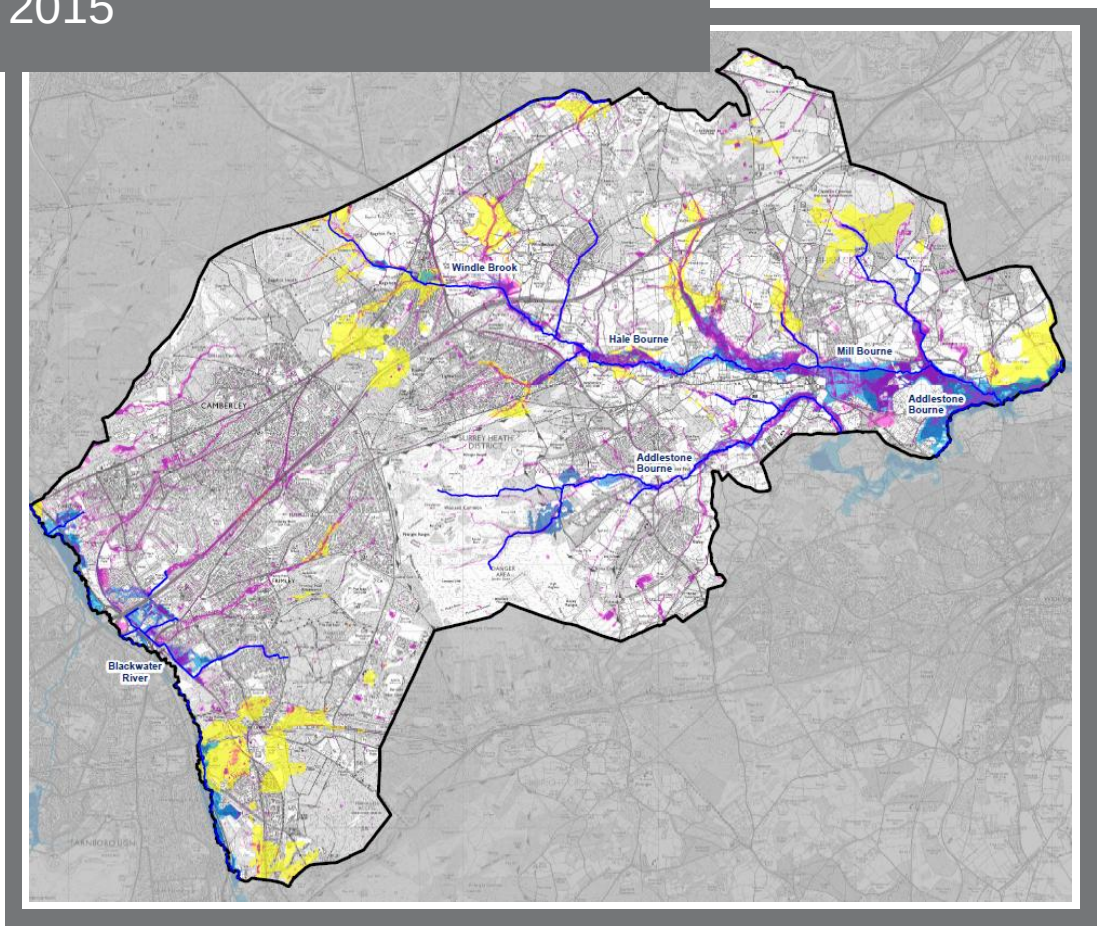
CAPITA

Surrey Heath Borough Council Strategic Flood Risk Assessment
Volume 1
Decision Support Document

October 2015



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Quality Management

Job No	CS074594		
Project	Surrey Heath Council SFRA Update		
Location	P:\environment\ZWET\CS078748_Woking_SurreyHeath_SFRA\Reports and Outputs\SurreyHeath		
Title	Volume 1 – Decision Support Document		
Document Ref	Surrey Heath Borough Council SFRA Report Volume 1 Decision Support Document	**Issue / Revision**	Final
Date	October 2015		
Prepared by	Hayley Todd	Signature (for file)	
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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
1	March 2015	Draft for Submission to SHBC and Environment Agency	HT	LM	MA
2	July 2015	Draft Final for submission to SHBC and the Environment Agency	HT	LM	KF
3	October 2015	Final Submission	GA	LM	KF

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Contents

Figures

Tables

Appendices

Executive Summary

This report is a Strategic Flood Risk Assessment (SFRA) for Surrey Heath Borough Council (SHBC). This SFRA is an update to the SHBC SFRA (2008) and has been prepared in accordance with current best practice, the National Planning Policy Framework (NPPF) and its accompanying Flood Risk and Coastal Change Planning Practice Guidance (PPG). This report is formed of three volumes. This updated SFRA is formed of three volumes:-

- This is **Volume 1,** the Decision Support Document which outlines the relevant planning policies, recommendations and guidance for planners and developers. This document also sets out how to use the SFRA in carrying out the Sequential Test.

- **Volume 2** is the Technical Report, which is a technical analysis of the flood risk from all sources in SHBC, and outlines the flood risk management measures associated with each source of flooding.

- **Volume 3** includes the flood risk maps, which represent as much of the data gathered as part of this update to visually display flood risk across the study area. The maps should be used in conjunction with this document, as well as Volume 2, and are referred to within the relevant chapters.

The SFRA has been based on best available data and users need to consider limitations of the quality and extent of the data used. This SFRA has utilised the information available from the Environment Agency's Blackwater Tribs Modelling Study (2014) and Blackwater Flood Risk Mapping Project (October 2007) and the Addlestone Bourne Flood Risk Mapping Study (2007). The Flood Risk Mapping data provides an improved level of accuracy and detail in relation to fluvial flood risk and has enabled a quantitative assessment of climate change impacts on flood risk from the Addlestone Bourne, Blackwater River and the Blackwater Tributaries. Other additional information on Flood Risk from the Environment Agency, Local Authorities and Thames Water has also been used to inform the SFRA.

Flood Risk Across Surrey Heath

Type of Flood Risk	Summary	Further information
Fluvial	The EA Flood Maps for Planning, Historic Flood incidents and detailed modelling outlines were used to evaluate fluvial flood risk across the Borough. Fluvial flood risk is detailed along the river valleys of the Blackwater and Bourne catchment areas including some main-river designated tributaries. In the Bourne catchment floodplains are wide, with large areas at risk, however much of this land is undeveloped. The floodplains of the Blackwater River are more developed, with higher property densities at medium to high risk.	Volume 2, Chapter 4 Volume 3, Figure 4, 5, 6 & 7
Surface Water	The UFMfSW has been used to assess surface water flood risk across SHBC as there are very limited details on recorded incidents. Similarly to the fluvial extents, large undeveloped floodplains are shown as at medium risk of surface water flooding.	Volume 2, Chapter 5 Volume 3, Fig 8, 9 & 10

Sewers	The developed western side of the borough will experience more sewer flood incidents, as denser drainage networks increase the probability of sewer flood incidents. Areas to the east of the borough are more reliant upon the watercourse network for surface drainage. There are no combined (surface/foul) sewers within SHBC however, due to the age of some properties foul drainage systems can also accommodate incorrectly connected surface water flows. This can lead to overload and surcharge of the foul drainage systems.	Volume 2, Chapter 7 Volume 3, Fig 11
Ground water	Most of the study area is at low risk of groundwater flooding due to the underlying sandstone geology. There is elevated flood risk from groundwater at Mytchett, and Central Chobham, in-particular where close proximity of watercourses saturate surrounding ground.	Volume 2, Chapter 8 Volume 3, Fig 12
Artificial Sources	There are very few incidents of flooding from the Basingstoke Canal or from the breach of reservoirs. The Basingstoke Canal has discharge channels to convey excess water away when the levels within the canal rise too high. These discharge points can cause problems to neighbouring boroughs, as well as failure within the borough at Frimley Green and Mytchett. The upper reaches of the Basingstoke Canal are a navigable natural watercourse and surface water connections are known to be present throughout its length. The Basingstoke Canal is therefore subject to high volume flows from heavy or prolonged rainfall. Due to the low probability of occurrence, flood risk from reservoirs is considered extremely low along the Blackwater River.	Volume 2, Chapter 9 Volume 3, Fig 13

Definition of Flood Zone 3b – the Functional Floodplain

PPG states that Local Planning Authorities (LPA's) should identify the definition of Flood Zone 3b within the SFRA, in accordance with the Environment Agency (EA). Within Surrey Heath, Flood Zone 3b will be defined using the 5% AEP model outline from available hydraulic models. Where detailed model outlines and the definition of the 5% AEP outline is unavailable, Flood Zone 3 from the Environment Agency Flood Maps for Planning should be used to define the Functional Floodplain.

Applying the Sequential Test

The Level 1 SFRA provides an evidence base for Surrey Heath Borough Council to carry out the Sequential Test. In applying the Sequential Test, development should be steered toward areas at least risk of flooding from all sources. As such careful consideration should be given to the suitability of sites where there has been a higher concentration of incidents reported or identified.

1. Introduction

1.1 Background

In 2008, two Strategic Flood Risk Assessments (SFRA's) were completed for the two main river catchments within the Surrey Heath Borough Council (SHBC). The Hale and Addlestone Bourne catchment SFRA was prepared with Woking Borough Council. The Blackwater Valley catchment SFRA was prepared in conjunction with Hart District Council. Based on the evidence within these SFRA's, SHBC adopted a Core Strategy and Development Management Policies Development Plan Documents in February 2012.

Capita Property and Infrastructure were commissioned in January 2015 to combine the two existing SFRA's for SHBC to create one, updated evidence base to assist the Council in selecting appropriate sites for allocation for housing, and other types of land use.

The 2008 SFRA documents covering SHBC were developed in line with the now superseded Planning Policy Statement 25 – Development and Flood Risk (PPS25) (DCLG, 2006). On 27th March 2012, this was replaced by the National Planning Policy Framework (NPPF). The NPPF states; "A Strategic Flood Risk Assessment is a study carried out by one or more planning authorities to assess the risk to an area from flooding from all sources, now and in the future, taking account of climate change, and to assess the impact that changes or development in the area will have on flood risk".

The NPPF and its accompanying Planning Practice Guidance (PPG, March 2014) maintain the requirement to apply a risk-based, sequential approach to the location of development in order to avoid flood risk to people and property. The key difference for flood risk policy compared to PPS25 is that the NPPF gives local authorities a wider remit to interpret and implement local policies. This makes the SFRA process all the more important in establishing suitable, reasonable and practical local development policies to manage local flood risk. Refer to Chapter 4 of this document for further discussion on the introduction of NPPF and its implications for the management of flood risk.

1.2 Aim of the SFRA

The aim of the SHBC Level 1 SFRA is to present sufficient information in the form of a robust evidence base to enable SHBC to apply the Sequential Test to site allocations. In addition the SFRA should form a reference document for use by development control officers for advising and determining decisions on windfall and allocated sites. Where development is located in an area of flood risk Surrey Heath Borough Council will be required to justify the development through the application of the Exception Test. However, the Exception Test should only be applied if the Sequential Test has been passed.

1.3 SFRA Objectives

In keeping with guidance presented in the NPPF and the brief provided by SHBC the main objectives of the SHBC Level 1 SFRA are:

- Present information on all sources of flooding to enable SHBC to apply the Sequential Test to the location of development and identify whether development can be allocated outside of high and medium risk zones

- Map flood risk from all sources within SHBC, including definitions of the functional floodplain (Flood Zone 3b).
- Assessing the impacts of climate change and residual risk
- Identification of flood risk management measures in place and coverage of the flood warning systems
- Identifying areas where additional development may significantly increase flood risk elsewhere through the impact of existing sources of flooding, or by additional surface water runoff
- Recommendations about the identification of critical drainage areas and the potential need for surface water management plans
- Advice on the likely applicability of sustainable drainage systems techniques for managing surface water run-off at key development sites
- Production of a concluding map showing the areas of the Borough which are at high risk of flooding
- Provide sufficient evidence to allow SHBC to justify existing policies and to write future policies.
- Recommend measurements to meet Water Framework Directive objectives in order to achieve wider environmental benefits.

2. Study Area Overview

The Surrey Heath Borough Council area is shown below, in Figure 2-1. A detailed description of the hydrology, topography, geology and demographics of the Borough is described further in Volume 2, Chapter 2, and are shown in Volume 3, Figure 1 and Figure 2.

