flood risk from sewers	Thames Water Utilities Limited
Enforcement of flood risk management from statutory reservoirs above 25,000m³ (The Flood & Water Management Act will change this figure to 10,000m³ capacity when relevant provisions are commenced)	The Environment Agency is the enforcement authority; the reservoir undertaker must comply with the Reservoirs Act and future provisions within the Flood and Water Management Act.
Flood incident management	All relevant authorities and emergency services and other utilities under the Civil Contingencies Act 2004.
Recovery after a flood	Reading Borough Council, working through local resilience forums (LRFs).

3 Flood Risk Management Strategy

3.1 National Flood Risk Management Strategy

National Objectives

The FWMA requires Local Strategies to be consistent with the National Flood and Coastal Erosion Risk Management Strategy (NFCERMS). As such the RBC Local Strategy has been produced in accordance with the overall aims and objectives of the NFCERMS and with the six guiding principles.

The six guiding principles of the NFCERMS are:

- Community focus and partnership working,
- A catchment based approach;
- Sustainability;
- Proportionate, risk based approaches;
- Multiple benefits;
- Beneficiaries should be allowed and encourages investing in local risk management.

The NFCERMS identifies the need for careful planning to help ensure that appropriate, sustainable options are selected when considering flood risk management at a local level. The RBC Local Strategy provides an opportunity to present a clear picture of what will be done to manage flood risk, and bring together relevant information contained within other plans to ensure a consistent approach across the borough when addressing flood risk. In doing so RBC will help communities to understand the risks, what they can do to manage them and how the risk management authorities can help.

Information sharing is the cornerstone to effective joint working. The approach taken in developing this Strategy advocates consultation with partner organisations to better understand the range of flood issues that they face. Through collaboration clear objectives can be set and success measured both now and in the future with all Partner organisations sharing the operational information required to investigate, develop and provide the best solutions to flood risk issues. It is important then, that the Strategy is a publicly accessible document that enables local people to access information about is the measures that are already in place to manage flood risk, as well as work that is planned to improve protection.

Effective cross boundary working is also important in managing flood risk and land drainage between neighbouring areas and for drainage systems that cross administrative boundaries. This means working closely with the other authorities, especially neighbouring authorities West Berkshire Council and Wokingham Borough Council.

The Berkshire 5 and the Overarching Local Flood Risk Management Strategy

The Berkshire 5 is a partnership formed between five of the Berkshire Unitary Authorities, all of which have been designated as LLFAs. The partnership comprised Bracknell Forest Council, The Royal Borough of Windsor and Maidenhead, West Berkshire Council, Wokingham Borough Council and Reading Borough Council (RBC). These authorities all share a hydrological catchment boundary and therefore it was deemed appropriate to produce an overarching strategy which identifies the principal flood risk issues across the county. The assessment of flood risk within each borough was completed

using each borough's Strategic Flood Risk Assessment (SFRA) and Preliminary Flood Risk Assessment (PRFA).

The Berkshire 5 Overarching Local Flood Risk Management Strategy (Berkshire 5 Strategy) was undertaken to help guide each of the five LLFA in the creation of their local, more detailed strategy. It set out the overarching principles which each authority will follow when completing their own detailed strategies and associated Action Plans.

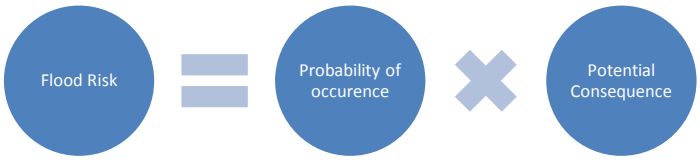
The Berkshire 5 Strategy highlights priority flood risk areas within each borough based on 500m² grid areas, this provides an overview of the flood risk within the borough. This information is based on the EA's modelled surface water and groundwater flood risk maps together with anecdotal evidence of flooding based on local authority flood records. Where the two data sets overlapped 'priority' flood areas were identified.

The Berkshire 5 Overarching Strategy Mapping is contained within **Appendix B**

3.2 Local Flood Risk Management Strategy

What is Flood Risk?

The FWMA defines flood risk as a 'combination of the probability of the occurrence with its potential consequences.'



The consequences of a flooding event can affect the following:

- Human Health
- Social and economic welfare
- Infrastructure
- Environment

The likelihood of flooding is either expressed as a chance, for example a 1 in 100 chance of flooding in any given year, or a probability, for example a 1% annual probability of flooding. A 1 in 100 year flood return period is also used to express this same event storm, but it should be noted that, as previously mentioned, this is still a probability and therefore a 1 in 100 year flood has the same potential to occur in any given year.

Local Flood Risk Management

Managing flood risk is an ongoing activity which will see continual improvements over time as a greater better understanding of local flood risk is developed.

RBC has a good understanding of the existing flood risk areas in Reading, and the associated flooding mechanisms, through the assessment work undertaken to date for the SFRA, SWMP and PFRA. As such, these areas will initially be the focus of future mitigation work along with further investigation, policy development and communication. There are, however, circumstances where implementation of mitigation works may be considered inappropriate. Examples of these are where mitigation works could result:

- increased flood risk up/downstream;

- unacceptable environmental consequences (e.g. loss of semi natural habitats, significant local disruption during the construction phase etc.),
- costs that are disproportionate to the benefit.

Funding is a major constraint on the implementation of mitigation strategies and the complex funding mechanisms that are available require demonstration that a scheme has taken into consideration the above criteria.

The RBC Local Flood Risk Management Strategy

The RBC Local Strategy refines and builds upon The Berkshire 5 Strategy information for Reading Borough, identifies priority flood risk areas and proposed mitigation measures or investigation in the Action Plan.

RBC's Preliminary Flood Risk Assessment (produced for the FRR) and Surface Water Management Plan (SWMP) form the key evidence base for the RBC Local Strategy. These reports provide a detailed overview of historical and recent flood events within the Borough, and consider the effects of climate change on future flood risk.

Flood Risk Areas

Flood management actions need be prioritised to ensure the limited funds available are targeted to where frequent or deep flooding coincides with sensitive receptors (such as households or main highways). High risk areas are generally known based on local authority and EA records of historic flooding. However these records are not comprehensive and consideration of future (modelled) flood risk is also required.

Modelled flood risk information on depth and frequency of flooding from surface and ground water provides an important source of data to supplement the actual historic flood risk evidence. Modelled information has been obtained for Reading Borough from the EA, which include their 1 in 30 annual probability surface water flood risk maps (showing flood depths greater than 0.3m and in areas greater than 500m^2) and their greater than 75% susceptibility to groundwater flooding maps. This modelled data has been validated against historic actual evidence of flooding based on local authority flood records. Where the two data sets clearly overlap, priority flood risk areas have been identified.

This information has been plotted and refined in a grid format based on a 100m by 100m grid allowing Local Flood Risk Priority Areas to be identified at a glance. In order to provide a priority map based on flood risk from groundwater, surface water and non-main rivers only, modelled flood risk cells that contain an EA main river have been removed. Equally records of fluvial flooding from main rivers or foul water flooding have also been removed from the historic flood risk records.

There are also areas where flooding has been observed, which do not coincide with published modelling extents. These areas require further investigation to ascertain the cause of flooding and any possible mitigation measures that could be undertaken or have already been implemented.

Based on the methodology described above, there are a number of Local Flood Risk Priority Areas within Reading which need to be investigated further; some of these areas have already had substantial flood mitigation works undertaken to reduce the risk of flooding in the future, whilst others still require further assessment and mitigation. Local Flood Risk Priority Areas should be taken into consideration when determining planning applications and future planning policy development to ensure new development does not increase the flood risk to these or neighbouring areas. High risk development, such as basement properties, should not occur in these flood risk areas. Each location determined to be a Local Flood Risk Priority Areas is identified on the map contained in Appendix C.

In Flood Risk Priority Areas new development should only be considered where it can be satisfactorily demonstrated that the risks of flooding as a consequence of development are acceptable. Surface water drainage systems for new developments will need to be designed in a manner that does not

further exacerbate flood risk in these local areas. This approach is consistent with the National Planning Policy Framework which advocates that surface water runoff from development sites should be managed to ensure that discharge rates and volumes are no greater than the predeveloped greenfield conditions.

Mitigating Local Flood Risk

When considering Flood Risk Management there are often many different options that could be utilised to reduce the risk of flooding. It should be recognised, however, that the options to mitigate flooding cannot remove the risk completely as there can always be an extreme event that may exceed the design standard of the measures put in place. The choice of flood mitigation and management measures will depend on the severity of flood risk (probability, hazard and consequence) and the circumstances involved (location, sensitivity of receptors, physical and economic viability).

Where mitigation is required to reduce the risk of flooding RBC will investigate the practicality of the various options available.

In denser urban areas it is often more difficult to find the space required for intervention without requiring displacement of the existing population and activities. This is an issue in the majority of Reading due to the built up nature of the Borough..

