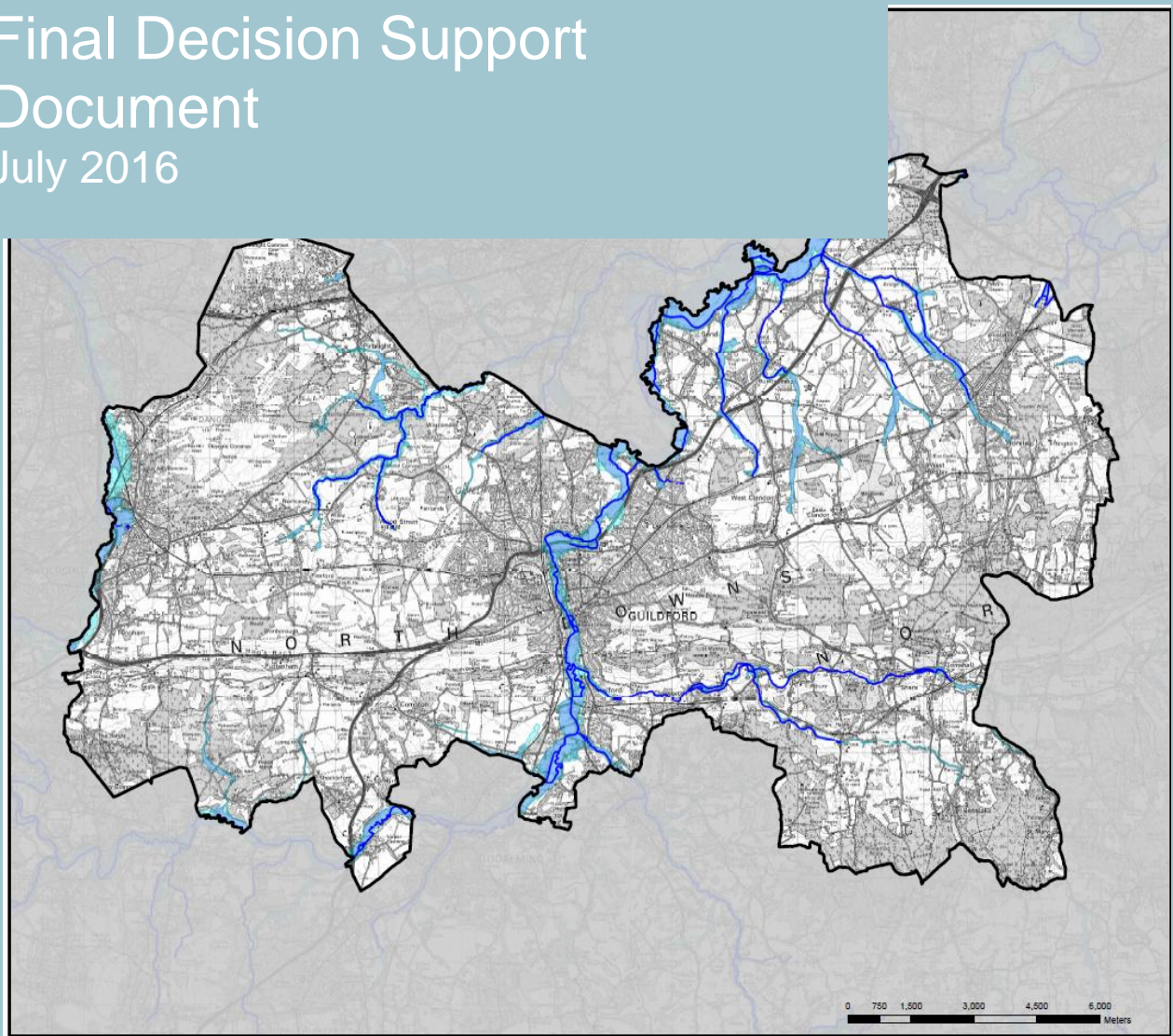






Guildford Borough
Strategic Flood Risk
Assessment
Volume 1
Final Decision Support
Document
July 2016



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Executive Summary

Guildford Borough Council (GBC) is currently producing their Local Plan and this Strategic Flood Risk Assessment (SFRA) will form a key evidence base to support the vision and approach to development over the plan period. This document has been prepared in response to the guidance in National Planning Policy Framework (NPPF) and its Planning Practice Guidance (PPG) that states that a sequential risk based approach should be applied to decision making at all levels of the planning process. The principle stages being the Local Level (this assessment) and the site level (planning applications).

The SFRA creates a strategic framework for the consideration of flood risk when making planning decisions at the Local Level.

The fundamental concepts that underpin the SFRA are outlined in the NPPF. The guidance provided in the NPPF requires local authorities and those responsible for development decisions to demonstrate that they have applied a risk based, sequential approach in preparing development plans and that they have considered flooding through the application of a Sequential Test. Failure to demonstrate that such a test has been undertaken at this level potentially leaves planning decisions and land allocations open to challenge during the planning process.

The underlying objective of the risk based sequential allocation of land is to reduce the exposure of new development to flooding and reduce the reliance on long-term maintenance of built flood defences. Within areas at risk from flooding, it is expected that development proposals will contribute to a reduction in the magnitude of the flood risk.

SFRAs are essential to enable a strategic and proactive approach to be applied to flood risk management. The assessment allows us to understand current flood risk on a wide-spatial scale and how this is likely to change in the future.

The main objectives of Guildford Borough SFRA are to provide flood information

- As the evidence base for the application of the risk based Sequential Test to support planning decisions, in line with NPPF;
- That is strategic in that it covers a wide spatial area and looks at flood risk today and in the future;
- That supports sustainability appraisals of the draft Local Plan; and
- That identifies what further investigations may be required in flood risk assessments for specific development proposals.

The SFRA is presented in a number of documents:

- VOLUME 1 – Decision Support Document (this document);
- VOLUME 2 – Technical Report; and
- VOLUME 3 – Mapping.

A short summary document has also been produced, presenting the key elements of Volumes 1 and 2.

The SFRA is a live document that is intended to be updated as new information and guidance become available. The outcomes and conclusions of the SFRA may not be valid in the event of future changes to the data or the baseline flooding situation. Decisions also require the inclusive assessment of wider planning issues and the user should be aware that changes to decision making principles affecting other planning issues can potentially affect the outcome of the risk based Sequential Test. It is the responsibility of the user to ensure they are using the best available information.

Document register

It is accepted that the technical content of Guildford Borough SFRA will need to be reviewed and amended as new information becomes available.

It is the responsibility of the reader to be satisfied that they are using the most up to date information and that this has been included within Guildford Borough SFRA.

The Guildford Borough SFRA (this document) is a live document requiring review in the event of an improvement or change in the fundamental principles or best available data underpinning the strategy.

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1. Introduction

1.1 Background

The 2009 Level 1 Strategic Flood Risk Assessment (SFRA) was carried out on behalf of GBC. The information in the 2009 Strategic Flood Risk Assessment (SFRA) was used to inform the Local Development Framework (LDF). The 2009 SFRA also provided information required to apply the Sequential Approach and Sequential Test on the Local Development Document scale. The SFRA was developed in line with the now superseded Planning Policy Statement 25 – Development and Flood Risk (PPS25) (DCLG, 2006)¹.

Capita Property and Infrastructure were commissioned in June 2014 to update the Level 1 SFRA document. This updated decision support document provides information on how to interpret Guildford Borough SFRA results to inform land use planning, flood warning and emergency planning and development control. The document also provides guidance for site-specific Flood Risk Assessment (FRA). The document requires the user to refer to technical information and flood maps contained in Volumes 2 and 3 of this SFRA.

The 2009 SFRA was largely retained however several updates and reviews were carried out. The following summarises the scope of works for this updated document:-

- Identify policy updates since 2009 in particular the introduction of National Planning Policy Framework (NPPF)² and the Planning Practice Guidance (PPG) for Flood Risk and Coastal Change³;
- Review any post 2009 flood incident data;
- Identify updates related to new datasets, including Guildford Surface Water Management Plan (SWMP), the Updated Flood Map for Surface Water (UFMfSW) and the risk from groundwater flooding; and
- Provide recommendation for general principles for flood risk management including a review of GBC Flood Risk Reduction Measures document.

The release of Planning Policy Statement 25: Development and Flood Risk in December 2006 (PPS25) (DCLG, 2006) emphasised the responsibility that Local Planning Authorities (LPAs) have to ensure that flood risk is understood and managed effectively using a risk-based approach as an integral part of the strategic planning process. PPS25 encouraged LPAs to undertake SFRA's and to use their findings and those of other studies to inform strategic land use planning. The National Planning Policy Framework (NPPF) document replaced the suite of Planning Policy Statements, including PPS25, on 27 March 2012.

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 PPG 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 3 of this document for further discussion on the introduction of NPPF and its implications for the management of flood risk.

PPG Flood Risk and Coastal Change recommends that SFRA's are completed in two consecutive stages. This provides the LPA with tools throughout the Local Plan and SFRA process sufficient to inform decisions regarding development sites. The two stages are: -

- Level 1 SFRA – Study Area Flood Source Review and Sequential Test
- Level 2 SFRA – Development Site Assessments for Exception Testing.

¹ Planning Policy Statement 25: Development and Flood Risk, March 2010.

² National Planning Policy Framework, March 2012

³ Planning Practice Guidance Flood Risk and Coastal Change, March 2014

The results of the Level 1 SFRA should enable GBC to clearly identify where development is appropriate according to NPPF and where development is necessary. A level 1 SFRA must be used to inform and shape the forthcoming local plan strategy and policies. The Level 1 SFRA should therefore enable a prompt start to the commencement of Level 2 (where required). The data review element of Level 1 also enables a robust specification and programme to be developed for a Level 2 SFRA. At the time of writing GBC is preparing a new Local Plan which will set out the vision and approach to development between now and 2031. Following completion of level 1 SFRA it is anticipated that GBC will be in a position to understand if there is a requirement to undertake a Level 2 SFRA. This will be supported by the findings of this Level 1 SFRA, which contains up to date modelling to enable a better understanding of the flood risk across the borough.

1.1.1 *Level 1 – Area Flood Source Review and Sequential Test*

A Level 1 SFRA presents sufficient information to enable the LPA to apply the Sequential Test to potential development sites and assists in identifying if application of the Exception Test will be necessary. The Level 1 SFRA also provides background information, a review of local policies, and guidance for site specific flood risk assessment and the potential for application of Sustainable Drainage Systems (SuDS). The review of policies is allied to guidance on the requirements for site-specific Flood Risk Assessments (FRAs) throughout the study area.

The outcomes from the Level 1 SFRA should be used by the LPA to identify the most suitable locations for development in line with NPPF and other planning drivers. A Level 2 SFRA will be needed if the level 1 SFRA and the sequential test shows that land outside flood risk areas cannot appropriately accommodate all the necessary development. This report presents the information generated during Level 1 of the SFRA. The Level 1 SFRA is based on existing published information held by local stakeholders..

1.1.2 *Aim of the SFRA*

The aim of Guildford Borough Level 1 SFRA is to present sufficient information in the form of a robust evidence base to enable GBC to apply the Sequential Test to all 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.

To assist GBC in understanding the flood risk posed to developments in areas at risk, a level 2 SFRA may be required to provide more detailed flood risk evidence for sites identified as potential allocations. It should present sufficient information to assist in determining if proposed developments will be safe from the risks of flooding for their lifetime.

1.2 SFRA Objectives

In keeping with guidance presented in the NPPF and its accompanying Planning Practice Guidance (PPG), the objectives of Guildford Borough Level 1 SFRA are:

1. Identify the extent of all Flood Zones;
2. Identify areas at risk of flooding from all flood sources present in the study area, providing GBC with the tools required to apply the Sequential Test;
3. Provide evidence-based report which inform GBC's Local Plan and other Development Plan Documents about managing potential flood risk which are also suitable to inform the Sustainability Appraisal of related documents;
4. Advise GBC on suitable policies to address flood risk management in a consistent manner across its administrative area;
5. Advise GBC on the requirements of site specific flood risk assessments based on local conditions and policy considerations;
6. Advise GBC on the principles, objectives and applicability of Sustainable Drainage Systems (SuDS) throughout the study area; and
7. Present information to inform GBC of the flood considerations necessary in developing and progressing flood emergency planning.

Note that the above objectives have not changed and remain the same (updated to account for policy changes) as the 2009 Level 1 SFRA. The potential impact of growth on future flood risk is a key driver for preparation of the SFRA and to provide a consistent and robust evidence base for assessment of new development.

2. Flooding In Guildford Borough

2.1 Description of Study Area

The Guildford Borough SFRA covers the whole of GBC’s administrative area, in South East England. Guildford borough is situated approximately 50 km (31 miles) southwest of London. Within the study area the principle fluvial watercourse is the River Wey and its tributaries. The study area includes the Wey Navigation, which is a combination of navigable river and manmade sections maintained by the National Trust and the Basingstoke Canal, which is managed and owned by the Basingstoke Canal Authority and used mainly by leisure boats. The River Blackwater flows along the western boundary of the study area.

