Surrey Heath Level 1 Strategic Flood Risk Assessment

Final Report

January 2025

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This report describes work commissioned by Surrey Heath Borough Council by an instruction dated 18 July 2024. The Client's representative for the contract was Kieran Bartlett of Surrey Heath Borough Council. Rachel Flood, Sarah Hambling, Samuel Hotchkiss, and Erica Godsland of JBA Consulting carried out this work.

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Contents

List of Figures

List of Tables

Abbreviations

ACDP	Area with Critical Drainage Problems
AEP	Annual Exceedance Probability
AStGWF	Areas Susceptible to Groundwater Flooding
CC	Climate Change
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EU	European Union
FAA	Flood Alert Area
FCERM	Flood and Coastal Erosion Risk Management
FFL	Finished Floor Level
FRA	Flood Risk Assessment
FRMP	Flood Risk Management Plan
FWA	Flood Warning Area
FWMA	Flood and Water Management Act
FWS	Flood Warning System
GSPZ	Groundwater Source Protection Zone
IDB	Internal Drainage Board
JBA	Jeremy Benn Associates
LFRMS	Local Flood Risk Management Strategy
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	metres Above Ordnance Datum
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
NRD	National Receptor Database
NVZs	Nitrate Vulnerable Zones
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
RBD	River Basin District
RBMP	River Basin Management Plan

RFCC	Regional Flood and Coastal Committee
RMAs	Risk Management Authorities
RoFSW	Risk of Flooding from Surface Water
SCC	Surrey County Council
SFRA	Strategic Flood Risk Assessment
SHBC	Surrey Heath Borough Council
SHLP	Surrey Heath Local Plan 2019 - 2038
SoP	Standard of Protection
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WFD	Water Framework Directive

Definitions

1D model: One-dimensional hydraulic model.

2D model: Two-dimensional hydraulic model.

Annual Exceedance Probability: The probability (expressed as a percentage) of a flood event occurring in any given year.

Brownfield: Previously developed parcel of land.

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.

Climate Change: Long term variations in global temperature and weather patterns caused by natural and human actions.

Design flood: This is a flood event of a given annual flood probability, which is generally taken as: fluvial (river) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or surface water flooding likely to occur with a 1% annual probability (a 1 in 100 change each year), plus an appropriate allowance for climate change, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Exception test: Set out in the National Planning Policy Framework (NPPF), the exception test is a method used to demonstrate that flood risk to people and property will be managed appropriately, where alternative sites at a lower flood risk are not available. The exception test is applied following the sequential test. As set out in Paragraph 178 of the NPPF (December 2024), the exception test should demonstrate that: development that has to be in a flood risk area will provide wider benefits to the community that outweigh flood risk; and 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.

Flood defence: Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific standard of protection (design standard).

Flood Map for Planning: The EA Flood Map for Planning (Rivers and Sea) is an online mapping portal which shows the Flood Zones in England. The Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences and do not account for the possible impacts of climate change.

Flood Risk Assessment: A site-specific assessment of all forms of flood risk to the site and the impact of development of the site to flood risk in the area.

Fluvial Flooding: Flooding resulting from water levels exceeding the bank level of a river (main river or ordinary watercourse).

Green infrastructure: A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity (NPPF, December 2024).

Greenfield: Undeveloped parcel of land.

Lead Local Flood Authority: The unitary authority for the area or if there is no unitary authority, the county council for the area.

Local Flood Risk Management Strategy: The Lead Local Flood Authority (LLFA) are responsible for developing, maintaining, applying, and monitoring a Local Flood Risk Management Strategy which sets out objectives for managing local flooding and is used by the LLFA to co-ordinate flood risk management on a day-to-day basis.

Main river: A watercourse shown as such on the statutory main river map held by the Environment Agency. They are usually the larger rivers and streams. The Environment Agency has permissive powers (not duties) to carry out maintenance and improvement works on main rivers).

Major development: Defined in the National Planning Policy Framework as a housing development where 10 or more homes will be provided, or the site has an area of 0.5 hectares or more, or as a non-residential development with additional floorspace of 1,000m² or more, or a site of 1 hectare or more, or as otherwise provided in the Town and Country Planning (Development Management Procedure) (England) Order 2015 (gov.uk).

Ordinary watercourse: Any 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. The local authority or internal drainage board has permissive powers (not duties) on ordinary watercourses.

Permissive Powers: Authorities have the power to undertake flood risk management activities, but not a duty to do so. This will depend on priorities in flood risk management.

Pitt Review: Comprehensive independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.

Pluvial flooding: See surface water flooding.

Resilience measures: Measures designed to reduce the impact of water that enters property and businesses; could include measures such as raising electrical appliances.

Resistance measures: Measures designed to keep flood water out of properties and businesses; could include flood guards for example.

Return period: Is an estimate of the interval of time between events of a certain intensity or size, in this instance it refers to flood events. It is a statistical measurement denoting the average recurrence interval over an extended period of time.

Riparian owner: A riparian landowner, in a water context, owns land or property, next to a river, stream or ditch.

Risk Management Authority: The Environment Agency; a lead local flood authority; a district council in an area where there is no unitary authority; an internal drainage board; a water company and a highway authority.