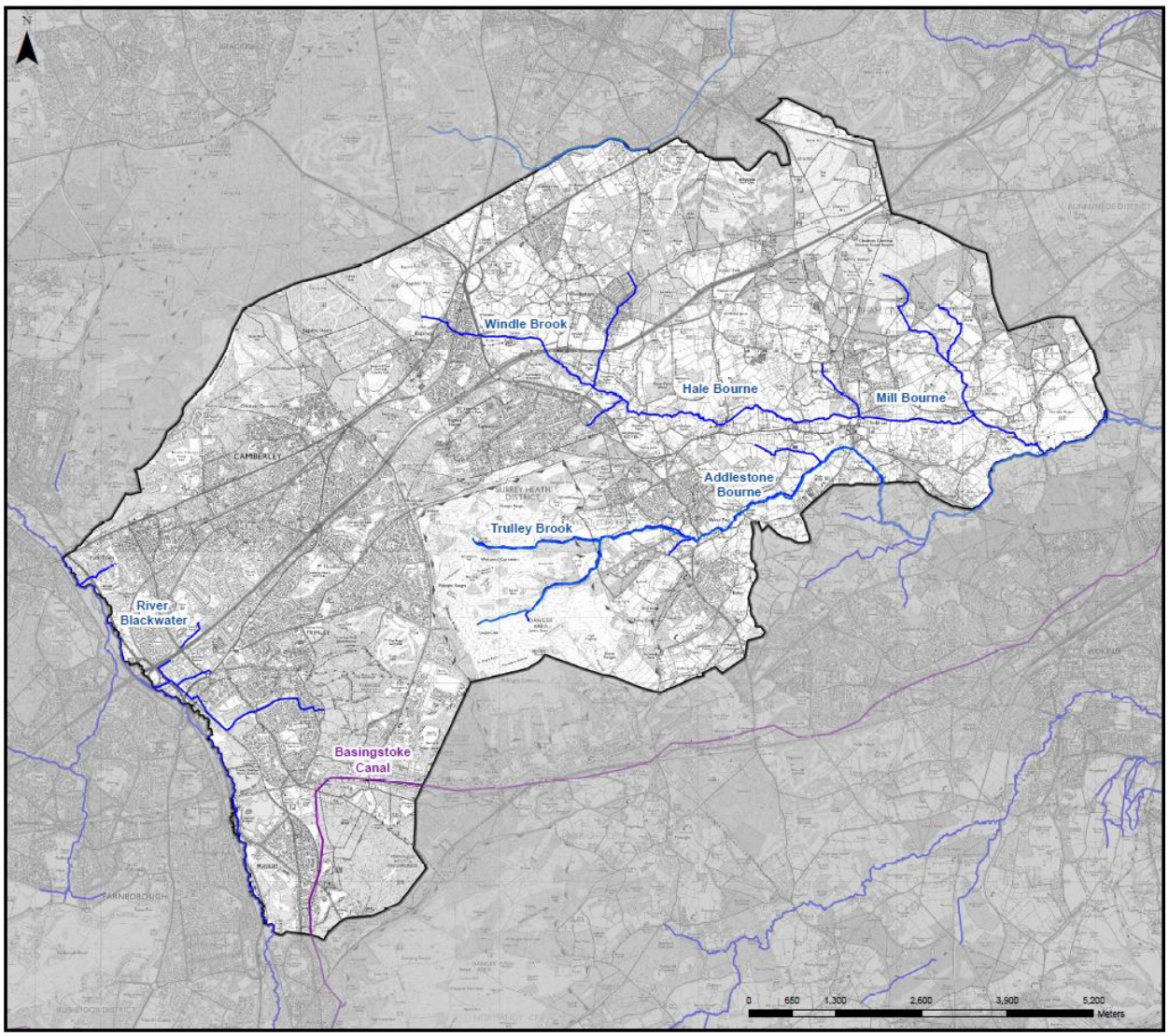

Figure 2-1 – Study Area

The previous SFRAs were divided according to river catchment areas; however the series of updated SFRAs across this part of Hampshire and Surrey have been based on Council area boundaries. The Surrey Heath study area is divided into two main river catchments, the Blackwater Valley and the Bourne catchments. At the very north of the study area, a small part of the borough falls north towards the Chertsey Bourne. The Blackwater River flows in a south to north direction along the western boundary of the Borough. There are several tributary rivers and watercourses within the study area that join the main river from the east, running through the urbanised areas. Through the eastern half of

the catchment, the Windle Brook drains from Bagshot, flowing into the Hale Bourne, which then becomes the Mill Bourne at its confluence with Clappers Brook, west of Chobham village. The Addlestone Bourne drains the southern parts of the study area, running from west to east to the south of the Mill and Hale Bourne. The Bourne watercourses confluence on the borough boundary to become the Addlestone Bourne, exiting the study area in the south-eastern corner and flowing towards the north of Woking.

Historic flooding has been reported along all of the main river channels, with particular impact in Chobham where flows confluence from neighbouring villages. Surface water flooding incidents have also been recorded across the catchment, with localised flood problems experienced in most areas. Much of the large expanses of land at high levels of flood risk are across undeveloped, rural and agricultural land, as shown in Volume 3, Figure 14.

The Basingstoke Canal runs through the southern corner of the Borough, from Mytchett Lake to the east of Deepcut. The canal was constructed as a contour canal, which flows at approximately 70m AoD until it reaches the lock flight at Deepcut.

The topography of the catchment is variable, with a considerable ridge (Chobham Ridges) dividing the Blackwater and Bourne catchments. The more urban western areas slope from east to west and drain into the Blackwater. The topography is relatively gentle on the west of the borough with the Blackwater River surrounded by lakes and flat floodplains. East of the Chobham Ridges the area is less densely populated with smaller villages, but the speed and volume of surface water run-off can be considerably greater due to the steeper gradients and heath land areas. This effect is experienced through most villages, particularly where watercourses have been culverted.

Most of the study area is underlain by the relatively impermeable sandstone, including Bracklesham Group and Barton Group sedimentary bedrocks. There is little presence of chalk and related aquifers across the study area. Along the river channels there are areas of fluvial gravel and sand deposits which are more permeable but also affected by groundwater levels.

The main settlements within Surrey Heath are Camberley, Frimley, Frimley Green, Mytchett, Bagshot, Lightwater, Windlesham, West End, Bisley and Chobham. The main communication networks are the M3 which bisects the study area north south, the A331 along the western boundary and the A30 London Road in the north. The mainline London to Exeter railway also runs through the Borough, as well as routes between Alton, Guildford and Reading.

The 2009 River Basin Management Plans have been used to identify the ecological status of the main river channels. All of the main rivers in the catchment area have a moderate ecological status, except for the Chertsey Bourne in the North, which has a good status. The Basingstoke Canal has moderate ecological status.

3. Flood Risk in Surrey Heath

The NPPF identifies six forms of flooding, five of which are relevant to Surrey Heath (there is no risk from coastal flooding in Surrey Heath):

- Rivers
- Surface Water
- Sewers
- Groundwater
- Artificial Sources

Of these, it is likely that flooding from rivers presents the greatest risk. Much of the land within the river catchments is rural or semi-rural, although some existing urban areas are affected. The main settlements have areas at risk of river flooding within them. There is also an increased likelihood of surface water flooding and sewer flooding in the urban areas due to the additional drainage systems required to accommodate the population, increased impermeable surfaces and culverted watercourse routes or other open channels. Groundwater has been identified as a potential issue and requires consideration in the planning process.

3.1.1 Flood Risk from Main Rivers

Flooding from rivers occurs when the volume of water in the river exceeds the capacity of the channel. In the west of the Borough, flood risk is from the River Blackwater and its tributaries; in the east of the Borough, fluvial flood risk is from the Bourne Rivers and its tributaries.

Different areas are at risk of flooding from different sized flood events. Four flood zones are defined by PPG based on the probability of flood events occurring. These are outlined in Table 3-1 below.

Table 3-1 – Planning Policy Guidance Flood Zone Definitions

Flood Zone	Definition
Flood Zone 1 – Low Probability	Land having a less than 1 in 1000 annual probability of river (<0.1% AEP)
Flood Zone 2 – Medium Probability	Land as having between a 1 in 100 and 1 in 1000 annual probability of river flooding(1% - 0.1% AEP)
Flood Zone 3a – High Probability	Land having a 1 in 100 or greater annual probability of flooding. (>1% AEP)
Flood Zone 3b – Functional Floodplain	This Zone comprises of land where water has to flow or be stored in times of flood.

For the purpose of this SFRA, specific SFRA flood zones have been derived, which can be used as a starting point for the Sequential Test decisions. These are defined in Table 5-4.

3.1.1.1 Definition of Flood Zone 3b – The Functional Floodplain

PPG states that Local Planning Authorities (LPA's) should identify and define Zone 3b within the SFRA, in consultation with the Environment Agency (EA). Within Surrey Heath, Flood Zone 3b will be defined using the 5% AEP model outline from available hydraulic models (Blackwater River, Blackwater Tributaries & Addlestone Bourne). Where detailed model outlines and the definition of the

5% AEP outline is unavailable, Flood Zone 3 from the Environment Agency Flood Maps for Planning should be used to define the Functional Floodplain (Volume 3, Figure series 4 shows the where detailed model outlines are available, all other watercourses have not been modelled). Flood risk betterment should be sought for redevelopment within all areas, and there should be no increase in development vulnerability or intensification in use. Volume 3, Figure series 5 shows the functional floodplain outline, as well as the remaining SFRA Flood Zones, as described in Section 4.2.4 and 4.3.4.

3.1.2 Flood Risk from Surface Water

Flooding from surface water can result from drainage systems that are under capacity, blockages of pipes, or a cumulative effect of frozen, parched or saturated ground reducing the possibilities of infiltration and increasing runoff. The urban drainage issue is most prevalent in major urban centres and has been known to lead to flooding within towns in the study area. Runoff due to saturated ground is more likely to happen in rural areas where the land is undeveloped and ground conditions allow water to pond on the surface. This can happen across the study area, but is more likely within the lower parts of the catchment and close to rivers.

The Updated Flood Map for Surface Water shows that some main roads and smaller roads are at risk of flooding. Most of the areas shown at risk in Volume 3, Figure 8 are the low lying areas adjacent to the river channels. Further information on surface water flood risk within Surrey Heath is presented in Volume 2, Chapters 5 and 6.

3.1.3 Flood Risk from Sewers

The assessment of sewer flooding incidents within this SFRA refers to flooding of water from foul water sewers which results in foul water flooding incidents. Flooding from surface water may impact on foul sewer flooding however, within this SFRA surface water flooding refers to flooding from overland flow and runoff as a result of rain falling on the ground. No modelling of surface water drainage networks has been carried out or evaluated to further ascertain flood risk from the drainage network.

Where rainwater is drained into surface water sewer systems (pipework or culverts) flooding can result when the volume received by the sewer exceeds its capacity. This can be due to under capacity, blockage, or the occurrence of an event greater than the design event of the sewer network.

Within Surrey Heath, the more urban developed areas have experienced more sewer flood incidents, as shown in Volume 3, Figure 11. However, maintenance of drains following reported sewer incidents means that historic flood events may not always reflect future flood risk. Further information on sewer water flood risk within Surrey Heath is presented in Volume 2, Chapter 7.

3.1.4 Flood Risk from Groundwater

Groundwater flooding occurs when the groundwater table rises to levels which cause emergence at the surface. However, the predominantly sandstone bedrock across most of the SHBC study area, means that much of the Borough has mostly a very low susceptibility to groundwater flooding. Correspondence with the Environment Agency[1] also reported that most of the study area is underlain by Wealden Clay, which limits groundwater flooding. The Environment Agency groundwater incident

[1] Environment Agency, West Thames division, groundwater team

database reported no reported records. There are small pockets of areas at elevated risk throughout the Borough include Mytchett, parts of Bagshot and Chobham. Further information on ground water flood risk within Surrey Heath is presented in Volume 2, Chapter 8.

3.1.5 Flood Risk from Artificial Sources

Artificial sources of flooding include reservoirs, canals or lakes that are above the natural ground level. Flooding may occur as a result of an impoundment structure being overtopped or failing. This could cause significant threat to life due to deep, fast flowing floodwaters. Only the floodplains of the Blackwater River in the east of the study area are at risk of flooding from Mytchett Lake, Hawley Lake, Cove Brook FSR, as indicated by the EA reservoir inundation maps shown in Volume 3, Figure 13.

There are two small isolated areas along the Basingstoke Canal that are at residual risk of flooding from the canal and are currently undeveloped. Whilst the consequences of breach of the reservoirs or canals are potentially high, the probability of occurrence in very low, and therefore the assigned risk from artificial sources is very low. Further information on flood risk from artificial sources within Surrey Heath is presented in Volume 2, Chapter 9.

4. Policy Context

4.1 Roles and Responsibilities

4.1.1 Environment Agency

The Environment Agency is a government agency who has an overarching objective is to protect and enhance the environment in England. Their role involves issues such as flood risk, water quality, water resources, biodiversity and mineral and waste regulators. With regards to water management the Environment Agency has a statutory duty to:

- Maintain or improve any watercourses which are designed as Main Rivers;
- Maintain or improve an sea or tidal defences (not relevant in Surrey Heath)
- Install and operate flood warning equipment and provide flood warning services;
- Provide Flood Warning Services where appropriate;
- Issue Flood Defence Consents[2];
- Control actions by riparian owners and occupiers which might interfere with the free flow of watercourses; and,

Statutory powers mean that the Environment Agency has powers to maintain watercourses and other activities listed above. *They are not required by law to provide a flood warning service but they do have powers to do this on a best endeavour basis. The Environment Agency maintain their assets but are not required by law to maintain privately owned defences.*

The Development Management Procedure Order 2015 (DMPO) and Environment Agency's Flood Risk Standing Advice (FRSA) has been revised (April 2015). The **FRSA for planning authorities**[3] and **FRSA for developers**[4] provides substantive responses to flood risk issues. The FRSA provides substantive responses to councils on lower risk planning applications in regards to flood risk issues only. Bespoke comments on other non flood related issues may also be provided.