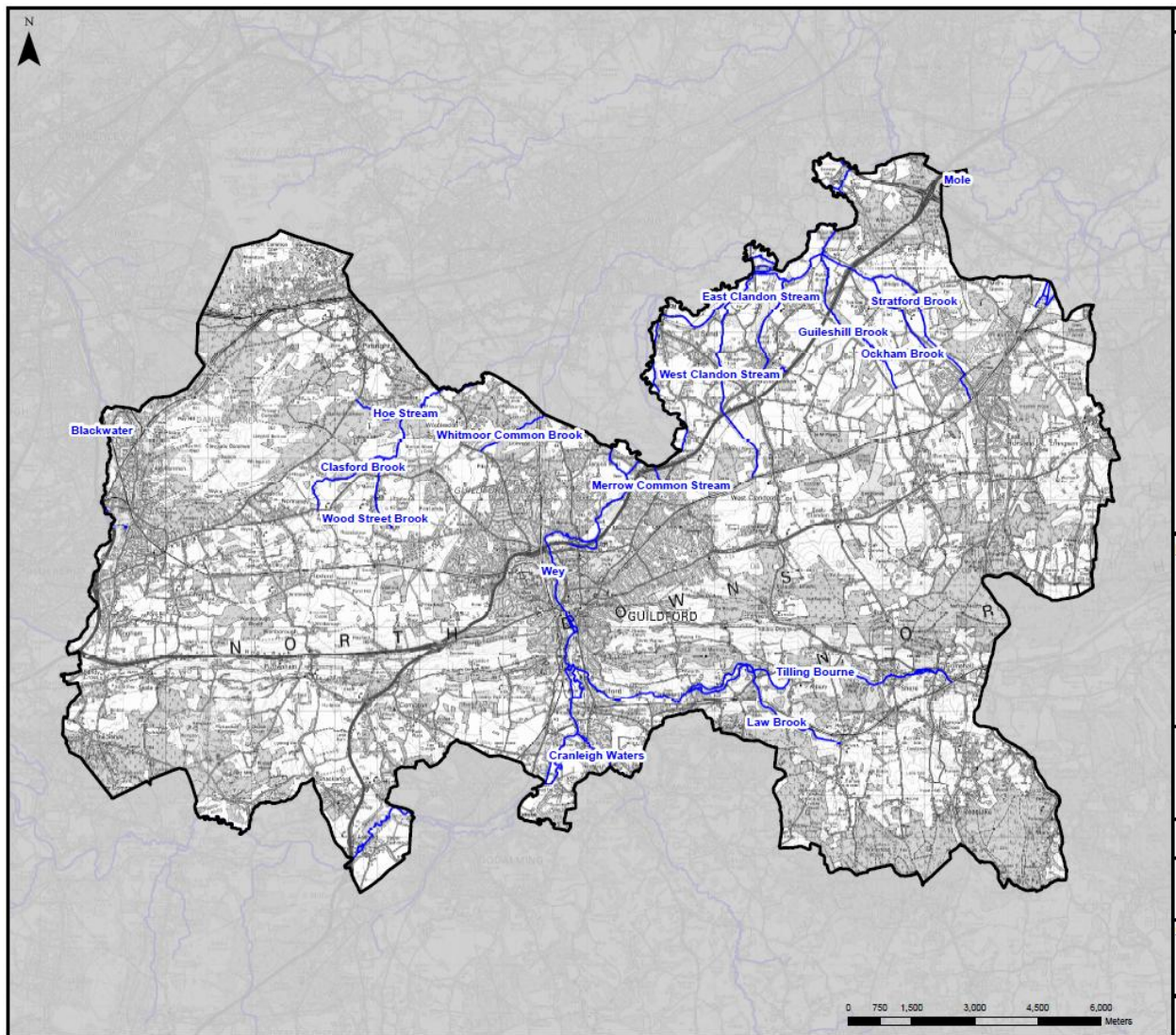


Figure 2-1: Guildford Borough Study Area

Catchment Area

The River Wey has a total catchment area of 904km², draining parts of Surrey, Hampshire and West Sussex. It joins the River Thames between Hamm Court and Whittets Ait facing a weirstream of Shepperton Lock. It is navigable from Godalming to its confluence as part of the Wey and Godalming Navigations. The main sub-tributary is the Tilling Bourne flowing from the western slopes of Leith Hill in Surrey westwards to a point just south of Guildford between the main village of Shalford and its Peasmarsh locality. Downstream the river forms the backdrop to Newark Priory and Brooklands.

The River Blackwater and its major tributaries, the Whitewater, Hart and Fleet Brook, together have a catchment area of approximately 360km². It partially marks the western boundary of Guildford Borough. The Blackwater Valley is fairly heavily urbanised. The source of the Blackwater is at Runfold just south of Aldershot, at Rowhill Nature Reserve. There are no major tributaries which join the Blackwater within the study area.

Topography / Geology

The topography is quite variable to the south of the study area where the edges of the South Downs are located. Notable areas of higher ground such as the topographic ridge of the Hogs Back can be found in the north the study area. Through this landscape the River Wey and the Blackwater have cut south-north valleys which are well defined topographically and especially on the River Wey the river floodplain is well developed.

In the Wey Valley the meandering floodplain increases in width as it moves northwards. Generally the floodplain reduces in width where the river flows through the urban areas. Upstream, in Guildford the floodplain is approximately 250m wide.

The geology of Guildford borough is characterised by three main rock types, Lower Greensand formation in the south, typically sandstone of varying character and Weald Clay to the far south east corner. Overlying the Greensand is a thin band of Chalk which runs east-west through the study area. To the north of this the geology is dominated by the London Clay. The Chalk and the Greensand are relatively permeable rock types which are the most likely to be a source of groundwater flooding. The London Clay is very impermeable and water is unlikely to soak into the ground easily in areas underlain by London (or Weald) clay. To the west towards the river Blackwater, the catchment geology mainly consists of Bracklesham Beds sandstone (which overlie the Bagshot Beds), overlaid by patches of Barton Sand in Farnborough and Aldershot.

In both the Wey and the Blackwater Valleys there are significant deposits of geologically recent river gravels which may have locally perched water tables within them.

Overland Flow

Areas of steep ground have the potential to generate runoff which can present a flood source. The steep topography in parts of the study area may present a flood source to areas down slope of them.

Artificial Sources

Artificial sources include reservoirs, canals and lakes where water is retained above natural ground level and operational and redundant industrial processes including mining, quarrying and sand and gravel extraction. Guildford borough is at risk of flooding from three reservoirs based on the reservoir inundation maps as shown in Figure 9 in Volume 3. However, only one reservoir - the Clandon Park reservoir - is located within Guildford borough boundary. The Vachery Pond, located south of Guildford, owned by Cook, the Sutton Place Lake owned by Knight Frank and the Clandon Park owned by Onslow both located north of Guildford.

2.2 Sources of Flooding

SFRA's are used to refine information on areas that may flood, taking into account flooding from rivers and all other sources of flooding and the impacts of climate change, in addition to information on the Flood Map (NPPF, 2012). Volume 2 of this SFRA is a technical assessment of the risk in Guildford borough which seeks to meet all three objectives of a SFRA as summarised above.

The primary source of flooding within Guildford borough is from fluvial (river) flooding from the River Wey and its tributaries. The main tributaries of the River Wey are the Tillingbourne and Cranleigh Water. The River Blackwater is a source of fluvial flooding within Guildford borough. There are no formal flood defences within the Study Area, however there are isolated flood relief facilities including flood relief channels and culverts. The majority of flooding within the study area is limited to open space and rural or semi-rural areas. A few developed areas are at high risk from flooding, notably areas of Guildford town centre on both banks of the River Wey, parts of Ash within the

Blackwater Valley and some properties in villages along the Tillingbourne. Climate change is expected to cause an increase in peak river flows over the next 50-100 years, and may result in some areas being at greater risk of flooding in the future. The Environment Agency (EA) Flood Zones indicate that parts of the study area lie within flood zone 2 and 3. These areas have a “medium” or “high” risk of flooding from the rivers, particularly within Guildford urban area. This SFRA provides detail on the distribution of risk within these zones.

Although river flooding poses the greatest risk within the study area, surface water flooding, groundwater flooding and flooding from land drainage systems and sewers can also be locally significant. The risk of flooding from other sources than rivers have been considered in the SFRA, these include groundwater flooding, surface water flooding, flooding from sewers and artificial sources, (including from a breach in the Basingstoke Canal embankment).

Groundwater flooding occurred in 2000 around the area of Stoke Park, and in this area springs have reappeared indicating that groundwater flooding is a risk in some parts of Guildford borough, particularly those located on the Chalk or Greensand.

With regard to surface water flooding, a large proportion of the study area is currently undeveloped and so in those areas the surface water runoff is unchanged from Greenfield rates. Any development has the potential to increase surface water flooding if runoff is not managed correctly. In the most intensively urbanised areas (Guildford town and surrounding urban area, and Ash), there is a higher potential for increased surface water flood risk following development. Sewer flooding is known to occur within Guildford borough; DG5 records of sewer flooding information were made available from Thames Water. Flooding from the Basingstoke Canal is considered a possibility in the event of an embankment failure or breach. All sources of flooding are discussed in Volume 2 of this SFRA.

2.3 Historic flooding

Guildford town is built around the River Wey and a number of significant floods have occurred throughout its history. Large floods have occurred in the following years; 1900, 1928, 1968, 2000 and 2006, 2007, 2012, 2013 and 2014. In the last 15 years, 146 flood incidents of commercial and residential flooding within Guildford borough have been reported to the Environment Agency. It is thought that many more incidents have occurred but were not reported or recorded.

The largest recorded event was for the 1968 flood, during which widespread flooding was documented. The second largest event was during the October and November 2000 floods. During this event, flooding occurred within the study area including within Guildford urban area.

2.4 Probability of flooding

The probability of fluvial (river) flooding is described in this SFRA using the Annual Exceedance Probability (AEP). This is sometimes known as the ‘annual probability’ of flooding. A flood event described as a 1% AEP has a 1% (or 1 in 100) chance of occurring in any given year.

The assessment of risk from fluvial sources in this SFRA is focussed on three different probability flood events summarised below in Table 2.1.

Table 2-1: Fluvial flood events considered in this SFRA

Annual Exceedance Probability (AEP) of flood event	Return Period of flood event	Use in this assessment
5% AEP	1 in 20 years	This has been used as a starting point in determining the extent of Flood Zone 3b*, the functional floodplain.
1% AEP	1 in 100 years	Used in the assessment of the risk of fluvial flooding for the River Wey (including the Tillingbourne and Cranleigh Waters) and the Blackwater.
1% plus Climate Change	1 in 100 years plus a 20% increase in flows	Used for assessing the future fluvial flood risk across the borough in respect to climate change.
0.1% AEP	1 in 1,000 years	Used in the assessment of the risk of fluvial flooding for the River Wey (including the Tillingbourne and Cranleigh Waters) and the Blackwater.

*This has also been divided into a developed and undeveloped flood zone 3b, as described in section 2.6.

2.5 Flood Risk Maps

Two principal sets of flood risk maps showing river flooding are included in this SFRA. It is important to understand the differences between the two sets of maps. Firstly, Volume 3 Figure Series 3-X contains the “Environment Agency Flood Zone Maps”. The EA Flood Zone Maps provide a broad indication of areas that may be at risk of fluvial flooding. The Flood Zone Maps are provided to Local Authorities by the EA, are updated on a regular basis, and provide a good starting point for the assessment of flood risk. The Flood Zone Maps show areas that may be within the 1 in 100 year and 1 in 1000 year return period fluvial flood extents. They do not take account of any flood defences (in any case unimportant in Guildford borough as there are no formal flood defences), they do not consider the impacts of climate change and they do not sub-divide Flood Zone 3 (the high risk zone based on the 1 in 100 year return period floodplain) into Flood Zones 3a and 3b (the Functional Floodplain) as this breakdown is set by the local council and planning authorities and should be based on local appropriate evidence. Consequently the definition of flood zone 3b may vary from borough to borough.

The second set of fluvial flood risk maps, contained in the SFRA, can be found within Volume 3 Figure Series 5A-X and are titled “Fluvial Flood Risk - Depth”. These maps are based on detailed river modelling and do consider the impacts of climate change, the influence of flood defences and assets (negligible in Guildford borough) and identify the areas defined as Functional Floodplain. This detailed information is necessary to allow the application of the Sequential Test.

Not all watercourses within the Study Area have been modelled in detail and in areas where no detailed modelling was available the EA Flood Zones data set has been used to assess flood risk. Areas where this has been necessary are primarily undeveloped or sparsely developed rural areas. The EA Flood Zones have been included on the detailed flood risk maps where more detailed modelled data was unavailable (Volume 3 Figure 5B map series).

The detailed flood mapping for Guildford borough (Volume 3 Figure 5B-map series) show significant areas of land within the 1 in 100yr Flood outline, however much of this area has remained sparsely developed or undeveloped due to the relatively well defined river valley and floodplain.