Objectives of Local Flood Risk Management

The objectives for the RBC Local Flood Risk Management Strategy are shown in Table 3.1 below. These objectives reflect the requirements of the FWMA and the NFCERMS.

Table 3.1: Reading Borough Objectives for Local Flood Risk Management

	Objective
1.	To improve knowledge of Local Flood Risk within Reading Borough including collating and mapping all existing flood risk data.
2.	To identify areas where flood risk is high or identify where there is future flood risk as a result of development or climate change.
3.	To engage with local communities to; increase awareness of local flood risk; consult on potential mitigation measures; and inform residents of the work RBC undertake as a LLFA in managing this risk.
4.	To reduce existing flood risk from local sources within the Borough
5.	To inform planning strategies and policies to facilitate flood risk management and mitigation from all local sources of flood risk except Main Rivers and reservoirs
6.	To prevent an increase in flood risk as a result of new development within the Borough
7.	To improve co-operation between Reading Borough Council and the Risk Management Authorities (RMAs)
8.	To facilitate RBC as LLFA in undertaking the duties and responsibilities under the FWMA and the EU Flood Directive
9.	To set out the guiding principles for SuDS in the Borough
10.	To promote sustainability of Flood Risk Management through Water Framework Directive compliance, Climate Change Adaptations, Land Management and the protection and enhancement of habitats and biodiversity.
11.	To take a holistic approach to flood management ensuring that the non-flood related benefits of schemes are maximised, selecting those with multiple and environmental benefits where practicable, and factoring in the monetary value of the additional benefits into the calculations

RBC will work towards achieving these objectives through implementation of the proposed mitigation measures and investigations contained within the Action Plan.

Reading Borough Council (RBC)

RBC has multiple internal departments, the majority of which are stakeholders of the RBC Local Strategy. These departments either influence flood risk by the work they undertake or they are impacted by flooding events that occur.

The principal departments are shown in figure 5.2. The main contact and lead in relation to the implementation of this Strategy and all local flood risk matters is the Highways Department.

Figure 3.1: Departments within Reading Borough Council that may be impacted by this strategy and local flood risk.

To ensure the effective implementation of the LFRMS, RBC internal departments will work together in partnership with other RMAs and stakeholders to help reduce the risk of flooding from local sources and increase the public's awareness of the risks.

A number of RBC policy documents have an influence on local flood risk management. The key documents include:

- Reading Borough Local Development Framework, Core Strategy, Policies to Support the Core Strategy, Adopted January 2008.
- Reading Borough Council Strategic Flood Risk Assessment (SFRA).
- Reading Borough Council Preliminary Flood Risk Assessment (PFRA).
- Reading Borough Council Surface Water Management Plan (SWMP).
- Reading Borough Council Tree Strategy for Reading, adopted June 2010
- Reading Borough Council Reading Biodiversity Action Plan

These documents can be viewed on RBC's website.

4 Action Plan

To assist RBC, RMAs and Stakeholders in progressing the Local Strategy the following Action Plan sets out a range of initiatives and measures which are currently planned to be carried out to mitigate and reduce the flood risk identified in local flood risk areas identified in Table 4.1 and Figure 4.1 . These highlight specific structural measures as well as changes to existing policy that need to be investigated to help reduce existing flood risk and prevent flood risk increasing due to future development.

Table 4.1: Local Flood Risk Areas

Ref. No.	Flood Risk Area	Catchment Description	Primary Causes of Flooding	Proposed Action	Proposed Time Scales	Predicted Cost / Funding
1.	Blundell's Copse (Grid ref: 466895, 173206)	Blundell's Copse is a sewered urban sub-catchment with predominantly residential land use. Historically a water body (pond) was located at the natural low point of the catchment. The area was developed in 1960 and is now called Keswick Close.	Historic pond located at Keswick Close. Potential capacity issue in TWUL sewer network that runs through Keswick Close	TWUL has proposals within their AMP5 programme for reduction of flood risk in Keswick Close. This will be achieved through the construction of a mini pumping stations and sewer improvements.	Commenced Q4 2014	Included in TWUL AMP5 funding programme.
2.	William Street (Grid ref: 470781, 173648)	William Street is a residential catchment on the west side of the town centre. William Street itself comprises terraced houses with basements dating back to around the 1900's. The sub-catchment is largely served by public surface water sewers although William Street	The gullies which drain the basement properties are locally the first point at risk of flooding on the network due to their low level.	As viable mitigation options are limited, it is proposed to undertake community engagement / liaison in the form of educational literature or workshops to raise awareness and educate residents as to how they can protect their properties from flooding. For example re-directing down pipes from basements levels and the use of flood guards. Review of planning policy with regards to basement dwellings within	Within the 2013-2014 financial year.	RBC Community engagement to make residents aware of the issues.

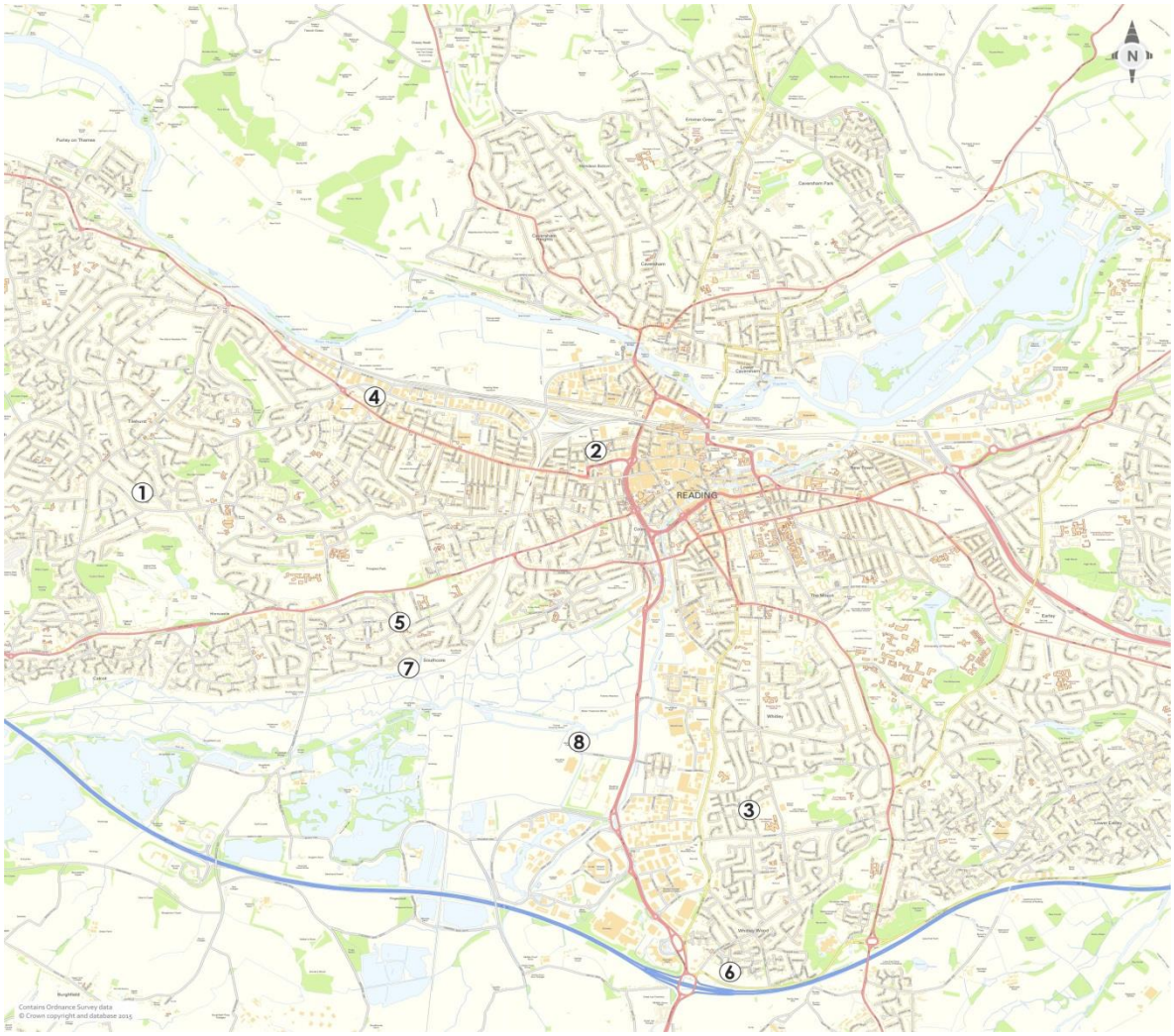
Ref. No.	Flood Risk Area	Catchment Description	Primary Causes of Flooding	Proposed Action	Proposed Time Scales	Predicted Cost / Funding
		is not.		areas of surface water flood risk. A small section of the natural catchment lies in LDF site SA9a, 221-222 Oxford Road & 10 and the rear of 8 Prospect Street. When this site comes to be redeveloped the proposals should aim to provide improvements to the drainage system.		
3.	Stockton Road (Grid ref: 472126, 170323)	Stockton Road and its associated residential crescents are located at the downstream end of a large natural sub-catchment which contains a large area of open woodland and parkland (The Cowsey) in the centre surrounded by residential development. The catchment falls steeply in the mid-section and is fully served by public SW sewers.	The topography of the natural catchment and the location of the development within the catchment. Overland flow paths not intercepted by the drainage system. Lack of capacity in the sewerage system combined with potential downstream restrictions.	A Flood Risk Management (FRM) bid was submitted for funding during 2012/2013. This bid was accepted and flood defence works have been completed with exception to landscape planting which will be finished in the appropriate planting season	Funding has been granted through Local Levy and the scheme is expected to be fully completed during 2015	Estimated costs: £143,000
4.	Stone Street (Grid ref: 468860, 174154	Stone Street lies at the low point of a small sewered residential sub-catchment, which borders the fluvial floodplain of the river Thames.	The existing TWUL sewer records show that the sewer between Stone Street and Portman Road currently runs uphill.	TWUL propose to implement an upgrade to the Cow Lane foul pumping station and monitor any associated reduction in flood risk to Stone Street. If the benefits are not measurable then seek to obtain TWUL support for implementation of the SWMP mitigation	TWUL confirmed internal approval to the proposed foul pumping station works in July 2011. Implementation undertaken in 2012-2013.	TWUL's proposed works are included in their AMP5 funding programme. SWMP Option 4 pond has an estimated cost of £60,000