Risk: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

Sequential test: Set out in the NPPF, the sequential test is a method used to steer new development to areas with the lowest probability of flooding. The sequential test is a risk-based approach, taking into account all sources of flood risk and climate change.

Sewer flooding: Flooding caused by a blockage or overflowing in a sewer or urban drainage system.

Stakeholder: A person or organisation affected by the problem or solution or interested in the problem or solution. They can be individuals or organisations, includes the public and communities.

Standard of Protection: Defences are provided to reduce the risk of flooding from a river and within the flood and defence field standards are usually described in terms of a flood event return period. For example, a flood embankment could be described as providing a 1% AEP (1 in 100 year) standard of protection.

Surface water flooding: Flooding as a result of surface water runoff as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse or cannot enter it because the network is full to capacity.

Surface Water Management Plan: SWMPs are non-statutory plans which are used to assess existing surface water problems in an area, identify options to manage the level of surface water risk, and inform investment decisions and planning decisions for new development. They also provide an evidence base for the development of local flood risk management strategies.

Sustainable Drainage Systems: SuDS are methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques, such as grates, gullies, and channels.

Water Framework Directive: Under the WFD, all waterbodies have a target to achieve Good Ecological Status (GES) or Good Ecological Potential (GEP) by a set deadline. River Basin Management Plans (RBMPs) set out the ecological objectives for each water body and give deadlines by when objectives need to be met.

Windfall site: A site which becomes available for development unexpectedly and therefore not included as allocated land in a planning authority's Local Plan.

Executive Summary

This report forms part of the evidence base for the Surrey Heath Local Plan 2019 - 2038 (SHLP). This report uses the best available information, including input from key stakeholders, to provide comprehensive and robust evidence on flood risk issues. It replaces the Level 1 SFRA published in 2021 and applies the latest national planning policy and guidance, including:

- National Planning Policy Framework (NPPF) (gov.uk), revised in July 2021 and most recently updated in December 2024.
- Planning Practice Guidance (PPG): Flood risk and coastal change (gov.uk) updated in August 2022.
- Updates to the EA climate change guidance (gov.uk) in July 2021 and May 2022.

Introduction

The key objectives of the assessment are:

- To collate and analyse the latest available information and data for current and future (i.e., climate change) flood risk from all sources, and how these risks may be mitigated against.
- To provide up-dated evidence to underpin policies in the emerging SHLP.
- To provide evidence to support the application of the sequential test for the allocation of new development sites, to support the Council in the preparation of the emerging SHLP.
- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as evidence base for use in the emerging SHLP.
- To help decide when a Flood Risk Assessment (FRA) will be required for individual planning applications.
- To provide advice for applicants carrying out site-specific Flood Risk Assessments (FRAs), including those at risk from sources other than river flooding, or at risk of flooding in the future due to climate change, and outline specific measures or objectives that are required to manage flood risk.
- To provide the basis for applying the sequential test on planning applications, including by identifying sources of flooding other than those in ‘Flood Zones’ and those at risk of flooding in the future.
- To identify opportunities to reduce the causes and impacts of flooding and gather information on the land that is likely to be required for flood risk management structures.

Summary of the borough and flood risk

This SFRA covers the borough of Surrey Heath. The main urban areas in the borough are Camberley, Frimley, Bagshot, Chobham, Bisley, Windlesham, and Mytchett.

Flood risk from all sources has been assessed in this SFRA. Parts of the borough are shown to be at risk of flooding from the following sources: fluvial, surface water, groundwater, sewers, reservoir inundation, and overtopping/ breach of canals. This study has shown that the most significant sources of flood risk across the borough are fluvial and surface water. The points below summarise the findings:

Fluvial: The borough lies across two catchments:

- The unnamed tributaries of the Blackwater River drain the western portion of the borough. The Blackwater River then flows in a north westerly direction before entering the River Loddon.
- The Windle Brook, Mill Bourne and Hale Bourne all drain the eastern portion of the catchment, before ultimately joining The Bourne River and flowing east into the River Wey.

The Bourne River and the Bourne tributaries (Mill Bourne, Hale Bourne, Windle Brook etc) are the primary source of fluvial flood risk in the borough, with more localised flooding alongside the western boundary of the borough from the Blackwater River and its tributaries.
Fluvial flood risk is discussed in Section 4.4 and Appendix D and the flood extents are shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

Surface Water: The Risk of Flooding from Surface Water map shows prominent overland flow routes that largely follow the lower topography of watercourses in the borough, including The Bourne River and its associated tributaries (the Mill Bourne, Hale Bourne and Windle Brook etc). There are some areas where there are additional flow paths and areas of ponding, for example where water is impounded at road or rail embankments and in low-lying areas. Much of the borough is rural, with areas of urbanisation within towns having an increased risk of surface water flooding affecting key infrastructure. There are considerable flow routes following the roads and watercourses through the main urban areas of Camberley, Frimley, Bagshot, Chobham, Bisley and Windlesham, alongside isolated areas of ponding, which may affect many properties across these settlements.

Surface water flood risk is discussed in Section 4.5 and Appendix D and the flood extents are shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

Climate Change: Areas at risk of flooding today are likely to become at increased risk in the future and the frequency of flooding will also increase in such areas, due to climate change. Flood extents will increase; in some locations this may be minimal, but flood depth, velocity and hazard may have more of an impact due to climate change. This SFRA provides an assessment of the impacts of climate change on fluvial and surface water flood risk.