There are however some areas of moderate to high development intensity within Flood Zone 3, most notably an area through Guildford town centre. Proposals for redevelopment within these areas will require careful consideration given the potentially high risk of flooding. Flood Zone 3b has therefore been divided into developed and undeveloped zones, as discussed below in Chapter 2.6. An assessment of the risk to these areas is covered in more detail in Volume 2.

Flood Zone 2 covers a wider area than Flood Zone 3, however, is not substantially wider than Flood Zone 3. This is a result of the relatively well defined valley and floodplain, which means a large change in water levels results in only a small change in flood extent.

Although the floodplain areas within the Study Area are generally sparsely developed there are a number of key transport links within the floodplain considered at high risk of flooding. The Blackwater River floodplain affects the A331 at Ash. The floodplain of the River Wey affects the A3 at Eashing and intermittently north of Guildford to the boundary of the study area, the A281 from Shalford to central Guildford and the A248 at Peasmarsh. The impacts of flooding on transport infrastructure should be considered in emergency planning.

Accordingly it can be concluded that:

- i. Generally existing development is at limited risk of fluvial flooding within the study area;
- ii. Some key areas of development and infrastructure are at risk of flooding; and
- iii. Future development must ensure that flow paths are not diverted or obstructed and that flood risk is not increased elsewhere.

2.6 Flood Zone 3b, the Functional Floodplain

The Functional Floodplain comprises land where water has to flow or be stored in times of flood. In line with NPPF, all new development should be kept outside of the Functional Floodplain, with the exception of certain 'water compatible' land uses (e.g. recreational and conservation uses), as well as essential transport/utilities infrastructure that have no viable alternative location. The Exception Test must be passed for essential infrastructure developments to take place in this zone.

For the purpose of this SFRA, across Guildford borough, the 1 in 20 year return period flood outline is an indication of areas which may be acting as Functional Floodplain. However, some development has historically taken place within the Functional Floodplain in Guildford borough, resulting in developed and undeveloped land. Developed land constitutes the footprint of the building; it does not constitute all of the land within a site area. Surface car parks and Greenfield areas can store water in times of flood.

There are developed sites within the Functional Floodplain where redevelopment is likely to continue to be proposed through windfall developments. Following application of the sequential and exception test, a Local Plan Development Management policy may consider allowing redevelopment of developed sites in the Functional Floodplain when flood risk betterment, appropriate mitigation and risk management can be achieved and implemented. There should, however, be no increase in development vulnerability or intensification in use.

In the case of sites allocations, redevelopment of developed land within the Functional Floodplain should only be considered when there are no reasonably available alternatives at less risk of flooding, and when the sequential and exception test has been passed. In these cases, in addition to the fore-mentioned requirements, land swaps should be considered to enable a reduction in flood risk on site and elsewhere.

It should be noted that information on the 1 in 20 year floodplain could only be provided where detailed hydraulic modelling has been carried out. Where detailed modelling and the 1 in 20 year outlines are unavailable, Flood Zone 3 from the EA Flood Maps for Planning should be used to define the Functional Floodplain.

Where detailed Flood Risk Assessments for a specific site are completed within Flood Zone 3, and there is currently no information on the 1 in 20 year floodplain, it is recommended that the extent of the functional floodplain is assessed in agreement with the Environment Agency.

The NPPF sets specific process and criteria for the assessment of flood risk in the preparation of Local Plans. Whilst flood risk is one of many considerations when allocating development sites, the NPPF provides specific constraints and requirements in relation to flood risk in order to ensure that any potential flood risks to people and property are suitably managed.

The developed and undeveloped Flood Zone 3b through Guildford urban area is shown below, in Figure 2.2 and in Volume 3, Appendix C, and Figure 3B. The outlines have been produced by clipping the 1 in 20 year modelled outlines by the building footprints. These have been determined by filtering OS MasterMap data by "building" and "structure" feature types.

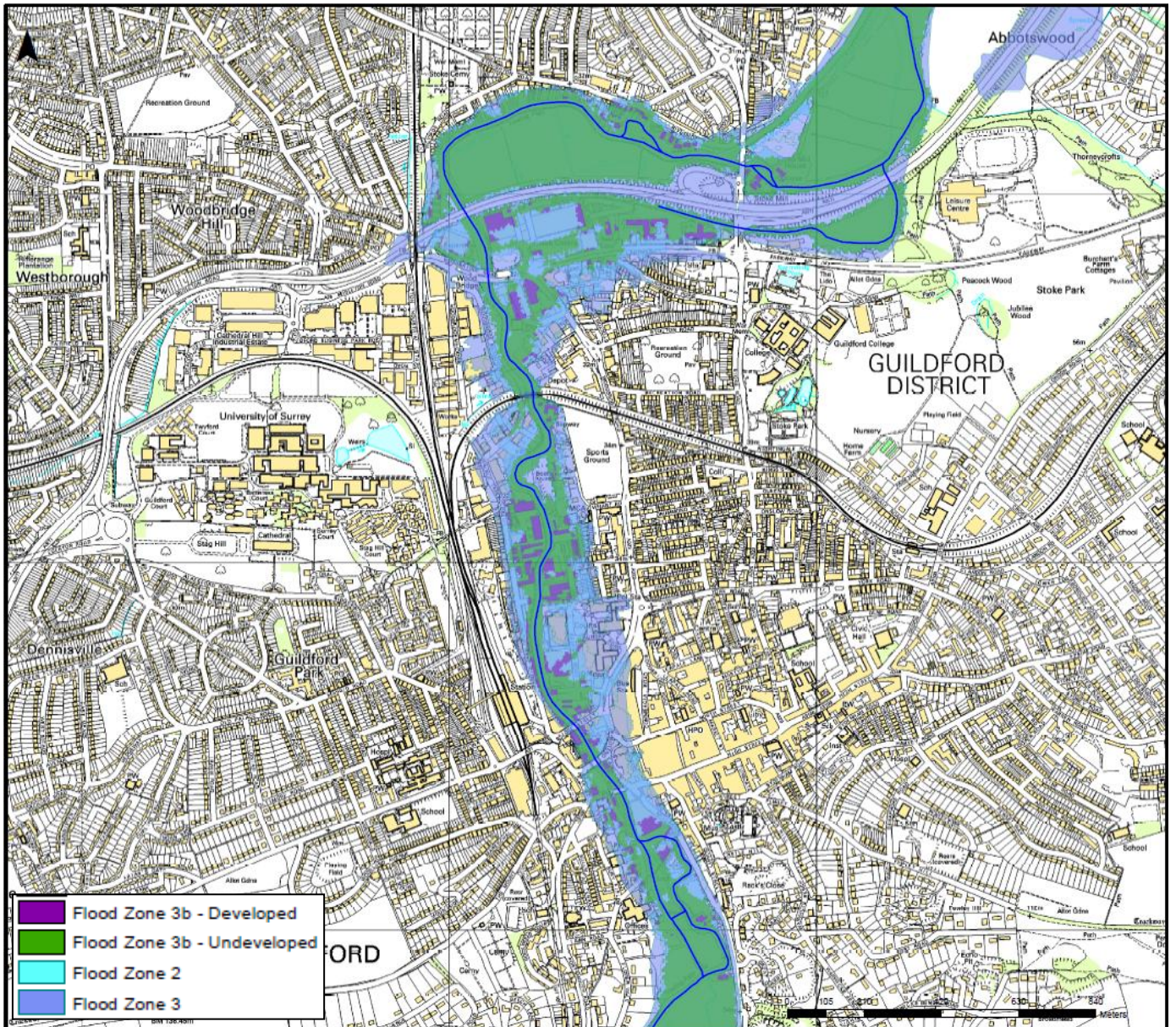


Figure 2-2 – Flood Zone 3b developed and undeveloped

3. Roles and Responsibilities

This section provides an overview of the roles and responsibilities of those involved with water management and the planning policy framework relevant to the study area for flood and/or water management.

3.1 Role and Responsibilities

3.1.1 Environment Agency

The Environment Agency (EA) is a government agency that has an overarching objective 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 EA has a statutory duty to:

- Maintain or improve any watercourses which are designed as Main Rivers;
- Maintain or improve sea or tidal defences;
- Install and operate flood warning equipment and provide flood warning services;
- Issue Flood Defence Consents⁴; and
- Control actions by riparian owners and occupiers which might interfere with the free flow of watercourses.

Statutory powers mean that the EA 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 EA 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**⁵ and **FRSA for developers**⁶ provides substantive responses to flood risk issues. The FRSA provides information for 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.

3.1.2 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** only⁷. SCC will provide technical advice and response to GBC on surface water drainage proposal for the development.

SCC has the 'lead' role in managing flood risk from **surface water, groundwater and ordinary watercourses**⁸ across the County. Partnership working underpins the delivery of effective local flood risk management. SCC will need to ensure that:-

- Proposals are not increasing flood risk on and off the site;

⁴ Any proposed developments or works within 8 meters of a watercourse designated as a main river requires flood defence consent from the environment agency

⁵ <https://www.gov.uk/flood-risk-assessment-local-planning-authorities>

⁶ <https://www.gov.uk/flood-risk-assessment-for-planning-applications>

⁷ 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.

⁸ 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.

- 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 EA 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; and
- 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 EA will only provide high level advice on surface water flooding.

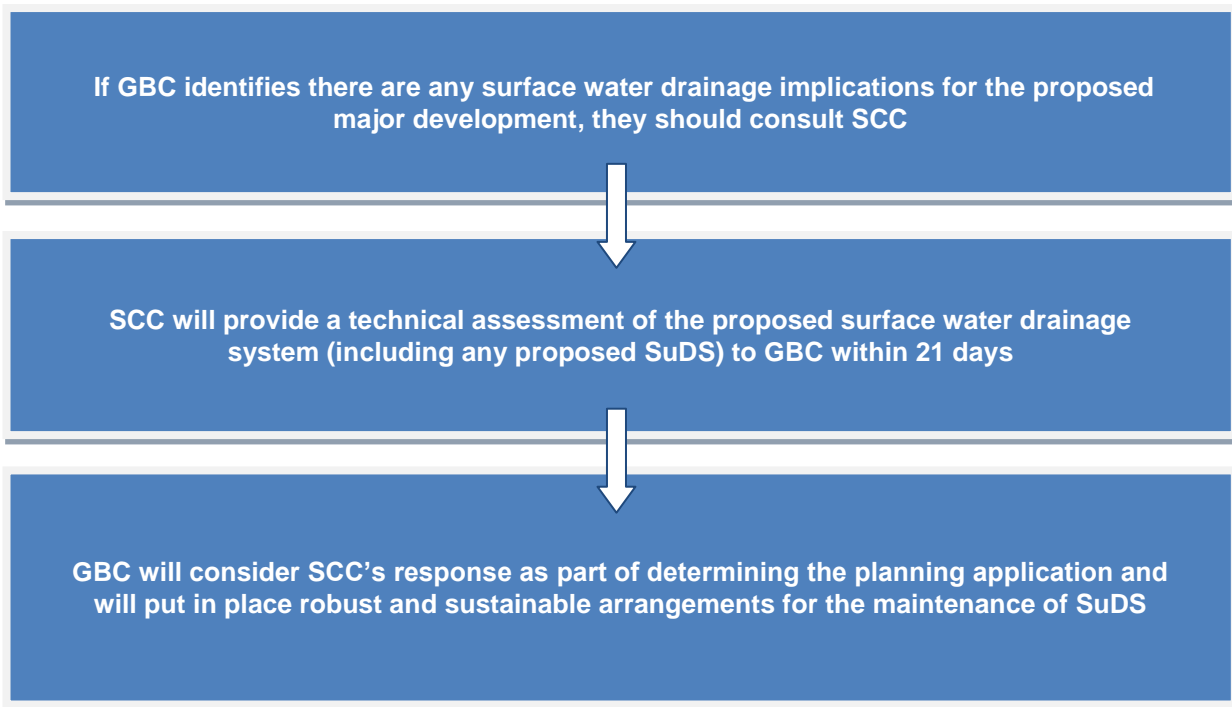
SCC has convened an officer group to coordinate flood risk management activity. It is also involved in reporting the implementation of recommendations, including the 2006-2007 Flooding Task Group and 2008 Pitt Review Monitoring Task Group.

3.1.3 Guildford Borough Council (Local Planning Authority)

GBC is responsible for determining planning applications, requiring consultation with the EA in areas of flood risk.

Following changes in National Planning Policy in April 2015, GBC as the Local Planning Authority (LPA) are responsible for local planning policies and decisions on planning applications relating to major development. GBC 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 GBC 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 GBC who need to assess the properties of the ground directly, or assess planning applications for SuDS.

3.1.4 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.

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. Presently, PPG and the non statutory technical guidance on the application of SuDS state that connection should follow a connection hierarchy. Sewerage undertakers also have a role of providing information to LPAs so that an SFRA takes into account any areas of critical drainage problems.

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

The consultation states that the “Strategic Flood Risk Assessment would be expected to include consideration of the provision and suitability of sustainable drainage systems across the local area”. 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 assist developers, planners and GBC who need to assess the properties of the ground directly, or assess planning applications for SuDS.