Ref. No.	Flood Risk Area	Catchment Description	Primary Causes of Flooding	Proposed Action	Proposed Time Scales	Predicted Cost / Funding
				proposal. This catchment area includes small sections of LDF sites SA4, Dee Park, and SA8b, 780-784 Oxford Road. The redevelopment proposals for these areas should aim to provide improvements to the drainage system.		
5.	Circuit Lane (Grid ref: 469126, 171991)	Circuit Lane is within a large sub-catchment that borders the Holy brook floodplain at its downstream boundary. The sub-catchment area is split approximately 50/50 with upper half comprising open park land and the lower half residential properties.	The topography of the natural catchment. Potential under capacity of the TWUL sewer network.	Hard engineering mitigation measures at household level to be considered at the northern end of Circuit Lane. A small section of the natural catchment lies in LDF site SA9c, Elvian School, Bath Road. When this site comes to be redeveloped the proposals should aim to provide improvements to the drainage system.	Potential implementation of engineering measures 2013-2014	Estimated cost £20,000. RBC committed to £5,000 based upon £4,000 being received from the FRM funding bid.
6.	Harness Close (Grid ref: 471908, 168777	The sub-Catchment is situated within the southern area of Whitley Wood, adjacent to the B3270	Flooding has resulting in flooding to properties in Harness Close (South Reading). 12 homes suffered from internal and external flooding and 2 properties from external flooding.	The source of the flooding is presently being investigated by RBC and TWUL	Investigations ongoing	To be confirmed
7.	The Holy Brook (Grid ref: 469159, 171609)	The Holy Brook is a tributaryof the Kennet and measures 6 miles in length.	Lack of maintenance works have resulted in erosion of the supporting embankment	The proposed work will reinstate the existing footpath and bank protection that has become eroded, ensuring inundation of flood plain to the south prior to bank	April 2015	Estimated cost £30,000

Ref. No.	Flood Risk Area	Catchment Description	Primary Causes of Flooding	Proposed Action	Proposed Time Scales	Predicted Cost / Funding
			and footpath. This bank failure led to flood waters being directed away from the floodplain towards nearby properties..	overtopping and inundation of the northern floodplain. Removal of trees which are causing issues within the Holy Brook		
8.	Island Road (Grid ref: 470642, 170895)	Island Road is located off the A33 crossroads junction and serves the Thames Water sewage treatment plant and the Smallmead recycling centre	In heavy rains water levels within the Foudry Brook can rise significantly and lead to flooding along Island Road.	Existing ditches to be maintained, penstock gate to be incorporated at the existing outfall headwall to control water flows and levels along the Foudry Brook	April 2015	
9.	Other			Revise and update existing Reading Borough Council Strategic Flood Risk Assessment (SFRA) to incorporate the latest flood risk information from all sources of flooding.		
10.	Other			Supplementary Planning Documents (SPD) Investigate the potential to develop planning policy which requires new development in local flood risk zones and / or critical drainage areas to reduce surface water discharges to greenfield runoff rates, or contribute to local flood mitigation schemes. Thereby ensuring no increase in flood risk and potential for reduction of flood risk in high surface water flood risk areas.		

Ref. No.	Flood Risk Area	Catchment Description	Primary Causes of Flooding	Proposed Action	Proposed Time Scales	Predicted Cost / Funding
11.	Other			Review of RBC emergency response strategies and sand bagging policy for fluvial events.		
12.	Other			Undertake S19 investigation and reporting of all events that result in internally flooded properties.		

Figure 4.1: Location of Local Flood Risk Areas



Key:

8 Local Flood Risk Area Reference number

5 Local Flood Risk

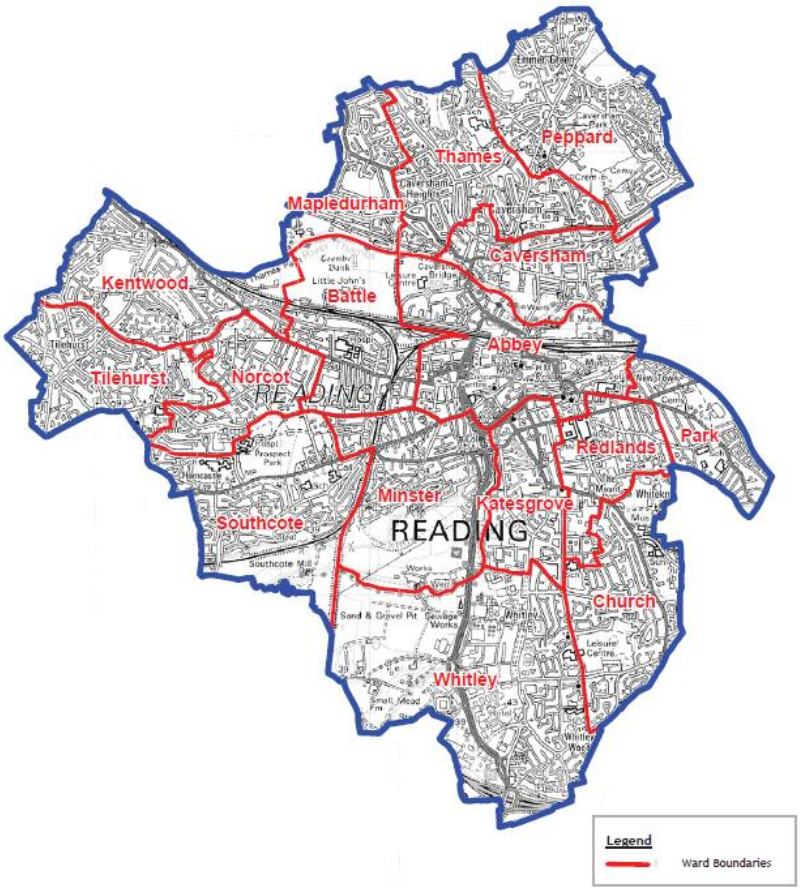
5.1 Background

Reading Borough covers an area of 40 square kilometres and incorporates Reading town centre and surrounding ward areas of:

- Abbey
- Battle
- Caversham
- Church
- Katesgrove
- Kentwood
- Mapledurham
- Minster
- Norcot
- Park
- Peppard
- Redlands
- Southcote
- Thames
- Tilehurst
- Whitley

The area includes the River Thames, River Kennet, Holy Brook, Foudry Brook, Berry Brook and the Kennet & Avon Canal. All of these watercourses (shown in figure 2.1 above) are designated Main River and hence will continue to be managed by the Environment Agency. Multiple tributaries, drainage ditches and culverts flow into these Rivers which are not classified as Main River and are the responsibility of RBC.

Figure 5.1: Reading Borough Authority Boundary



The geology of the Borough is characterised by river terrace deposits, including sands and gravels within the vicinity of the River Thames corridor, overlying Reading Beds and London Clay.