[2] Any proposed developments or works within 8 meters of a watercourse designated as a main river requires flood defence consent from the environment agency

[3] https://www.gov.uk/flood-risk-assessment-local-planning-authorities

[4] https://www.gov.uk/flood-risk-assessment-for-planning-applications

4.1.2 Surrey County Council (Lead Local Flood Authority)

Surrey County Council (SCC) is the Lead Local Flood Authority (LLFA) for Surrey. A LLFA is a **Statutory Consultee** on planning applications for surface water drainage. This role applies to **major development** only[5]. Surrey County Council will provide technical advice and response to SHBC on surface water drainage proposal for the development.

Surrey County Council has the 'lead' role in managing flood risk from **surface water, groundwater and ordinary watercourses**[6] across the County. Partnership working underpins the delivery of effective local flood risk management. Surrey County Council will need to ensure that:-

- Proposals are not increasing flood risk on and off the site;
- There is a review of the maintenance schedule to ensure that the drainage system will operate effectively as designed

This involves close working with partners involved in flood and water management, known as Risk Management Authorities.

- Applying and monitoring the Local Flood Risk Management Strategy. This will be guided by the Environment Agency's National Flood and Coastal Risk Management Strategy.
- Cooperating with other Risk Management Authorities within SCC, including the 11 other districts and boroughs, water utility companies, the Environment Agency and others.
- Maintain a register of local structures and features that are likely to have a significant effect on flood risk.
- In the event of a significant flood, investigate to an appropriate level whether the relevant flood risk management functions were exercised correctly.
- Contribute towards sustainable development when exercising a flood risk management function.
- Statutory consultee on planning applications from 15th April 2015 for 10 houses or more (or equivalent other type of development) with regard to surface water management.

The Environment Agency will only provide high level advice on surface water flooding.

Surrey County Council has convened an officer group to coordinate flood risk management activity. It is also involved in reporting the implementation of recommendations, including the 2006-2007 Flooding Task Group and 2008 Pitt Review Monitoring Task Group.

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[5] Major development is defined as developments of 10 dwellings or more; or equivalent non-residential or mixed development as set out in Article 2(1) of the Town and Country Planning Development Management Procedure (England) Order 2010.

[6] An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, but which does not form part of a main river.

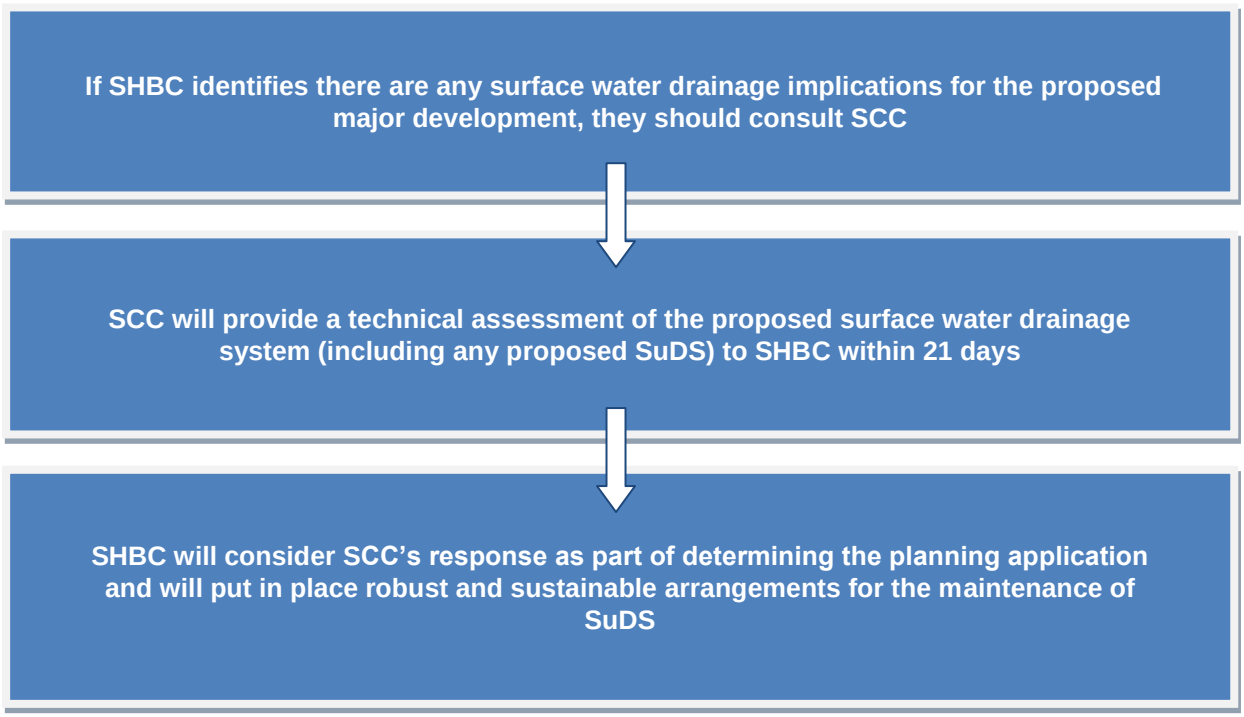
Surrey County Council also host 'Surrey Flood Risk Partnership Board (SFRPB) which bring together all the relevant organisations, including Surrey Heath BC who have a role to play in Flood Risk Management in the County.

4.1.3 Surrey Heath Borough Council (Local Planning Authority)

Surrey Heath Borough Council is responsible for determining planning applications, requiring consultation with the Environment Agency in areas of flood risk.

Following changes in National Planning Policy, Surrey Heath Borough Council as the LPA will be responsible for local planning policies and decisions on planning applications relating to major development. SHBC will also have to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate. SCC will act as a statutory consultee and SHBC should consult SCC on the management of surface water to satisfy themselves that the proposed minimum standards of operation are appropriate. It should be ensured through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

The flow chart below outlines how the relationship with the LLFA and the LPA will work in practice.



Volume 2 provides details of the Infiltration SuDS Map (detailed) developed by the British Geological Survey (BGS). The dataset provides subsurface information enabling preliminary assessment of the ground for infiltration SuDS. This dataset will provide a guide to developers, planners and SHBC who need to assess the properties of the ground directly, or assess planning applications for SuDS.

4.1.4 Sewerage undertakers

Sewerage undertakers are responsible for surface water and foul drainage from developments, where this is adopted via adopted sewers. Thames Water is the sewerage undertaker within the study area.

The Flood and Water Management Act 2010 is set to remove the automatic right to connect to public surface water sewers. This may require developers to provide more justification than is currently required in order to connect to the Thames Water drainage network. It may, in future, be necessary to provide evidence that surface water runoff cannot be appropriately managed within the site through the use of soakaways or by direct discharge into a watercourse in order to gain approval for connection to the public surface water sewer. Additionally, they have a role of providing information to LPAs so that an SFRA takes into account any areas of critical drainage problems.

Updates to the Planning Practice Guidance in April 2015 highlight that sewerage undertakers are not statutory consultees, however SHBC are advised to consult with Thames Water Utilities Ltd on all planning applications that are proposing to discharge to their network.

4.1.5 Highways England

Highways England is responsible for maintaining major roads throughout England; this includes the upkeep of the surface water drainage infrastructure associated with the road network. The only major road within the study is the M3 which runs through the centre of the Borough.

4.1.6 Riparian Landowners

The person who owns the land containing or adjacent to a watercourse is the riparian owner. By law, it is the riparian owner who is responsible for maintaining a watercourse. These responsibilities are outlined in the Environment Agency's **'living on the edge' document[7].** The key responsibilities associated with flood risk are highlighted below:

- To maintain a flow within a watercourse through owned land without any obstruction, pollution or diversion which affects the rights of others.
- To accept flood flows through owned land, even if these are caused by inadequate capacity downstream. A landowner has no duty in common law to improve the drainage capacity of a watercourse he/she owns.
- To keep the banks clear of anything that could cause an obstruction and increase flood risk, either on owned land or downstream if it is washed away.
- Is responsible for maintaining the bed and banks of the watercourse and the trees and shrubs growing on the banks. The property owner should always leave a development-free edge on the banks next to a watercourse
- To keep any structures, such as culverts, trash screens, weirs and mill gates, clear of debris.
- Is responsible for protecting your property from water that seeps through natural or artificial banks. Where this damages a flood defence, the local risk management authority may require you to pay for repairs.

Surrey Heath Borough Council has responsibility for granting consent for works on ordinary watercourses and can take action against illegal or sub-standard work, including works affecting flow within the channel.

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403435/LIT_7114.pdf

4.2 European Policies

4.2.1 Water Framework Directive (EU Directive 2000/60/EC)

The EU Water Framework Directive was developed following a review of EU water policy. The WFD requires that rivers, coastal waters and groundwater achieve Good ecological status or potential by 2027 and are prevented from deteriorating. This is carried through an integrated River Basin Management Plan and includes the management of both biological and chemical elements. This is a method of ensuring all requirements and pressures on the water environment are taken into account within a river basin. The implications of the Water Framework Directive on flood risk are likely to include controls on the type of flood alleviation schemes that can be implemented and that any flood alleviation schemes should also contribute to achieving 'good ecological status' and preventing deterioration through methods such as restoration of floodplains to their natural state and purpose. The Thames River Basin Management Plan covers the Surrey Heath Borough.

4.2.2 Floods Directive

The European Directive on the Assessment and Management of Flood Risks (European Union, 2007) came into force on the 26th November 2007. The directive was transposed into English and Welsh law as the Flood Risk Regulations in December 2009. The directive requires member states to consider the potential impacts that domestic policies might have on flood risks and the management of flood risks to neighbouring member states. It recognises that objectives regarding the management of flood risk should be determined by the Member States themselves and should be based on local and regional circumstances.

The directive requires Member States to designate competent authorities to implement the Directive; for England, this is the Environment Agency. The directive requires the following elements to be undertaken:

- Preliminary Flood Risk Assessments to identify areas that are at potentially significant flood risk, to be completed by 20 December 2011;
- Flood hazard maps (showing the likelihood and flow of the potential flooding) and flood risk maps (showing the impact), to be completed by 20 December 2013;
- Flood risk management plans (showing measures to decrease the likelihood or impact of flooding), to be completed by 22 December 2015; and
- Updates every 6 years thereafter that take into account the impact of climate change.

The Surrey Preliminary Flood Risk Assessment (2011) confirmed that part of the County Council's administrative area is in a 'Flood Risk Area' (the Greater London Flood Risk Area) and is therefore required to deliver flood hazard / risk maps and a flood risk management plan under the Regulations. Surrey County Council has produced the Local Flood Risk Management Strategy, which sets out who is responsible for flood risk management measures across the County, including Surrey Heath.

4.3 National Policies

Since the 2008 SFRA's were completed, updates to national planning policy and flood risk have been implemented. This section highlights the main changes and the impacts they have on the SFRA.

4.3.1 Flood and Water Management Act (2010)

The Flood and Water Management Act (2010) places significantly greater responsibility on all Local Authorities to manage and lead on local flooding issues. As the LLFA, the Act sets out the requirements and targets of Surrey County Council:

- Taking an active role leading flood risk management
- Cooperating with other relevant authorities to manage local flood risk
- Investigating flood incidents and reporting upon them
- Maintaining an 'Asset Register' of assets that have a significant influence on local flood risk
- Designating 'features' that have a significant influence on local flood risk
- Regulating and enforcing works on 'ordinary watercourses'
- Development and implementation of the Local Flood Risk Management Strategies (LFRMS)
- Providing support to the LPA, acting as the statutory consultee on the delivery of SuDS techniques.

The Flood and Water Management Act also clarifies three key areas that influence development:

- Sustainable Drainage Systems (SuDS) - the Act makes provision for a national standard to be prepared on SuDS. Developers will be required to obtain LPA approval for the SuDS in accordance with the draft national standards, likely with conditions.
- Flood risk management structures - the Act enables the EA and local authorities to designate structures such as flood defences or embankments owned by third parties for protection if they affect flooding or coastal erosion. A developer or landowner will not be able to alter, remove or replace a designated structure or feature without first obtaining consent.
- Permitted flooding of third party land – In exceptional circumstances, the EA and local authorities have the power to carry out work which may cause flooding to third party land where the works are deemed to be in the interest of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or of cultural heritage.

4.3.2 National Planning Policy Framework (2012)

The National Planning Policy Framework[8] was issued in March 2012 and outlines the national policy including on development and flood risk assessment. This replaced with immediate effect national policy including Planning Policy Statement 25 – Development and Flood Risk.

The NPPF requires Local Plans to be supported by a Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources. Advice should be sought from the Environment Agency and any other relevant flood risk management bodies such as the Lead Local Flood Authorities that are tasked with managing future risk, and also the local authorities that have often historically managed the role now undertaken by the LLFA. Planners should use the Sequential Test as the primary decision making tool, and then apply the Sequential Approach to determine the layout of the plan.

4.3.3 National Planning Policy Guidance, April 2015

The Technical Guidance to the National Planning Policy Framework[9] has been superseded by the Planning Practice Guidance Flood Risk and Coastal Change[10] (April 2015) which sets strict tests to protect people and property from flooding. All local planning authorities are expected to follow the PPG. Where these tests are not met, national policy is clear that new development should not be allowed. The

[8] National Planning Policy Framework (DCLG, 2012)

[9] Technical Guidance to the National Planning Policy Framework (DCLG, 2012)

[10] http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

main steps to be followed are designed to ensure that if there are better sites in terms of flood risk, or a proposed development cannot be made safe, it should not be permitted.