3.1.5 Highways England

Highways England are responsible for maintaining major roads throughout England; this includes the upkeep of the surface water drainage infrastructure associated with the road network. Major roads within the study area include a short stretch of the M25 at junction 10 with the A3 which continues south west across the study area, and the A31.

3.1.6 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**' document⁹. 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 own;
- 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; and
- 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.

3.2 European Policies (EU)

3.2.1 Water Framework Directive

The EU Water Framework Directive was developed following a review of EU water policy. It seeks to restore and improve water quality in rivers, coastal waters and groundwater in an integrated way. It seeks to achieve 'good ecological status' of water bodies through integrated river basin management. 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' through methods such as restoration of floodplains to their natural state and purpose.

3.2.2 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.

⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403435/LIT_7114.pdf

The directive requires Member States to designate competent authorities to implement the Directive; for England, this will be 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 significant Flood Risk Area (The London Indicative Flood Risk Area) and is therefore required to deliver flood hazard / risk maps and a flood risk management plan under the Regulations.

3.3 National Policies

3.3.1 *Flood and Water Management Act, 2010*

The Flood and Water Management Act 2010 places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues. The Act and Regulations together set out the requirements and targets Local Authorities need to meet, including:

- Taking an active role leading flood risk management as Lead Local Flood Authorities (LLFAs);
- Cooperating with other relevant authorities to manage local flood risk;
- Duty to investigate flood incidents and report upon them;
- Maintain an 'Asset Register' of assets that have a significant influence on local flood risk;
- Designate 'features' that have a significant influence on local flood risk;
- Regulation of works on 'ordinary watercourses';
- Development and implementation of Local Flood Risk Management Strategies (LFRMS); and
- Responsibility for first approval, then adoption, management and maintenance of Sustainable Drainage System (SUDS) where they service more than one property.¹⁰

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

- Sustainable drainage (SuDS) - the Act makes provision for a national standard to be prepared on SuDS. Developers will be required to obtain local authority approval for the SuDS in accordance with the standards, likely with conditions. When they are designed and constructed robustly, local authorities will be required to adopt and maintain the SuDS that serve more than one property;
- 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; and
- Permitted flooding of third party land - 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.

¹⁰ Note – it is unlikely that GBC will adopt or maintain SuDS assets. At the time of writing, GBC are assessing their future strategy on the management and maintenance of SuDS following recent changes in National Policy and Guidance.

3.3.2 National Planning Policy Framework (NPPF)

The National Planning Policy Framework¹¹ was issued in March 2012 and includes national policy on development and flood risk. 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 EA and other relevant flood risk management bodies, such as LLFAs and Internal Drainage Boards (IDBs). In developing policies, Local Plans should apply a sequential, risk-based approach to the location of development in order to avoid flood risk to people and property, to manage any residual risk, and to take account of the impacts of climate change. A sequential approach is also applied to ensure that the development is placed in the area of least risk within a site.

In general, these requirements will be met by:

- Applying the Sequential Test and where appropriate and necessary the Exception Test;
- Safeguarding land from development that is required for current and future flood risk management;
- Using opportunities offered by new development to reduce the causes and impacts of flooding;
- Seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations where climate change is expected to increase flood risk to existing development;
- Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The SFRA will be the basis for applying this test and a sequential approach should be used in areas known to be at risk from any form of flooding;
- Following application of the Sequential Test, if it is not possible for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied. It should only be applied if appropriate to the type of development and flood zone and if consistent with wider sustainability objectives;
- 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 SFRA. It must also be demonstrated within a site specific FRA that the development will be safe for its lifetime without increasing flood risk elsewhere and where possible reducing flood risk; and
- When determining planning applications, the LPA should ensure that flood risk is not increased elsewhere and should only consider development in areas at risk from flooding where it can be demonstrated that a sequential approach has been taken, that the development is appropriately flood resilient, that residual risks can be managed and that priority is given to the use of sustainable drainage systems.

Further details on the application of the Sequential Approach and Sequential Test are explained in Chapter 4.

3.3.3 National Planning Practice Guidance

The Technical Guidance to the National Planning Policy Framework¹² has been superseded by the Planning Practice Guidance Flood Risk and Coastal Change¹³ (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 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.

¹¹ National Planning Policy Framework (DCLG, 2012)

¹² Technical Guidance to the National Planning Policy Framework (DCLG, 2012)

¹³ <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

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

- Asses 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.

3.4 Other Relevant Policy

3.4.1 *Sewers for Adoption 7th Edition (September 2012)*

- Following the change in responsibility for sewerage services in England and Wales (October 2011), The 7th edition of Sewers for Adoption was issued;
- This document is the definitive guide for those planning, designing and constructing sewers and pumping stations for subsequent adoption by water companies in England and Wales under Section 104 of the Water Industry Act; and
- This guidance provides best practice on planning, design, construction, operation and maintenance of SUDS to facilitate their effective implementation within developments.

3.4.2 *BREEAM New Construction Non-Domestic Buildings Technical Manual (2011)*

Similar to the code for sustainable homes there is also a guide for Non-Domestic Buildings. The primary aim of BREEAM New Construction SD5073¹⁴ is to mitigate the life cycle impacts of new buildings on the environment in a robust and cost effective manner.

Policy 03 Surface Water Runoff aims to avoid, reduce and delay the discharge of rainfall to public sewers and watercourse, therefore minimising the risk of localised flooding on and off site, watercourse pollution and other environmental damage.

The guidance is split into three parts;

- Flood Risk – two credits
- Surface water runoff- two credits
- Minimising water course pollution – one credit

There is extensive guidance contained in the document and it is recommended that the reader is referred to page 373 of the guidance document.

3.4.3 *Home Quality Mark*

The Code for Sustainable Homes (2010) has been replaced by the Home Quality Mark. Updated guidance is expected to be released by the end of 2015.

3.5 Local Policies and Guidance

3.5.1 *Guildford Borough Draft Local Plan*

¹⁴ BRE Global Limited, BREEAM New Construction, Non Domestic Buildings Technical Manual SD5073 – 2.0:2011

The new Local Plan will set out the vision for the borough and the approach to development over the plan period. This SFRA will be used as part of the evidence base to support the Local Plan. The consultation period on the draft Local Plan Strategy and Sites closed in September 2014. A summary of the key themes from the draft Local Plan consultation has been published, and work continues to prepare the next iteration of the plan.

In Appendix B of the Draft Local Plan is the Infrastructure Schedule which focuses on the infrastructure needed to support the development planned in the first five years of the plan period. It also includes the infrastructure needed to support the strategic development sites. The Council is undertaking a project to look at possible surface water flood mitigation measures. Three locations, Ash, Ash Lodge Drive and Tongham, were identified as 'hotspots' for surface water flooding in the Council's SWMP for Ash. There are potential schemes suggested that could alleviate flooding in locations across the borough, (these are subject to change) these include:-

- **Ash Station (Harpers Road)**—A Flood Storage area to the east of the Ash Hill Road would reduce the risk of flooding and overtopping of the culvert which would cause flooding to properties along the natural valley of the historic watercourse.
- **Ash Lodge Drive**—Surface water sewers at Ash Church Road / Ash Street are rapidly exceeded during times of heavy rain, which causes local flooding. Surface water sewers south of Ash Lodge Drive drain to the low spit on South Lane into a 375mm sewer, before flowing into the 1050mm surface water sewer which runs to the south of the Ash Lodge Drive. Both sewers should be upsized.
- **Tongham**—Flooding reported on New Road, further investigation to determine if maintenance needs to be improved.

A SWMP for Guildford urban area¹⁵ has also been produced, and identifies 14 hotspots and associated action plans for addressing surface water flood risk in these areas. The 14 hotspots identified are listed below. Further information on the proposed actions, responsibilities, cost benefit analysis and funding strategies area available in appendix G online¹⁶

- Flexford
- Fairlands
- Applegarth
- Ashenden Estate
- Rydeshill
- Bellfields
- Jacobswell
- Send
- Ripley
- The Horsleys
- Burpham
- York Road area
- Tormead and Collingwood Crescent
- Effingham

3.5.2 Flood Report

GBC has prepared a flood report¹⁷ for the borough with several actions to implement the schemes mentioned above. These include:

- Build a bund to protect properties in Ash Green. Work started in the summer of 2015;
- Look at areas where sandbags can be stored in the town centre. This takes away the need to transport them in times of emergency; and

¹⁵ <http://www.guildford.gov.uk/surfacewatermanagementplan>

¹⁶ [http://www.guildford.gov.uk/media/15896/Guildford-Surface-Water-Management-Plan---Appendix-E---Action-Plans-for-Hotspots/pdf/Guildford_SWMP_Appendix_G_-_Action_Plans_for_Hotspots_\(2\).pdf](http://www.guildford.gov.uk/media/15896/Guildford-Surface-Water-Management-Plan---Appendix-E---Action-Plans-for-Hotspots/pdf/Guildford_SWMP_Appendix_G_-_Action_Plans_for_Hotspots_(2).pdf)

¹⁷ Procedures in response to flood alerts and warnings, May 2012

- Look at options for temporary flood defence equipment - this could be contributed towards a more permanent form of flood defence. After careful assessment with the EA, appropriate equipment as required will be selected and procured.

3.5.3 *Emergency Plan*

GBC has developed an Emergency Plan. This was last updated in November 2013 and is currently being updated. The document advises on the procedures to adopt in the event of severe flood within Guildford borough. It details the levels of Flood Watch, and the responsibility of the “Flood Family” and the call out procedure. It also details the distribution of sandbags in a designated order to mirror the rising flood level of the river and the actions that are needed to protect property. Details of the Engineering Services Flood Plan are included in the Emergency Plan. GBC’s draft Multi Agency Flood Plan details the location of shelters and emergency services to be used in a flood event emergency. Development of Multi Agency Flood Plans (MAFPs) allows all responding parties to work together on an agreed coordinated response to severe flooding. The Multi Agency Flood Plan will adequately address river, coastal and surface water flood risk and the associated emergency response arrangements.

3.5.4 *Surface Water Management Plan*

In November 2012 GBC commissioned Halcrow Group Ltd to undertake a Surface Water Management Plan (SWMP). A SWMP is a process by which GBC, in partnership with other organisations, can better understand flooding from surface water, and identify cost effective actions to manage flood risk. The outputs from a SWMP are long term plans about how to manage surface water in areas at risk. The Guildford SWMP covers the whole of the GBC administrative area which is within the River Wey and Tillingbourne catchments. The western limit of the study boundary is the catchment boundary of the Wey and the Blackwater. The Guildford SWMP was approved and endorsed by the Executive in January 2015, and can be found online:

<http://www.guildford.gov.uk/surfacewatermanagementplan>

Within the study area 9 Hotspot Areas were identified. For each of the Hotspot Areas identified within the study area, site-specific measures were identified that could be considered to help alleviate surface water flooding. Analysis of the number of properties at risk of flooding was undertaken for the rainfall event with a 1 in 75 probability of occurrence in any given year. A review of the results demonstrates that 718 properties in the hotspot areas could be at risk of surface water flooding.

3.5.5 *Ash Surface Water Study*

In November 2012 GBC commissioned Halcrow to undertake a surface water study for Ash. The purpose of the study was to:

- identify capital schemes in high risk locations in the study area to support future funding bids;
- provide an evidence base to support a business case for future funding of maintenance of key assets; and
- provide drainage information to assist the determination of planning applications and form part of the evidence base informing the new Local Plan.

Of the nine hotspot areas identified in the SWMP, four areas were excluded from further analysis as part of the Ash Surface Water Study. Therefore, five proposed hotspot areas were proposed to be taken forward as part of the Study. For each hotspot a detailed risk assessment was undertaken. In addition, an economic appraisal was done and mitigation options were proposed in order to alleviate flooding in the area.

3.5.6 *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.

The EA has used a national methodology, which was set out by Defra, to identify Indicative Flood Risk Areas (IFRA) across England. Of the ten IFRAs that have been identified nationally, only one affects part of the County Council's administrative area – The London IFRA. Within this Flood Risk Area, the Regulations require Surrey County Council to carry out two subsequent key stages:

- Produce flood hazard maps and flood risk maps; and
- Produce flood risk management plans.

The London IFRA extends into the north of Surrey and covers parts of Tandridge, Reigate and Banstead, Elmbridge, Epsom and Ewell and Mole Valley.

3.6 Environment Agency Guidance

3.6.1 Catchment Flood Management Plans (CFMP)

Catchment Flood Management Plans (CFMPs) are the Environment Agency's high level strategic plans for the sustainable management of flood risk at a river catchment scale. The documents seek to identify those factors that influence flooding in an area and through liaison with key decision makers identify broad policies for the long term management of flood risk in a sustainable manner.

The study area is covered by "Sub-area 8 – Heavily populated floodplain" discussed in the Thames Catchment Flood Management Plan (Environment Agency, January 2007). This section identifies the key issues and policies from this document.

The Thames CFMP identifies the characteristics of Guildford borough to be:

- Typically an area of heavily populated floodplain.
- An area with 590 properties at a 1% risk of flooding from rivers.