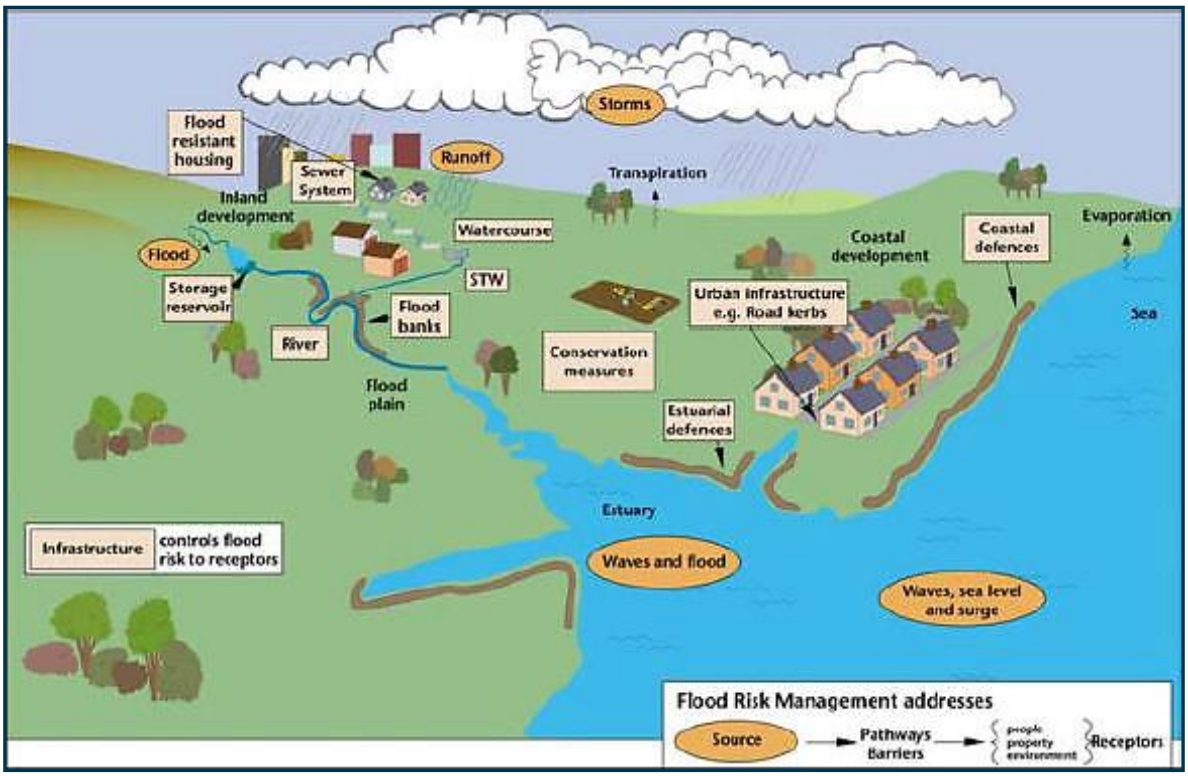
5.2 Local Flood Risk

Flooding can occur from multiple sources. As the LLFA, RBC now has the responsibility of recording and investigating, where necessary (under Section 19 FWMA), flooding incidents caused by surface water, groundwater or ordinary watercourses.

Flood risk from the sea and rivers has been the main focus of flood defence in the UK for the past thirty years. It is therefore relatively well understood with detailed techniques for assessment. Surface water flooding, caused by heavy rainfall, is less predictable and less well understood and was the main source of flooding within Reading during the 2007 summer flood event.

In general terms, there is a well-established framework for environmental risk assessment provided by the Government's 'Foresight' flood and coastal project in 2003 (illustrated below in Figure 5.3). This is termed a Source – Pathway – Receptor model and will be used to consider flood sources, risks and potential management measures, as it reflects the physical processes by which flooding occurs.

Figure 5.3: Source-pathway-Receptor Model for Flood Risk Analysis (source: Foresight Flood and Coastal Defence Project, 2003)



- **Sources** are the weather events or sequences of events that may result in flooding (e.g. heavy or sustained rainfall, marine storms)
- **Pathways** are the mechanisms that convey flood waters that originate as extreme weather events to places where they may impact upon receptors.
- **Receptors** are the people, houses, industries and commercial units impacted by flooding.

The main focus within Local Flood Risk Management is to reduce the impact of flooding on the receptors, through the alteration and management of the pathways.

Flood Risk is defined as 'a combination of the probability of the occurrence with its potential consequence'. Consequences of flooding can be negative or positive. This includes consequences to human health, economic activity and the environment (including cultural heritage). Refer to section 3.2.

Flood Risk within the Reading area comes from a number of sources. It is not technically or financially possible to alleviate all risk of flooding across Reading so it is important to take a risk-based approach and prioritise areas that are at greatest risk and will therefore derive the most benefit from flood risk management work.

5.3 Historic Flooding

There are a number of documents which aim to identify past flooding within Reading Borough. A Strategic Flood Risk Assessment (SFRA) was completed by Jacobs in 2009 which sought to collate known sources of flooding, identify Flood Zones, recommend appropriate land uses and identify potential flood mitigation measures. The Preliminary Flood Risk Assessment (PFRA) was completed in June 2011 and collated known sources of local historical and future flood risk. The PFRA provides a strategic overview of flood events across Reading Borough and mapping outputs informed actions to be taken in the subsequent Surface Water Management Plan produced in June 2013.

These Flood Risk Management Documents can be viewed on RBC's Web-site.

Reading Borough Council (RBC) Records

RBC holds a limited set of historic flooding records including the following datasets:

- 1947 Fluvial Flooding
- 2000 Fluvial Flooding
- 2003 Fluvial Flooding
- 2007 flood event – Internally and externally flooded residential buildings.
- 2007 flood event – Flooded Schools
- 2007 flood event – RBC buildings
- 2013/14 winter flooding – residential properties and businesses
- Complaints of flooding reported to RBC from members of the public.

Detailed records of flooding of individual properties are difficult and time consuming to collect for any one risk management authority. Therefore, most flood records rely on accurate data being recorded and reported by home owners. The 2007 and 2013/14 flood event records for residential properties and businesses in Reading list the address of the property through a door knocking exercise undertaken by RBC. Through canvassing affected occupiers it was possible to identify whether main buildings were flooded internally, or limited to garage/outbuildings. It was not possible however, to record detail such as depth, source, and duration.

Royal Berkshire Fire & Rescue Service (RBFRS) Records

The RBFRS provided all their flooding event data and records to RBC for the last 10 years which was sorted to include only events in Reading and those that specifically state they were surface water

related. The data only includes the year, location and brief description. This filter of data resulted in 18 records of flooding over the 10 year period.

5.4 Asset Maintenance

As assets age and deteriorate they will become less capable of performing their original flood risk management function. The impact on flood risk will vary depending on the type of asset. For example ditches and attenuation tanks becoming silted up, blocked by rubbish, or extensive vegetation growth, which in turn will reduce the capacity of the asset to convey and store water, therefore increase the risk of flooding. Other assets such as flood walls can weaken overtime and become less resistant to the force of the flood water that they are intended to hold back.

Routine maintenance, such as clearing ditches can mitigate this risk and extend the lifetime of an asset. However without regular maintenance and a programme of replacement and remediation, the deterioration of assets with age would increase local flood risk.

In accordance with the FWMA (Section 21) RBC holds an asset register of structures which affect flood risk. This register allows members of the public to identify significant flood risk assets managed by them as private individuals or partner organisations in their locality. Refer to Table 2.1

6 Sustainable Development

6.1 Climate Change

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. 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%.

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%).
- Peak river flows in a typical catchment likely to increase between 8 and 18%.

6.2 Implication on Flood Risk

Climate changes can affect local flood risk in several ways and these impacts will vary depending on local conditions and the vulnerability of receptors.

Wetter winters and more of this rain falling in wet spells may increase flooding in both rural and urbanised catchments. More intense and prolonged rainfall can result in more surface runoff being conveyed to drains and sewers resulting in greater flood risk and potential impact to water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for climate change.

There is a risk of flooding from groundwater-bearing strata particularly chalk and limestone aquifers across the district. Recharge may increase in wetter winters resulting in more groundwater emergence.

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.

In recognition of the effects of climate change the Reading Climate Change Partnership (RCCP) was formed in 2009 with the aim of reducing carbon emissions generated across Reading Borough. The RCCP produced Reading Boroughs strategy 'Reading Means Business on Climate Change 2013-2020' which recognises that through appropriate planning policy and development control much can

be achieved to reduce the risk of flooding and potential consequences for new development. Similarly, it acknowledges that existing buildings can be made more resilient or resistant to effects of flooding in problem areas.

6.3 Adapting to Climate 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 a key component in achieving long-term, sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions about 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.

6.4 Sustainable Drainage Systems (SuDS)

The Government aims to reduce the impact of future development by promoting the use of sustainable drainage systems. The purpose of sustainable drainage systems is to replicate, as closely as possible, the natural drainage from a site before development without transferring pollution to groundwater.

Sustainable drainage objectives are to minimise the impacts from development on the quantity and quality of water running off a site, while maximising amenity and biodiversity opportunities. Appropriate techniques include infiltration and retention, which mimic runoff from a site in its natural state and enable rainwater to be managed close to its source.

