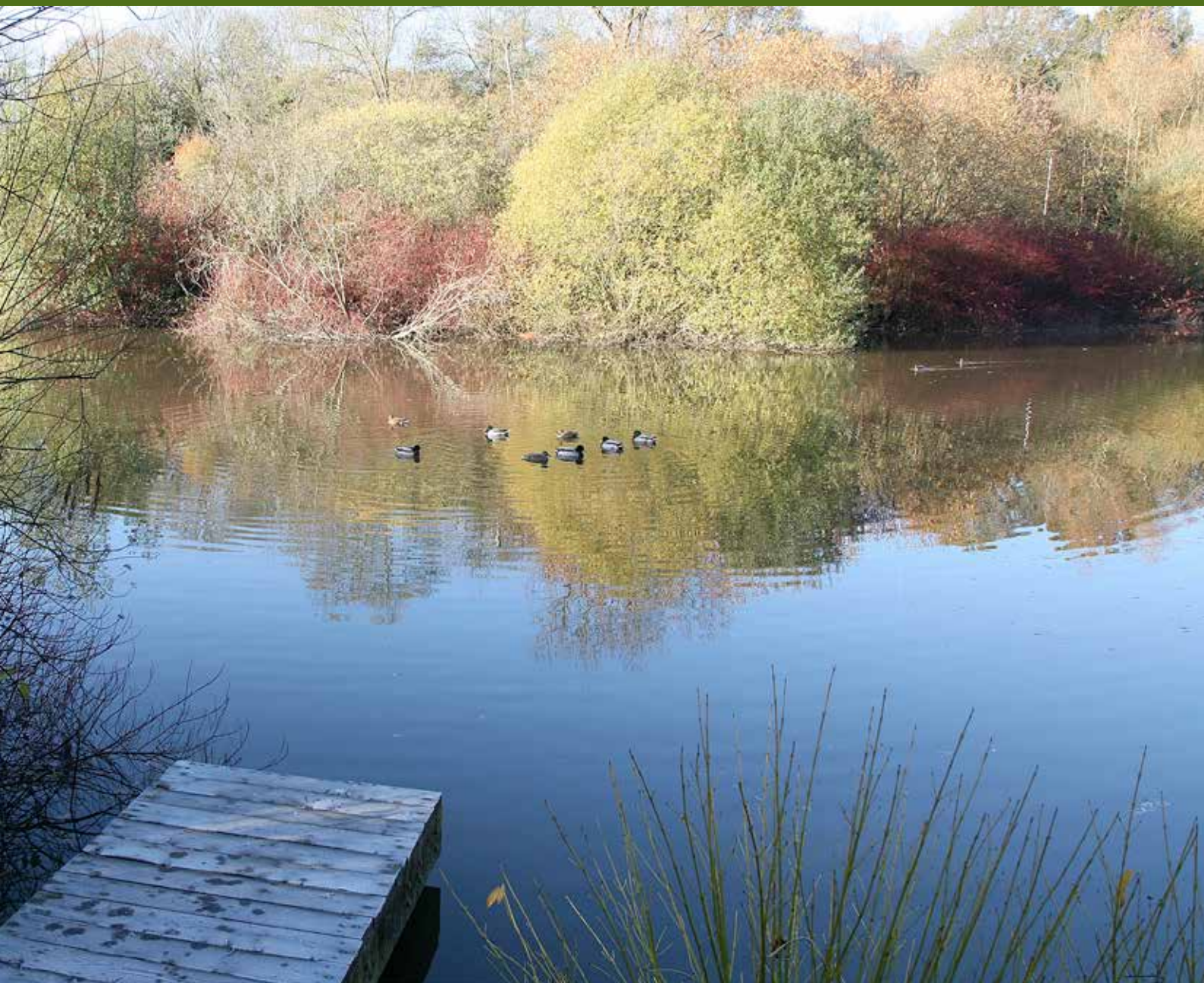
Bracknell Forest Council

Local Flood Risk Management Strategy 2017-2020



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Version	Date	Amendments
Version 1.1	March 2015	Amendments to the original version to take into account of the changes regarding the Suds process.
Version 2	Dec 2016	Revised and updated version 2017-2020

Foreword

Bracknell Forest Council (BFC) recognises that flooding is an important matter for residents, businesses and road users.

Flooding can have a significant detrimental impact on the lives of residents and others. Homes can be ruined along with valuable possessions - potentially resulting in residents feeling constantly vulnerable in their own homes wondering when the next incident might take place. Traffic can be badly affected, bringing great inconvenience to road users and potential damage to vehicles and roads. Important recreational sites may be inaccessible to residents for long periods of time perhaps resulting in the disruption of normal family life.

This strategy explains the approach we are taking to managing flood risk. Recognising the limited and reduced resources we have available is important in the context of managing flood risk. The resource levels have been significantly reduced since the 2013-2016 strategy was developed.

The primary focus of this strategy is local flooding. To members of the public suffering from flooding its cause is irrelevant, but each source of flooding may have a number of different organisations responsible for it. This strategy seeks to clarify how organisations will work together and establish objectives set for the next three years. These objectives will be achieved dependant upon information and resources that are available, where the risk is greatest and in relation to what funding can be attained.

Assessing levels of risk from flooding is a difficult task. We propose to take a pragmatic approach to flood risk and ensure we do nothing to make it worse and where possible take steps to reduce the impact in the future. In working with others, the council will also utilise its own assets such as highways, parks and countryside and amenity land to optimise their use in reducing the impact of flooding. Our sustainable planning policies and highway network management and design will also ensure new developments take full account of flooding risks.

Extreme weather events which cause flooding are clearly not something that can be controlled and the objectives identified in this strategy seek to manage flood risk, since it cannot be removed entirely.

This strategy is a statement of intent as to what the council as a whole is working towards to manage flood risk within the Borough, and its implementation is intended to be of tangible benefit to local residents and businesses and to those passing through our borough.

Councillor Iain McCracken
Executive Member for Culture, Corporate Services and Public Protection

Cllr Chris Turrell
Executive Member for Planning and Transportation

1 Introduction and objectives

1.1 The purpose of this strategy

The Government introduced the Flood and Water Management Act 2010 which identified Local Authorities as the "lead local flood authority', enabling them to mange local risk in a more coordinated way. The responsibilities relate to local flood risk, namely from surface water, groundwater and ordinary watercourses (smaller rivers, streams and ditches). Flood risk from all other rivers (known as main rivers) remains the responsibility of the Environment Agency.

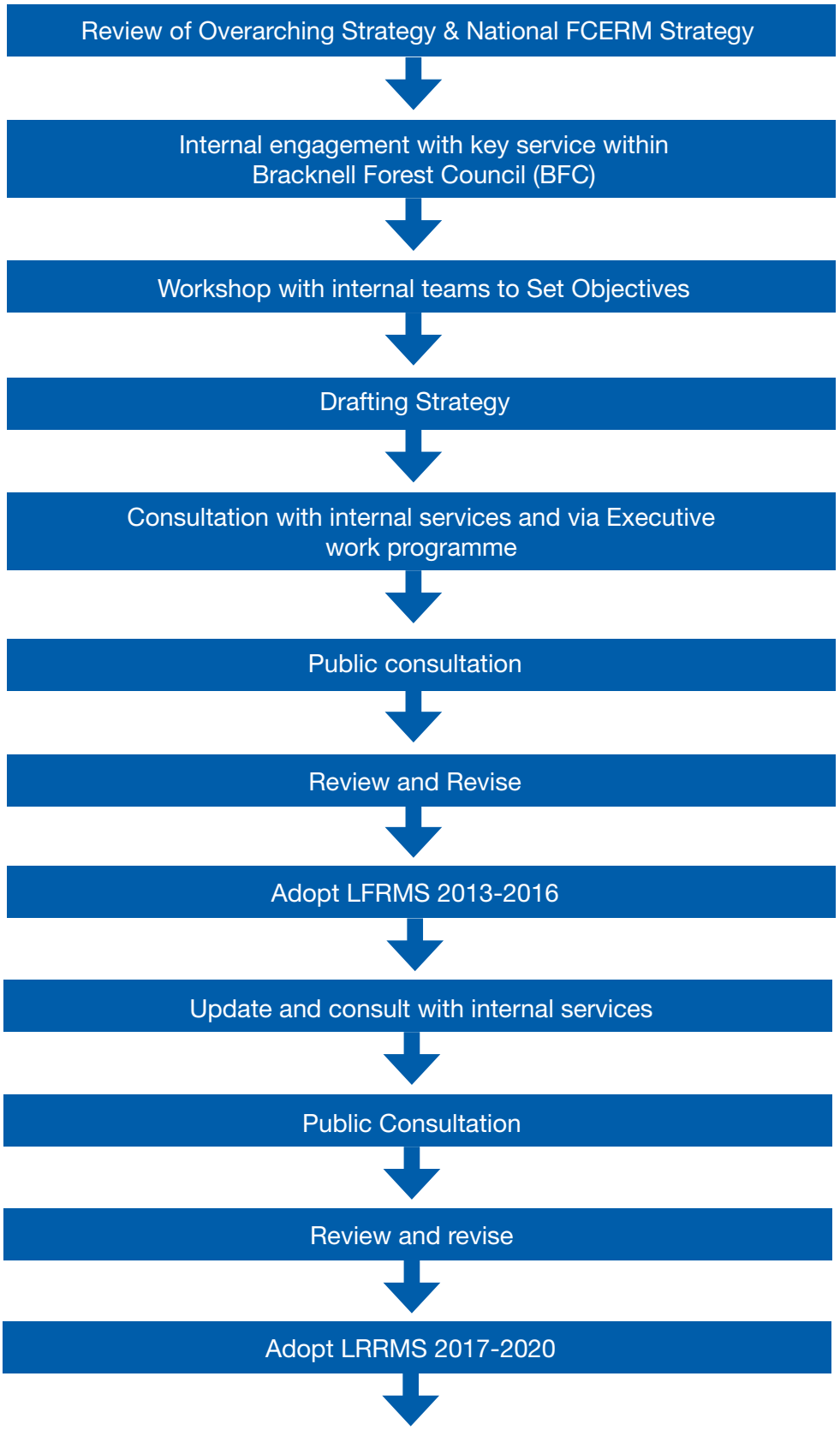
The Local Flood Risk Management Strategy (LRMS) for Bracknell Forest aims to increase awareness of local flood risk issues. It sets out how partners are working together to reduce flood risk.

Bracknell Forest Borough is assessed as being at a low risk of flooding. Where flooding has been experienced it has been of a short duration in relation to intense rainfall. However communities do not always distinguish between different types of flood risk, as the impact is their key concern. We cannot stop flooding. Extreme weather events are on the increase and our intention is that the impact of flood incidents is as minimal as possible.

This strategy starts with Chapter 1 as an overview of the legislation that underpins flood risk management. It is followed by Chapter 2 which provides clarification on roles and responsibilities of the organisations involved in flood risk management. Chapter 3 provides a summary of flood risk within the Borough. Chapter 4 provides information on options and funding mechanisms and details our objectives and measures for managing flood risk. The strategy is supported by a number of annexes which detail how we manage our duties. These are held separately in annexes so they can be updated independently of the strategy should the need arise.

1.2 How the Local Flood Risk Management Strategy (LRMS) has been produced and updated

The process for developing the Local Strategy has been produced in a number of stages which are identified below.



The Pitt Review

Sir Michael Pitt carried out an independent review of national flood risk management practices after the widespread floods during the summer of 2007 in which over 50,000 households were affected and damages exceeded £4 billion. The Pitt Review was published in June 2008 and called for urgent and fundamental changes to the way flood risk was being managed. The report contained 92 recommendations for the Government, Local Authorities, Local Resilience Forums and other stakeholders which were based around the concept of local authorities playing a major role in the management of local flood risk, through coordination with all relevant authorities.

Many of the recommendations within the Pitt review have now been implemented through the FWMA (2010), which places a great deal of responsibility on the upper tier local authorities which includes unitary authorities such as Bracknell Forest, especially under their role as LLFA. The role of the Environment Agency remains largely unchanged; however they now have the role of overseeing all sources of flooding.

Whilst some of the recommendations of the Pitt Review have been implemented through the FWMA, critically Schedule 3 which related to adoption of Sustainable Drainage schemes has been abandoned by the Government.

The FWMA places responsibilities on Lead Local Flood Authorities to maintain and update an Asset Register, to designate structures and to be the responsible authority for Surface Water flooding and Groundwater flooding.

The EU Floods Directive

The EU Flood Directive (2007/60/EC) for the assessment and management of flood risks came into force on 26 November 2007. This Directive requires Member States to assess if all watercourses and coast lines are at risk from flooding, to map the flood extent and assets at risk in these areas and to take adequate and coordinated measures to reduce this flood risk.

All Lead Local Flood Authorities have had to produce a Preliminary Flood Risk Assessment (PFRA) which involved collecting information on past and predicted future floods from surface water, groundwater and ordinary watercourses. Bracknell Forest Council (BFC) does not have areas of significant flood risk identified as part of this process.

1.3 The Flood & Water Management Act (2010)

The Flood & Water Management Act (2010), gained royal assent on the 8th April 2010 and provides legislation for the management of risks associated with flooding. The FWMA was instigated as a result of the pitt review which looked at the widespread severe flooding during the summer of 2007.

The Act reinforces the need to manage flooding holistically and in a sustainable manner. It also places a number of new roles and responsibilities on councils which are designated as LLFAs. The preparation of this Flood Risk Management Strategy is just one of the duties placed upon LLFAs.

The Act defines various bodies as 'risk management authorities' and lists them as the following:

- A Lead Local Flood Authority;
- The Environment Agency;
- A district council for an area for which there is no unitary authority;
- An internal drainage board;
- A water company; and
- A highway authority.

The Act defines a number of duties which are detailed in Chapter 2 of this document.

1.4 Relationship to other documents

There are a number of other documents of relevance and that may have bearing on the Local Strategy and these are identified below:

Table 1.0: How other plans and strategies fit into the Local Flood Risk Management Strategy

Document	Description	What has the document been used for within the production of the Local Strategy?
National Planning Policy Framework (NPPF)	This is National Planning Policy in relation to the requirements for development and flood risk. The NPPF provides clearer guidance on how flood risk should be considered within the planning process.	The Strategy has been informed by the general principles of the NPPF.
Technical Note NPPF	This is the technical guidance in implementing the NPPF	The Strategy has used the technical guidance and information in the preparation of potential options for managing flood risk.
Bracknell Forest Core Strategy	The Local Authorities policy document in relation to planning and Bracknell's vision for development in the future. The Core Strategy for Bracknell was adopted in February 2008; this sets out the planning framework for Bracknell up to 2026. The Core Strategy makes up part of the Local Development Framework and sets up a number of Planning Policies to help guide development within the Borough.	The policies and information on regeneration and development proposals have been reviewed to ensure that there is no conflicts between the Local FRM Strategy and the Core Strategy
Bracknell Forest SFRA (Strategic Flood Risk Assessment)	An evidence base used to inform the Spatial Planning process. Bracknell SFRA was completed in August 2010 and is used as an evidence base to assess flood risk for spatial planning purposes and for individual flood risk assessments.	THE SFRA update will be completed by summer 2017.
Bracknell Forest PFRA (Preliminary Flood Risk Assessment)	This is a high level document required under the EU Floods Directive. This document covers local sources of flood risk and makes an assessment of the risk from these sources within Bracknell.	The PFRA is based on a 6 year cycle and will review require during 2017.
National Flood and Coastal Erosion Risk Management Plan (FCERM)	This is the Overarching guidelines for flood risk management within the UK	The Local Strategy has been aligned with the National Strategy.
Catchment Flood Management Plan	Provides a catchment approach to managing Flood risk and provides key policies and actions on the catchment scale.	Used to provide background information and to ensure the policies within the Local Strategy align with the catchment policies identified for the catchment Bracknell sits within.
Thames River Basin Management Plan	Provides information on water quality and quantity within the borough and measures to improve them in line with the Water Framework Directive.	Used to understand the existing baseline and links to the requirements of the Sustainable Drainage Systems.