The Thames CFMP also identifies the key flooding characteristics of Guildford borough urban area to be:

- Flood risk will increase as a result of urbanisation and climate change.
- Flood risk is concentrated in known locations and problems with flooding from rivers are well documented.

Guildford borough urban area is characterised as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk. In areas of redevelopment, resilience and resistance measures can be incorporated into new buildings. Partnership work with GBC is an example of how this can be developed to achieve sustainable and flood compatible floodplain use. Flood awareness and emergency response will have an important role to play in all areas.

4. Guidance on Applying the Sequential Test

4.1 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 flood sources. The NPPF requires LPAs to apply the Sequential Test at all stages of the planning process to ensure that where possible developments are located in the areas at least risk of flooding. Through application of the Sequential Test LPAs are required to guide new development towards areas of the lowest flood probability. The Sequential Approach should be applied at all levels of planning.

Allied to the Sequential Test, NPPF also assigns different vulnerabilities to different types of development (Table 4-1). If when applying the Sequential Test development in the floodplain is necessary and satisfactorily justified 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 (Table 4-3). In certain circumstances, the LPA may be required to undertake the Exception Test (discussed further in Section 6).

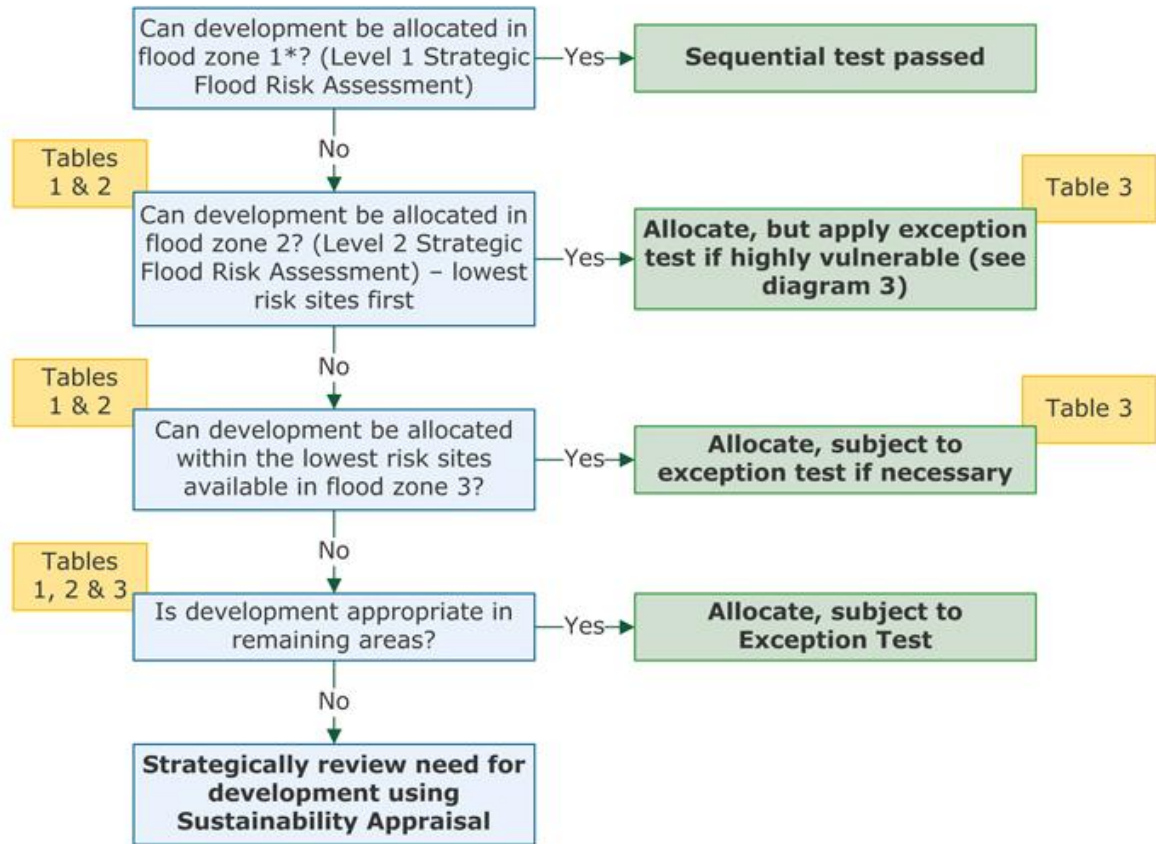
Table 3 of the PPG for Flood Risk and Coastal Change (April 2015) presents compatibility of different types of development according to their flood vulnerability (Table 4-2). Following the satisfactory application of the Sequential Test Table 3 of the Planning Practice Guidance (PPG) (ID Reference: 7-067-20140306) should be used to guide potential land uses to areas where the development vulnerability is appropriate to the flooding probability.

Accordingly, it is assumed that an assessment of flood risk is collected for use alongside other information to facilitate decision-making on the proposed land use. The flood risk information should be prepared using the risk-based, sequential process described in the flow chart in Figure 4-1, based on PPG guidance.

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 4-1 and Table 4-2) 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.

The Sequential and Exception Test do not need to be applied to minor developments and changes of use, except for a change of use to a caravan or camping or chalet site, or to a mobile home or park home site.

Some developments may contain different elements of vulnerability and the highest vulnerability category should be used when applying the sequential test, unless the development is considered in its component parts.



* Flood Zone 3b has also been divided into a developed and undeveloped flood zone 3b through Guildford urban area, as described in section 2.6 and shown in Figure 2.2 and in Volume 3, Appendix C, and Figure 3B.

Figure 4-1 – An Application of the Sequential Test for Local Plan preparation (PPG Flood Risk and Coastal Change)

Table 4-1 – Flood Risk Vulnerability Classifications

PPG Table 2: Flood Risk Vulnerability Classification	
Essential Infrastructure	<ul style="list-style-type: none"> Essential transport infrastructure (including mass evacuation routes), which has to cross the area at risk, and strategic utility infrastructure
Highly Vulnerable	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 4-2 – Flood Risk Vulnerability Classifications and flood zone ‘compatibility’

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**	✗	✗	✗	✓**

Notes on Table 4-2

- ✓ Development is appropriate
- ✗ Development should not be permitted
- * In flood Zone 3a, essential infrastructure should be designed and constructed to remain operational and safe in times of flood
- ** In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the exception test, and water compatible uses, should be designed and constructed to
 - Remain operational and safe for users during times of flood
 - Result in no net loss of floodplain storage
 - Not impede water flows and not increase flood risk elsewhere

Table 4-3: Template table for recording Sequential Test process

Sites Identified for Potential Future Development	Flood Zones (See Vol 3 for Flood Zones)	Fluvial Flood Risk (See Vol 3 for detailed maps of river flooding. Consider the climate change impacts and the Functional Floodplain)	Fluvial Flood Risk -Extreme (See Vol 3 for detailed maps of river flooding. Consider the extent of the 1000 year return period floodplain)	Risk of surface water and sewer flooding (See Vol 3 for maps of recorded surface water, and sewer flooding)	Risk of ground water flooding (See Vol 3 groundwater susceptibility map)	Risk of flooding from artificial sources (See Vol 3 risk of flooding from the Basingstoke Canal)	Additional comments

NPPF acknowledges that some areas could also be at risk of flooding from flood sources other than fluvial and tidal systems. Consequently all sources of flooding must be considered when looking to locate development. Other sources of flooding requiring consideration when situating new development allocations in Guildford Borough include:

- Surface Water Flooding;
- Groundwater;
- Sewers; and
- Artificial Sources.

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

GBC 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.

It is recognised that flood risk information must be considered alongside other spatial planning issues. 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.

All ‘reasonably available’¹⁸ sites will need to be sequentially tested, including sites suggested through the ‘Call for Sites’ process, current records and sites in council ownership. GBC should then promote sites accordingly, based on those at least risk of flooding and appropriate land uses. When applying the Test it will be important for GBC 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.

Table 4-3 provides a template table for GBC 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. The Flood Risk Matrix illustrates how the Sequential Test should be undertaken. The development must be appropriate for the Flood Zone in order to proceed to the Sequential or the Exception Test.

Additional guidance to assist GBC to strategically undertake the Sequential Test is detailed in Section 4.3.

¹⁸ (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:
 - o Owned by the applicant;
 - o For sale at a fair market value; or
 - o 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.)

The flood risk information required to address the four stages in the application of the Sequential Test noted in the table below is provided in the relevant sections of Volume 2, and the flood maps in Volume 3 of this SFRA. Specific guidance for GBC on the use of these flood maps in the application of the Sequential Test is provided below in Table 4-4.

Table 4-4: Guidance for GBC on the use of this SFRA in the application of the Sequential Test

Stage in Sequential Test	Guidance	Associated Map Series in Guildford Borough SFRA (Volume 3)
1. Can development be allocated in Zone 1?	GBC should use Flood Zone maps to identify areas within Zone 1 and consider whether proposed developments can be allocated in Zone 1. Within Zone 1, areas at risk from other sources of flooding should be avoided where possible	Flood Zone Maps (Appendix C Vol 3) Also refer to Appendices D, E, F, G for othersources of flooding
2. Where are the available sites in Zone 2? Can development be allocated within them?	GBC should use the Detailed Maps of River Flooding to identify areas within Zone 2 and consider the lowest risk sites first.	Detailed Maps of River Flooding – (Appendix C, Vol 3)
3. Where are the lowest risk available sites in Zone 3? Can development be allocated within them?	GBC should use the detailed maps and indicative flood depth maps within this SFRA to understand the distribution of risk within Flood Zone 3.	Detailed Maps of River Flooding (Appendix C, Vol 3) Flood Depth Maps (Appendix C, Vol 3)
4. Is development appropriate and permissible in remaining areas?	In considering the appropriateness of development in remaining areas, GBC should consider the vulnerability of the proposed development and Tables 2 and 3 of PPG Flood Risk and Coastal Change.	Flood Depth Maps (Appendix C, Vol 3) Other Sources of Flooding Maps (Appendices D, E, F, G, Vol 3)

The protocols adopted for the Sequential Test should ideally be agreed with the EA. It is important that the decision maker engages key stakeholders early in the decision making process. It is also important to consider uncertainty of information when making land use planning decisions. For example is the modelling data available detailed or broad scale and is it the most up to date (refer to Section 7.6 which discusses when data should be reviewed).

4.3 Additional Guidance

The sequence of steps presented below in tandem with Figure 4.1 is designed to provide GBC and developers with additional guidance on how to apply the Sequential Test strategically. The steps are designed to ensure land allocations are allocated in line with the principles of the Sequential Test or, failing this, that the requirement for application of the Exception Test is clearly identified.

1. Strategic developments that need to be accommodated in Guildford borough within the lifetime of its Local Plan should be assigned a vulnerability classification in accordance with Table 2 “Flood Risk Vulnerability Classification” in PPG.

2. The Flood Zone classification of all development sites identified by GBC should consider the effects of climate change on flood zone definition for the design life of any development that the site may be suitable for.
3. Developers should use their experience within their locality to assess how long they anticipate the development being present for; a 60 year design life for non residential development plans should be used as a guide. Developers would be expected to justify why they have adopted a given lifetime for the development when preparing a site specific flood risk assessment. Residential development should be considered for a minimum of 100 year design life unless there is specific justification for considering a shorter period.
4. In the first instance any 'highly vulnerable' developments the LPA is seeking to accommodate should be located on potential development sites within Flood Zone 1. If the 'highly vulnerable developments' cannot be located in Flood Zone 1, because the identified sites are unsuitable or there are insufficient sites in Flood Zone 1 then sites in Flood Zone 2 can be considered, once having passed the Exception Test. If sites in Flood Zones 1 and 2 are inadequate, then to accommodate the development the LPA may have to identify additional sites in Flood Zones 1 or 2 or seek opportunities to locate the development outside their administrative area.
5. Once all 'highly vulnerable' developments have been allocated to a development site, the LPA can consider those development types defined as 'more vulnerable'. In the first instance 'more vulnerable' development should be located in any unallocated sites in Flood Zone 1. Where these sites are unsuitable or there are insufficient sites, sites in Flood Zone 2 can be considered. If there are insufficient sites in Flood Zone 1 or 2 to accommodate the 'more vulnerable' development types, sites in Flood Zone 3a can be considered. However, any 'more vulnerable' developments in Flood Zone 3a will require application of the Exception Test (described in Section 5).
6. Once all 'more vulnerable' developments have been allocated to a development site, the LPA can consider those development types defined as 'less vulnerable'. In the first instance 'less vulnerable' development should be located in any remaining unallocated sites in Flood Zone 1, 2 or 3a (in that order). Less vulnerable development types are not appropriate in Flood Zone 3b – Functional Floodplain.
7. 'Essential infrastructure' developments should also be preferentially located in the lowest flood risk zone, however this type of development can be located in Flood Zones 3a and 3b, where necessary, through application of the Exception Test.
8. Finally, it is recommended that water compatible development is allocated last. Water compatible developments typically have the least flood risk constraints and therefore it is considered appropriate to consider them last when allocating development sites.