The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites, and recommends that priority be given to the use of SuDS in new development, this being complementary to the control of development within the floodplain. The variety of sustainable drainage techniques available means that virtually any new development should be able to deliver a drainage scheme around these principles.

The FWMA contains provisions that require sustainable drainage systems to be provided on new developments. These provisions are expected to be implemented in 2015, and they will have important implications for the way in which flood risk and drainage is considered and approved in the future.

The Act establishes RBC, as a LLFA, and the SuDS Approving Body (SAB), which will be responsible for approval, and in some cases the adoption and maintenance of SuDS systems. National standards will be published by the Government setting out the guiding principles for the design of sustainable drainage systems.

These changes will have any impact on the development process and the role of the Reading Borough Council, as it may be responsible for surface water drainage on the majority of future developments.

It is also possible in certain circumstances to consider ‘retrofitting’ sustainable drainage systems to existing developments, providing a range of benefits including improved management of surface water, separation of surface water runoff from foul water sewerage and improvements to local environmental amenity and biodiversity.

7 Environmental Assessment

7.1 Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) has been undertaken to ensure that any significant effect's arising from this strategy are identified, assessed and mitigated. The SEA for the RBC Local Strategy is contained within Appendix D

SEA is a generic tool that was introduced by the European Union (EU) Directive 2001/42/EC. The objective of the SEA Directive is to '*provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view of promoting sustainable development* (Article 1)'. This requires national, regional and local authorities in Member States to carry out SEA on certain plans and strategies that they promote.

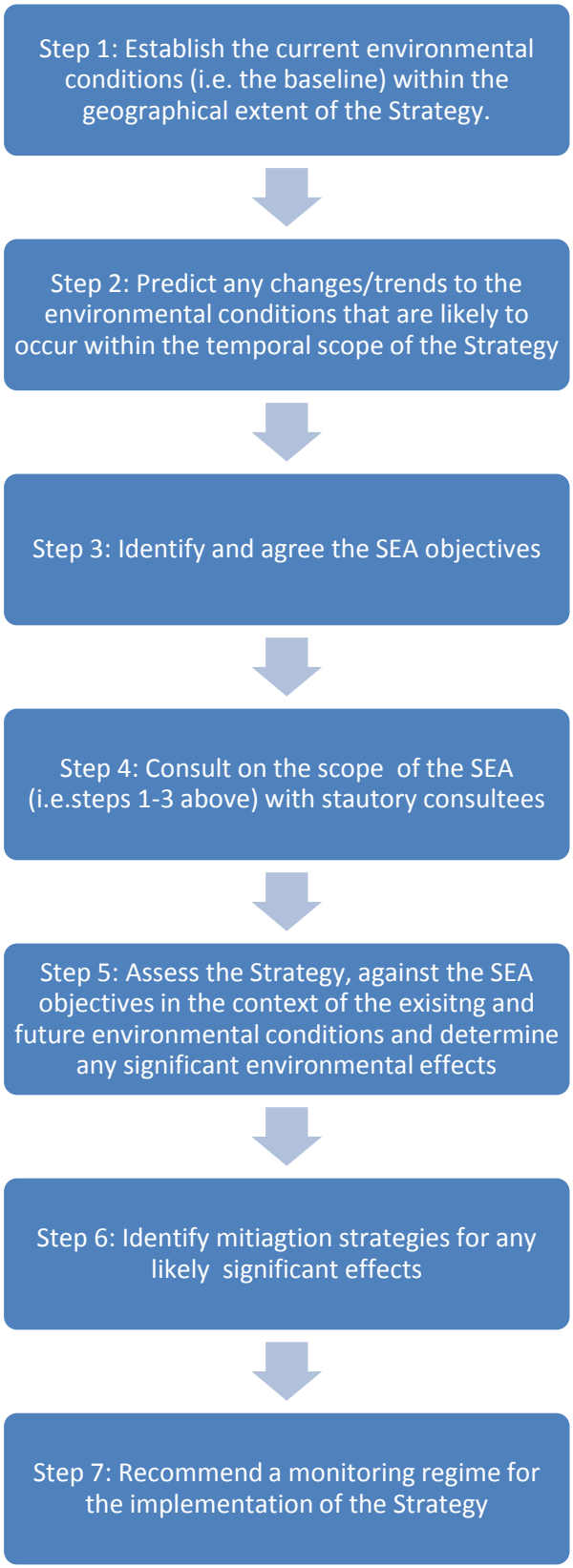
It has been determined that this Local Flood Risk Management Strategy constitutes a plan or programme as defined by the SEA Regulations and therefore the Strategy should be subject to a Strategic Environmental Assessment. As a consequence an Environment Report should be prepared to accompany this Strategy at public consultation and prior to its adoption.

The Regulations state:

> *The Environmental Report must identify, describe and evaluate the likely significant effects on the environment of implementing the plan (or in this case Strategy).*

In producing the SEA the following diagram (figure 7.1) indicates the process steps to be taken and subsequent bullet points describe specific details to be reported within the SEA.

Figure 7.1: SEA Processes



- S**tep 1** - this step is undertaken in order to evaluate the sensitivity, vulnerability, value and importance of the existing environment. This is achieved by identifying the environmental designations and conditions through a review of available data and existing plans and policies. This assessment is done at a level appropriate to the strategic nature of the Strategy and will be presented in a series of GIS plans. No new data will be collected.

- **Step 2:** - this step is undertaken to ensure that the assessment of effects is evaluated in context of the whole Strategy period. It will identify key trends which could have an influence on the significance of an effect such as climate change.

- **Step 3**: - this step involves identifying environmental objectives which are relevant to the local area. This step will require a review of national, regional and local planning policies, environmental legislation/policies and other relevant plans or strategies. These SEA objectives should take into account the following issues;
  - Biodiversity
  - Population
  - Human health
  - Soil and ground conditions
  - Water resources
  - Air quality
  - Material assets
  - Cultural heritage
  - Landscape

- **Step 4: -** Natural England, Environment Agency, and the Historic Monuments and Building's Commission (previously English Heritage) will be consulted on the scope of the SEA. A scoping report outlining steps 1-3 above has been be prepared and is included at Appendix D.

- **Step 5**: - The assessment will be undertaken using a systematic approach of analysing each action or policy within the Strategy against each of the agreed objectives. The significance of any effects (adverse or beneficial) will be determined by virtue of the sensitivity/importance of the environment (existing and future) and the magnitude of any change / impact as a consequence of the Strategy. The assessment will be reported as a series of tables.

- **Step 6:** It is not anticipated that there will be many (if any) significant *adverse* environment effects as a result of the Strategy. If any are identified, mitigation measures to avoid reduce or compensate the effect will be recommended.

- **Step 7**: - A monitoring regime for any significant environmental effects (and associated mitigation measures) will be devised, for the whole Strategy period.

To date, Steps 1-4 have been undertaken and a Scoping Report (covering these steps) has been prepared (**provided at Appendix D**). The purpose of the Scoping Report was to inform the statutory consultees of the intended approach to assessing the potential environmental effects of the Local

Flood Risk Management Strategy. The statutory consultees have been consulted and have confirmed that they are in agreement with the approach proposed (also provided at **Appendix D**).

The Draft Local Strategy is currently being assessed against the SEA objectives and an Environmental Report is being prepared for publication with the adopted Strategy.

The assessment will be undertaken by considering the potential effects of the Strategy on the following different aspects of the environment;

- Biodiversity
- Population
- Human health
- Soil and ground conditions
- Water resources
- Material assets
- Cultural heritage

By using the following objectives;

i. To protect and improve the quality and condition of water resources in Reading Borough.
ii. To conserve and enhance biodiversity across Reading Borough.
iii. To protect and conserve soils and reduce their ability to act as pollution sources and pathways.
iv. To promote the mitigation of, and adaptation to, climate change and its effects across Reading Borough.
v. To safeguard existing and future material assets and critical infrastructure in Reading Borough.
vi. To protect the health and wellbeing of local people and communities in Reading Borough.
vii. To safeguard and enhance sites, features and settings of cultural heritage, archaeological, historical value across Reading Borough.

The Environmental Report will document this assessment and will be presented using a series of tables as shown in the example below;

Table 7.1: Example Assessment Table

SEA Objectives	Guide Questions		Timescale			Commentary/Explanation	
			Short term	Medium term	Long term		
To protect and improve the quality and condition of water resources in Reading Borough	Will the Strategy impact on water resources across Reading Borough and beyond? Will the Strategy protect and improve surface and groundwater water quality? Will the Strategy contribute towards achievement of Good Ecological Potential/Status? Will the Strategy mobilise known areas of contamination?		+ Minor Positive	+ Minor Positive	+ Minor Positive	Assessment of effects: Mitigation: None Assumptions: Uncertainties:	
Key	++ Significant Positive Effect	+ Minor positive effects	0 No overall effect	- Minor negative effect	-- Significant negative effect	? Score Uncertain	
NB: where more than one symbol is presented in a box it indicates that the SEA has found more than one score for the category. Where a box contains a ?, this indicates uncertainty over whether the effect could be a minor or significant effect. A conclusion of uncertainty arises where there is insufficient evidence for expert judgment to conclude an effect.							