It is recommended that the Council work with other Risk Management Authorities (RMAs) to review the long-term sustainability of existing and new development when developing climate change plans and strategies for the borough.

The approach to climate change is discussed in Section 5 and the flood extents are also shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

Sewer: Thames Water provide water services and sewerage services across the borough. Thames Water have provided details of historic sewer flooding across the borough. Postcodes with a high number of previous sewer flooding events have been identified in several areas including, Camberley, Frimley and Chobham. *Sewer flood risk is discussed in Section 4.6.*

Groundwater: The Areas Susceptible to Groundwater Flooding map shows that in general, the main areas with greater than 50% susceptibility to groundwater flooding are located towards the centre and southwest of the borough near Chobham, Bagshot and Mytchett. The JBA Groundwater Emergence Map emulates this with large parts of the east, centre and west of the borough having predicted groundwater emergence levels that are either at or very near (within 0.025m of) the ground surface, particularly in Chobham, Frimley and Mytchett. There is no national groundwater flood dataset to inform the areas at risk from groundwater flooding; however, emergence mapping when considered in conjunction with topography and surface water flow paths can indicate areas where groundwater is likely to emerge, and the flow paths it may take once above the ground. *Groundwater flood risk is discussed in Section 4.7 and Appendix D, and the AStGWF map is shown in the* Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

Canals: The Basingstoke Canal runs through the southernmost area of the borough, parallel to the South Western Main Line and then along the eastern side of Mychett and Frimley Green. The Basingstoke Canal Authority was consulted as part of this study but no information on whether there are records of overtopping or breach incidents was provided by the authority within the SFRA timescales. *Canal flood risk is discussed in Section 4.8.*

Reservoirs: There are four reservoirs located within the borough, and three located outside the study area where the 'wet day' or 'dry day' scenario extents encroach into the borough. There is a potential risk of flooding from reservoirs both within the borough and those outside. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific FRAs (where relevant) in accordance with the updated PPG: Flood risk and coastal change. *Reservoir flood risk is discussed in Section 4.8 and Appendix D. The 'Dry Day' and 'Wet Day' flood extents are shown in the* Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

Defences

The EA Asset Information Management System (AIMS) dataset provides information on flood defence assets across the borough. The only formal defence types located within the borough are an embankment and two flood walls located to the west and centre of the borough near Frimley and Windlesham. *Further information on defences across the borough is available in Section 6.4 and shown in the* Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud)*.*

How to use this report

Planners and developers

The SFRA provides recommendations regarding all sources of flood risk across the borough, which can be used to inform policy on flood risk within the emerging SHLP. This includes how the cumulative impact of development should be considered.

It provides the latest flood risk data and guidance to inform the sequential test, for both allocations and individual planning applications, and provides guidance on how to apply the exception test.

Links have been provided for relevant guidance documents and policies published by other RMAs such as the Lead Local Flood Authority (LLFA) and the Environment Agency (EA).

This SFRA is a strategic assessment of flood risk and does not replace the need for site-specific FRAs, where required. The SFRA provides guidance for the development industry and development management officers to establish when an FRA is required and to assess whether site-specific FRAs meet the required quality standard (Section 8.2). This should be used alongside the EA's FRA Guidance (gov.uk). The SFRA can be used to help identify which locations and development may require emergency planning provision.

Developers need to check and ensure that new development does not increase surface water runoff rates and volumes from a site or contribute to cumulative effects of development at sensitive locations (Section 7). Section 8.5.1 provides information on the surface water drainage requirements of the LLFA. Further assessments may also be required at this stage to manage the risk from sewer flooding to a site, and developers should contact Thames Water for further advice. SuDS should be considered at the earliest stages that a site is planned to be developed which will help to minimise costs and overcome any site-specific constraints.

At the planning application stage, developers may need to undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extent (including latest climate change allowances, last updated in May 2022), inform master-planning, and demonstrate, if required, that the exception test is satisfied.

Neighbourhood Plans

Neighbourhood planning groups can use the information in this SFRA to assess the risk of flooding to sites within their community, using Section 4, the sources of flooding across the borough and the interactive flood mapping on the Council website. The SFRA will also be helpful for developing community level flood risk policies in high flood risk areas. Similarly, all known available recorded historical flood events across the borough are listed in Section 4.2. This can be used to supplement local knowledge regarding areas worst hit by flooding. Ongoing and proposed flood alleviation schemes planned within the borough are outlined in Section 6 and Section 8 discusses mitigations, resistance and resilience measures which can be applied to alleviate flood risk to an area.

Mapping

Mapping for this SFRA is available on Surrey Heath Borough Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud). The SFRA mapping highlights on a strategic scale flood risk from fluvial, surface water and reservoirs sources, and where groundwater emergence may occur; as well as where the effects of climate change are most likely. The maps are useful to provide a community level view of flood risk but may not identify if an individual property is at risk of flooding or depict small scale changes in flood risk. Local knowledge of flood mechanisms will need to be included to complement this mapping.