Catchment Flood Management Plan (CFMP)

CFMPs provide an overview of flood risk across a river catchment. They consider all types of flooding and consider the impacts of climate change. CFMPs have been produced by the Environment Agency and are to be used as a tool that informs the management of flood risk on a river catchment basis.

Bracknell Forest falls within the Thames CFMP Region Sub-area 7: Expanding town in floodplain locations for areas around the Upper and Middle Blackwater. It also falls within Sub-area 1: Towns and villages in open floodplain (north and west). This means there are two policy options for the two distinct types of areas within Bracknell Forest.

Policy option 4: Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

Policy option 6: Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

National Flood and Coastal Erosion Risk Management Strategy for England and Wales

The FWMA 2010 requires the Environment Agency to develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England.

The overall aim of the Strategy is to ensure the risk of flooding is properly managed by using the full range of options in a coordinated way. The government will work with individuals, communities and organisations to reduce the threat of flooding by:

- Understanding the risks of flooding, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
- Avoiding inappropriate development in areas of flood risk and being careful to manage land elsewhere to avoid increasing risks;
- Building, maintaining and improving flood management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
- Increasing public awareness of the risk that remains and engaging with people at risk to make their property more resilient; and
- Improving the detection, forecasting and issue warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

The FWMA states that Local Strategies must be consistent with the National Strategy. Being consistent with the National Strategy means acting in accordance with the overall aims and objectives, and in particular with the following six ‘guiding principles’:

- Community focus and partnership working;
- A catchment ‘cell’ approach;
- Sustainability;
- Proportionate, risk-based approached;
- Multiple benefits; and

- Beneficiaries should be allowed and encouraged to invest in local risk management.

There is an aspiration that public authorities cooperate to manage flood risks.

River Basin Management Plan

Bracknell lies within the Thames River Basin. The Thames River Basin Management Plan is about the pressures facing the water environment in this river basin district, and the actions that will address them.

It has been prepared in consultation with a wide range of organisations and individuals. There are a number of main river watercourses that are within the borough (as seen in Annex A, figure A.1). The European Water Framework Directive came into force in December 2000. It gives an opportunity to plan for and deliver a better water environment, focussing on ecology and protecting and enhancing water quality.

The table below provides a summary of the quality information for these watercourses. The information below is taken from survey reports completed by the Environment Agency which provide information on water quality and measures to improve it in line with the Water Framework Directive.

Table 1.1: Water body existing status

Water body	Chemical quality	Ecological quality	Hydromorphological status	Overall Risk
Bull Brook	Does not require assessment	Moderate Potential	Heavily Modified	At risk
Cut (Ascot to Bull Brook confluence at Warfield)	Does not require assessment	Moderate Potential	Heavily Modified	At risk
Cut at west Bracknell	Does not require assessment	Moderate Potential	Heavily Modified	At risk
Cut (Binfield to River Thames confluence) and Maidenhead Ditch	Good	Poor Potential	Heavily Modified	At risk

Within the River Basin Management Plan (RBMP) there are a number of measures that are currently now in place that can improve the status of the watercourse. The Cut and Bull Brook are classified as a heavily modified water bodies and the mitigation measures are focused around:

- Attenuate flows to limit detrimental effects of the features within the water body (drainage);
- Improvements and retention of marginal aquatic vegetation;
- Removal of obsolete structures and;
- Improve the in-channel morphology.

1.5 What is flooding and flood risk?

What is a Flood? The FWMA identifies a flood as:

'including any case where land not normally covered by water becomes covered by water.'
It does not matter whether the flood is caused by:

- *heavy rainfall*
- *a river overflowing its banks being breached*
- *a dam overflowing or being breached*
- *tidal waters*
- *groundwater*

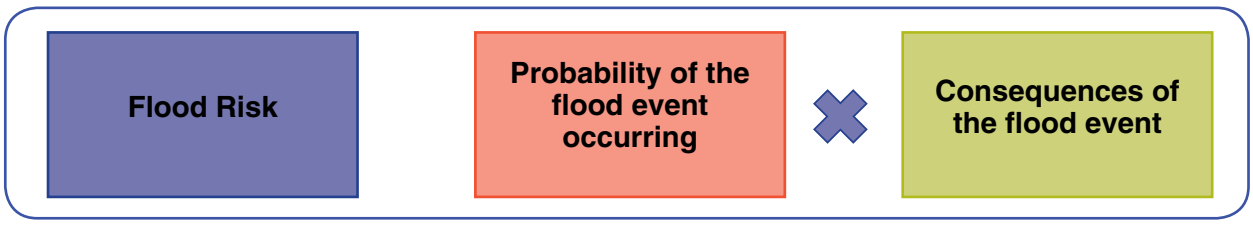
a flood does not include:

- A flood from any part of a sewerage system, unless wholly or partly caused by an increase in the volume of rainwater entering or otherwise affecting the system or
- A flood caused by a burst water main

The European Union (EU) Floods Directive defines a flood as a covering by water of land not normally covered by water. Flooding can occur relatively quickly and these are often referred to as flash floods, others can develop over a longer period of time. Floods can also recede at different rates and can be limited to local areas or be spread over whole river valleys. Although flooding can occur in unwanted areas, some areas such as balancing ponds that can be wet or dry are designed to flood in times of high flows.

Flood risk is the combination of flooding probability and the potential adverse consequences of the flood event (in relation to human health, the environment, cultural heritage and economy). The probability or likelihood of flooding is described as the chance that a location will flood in any one year. If a location has a 1.3% chance of flooding each year, this can also be expressed as having a 1 in 75 chance of flooding in that location in any year.

This does not mean that if a location floods one year, it will definitely not flood again for the next 74 years.



Flooding is a natural phenomenon, the effects of which can be made worse by poor management of the environment and landscape. The effects of flooding in the future may also be made more severe due to the impact of climate change, especially if nothing is done in relation to the risks.

Factors that contribute to flooding can be meteorological in nature such as rainfall, hydrological such as groundwater level or human factors including occupation of the floodplain, changes in land use activities and structural flood control measures.

Rainfall and the consequential flooding are largely unpredictable in location and severity, and dealing with these uncertainties will be challenging. This is the type of flooding that Bracknell is most familiar with.

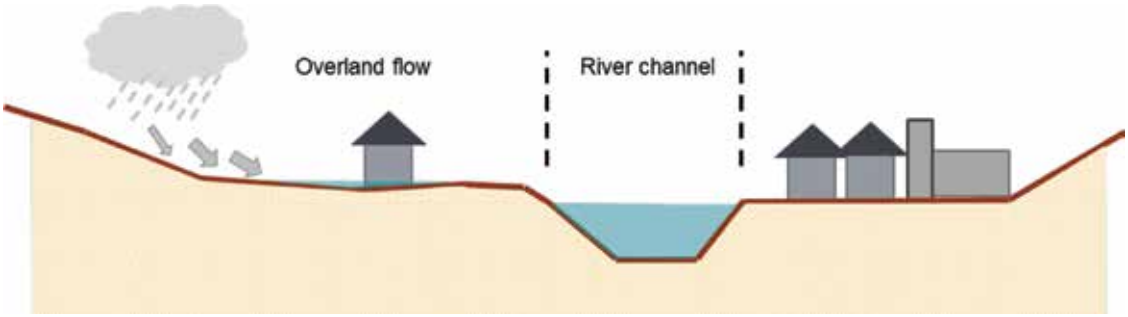
Surface water flooding

Surface water flooding is a form of local flood risk, and is also known as pluvial flooding or flash flooding. This type of flooding occurs when rainfall generates runoff which flows over the surface of the ground and accumulates in low lying areas. It is usually associated with high intensity rainfall events and can be exacerbated when the ground is saturated or when the drainage network has insufficient capacity to cope with the additional flow.

It is very difficult to predict this type of flooding. It may affect a widespread area and the extent of the flooding is relevant to the duration and intensity of rainfall, most of it is short-lived hence the description of flash flooding.

The Environment Agency undertook a surface water modelling exercise and produced surface water flood risk maps for the country. These maps can be viewed here

https://flood-warning-information.service.gov.uk/long-term-flood-risk map?easting=485435&northing=166403&address=100080208054



Sewer flooding

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding.

Surface water flooding is normally caused when the capacity is exceeded and the system surcharges causing water to flow out of the manhole and drain covers. A surface water sewer can also fail as a result of a blockage, siltation, collapse and equipment or operational failure.

Highway flooding

Highway flooding can be defined as flooding caused by heavy rainfall resulting in overflows from drains, gullies and manholes leading to ponding in low spots on the highway network. Overflows could also be due to localised blockages, siltation, collapse and equipment or operational failure.

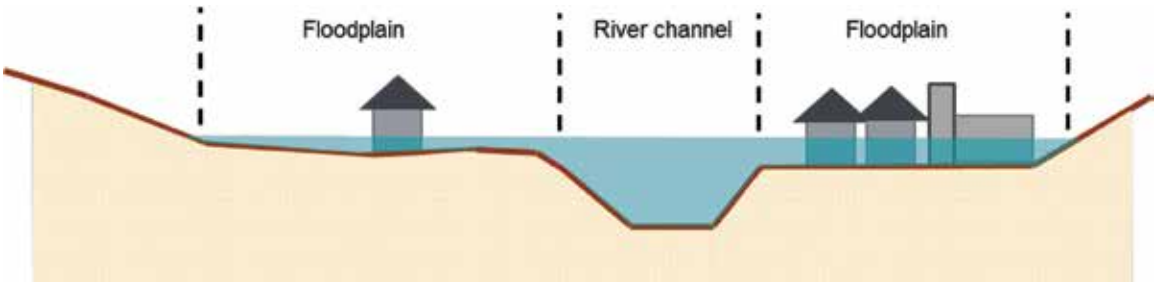
Groundwater flooding

Groundwater flooding occurs when water levels in the ground rise above the ground surface. Flooding of this type tends to occur after long periods of sustained heavy rainfall and can last for weeks or even months. The areas at most risk are often low-lying areas where the water table is more likely to be at a shallow depth and flooding can be experienced through water rising up from the underlying aquifer or from water flowing from springs. Ground water flooding occurs in areas which have highly permeable geology such as chalk.

River flooding

River flooding is known as fluvial flooding. Flooding from a river occurs when the capacity of the channel is exceeded and the water spills onto the floodplain.

The main rivers within Bracknell are The Cut located along the northern boundary of the Borough and the Blackwater along the southern boundary.
The Environment Agency have modelled all Main Rivers in the UK. Plans showing the extent of flooding associated with Rivers can be reviewed here. https://flood-warning-information.service.gov.uk/long-term-flood-risk



Ordinary watercourse flooding

Ordinary watercourse flooding concerns flooding from any watercourse which is not designated as a main river. All smaller watercourses, ditches and streams are classified as ordinary watercourses. Flooding from an ordinary watercourse occurs when the channel cannot accommodate the volume of water that is flowing in it, or when there is significant impedance to the passage of flow within the channel of the watercourse to the extent that it causes flow to come out of banks. Ordinary watercourses not designated as main rivers are the Bull Brook running from Martins Heron to The Cut.

Reservoir flooding

Reservoir flooding occurs when there is a complete or partial failure of the reservoir structure. It may be caused by erosion due to seepage, overtopping of the dam beyond its design level or through accidental damage. There are three reservoirs located within Bracknell; Mill Pond, Fish Place (Ascot) and Sandhurst Lower Lake.

Interaction between different sources of flooding

Whilst the primary focus of this strategy is local flooding (surface, small watercourses) flooding in the Borough can arise from a number of combined sources. To members of the public suffering from flooding the source of water may seem irrelevant however each flooding source may have a number of different organisations responsible for dealing with it.

1.6 Bracknell Forest Borough Council objectives

This section sets out the primary principles and objectives to ensure that local flood risk is considered and managed effectively. Recognising the limited allocated resources we have available is important in the context of managing flood risk. These resource levels have been significantly reduced since the 2013 - 2016 strategy was developed. Therefore progress with respect to some areas has been slower than anticipated. In addition there is no one post responsible for flood risk management, the responsibilities for managing the requirements of the FWMA are split across divisions within the Environment, Culture & Communities Department

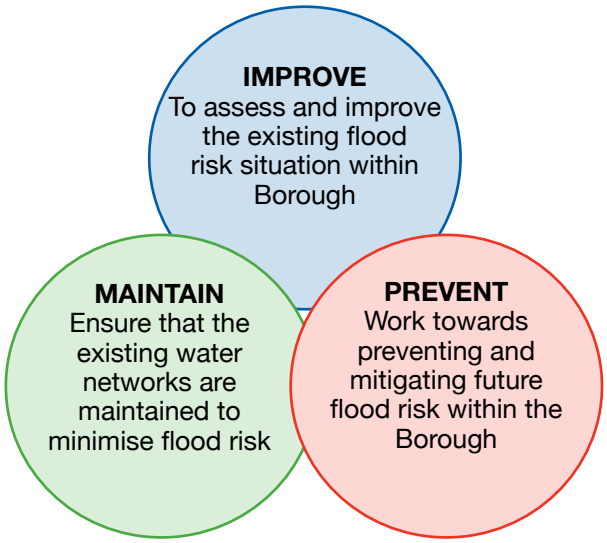
We propose to take a pragmatic approach to reduce the current flood risk and ensure that we do nothing to make this worse in the future. In formulating these objectives and measures we considered three options for flood risk management:

Maintain – Ensure existing water networks are maintained to minimise flood risk. Maintain so as not to worsen the situation.

Improve – Assess and improve the existing flood risk situation within the Borough. Seek to better understand the flood risk and drainage characteristics of the Borough.

Prevent – Work towards preventing and mitigating future flood risk within the Borough. Ensure there is no net increase in flood risk by considering the impact of new development, land use changes and climate change.

Figure 1.2: Overarching principles



The measures are those that we will seek to implement in order to meet the objectives of the Local Strategy. Each of the objectives has been considered in turn with measures identified to meet these objectives. These measures are explained within Table 4.2

Table 1.2: Local Flood Risk Management Strategy (LRMS) objectives

Objective		Contributes to overarching principle
1	Seek to reduce the current flood risk and ensure that as the LLFA we do not increase this in the future.	IMPROVE MAINTAIN PREVENT
2	Deliver a Local Flood Risk Management Strategy (LRMS) in line with the national flood risk management guidance.	IMPROVE MAINTAIN PREVENT
3	Deliver the LLFA duties and responsibilities under the FWMA	IMPROVE MAINTAIN PREVENT
4	Understand and capture flooding and drainage data of the Borough.	IMPROVE
5	Improve the level of understanding of flood risk, within the community as well as with key agencies. Ensure understanding of roles and responsibilities and adopt partnership working to deliver realistic outcomes.	IMPROVE
6	Ensure that due consideration is given to the wider environmental, social benefits and climate change requirements in both the strategy and delivery of objectives and measures.	MAINTAIN
7	Seek to avoid an increase in flood risk as a result of new development by controlling how any additional water enters existing drainage systems.	PREVENT
8	Currently Bracknell Forest Council (BFC) has not identified any schemes, however as opportunities arise for grant funding consider whether any potential schemes may be able to benefit.	IMPROVE MAINTAIN PREVENT
9	Identify and deliver appropriate opportunities for training and education in flood risk management.	IMPROVE MAINTAIN PREVENT

2 Roles and responsibilities

2.1 Why define roles and responsibilities?

Local Authorities rules have been enhanced so that they have responsibility for leading the coordination of flood risk management in their areas. Bracknell Forest Council (BFC) has been designated as the Lead Local Flood Authority (LLFA) and is responsible for leading local flood risk management across the Borough.

2.2 Risk Management Authorities within Bracknell Forest

The Flood and Water Management Act (FWMA) defines risk management as the following:

What is Risk Management?