A copy of the Scoping Report together with response received to date from the consultees is included within Appendix D. The Scoping report has been issued to each RMA for consideration and once agreed the SEA will be commenced.

Monitoring of the significant environmental effects of implementing this strategy will be undertaken to comply with SEA Directive-Article 10.2, to ensure that any unforeseen adverse effects of the strategy are recognised and dealt with.

7.2 The Natural Environment and Rural Communities Act 2006

All local authorities and other public authorities in England and Wales (including highways departments and LLFAs) have a Duty to have regard to the conservation and enhancement of biodiversity in exercising their functions.

The Duty is set out in Section 40 of the Natural Environment and Rural Communities Act (NERC) 2006, and states that: *"Every public authority must, in exercising its functions, have regard, so far as*

is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity" and aims to make biodiversity a natural and integral part of policy and decision making. Implementation of the duty helps deliver the government's target, as set out by the Government in The England Biodiversity Strategy (Biodiversity 2020: A strategy for England's wildlife and ecosystem services) to *"halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people."*

The conservation and enhancement of biodiversity and the delivery of effective flood risk alleviation schemes are in no way mutually exclusive. For example, where new flood water attenuation areas are proposed, these can be designed in such a way as to maximise their ecological value by shaping ponds appropriately or by planting street trees to slow water run off whilst providing habitat for birds and insects.

Recognising this is a key action within the England Biodiversity Strategy is to *"promote approaches to flood and erosion management which conserve the natural environment and improve biodiversity."*

Despite being an urban authority Reading has a significant amount of open space, including private gardens, parks, woodlands and floodplains, some of which is of significant ecological value. This includes approximately 500 hectares of habitats of principal importance for biodiversity as defined under Section 41 of the NERC act and as priority habitats in the Reading Biodiversity Action Plan (RBAP). In turn these habitats support a number of species of principal importance and a key component of this strategy is to ensure that the biodiversity benefits of any flood alleviation schemes are maximised.

7.3 Trees and landscaping

In addition to biodiversity benefits, the community and environmental benefits of soft landscaping within flood alleviation schemes can be far reaching. For example replacing hard surfaces with soft landscape areas can improve the feel of a neighbourhood, reduce the fear of crime and increase property values whilst slowing surface water runoff. Street trees can reduce air pollution and provide a natural means of urban cooling. The creation of green roofs will reduce rainfall run off rates whilst providing meaningful wildlife habitats and green space for residents to enjoy.

The council has adopted a tree strategy that aims to increase tree cover across the borough prioritising areas with low tree cover. Street trees take up rainfall and this in turn will reduce runoff and the likelihood of flooding.

In summary, ensuring that well thought out soft landscaping is an integral to any flood risk alleviation scheme is key to delivering multiple benefits as set above.

7.4 Water Framework Directive

The Strategy will complement work that is currently underway to comply with the requirements of the EU Water Framework Directive (WFD) -2000/60/EC. The Directive seeks to improve the management, protection and enhancement of the water environment. RBC is working in partnership with the Environment Agency to meet its obligations under the WFD to ensure that all watercourses achieve good ecological and chemical status by 2017 and 2027 respectively.

Flood risk management activities are expected to have significant impact on the ability of the UK to comply with the requirements of the Water Framework Directive, as flood protection can involve substantial alteration to the natural properties of a watercourse. The Thames River Basin Management Plan encourages the use of SuDS as a means of reducing the physical impact of flood risk management works on the ecological status or potential of a water body.

8 Funding Options

Reading Borough Council along with all other county and unitary authorities is funded by a Formula Grant provided by the Department for Communities and Local Government (CLG). Together with locally collected council tax, the two resources fund the entire range of services administered by the council. Flood Risk Management is one of the services. Reading Borough Council has to allocate appropriate funds to each service, and consider flood risk management priorities against other investment needs.

However, the cost of constructing, operating, maintaining, repairing and renewing flood defences is considerable and so the government provides support through the Grant in Aid scheme to the Environment Agency. This is supplemented by local levies raised through the Regional Flood and Coastal Committees (RFCCs) and by the Revenue Support Grant.

Through the Environment Agency, LLFAs can access these funding opportunities by applying for scheme specific funding based on the positive benefits of the scheme. The system is known as the Flood and Coastal erosion Risk Management Grant in Aid (FCRM GiA).

Under this system, outcomes (eg houses protected and economic benefits) are given financial figures, the more outcomes the higher the financial benefit. These are compared with the costs of proposed schemes. Funding is prioritised nationally for those schemes with the highest outcome:cost ratio.

The RBC Action Plan sets out a series of objectives that taken together form the Flood Risk Management system. Achieving these objectives will require resources to drawn from National and Local funding streams.

Flood and Coastal erosion Risk Management Grant in Aid (FCRM GiA)

The level of funding available from Central Government to promote Flood and Coastal Erosion Risk Management is derived from a consistent formula that determines the level of **contribution** available to deliver specific planned actions. It is important to note that no scheme will receive 100% funding and the outcome:cost ratio will be increase where high levels of alternative funding and contributions are secured.

This methodology measures present value whole life costs and balances it against present value benefits achieved from the actions. The calculation considers benefits to the environment and businesses, and benefits are weighted to provide protection to households in less affluent areas that cannot afford sufficient protection.

This direct calculation is designed to ensure that each scheme is considered fairly based on the outcomes achieved / benefits gained. Whilst this has led to a reduction in spending commitment from Central Government towards individual schemes, it is intended that overall the number of schemes being promoted in this way will have greater certainty to proceed.

The type of schemes which can qualify for FCRM GiA Partnership Funding include:

- Flood alleviation projects for houses at risk from fluvial (river), tidal (coastal), ground and surface water sources, and projects to implement property level protection measures.
- Schemes to reduce coastal erosion and / or benefit wildlife through the delivery of the FCRM works.
- New proposed flood and coastal defences and capital maintenance on existing assets; providing the work will either re-instate the standard of service and design life of the asset or improve the standard of service and extend the design life of the asset.

Explanation and guidance has been published by the Environment Agency and includes definitions of the above terms. Follow this link to the guidance

The Local Levy

The EA undertakes significant flood defence work which is funded by a levy on upper tier Councils (authorities including Reading Borough).

The Berkshire 5, which includes Reading Borough, was established to:

- to ensure there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines;
- to promote efficient, targeted and risk-based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities;
- to provide a link between the Environment Agency, LLFAs, other risk management authorities, and other relevant bodies to engender mutual understanding of flood and coastal erosion risks in its area.

The number of schemes securing national funding can be influenced by reducing costs or securing contributions. The Environment Agency aims to secure contributions from all major beneficiaries – (businesses and funds). Contributions from the RFCC levy can also be used to “top-up” schemes that are important but fall short of receiving national funding.

It is generally expected then that any shortfall in the FCRM GiA Partnership Funding calculation will need to be met using the Local Levy.

The Community Infrastructure Levy

The Community Infrastructure Levy (CIL) Regulations were introduced in 2014 as a means of providing new and enhanced existing community infrastructure needed to support development growth. This charge may be used to fund a wide range of community infrastructure including flood defences. The Levy is not intended to be used to finance flood mitigation measures that will normally be provided to mitigate flood risks consequences as part of the development itself. However, opportunities to may be taken to promote regional flood risk control measures that protect the existing conurbation that also provide a function to enable sustainable development by pooling resources.

Growing Places Fund

The Government is committed to promoting sustainable development growth through initiatives such as the Growing Places Fund. The objective of the fund is to:

- generate economic activity in the short term by addressing immediate infrastructure and site constraints and promote the delivery of jobs and housing
- to allow Local Enterprise Partnerships (LEPs) to prioritise the infrastructure they need, empowering them to deliver their economic strategies
- to establish sustainable revolving funds so that funding can be reinvested to unlock sites and secure investment

The Government invites Local Enterprise Partnerships to submit proposals for infrastructure projects to access part of this £500m fund. It must be shown that funding is needed to unlock development and how this will realise uplift in land values. In turn, developers would be expected to recycle a proportion of this uplift or financial receipts to repay initial funding. A link to the Governments Growing Places Fund Prospect can be followed here

Additional local contributions

Contributions may be sourced from Developers and major beneficiaries; Local Authority funding from Community Infrastructure Levy, local precepts and Tax Increment Financing as well as direct contributions (such as Highways for surface water improvement schemes on roads).