The National Planning Practice Guidance document provides guidance on how the local planning authorities should:

- Assess flood risk;
- Avoid flood risk; and
- Manage and Mitigate flood risk and coastal change.

There is also information on the requirements to consult the Environment Agency, on the role of lead local flood authorities and on flood risk in relation to minor developments. In addition, NPPF provides information on the application of the Sequential and the Exception Tests in the preparation of a Local Plan.

The April 2015 update to the practice guidance provides additional guidance on SuDS, including:

- The importance of SuDS;
- When SuDS should be considered;
- The SuDS discharge hierarchy;
- Factors a local authority will address when considering SuDS as part of a planning application;
- When SuDS are inappropriate and relevant flood risk consultees;
- Applicability of Defra's Non-statutory Technical Standards for Sustainable Drainage Systems;
- Design and construction cost considerations;
- Operation and maintenance considerations; and
- Where to go for further SuDS advice.

As part of the April 2015 update, the practice guidance provides details on the parties responsible for assessing the suitability of SuDS practices. As per paragraph 084 from the practice guidance:

The decision on whether a sustainable drainage system would be inappropriate in relation to a particular development proposal is a matter of judgement for the local planning authority. In making this judgement the local planning authority will seek advice from the relevant flood risk management bodies, principally the lead local flood authority, including on what sort of sustainable drainage system they would consider to be reasonably practicable.

4.3.4 Non-statutory Technical Standards for Sustainable Drainage Systems, March 2015

This document, published by the Department for Environment, Food and Rural Affairs, sets out non-statutory technical standards for sustainable drainage systems. The non-statutory technical standards should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.

Non-statutory technical standards are provided for the following items:

- Flood risk outside the development;
- Peak flow control;
- Volume control;
- Flood risk within the development;
- Structural integrity;
- Designing for maintenance considerations; and
- Construction.

4.4 Regional Policies

4.4.1 Catchment Flood Management Plans

A catchment flood management plan (CFMP) is a high-level strategic planning document that provides an overview of the main sources of flood risk and how these can be managed in a sustainable framework for the next 50 to 100 years. The Environment Agency engages stakeholders within the catchment to produce policies in terms of sustainable flood management solutions whilst also considering local land use changes and affect of climate change.

The approach that the Environment Agency would like to see taken to flood risk management within the Study Area is outlined in the Thames CFMP. The Surrey Heath SFRA Study area is covered by sub-area group Seven and Eight, “Expanding towns in floodplain locations” and “Heavily populated floodplains.” The proposed management policies are discussed further in Volume 2, Chapter 4.

4.4.2 Flood Risk Management Plan for the Thames Catchment Area

This document is currently in draft stage and is due to be published in December 2015. This is a strategic document that demonstrates how the Environment Agency is going to manage flood risk at a catchment level in the future. This document should be reviewed in the future when it becomes available.

4.5 Local Policies

4.5.1 Local Flood Risk Management Strategy

Surrey County Council is the Lead Local Flood Authority for the Surrey Heath area. SCC is required to develop, maintain, apply and monitor a Local Flood Risk Management Strategy (LFRMS). The strategy aims to increase awareness of local flood risk issues, and set out how partners are working together to reduce flood risk. The document provides an overview of the ongoing flood risk management work underway across Surrey for 2012-2016. The Surrey Flood Risk Partnership Board oversees the strategy.

Reflecting the requirements of the Flood and Water Management Act (2010) and the National Flood and Coastal Erosion Risk Management Strategy (2011) the LFRMS aims to make it easier for management authorities to work together and clarify roles, providing a clear overview of the levels of flood risk throughout the County by considering flooding issues at catchment level. The strategy also aims to reflect the concerns of residents and business, in order to appropriately prioritise the spending of schemes aimed to reduce flood risk. The strategy must cover how and when the flood risk reduction measures will be implemented, how much they cost and how they will be paid for.

The document can be found online at:
http://www.surreycc.gov.uk/__data/assets/pdf_file/0006/393486/Surrey-LFRMS-Final-consultation-draft.pdf

4.5.2 Surrey Heath Local Plan

Surrey Heath Borough Council adopted a Core Strategy and Development Management Policies DPD in February 2012. The Council has adopted a spatial strategy which directs development to the more sustainable urban locations on the western side of the Borough with only limited development being provided for in the more rural, flood prone eastern parts. Policy CP3 of the Core Strategy expects the

Council to provide for 3,240 net new homes over the plan period 2011 – 2028. This equates to an annual requirement for 191 net new homes.

Policy C4 allocates a large strategic housing site at Deepcut accommodating a net number of 1200 new homes along with supporting infrastructure. This site provides for almost half the Borough's housing target to 2025 with the most of the remaining housing expected to be provided in the Western Urban Area (WUA) which consists of the settlement areas of Camberley, Frimley, Frimley Green and Mytchett. Policy CP8 makes provision for new employment but this is expected to be provided for on the existing employment areas by promoting more intensive use of these sites.

The Council is currently in the process of updating its Local Plan evidence base. This evidence includes a new Strategic Housing Market Analysis (SHMA), Strategic Housing Land Availability Assessment (SHLAA) and an Employment Land Review (ELR).

4.5.3 Surrey Preliminary Flood Risk Assessment

A Preliminary Flood Risk Assessment (PFRA) was prepared for Surrey County Council in June 2011. The report was prepared to ensure Surrey County Council met their duty to deliver the requirements of the Flood Risk Regulations (2009).

The PFRA is aimed at providing high level overview of flood risk from all sources of flooding within the local area, including consideration of surface water, groundwater, ordinary watercourses and canals.

5. The Sequential Test

5.1 What is the sequential test?

The NPPF Sequential Test is a risk based approach to determine the suitability of development according to flood risk from fluvial and tidal sources. The NPPF requires LPAs to apply the Sequential Test at all stages of the planning process to ensure that where possible developments are removed from areas with a high probability of flooding. Through application of the Sequential Test LPAs are encouraged to guide new development towards areas of the lowest flood probability.

Allied to the Sequential Test, NPPF also assigns different vulnerabilities to different types of development (Table 2 of the Planning Practice Guidance (PPG) for Flood Risk and Coastal Change). If when applying the Sequential Test development in the floodplain is necessary the LPA should also bear in mind the vulnerability classification of their proposed development to assess if it is appropriate in an area of flood risk. In exceptional circumstances the LPA may be required to undertake the Exception Test to justify development in the floodplain (discussed further in Chapter 6).

NPPF also assigns which types of development are compatible within each flood zone (Table 3 of the PPG for Flood Risk and Coastal Change). Using the information within these tables (Table 5-1, Table 5-2 and Table 5-3) in tandem with the Sequential Test methodology set out below, planners should guide developments to those areas where the development vulnerability is appropriate to the flooding probability.

Table 5-1 – PPG Table 1 - Flood Zone Definitions

Flood Zone		Definition
Zone 1	Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (<0.1% AEP)
Zone 2	Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding. (1% - 0.1% AEP)
Zone 3a	High Probability	Land having a 1 in 100 or greater annual probability of river flooding. (>1% AEP)
Zone 3b	Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Across SHBC, this is defined as land having a 1 in 20 year (5% AEP) or greater annual probability of river flooding, defined using detailed hydraulic modelling provided by the Environment Agency. Where the 5% AEP outline is unavailable, the Flood Zone 3a outline (1% AEP) has been used to define Flood Zone 3b.

Table 5-2 – PPG Table 2 -Flood Risk vulnerability Classifications

Vulnerability Classification	Types of Development
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes), which has to cross the area at risk, and strategic utility infrastructure
Highly Vulnerable	• Police, Ambulance and Fire stations and Command Centres and telecommunications installations required to be operational during flooding and emergency dispersal points • Basement dwellings, Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place).
Water-Compatible Development	• Flood control infrastructure and • Water transmission infrastructure and pumping stations and sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves and navigation facilities. • MOD defence installations and ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 5-3 - PPG Table 3: Flood Risk Vulnerability and flood zone 'compatibility'

Flood Zones	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water-Compatible Development
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	✗	✓
Zone 3b	Exception Test Required	✗	✗	✗	✗

Table 5-4 has been adapted to form the SFRA Flood Zone definitions that SHBC should use as starting points within the SFRA. Beyond these fluvial SFRA flood zones, application of the Sequential Test must consider the impacts of all sources of flooding. The fluvial SFRA flood zone definitions include available detailed modelling results, and are therefore more accurate than using the EA flood zones alone. The definitions of each zone along the different watercourses are outlined in Table 5-4.

Table 5-4 – Surrey Heath Borough Council Fluvial SFRA Flood Zones

SFRA Flood Zone	Blackwater	Blackwater Tributaries	Addlestone Bourne	Mill and Hale Bourne	Other Watercourses
SFRA Flood Zone 2	EA Flood Zone 2	0.1% AEP outline	EA Flood Zone 2	EA Flood Zone 2	EA Flood Zone 2
SFRA Flood Zone 3	1% AEP + CC outline	1% AEP + CC outline	1% AEP + CC outline	1% AEP + CC outline	EA Flood Zone 3
SFRA Flood Zone 3a	1% AEP outline	1% AEP outline	1% AEP outline	1% AEP outline	Not defined
SFRA Flood Zone 3b	5% AEP outline	5% AEP outline	5% AEP outline	5% AEP outline	EA Flood Zone 3

5.2 How should the SFRA be used to apply the Sequential Test?

Surrey Heath Borough Council should use the information presented in this Level 1 SFRA to undertake the Sequential Test. The Sequential Test should be accurately documented to ensure that the decision

processes followed for the locating of a development are consistent and transparent. Table 5-5 provides a template for Surrey Heath to consider when undertaking the Sequential Test. This table can be used to record the information used in the decision making process for each allocated area/site following the methodology outlined in the flow chart shown in Figure 5-1.

It is recognised that flood risk information must be considered alongside other spatial planning issues. However, the same weighting may not always be applied to all other issues; flood risk presents a danger to life. This was recently highlighted in the Doncaster Examination in June 2014. Allocations are thus "Tested" on the basis of their flood risk attributes and the outcome used to inform decisions that include other spatial planning issues such as transport, housing, economic growth, natural resources, regeneration, biodiversity, the historic environment and management of other hazards.

To perform the Test, SHBC first need to be aware of what sites are reasonably available[11] alternatives in their council area in order that all sites that have been put forward, through 'Call for Sites', current record and sites in council ownership amongst others. Once the sites have been tested, they can then be promoted and allocated accordingly based on those at least risk of flooding and appropriate land uses. It is necessary to clearly define reasonably available, should the need arise to provide evidence that there are not locations outside of those considered with a lower probability of flooding that could be considered to be "reasonably available" for the type of development proposed.

When applying the Test it will be important for SHBC to demonstrate:

- That a transparent process has been formulated and followed;
- That this process has sought to steer new development to areas with the lowest probability of flooding (according to Table 1 PPG); and
- That full consideration has been given to reasonably available alternatives on land with a lower probability of flooding

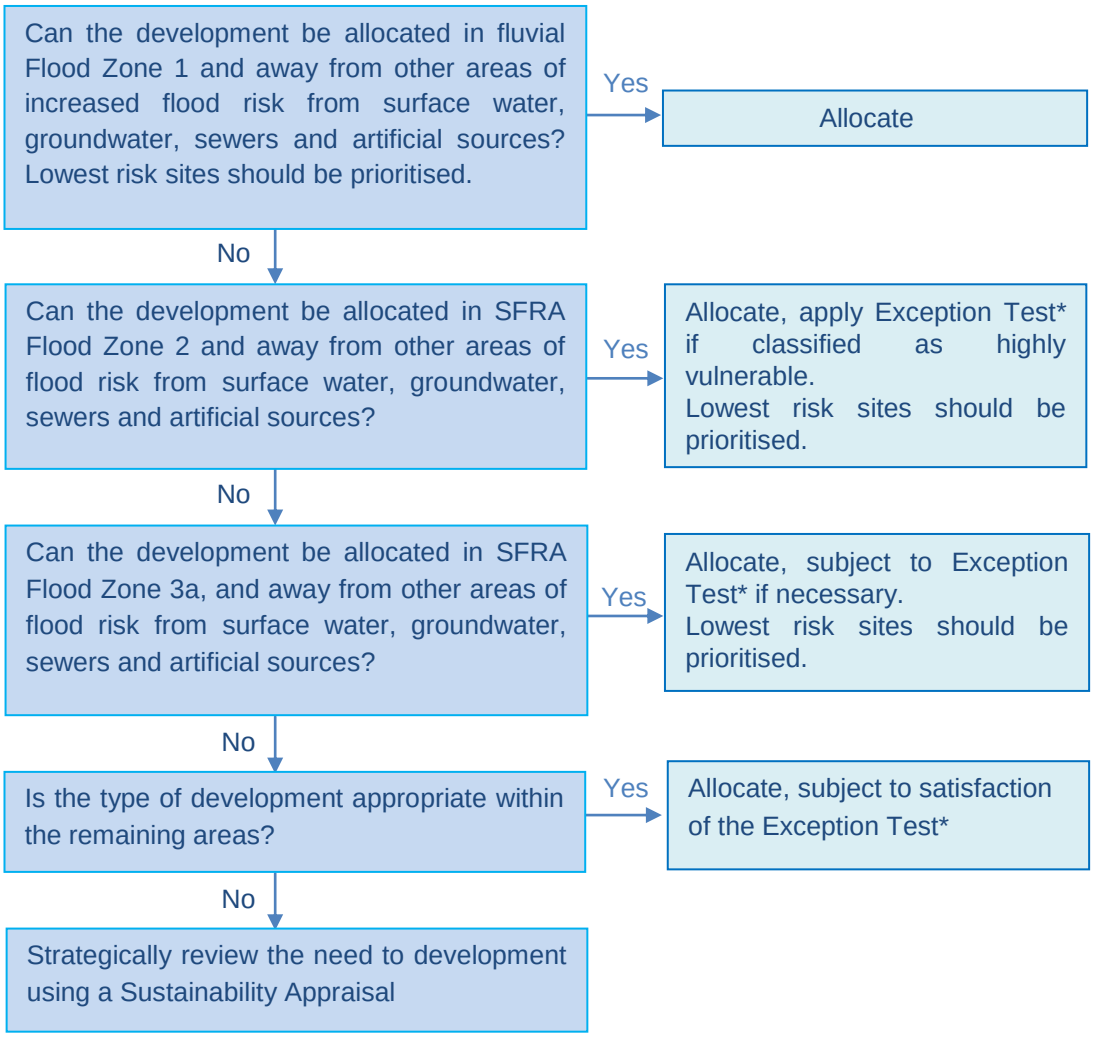
The protocols adopted for the Sequential Test should ideally be discussed with the Environment Agency. It is important that the decision maker engages key stakeholders early in the decision making process.