Means anything done for the purpose of -

1) analysing a risk;
2) assessing a risk;
3) reducing a risk;
4) reducing a component in the assessment of a risk;
5) altering the balance of factors combined in assessing a risk, or
6) otherwise taking action in respect of a risk or a factor relevant to the assessment of a risk (including action for the purpose of flood defence).

The following organisations are identified as being 'Risk Management Authorities (RMAs) within Bracknell.

Lead Local Flood Authority	- Bracknell Forest Council (BFC)
Environment Agency	
District Council	- Not relevant as Bracknell is a Unitary
Internal drainage board	- there are no internal Drainage Boards within Bracknell
Water Company	- Thames Water
Highway Authority	- Bracknell Forest Council (BFC) are the Highway Authority

Figure 2.0: Flood risk partners

Under the provisions of the FWMA, the following duties are common to all risk management authorities:

- *A duty to cooperate with other risk management authorities;*
- *A duty to act consistently in accordance to the national and local strategies;*
- *Powers to take on flood risk functions from another risk management authority, and*
- *A duty to contribute towards the achievement of sustainable development.*

More detailed information on the specific roles and responsibilities of each organisation is also included in this chapter.

Lead Local Flood Authority (LLFA)

Bracknell Forest Borough Council is the Lead Local Flood Authority. In conjunction with leading and co-ordinating flood risk management activities, the FWMA also places a number of key duties on the LLFA. These duties are identified within the table below, more detailed information on implementation is provided within the relevant annexes.

Responsibility	Details
Local Strategy	To develop, maintain and monitoring of a Local Strategy in line with the National Strategy.
Duty to Investigate Flood Incidents	To build an accurate image of the flood risk issues across Bracknell requires the collation of useful records from actual flood incidents when they occur. Residents should proactively report such incidents. The investigations will examine which authorities have an involvement in a flood incident, and a report should outline their responsibilities or actions, if any. All Risk Management Authorities have a duty to cooperate under the FWMA and will work together to seek resolution. Investigations will involve consultation with the relevant risk management authorities, landowners and private organisations involved. As the LLFA we also have enforcement powers with repect to riporian ownership under the Land Drainage Act. The aim is for the Flood Investigation Reports to provide an understanding of the situation, outlining possible causes of flooding and potential long-term solutions. Further recommendations will also be made to highlight potential flood risk management actions. Reports will provide a clear and thorough understanding of the flooding situations.
Preparation of an Asset Register	The LLFA 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. BFC is required to ensure there are records of all significant assets available for use by risk management authorities and for inspection by the public at all reasonable times. It is anticipated that this will take many years before this register is sufficiently comprehensive to be of real value in terms of flood risk management. Steps are underway to undertake and develop this register. Unlike major assets associated with fluvial or tidal flooding or coastal erosion, there has often been much confusion over the ownership and maintenance responsibility of local flood risk assets. This is likely to be due to local drainage infrastructure commonly being hidden underground or along land boundaries, where landowners either do not realise or acknowledge that they have any responsibility. The Asset Register is a way to address this problem and ensure that residents are aware of assets in their area and have information to enable them to contact the assets' owners when there are issues. There are currently no set criteria for what defines an asset as significant but the most important consideration is its location. Future flood risk mapping and the flood history at a site will be used to analyse the 'significance' of each flood risk asset. The vulnerability of the asset's surroundings will also be used to determine the consequences of its failure. New Sustainable Drainage Assets will be recorded via the planning and designation processes and asset data may also be captured through local studies, such as Surface Water Management Plans and Flood Investigation Reports.

Designation of Features	BFC and the Environment Agency are both designating authorities' which means that these authorities may 'designate' features or structures where the following conditions are satisfied: • The designating authority has established that the existence or location of the structure or feature effects flood risk. • The designated authority has flood or risk management functions in respect of the risk which is affected. • The structure or feature is not designated by another authority. • The owner of the structure or feature is not a designating authority. An example of such a structure or feature might be a privately owned balancing pond or river bank. If an asset becomes 'designated' its owner cannot alter or remove it without first consulting the designating risk management authority. The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. Designating of features or structures will be done only when there are concerns about the asset.
Consenting works to ordinary watercourses	The LLFA is responsible for consenting works, by third parties on ordinary watercourses within their boundary. Works are covered by the requirements of Section 23 of the Land Drainage Act 1991.
Sustainable Drainage Systems (SuDS)	The Floods and Water Management Act sought to ensure that Sustainable Drainage Systems were adopted and maintained by Local Authorities. This was to reduce the risk of failure of systems due to maintenance. However in December 2014 the Government abandoned the relevant schedule of the Floods and Water Management Act and instead implemented some changes to the wording of the National Planning Policy Framework. The Environment Agency are now only a Statutory Consultee for Planning Applications which fall within Flood Zone 2 or 3. From April 2016 the LLFA became the statutory consultee for all Major Developments, with a duty to consider sustainable drainage provisions. The duty to adopt SUDS schemes has been removed and SUDS will remain largely in private ownership. The developer may maintain the SUDS themselves or get a third party to maintain the system (Service management company, water and sewage company, Local Government, private individuals, property owners or occupiers). The LLFA will have a vested interest in the long term performance of any drainage system in order to minimize flood risk. Should the delivery of SuDS on new developments lead to privately owned and maintained systems, the LLFA will consider designating those SuDS under Schedule 1 of the FWMA. The effect of which will be that a person may not alter, remove or replace a designated structure or feature without the consent of the responsible authority. In addition, the designation becomes a local land charge.

Environment Agency

The Environment Agency (EA) has both a national strategic role and local operational role in relation to flood risk management. Although their involvement at a local level has reduced given the changes in responsibility.

National Strategic Role
The Floods and Water Management Act requires the EA to publish the National Strategy. The National Strategy has guiding principles that need to be incorporated into the Local Strategy. The National Strategy aims to define and understand the roles and responsibilities of risk management authorities and to provide information to communities at risk.

The National Strategy identifies the following strategic actions for the EA:

- Use Strategic Plans such as the Catchment Flood Management Plan (CFMP) and the Shoreline Management Plan to set the direction of Flood risk management;
- Support the creation of Flood Risk Regulation by collating and reviewing the assessments, plans and maps that Lead Local Flood Authorities produce;
- Provide data, information and tools to inform government policy and aid risk management authorities in delivering their responsibilities;
- Support collaboration, knowledge-building and sharing of good practice including provision of capacity-building schemes;
- Manage the Regional Flood and Coastal Committees (RFCCs) and support their decisions in allocating funding for flood defence and flood resilience;
- Report and monitor on flood and coastal erosion risk management; and
- Provide grants to risk management authorities to support the implementation of their incidental flooding or environmental powers.

Local Operational Role
The EA's local operational role includes emergency planning, advising on planning applications when they are classed as major development and are situated within a Flood Zone in relation to flood risk and managing flooding from main rivers and reservoirs.

Emergency Planning
The EA, as part of their role in emergency planning, contributes to the development of multi-agency flood plans. These are developed by local resilience forums to help the organisations involved with responding to a flood work efficiently together.

To help provide better warning to organisations, the media and the public the EA also work with the Met Office jointly in the Flood Forecasting Centre. The EA have a responsibility to Warn and inform through issuing flood alerts and warnings.

Main Rivers
Main Rivers are watercourses shown on the Statutory Main River Map held by the EA and DEFRA. The EA has permissive powers to carry out works of maintenance and improvement on Main Rivers. This can include any structure or appliance for controlling or regulating flow of water into or out of the channel. The overall responsibility for maintenance of Main Rivers lies with the riparian owner.

The EA can bring flood defence schemes forward through the Regional Flood and Coastal Committees, and it will work with lead local flood authorities and local communities to shape schemes which respond to local priorities. The EA are also the regulating authority with regards to consenting works carried out by others, in, under, over or within 8 metres of a main river in accordance with the Local Bylaws permitting through the Environmental Permitting regulations.

Reservoirs
The EA enforce the Reservoirs Act 1975, (amended within the Floods and Waters Act 2012), which is the safety legislation for reservoirs in the United Kingdom. The EA is responsible as the Enforcement Authority in England and Wales for reservoirs that are greater than 25,000m^3 (amended to 10,000m^3 in Floods and Waters Act but is yet to be enacted). As enforcement Authority the EA must ensure flood plans are produced for specified reservoirs. However the responsibility for carrying out work to manage reservoir safety lies with the reservoir owner/ operator who should produce the flood plans.

Highway Authority

As Highway Authority (HA), BFC has the same obligations to co-operate on flood risk issues. It also has the following responsibilities under other legislation:

Responsibility to maintain highways, including ensuring that highway drainage systems are clear and that blockages on the highway are cleared. This is a duty under the Highways Act and therefore strategic highways are inspected and maintained regularly.

As HA the Council also has powers to deliver works that they consider necessary to protect the highway from flooding. These works can either be on the highway itself or on land which has been acquired by the HA in the exercise of highway acquisition powers.

The HA may divert parts of watercourses or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from the highway.

Thames Water

The water industry is highly regulated and the quality of customer service and the prices they are able to charge their customers are regulated by the Water Services Regulation Authority (WSRA), commonly known as Ofwat. Thames Water is the principle sewer authority operating within Bracknell. Thames Water has the following responsibilities for flood risk management:

- Respond to flooding incidents involving their assets; including storm sewers draining and located under a public highway.
- Maintenance of a register of properties at risk of flooding due to hydraulic overload in the sewerage network (DG5 register)
- Provide, maintain and operate systems of public sewers and works for the purpose of draining an area;
- Have a duty to co-operate with other relevant authorities in the exercise of their flood risk management functions;
- Must have a regard to national and local flood risk management strategies.

The DG5 Register
All water and sewerage companies maintain a register of properties at risk of flooding due to hydraulic overload in the sewerage network; this is known as the DG5 register and part of the set of Ofwat DG (Director General) Indicators.

The DG5 Register is a register of properties and areas that have suffered or are likely to suffer flooding from public foul, combined or surface water sewers, due to the system being overloaded. There are 3 at risk reporting categories:

- 1 in 20 year;
- 1 in 10 year; and
- 1 in 2 year.

This reporting category reflects the frequency of flooding incidents in properties/areas and the return period of the storm that causes the flooding. For a sewer to be classified as over-loaded the flow of a storm must be unable to pass through it due to a permanent problem not due to problems such as blockage, siltation or collapse. Flooding that occurs during more intense storm events (greater than 1 in 20 years) is also excluded. When a solution is in place to rectify the overloading a property or area is removed from the register.

Tackling sewer flooding
As part of the obligation to Ofwat, sewerage companies are required to undertake capacity improvements to alleviate sewer flooding problems on the DG5 register during the current Asset Management Period (2010 – 2015) with priority being given to more frequent internal flooding problems.

2.3 Other stakeholders

Local communities & householders

Communities have vital knowledge about the history of flooding in their area and can make important contributions to helping manage the levels of flood risk. It is important therefore that residents are encotaged to report flooding incidents otherwise we can't do anything to assess or take action. This also includes taking steps to reduce the impacts of flooding on their properties. BFC's policy on the distribution of sandbags is provided in the Annexes.

RMAs are unlikely to be able to record every incident of flooding that occurs in the Borough without the help of Parish Councils and Communities, especially those that do not directly flood properties. However, flooding incidents which affect roads or enter the curtilage of properties are important to record. They can indicate that there has been flooding in relatively regular rainfall events which would warn that the properties are at risk in more extreme rainfall events. This information is crucial in building up cases for flood defence and flood resilience schemes.

Communities affected by flooding should report the incidents to BFC, via Customer Services, who may or may not undertake a formal investigation. The decision on whether an incident will be investigated formally will be in accordance with the flood investigation policy within the Annexes to this document.

Residents may also wish to take a proactive approach to flood risk by signing up to Floodline Warnings Direct through the EA. The free flood warning service gives advance notice of when flooding from rivers is likely to happen and gives time to prepare. Warnings can be received by a variety of means including text, phone, e-mail etc. More information can be found here https://www.gov.uk/floodsdestroy

Many residents may be unaware of the flood risk to their property if there has not been a flooding incident while they lived there. The EA provide guidance and information on preparing for flood events through their website, including information on flood information in the form of flood risk maps.
It is the responsibility of householders and businesses to look after their property including protecting it from flooding. Whilst in some circumstances other organisations or property owners may be liable due to neglect of their own responsibilities, there will be many occasions when flooding occurs despite all parties meeting their responsibilities. It is also vitally important that householders whose homes are at risk of flooding, take the following steps to ensure the impact to their home reduced:

- Check whether their household is at risk from flooding from all sources;
- Ensure that preparations have been made in the event of a flood;
- Take measures to ensure that the impact of flooding to their household is reduced, either through permanent measures or temporary measures; and
- Where possible take out flood insurance (this is relative to fluvial flooding, it is very difficult to insure against storm events)

Local Planning Authority

As well as being the LLFA BFC is also the Local Planning Authority. They are responsible for the production of strategic planning documents such as the Local Plan/Core Strategy that guide new development and regeneration within the Borough. They also determine planning applications in line with national and local policies.

Landowners

Landowners whose property is adjacent to a river, stream or ditch are likely to be riparian owners with responsibilities. If a property borders a river, stream or ditch then the property owner is likely to be a riparian owner, owning the land up to the centre of the watercourse. Land registry details should confirm this.

Riparian owners have a duty to protect their property from flooding but in most cases will need to discuss the methods of doing this with the EA or BFC. They also have the responsibility for maintaining the bed and banks of the watercourse and ensuring there is no obstruction, diversion or pollution to the flow of the watercourse. Any works to the watercourse will need consent from either the EA (if Main River) or the BFC (if an Ordinary Watercourse). The EA and BFC have enforcement and consenting powers under the FWMA and other legislation.

Businesses

Utility and infrastructure providers such as Network Rail, energy companies and telecommunication companies are not Risk Management Authorities as defined by the FWMA. However they have a crucial role to play in flood risk management as their assets can be important consideration in planning for flooding. They may have assets such as culverts and bridges that have the potential to restrict flood flows and increase the risk of flooding to the community, information about these assets needs to be shared with the risk management authorities. They may already maintain plans for the future development and maintenance of the services they provide and it is important that they consider flood risk management issues during this planning process. This will help to ensure that their assets and systems are resilient to flood risk and that the required level of service can be maintained in the event of an incident.

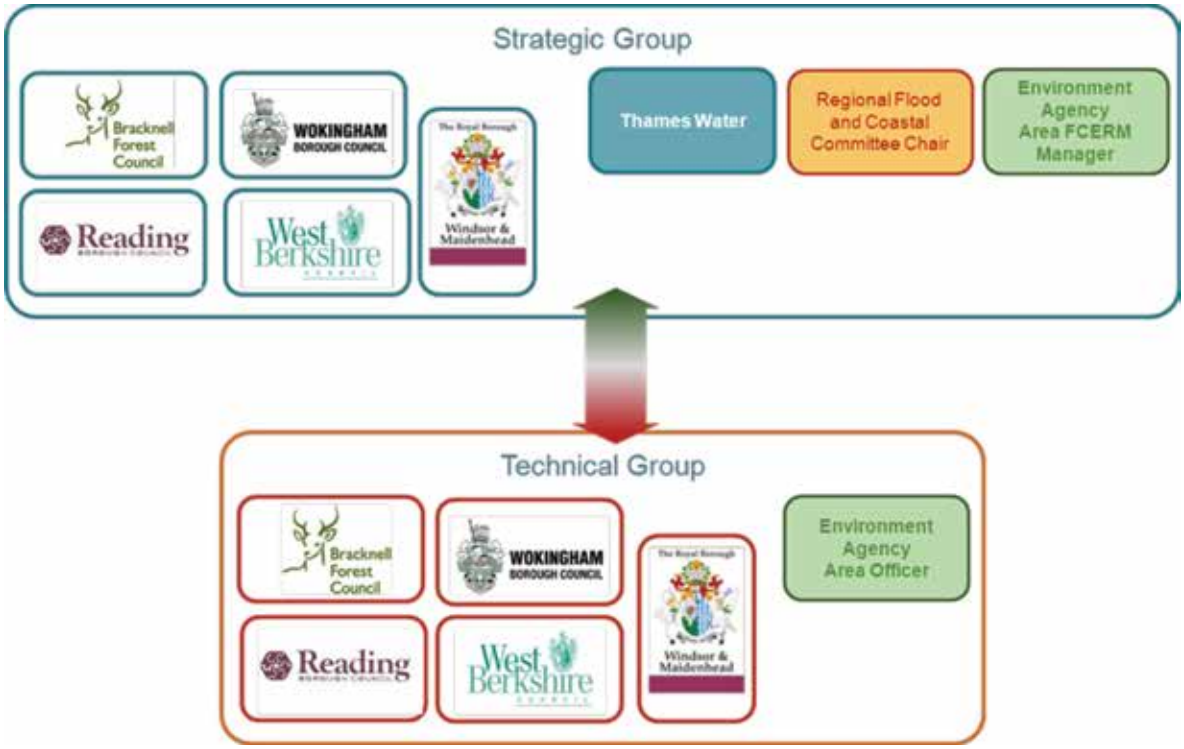
2.4 Berkshire Five Strategic and Technical Groups

The FWMA encourages Risk Management Authorities to work together and cooperate on flood risk management. The Berkshire Group was set up to facilitate discussions on the implementation of the FWMA and to share best practice. This has evolved into an established group whereby flood risk issues can be discussed and in some respect economies of scale be sought. The Berkshire Five Group consist of five of the Berkshire Unitary Authorities, these are:

- Bracknell Forest Council (BFC);
- Reading Borough Council (RBC);
- Royal Borough of Windsor and Maidenhead (RBWM);
- West Berkshire Council (WBC); and
- Wokingham Borough Council (WBC).