In promoting new development sites Section 106 payments or contributions will be made towards extending community infrastructure (such as education, highways, leisure). These payments could can be used towards resolving existing flooding issues local and associated to the development, which were not necessarily mitigated as part of the development proposal. The NPPF also requires new development to provide opportunities to reduce flood risks from developed sites so potential may exist for developers to reduce wider flood risks without contributing towards community based schemes.

Contributions should also be sought from local residents and businesses that benefit from proposed flood relief schemes identified through the Action Plan process, which are not subject to Local Levy.

9 Next Steps

9.1 Consultation Process

The draft Strategy will be circulated widely among community groups, stakeholders, organisations with an interest in flood risk management, for their review and comment. There will also be a six week public consultation via the RBC web-site, following which the draft Strategy will be updated in response to the comments.

Then following scrutiny and approval by RBC Members the Local Strategy will be published as a statutory document.

9.2 Ongoing review and Scrutiny

To comply with the FWMA Section 9, the Strategy should be reviewed at regular intervals to account for any changes in the flood risk posed to Reading Borough and enable lessons learned to be reflected into the next edition of the Strategy.

It is recommended that the Action Plan is monitored annually, to consider the success of implemented measures against each objective, with an overall review of the Strategy undertaken in cycles to align with the Flood Risk Regulations review period set every 6 years, unless substantial change in RBC Policy or significant changes in any of the data sources used in its development, dictate otherwise.

The Action Plan contained within the Strategy will also be reviewed following any severe local flooding events in the borough. If following an investigation, under Section 19 of the FWMA, it is subsequently deemed necessary for further action to be undertaken it will be amended as appropriate.

Appendix A Glossary

Glossary

EA	Environment Agency
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FRR	Flood Risk Regulations 2009
FMfSW	Flood Map for Surface Water
FWMA	Flood and Water Management Act 2010
HA	Highways Agency
LLFA	Lead Local Flood Authority
NR	Network Rail
NRD	National Receptor Dataset
PBA	Peter Brett Associates LLP
PPS25	Planning and Policy Statement 25: Development and Flood Risk
PFRA	Preliminary Flood Risk Assessment
RBC	Reading Borough Council
RFDC	Regional Flood Defence Committee
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TWUL	Thames Water Utilities Limited

Appendix B Berkshire 5 – Priority Flood Risk Areas

Berkshire 5 - Priority Flood Risk Areas

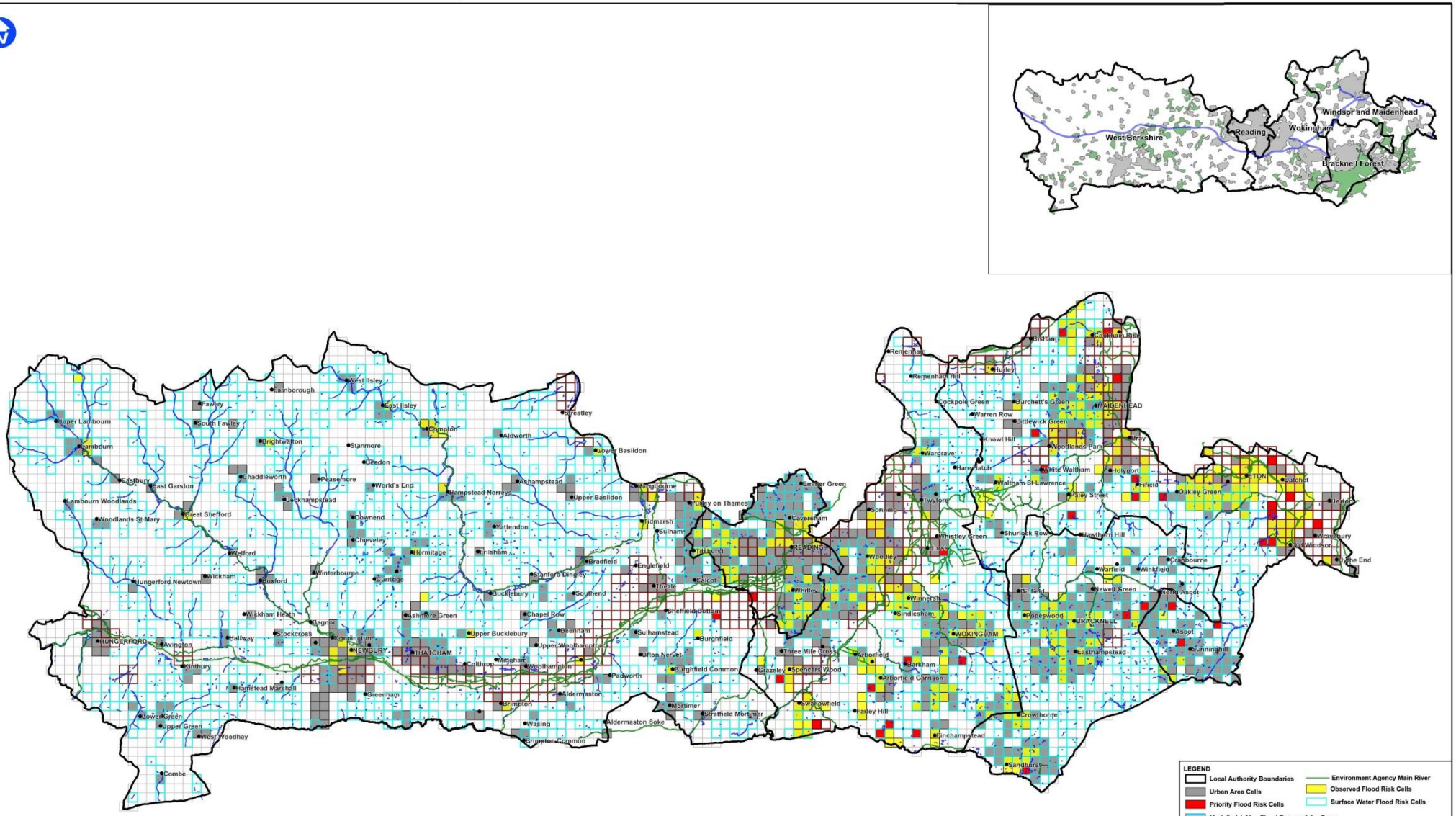
Modelled flood risk information on depth and frequency of flooding from surface and ground water sources provides a means to supplement the anecdotal flood risk evidence. Modelled information has been obtained for Berkshire from the EA including their 1 in 30 annual probability surface water flood risk maps (showing flood depths greater than 0.3m and in areas greater than 500m²) and their greater than 75% susceptibility to groundwater flooding maps. This modelled data has been plotted against anecdotal evidence of flooding based on local authority flood records. Where the two data sets overlap, priority areas can be identified.

This information has been plotted in a grid format based on a 500m by 500m grid allowing an overview of the flood risk across the County and key priority areas to be identified at a glance. In order to provide a priority map based on flood risk from groundwater, surface water and non-main rivers only, modelled flood risk cells that contain an Environment Agency main river have been removed. Equally records of fluvial flooding from main rivers, or foul water flooding have also been removed from the historic flood risk records (although the source of flooding is not always made clear and so some records of main river flooding may have been included).

Urban and rural areas have been distinguished based upon Ordnance Survey GIS table of urban extent. Where these urban areas cover over 50% of a grid cell, the grid cell is marked as urban. Priority areas have therefore been plotted separately based on their urban or rural setting in accordance with the policies presented in this document and can be seen below. Those areas highlighted due to observed flooding but are not coinciding with the modelling need to also be investigated further as to the cause of flooding and any possible actions that may be necessary or have already been taken to ensure that the risk is reduced of it occurring again.

Based on the methodology described above, there are a number of priority areas within each Borough which need to be investigated further within their individual local strategies to determine the cause of action for each. These areas and their boundaries should be taken into consideration in planning policy as future development may increase the flood risk to these areas even though they are not at direct risk themselves.

As the priority areas are based on historical flooding events they do not take into account any mitigation measures already undertaken. The local strategies will need to include existing mitigation measures undertaken to reduce the risk of these events occurring again.