The mapping data should always be supplemented by direct consultation with the relevant wastewater company to ascertain if there is any site-specific risk from a public sewer. This is because sewer flood risk information is not publicly available and would need to be considered on a site-specific basis.

Cumulative Impact Assessment (CIA)

Under the NPPF, strategic policies and their supporting SFRAs are required to ‘consider cumulative impacts in, or affecting, local areas susceptible to flooding’ (Paragraph 171). A Cumulative Impact Assessment (CIA) has identified which catchments in the borough are more sensitive to the cumulative impact of development and where more stringent policy regarding flood risk is recommended. Any development in these areas should seek to contribute to work that reduces wider flood risk in those catchments.

1 Introduction

1.1 Purpose of a Strategic Flood Risk Assessment (SFRA)

Surrey Heath Borough Council as the Local Planning Authority (LPA) are responsible for producing a Local Plan, determining planning applications, enforcement in response to breaches of planning control, and supporting neighbourhood planning. The Council published its Pre-Submission Surrey Heath Local Plan (2019-2038): (Regulation 19) document in August 2024. Once adopted, the plan will replace their Current Local Plan (surreyheath.gov.uk).

As set out in the 2024 NPPF (Paragraph 171) "Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards."

In July 2024, Surrey Heath Borough Council commissioned a new Level 1 SFRA following advice from the EA to reflect the latest legislation and guidance and incorporate new available modelling in the borough. This SFRA replaces the previous 2021 Level 1 SFRA (surreyheath.gov.uk).

The 'How to prepare a Strategic Flood Risk Assessment guidance' (gov.uk) (last updated May 2024), sets out the requirements that the LPA must address within its SFRA and has been used to undertake this Level 1 SFRA.

As the data available for SFRAs and the relevant legislation is continually changing, an SFRA should be updated to reflect changes where applicable and reasonably practicable. Under any changes in guidance or legislation, the implications on the SFRA should be considered and a review undertaken where this is deemed reasonably necessary.

1.2 Levels of SFRA

The PPG: Flood risk and coastal change (gov.uk) identifies two levels of SFRA.

Level 1 SFRAs are high-level strategic documents and do not go into detail on an individual site-specific basis. Where potential site allocations are not at major flood risk and where development pressures are low, a Level 1 assessment is likely to be sufficient, without the LPA progressing to a Level 2 assessment. The Level 1 assessment should be of sufficient detail to enable application of the sequential test, to inform the allocation of development to areas of lower flood risk.

A Level 2 assessment is required where land outside flood risk areas cannot appropriately accommodate all necessary development, creating the need to apply the NPPF's exception test, or if an LPA believe they may receive high numbers of applications in flood risk areas on sites not identified in the Local Plan. In these circumstances the assessment should consider the detailed nature of the flood characteristics from all sources, both now and in the future.

This report fulfils the requirements of a Level 1 SFRA.

1.3 Study area

The study area for this SFRA is the borough of Surrey Heath, which is located in the north west of Surrey, in the southeast of England. The western half of the borough is mainly urban in character and comprises of Camberley (main centre), Frimley and the villages of Frimley Green, Mytchett and Deepcut. The eastern half of the borough is mostly rural but includes the larger villages of Bisley, Bagshot, Lightwater, West End and Windlesham, and the smaller village of Chobham.

The study area is bounded by seven other authorities, shown in Figure 1-1:

- Bracknell Forest
- Guildford Borough
- Hart District
- Royal Borough of Windsor and Maidenhead
- Runnymede Borough
- Rushmoor Borough
- Woking Borough

There are two water service providers within the Borough; South East Water, which supplies the western side of the borough and Affinity Water which supplies the eastern side of the borough. The sewerage provider for the whole borough is Thames Water. Locations where these companies supply can be found on the UK Parliament website (parliament.uk).

The LLFA across the entire borough is Surrey County Council.

The key watercourses which flow through the borough are the River Blackwater, which flows in a northerly direction along the western border, and Hale Bourne / Mill Bourne (which become Addlestone Bourne), which flows in a south-easterly direction through the eastern side of the borough. The watercourses are shown in Figure 1-2.

1.4 Consultation

SFRAs should be prepared in consultation with other Risk Management Authorities (RMAs). In addition to the LPA the following parties have been consulted during the preparation of this version of the SFRA through data requests and draft report reviews:

- Surrey County Council (SCC) as LLFA
- Environment Agency (EA)
- Thames Water

In addition, the following parties were consulted through data requests during the preparation of this SFRA:

- The neighbouring LPAs to provide data on cross-boundary development implications
- Surrey Fire and Rescue Service
- Basingstoke Canal Authority