N.B. Slough Borough Council have aligned themselves with South Buckinghamshire Council due to the local drainage catchments.

Figure 2.1: Berkshire Strategic and Technical Group Structure



There are currently two separate groups although due to limited resources the intention is that the strategic and technical officers the group will consider merging during 2017 with updated terms of reference.

The Technical Group is comprised of operational officers within the LLFA which aim to discuss the technical aspects of how the Floods and Water Management Act will be implemented. The Technical Group provide information and suggest approaches to the implementation of the FWMA for decisions at the Strategic Group. As resources become even more stretched there is the potential to merge these two groups. An internal flood risk management group is establshed to monitor objectives of the CFRMS. These meet twice a year.

3 Nature of Flood Risk within Bracknell

3.1 Overview of Bracknell Forest Borough

Bracknell Forest Borough covers an area of approximately 109 square kilometres and contains three main towns. The largest is Bracknell which lies in the centre of the Borough. To the south of the Borough are the towns of Crowthorne and Sandhurst.

Outside the town, the south of the Borough is forested, the majority of which is owned by The Crown Estate and Forestry Commission. The north of the Borough is mainly rural, agricultural land. The Borough is made up of six parishes, these being Binfield, Bracknell, Crowthorne, Sandhurst, Warfield and Winkfield.

The main rivers in the Borough are The Cut and the River Blackwater. The Cut flows from North Ascot in a northern direction along the eastern boundary of the Borough, before turning west and flowing past the northern boundary of Bracknell, where it is joined by a tributary from within the town. It then turns north again, exiting the Borough at Westley Mill. The River Blackwater flows along the southern boundary of Bracknell and is flanked by a series of ponds and lakes, i.e. Yateley Lakes, Trilakes Fisheries and the Country Park. Both rivers form part of the Thames River Basin and are the responsibility of the Environment Agency Thames Area. Multiple tributaries and drainage ditches flow into these Rivers; these are not classified as main rivers.

The bedrock geology of the Borough generally consists of Bagshot, Windlesham and Camberley Sand Formations (beds of sand, silt and clay) to the south and London Clay to the north of Bracknell.

3.2 Flood risk within Bracknell Forest

Historical flood incidents recorded by BFC have been captured as four main event years, 2000, 2002, 2006 and 2007. These flood events were mainly caused by surface water flooding, which can be directly attributed to rainfall storm events which occurred over all or some parts of the Borough. In the last two flood incidents, surface water flooding was experienced as drainage systems and the underlying soils became overloaded and unable to cope with the volume and intensity of rainfall.

Historical flooding within the Borough is based on information gathered by BFC, Thames Water and the Environment Agency. This historical information is summarised within this chapter.

Table 3.0: Historical Flood events

Date	Brief Description	Source
7th – 8th May 2000	Localised flooding across the Borough, number of properties unknown.	Surface Water
8th August 2002	Localised flooding across the Borough, number of properties unknown.	Surface Water
17th November 2006	Localised flooding across the Borough, number of properties unknown.	Surface Water
20th July 2007	Localised flooding across the Borough. Estimated no. of properties < 10	Surface Water

Table 3.0 above does not intend to provide an exhaustive list of all flood events or areas affected by flooding, but rather an indication of the types of flood events which have occurred in the past.

This information does not indicate locations that may be susceptible to future flooding due to local changes such as improvements to drainage systems whilst the Thames Valley and its surrounding catchment areas have experienced a number of significant events since 2007, (2012 and Winter 2013 to 2014) these have not resulted in any flooding in Bracknell.

The Environment Agency (EA) have produced fluvial flood maps and Flood Maps for surface water, these are based on these are based on detailed modelling of predicted flood events which have been calibrated using historical flooding information. See figures in Annex A. Interactive mapping for your area can be checked here https://flood-warning-information.service.gov.uk/long-term-flood-risk

3.3 Types of flooding

Surface water flooding

It has been identified from the historical flood records, that the most recent and significant surface water flooding to affect the Borough was recorded on the 20th July 2007 with a 1 in 33 chance of occurring (Bracknell Forest PFRA). Heavy rainfall over the previous weeks had caused a degree of saturation to soils, resulting in less infiltration through the underlying geology, leading to high surface water runoff rates in a short amount of time.

The Historical Flood Records also indicated similar issues, albeit to a lesser extent, during storm events in 2002 and 2006.

The Environment Agency undertook a nationwide modelling study to produce surface water flood maps. These are based on ground levels and areas draining to natural valleys. The modelling includes assumptions regarding the presence of drainage features across urban areas. They have been provided for 3 classes of event the 30 year (high), 100year (moderate) and the 1000 year even (low).

The EA Flood Map for Surface Water within Bracknell identifies surface water flooding within the Borough as relatively sporadic, with discrete patches of surface water flooding across the whole catchment.

Sewer flooding

Records of flooding from the surface and foul water sewers have already been provided for the PFRA and the SFRA from Thames Water.

Groundwater flooding

Groundwater flooding in Bracknell Forest is unlikely due to the underlying geology. An exception to this is along the watercourses where the presence of river gravels or alluvium can act as local aquifers and potentially cause groundwater flooding. Refer to Annex A which includes a map to show the areas susceptible to groundwater flooding and indicates a low probability of risk within the Borough.

The EA have generated maps showing the percentage of an area being susceptible to groundwater flooding. These show the Borough divided into squares and the percentage of this square being susceptible to groundwater emergence. Much of the Borough is covered by squares less than 25% susceptible. It should be noted that the assessment has been undertaken on a broad scale.

River (Fluvial) flooding

The EA modelled floodplains in the north of the Borough tend to be along relatively narrow floodplains associated with The Cut, typically covering approximately 100m to 200m in width. This mapping indicates that the downstream floodplain of The Cut could reach a width of approximately 500m. This area is mainly countryside, but identified within the EA Flood Maps (refer to Annex A) there are existing isolated areas at risk. The EA historical flood mapping indicates that some of these properties may have experienced flooding in the past.
Whilst the EA flood maps shows past flooding, no historical records of river flooding have been found along the tributaries, the Environment Agency's historical flood map indicates that the incidents of flooding mainly occur along The Cut in several locations.

Flooding in the south of the Borough associated with the River Blackwater remains within the fields and lakes situated along the River's borders, particularly on the western side. On the eastern side flood risk is generally more extensive with the flood zones extending far into the town. The EA historical flood map extent corresponds well with the flood zones along the meadows and lakes area.

Ordinary watercourse flooding

There are no specific flooding records related to ordinary watercourses, however some historical flooding could be attributed to watercourses of this type combining with others during a flood event.

Flooding from impounded water bodies

There are three reservoirs (those that hold 10,000m3 of water above ground); these are Mill Pond, Fish Pond in Ascot and Sandhurst Lower Lake. As yet the extent is of flooding from the reservoir inundation maps from potential breaches is not available to the public.

Mill Pond, near Wildridings Road, has a spillway which diverts flows through a pedestrian subway nearby and via paths through an industrial estate to The Cut. Mill pond was created as an attenuation pond to ease the burden of increased runoff on the sewer and river network from new developments in the area.

There are approximately 25 other attenuation ponds in the Borough which are not classified as reservoirs. Whilst the other attenuation ponds have also overtopped on occasion, there are no known incidents of flooding affecting properties.

Key Points on Local Flood Risk within Bracknell:

Generally river (fluvial) flooding is not an issue within the Borough.

Historical surface water flood events have been sporadic.

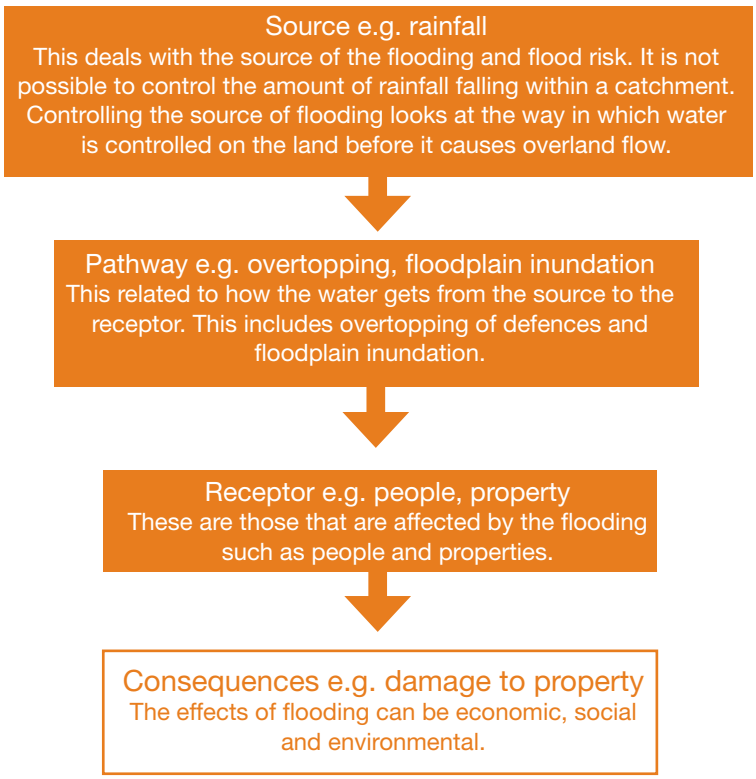
The risk of groundwater flooding is low due to the nature of the geology

4 Options and funding

4.1 Options for managing local flood risk

When considering flood risk management there are many different options that can be utilised to reduce the risk of flooding to individuals. However the options cannot remove the risk completely as there can always be an extreme event that may exceed the design standard of the measure put in place. It is also important when considering methods to consider the Source, Pathway, Receptor and Consequences model.

Figure 4.0: Source - pathway- receptor- consequence



When deciding what combination of flood risk management measures or strategies to adopt it is important that the same general performance features are considered for each and every option. These should be considered together with the specific characteristics that affect the performance of that option.

4.2 Options suitable for Bracknell Forest Council (BFC)

There are a number of options for managing flood risk within the Borough.

Options to control the source – reducing runoff from the catchment

These methods help reduce or delay the runoff entering the system of drainage systems; and reduce or increase the speed at which water is conveyed downstream.

Land Use
The generation of surface water runoff can be reduced through the implementation of certain agricultural practices. For example, land can be ploughed across the slope of the land thereby, reducing the effect of channelling of water over the land when it rains. Measures can include incorporating buffer strips on farm with tree planting to delay the flow of water through a catchment.

Sustainable Drainage Systems (SuDS)
The implementation of sustainable drainage measures as part of any development is a necessity to ensure future flood risk is not increased due to an increase in impermeable area. There is also potential to reduce the existing flood risk. This can include, for example, permeable paving with sub-base storage, swales, attenuation basins and ponds. These methods will act as source control method to reduce the amount of run off entering the drainage network, and therefore reduce the risk of flooding downstream from a severe rainfall event. There are also environmental benefits with the installation of these systems such as a reduction in diffuse pollution entering the watercourses.

Storage
These structures, providing storage can take up a large land area, but with careful design can take different forms to incorporate them into the existing landscape. These aim to control the rate in which run off is discharged into the watercourse and if ground conditions are suitable allows water to infiltrate.

Options to control the Pathway

Storage
Where land area allows it may be possible to construct offline and online storage areas, to attenuate the flood water and discharge it from the area at a manageable rate. May require a large area, but can be multifunctional space. If it is designed to attenuate over 10,000m³ of water it may be designated as a reservoir (under the Reservoirs Act 1975, as amended by the Floods and Water Management Act 2010).
Channel Design

- reduce or increase the conveyance capacity of the watercourses (for example, by construction of bypass channels or multistage channels, by widening or deepening, or by changing the roughness of the existing channel);
- Removal of constrictions to the flow within the channel or floodplain.
- Flood Farming

Flood Farming is about getting farmers or landowners to agree to allow their land to be designed to flood more frequently through the construction of measures around an area to contain the water as it flows in. Clearly landowners would require compensation for the use of their land.

Options to affect the receptor - preventing water from affecting assets

Walls and Embankments

Hard engineering techniques may be the only viable option in some areas, these methods would involve the construction of embankments and flood walls; these can be costly and have higher environmental implication on the area when compared to other methods.

Property Level

A general approach to improving community resilience should be adopted throughout the Borough, including increasing the general awareness and preparedness for a flood event in areas that are at high risk areas. There are options for home and business owners to take action in relation to resistance and resilience measures.

Resilience Measures These are measures that allow buildings to recover quickly in the event of flooding	Existing developments in risk areas could retrofit flood resilience measures therefore allowing a property to be quickly habitable again if a property did flood.
Resistance Measures These are described as those measures that prevent water from entering the property	In addition the properties could include property protection schemes, such as demountable flood defences and airbrick covers. These are known as resistance measures.

Exceedance

Not all flooding can be prevented but the route that overland flows or flows that exceed the drainage systems take can be controlled along the existing highways or other flow routes to areas designed to attenuate flood water. This can be achieved through:

- increasing kerb heights and property thresholds to retain water on designated sections of highway. This could be combined with existing highways maintenance and improvement projects which would make it more cost effective.
- divert flood flows to less vulnerable areas, through bypass channels or a piped network, with a suitable capacity. This can be incorporated into new development as part of the planning and design phase.

Non structural measures

A number of other measures should also be used in conjunction with any of the above methods or as standalone to further reduce flood risk. These methods are relatively simple and are the least costly:

Review asset management and maintenance methods
It is important to review the maintenance and management of drainage infrastructure and assets. This will happen for significant flood risk assets (such as culverts and weirs) through the development of the Asset Register to meet the requirements of the FWMA.

The riparian owners are responsible for maintenance of the watercourses and assets. BFC will ensure that owners are aware of their responsibilities to maintain their assets and watercourses.

Future Developments
Future developments should incorporate appropriate mitigation measures and the use of SuDS and help contribute to the reduction of flood risk in the community.

Community Flood Management Plans
These are community lead flood management plans which may be appropriate in some locations and allow the community to understand what actions they need to take in the event of a flood. This could include for example, who they should contact and if advised to evacuate, where they should go and the route that they should take.

There are currently no community flood plans within the Borough, and given flooding history and appetite. These are unlikely to develop.

The table below identifies the suitability of potential flood risk management options for Bracknell.