5. Guidance on Applying the NPPF Exception Test

5.1 What is the Exception Test?

As shown in Volume 3, some areas of Guildford borough are within Flood Zones 2 and 3 and are predicted to have a medium or high risk of flooding. Following the application of the Sequential Test it may not be possible for GBC to steer all new development towards flood zone 1, particularly when regeneration objectives are taken into account. However, as required by the NPPF and NPPG GBC must demonstrate that there are no other reasonable available alternative sites located in areas at less risk of flooding.

If, following satisfactory application of the Sequential Test, it is not possible to allocate all development in Flood Zone 1; the Exception Test may need to be applied to allocate sites in Flood Zones 2 and 3, as set out in PPG. Following the application of the flood risk sequential test, should development sites need to be considered in flood zones 2 and 3, subject to NPPF/NPPG criteria, an exception test may need to be carried out and passed.

5.2 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 PPG provides additional guidance on the application of the Exception Test.

If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, 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 criteria should be provided, for instance, through the sustainability appraisal. If a potential site allocation fails to score positively against the aims and objectives of the sustainability appraisal, or is not otherwise capable of demonstrating sustainability benefits, GBC should consider whether the use of planning conditions and/or planning obligations could make it do so. Where this is not possible the Exception Test has not been satisfied and the allocation should not be made.

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.

Figure 5.1 presents the process that should be followed by GBC in its application of the Exception Test under the PPG

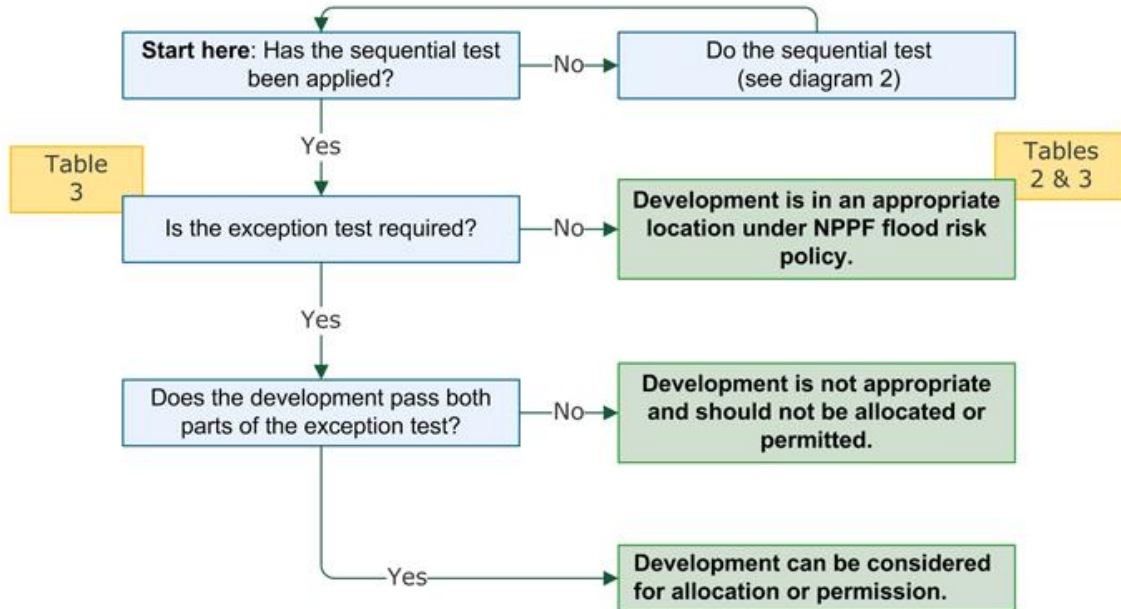


Figure 5-1: An Application of the Exception Test for Local Plan preparation (PPG Flood Risk and Coastal Change)

Information in Table 5.1 of this SFRA can be used to assess the safety of particular locations since it gives greater detail on the actual risks, residual risks and the associated magnitude of the flood hazard. As well as the safety of people while occupying a site consideration should be given to the safe access and egress arrangements that can be implemented so that during flood events the appropriate level of safety can be maintained.

Table 5-1: Guidance for GBC on the use of this SFRA in the application of the Exception Test

Exception Test safe development		
Source of flood risk	Guidance	Associated Map Series in GY SFRA (Volume 3)
1. River flooding	<p>The risk of fluvial flooding in much of Guildford borough area is low.</p> <p>The primary risk is in the river valleys of the Wey (including the Tillingbourne and Cranleigh Waters tributaries) and the Blackwater.</p>	<p>Detailed Maps of River Flooding (Volume 3, Figure 5B-X)</p> <p>Show present day and future flood outlines including the impact of climate change</p>

Exception Test safe development		
Source of flood risk	Guidance	Associated Map Series in GY SFRA (Volume 3)
2. Other sources of flooding	This SFRA has also considered the risk of flooding from surface water, sewers, artificial sources and groundwater. There are records of observed surface water and groundwater flooding incidents within the town.	Other Sources of Flooding – Appendices D, E, F, G, Vol 3.

It is important that GBC retains a record of all assumptions and decisions made with regard to both the Sequential and Exception Tests, in order to demonstrate the process has been performed. Once the Tests are completed, and GBC is satisfied with the outcome, it is then possible to continue with the Local Plan 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.

6. Guidance on How to Use the SFRA in Development Control

6.1 Guide to Volume 3 – Contents relevant to Development Control

- Appendix A – Catchment overview
- Appendix B – Flood Defences
- Appendix C – Flood Zone 3b and Flood Risk from Rivers
- Appendix D – Flood Risk from Surface water
- Appendix E – Flood Risk from Groundwater
- Appendix F – Flood Risk from Sewers
- Appendix G – Flood Risk from Artificial Sources

6.2 Guidance for site-specific flood risk assessments

Although this SFRA has been undertaken for Guildford borough, it does not negate the need for site specific Flood Risk Assessments (FRA) to be undertaken at the planning application stage. Instead, this SFRA provides advice on the scope of the additional information required within FRA.

6.3 A Guide for Developers

The EA Guide for Developers (May 2013) provides a tool for developers to refer to during each development stage. The guide gives advice on how a development can be better for people and the environment.

At the Pre-Planning Application stage, the EA encourages developers to make enquiries on the EA website that allows for a considered response. This stage of enquiries allows issues to be addressed such as; a lack of information in the application, if there is any more information available to help the application, and whether the application is likely to be refused. Pre-Planning Application Enquiries save the developer time and money, and make sure the development is better for the environment (Developers Guide, May 2013). Any bespoke pre-application advice from the EA will be chargeable.

The EA Pre-application enquiry form can be found at:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

In addition to NPPF, the Guide for Developers provides advice on “Managing the risk of flooding” by ensuring the site land use and layout is appropriate to risk of flooding. This section of the guide also details reiterates the government regulations set out by NPPF by stating the need for developers to “avoid causing flooding elsewhere”.

The Guide for Developers details the permissions needed for Flood Risk Management. The Water Resources Act 1991 and associated byelaws require the application for formal consent for works in, over, under or adjacent to main rivers. This is to ensure that these activities don't cause flooding or make an existing flooding problem worse, and don't damage the local environment, fisheries, wildlife, and flood defences. Main rivers are watercourses designated by Defra and are usually larger rivers or streams.

The EA Guide for Developers is available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289894/LIT_2745_c8ed3d.pdf

The Development Management Procedure Order 2015 (DMPO) and Environment Agency's Flood Risk Standing Advice (FRSA) has been revised (April 2015). Comprehensive guidance and **FRSA for developers**¹⁹ can be found online, and provides an excellent platform for developers. 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.

The **FRSA for planning authorities**²⁰ also provides substantive responses to flood risk issues.

¹⁹ <https://www.gov.uk/flood-risk-assessment-for-planning-applications>

²⁰ <https://www.gov.uk/flood-risk-assessment-local-planning-authorities>

7. SFRA Maintenance and Management

7.1 Introduction

This chapter provides an introduction to the maintenance and management procedures that are required to ensure Guildford Borough SFRA remains up-to-date and continues to make use of the best available information. Implementing a maintenance and management procedure for the SFRA will assist GBC to regularly review the technical data available and to commission technical updates where necessary.

Throughout this chapter, several key actions are recommended in the implementation of a maintenance and management structure for the SFRA. These actions are highlighted in **blue bold text**.

7.2 Data Collection

The objective of this Level 1 report is to collate and review the information available relating to flooding in the study area and present this in a manner suitable for GBC to apply the Sequential Test.

This section describes the data collection process, presents the available data and discusses its benefits and limitations. A comprehensive record of all the data collected through the production of the Level 1 SFRA is presented in a document register in Appendix A.

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 (neighbouring district / borough Councils, SCC and the EA) 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.

7.2.1 Stakeholders

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

- Guildford Borough Council;
- Surrey County Council;
- Environment Agency - The study area is within the EA West Thames, which is responsible for the River Wey,
- Basingstoke Canal Authority;
- National Trust;
- Thames Water - Thames Water is responsible for the management of surface water and foul water in the study area; and
- 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.

All of the data was registered on receipt and reviewed to assess its contribution to the Level 1 SFRA. Details of all data collected are presented in Appendix A.

7.3 Data Processing

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

- Historic records of flooding were assessed to determine source of flooding and GIS layers were compiled. Maps and figures were produced using map templates designed for the SFRA report.

7.4 Data Ownership

The datasets obtained for use in the SFRA have come from a number of sources 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. **GBC should be aware of the Intellectual Property Rights (IPR) they possess so that they only issue data that is contractually appropriate. Datasets produced during the SFRA are owned by GBC and can be passed to external parties at their discretion.** Other datasets are the property of the EA and should not be released by GBC.

It is recommended that information on all sources of flooding continues to be collected and that where appropriate more resources are invested in determining the source and pathways of flooding. When more detailed or updated hydraulic modelling becomes available from the EA or other sources this information should be incorporated into the SFRA. More detailed information may also be collected for FRAs carried out by developers and land owners at the local site scale. Information from site level FRAs will be submitted to the councils and the EA as part of the development control process and this information should be used to inform the SFRA in the future.

7.5 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 GBCs existing corporate GIS infrastructure.
 - Electronic document management system - PDF versions of all maps and reports produced during the SFRA.

To ensure that the SFRA remains ‘live’ it is important to nominate a Management Group with responsibility for monitoring, managing and maintaining the SFRA, as shown in Figure 7.1. It is recommended that the monitoring of the SFRA is linked to the Borough’s Monitoring report.

By following this process of information dissemination and review, the management team can ensure a consistent and up to date supply of strategic flood risk information to all levels of planning process.

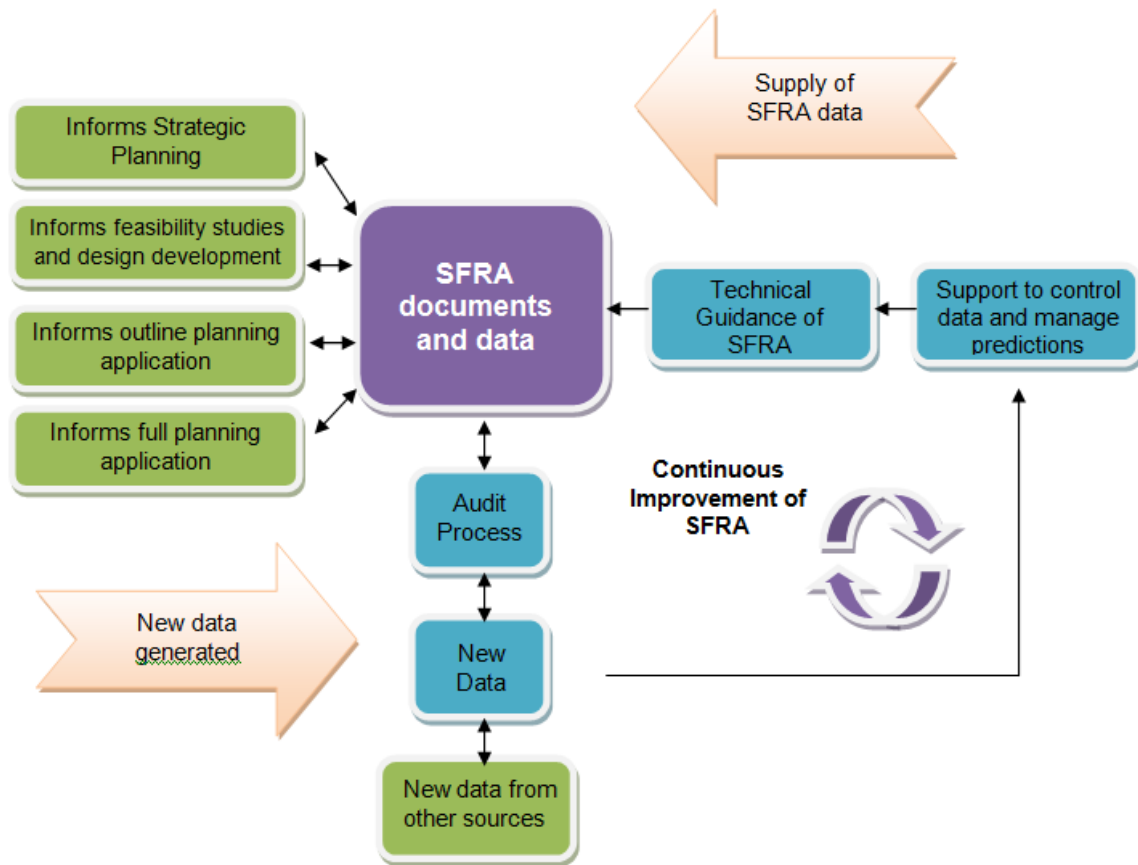


Figure 7-1: SFRA Data management System

7.6 Monitoring the SFRA

It is in the interest of GBC that the SFRA remains current and up-to-date. **To help facilitate this, it would be useful for GBC to liaise regularly with West Thames of the EA to discuss the need for an update and if necessary organise an annual meeting to review the SFRA. Prior to this meeting it is recommended that the following maintenance checks be undertaken:**

- Review the datasets used in the SFRA are still the most up to date.
- Consider whether a formal review of the SFRA is necessary.