The flood risk information required to address the four stages (shown in Figure 5-1) in the application of the Sequential Test noted above is provided in the relevant sections of Volume 2, and the flood maps in Volume 3 of this SFRA.

[11] (A site is only considered to be reasonably available if it is both 'deliverable' and 'developable' as defined by the NPPF:

- The site is within the agreed area of search.
- The site is of comparable size and can accommodate the requirements of the proposed development.
- The site is either: owned by the applicant; for sale at a fair market value; or is publicly owned land that has been formally declared to be surplus and is available for purchase.
- The site is not safeguarded in the Local Plan for another use. Sites are not considered to be reasonably available if they fail to meet any of the above requirements or already have planning permission for a development that is likely to be implemented.

Figure 5-1 – Sequential Test Flow Chart[12]



*A level 2 SFRA is required for allocations needing the exception test.

[12] Adapted from the Planning Practice Guidance, April 2015

Table 5-5 – Matrix for Recording the Sequential Test

Site Identified for Potential Future Development	Flood Zone Classification	Risk of Flooding from Rivers & Ordinary Watercourses	Risk of Flooding from Surface Water	Risk of Flooding from Sewers	Risk of Flooding from Groundwater	Risk of Flooding from Artificial Sources	Additional Comments or Other Suitable Sites
	Refer to Volume 1 Table 5-1 and 5-3	Refer to Volume 2, Chapter 5	Refer to Volume 2, Chapter 6	Refer to Volume 2, Chapter 7	Refer to Volume 2, Chapter 8	Refer to Volume 2, Chapter 9	

6. The Exception Test

6.1 What is the Exception Test?

As shown in Volume 3, some areas of SHBC area are within Flood Zones 2 and 3 and are predicted to have a medium or high risk of flooding.

It is expected that the Exception Test will have to be applied to allocated sites in Surrey Heath as it is not likely that it will be possible to avoid all development in Flood Zones 2 and 3. The Exception Test allows necessary development to go ahead when sites with a lower risk of flooding are not available. It may not always be appropriate to apply the Exception Test.

6.2 What is required to pass the Exception Test?

Figure 5.1 in Section 5 highlights the stages in the Sequential Test at which the Exception Test may need to be applied. The Planning Practice Guidance provides additional guidance on the application of the Exception Test.

If, following application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding; the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
- a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

The first of the criteria should be addressed through a sustainability appraisal[13]. If a potential allocation fails to score positively; it has failed the exception test. This should be overcome at preapp stage, not by conditions and S106 obligations. Where this is not possible the Exception Test has not been satisfied and the allocation should not be made. It should be noted that just because a site is sustainable it may not be a more important criteria than flood risk

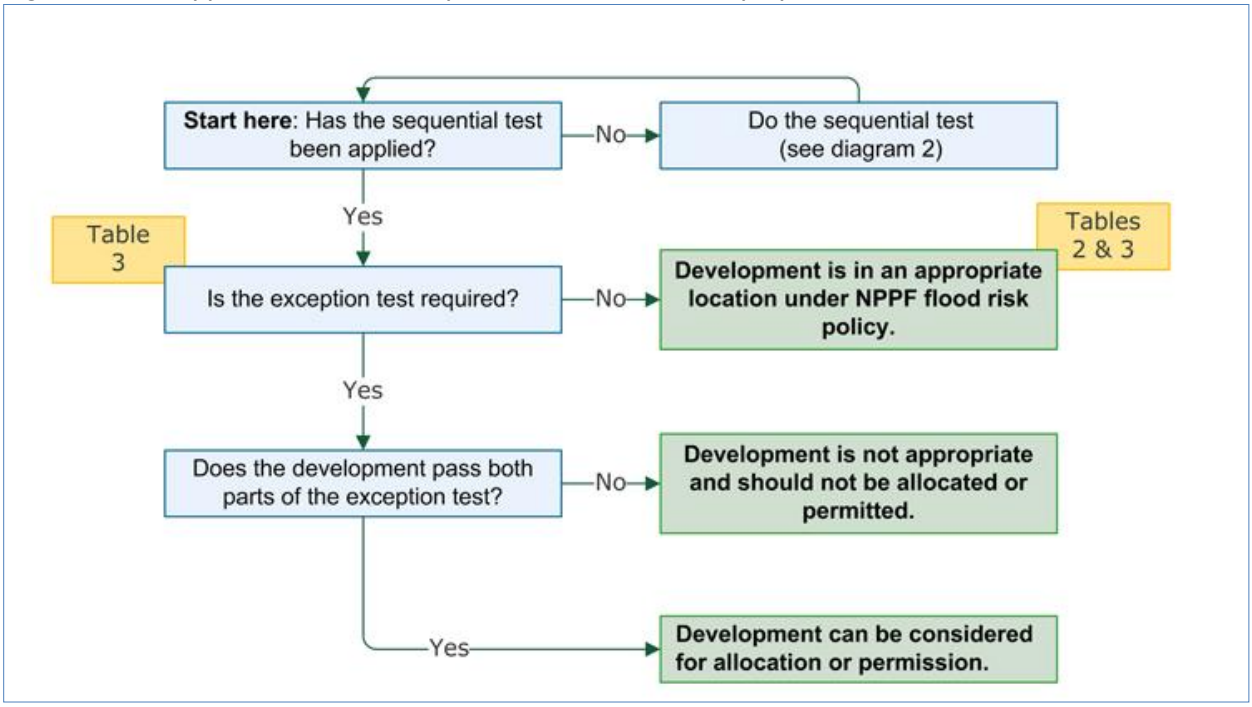
The second part of the Exception Test relates to the “safety” of the development. The Planning Practice Guide provides detail on ‘What is safe?’ When considering safety, specific local circumstances need to be taken into account, including:

- The characteristics of a possible flood event, e.g. the type and source of flooding and frequency, depth, velocity and speed of onset;
- The safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood;
- The structural safety of buildings, and;
- The impact of a flood on the essential services provided to a development.

[13] http://planningguidance.planningportal.gov.uk/blog/guidance/strategic-environmental-assessment-and-sustainability-appraisal/sustainability-appraisal-requirements-for-local-plans/

Figure 6-1 presents the process that should be followed by SHBC in its application of the Exception Test under the PPG

Figure 6-1 An Application of the Exception Test for Local Plan preparation



It is important that Surrey Heath Borough Council retain a record of all their assumptions and decisions with regard to both the Sequential and Exception Tests, in order to demonstrate that they have performed the process. Once the Tests are completed, and SHBC are satisfied with the outcome, it is then possible to continue with the development process.

Flood events, more than many other emergencies, can affect a wide number of homes and the time to recover from a flood emergency can be prolonged. Accordingly it should be remembered that the level of “safety” will vary depending on the vulnerability of the community affected. More vulnerable residents will potentially be more severely affected by the consequences of flooding and levels of safety should be commensurate with the risk.

7. Summary of High Risk Areas and Planning Considerations

7.1 Summary of High Risk Areas

A map showing the areas of the Borough which are at a high risk of flooding, taking into account all sources of flooding, residual risk and climate change, is shown in Volume 3, Figure 14, and reproduced below in Figure 7-1. The flood risk classifications have been defined according to the following criteria:

Fluvial flood risk:

- Very high risk – Flood Zone 3b (5% AEP plus EA flood zone 3 where detailed modelling unavailable)
- High risk – EA Flood Zone 3a

Surface water flood risk:

- Very high risk – 1% AEP outline from the Updated Flood Map for Surface Water (UFMfSW)
- High risk – 3.3% AEP outline from the UFMfSW

Groundwater flood risk:

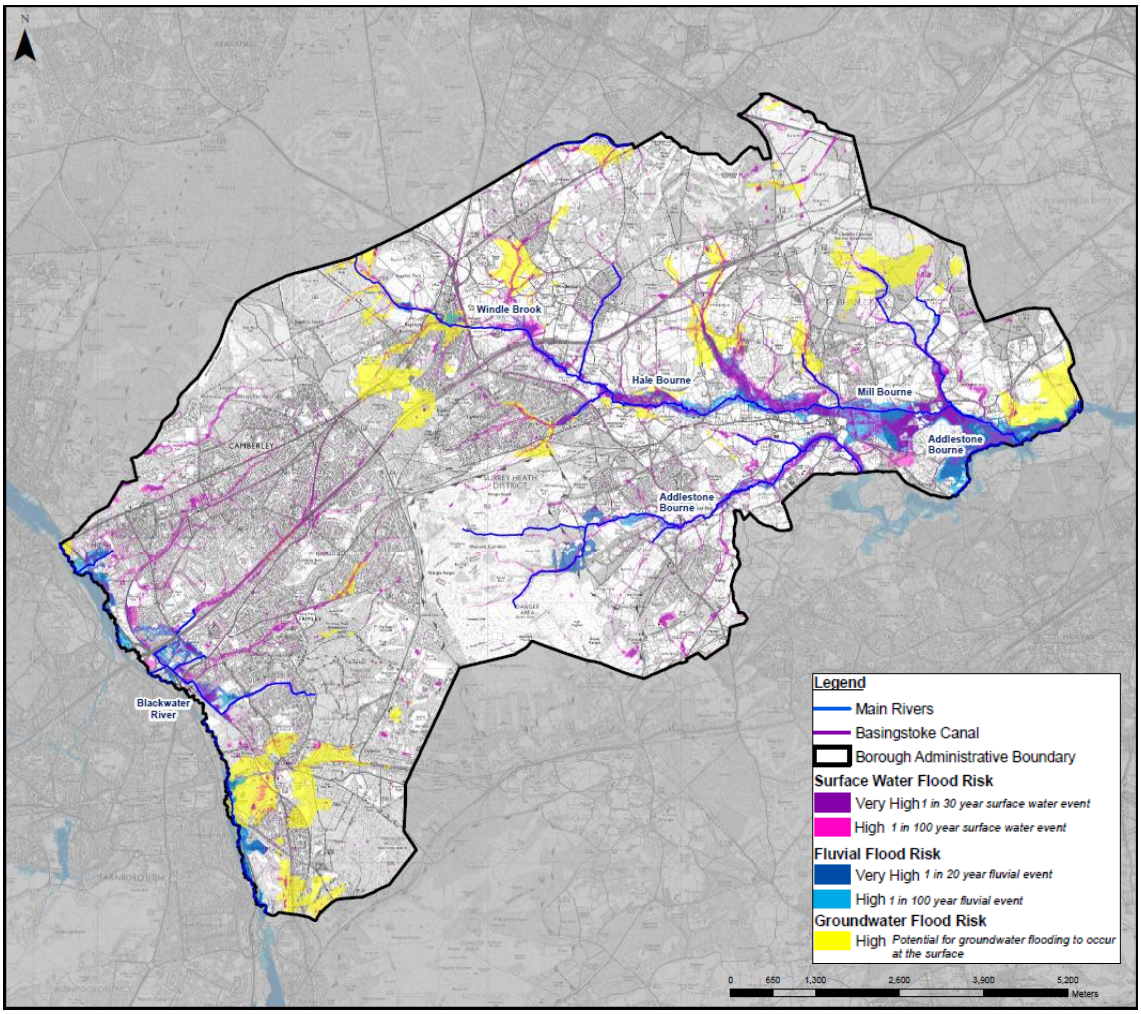
- Areas where the BGS groundwater susceptibility dataset shows that there is potential for groundwater flooding to occur at the surface

Volume 3, Figure 14 shows that the river corridors are subject to high risk from fluvial and surface water sources, as well as some groundwater flood risk. Parts of Bagshot, Chobham, Lightwater, Mytchett and Camberley are at high risk from an accumulative effect from all three of these sources. Much of the areas at high risk from two or three of these sources are undeveloped rural floodplains within the Bourne catchment. These maps show the importance of having a multi-agency flood plan and how the planning system should encourage that developments do not increase the burden on the emergency services during a flood event.