LEGEND

- Local Authority Boundaries
- Urban Area Cells
- Priority Flood Risk Cells
- Modelled 1:30yr Flood Extent >0.3m Deep
- Modelled Susceptibility to Groundwater Flooding Cell (=/> 75%)
- Environment Agency Main River
- Observed Flood Risk Cells
- Surface Water Flood Risk Cells

TITLE:

RURAL PRIORITY FLOOD RISK AREAS

DRAWING #: 27106	REVISION: -	DATE OF ISSUE: SEPT 2012	DRAWN BY: SP
FILENAME: Rural_Priority Areas.WOR		SCALE: NTS	CHECKED BY: PJ

NETWORK ADDRESS: J:\27106 - Berkshire 5 FRM strategy\001\MapInfo\WOR

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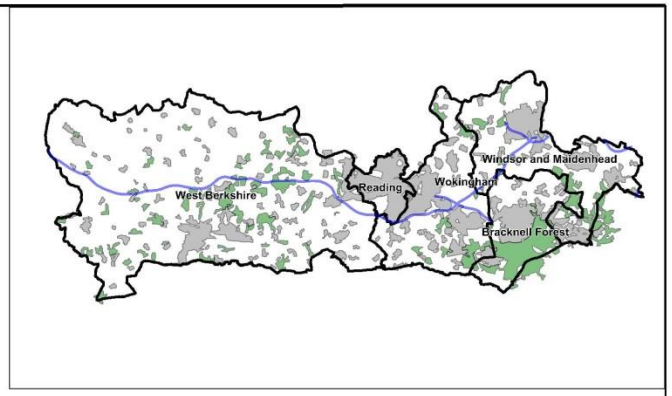

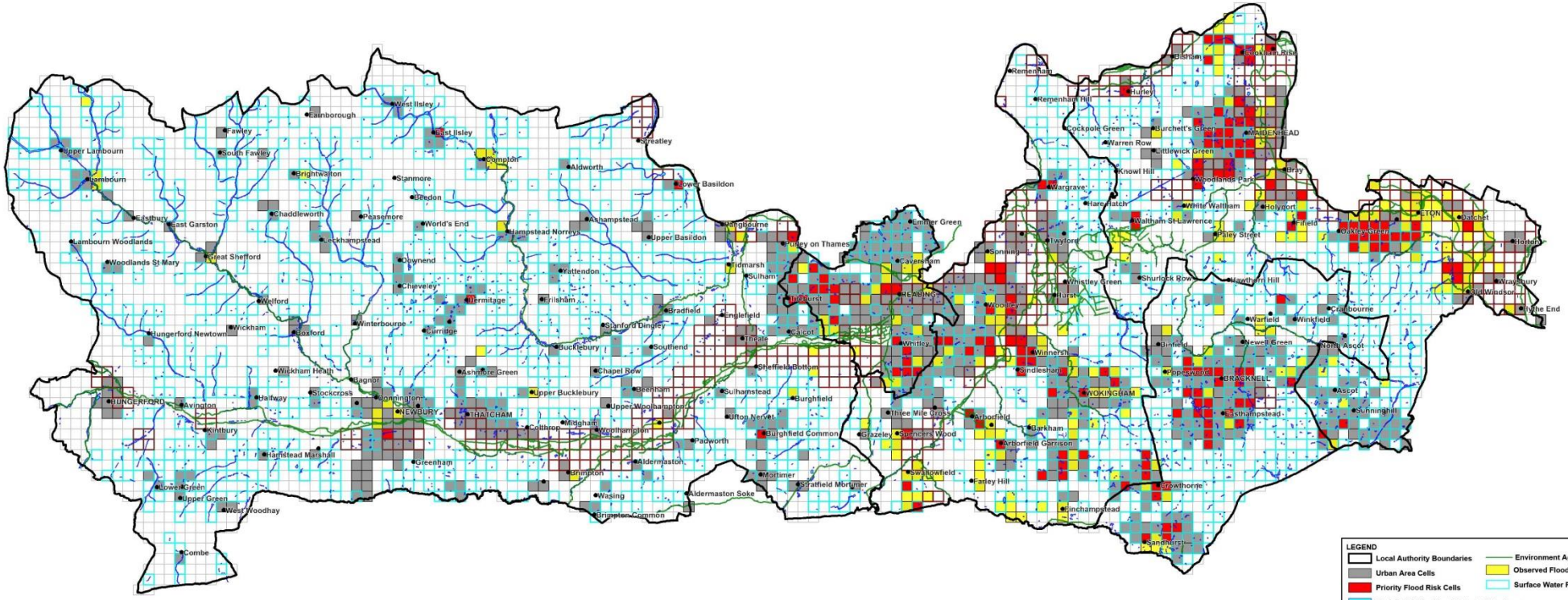

LEGEND

- Local Authority Boundaries
- Urban Area Cells
- Priority Flood Risk Cells
- Modelled 1:30yr Flood Extent >0.3m Deep
- Modelled Susceptibility to Groundwater Flooding Cell (=/> 75%)
- Environment Agency Main River
- Observed Flood Risk Cells
- Surface Water Flood Risk Cells

TITLE:

URBAN PRIORITY FLOOD RISK AREAS

DRAWING #:	REVISION:	DATE OF ISSUE:	DRAWN BY:
27106	-	SEPT 2012	SP
FILENAME: Urban_Priority Areas.WOR		SCALE: NTS	CHECKED BY: PJ

NETWORK ADDRESS: J:\27106 - Berkshire 5 FRM strategy\001\MapInfo\WOR

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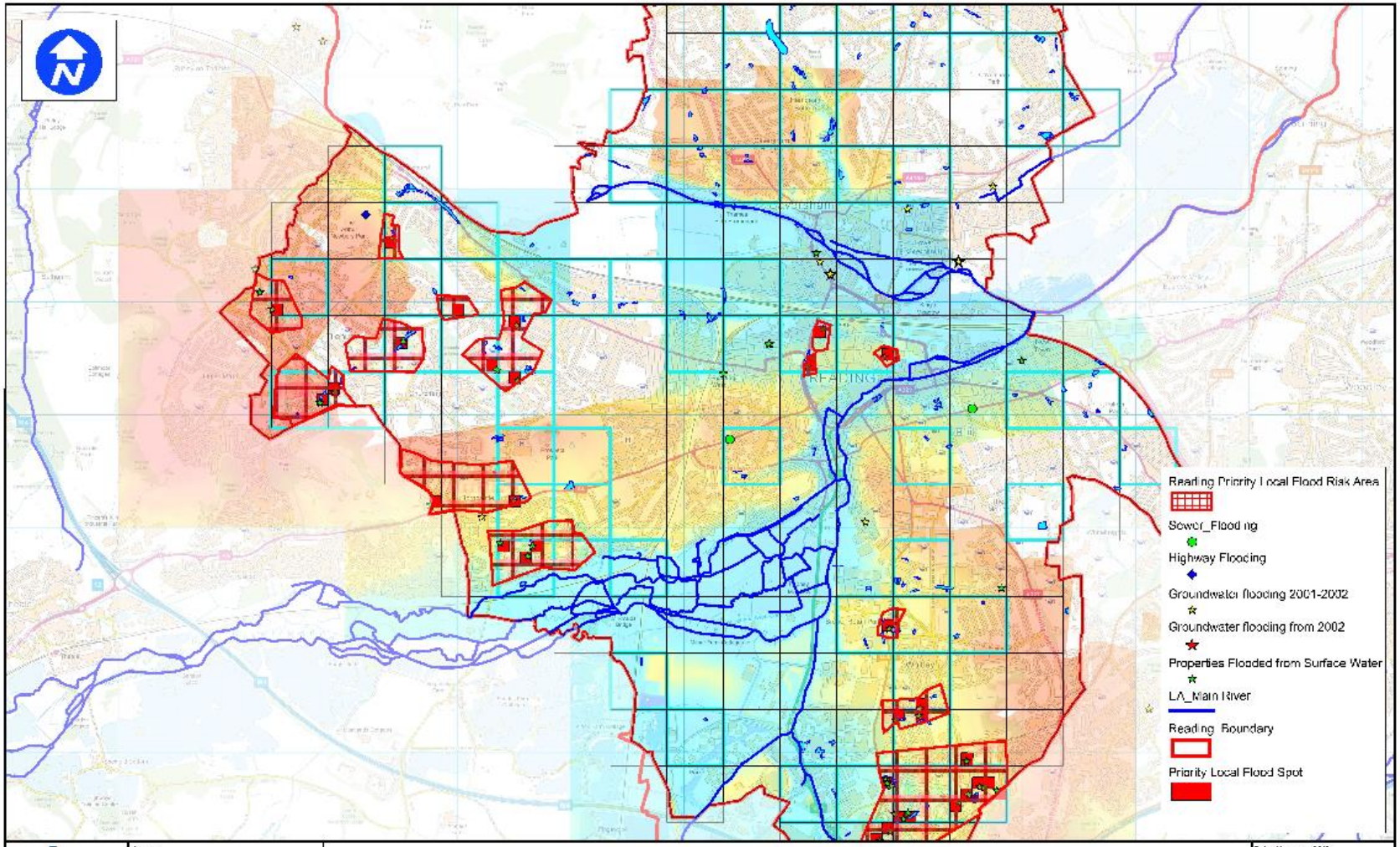
Appendix C Local Flood Risk Priority Areas



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Client

Reading BOROUGH COUNCIL

Reading Borough Council Local Flood Risk Management Strategy

Local flood Risk Priority Areas

Date: November 2010

Scale: XX

Drawn By: KFW Checked By: XX

Rev:

Figure Number

Figure 1

Appendix D Strategic Environmental Assessment