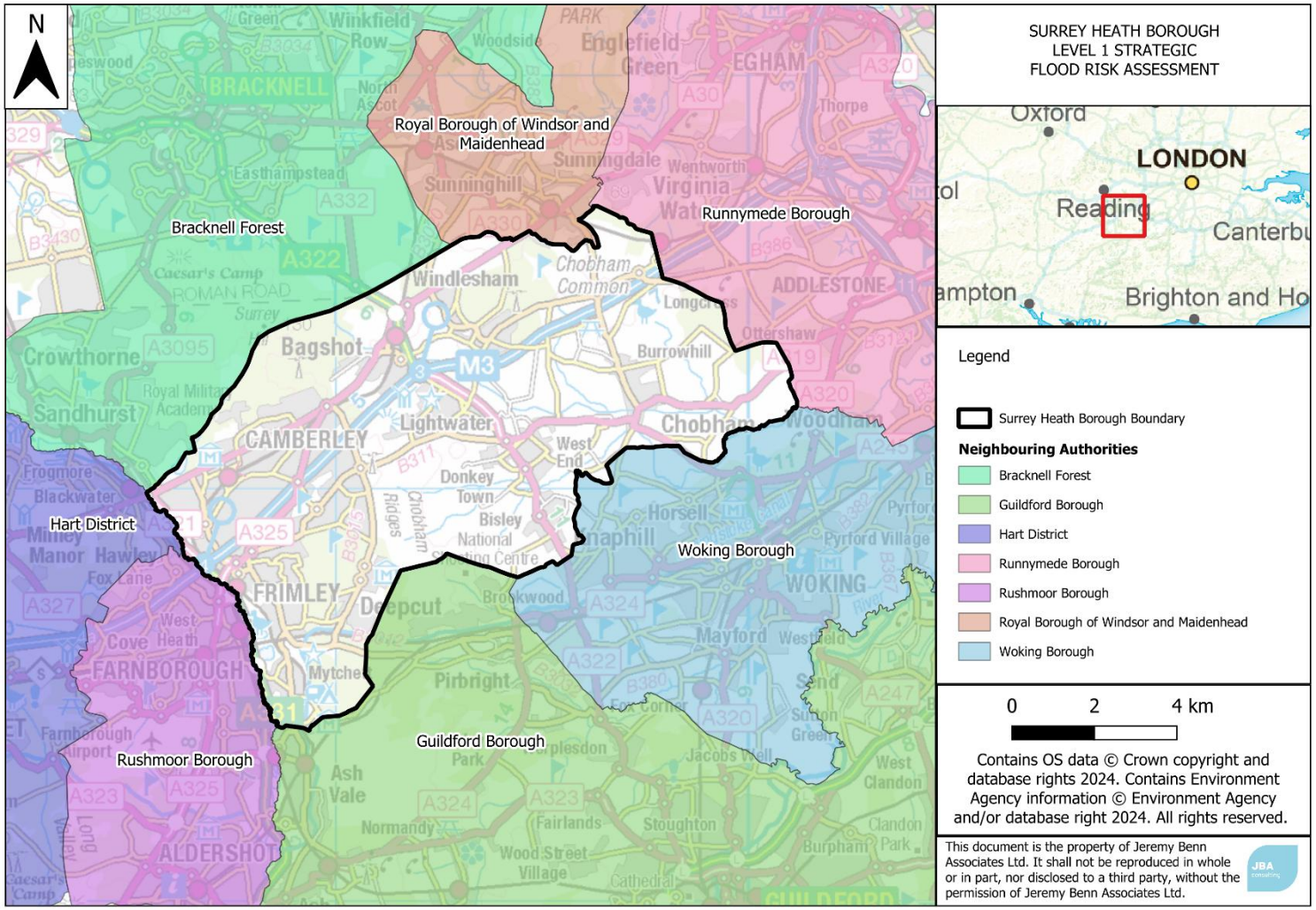


Figure 1-1: Surrey Heath borough and its neighbouring authorities.