Whilst all datasets should be checked for updates and key organisations contacted, Table 7.1 contains a list of datasets that are likely to be updated regularly.

Table 7-1: Datasets that are known to be updated regularly

Dataset	Owner	Comment
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, Surrey Fire and Rescue services, Highways authority, Surrey.	Unknown

7.7 Incorporating new datasets

The following tasks should be undertaken when including new datasets in Guildford Borough SFRA:

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

7.8 Updating SFRA reports and figures

Volume 2 provides a record of all of the technical analyses used to develop Guildford 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 GBC and other stakeholders.

8. Future Flood Risk Management Practices

Current flood risk management practises within the study area have been described in Section 3. This section describes the practises that are planned for the area or can be incorporated into new developments.

8.1 Strategic Flood Defences and Maintenance

Flood defences are typically designed and constructed to protect people and property from a given magnitude of flood. This is referred to as the design standard and may vary depending on the age of the structure, the value attributed to property and safety of people it is designed to serve and the scale of works necessary to construct the defence. Within Guildford borough there are no formal defences, but there are isolated flood relief facilities including flood relief channels and culverts. The flood relief schemes include the River Wey Improvement Scheme and the Broadmead and the Newark channels. GBC is also undertaking a project to install property level protection in approximately 35 properties in William Road, Mary Road, Leas Road and Walnut Tree Close in Guildford Town Centre. These are the locations which suffered from flooding in winter 2013.

There are a number of small watercourses across the study area. It is important that a maintenance regime is in place to ensure that there is regular cleaning and debris removal to prevent blockages from occurring. Where blockages do occur, flooding can occur quickly and although the disruption caused may be localised, flood depths and hazards can be significant. Across the study area, the responsibility for these watercourses lies with different organisations; but primarily with the Riparian owner (the person owning the banks). Thames Water, GBC and the EA have powers and sometimes duties to maintain watercourses.

It is important for GBC where possible to establish good relationships with the other maintaining bodies for these watercourses and then an open forum of discussion can exist, which in turn would lead to the benefit of reducing flood risk across Guildford borough. Mapping of, and improved communication between the bodies responsible for surface water drainage infrastructure is a key recommendation of Sir Michael Pitt's review (2007).

8.1.1 Flood Warning

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 (refer to Chapter 12 for additional information).

Flood Warning is an essential component of the strategy to reduce flood risk. The EA seeks to provide a flood warning service in all areas at risk of flooding. 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 number for individual rivers.

Guildford Borough has been included as part of the Upper Wey Flood Alert area from July 2014. Up until then, Guildford Borough had been covered by the Lower Wey flood alert area. This change will mean that Flood Alerts covering Guildford Borough will be issued much earlier than they have been up until now which will give the residents greater time to prepare for potential flooding. Guildford Borough will continue to be covered by its own Flood Warning area which is issued when flooding is expected. The flood Warning area of the River Wey is situated in a larger geographical area, where the EA provide a general Flood Alert early notification to possible flooding. However, the flood warning system only operates for fluvial flooding taking into consideration that a significant number of properties within urban areas of the study area at risk from surface water flooding or experience flooding too quickly for current warning systems to be effective, means that most flooding incidents are likely to occur without any warning.

Sir Michael Pitt's review¹ of the summer 2007 floods stresses the importance of developing a flood warning system for surface water flooding. One of the report's interim conclusions (IC3) was *"the EA 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."*

8.1.2 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 infrastructure in urban areas can also frequently become blocked with debris which, if not removed, can lead to blockages in culverts and backing up of a watercourse 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 the responsibility of the riparian owner to maintain the watercourses or defences to a suitable standard. The Local Authority or EA has permissive powers to act should the riparian owner not satisfy their maintenance requirements.

8.1.3 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

8.1.4 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 demountable barriers.

8.1.5 Flood Resistance

This is defined as:-

'Constructing a building in such a way to prevent floodwater entering the building and damaging its fabric'.

Floodwaters will enter buildings through the weakest points in the construction which maybe in the brickwork, party walls of terraced or semi-detached buildings, expansion joints between walls where different construction materials meet, vents, door thresholds, seepage from below ground through floors and basements and/or sanitary appliances from backflow from surcharged drainage systems.

Flood resistance techniques can be employed on buildings. These can include raising finished floor levels 300mm above the design flood level including an allowance for climate change and the use of appropriate materials that can withstand periodic flooding. They include the use of low permeability materials in the construction of the building and are likely to only be effective for short duration flood events and of low flooding depths (less than 0.3 m). They may be used in conjunction with flood resilience techniques when the predicted flood level is between 0.3 - 0.6 m.

8.1.6 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 with 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).

9. Drainage of Development Sites

Objective 6 of this Level 1 SFRA is to 'advise GBC on the principles, objectives and applicability of Sustainable Drainage Systems (SuDS) throughout the study area'. In keeping with the guidance of NPPF, local authorities should encourage the application of Sustainable Drainage Systems (SuDS). This section presents a summary of surface water policy and practices. Volume 1 should be referred to for additional information on selection of the SuDS techniques available, and a review of the soils and geology of the study area. Together, both sections should enable GBC to identify what type of SuDS techniques could be employed in development schemes within the study area.

9.1 Background

Traditionally, built developments have utilised piped drainage systems to manage surface water and convey surface water run-off away from developed areas as quickly as possible. Typically these systems connect to the public sewer system for treatment and/or discharge to local watercourses. Whilst this approach rapidly transfers surface water from developed areas, the alteration of natural drainage processes can potentially impact on downstream areas by increasing flood risk and reducing water quality. Receiving watercourses are therefore much more sensitive to rainfall intensity, volume and catchment land uses after a catchment or areas of a catchment have been developed.

Flooding from sewers is typically less well publicised than flooding from rivers or the sea, in part due to the often greater frequency with which sewer flooding can occur but predominately because it typically affects geographically small areas for relatively short periods of time. However, the hazards and nuisance of sewer flooding remain of particular concern in areas of growth.

Due to the difficulties and inconvenience associated with upgrading sewer systems it is uncommon for sewer and drainage systems to keep pace with the rate of development/re-development. As development progresses and/or urban areas expand, the drainage systems become inadequate for the volumes and rates of surface water they receive, resulting in increased flood risk and/or pollution of watercourses. Allied to this the implications of climate change on rainfall intensities, is predicted to lead to flashier catchment/site responses and surcharging of piped systems.

In addition, as flood risk has increased in importance within planning policy, a disparity has emerged between the design standard required of new conventional sewer systems and the return period against which development should be safeguarded from flooding. New sewer systems are typically designed to accommodate the 3.3% annual probability storm without flooding at the ground surface in accordance with Sewers for Adoption²¹ whilst new developments are typically required to mitigate against the risks from the 1% annual probability flood. This results in drainage inadequacies for the flood return period developments need to consider. Whilst the risk of flooding from fluvial systems may be managed, an inappropriately designed site drainage system could generate a new flood risk to development and existing property.

A sustainable solution to these issues is to reduce the volume and/or rate of water entering the sewer system and watercourses. The Government's preferred method to achieve this is through the use of SuDS.

9.2 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 surface water flow regime present on a site prior to development.

²¹ Sewers for Adoption , 7th Edition A Design and Construction Guide for Developer, September 2012

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.

9.3 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 GBC.

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. GBC will need to decide on the strategy of adopting SuDS.

GBC, 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.

9.3.1 *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 EA is the consenting authority for discharges to controlled waters (i.e. groundwater or watercourses), SuDS will be favoured for the removal of pollutants and attenuation of discharge rates.

9.3.2 *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 1 hectare 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 5.7, provides further detailed information on the uses of SUDS in Guildford borough.

10. Policy Considerations

Objective 4 of this Level 1 SFRA is *'to advise GBC on suitable policies to address flood risk issues in a consistent manner across its administrative area'*. To meet this objective, national and local policies have been reviewed (Section 3) along with the objectives and aspirations identified by the EA (outlined in the Thames CFMP).

The SFRA will form part of the Local Plan evidence base, and should be used to inform the preparation of planning policies in the emerging new Local Plan. It is not a policy document.

This section draws together information from the SFRA, to identify considerations for the formation of planning policy. This list will be considered by policy makers along with other evidence base documents, as needs and constraints are balanced to deliver sustainable development over the plan period.

Table 10-1: SFRA Policy Considerations

Policy Considerations	
1	Apply the sequential test, and locate development in areas at least risk of flooding.
2	Seek to ensure development proposals do not increase flood risk, and where possible, reduce flood risk on site and elsewhere.
3	If, having passed the flood risk sequential test, development is proposed in areas at risk of flooding, then developers will be required to demonstrate through the exception test that suitable compensatory storage and mitigation can be provided, and that the development will result in an overall reduction of flood risk on site and, where possible elsewhere.
4	Consider the benefits of preparing planning guidance for development proposals in Guildford Town Centre in areas of medium to high flood risk, to encourage design that is resistant and resilient to flooding.
5	Consider the betterment opportunities from potential new park areas in Guildford Town Centre (with regards to the Guildford Town Centre Masterplan).
6	Consider ways to achieve betterment when development is proposed that could affect the River Wey floodplain.
7	Consider seeking detailed flood information when major development is proposed in areas at risk of flooding but where there is currently insufficient information on flood risk available
8	Consider seeking an assessment of groundwater flood risk for development proposals within areas potentially at risk of groundwater flooding. This could be part of a FRA, or a separate document.
9	Consider requirements and restrictions in relation to development impacted by or in proximity to the Basingstoke Canal and reservoirs.
10	Consider potential risk from embankment or structure failure from development in proximity to the River Wey navigation and the use of flood management measures.
11	Consider requirements in relation to surface water flood risk, particularly in relation to identified areas in the Guildford SWMP and Ash Surface Water Study.

11. Site Specific Flood Risk Assessment Guidance

Objective 5 of this Level 1 SFRA is to *'advise GBC on the requirements of site specific flood risk assessments based on local conditions and policy considerations'*.

Flood risk is a fundamental consideration for any development project regardless of scale or type. Understanding the flood risk to and arising from a development is essential to managing the risk to people and property reducing the risk of injury, property damage or even death. Climate change is of particular concern to flood risk, with current predictions suggesting the UK will experience milder wetter winters and on average hotter drier summers, whilst sea levels will continue to rise. This will lead to an increase in rainfall and therefore flood events in winter months and increase the risk of thunderstorms in the summer months, as well as increasing the unpredictability of our weather.

Evidence collected through this Level 1 SFRA demonstrates flooding in the study area is not limited to just rivers (although it may be exacerbated by fluvial flooding). In fact flooding is proven to arise from a number of sources, each presenting their own type of risk and requiring management. In addition some areas currently not at risk of flooding may be at risk in the future as the effects of climate change take hold.

A failure to adequately consider flood risk in development proposals can have significant implications for the planning and development processes and longer term on the residents of new or existing developments. Issues that may arise through inappropriate consideration of flood risk include:

- Failure to consider wider plans prepared by the EA or other operating authorities may result in an objection to a proposed scheme.
- Failure to identify flood risk issues early in a development project could result in failure of a development proposal, requiring redesign of the site to mitigate flood risk.
- Failure to adequately assess all flood risk sources and construct a development that is safe over its lifetime could increase the number of people at risk from flooding and/or increase the risk to existing populations.
- If an adverse effect can be demonstrated (i.e. flooding did not occur prior to development) by neighbouring properties or residents.
- Properties may be uninsurable and therefore effectively unable to be sold if flood risk management is not adequately provided for the lifetime of the development.

However, development can work with flood risk if it is accurately understood and managed. Using a sound understanding of flood risk to locate, and design developments enables flood risks to be managed through positive planning. This positive planning needs to consider the risks to a development from local flood sources but also the consequences a development may have on increasing flood risk. Early identification of flood risk constraints can ensure developments maximise development potential whilst achieving the principles of sustainability.