The EA Flood Maps for Planning, Historic Flood incidents and detailed modelling outlines were used to evaluate fluvial flood risk across the Borough. High and very high fluvial flood risk is concentrated along the valley of the Blackwater River and its tributaries, and the Bourne River catchment including its tributaries.

The UFMfSW has been used to assess surface water flood risk across SHBC as there are very limited details on recorded incidents. Similarly to the fluvial extents, large undeveloped floodplains are shown as at medium risk of surface water flooding.

Most of the study area is at low risk of groundwater flooding due to the underlying sandstone geology. There is elevated flood risk from groundwater in parts of Mytchett, Bagshot and Chobham.



Note: The information in this map is available in more detail in Volume 3, Figure series 14

7.2 Functional Floodplain

The functional floodplain, flood zone 3b, has been defined as the land having a 1 in 20 year (5% AEP) or greater annual probability of river flooding, defined using detailed hydraulic modelling provided by the Environment Agency. Where the 5% AEP outline is unavailable, the Flood Zone 3a outline (1% AEP) has also been used to define Flood Zone 3b. The 5% AEP outline was available along the Blackwater River and its tributaries, the Bourne and its tributaries, from the detailed modelling studies. The smaller, unmodelled tributaries within the borough therefore have a more conservative flood zone 3b definition using the EA flood zone 3a outline. The SFRA Flood Zones are shown in Volume 3, Figure 5.

It has been assumed that the defended and undefended scenarios are equivalent along most of the watercourses. Additional modelling along the Blackwater Tributaries includes the defended scenario; which should be included and updated in the SFRA when it is published.

7.3 Preliminary Drainage Areas

Volume 2 Chapter 6 also identifies the areas which are likely to increase surface water flooding and highlights the areas particularly susceptible to surface water flooding, by identifying preliminary drainage areas and upstream and downstream catchments. These areas should be used to develop policies within the local plan for managing surface water runoff. These should be combined with new planning considerations for delivering SuDS.

7.4 Use of Emergency Plan in the Planning System

Outcomes from the SFRA should be addressed in the Multi-Agency Flood Plan which may then be incorporated into a local emergency plan to major incident plan as seen appropriate. It is expected that the other professional partners including Local authorities, the EA, fire service, police service and the Health Authority, will also contribute to the Multi-Agency Flood Plan. This is an obligation under the Civil Contingencies Act (July 2004).

The Multi-Agency Flood Plan should:

- Identify the responsibilities of professional partners and others in the management of flood risk
- Identify the appropriate responses to flood warnings
- Identify the actions required during instigation of the plan
- Identify recovery actions following a flood event
- Identify clear communications routes between professional partners.
- The risk of isolation of residential areas
- The risk of flooding of major transport routes in and out of the study area

With the appropriate management of flooding taking increasing importance in the planning system, more developments will be required to ensure they appropriately manage their risks and do not exacerbate the risks to surrounding property and residents as a consequence of development. Whilst much of the impact of development should be mitigated against through appropriate proactive planning, (through application of the Sequential Test), there will remain some developments that will have to take place in areas at risk of flooding. In such circumstances, developments should be constructed in such a way as to safeguard them and their residents from flooding; however the impact of the development on the ability of emergency services to maintain current standards of service should also be considered.

Having regard to the Council's emergency plan will enable SHBC to establish where a proposed development may place an unreasonable pressure on emergency services and/or increase risks to the existing population. Similarly it will enable developers to incorporate appropriate mitigation measures into their developments to minimise the impact it will have on the existing emergency service provision.

7.5 Guidance for Developers

Although this SFRA has been undertaken for the SHBC area, it does not negate the need for site specific Flood Risk Assessments (FRAs) to be undertaken at the planning application stage. It is essential that Flood Risk Assessments submitted with development proposals take into account the findings of this SFRA and assesses flood risk from all sources.

Proposals should also demonstrate that safe access / egress to the development can be maintained during an extreme flood event and that development is set at an appropriate level so that the residual

risks are managed to acceptable levels. Where the site falls within an area which is classified as being at High or Medium Residual Risk from all sources, as defined in the relevant chapters within Volume 2, the FRA should include a detailed assessment of the residual risks posed by the existing defences being breached or overtopped in an extreme event (usually the 0.5% AEP plus climate change).

It should be noted that constraints to development are likely to be significant and developers should seek advice from the Council, the Environment Agency and Thames Water as to the specific requirements for assessment. Appendix B of this document provides further detailed guidance for the completion of detailed flood risk assessments and guidance on mitigation measures. A Site Specific Flood Risk assessment checklist is also available from PPG, and can be found at:

http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/

8. Drainage of Development Sites

An objective of this Level 1 SFRA is to advise SHBC on the principles, objectives and applicability of Sustainable Drainage Systems (SuDS) throughout the study area. As outlined in Chapter 4 of this document, the Local Planning Authority, in consultation with the LLFA, are responsible for the delivery of SuDS. Managing surface water flooding at its source is one of the most proficient ways to minimise run off from a site and prevent increasing flood risk in the surrounding area.

8.1 What are SuDS?

SuDS are a varied collection of techniques designed to manage surface water in a sustainable manner. SuDS achieve this by seeking to manage surface water from new developments as close to its source as possible and by mimicking the natural surface water flow regime present on a site prior to development. Typically this approach involves a move away from conventional piped systems to softer engineering solutions inspired by natural drainage processes.

For SuDS to be fully sustainable they should seek to contribute to each of the three goals of sustainability (identified below), with the favoured system contributing equally to each goal. The three goals of sustainable drainage systems are:

1. Reduce flood risk (to the site and neighbouring areas),
2. Reduce pollution, and,
3. Provide landscape and wildlife benefits.

In addition, SuDS should also be designed to ensure they remain effective for storm events up to and including the 1% annual probability storm event including an increase in peak rainfall intensities to account for the predicted effects of climate change.

There should be capacity in the receiving sewer system and surface water runoff should be managed to prevent an increase in offsite flood risk. Any increase in discharge rates and discharge volume must be mitigated for.

8.2 SuDS Policies

Following changes within NPPF on the 6th April 2015, all Major Development planning applications will, require the inclusion of SuDS designs. Full planning applications are required to be accompanied by a detailed SuDS drainage design including simulation modelling of the proposed system. The SuDS pro-forma must be completed and signed by a competent drainage engineer and submitted as part of the planning application. The proposed drainage system shall be designed in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems and any forthcoming Sustainable Drainage Systems Guidance from Surrey Heath Borough Council.

In accordance with PPG paragraph 80, all planning applications must follow the hierarchy for discharge destinations. Where it is not possible to achieve the first hierarchy, discharge through the ground, applicants must demonstrate in sequence why the subsequent discharge destinations were selected.

Where the intention is to dispose to soakaway, these should be shown to work through an appropriate assessment carried out under Building Research Establishment (BRE) Digest 365. All designs shall be based on actual infiltration figures obtained through percolation tests, carried out in accordance to BRE Digest 365.

In accordance with CIRIA Report 156, Infiltration Drainage and SuDS Manual (C697 or latest amended version C753), an adequate factor of safety must be applied to the observed infiltration value. The

minimum factor of safety acceptable is 2 and that must be increased to reflect the consequences of failure of the system, the topography of the site and the likelihood of flooding.

Infiltration units must stand the test of half-emptying the provided storage within 24hrs for up to the 1 in 10 year annual probability storm (for all rainfall durations). The proposed infiltration devices shall not intercept the water table and shall have at least 1m of unsaturated ground between the base of the infiltration device and the water table. Therefore infiltration SuDS may not be suitable for use where there is a shallow water table and insufficient unsaturated ground for soakage and or contamination. There should be no infiltration of water into contaminated land.

If infiltration is not viable, subject to evidence being provided to support the choice of discharge destination, proposals to dispose of surface water in to a watercourse, surface water sewer, highway drain or another drainage system, should be accompanied by evidence of the system having spare capacity downstream

All development should aim to achieve pre-development greenfield run-off rates. If this is not proposed, evidence must be submitted demonstrating why it has not been possible to achieve the greenfield run-off rate and why it is only possible to achieve the proposed discharge rate.

Sustainable drainage systems should be designed to ensure that the maintenance and operation requirements are economically proportionate. Surrey Heath Borough Council will need to decide on the strategy of adopting SuDS.

SHBC, as the LPA, is expected to

- Consult with SCC as the LLFA on the management of surface water
- Satisfy themselves that the proposed minimum standards of operation are appropriate
- Ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

8.2.1 Building Regulations 2008 H3 Rainwater Drainage

The Building Regulations 2008 (Approved UK Building Regulations 2008) enable the principles of the NPPF to be enforced during construction by stipulating that:

1. Adequate provision shall be made for rainwater to be carried from the roof of the building;
2. Paved areas around the building shall be so constructed as to be adequately drained;
3. Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority:
    - an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
    - a watercourse; or, where that is not reasonably practicable,
    - a sewer.

As the Environment Agency are the consenting authority for discharges to controlled waters (i.e. groundwater or main-river watercourses), SuDS will be favoured for the removal of pollutants and attenuation of discharge rates.

8.2.2 Environment Agency Policies

The Thames Catchment Flood Management Plan (Environment Agency, January 2007) also advocates policies relating to SuDS, these are:

- All sites greater than 5 hectares in size require the following:
    - SuDS,

- Greenfield discharge rates,
- Attenuation of the 1 in 100 year storm event including allowance for climate change,

- Allocated land should set-aside space for SuDS.

Volume 2, Chapter 5, provides further detailed information on the uses of SUDS in SHBC.

9. Future Flood Risk Management Practices

Current flood risk management practices within the SHBC SFRA study area have been described in Volume 2, Chapter 3. This section describes the practices that are planned for the area or methods that can be incorporated into new developments.

9.1 Flood Warnings

Ensuring people in areas of flood risk are aware of potential flooding is key to ensuring they are prepared, facilitating the protection of property and evacuation where necessary.

Flood Warning is an essential component of the strategy to reduce flood risk. The Environment Agency seeks to provide a flood warning service for areas at risk from flooding from rivers and the sea in areas where it is possible to do so. It consists of three flood warning codes – Flood Alert, Flood Warning and Severe Flood Warning that indicate the level of danger. The flood warnings are disseminated through a variety of mediums that include TV, radio, an automated voice messaging service direct to a phone/fax/pager, the Internet and/or loudhailer. There is also an emergency Floodline number (0345 988 1188) and a quick dial numbers available for the individual rivers.

Sir Michael Pitt's review[i] of the summer 2007 floods stresses the importance of developing a flood warning system for surface water flooding. One of the reports interim conclusions (IC3) was *"the Environment Agency further develops tools and techniques for predicting and modelling river flooding, especially to take account of extreme multiple events; and takes forward work to develop similar tools and techniques to model surface water flooding."*

9.2 Flood Alleviation Scheme Maintenance

The potential for flooding can be increased in areas where flood alleviation measures are not maintained regularly and/or adequately. Breaches in raised flood defences, for example, are most likely to occur where the defence has been degraded or not maintained to its design standard. Drainage systems within urban areas can also frequently become blocked with debris which, if not removed, can lead to blockages in culverts and backing up of watercourses resulting in flooding of property and infrastructure.

It is an essential aspect of flood risk management practise that all flood alleviation schemes and hydraulic structures are regularly maintained to a specified design standard. It is usually the responsibility of the riparian owner to maintain the watercourses or defences within their ownership to a suitable standard. The Lead Local Flood Authority or Environment Agency has permissive powers to act should the riparian owner not satisfy their maintenance requirements.

9.3 Flood Mitigation on site

Flood mitigation measures can also be incorporated within a development and are usually more appropriate in areas of residual flood risk. The Pitt Review (Sir Michael Pitt, 2008) recognised the importance of flood resilient and resistant techniques and came to an interim conclusion (IC11) that *"no new building should be allowed in a flood risk area that is not flood-resilient, and that Government should work with organisations such as the Royal Institute of British Architects and the building industry to encourage flood-resilient building and development design."*

The Code for Sustainable Homes (CLG, April 2010) also offers credits for developments that consider flood risk. Preference is given to sites located in low flood risk zones, commensurate with policies presented in NPPF. One credit is made available for developments in Flood Zones 2 or 3 that are appropriately flood resilient and resistant.

Similar to the code for sustainable homes there is also a guide for Non-Domestic Buildings (CLG, 2011). One credit is made available for developments in Flood Zone 2 or 3 and 2 credits are available for developments in Flood Zone 1.

When including flood avoidance (which should always be the first consideration through application of the Sequential Test) flood risk mitigation measures that can be employed on individual sites can be split into three categories:

- Flood Avoidance
- Flood Resistance
- Flood Resilience

9.3.1 Flood Avoidance

This is defined as: *'Constructing a building and its surrounds (at site level) in such a way to avoid it being flooded (e.g. by raising it above the flood level, re-sitting outside flood risk area etc.)'.*

These are used to restrict the pathway between the flooding source and the receptor. The preferential option is to locate the building outside a flood risk area through rearranging the site layout if possible, alternatives within this category could include a permanent or temporary defence such as raised kerbs to contain and route flood water through a site or allow for the provision of demountable barriers.