Table 4.0: Flood risk management measures

Option	Source, pathway, receptor	Comments	Applicable for Bracknell (Yes/No)
Land Use	Source	Farmland that generates flooding	No
Sustainable Drainage Systems	Source	Sustainable Drainage Systems should be implemented within all new development. The Local Planning Authority (LPA) will approve Sustainable Drainage Systems as part of a planning application. The LLFA will provide technical advice to the LPA as a statutory consultee.	Yes
Maintenance of Channels	Pathway	Maintenance of main river channels is the responsibility of riparian owners with an overview from the Environment Agency. Maintenance of ordinary watercourse is the responsibility of the riparian owners.	Yes
Improving channel capacity	Pathway	Opportunities to improve channels through development and redevelopment for main rivers and ordinary watercourse.	Yes
Increasing the storage	Pathway	This will be the creation of storage within the floodplain. Flooding from the rivers are considered to be minimal within Bracknell as a source of flooding (see Local Flood Risk Chapter)	No
Construction of flood defences	Pathway	Traditional flood defences, such as walls are likely to be of limited affect within Bracknell due to the nature of flooding.	No
Property Level Protection	Receptor	This option directly affects people's property. Bracknell floods from sporadic flooding from surface water runoff.	Yes
Community Flood Management Plans	Receptor	Allows actions to be taken to provide measures during a flood event	Yes
Flood Emergency Planning	Receptor	Allows a co-ordinated approach from Bracknell.	Yes

4.3 Managing flood risk through the requirements of the FWMA

As well as considering general options for managing flood risk within Bracknell, the FWMA identifies that the LLFA is required to undertake a number of actions.

Table 4.1: Bracknell FWMA requirements

FWMA Requirement	Description	Annex Reference
Production of Asset Register	The asset register allows identification of assets within the Borough that may have a significant impact on flood risk. Whilst this does not involve the building of defences, it helps identify existing structures that act as pathways throughout the Borough	D
Designation of Features	The designation of an important feature allows the LLFA control over this pathway structure	E
Flood Investigations	To assess the causes of a flood event and the roles and responsibilities of the Risk Management Authorities within the area. This will allow Bracknell to understand the flooding including the causes and possible measures that could be taken to reduce flood risk in the future.	B
Transfer of powers on ordinary watercourse	Bracknell will be responsible for issuing and reviewing works to ordinary watercourses. This will allow for flood risk issues to be taken into account with works to ordinary watercourses.	C

4.4 Sustainable drainage requirements

Water is an essential part of our natural and built environment. The way we live, work and play to varying degrees are influenced by the availability and quality of water.
Increasingly we need to embrace water management as an opportunity rather than a challenge. Successfully delivered sustainable drainage provides communities and wider society with benefits set within the context of adapting to climate change, development and improving our natural environment."

Extracted from 'Planning for SuDS – Making it happen' (CIRIA report C687, 2010)

Background

SuDS as a means of dealing with surface water are not, in themselves, a new concept.
The natural means of dealing with rainfall is through evaporation, infiltration, or take up by vegetation. Excessive rainfall that cannot be dealt with in this manner flows over land to watercourses, stream and rivers, or collects in hollows to form ponds or marsh.
Bracknell Forest Borough was fairly undeveloped prior to construction of the new town, with any development relying on soakaways, connections to ditches or watercourses or basic surface water drainage systems, using conventional pipes.
With the development of the new town in the 1950's came a new form of surface water drainage, still based upon the use of drainage pipes, but now incorporating the concept of balancing flows, so that generally smaller pipes conveyed water to the existing water courses which were themselves either piped or altered, with water which exceeded the capacity of the pipes being stored either in ponds (such as Mill Pond) or by being diverted into dry ponds for a short time.
Most modern development within the Borough since the 1970's has also followed this principle of balancing flows, along with restricting flows from developments so as not to overwhelm surface water sewers or watercourses downstream of the site.

Conventional surface water drainage systems

It is often perceived that this modern "conventional" form of drainage – gullies, manholes, pipework and storage – is a sustainable drainage system.
However, whilst often delivering the goals of reducing flood risk and dealing with rainfall from the development, these systems do not meet the basic requirements for SuDS.

Conventional surface water drainage systems have the following attributes:

- They are generally piped systems below ground
- They are not legible, i.e. they do not show how they function
- They are not easily maintainable
- They do nothing to deal with pollutants - during the first flush following a period of rainfall, pollutants will be washed from surfaces, such as highways, and are then transported very efficiently into water courses or ponds without any treatment
- They do not provide much in the way of amenities - balancing ponds in the borough such as Savernake and Westmorland are mostly owned by Thames Water. Without entering into management agreements with BFC these ponds would normally be fenced off and not available to the public.

- They do not deal with all of the rainfall from a development - water companies are only obliged to deal with rainfall up to 1 in 30 year storm events. Any flows in excess of this amount, are not catered for in the adopted public sewer system. Instead the excess rainfall is dealt with by the provision of storage which is separate and often privately owned (usually with the owners being unaware of their ongoing liabilities – as these systems are hidden below ground). However, the excess rainfall does usually drain down into the Thames Water sewers over time
- They do not help to provide water for vegetation and trees, nor do they help to replenish the natural water table within the development

Sustainable drainage systems

SuDS work in a different way to conventional piped systems. The systems use a variety of different techniques to not only deal with the rainfall, but also to capture pollutants and silts, as well as providing water for plants and replenishing the ground water table.
Over the past few decades where SuDS have been constructed they have not only been dealing with the rainfall from 1 in 30 year events, but also from other events up to 1 in 100, all generally being owned and managed by one body. They are therefore more integrated in their design and provide many benefits in addition to their basic function.
SuDS have been promoted by Government, the Environment Agency and by Planning Policy for some time, but their uptake has been slow. This is mainly due to a presumption that they are:

- Expensive to construct
- Use too much land
- Difficult to maintain
- Difficult to design
- Difficult to adopt by public authorities

Publications by CIRIA, the Environment Agency and NHBC, together with practical experience from Europe, USA and Australia, as well as pioneering work by some authorities such as Oxfordshire have shown that these perceptions are misplaced, except those regarding adoption.

The Government, following the Pitt review, took on board misconceptions about adoption, and in the Flood and Water Management Act 2010 (FWMA), published details of a new body which would be part of the Lead Local Flood Authority – the SuDS Approving Body. adoption.

Current proposals

Following extensive work on preparing for implementing Schedule 3 of the FWMA, the government carried out a consultation in September 2014 with a view to abandoning that work, and instead placing the responsibility for approving SuDS within the local planning authority (LPA).

The LPA will assess and approve Sustainable Drainage Systems (SuDS) as part of a planning application. It is intended that this will apply to “major” developments initially, but may be extended to include “minor” developments.

The drainage of surface water from a proposed development will be given greater weight as a material consideration when determining the application. The government expects local planning policies and decisions on major planning applications to ensure that SuDS are used – unless demonstrated to be inappropriate.

Currently the Environment Agency are the statutory consultee with regard to any flood risk which may affect, or be affected by, any proposed development. In future the Environment Agency will only be the statutory consultee when the development affects a main river. It is proposed that the previous statutory consultee role for all other development will transfer to the LLFA.

The LPA will consult the LLFA (and EA when appropriate) and satisfy themselves that the proposed minimum standards of operation are appropriate, that there are clear arrangements in place for ongoing maintenance for the lifetime of the development and ensure that the SuDS are designed to have maintenance and operational requirements which are economically proportionate.

The current requirement in the National Planning Policy Framework (NPPF) that all development in areas at risk of flooding are expected to use SuDS will still apply. Planning applications that fail to meet a policy requirement to normally deliver SuDS first over conventional drainage could be rejected.

Local planning authorities have a broad discretion to impose conditions on planning permissions providing they meet the legal and policy tests (as set out in the National Planning Policy Framework). Planning conditions can require the use of effective sustainable drainage systems to drain a development's surface water runoff, and also to ensure that the sustainable drainage systems will be maintained for the lifetime of the development.

Any conditions imposed on the grant of planning permission run with the land and continue to apply so future land owners would be required to adhere to them. In some circumstances it may be appropriate for this to be delivered using a Section 106 (Town and Country Planning Act 1990) agreement.

To ensure the delivery of effective sustainable drainage systems, conditions could require that the construction of the drainage solution be in accordance with a detailed scheme as agreed with the LPA. In order to be effective, the conditions would need to provide that the sustainable drainage systems be maintained for the lifetime of the development.

Any condition regarding maintenance should be effective and must:

a) Clearly identify who will be responsible for maintaining the SuDS and funding for maintenance should be fair for householders and premises occupiers,
b) Set out a minimum standard to which the SuDS must be maintained.

Government will set out options within planning policy for the delivery of long term maintenance. The developer may maintain the SuDS themselves or get a third party to maintain the system (Service management companies, Water and Sewerage companies, Local Government, private individuals, property owners or occupiers).

Design considerations

- Government has proposed that the SuDS national standards which were developed as ministerial standards for use by the SuDS Approving Body, will become national guidance. This guidance would be supported by partner-led “guidance” maintained as a standalone document.

- Bracknell Forest Council as the LLFA, would expect SuDS to be designed to be in accordance with the national SuDS guidance. In addition, there would be a requirement that the SuDS are also designed in accordance with BS 8582:2013 - Code of practice for surface water management for development sites. Any SuDS used within Bracknell Forest should also accord with the guidance given in Annex F to this strategy.

- Particular emphasis by the LLFA would be placed on the provision of SuDS which were constructed on or near the surface, which utilize natural vegetative SuDS features and/or permeable block paving so as to deliver multiple benefits with regard to flood risk, surface water management, water quality, etc; The use of below ground, piped storage systems would be discouraged, due to their inability to deliver benefits particularly with regard to water quality and interception.

4.5 Funding options

National funding

It is important that the Local Strategy sets out how the proposed actions and measures will be funded and resourced. It is also important that this strategy sets out the different types of funding that are available to the individual LLFA.

Flood Defence Grant in Aid
The Environment Agency is responsible for allocating central government funding to manage flood and coastal erosion risk in England.

This funding is known as Flood Defence Grant in Aid (FDGiA). It goes to flood risk management authorities (RMAs) who are formed of the Environment Agency, English local authorities and internal drainage boards (IDBs). Together, they use it to pay for a range of activities including flood defence schemes that help reduce the risk of flooding and coastal erosion.

When allocating FDGiA to RMAs, the EA follow Defra policy and guidelines, which set out what projects are able to be funded. The Environment Agency's Regional Flood and Coastal Committees (RFCCs) play an important role in agreeing programmes of work, and can raise extra funding from local authorities, known as local levy (see below). The RFCCs are made up of a majority of elected members from local authorities and representatives from other local interest groups.

Flood and Coastal Resilience Partnership funding
In April 2012 the approach to the way that Government funds flood risk management projects changed. Defra's new methodology for allocating capital funding - flood and coastal resilience partnership funding - is based on the outcomes delivered.

Funding levels for each scheme now relate directly to the number of households protected, damaged prevented and other benefits such as environmental or business benefits that will be delivered. Instead of meeting the full costs of just a limited number of schemes, the partnership approach to funding flood and coastal resilience means that Government money is potentially available towards the costs of any worthwhile scheme. Funding levels are based on the numbers of households protected, the damages being prevented, and the other benefits a project would deliver. Overall, more schemes are likely to go ahead than under the previous 'all or nothing' approach if contributions from other sources are present.

The total benefits of a scheme must exceed the costs to the taxpayer for any scheme to qualify for FDGiA.

The local levy
Local levies are paid by upper tier authorities, such as Bracknell Forest Borough Council, to the Thames Regional Flood and Coastal Committee for additional flood risk management schemes that would not otherwise proceed. The Thames Regional Flood and Coastal Committee set a local levy and vote on where to invest the local levy.

Funding to Lead Local Flood Authorities though Area Based Grants
Funding for LLFA to meet their new responsibilities has been allocated through Area Based Grants or local services support grants. The money is not ring fenced so individual authorities

must decide how much grant to spend, subject to limits on overall budget and the need for investment on other priorities. The amount of money allocated for each LLFA varies based on the overall risk within the relevant area.

Local funding

Highway budget

The Council currently delivers an annual capital budget for work on the highways drainage network. Work is prioritised according to safety, internal property flooding, social impact and the duration of flood incidents.

The Council also has a revenue budget that it uses for maintaining the highway network.

Community Infrastructure Levy (CIL)
The Community Infrastructure Levy (CIL) came into force in April 2010 and provides the local authorities with an alternative source of potential funding for flood defence and alleviation schemes; only the charging authority is able to determine what to spend the CIL on. It allows the local authorities to raise funds from new development in their area in order to pay for the impact that development has on local infrastructure.

Local authorities are required to use this funding for infrastructure needed to support the development; it can be used to construct new infrastructure, increase the capacity of existing infrastructure or repair failing infrastructure. The Localism Act 2011 includes a broad definition of the infrastructure that can be covered by this scheme including transport, flood defence, schools, hospitals and parks. Bracknell Forest adopted CIL in April 2015 and at this time, there are no flood defences or drainage projects listed.

Section 106 Funding – Developers Contributions
Section 106 of the Town and Country Planning Act 1990 allows a local planning authority to enter into an agreement with a landowner or developer in association with granting of planning permission. A section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting provision of services and infrastructure.

It is recommended that any flood risk which is caused by, or increased by, new development should be resolved and funded by the developer. This can be secured through planning conditions or through a Section 106.

Other sources of funding

There are also other sources of funding currently available and there may be other funds in the future that can be used for flood risk management. A list of the current funds is provided below:

- European Regional Development Fund (ERDF) - South East England Operational Programme (SEEOP) sets out how ERDF resources are to be used in the South East Region. The Programme is based upon an analysis of the needs and opportunities facing South East England, particularly the recognised importance of decoupling further economic growth from resource consumption, pollution generation and a loss of biodiversity if the Region is to achieve its vision of achieving sustainable prosperity by 2016.

- Business Improvement District (BID) scheme - business-led initiative supported by government legislation which gives local businesses the power to 'raise funds locally to be spent locally' on improving their trading environment.
- Growing Places Fund - aims to help address this constraint; enabling targeted investment in pieces of infrastructure which unlock development, allowing places to realise development values which can be recycled to provide a longer term solution to infrastructure provision.

4.6 How are Bracknell's objectives going to be achieved?

Whilst the above provides a general overview of the funding mechanisms available to all Lead Local Flood Authorities, the Objectives identified as being specific for Bracknell have been considered in the following table.

Table 4.2: How Bracknell will achieve the objectives

Objective		Potential Measures/Actions to achieve the Objective	How this is to be achieved
1	Seek to reduce the current flood risk and ensure that as the LLFA we do not increase this in the future.	This combines the measures listed below within the table and includes, planning measures, provision of technical advice responsibilities and requirements under the FWMA and developing schemes.	Through the measures listed within this table.
2	Deliver a local flood risk management strategy in line with the national flood risk management guidance.	Assess criteria against national guidance including the National FCERM, Flood and Water Management Act (FWMA) 2010 and existing local policies and align accordingly.	Review strategy every 3 years as a minimum. Review of the SFRA during 2017.
3	Deliver the LLFA duties and responsibilities under the FWMA	Provide guidance and administer a process for consenting of new structures and maintenance of existing structures on water courses.	Information and guidance produced and process managed through existing team structures.
		Produce a flood investigation policy and publish formal investigations which meet the criteria as detailed within the policy.	Publication of Flood Investigations Policy within the Strategy. Ongoing investigations as per policy.
		Develop an asset register and designate assets as appropriate.	The Asset Register is underway, assets are added to the register as appropriate.
		Share information and work together to understand the flood risks and to plan for future flood risk management measures.	Establish a formalised internal group in relation to flood risk management with relevant functions. insert - This group also has partners in attendance. Opportunities to progress are also taken outside of the formal meeting structure e.g. with parish Councils. This meets every 6 months.