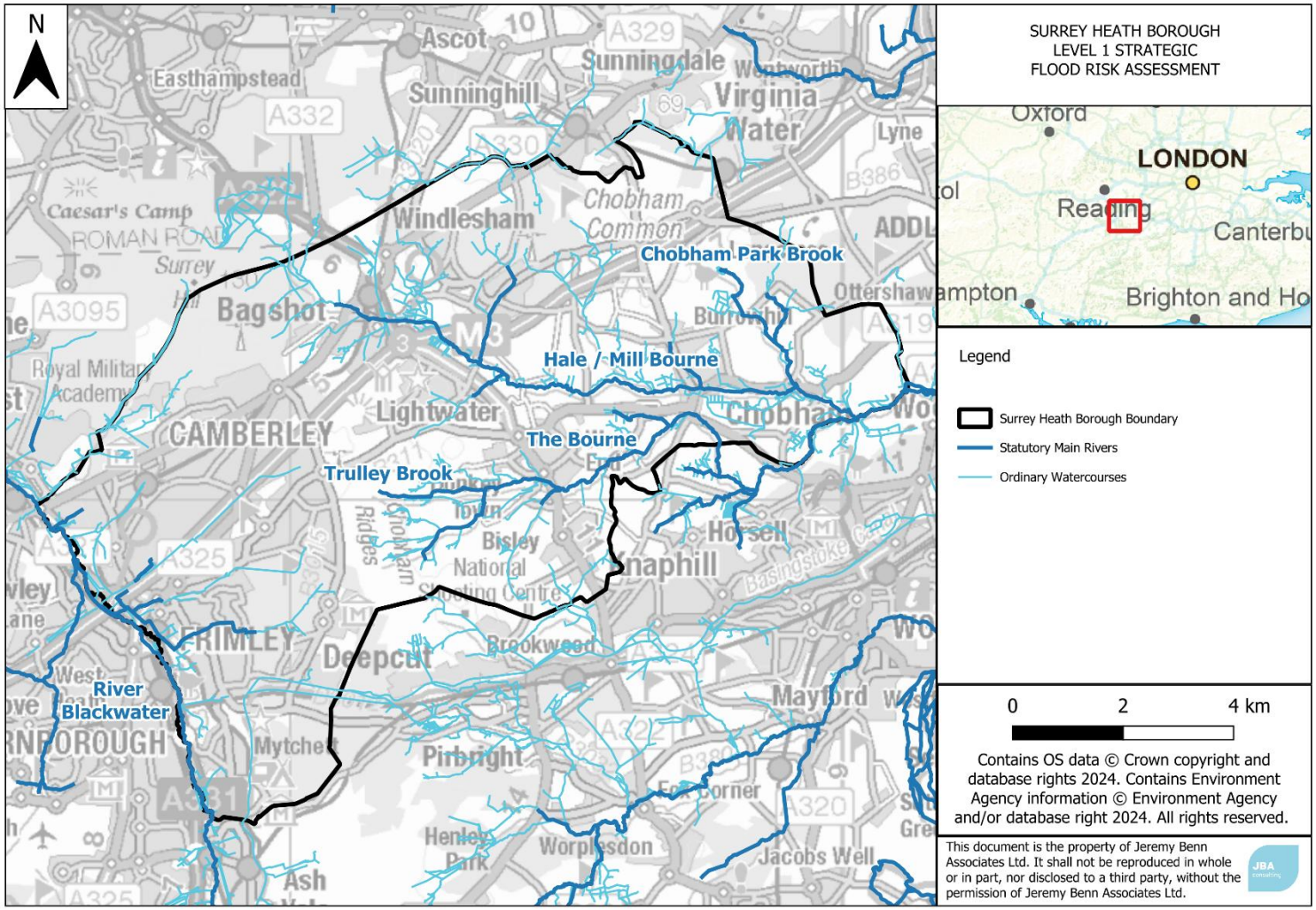


Figure 1-2: Main rivers and ordinary watercourses across the borough.

1.5 Structure of this report

Table 1-1 sets out the contents of this Level 1 SFRA report and appendices, and how to use each section.

Table 1-1: Sets out the contents of the report and how to use each section.

Section	Contents	How to use
Executive summary	This section focuses on how the SFRA can be used by planners, developers, and neighbourhood planners.	Users should refer to this section for a summary of the Level 1 findings and recommendations.
1. Introduction	This section provides a background to the study, the Local Plan stage the SFRA informs, the borough, the roles and responsibilities for the organisations involved in flood management and how they were involved in the SFRA. It also provides a short introduction to how flood risk is assessed and the importance of considering all sources.	Users should refer to this section for general information and context.
2. Flood risk policy and strategy	This section sets out the relevant legislation, policy, and strategy for flood risk management at a national, regional, and local level.	Users should refer to this section for any relevant policy which may underpin strategic or site-specific assessments.
3. Planning policy for flood risk management	This section provides an overview of both national and existing Local Plan policy on flood risk management. This includes the Flood Zones, application of the Sequential Approach and sequential/exception test process. It provides guidance for the Councils and developers on the application of the sequential and exception test for both allocations and windfall sites, at allocation and planning application stages.	Users should use this section to understand and follow the steps required for the sequential and exception tests.
4. Understanding	This section provides an overview of the characteristics	This section should be used to understand all

Section	Contents	How to use
flood risk in the study area	of flooding affecting the study area and key risks including historical flooding incidents, flood risk from all sources and flood warning arrangements.	sources of flood risk across the study area including where has flooded historically. This section may also help identify any data gaps, in conjunction with Appendix B.
5. Impact of climate change	This section outlines the latest climate change guidance published by the EA and how this was applied to the SFRA. It also sets out how developers should apply the guidance to inform site-specific FRAs.	This section should be used to understand the climate change allowances for a range of epochs and conditions, linked to the vulnerability of a development.
6. Flood alleviation schemes and assets	This section provides a summary of current flood defences and asset management and future planned schemes. It also introduces actual and residual flood risk.	This section should be used to understand if there are any defences or flood schemes in a particular area, for further detailed assessment at site specific stage.
7. Cumulative impact of development and strategic solutions	This section includes the Cumulative Impact Assessment (CIA) identifying the areas of the borough which are potentially most sensitive to increased flood risk as a result of development.	Planners should use this section to help develop policy recommendations for the cumulative impact of development.
8. Flood risk management for developers	This section contains guidance for developers on FRAs, considering flood risk from all sources.	Developers should use this section to understand requirements for FRAs and what conditions/guidance documents should be followed, as well as mitigation options.
9. Surface water management and Sustainable Drainage Systems	This section provides an overview of SuDS, Guidance for developers on Surface Water Drainage Strategies, considering any specific local standards and guidance for SuDS from the LLFA.	Developers should use this section to understand what national, regional, and local SuDS standards are applicable. Hyperlinks are provided.
10. Recommendations	This section summarises sources of flood risk in the study area and outlines planning policy recommendations. It also sets out the next steps.	Developers and planners should use this as a summary of the SFRA. Developers should refer to the Level 1 SFRA recommendations when considering site specific assessments.