9.3.2 Flood Resistance

This is defined as 'Constructing *a building in such a way to prevent floodwater entering a building and damaging its fabric'.*

Floodwaters will enter buildings through the weakest points in the construction which may be through brickwork, under party walls of terraced or semi-detached buildings, along expansion joints between walls where different construction materials meet, and through open spaces such as air bricks, vents and door thresholds. Seepage from below ground should also be considered where longer term flooding occurs where surrounding pressure can force water through floors and basements and/or into sanitary appliances from backflow of surcharged drainage systems. Service ducts and the services themselves may also be subjected to surface water ingress.

Flood resistance techniques can be employed on buildings. These include raising the finished floor levels 300mm above any potential flood level including an allowance for climate change; and the use of appropriate materials that can withstand periodic flooding. Materials suitable for use in construction for areas subject to flood will be of low permeability but they are likely to be effective only for short duration flood events and for low flooding depths (less than 0.3 m). Some materials may be more effective when used in conjunction with other flood resilience techniques for predicted flood levels above 0.3 m.

9.3.3 Flood Resilience / Repairable

This is defined as: *'Constructing a building in such a way that although floodwater may enter the building its impact is reduced (i.e. no permanent damage is caused, structural integrity is maintained and drying and cleaning is facilitated)'.*

Flood resilience techniques are also employed on buildings within the floodplain. This type of approach is often more appropriate when the predicted depth of flooding is greater than 0.3 m or

flooding is expected to last for a long time. In these cases the use of more durable materials that will not be easily damaged by floodwaters, as well as the use of construction materials that are more effective at draining and drying, are recommended.

There is currently no guidance within the UK Building Regulations for appropriate means of construction for properties in flood risk areas. For more information on flood resistant construction refer to the Communities and Local Government publication 'Improving the Flood Performance of New Buildings: Flood Resilient Construction' (May, 2007).

10. SFRA Maintenance and Management

10.1 Data Collection

An objective of this Level 1 SFRA is to collate and review the information available relating to flooding in the study area and present this in a manner that allows SHBC to apply the Sequential Test.

This section describes the data collection process, and presents the available data. A comprehensive record of all the available data collected through the production of the Level 1 SFRA is presented in a document register in Appendix A. All of the data was registered on receipt and reviewed to assess its contribution to the Level 1 SFRA.

The information presented in this Level 1 report should not be considered as an exhaustive list of all available flood related data for the study area. The Level 1 SFRA report is a presentation of the data collected following consultation with and input from the partnering local authorities and agencies within the timeframe available.

The Level 1 SFRA assessment methodology is based on using available existing information and data where suitable. As a result, there has been no new investigation undertaken for this Level 1 SFRA.

10.1.1 Stakeholders

The information used in this SFRA has been sourced from a variety of stakeholders including:-

- Surrey Heath Borough Council - Local Planning Authority and Land Drainage Authority
- Surrey County Council - Lead Local Flood Authority
- Environment Agency - West Thames Area
- Basingstoke Canal Authority
- Thames Water - owners of all public surface water and foul water sewers in the study area
- British Geological Survey – Geological data used to derive SUDS suitability maps and susceptibility to groundwater data set

It is recommended that during future iterations of the SFRA, the above organisations are contacted to ensure that the most up-to-date records are included in the SFRA.

10.2 Data Processing

The following data processing was undertaken during the development of the SFRA:

- GIS layers were compiled to represent Environment Agency and SHBC data and information from reports and records of flooding across the borough.
- Maps and figures were produced using map templates designed for the SFRA report.
- Analysis to identify areas where additional development may significantly increase flood risk elsewhere was carried out using rolling ball analysis, evaluating topographic to establish catchment boundaries.

10.3 Data Ownership

The datasets obtained for use in the SFRA have come from a number of sources, as outlined in Appendix A, under licence agreement. These datasets cannot be passed to external sources without permission from the owner and those requiring the data should ensure that they possess the appropriate copyrights and access. SHBC should be aware of the IPR they possess so that they only issue data that is contractually appropriate. Datasets produced during the SFRA are owned by Surrey Heath Borough Council and can be passed to external parties at their discretion. Other datasets are the property of the EA and should not be released by SHBC.

10.4 SFRA Data Management System

The data management strategy developed for the SFRA is designed to account for likelihood that external parties will seek to make use of the information within the SFRA in preparing flood risk assessments and assessing sites. The SFRA is also a "live" document, and as such it is necessary to ensure at regular intervals in the future that the information within it remains valid.

The final deliverables of the SFRA are delivered in two forms:

- Digital copies of the SFRA reports – the SFRA contents are divided into several volumes and chapters to allow easier update during future iterations.
- Electronic datasets including:
    - Raw GIS data - SFRA flood outlines and additional GIS data layers used to produce the SFRA maps and figures. Some of these were obtained under licence from the Environment Agency. All data is provided in a format compatible with Surrey Heath Borough Councils existing corporate GIS infrastructure.
    - Electronic document management system - PDF versions of all maps and reports produced during the SFRA

It is recommended that the following maintenance checks be undertaken on a regular basis and if necessary meetings arranged with the relevant organisations:

1. Has any flooding been observed within the Borough since the previous review?

If Yes

- What was the mapped extent of the flooding?
- On what date did the flooding occur?
- What was the perceived cause of the flooding?
- If possible, what was the indicative statistical probability of the observed flooding event? (I.e. how often, on average, would an event of that magnitude be observed within the District?)
- If the flooding was caused by overtopping of the riverbanks, are the observed flood extents situated outside of the current Zone 3a? If it is estimated that the frequency of flooding does not exceed, on average, once in every 100 years then the flooded areas (from the river) should be incorporated into Zone 3a to inform future planning decision making.

2. Have any amendments to NPPF or the Practice Guidance been released since the previous review? Does the revision to the policy guidance alter the definition of the Flood Zones presented within the SFRA?

If Yes

- Does the revision to the policy guidance alter the decision making process required to satisfy the Sequential Test?
- Does the revision to the policy guidance alter the application of the Exception Test?
- Does the revision to the policy guidance alter the categorisation of land use vulnerability, presented within the NPPG, 2014?

3. Has the implementation of the SFRA within the spatial planning and/or development control functions of the Council raised any particular issues or concerns that need to be reviewed as part of the SFRA process?

If Yes – Consider updating the SFRA

4. Has the Environment Agency issued any amendments to their flood risk mapping and/or standing guidance since the previous policy review?

If Yes

- Has any further detailed flood risk mapping been completed within the District, resulting in a change to the 20 year, 100 year or 1000 year flood outline? If yes, then the Zone 3b and Zone 3a flood outlines should be updated accordingly.
- Has the assessment of the impacts that climate change may have upon rainfall and/or river flows over time altered? If yes, then a review of the impacts that climate change may have upon the borough is required.
- Do the development control recommendations provided in Section 9 of the SFRA in any way contradict emerging EA advice with respect to (for example) the provision of emergency access, the setting of floor levels and the integration of sustainable drainage techniques? If yes, then a discussion with the EA is required to ensure an agreed suite of development control requirements are in place.
- Have any new/updated surface water or other sources of flooding maps been produced and published?

Whilst all datasets should be checked for updates and key organisations contacted,

Table **10-1** contains a list of datasets that are likely to be updated regularly.

Table 10-1: Datasets that are known to be updated regularly

Dataset	Owner	Update Frequency
Flood Zones	Environment Agency	Updated quarterly
Catchment Flood Management Plans	Environment Agency	Updated every five years
National Flood and Coastal Defence Database (NFCDD)	Environment Agency	Ongoing updates
Historic flood incidents	Environment Agency, Water companies, Fire Brigade, Highways Dept, SHBC	Unknown

10.4.1 Incorporating New Datasets

The following tasks should be undertaken when including new datasets in the SHBC SFRA:

- Identify new dataset.
- Save new dataset/information.
- Record new information in log so that the next update can review this information.

10.4.2 Updating SFRA reports and Figures

Volume 2 provides a record of all of the technical analyses used to develop the Surrey Heath Borough SFRA. In recognition that the SFRA will be updated in the future, the report has been structured in chapters according to the sources of flooding investigated. By structuring the report in this way, it is possible to undertake further analyses on a particular source of flooding and only have to supersede the relevant chapter, whilst keeping the remaining chapters unaffected.

In keeping with this principle, the following tasks should be undertaken when updating SFRA reports and figures:

- Undertake further analyses as required after SFRA review
- Document all new technical analyses by rewriting and replacing relevant Volume 2 chapter/s.
- Amend and replace relevant SFRA Maps in Volume 3.
- Review and if required, amend Chapter 1 of Volume 1.
- Reissue to departments within Surrey Heath Borough Council and other stakeholders.

11. Conclusions and Recommendations

11.1 Summary of Flood Risk in Surrey Heath

A summary of flood risk from all sources across the Borough have been identified throughout Volume 2 of this SFRA. A summary of this information is present in Table 11-1 below.

Table 11-1 – Summary of flood risk from all sources of flooding

Type of Flood Risk	Summary	Further information
Fluvial	The EA Flood Maps for Planning, Historic Flood incidents and detailed modelling outlines were used to evaluate fluvial flood risk across the Borough. Fluvial flood risk is concentrated along the river valleys In the Bourne catchments, floodplains are wide, with large areas at risk, however much of this land is undeveloped. The floodplains of the Blackwater River are more developed, with some areas at medium to high risk.	Volume 2, Chapter 4 Volume 3, Figure 4, 5, 6 & 7
Surface Water	The UFMfSW has been used to assess surface water flood risk across SHBC as there are very limited details on recorded incidents. Similarly to the fluvial extents, large undeveloped floodplains are shown as at medium risk of surface water flooding.	Volume 2, Chapter 5 Volume 3, Figure 8, 9 & 10
Sewers	The developed areas of Camberley, have experienced numerous sewer flooding incidents; the denser public drainage networks increase the probability of sewer flood incidents.	Volume 2, Chapter 7 Volume 3, Figure 11
Groundwater	Most of the study area is at low risk of groundwater flooding due to the underlying sandstone geology. There is elevated flood risk from groundwater close to river valleys	Volume 2, Chapter 8 Volume 3, Figure 12
Artificial Sources	Flood risk from the Basingstoke Canal can occur through failure of the embankments at Frimley Lodge Park and cause flooding to the highway at Sturt Road, Frimley Green. Due to the low probability of occurrence, flood risk from reservoirs is considered low along the Blackwater River.	Volume 2, Chapter 9 Volume 3, Figure 13

11.2 Policy Recommendations

The SFRA makes the following recommendations, outlined in Table 11-2, which should be considered when developing policies and using the SFRA. The recommendations have been divided into categories associated with each type of flood risk. The organisations likely to be involved in implementing the recommendations have been identified also. The emerging Surrey Heath Local Plan and other users of the SFRA need to take into consideration the recommendations within this SFRA. It

is important to recognise that the allocation of future developments can impact flood risk and should be managed carefully. Tables 11-2 to 11-7 detail the specific recommendations for Surrey Heath Borough Council as a result of this SFRA study.

Table 11-2 – Key Policy Recommendations

	Recommendation	Organisation
1	On watercourses that have not been included within detailed river models, and as such do not have a defined Flood Zone 3b. That is 'all areas within Flood Zone 3 should be considered Flood Zone 3b (Functional Floodplain) unless or until, an appropriate FRA shows to the satisfaction of the EA that it can be considered as falling within Flood Zone 3a (High Probability).	SHBC EA Developer
2	It is recommended that policies are developed such that development must not increase flood risk from all sources in the surrounding area.	SHBC
3	It is recommended that SHBC liaise with Hart DC, Rushmoor BC and Guildford BC regarding development policies in their boroughs, to ensure flood risk is not increased along the Blackwater Valley.	SHBC HDC RBC GBC
4	It is recommended that SHBC liaise with local authorities that cover the Blackwater River and Addlestone Bourne catchments to ensure that flood risk is not increased within the whole of the catchments and management strategies are consistent.	SHBC WBC HDC RBC
5	It is recommended that information on all sources of flooding continues to be collected and where possible more resources are invested in documenting flooding incidents and determining the source of flooding	SHBC Land owners
6	Due to limitations and lack of information available on other sources of flooding; and in some cases the local nature of problems it is recommended that these issues are considered in detail on a site by site basis.	SHBC Land owners EA

Table 11-3 – Recommendations for Managing River Flooding

	Recommendation	Organisation
1	Results of updated hydraulic modelling and hydrological studies should be incorporated into future updates of the SFRA	SHBC EA
2	Where limitations in data or the scale of assessment have been identified, information should be improved through more detailed study. Where modelling is carried out as part of an FRA, results should be captured by SHBC to inform the SFRA.	SHBC EA Developers
3	Following completion of the Chobham Flood Alleviation Scheme design (c. 2016), developers will need to consider the potential changes in flood zone classification.	SHBC EA

Table 11-4 – Recommendations for Managing Surface Water Flooding

	Recommendation	Organisation
1	Policies should be developed to ensure that appropriate surface water management and mitigation is provided for developments. Where possible, surface water runoff rates	SHBC SCC

	should be reduced to Greenfield run off rates.	
2	SHBC should engage in its responsibility to promote and deliver the use of SuDS within new and re- developments.	SHBC
3	SHBC should use Volume 3, Figure 10 in the development of surface water management policies, to reduce surface water runoff from developments in the upstream generating catchments and manage flooding in the downstream receiving catchments.	SHBC
4	SHBC should use the information in Volume 3, Figure 10 as a starting point for the production of Surface Water Management Plans across Surrey Heath. The purpose of a SWMP is to improve understanding of local flood risk, develop flood mitigation solutions and justify their construction via a variety of funding sources. SWMPs should be prioritised in areas with known local flood risk issues and / or areas where significant future development is proposed.	SHBC