4	Understand and capture flooding and drainage data of the Borough.	Research, capture and record all relevant data.	Via the asset register and capturing of additional data to GIS. Through Flood Investigations when undertaken.
5	Improve the level of understanding of flood risk, within the community as well as with key agencies. Ensure understanding of roles and responsibilities and adopt partnership working to deliver realistic outcomes.	This strategy will provide a clear explanation of the roles of flood risk management authorities as well as the important roles that residents and land managers can play	Undertaken as part of the Local Strategy production and as opportunities allow and as opportunities for engagement allow.
		Ensure riparian owners are aware of their duties to keep watercourses flowing freely. Provide clearer information on BFC website and co-deliver with the Environment Agency.	Current website information and as opportunties for engagement arise.
		Achieved via the Berkshire 5 technical and strategic officers forum and strengthening internal/external arrangements. Currently meet every 1/4.	Continued engagement and attendance with these groups and through the internal flood risk management group.
6	Ensure that due consideration is given to the wider environmental, social benefits and climate change requirements in both the strategy and delivery of objectives and measures.	Promote the concept of water cycle management, including water quality and a blue infrastructure plan for multifunctional spaces that will hold flood water, provide space for wildlife and local green space as part of the master planning process.	By ensuring that the planning process and the LLFA role consider these aspects when reviewing applications.

7	Seek to avoid an increase in flood risk as a result of new development by controlling how any additional water enters existing drainage systems.	Ensure that planning decisions are based on up-to-date information about all flood risks and that there is a consistent approach to surface water management in new development. Stricter standards to be used with regard to discharge rates, volumes, storage for watercourses and their catchments known to have capacity issues.	Building on government guidelines on sustainable drainage and BS 8582: 2013, we will provide comments to the local planning authority in respect of new development. Emphasize that there should be no increase in surface water flow from future development wherever possible.
8	Currently BFC has not identified any schemes however as opportunities arise for grant funding consider whether any potential schemes may be able to benefit.	Use current information and the flood investigations policy as the key criteria to identify areas at most risk and develop bid submissions and schemes. Cost benefit analysis approach has meant that generally we will not meet the criteria. However we are engaged with the EA to discuss the potential of individual schemes on a one to one basis.	Where a potential issue is identified funding for studies and schemes will be sought from FDGiA/Local Levy or through other funding opportunities.
9	Identify and deliver appropriate opportunities for training and education in flood risk management.	Continue to build upon existing networks and commit to highlighting continuing opportunities for education and engagement.	Review website and update. As and when opportunities arise, specifically with other Risk Management Authorities and at a local Parish level.

4.7 Next steps

Monitoring, review and updating this local strategy will be essential to ensure it remains fit for purpose and as a way of demonstrating success in delivering reduced flood risk within the Borough. Each strategy will be updated on a 3 year cycle.

The Bracknell Forest Preliminary Flood Risk Assessment, which is the key evidence base for this strategy is revised on a 6 year cycle. The current PFRA is dayed July 2011 and therefore requires review in the summer of 2017.Our local knowledge and understanding of local flood risk will improve in coming years and there must be opportunities to update the strategy as new information becomes available, and for this reason the strategy should be viewed as a living document.

The reviews will ensure the contents are compatible with current legislation as well as a report showing progress against the set objectives. In this respect, an annual review report prepared for Environment Culture & Communities Departmental Management Team (and Corporate Management Team or Executive if substantial change warrants it) will be produced ensuring the document is as up to date as possible.

Annexes

Annex A Mapping

Figure A1 - EA flood map BFC

Flood Zone 2 – area could be flooded from a river with up to a 0.1 per cent (1 in 1000) chance of occurring each year.
Flood Zone 3 – area could be flooded from a river with a 1 per cent (1 in 100) or greater chance of happening each year.