This Level 1 SFRA presents sufficient information to assist GBC to apply the Sequential Test and identify where the Exception Test may be required. However, the scale of assessment undertaken for a Level 1 SFRA is typically inadequate to accurately assess the risks faced by a particular discrete development at a given location with the study area. This Level 1 SFRA has attempted to identify all sources of flood risk at the catchment and borough scale using the best available information. However, more local and site specific sources of flooding may become apparent during a Level 2 SFRA or during the course of a site specific FRA.

In addition, the information presented in the Level 1 SFRA does not necessarily fully address all the flood sources. For example, Flood Zones provided by the EA are not defined for all watercourses; typically watercourses with a catchment area less than 3km² are omitted from EA mapping unless there is a history of flooding affecting a population. Consequently there will be some locations adjacent to watercourses where on first inspection it is suggested there is no flood risk. This should be fully investigated to ensure more people are not placed at risk through inappropriate development.

Therefore, as part of the planning applications which come forward in future for both allocated and non-allocated sites, site specific FRAs will be required to assess the flood risk posed to individual discrete proposed developments and to ensure that where necessary, and appropriate, suitable mitigation measures are included in the development.

This section presents the recommendations for site specific FRAs, the circumstances under which they should be prepared and their requirements for submission with planning applications to GBC.

The site specific Flood Risk Assessment guidance presented in the following sections has been developed based on:

- The recommendations presented in NPPF and its accompanying PPG;
- The Environment Agency's standing advice to LPAs;
- A review of local policies and bye-laws throughout the study area; and
- The information and findings gathered and developed during preparation of this Level 1 SFRA.

11.1 When are Flood Risk Assessments Required?

When informing developers of the requirements of a Flood Risk Assessment for a development site, consideration should be given to the position of the development relative to flood sources, the vulnerability of the proposed development and its scale.

In accordance with NPPF and the General Development Procedure Order (GDPO)²² FRAs should always be provided with planning applications in the following situations:

- The development site is located in Flood Zone 2 or 3;
- The development site is equal or greater than 1 hectare in area in Flood Zone 1;
- The development site is located in Flood Zone 1 but the Environment Agency, Internal Drainage Board and/or other bodies have identified critical drainage problems;
- The development is located within 20m of any watercourse regardless of flood zone classification; or
- The development involves any culverting operation or development which controls the flow of any river or stream.

The EA is a statutory consultee for planning applications that fall into the above situations with the exception of minor developments in flood zones 2 and 3. Minor development²³ in relation to flood risk means:-

- minor non-residential extensions: industrial/commercial/leisure etc. extensions with a footprint less than 250 square metres.

²² The Town and Country Planning (General Development Procedure) (Amendment) (No.2) (England) Order 2006
<http://www.legislation.gov.uk/ukxi/2006/2375/contents/made>

²³ Planning Practice Guidance Flood Risk and Coastal Change, 2014

- alterations: development that does not increase the size of buildings eg alterations to external appearance.
- householder development: For example; sheds, garages, games rooms etc. within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling eg. subdivision of houses into flats.

Minor developments are unlikely to raise significant flood risk issues unless:

- they would have an adverse effect on a watercourse, floodplain or its flood defences;
- they would impede access to flood defence and management facilities; or
- where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.

For minor development in Flood Zone 2 and 3 it is the responsibility of the LPA to determine the suitability of development against flood risk. In addition the LPA is also responsible for determining the suitability of development against other forms of flooding (identified through this Level 1 SFRA). In summary the LPA is responsible for determining the suitability of developments in the following situations:

- Development sites less than 1 hectare in area;
- Minor developments in Flood Zones 2 and 3; and
- Developments at risk of flooding from flood sources other than fluvial or tidal (i.e. groundwater, surface water and infrastructure failures).

For developments in these situations the LPA must establish the requirements for FRAs and assess their suitability as part of the planning application.

11.2 Flood Risk Assessments Requirements

In general for all planning applications where a FRA is required under the NPPF it will be necessary to prepare a document to the satisfaction of the decision maker (GBC) who will seek the advice of the EA and Surrey County Council as the LLFA when required.

Although not as well defined as in PPS 25 the NPPF states “there should be iteration between the different levels of flood risk assessment”. Using the previous guidance in PPS 25 the following staged approach comprises of:

The staged approach comprises:

- Level 1 FRA - Screening Study
- Level 2 FRA - Scoping Study
- Level 3 FRA - Detailed Study

However it will not always be necessary to prepare each of the documents, in some cases where a site is known to flood it may be appropriate to prepare a Level 2 or 3 assessment directly.

The following outlines the minimum requirements for FRA at each stage in the process. These include:

- Considering the risk of flooding arising from the development in addition to the risk of flooding to the development;
- Consider, where possible the opportunity to reduce flood risk;

- Identifying and quantifying the vulnerability of the development to flooding from different sources and identify potential flood risk reduction measures;
- Assessments of the remaining 'residual' risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development;
- The vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification, including arrangements for safe access;
- Considering how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems.
- Fully account for current climate change scenarios and their effect on flood zoning and risk.

Where a particular element of the FRA cannot be achieved to the satisfaction of the EA or LPA it will be necessary to advance the next level of FRA.

11.2.1 Level 1- Screening Study

A Level 1 Screening Study is intended to identify if a development site has any flood risk issues that warrant further investigation. This should be based on existing information such as that presented in this Level 1 SFRA. Therefore this type of study could be undertaken by a development control officer in response to the developer query or by a developer where the Level 1 SFRA is available. Using the information presented in the Level 1 SFRA and associated GIS layers a development control officer could advise a developer of any flooding issues affecting the site. This information could then be used by the developer as a basis to further their understanding of how the flood risks could potentially affect their development.

11.2.2 Level 2 – Scoping Study

A level 2 Scoping Study is predominately a qualitative assessment designed to further understanding of how the flood sources affect the site and the options available for mitigation. The Level 2 FRA should be based on existing information to further a developers understanding of the flood risk and how it affects their development. This type of assessment should also be used to inform site master plans raising a developer's awareness of the flood management elements the proposed development may need to consider.

11.2.3 Level 3- Detailed Study

Where the quality and/or quantity of information for any of the flood sources affecting a site is insufficient to enable a robust assessment of the flood risks, further investigation will be required. For example it is considered inappropriate to base a flood risk assessment for a residential care home at risk of flooding from fluvial sources on Flood Zone maps alone. In such cases the results of hydraulic modelling are required to ensure details of flood flow velocity, onset of flooding and depth of flood water is fully understood and that the proposed development incorporates appropriate mitigation measures.

12. Emergency Planning

Objective 7 of this Level 1 SFRA is *'to present sufficient information to inform GBC of the flood considerations necessary in developing and progressing flood emergency planning'*.

In Sir Michael Pitt's Review of the 2007 floods he recognises the 'dedicated and quick response' of emergency services which prevented the worsening of many situations. However, he also identified a number of failings and opportunities to improve our preparedness for future flood events. In particular he advises that with 'stronger local leadership of flood risk management, clarification of roles, more effective co-operation between responsible organisations, better protection of infrastructure and wider and deeper public engagement' the impact of flooding on communities could be significantly reduced.

For many of these opportunities identified by Sir Michael Pitt to be achieved, the role local authorities have in planning and responding to flood events must be clearly defined. To assist local authorities in understanding their role it is essential to have a technically sound emergency plan in place to provide clear procedural instructions to the organisations, companies and individuals involved and affected.

The mobilisation and organisation of the emergency services and supporting agencies (for example GBC) can be integral to the coordinated rescue, treatment and transport of potentially large numbers of displaced residents or casualties. Similarly, during and after a flood event the role of the local authority can include providing transport for the evacuees and safe rest centres in the event of homes being flooded. Further health and welfare issues are inevitable as a result of serious flood events, which may impact on the ability of people to return to their homes or places of business.

Whilst this SFRA is not designed to fulfil the role of providing an emergency plan it does contain useful information for GBC and other key organisations to assist them in understanding their risks (direct and indirect) and begin the process of developing an appropriate co-ordinated response.

12.1 Developing an Emergency Flood Plan

The existing GBC Emergency Plan (2013) sets out the procedures for the activation of the Borough Emergency Management Team (BEMT) who will lead the Borough Council's response to a major incident. It is prepared for the guidance of Borough Council Officers, who may be required to provide additional services to meet the demands of a major peacetime emergency in order to minimise the impact of an event on the community, protect lives, the environment and ensure continuity of service provision. Updates to the emergency plan were proposed after the Winter 2013 flooding.

Specific plans have been developed by the Council for severe weather and flooding incidents, the activation of rest centres as well as business continuity. These are available from the District Emergency Planning Liaison Officer (DEPLO).

12.2 Use of the Emergency Plan in the Planning System

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 through appropriate proactive planning (through application of the Sequential Test), there will remain some developments that will 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.

Ensuring a robust emergency plan is in place will enable GBC to establish where a proposed development will place an unreasonable pressure on emergency services and may 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.

13. Other Possible Users of the SFRA

- 13.1.1 The information contained within the SFRA is primarily compiled for use in the Local Plan process and in Development Control, however the information on flooding may also be useful to a much wider range of users. These potential users include (but are not limited to):
- Transport and highways team including strategic transport planners – the SFRA can be used to identify flood risk to essential infrastructure, both proposed and existing;
 - Education Building Development and Education and Children’s teams – the SFRA should be used to ensure flood risk is considered in the allocation of land for new schools and also used to inform emergency plans that make use of school buildings;
 - Police Constabulary – the SFRA can be used to inform future updates of the Flood Plan. Information within this SFRA on the spatial distribution of flood risk throughout the area should also be used by the Police (and other developers of critical infrastructure) when locating new sites or developments.
- 13.1.2 In order to ensure these potential users are integrated into the SFRA process, it is recommended that this report is made available for their comment, review and future input as appropriate.

14. Conclusions and Recommendations

14.1 Conclusions

Evidence collected through this Level 1 SFRA proves areas of Guildford borough are susceptible to flooding from a variety of flood sources. Flood sources include:

- Fluvial;
- Surface Water ;
- Drainage/Sewers; and,
- Groundwater.

Generally existing development is at limited risk of fluvial flooding within the study area. However, there are some key areas of development and infrastructure at risk of flooding. With the prospect of climate change it is considered that these causes of flood risk will worsen unless management practices are changed and/or mitigation measures are implemented.

14.2 The Next Stage

14.2.1 *Strategic Planning Policy*

Using the information presented in this Level 1 SFRA, GBC should apply the NPPF Sequential Test to their strategic land allocations and future windfall sites, seeking to guide development to areas of lowest flood risk wherever possible.

Where there are insufficient sites in areas of low flood risk to accommodate the required growth, consideration can be given to development in higher risk flood zones, but GBC should give consideration to the vulnerability of developments, seeking to match development vulnerability to acceptable levels of flood risk.

In addition GBC should give consideration to the policy considerations within Section 10, as it develops its Local Plan.

14.3 Recommendations

14.3.1 *Requirement for a Level 2 SFRA*

Where a Level 1 Assessment shows that land outside flood risk area cannot appropriately accommodate all the necessary development, it may be necessary to increase the scope of Assessment to a Level 2 SFRA. This more detailed assessment would provide the information necessary for application of the Exception Test where appropriate. The Level 2 SFRA should improve the quantity/quality of data available in those areas requiring the Exception Test such that decisions regarding the safety and impact of the proposed developments can be made on robust data.

Such situations will include any development allocations in areas of Flood Zone 3 and some locations in Flood Zone 2 where the development vulnerability dictates.

14.3.2 *Development Control*

Development Control Officers within GBC should familiarise themselves with the SFRA and ensure that site specific Flood Risk Assessments are provided where necessary and prepared against the recommendations of Table 6.1.

14.3.3 Emergency Planning

GBC should use the findings of this Level 1 SFRA to refine and inform emergency plans developed for the area. This should include liaison with local emergency services to share and discuss the available data and its implications for emergency planning. When developed, the emergency plans can then be integrated with the planning system for those developments that cannot be located in lower risk flood zones.

14.3.4 River Wey River Bank Strategy

GBC should produce a strategy to advise riparian owners and future property developers on their obligations for the maintenance of riparian areas including a strategy for maintaining and where necessary improving the standard of defence offered by flood defence structures along the River Wey through Guildford urban area.

Such a strategy should be developed in liaison with the Environment Agency.

14.4 When should the SFRA be updated

NPPF and the EA intend for SFRAs to be living documents, updated as new data is available. New sources of data become available all the time and as such GBC should liaise with the EA to determine a suitable period for review and update of the SFRA that is acceptable to all parties. This may include consideration of:

- New climate change updates;
- Modelling result updates;
- Development of new flood alleviation measures;
- New model data;
- Issue of new guidance documentation; and/or
- Development of all allocations; or
- Developments through the EU Flooding Directive.

15. References

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16. Glossary and Notation

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 EA 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
EA Flood Zone 2	Medium probability of flooding. Probability of fluvial flooding is 0.1 – 1%. Probability of tidal flooding is 0.1 – 0.5 %
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 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 that are at highest risk of flooding.
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 EA 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.
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.
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 Document Register

CAPITA

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