Table 11-5 – Recommendations for Managing Groundwater Flooding

	Recommendation	Organisation
1	It is recommended that a policy is developed regarding areas at risk of groundwater flooding taking into consideration the limitations of the assessment made in the SFRA and available data. It may be appropriate for FRAs to complete more detailed groundwater analysis, given the localised nature of this source of flooding.	SHBC Developer

Table 11-6 – Recommendations for Managing Flooding From Artifiicial Sources

	Recommendation	Organisation
1	It is recommended that the council consult with the Environment Agency and the Basingstoke Canal Authority to agree policies for development at risk from canal breach, this may include agreeing raised floor levels, or developing evacuation plans	SHBC EA BCA
2	It is recommended that FRAs for developments at risk of flooding from breach of the canal consider this in their assessment.	SHBC Developers
3	It is recommended that the council consult with the Environment Agency to agree appropriate policies for development adjacent to artificial water bodies where there is a risk of flooding	SHBC EA BCA
4	It is recommended that SHBC liaise with the owners of reservoirs and lakes both up and down stream of the catchment (including the Cove Brook FAS) to ensure they are managed appropriately to minimise flood risk within Surrey Heath.	SHBC RBC MOD

Table 11-7 – Recommendations for Managing the Maintenance of the SFRA

	Maintenance and Management of the SFRA	Organisation
1	It is recommended that the SFRA is updated to ensure it remains a robust and current document. Therefore it is	SHBC

	further recommended the SFRA Management and Maintenance strategy is adopted.	
2	Information from site level FRAs will be submitted to the council, and the Environment Agency shall be consulted as per the statutory requirement, as part of the development control process and this information should be used to inform the SFRA in the future.	Developers EA SHBC
3	It is likely that the council will receive multiple requests for copies of the SFRA, it is therefore recommended that the SFRA is made available for viewing and download through the council webpage.	SHBC
4	It is important the liaison is maintained between the LPA, LLFA, Thames Water, the Environment Agency, Highways Agency, and other stakeholders to work towards sustainable management of flood risk now and in the future.	SHBC SCC TW EA HA

References

- National Planning Policy Framework. Department for Communities and Local Government (March 2012)
- Planning Practice Guidance: Flood Risk and Coastal Change. Department for Communities and Local Government (April 2015)
- Thames Catchment Flood Management Plan: Summary Report. Consultation Environment Agency, Bristol (December 2009)
- Surrey County Council Preliminary Flood Risk Assessment (June 2011)
- Surrey County Council Local Flood Risk Management Strategy (2012)
- River Blackwater Flood Study Final Flood Mapping report. Peter Brett Associates (August 2007)
- Blackwater Tributaries Flood Risk Mapping Study, Environment Agency (2012)
- River Wey Flood Mapping Study. Atkins (February, 2006)
- Living with Environmental Change. study led by NERC (2013)
- Living on the Edge, Environment Agency (2014)
- Strategic Environmental Assessment and Sustainability Appraisals for Local Plans, PPG, 2014
- Designing for Exceedance in Urban Drainage – good practice (C635). CIRIA (May 2006)
- Planning for SuDS – making it happen (C687). CIRIA (December 2010)
- The SUDS Manual (C697D). CIRIA (March 2007)
- Site Handbook for the Construction of SuDS (C698D). CIRIA (February 2007)
- Guidance on the Permeable Surfacing of Front Gardens. Department for Communities and Local Government (May 2009)
- Promoting Sustainable Drainage Systems: Design Guidance for Islington. Robert Bray Associates Ltd, Islington Borough (March 2012)
- Sustainable Drainage Systems (SuDS) – an introduction. Environment Agency (May 2003)
- Floods Review. Sir Michael Pitt (2008) (http://www.cabinetoffice.gov.uk/thepittreview.aspx)
- Flood Risk Standing Advice (March 2014) for local Planning Authorities (https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities)

12. Glossary

Term	Definition
Alluvium	Sediments deposited by fluvial processes / flowing water
Annual Exceedance Probability (AEP)	The probability of an event occurring within any one given year.
Attenuation	In the context of this report - the storing of water to reduce peak discharge of water
Aquifer	A source of groundwater comprising water-bearing rock, sand or gravel capable of yielding significant quantities of water.
Breach	An opening – For example in the sea defences
Brownfield	Previously developed land, usually of industrial land use within inner city areas.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Culvert/culverted	A channel or pipe that carries water below the level of the ground.
Drift Geology	Sediments deposited by the action of ice and glacial processes
EA Flood Zone 1	Low probability of flooding. Probability of flooding is less than 1 in 1000/ 0.1 % AEP.
EA Flood Zone 2	Medium probability of flooding. Probability of fluvial flooding is 0.1 – 1% (1 in 100 to 1 in 1000). Probability of tidal flooding is 0.1 – 0.5 % (1 in 200 to 1 in 1000).
EA Flood Zone 3a	High probability of flooding. Probability of fluvial flooding is 1% (1 in 100 years) or greater. Probability of tidal flooding is 0.5% (1 in 200 years).
EA Flood Zone 3b	Functional floodplain
Estuary	A tidal basin , where a river meets the sea, characterised by wide inlets
Exception Test	The exception test should be applied following the application of the Sequential Test. Conditions need to be met before the exception test can be applied.
Flood defence	Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Floodplain	Area adjacent to river, coast or estuary that is naturally susceptible to flooding.
Flood Resilience	Resistance strategies aimed at flood protection
Flood Risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption)
Flood Risk Assessment	Considerations of the flood risks inherent in a project, leading to the development actions to control, mitigate or accept them.
Flood storage	A temporary area that stores excess runoff or river flow often ponds or reservoirs.
Flood Zone	The extent of how far flood waters are expected to reach.
Fluvial	Relating to the actions, processes and behaviour of a water course (river or stream)
Fluvial flooding	Flooding by a river or a watercourse.
Freeboard	Height of flood defence crest level (or building level) above designed water level
Functional Floodplain	Land where water has to flow or be stored in times of flood.
Freeboard	Height of the flood defence crest level (or building level) above designed water level.
GIS	Geographic Information System – A mapping system that uses computers to store, manipulate, analyse and display data
Greenfield	Previously undeveloped land.
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
Highly Vulnerable Developments	Developments where the consequence of flooding is greatest.
Hydraulic Modelling	A computerised model of a watercourse and floodplain to simulate water flows in rivers too estimate water levels and flood extents.
Hydrodynamic Modelling	The behaviour of water in terms of its velocity, depth and hazard that it presents. Infiltration The penetration of water through the grounds surface.
Infrastructure	Physical structures that form the foundation for development. Inundation Flooding.
LiDAR	Light Detection And Ranging – uses airborne scanning laser to map the terrain of the land.

Local Development Framework (LDF)	The core of the updated planning system (introduced by the Planning and Compulsory Purchase Act 2004). The LDF comprises the Local Development Documents, including the development plan documents that expand on policies and provide greater detail. The development plan includes a core strategy, site allocations and a proposals map.
Local Planning Authority	Body that is responsible for controlling planning and development through the planning system.
Main River	Watercourse defined on a 'Main River Map' designated by DEFRA. The environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
Ordinary Watercourse	An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, but which does not form part of a main river.
Overland Flow	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
Overtopping	Water carried over the top of a defence structure due to the wave height exceeding the crest height of the defence.
Reach/ Upper reach	A river or stream segment of specific length. The upper reach refers to the upstream section of a river.
Residual Flood Risk	The remaining flood risk after risk reduction measures have been taken into account.
Return Period	The average time period between rainfall or flood events with the same intensity and effect.
Risk	The probability or likelihood of an event occurring.
River Catchment	The areas drained by a river
SAR	Synthetic Aperture Radar - a high resolution ground mapping technique, which uses reflected radar pulses.
Sequential Test	Aims to steer development to areas of lowest flood risk.
Sewer flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Solid Geology	Solid rock that underlies loose material and superficial deposits on the earth's surface
Source Protection Zone	Defined areas in which certain types of development are restricted to ensure that groundwater sources remain free from contaminants.
Standard of Protection	The flood event return period above which significant damage and possible failure of the flood defences could occur.
Storm surge	A high rise in sea level due to the winds of the storm and low atmospheric pressure.
Sustainability	To preserve /maintain a state or process for future generations.
Sustainable drainage system	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations meeting their own needs
Tidal	Relating to the actions or processes caused by tides.
Topographic survey	A survey of ground levels.
Tributary	A body of water, flowing into a larger body of water, such as a smaller stream joining a larger stream.
UFMfSW	Updated Flood map for Surface Water. This is a GIS dataset showing the areas susceptible to surface water flooding, developed using broadscale JFLOW+ modelling. The data set was released in 2014.
Water Framework Directive	A European Union Directive 2000/60/EC which commits European Union member states to achieve good qualitative and quantative status of all water bodies including marine waters).
1 in 100 year event	Event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year.
1 in 100 year design standard	Flood defence that is designed for an event, which has an annual probability of 1%. In events more severe than this the defence would be expected to fail or to allow flooding.

Appendix A – Data Register

Data		Description	Date Provided	Owner / Author
Hydraulic Models and Reports	Addlestone / Hale Bourne Flood Mapping Study	Study undertaken by Mott Macdonald for the Environment Agency in 2007. Package includes hydrology report, modelling report, figures, appendices and extents.	January 2015	Environment Agency
	River Blackwater Flood Mapping Study	Study undertaken by PBA for the Environment Agency in 2007. Package includes final report, figures, appendices and extents.	January 2015	Environment Agency
	Blackwater Tributaries Flood Risk Mapping Study	Study undertaken by JBA Consulting for the Environment Agency in 2012. Package Includes final report, appendices and extents.	January 2015	Environment Agency
	Chobham Flood Alleviation Scheme Strategy Report	Report completed by National Rivers Authority, identifying critical areas.	January 2015	Environment Agency
Flood Alleviation Schemes		Existing and proposed flood alleviation schemes through Surrey Heath.	January 2015	Environment Agency & SHBC
Historic Property Flooding Incidents		Flooded property database identifying location, date and source where possible.	February 2015	Environment Agency & SHBC
Reservoir Flood Outline		GIS outlines showing the extent of flooding in case of reservoir breach.	February 2015	Environment Agency
Thames Catchment Flood Management Plan (CFMP)		Composed by the Environment Agency in December 2009, outlines flood risk and subsequent management strategies across the West Thames catchment.	February 2015	Environment Agency
Groundwater Level Data		Level data for seven sites across the Woking and Surrey Heath Boroughs.	February 2015	Environment Agency
Asset Data		Package includes AIMS defences and structures, recorded asset failures and maintenance of the watercourse.	February 2015	Environment Agency & SHBC
Historic Flood Events		GIS outlines showing recorded	January	Environment

	outlines and proposed sources.	2015	Agency & SHBC
Flood Risk presented by Groundwater*	GIS outline of EA dataset Areas that are susceptible to groundwater flooding.	February 2015	Surrey Heath Borough Council
Watercourses (EA Main River) *	Watercourses GIS layer, line data at 1:10000 scale.	March 2015	Surrey Heath Borough Council
Detailed River Network*	Minor watercourses recorded as line data in GIS layer.	February 2015	Surrey Heath Borough Council
Flood Warning and Alert*	GIS outlines of Flood Warning Areas and Flood Alert Areas.	February 2015	Surrey Heath Borough Council
Flood Map*	GIS outlines of Flood Zone 2, Flood Zone 3, Defences, and Areas Benefitting From Defences.	February 2015	Surrey Heath Borough Council
Groundwater Vulnerability*	GIS outline of groundwater vulnerability.	February 2015	Surrey Heath Borough Council
Historic Flood Map*	GIS outlines showing recorded outlines, with temporal information, and the updated Historic Flood Map.	February 2015	Surrey Heath Borough Council
Topographic Data	IFSAR dataset, raster format.	February 2015	Surrey Heath Borough Council
Flood Risk presented by Surface Water*	GIS dataset of Updated Flood Map for Surface Water (Basic).	February 2015	Surrey Heath Borough Council
Mapping	OS Mapping GIS file (50k and 250k).	January 2015	Surrey Heath Borough Council
Surrey Heath Local Plan	Public report outlining the strategies and policies concerning future development in the Surrey Heath Borough.	January 2015	Surrey Heath Borough Website
Key susceptible infrastructure	GIS dataset presenting the Flood Resilience Road Network.	January 2015	Surrey County Council
Flood Risk Improvement Schemes	Proposed Capital Highway Drainage Schemes within the borough for the next five years.	January 2015	Surrey County Council & SHBC
Flood Incidents	Property flooding database, and wetspot and historical flooding information provided in GIS format.	January 2015	Surrey County Council & SHBC
Previous SFRA	Woking and Surrey Heath SFRA, Surrey Heath (Bourne) SFRA.	January 2015	Held on file from previous commission

Sewer Flooding Information	DG5 Extract for Surrey Heath Borough.	February 2015	Thames Water
*Note: Data from Environment Agency Geostore database, received from SHBC			