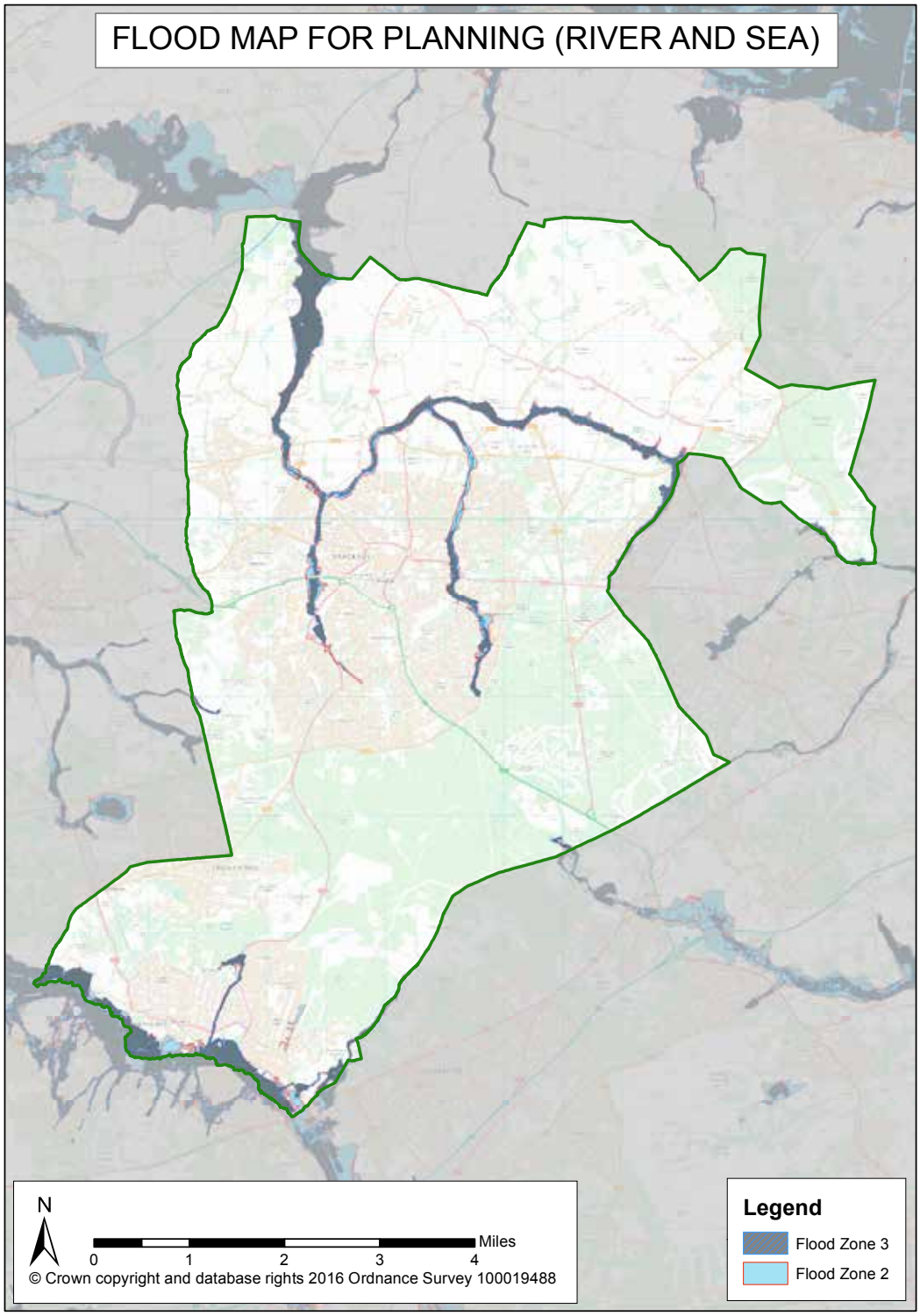


Fig A2 – Flood map for surface water 30 year BFC

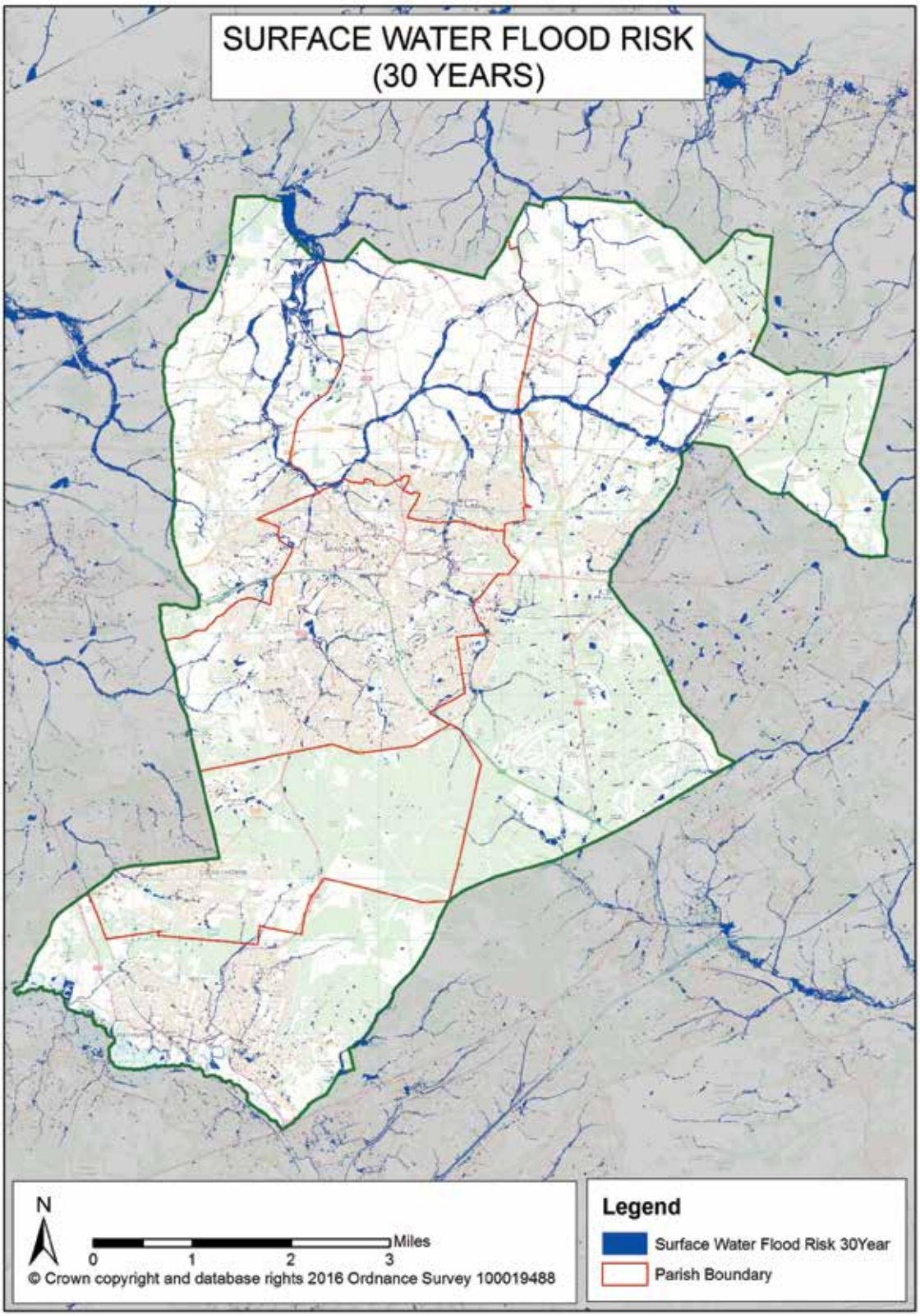


Fig A3 – Flood map for surface water 100 year BFC

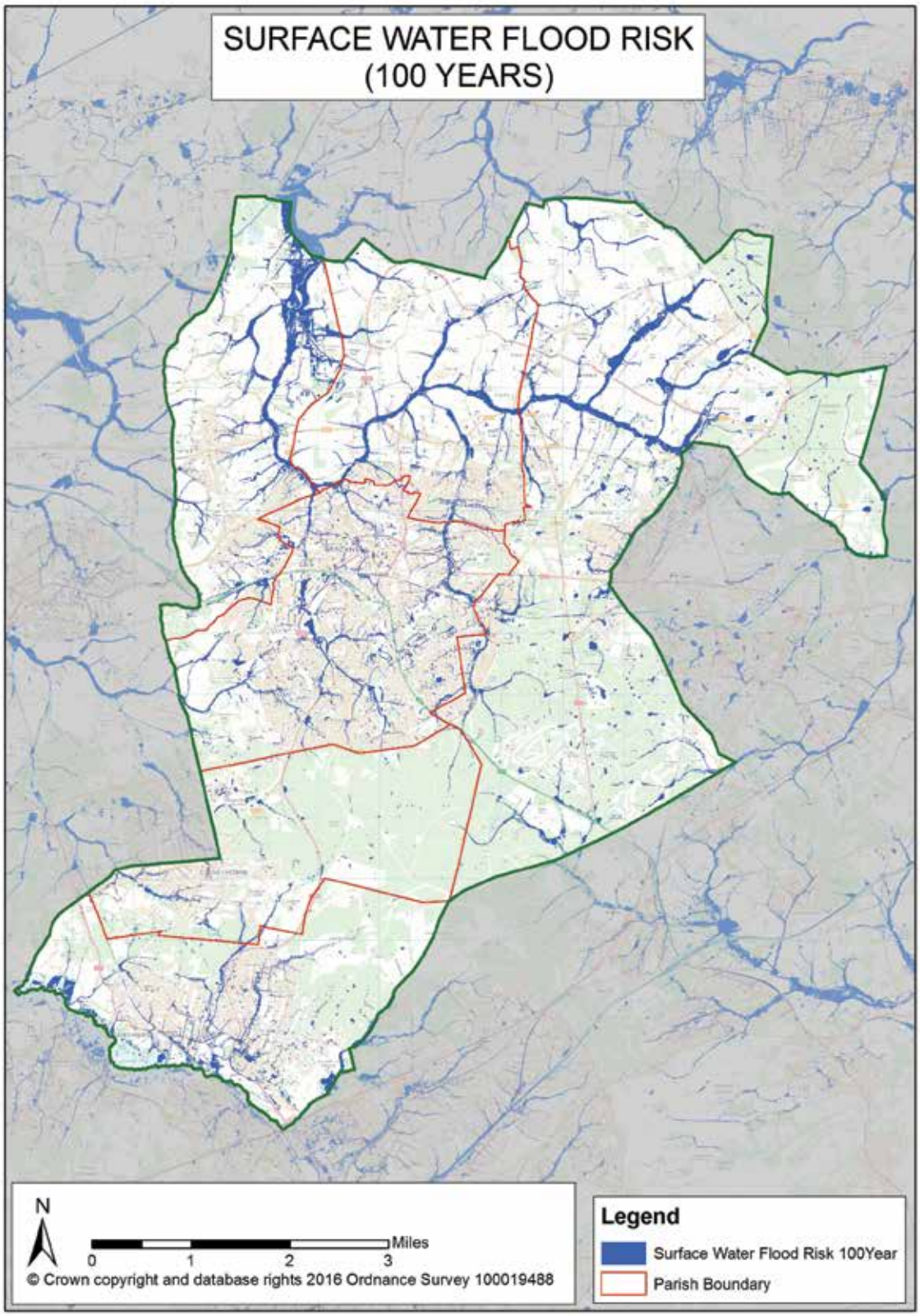


Fig A4 - Flood map for surface water 1000 year BFC

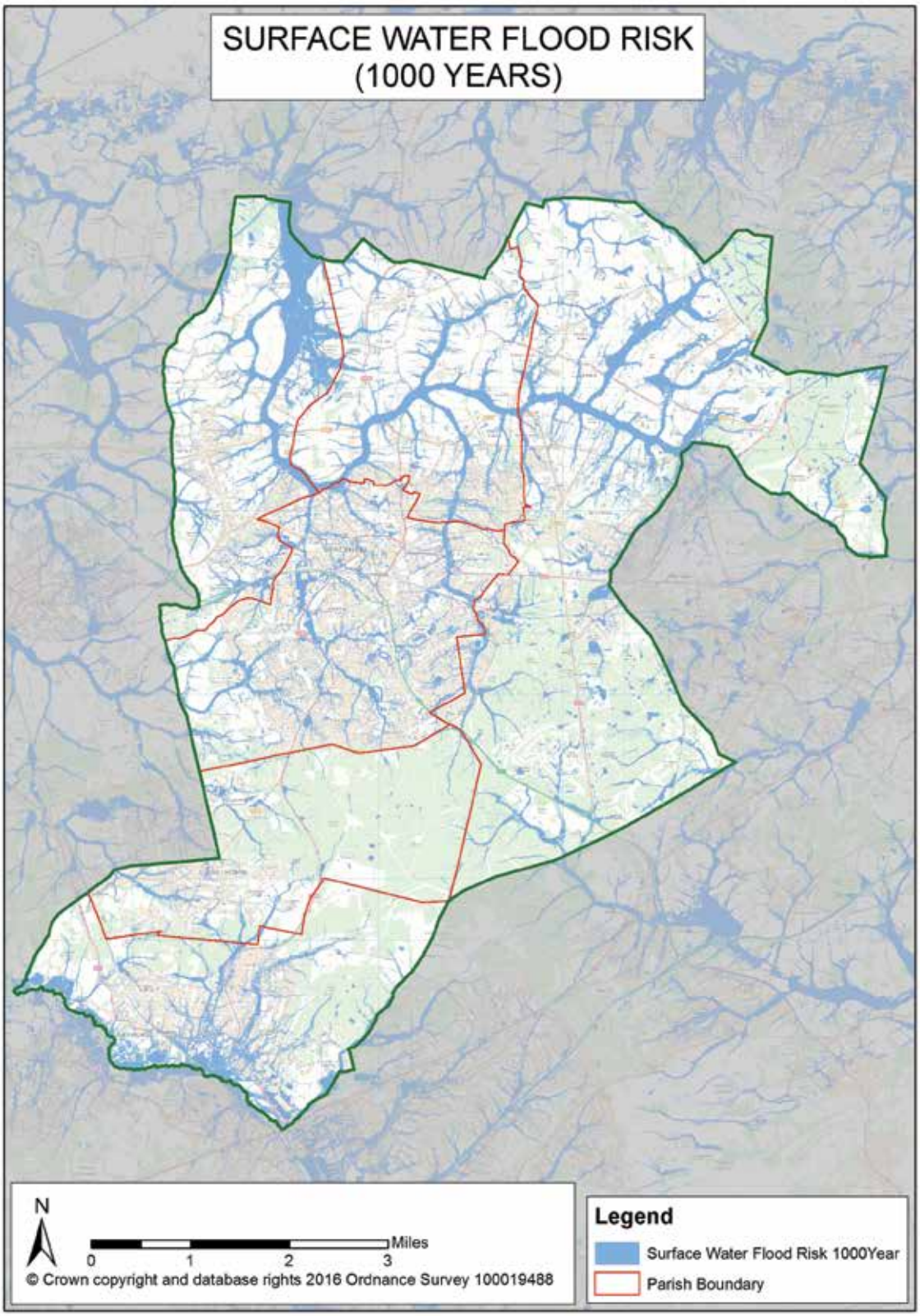


Fig A5 - Areas susceptible to groundwater flooding

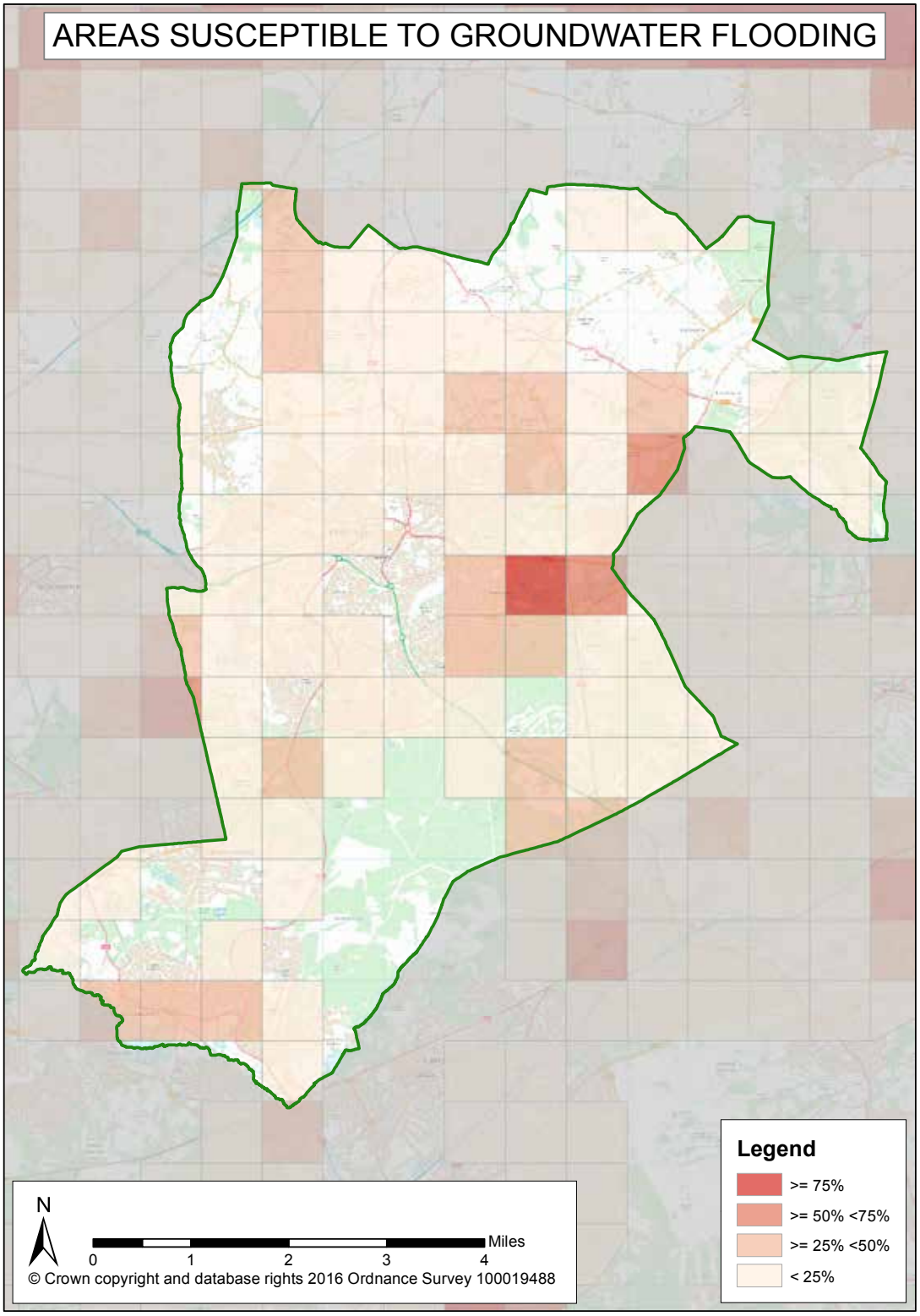
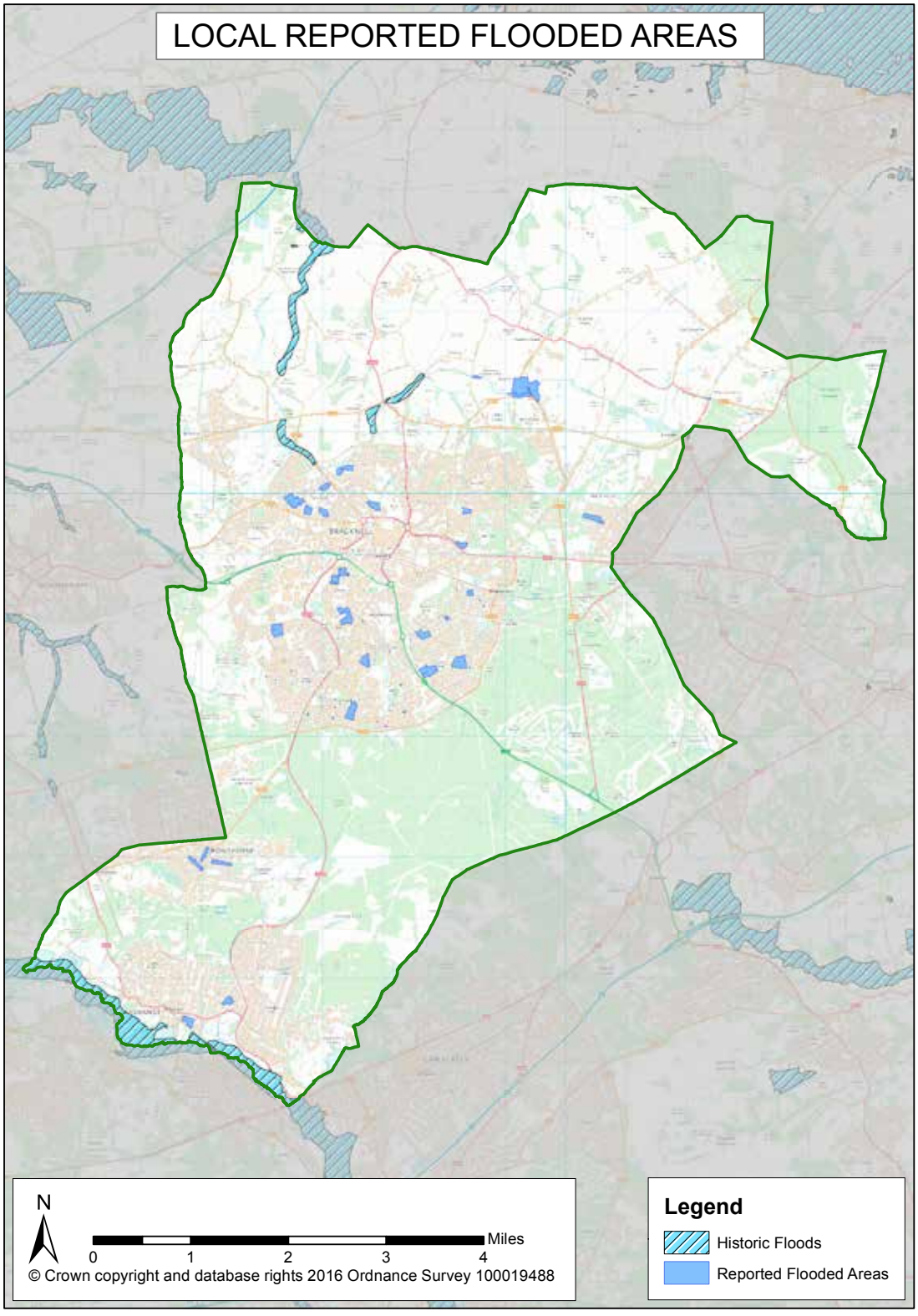


Fig A6 – Local flooding hotspots BFC



Annex B Flood investigation policy

1 INTRODUCTION

The Flood and Water Management Act (FWMA) places a duty on the Council (in its capacity as Lead Local Flood Authority) to investigate flooding incidents to the extent that it considers necessary or appropriate.

Section 19 of the Flood and Water Management Act (FWMA) 2010 outlines that:

(1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:

(a) which risk management authorities have relevant flood risk management functions, and
(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must:

(a) publish the results of its investigation, and
(b) notify any relevant risk management authorities.

"Risk management authority" means:

(a) the Environment Agency,
(b) a lead local flood authority,
(c) a district council for an area for which there is no unitary authority,
(d) an internal drainage board,
(e) a water company, and
(f) a highway authority.

2 THRESHOLD FOR INVESTIGATION

The Council will undertake formal investigations into flooding incidents reported by residents, or that otherwise come to its attention, involving:

- A risk to life as a result of flooding.
- Internal flooding of one property experienced on more than one occasion.
- Internal flooding of two properties or more during one flood incident.
- Flooding of critical local infrastructure.
- Ambiguity surrounding the source or responsibility of a flood incident.

The Council will formally investigate and publish a flood investigation report on events that meet the criteria above. Publication will be via the website.

The Council may also investigate and internally record smaller flooding incidents but will not be required to publish the findings of such events.

3 PURPOSE AND SCALE OF FLOOD INVESTIGATION REPORTS

Any investigations undertaken will seek to establish the likely causes of the flooding incident, the relevant risk management authorities involved and any actions proposed or undertaken by the relevant risk management authorities.

Investigations will be undertaken during, or as soon as possible after the flooding incident and will be appropriate to the scale and nature of the flooding incident. Investigations will have to be prioritised in relation to the numbers of reported incidents and available resources. The scale of the flooding will proportionally affect the size of the investigation and subsequent report.

Small scale flooding incidents and incidents where the relevant risk management authorities are immediately apparent or are undertaking actions to alleviate the cause of the flooding incident are likely to require only limited investigations.

4 CONTENT OF FLOOD INVESTIGATION REPORTS

The purpose of flood investigation reports is to inform parties which risk management authorities have relevant functions relating to the flood incident.

All published flood investigation reports should contain the following information:

- Site location, maps and photos
- Site characteristics and drainage
- Flood history and extent
- Details of the flood event (inc. Confirm reference number/date of flood event/date flood event reported to BFC/date of investigation/threshold for investigation [as outlined in sc 2 above]).
- Rainfall analysis
- Identified sources/probably causes
- Role and responsibilities
- Outcomes of investigation including proposed activities and recommendations

5 DISCLOSURE OF INFORMATION

It should be noted that initial reports are likely to be received as anecdotal evidence from members of the public, in depth investigations will likely require officers to visit and undertake their own evidence collection. The published report does not have to detail the specific detail of what was affected or proposed mitigation, e.g. specific addresses. Generic areas can be referred to. However it is worth noting that if properties have flooded then the owners have obligations to declare flood information in any insurance contract or property sale.

6 PUBLICATIONS OF FLOOD INVESTIGATION REPORTS

The findings of all flood investigation reports will be made publicly available via the website and linked to internal records.

Annex C Consenting process

As LLFA we are now responsible for the consenting of works to ordinary watercourses and have powers to enforce un-consented and non-compliant works. This includes any works (including temporary) that affect flow within the channel of any ordinary watercourse (such as in channel structures or diversion of watercourses).

Consent is refused if the works would result in an increase in flood risk, a prevention of operational access to the watercourse and/ or they pose an unacceptable risk to nature conservation. The clear guiding principle will be to ensure tat obstructions are kept to a minimum and not increase the risk of flooding. Where obstructions are inserted without consent or in a manner contrary to a consent the LLFA has powers to enforce their removal or take remedial action.

Information about the need for consents and the consenting process are available on the website.

https://www.bracknell-forest.gov.uk/privatepropertydrainage

Annex D Register/record of flood risk assets

All LLFAs are required to maintain a register of structures or features (asset register) which are likely to have a significant effect on flood risk in their area.

Flood risk assets are structures or features which are considered to have an effect on flood risk. An example could be an embankment protecting properties and therefore decreasing flood risk, or an undersized culvert in a residential area, which may actually increase flood risk during high rainfall.

The requirement is to ensure there are records of all significant assets available for use by risk management authorities (asset record) and for inspection by the public at all reasonable times (asset register).

The asset record will include a map of local flood risk assets along with clarification as to whether the asset is publicly or privately owned. The asset register will then provide further information about each asset and contact details for the owner/maintainer. There has often been much confusion over the ownership and maintenance responsibility of assets. This is likely to be due to local drainage infrastructure commonly being hidden underground or along land line boundaries where landowners do not realise or acknowledge they have any responsibilities. The asset register is a way to address this problem.

There are no defined criteria as to what defines an asset as significant but a key criteria is location. Future flood risk mapping and flood history at the site will be used to assess significance.

Although the process has started it will take a number of years before this register is sufficiently comprehensive to be of real value in flood risk management.

New sustainable drainage assets will be recorded via the planning and designation processes and included on the register.

Annex E Designation process

LLFAs and the Environment Agency are known as ‘designating authorities’. That is, they may ‘designate’ natural or artificial features or structures that are important for flood risk management. The process is set out within the FWMA.

They may designate features or structures where the following four conditions are satisfied:

1. The designating authority thinks the existence or location of the structure or feature af fects:
a) a flood risk, or
b) a coastal erosion risk.