Section	Contents	How to use
Appendices	**Appendix A: Interactive Mapping Portal User Guide** Provides further details of the mapping data shown within the Councils Interactive Mapping Portal (surreyheath.hub.xmap.cloud). **Appendix B: Data Sources used in this SFRA** Details the data available to inform the SFRA and provides information on where the data can be obtained (if applicable). **Appendix C: Guide for using available flood risk data in applying the sequential test** Discusses the availability and limitations of data for assessing the risk from different sources of flooding both now and in the future within the sequential test, including a user guide for the Council to use the data supplied in the SFRA through the application of the sequential test for different sources of risk. **Appendix D: Summary of flood risk across the borough** Highlights the key areas at risk from different sources of flooding across the borough. **Appendix E: JBA Groundwater Emergence Mapping** Shows the JBA Groundwater Emergence Mapping which is not shown on the Councils Interactive Mapping Portal (surreyheath.hub.xmap.cloud).	Planners and developers should use these appendices to understand what data has been used in the SFRA, to inform the application of the sequential and exception tests, as relevant, and to use these maps and tabulated summaries of flood risk to understand the nature and location of flood risk.

2 Flood risk policy and strategy

This section sets out the flood risk management roles and responsibilities for different organisations and relevant legislation, policy, and strategy.

2.1 Roles and responsibilities for Flood Risk Management across the borough

There are different organisations in and around the study area that have responsibilities for flood risk management, known as Risk Management Authorities (RMAs). These are listed in Table 2-1 with a summary of their responsibilities.

Further information on the roles and responsibilities of the RMAs is available in Annex A of the National Flood and Coastal Erosion Risk Management Strategy (FCERM) (gov.uk) for England.

The Local Government Association (gov.uk) also provide further information on the roles and responsibilities for managing flood risk.

The National flood risk standing advice for local planning authorities (gov.uk) provides advice on when to consult the EA.

Table 2-1: Roles and responsibilities for RMAs.

Risk Management Authority	Strategic Level	Operational Level	Planning role
SHBC as LPA	Local Plans	Determination of planning applications	Determination of planning applications
EA	Strategic overview for all sources of flooding, National Strategy, and general supervision	Main River (e.g., River Sence) and reservoirs (Flood Risk Activity Permits (FRAPs), enforcement, and works)	Statutory consultee for certain development in Flood Zones 2 and 3 and all works within 20 metres of a main river.
SCC as LLFA	Coordination of Local Flood Risk Management and maintaining a Local Flood Risk Management Strategy (LFRMS)	Surface water, groundwater, and ordinary watercourses (consenting, enforcement, and works)	Statutory consultee for major developments

Risk Management Authority	Strategic Level	Operational Level	Planning role
Thames Water	Asset Management Plans, supported by Periodic Reviews (business cases), develop drainage and wastewater management plans	Public sewers and some reservoirs	Non-statutory consultee
Highways Authorities - National Highways for motorways and trunk roads and SCC for non-trunk roads	Highway drainage policy and planning	Highway drainage	Statutory consultee regarding highways design standards and adoptions

2.1.1 Riparian ownership

Land and property owners are responsible for the maintenance of watercourses either on or next to their properties, called Riparian Owners. Riparian Owners are also responsible for the protection of their properties from flooding as well as other management activities, for example by maintaining riverbeds/ banks, controlling invasive species, and allowing the flow of water to pass without obstruction. More information can be found in the 'Your watercourse: rights and roles guide' which can be downloaded from the Government website 'Owning a watercourse' (gov.uk).

When it comes to undertaking works to reduce flood risk, the EA, and SCC as LLFA do have permissive powers, but limited resources must be prioritised and targeted to where they can have the greatest effect. Permissive powers mean that RMAs are permitted to undertake works on watercourses but are not obliged.

2.2 Relevant legislation

The following legislation is relevant to development and flood risk in the study area. Hyperlinks are provided to external documents:

- Town and Country Planning Act (1990) (gov.uk), Water Industry Act (1991) (gov.uk), Land Drainage Act (1991) (gov.uk), Environment Act (1995) (gov.uk), which set out the regulations for development on land in England and Wales.

- Flood and Water Management Act (2010) (gov.uk) – as amended and implanted via secondary legislation. These set out the roles and responsibilities for organisations that have a role in Flood Risk Management.
- The Land Drainage Act (1991, as amended) (gov.uk) and Environmental Permitting Regulations (2018) (gov.uk) also set out where developers will need to apply for additional permission (as well as planning permission) to undertake works to an ordinary watercourse or main river.
- The Water Environment Regulations (2017) (gov.uk) – these transpose the European Water Framework Directive (WFD) (2000) into law and require the EA to produce River Basin Management Plans (RBMPs). These aim to improve/maintain the water quality of aquatic ecosystems, riparian ecosystems, and wetlands so that they reach 'good' status.
- The Environment Act 2021 (gov.uk) requires developers to provide Biodiversity Net Gain (BNG) and for LPAs to develop Local Nature Recovery Strategies (LNRS). Strategic site allocations in Local Plans which present opportunities for BNG or areas for habitat improvement/creation identified by the LNRS could have parallel opportunities to contribute to reduced flood risk from a range of sources.
- Other environmental legislation such as the Habitats Directive (1992) (gov.uk), Environmental Impact Assessment Directive (2014) (gov.uk), and The Environmental Assessment of Plans and Programmes (Amendment) Regulations 2020 (gov.uk) also apply as appropriate to strategic and site-specific developments to guard against environmental damage.
- The Planning and Compulsory Purchase Act (2004) (gov.uk) Section 19(1A) requires local planning authorities to include in their Local Plans 'policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change.'