2. The designating authority has flood or coastal erosion risk management functions in respect of the risk which is affected.

3. The structure or feature is not designated by another authority.

4. The owner of the structure or feature is not a designating authority.

If an asset becomes ‘designated’ its owner cannot alter or remove it without first consulting the designating risk management authority. The designation process covers both the initial designation by the designation authority and an appeals process which is available to the owner of the structure or feature. Once designated the designating authority will have enforcement powers should the structure or feature be altered of modified without permission.

The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. Designating of features or structures is not something that will be done regularly but only when there are concerns about the asset.

A process for designating features has been developed. With the increase in privately owned and maintained SuDS following the change in government direction, it is likely that there will be substantial increase in the number of designations being carried out in the future.

Annex F

Sustainable drainage systems – Local guidance

Planning applications

When making planning applications, developers will get the best results if they consider the use of SuDS options early in the site evaluation and planning process, not just at the detailed design stage.

Trying to retrofit a sustainable drainage system into a layout which has already been designed is very difficult. It can lead to a design which compromises the benefits of SuDS, results in excessive land take and usually costs more than a conventional drainage system.
It is therefore important to engage in early discussions with the SuDS team, who work alongside their colleagues in the highway and planning authorities. This will ensure that surface water management is integrated into the development, leading to an effective drainage design with costs adequately considered at the start of the development.

There will be a SuDS solution to suit the site, due to the wide range of components available. To determine the right technique it is necessary to first establish the soil conditions and hydrology of the site and use the results of the investigations to support the drainage proposals. The choice can also be significantly influenced by the quality of the land (whether it is affected by contamination), the need to protect vulnerable groundwater sources and the permeability of the soil.

SuDS solutions are most cost effective when designed to work with the natural drainage pattern of the site, for example designed to use existing ditches or natural depressions for swales and ponds or designed to form part of hard and soft landscaped areas. Ponds and green spaces will provide habitats for wildlife to flourish, reduce pollution and provide areas for people to enjoy, adding value to the site.

In the early stages of the site design, consideration should be given as to how the drainage system will be adopted and maintained in the future. It is likely these decisions will influence the design just as much as the technical considerations.

The local planning authority will determine the application in accordance with national and local policies whilst taking into account advice on technical matters from the LLFA.

The LPA will need to be satisfied that:

- any proposals meet national and local policies
- any proposals clearly identify who will be responsible for maintaining the sustainable drainage systems and funding for maintenance should be fair for householders and premises occupiers; and,
- set out a minimum standard to which the sustainable drainage systems must be maintained.

What is expected from the developer?

- Ensure that any submission has been designed in accordance with the national SuDS guidance and this LFRMS
- Use “Planning for SuDS – making it happen” CIRIA C687 to guide the planning of the site
- Consider how to manage the rate of surface water run-off so that it is similar to the conditions before the development. Also consider the effect this run-off will have on any receiving ground or watercourse
- Use the “Code of Practice For Surface Water Management For Development Sites” BS8582:2013, in developing a drainage strategy for the site
- Speak to the SuDS team about the surface water drainage proposals for the site. They can advise on what consents will be required, which types of SuDS are unsuitable and whether
- to take special precautions to prevent pollution or reduce infiltration
- When carrying out the detailed SuDS design, use “The SuDS Manual” CIRIA C697 (C753) to inform the choice of SuDS components, maintenance, etc; for the development
- Demonstrate in the Flood Risk Assessment (FRA) that surface water will not cause flooding on site or offsite as a result of the proposed development
- Whilst constructing the site, protect adjoining areas from flooding
- Consider the timetable for construction. Where permeable surfaces are installed, ensure they are not blocked with silt from site activities. Ensure that any planting is carried out in the right conditions
- Ensure there is an adequate management and maintenance system in place to ensure operation of the drainage system until final adoption

Pre-application discussions

The SuDS team will either engage in direct pre-application discussion with developers, or as part of a multi-disciplinary team during LPA discussions. The importance of early discussions cannot be over-emphasized. They should establish the following:

a) hydrological, planning and environmental objectives for the site (leading to a drainage strategy)

b) requirements of the local drainage approval and designation processes, including consents, inspections, commuted sums for future maintenance, etc;

c) environmental or technical constraints to drainage design for the site

d) the need for a Flood Risk Assessment (FRA)

e) planning layout and constraints – in joint discussions with the Local Planning Authority

f) highway layout and constraints – in joint discussions with the Local Highway Authority

g) establishing blue and green corridors within the development

h) design criteria for the surface water management system

i) designing the surface water management system for future maintenance

j) opportunities for the surface water management system to deliver multiple benefits

k) land ownership for drainage routes and points of discharge (including proposed sewer connections)

l) existing drainage systems - both on and off site

m) stakeholder responsibilities and requirements, including timescales for any likely approvals/consents

n) temporary drainage during the construction phase(s).

For larger sites or multi plot developments, where the land is sub divided into separate plots owned by different landowners, or where there is an intention to develop the land in phases, the content for a drainage Masterplan should be agreed at this stage.

The Masterplan should be designed to ensure effective communication between all developers and identified stakeholders in establishing the selection, implementation and phasing of source control, site and regional and/or linking drainage components, together with responsibilities for temporary drainage and maintenance during construction.

Outline planning application

The following information should be presented the form of a drainage strategy to enable determination of the application:

a) the technical design criteria used for the development site(s) based upon the national SuDS guidance

b) any constraints which affect the proposed development

c) topographical survey of the site, including levels and sections of any adjacent water courses for an appropriate distance upstream and downstream of discharge point

d) how the indicative drainage design meets the FRA requirements (if an FRA is required)

e) proposed approach in the drainage design to deal with flood risk, water quality, conveyance, storage, exceedance routes and multi functional use of drainage ‘space’ to meet community and environmental requirements

f) details of any offsite works required

g) details of any consents required

h) identification of discharge points or receptors i.e. to ground, watercourse or sewer

i) identification of sensitive receptors, including groundwater protection zones, habitat designations or archaeological features

j) an assessment of the need and opportunity for rainwater harvesting and use

k) evidence of infiltration capacity at the site and suitability of infiltration drainage

l) proposed design calculations for peak flow, volume control and greenfield runoff, and/ or brownfield runoff where appropriate. Based upon the national SuDS guidance showing pre-development (greenfield or brownfield as relevant) and post-development runoff rates, critical storm duration and associated storage estimates with indicative impermeable areas

m) inclusion of climate change, future development allowances and quantification of any surface water flows on-site from off-site locations

n) temporary drainage during construction

o) proposed split of the surface water management systems between private (i.e. within curtilage) and public (i.e. in public open space and/or highway)

p) the relationship with and links to the LFRMS, Water Framework Directive, Planning, Sustainability and Environmental Policies (National, Regional and Local)

The Masterplan (in addition to the drainage strategy information) should include:

i. details of phasing;
ii. individual plot discharge and storage constraints;
iii. who would be responsible for construction, maintenance and adoption of the regional and/ or linking components of the drainage system;
iv. who would be responsible for controlling the overall surface water management of the site;

Due to the nature of outline planning applications and whether or not certain aspects of the proposed development are reserved, the amount of information which would be contained within the drainage strategy (set out above) should be considered to be a minimum.

If the drainage of the site is not reserved (and the layout and landscape design are also not reserved) then the drainage strategy should be more detailed as set out below.

It is likely that an outline planning permission will have a condition(s) attached requiring the submission of more detailed drainage information which must be approved before the development can commence.

Full planning application

(or reserved matters application if applicable)

Detailed design

If a reserved matters application is being made, the submission on the detailed design and layout of the sustainable drainage system should update and enhance the drainage strategy, taking into account the advice from the SuDS team and stakeholder inputs, and be submitted as a detailed drainage strategy.
If a full planning application is being made then the submission should be a combination of the information required for an outline application drainage strategy and the following information, to produce a detailed drainage strategy:

a. Final design calculations to demonstrate conformity with the design criteria for the site for peak flow, volume control and greenfield runoff, and/or brownfield runoff where appropriate. Based upon the national SuDS guidance showing pre-development (greenfield or brownfield

as relevant) and post-development runoff rates, critical storm duration and associated storage estimates to determine the scale (and associated land take) of conveyance and storage structures;

b. Existing and proposed site sections and site levels;
c. Long sections and cross sections for the proposed drainage system;
d. Plan of proposed SuDS with sub-catchment areas including impermeable areas and phasing;
e. Details of connections to watercourses and sewers;
f. Operational characteristics of any mechanical features including maintenance and energy requirements;
i. Plan demonstrating flooded areas for the 1 in 100 year storm when system is at capacity and demonstrating flow paths for design for exceedance;
j. Access arrangements for all proposed SuDS;
k. Management plan for all non adopted drainage;
l. Landscape planting scheme if proposing vegetated SuDS;
m. Plan for management of construction impacts including any diversions, erosion control, phasing and maintenance period (pre-adoption);

The local planning authority will determine the application in accordance with national and local policies whilst taking into account advice on technical matters from the LLFA.
Due to the nature of full or reserved matters planning applications certain aspects of the proposed development may not be fully developed at the time of submission. The amount of information which would be contained within the detailed drainage strategy (set out above) should be considered to be a minimum.

If the applicant has not fully detailed the drainage design, it is likely that the planning permission will have a condition(s) attached requiring the submission of more detailed drainage information which must be approved before the development can commence.

Allowance for urban creep

Increased development within urban areas can have an impact on flooding, particularly surface water flooding. Urban creep describes activities such as paving over gardens and building extensions. This sort of development increases the hard surfaces in a catchment, reducing the opportunity for water to filter into the soil, increasing the volume of water which has to run off into drains and the speed at which it flows, thus increasing the intensity of the peak flow.

The activities which make up urban creep are often outside the development management process (known as permitted development) so their impacts on flooding are less likely to be controlled than development which is subject to normal planning procedures.

The LLFA will look for all future development to have an allowance for creep built into any surface water design this will in accordance with the following table:

Residential development density Dwellings per hectare	Change allowance % of impermeable area
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats and apartments	0

Note: where the inclusion of the appropriate allowance would increase the total impermeable area to more than 100%, then 100% should be used as the impermeable area for calculation purposes.

The consideration of urban creep should be assessed on a site by site basis but is usually limited to residential development only. However on commercial, industrial, retail, school and hospital sites an allowance may be required.

Designing for Exceedance

Whilst SuDS are generally designed to cope with rainfall in excess of that used for public sewer design, nevertheless it would be prohibitive to design a system to cope with all rainfall events. Any development should therefore be designed to deal with any water which exceeds the design capacity, this is called exceedance.
The LLFA will expect all development to be designed to ensure that exceedance is allowed for, and that flow paths are provided to deal with this situation. Exceedance should not have a detrimental effect upon life, property or critical infrastructure. .

Annex G Sandbag policy

Operational procedure

FLOOD CONTAINMENT/PREVENTION (SANDBAG POLICY)

General

In the event of a serious flooding problem affecting a large area of the Borough or a number of properties the expectation is that calls for assistance will be coordinated through the Customer Services Centre and Forestcare (out of hours). These calls will then be directed to and managed by the appropriate service area (Highways/Landscape). Service areas need to coordinate throughout any flooding incident to ensure there is an overall coordinated picture. This coordination will be facilitated via the emergency planning function and most likely with the establishment of a Corporate Severe Weather Management Team.

All requests for sandbags will be assessed in terms of priority of need and associated risk. Because the nature of local flooding tends to be as a result of the rapid onset of surface water run off the Councils ability to respond to hundreds of requests for assistance over a very limited time is extremely limited.

Priority of need

Where likely need has been identified the priority is to provide advice to the Customer Services Centre/Forestcare as to how calls are to be handled. They will normally agree to take the full details and advise the caller that these will be passed on to the officers so that they may evaluate need having regard to the circumstances and the following priorities. The caller will be advised not to assume that help will be coming. The Council will deploy sandbags with regards to the following priorities.

- To prevent loss of life or serious injury.
- Maintaining access for the emergency services.
- Protection of property occupied by a vulnerable resident (regardless of tenure) such as a housebound, frail or disabled person unable to assist themselves.
- Protecting vital facilities within the community.
- Protection of vital facilities and infrastructure within the community.
- Protection of BFC property.

It is essential to recognise that BFC maintains a limited supply of sandbags which is intended to be deployed according to the above priorities. It is not able to provide a sandbag service on demand to the general public.

Other than in the circumstances outlined above BFC will not normally seek to provide sandbags to private properties. Residents and local businesses are expected to make their own provision for flood defence based on the weather forecasts and any previous local experience. The Council has no liability to provide sandbags and care must be taken to ensure that no liability is accepted.

Flooding on the highway

The Council's highways contractor, Ringway, holds only a very limited sandbag stock and will in its normal course of duties deploy sandbags intended for use on the road network to contain modest scale pollution events.

Sandbags will not ordinarily be used to prevent flooding on the road and if the network becomes flooded it will recede over time. Ringway is responsible for placing flood warning signs on the network and in extreme conditions close roads. Ringway support can be arranged via the highways team in hours via Forestcare out of hours.

Flooding of other BFC owned and occupied property

Council resources will be deployed (via CLL) to help prevent flooding of council properties including offices, schools, libraries, leisure centres and community buildings. CLL may also be called upon to assist vulnerable households in the community.

Emergency planning

The Emergency Planning function is able to provide coordinating support and assistance to the above roles. Specific requests for support such as maintaining access may also be received via the emergency services. The first priority is to assess the situation and determine the likelihood of there being a need to establish the Corporate Severe Weather Management Team as outlined in the Corporate Severe Weather Plan.

Vulnerability

Discretion and judgment will be required in the deployment of sandbags which prevent loss of life or serious injury, protection of transportation routes and vital facilities within the community. Deployment will be considered at the time of need, giving due regard to the extent and duration of event, protection of the vulnerable, previous flooding history, and health and safety of the teams making deliveries.

It is not possible to provide an exact definition of vulnerable but circumstances such as medical conditions, disabilities, age, and pregnancy may make an individual more vulnerable. Requests for assistance will be made to the Council via the Customer Services Centre and Forestcare, and where there is uncertainty as to whether a person is vulnerable this information should be passed to the Severe Weather Management Team/Emergency Planning Function for decision. It may be necessary to liaise with other service areas colleagues in making this assessment.

Resources and manpower

Stocks of 700 ready filled and 500 empty sandbags are located at the Depot. CLL are responsible for ensuring that stock levels are maintained and available for use.

In the event of need to deploy/restock then manpower resources can be called upon from CLL. No formal callout/standby arrangements are in place out of hours, therefore a telephone call must be made to the CLL managers to determine possible staffing resources and timescales of availability.

Mutual aid arrangements

In the event of urgent need then under the Berkshire emergency planning mutual aid memorandum other Berkshire local authorities may be able to assist if it is a localised event or they have additional capacity – contact can be made via the Emergency Planning Function. BFC may also receive a request for mutual aid, depending upon the numbers required this decision must be made by the Severe Weather Management Team. Above all consideration should be given to the needs of BFC as a priority.

Where BFC provides sandbags, they become the responsibility of the person receiving them. BFC cannot accept responsibility for putting the bags in place (although this should be determined at the time of need, e.g. if there are elderly tenants) or for disposing of them after flooding recedes, although in exceptional circumstances this view will be reconsidered.

Forward planning

Consideration should be given by all BFC site managers as to the local risk of flooding and previous experience and, wherever possible, sandbags should be deployed in advance when the risk is considered high. Under such circumstances stock can be drawn from the corporate store.

Annex H: SEA/HRA summary

Separate links on Website

https://www.bracknell-forest.gov.uk/floodriskmanagement

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Nepali

यस प्रचारको सक्षेपं वा सार निचोड चाहिं दिइने छ ठूलो अक्क्षरमा, ब्रेल वा क्यासेट सून्नको लागी । अरु भाषाको नक्कल पनि हासिल गर्न सकिने छ । कृपया सम्पर्क गनूहोला ०१३४४ ३५२००० ।

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