2.3 Key national, regional, and local policy documents and strategies

Table 2-2 summarises relevant national, regional, and local flood risk policy and strategy documents and how these apply to development and flood risk. Hyperlinks are provided to external documents. These documents may:

- Provide useful and specific local information to inform FRAs within the local area.
- Set the strategic policy and direction for flood risk management and drainage – they may contain policies and action plans that set out what future flood mitigation and climate change adaptation plans may affect a development site. A developer should seek to contribute in all instances to the strategic vision for flood risk management and drainage in the study area.
- Provide guidance and/or standards that inform how a developer should assess flood risk and/or design flood mitigation and SuDS.

The following sections provide further details on some of these documents and strategies.

Please note that the links to these documents may change over time and any requests for these documents should be directed toward the author.

Table 2-2: National, regional, and local flood risk policy and strategy documents.

Policy level	Document, lead author and date	Contextual information	Policy and measures	Development design requirements	Next update due
National	Flood and Coastal Management Strategy (EA) 2020 (gov.uk)	Yes	Yes	No	2026
National	National Planning Policy Framework updated in December 2024 (gov.uk)	Yes	Yes	Yes	-
National	Planning Practice Guidance (PPG): Flood risk and coastal change (gov.uk) updated in August 2022	Yes	Yes	Yes	-
Regional	Thames Catchment Flood Management Plan (2009) (gov.uk)	Yes	Yes	No	-
Regional	Thames River Bain District Management Plan (2022) (gov.uk)	Yes	Yes	No	2028
Regional	Thames Water Resources Management Plan (2024) (thameswater.co.uk)	Yes	No	No	-
Regional	Thames Water Drainage and Wastewater Management Plan (2023) (thameswater.co.uk)	Yes	No	No	-
Regional	Climate change guidance for development and flood risk (EA) last updated May 2022 (gov.uk)	Yes	No	Yes	-
Local	Surrey Preliminary Flood Risk Assessment (2011) (surreycc.gov.uk)	Yes	No	No	-
Local	Surrey Preliminary Flood Risk Assessment Addendum (2017) (gov.uk)	Yes	No	No	-
Local	Hart, Rushmoor and Surrey Heath Water Cycle Study (2017) (surreyheath.gov.uk)	Yes	Yes	Yes	-

2.3.1 The National Flood and Coastal Erosion Risk Management Strategy for England (2020)

The National Flood and Coastal Erosion Risk Management Strategy for England (gov.uk) provides the overarching framework for future action by all RMAs to tackle flooding and coastal erosion in England. The Strategy looks ahead to 2100 and the actions needed to address the challenge of climate change.

The Strategy has been split into three high level ambitions:

- Climate resilient places.
- Today's growth and infrastructure resilient in tomorrow's climate.
- A nation ready to respond and adapt to flooding and coastal change.

Measures within the Strategy include:

- Updating the national river, coastal, and surface water flood risk mapping and producing a new set of long-term investment scenarios to improve understanding of future risk and investment needs.
- Trialling new and innovative funding models to contribute to the investment needs for flood and coastal resilience.
- Flood resilience pilot studies.
- Developing an adaptive approach to the impacts of climate change by seeking nature-based solutions towards flooding and erosion issues, integrating Natural Flood Management (NFM) into the new Environmental Land Management scheme, and considering long term adaptive approaches in Local Plans.
- Maximising the opportunities for flood and coastal resilience as part of contributing to environmental net gain for development proposals, investing in flood risk infrastructure that supports sustainable growth, and developing world leading ways of reducing the carbon and environmental impact from the construction and operation of flood and coastal defences.
- Aligning long term strategic planning cycles for flood and coastal work between stakeholders.
- Consistent approaches to asset management and record keeping.
- Updating guidance on managing high risk reservoirs considering climate change.
- Development of digital tools to communicate flood risk, transforming the flood warning service, supporting communities to plan for flood events, increasing flood response and recovery support, and mainstreaming property flood resilience measures and 'building back better' after flooding.

The Strategy was laid before parliament in July 2020 for formal adoption and published alongside a Policy Statement for Flood and Coastal Erosion Risk Management (gov.uk). The statement sets out five key commitments which will accelerate progress to better protect and better prepare the country for the coming years:

1. Upgrading and expanding flood defences and infrastructure across the country,
2. Managing the flow of water to both reduce flood risk and manage drought,

3. Harnessing the power of nature to not only reduce flood risk, but deliver benefits for the environment, nature, and communities,
4. Better preparing communities for when flooding and erosion does occur, and
5. Ensuring every area of England has a comprehensive Local Plan for dealing with flooding and coastal erosion.

It can be expected that the implementation of the National Strategy will lead to the publication of new guidance and practice that is focused on resilience and adaptation over the coming years. It will be important to adjust the content of the SFRA so that changes in approach are captured in the delivery of the Local Plan.

2.3.2 Flood Risk Regulations (2009)

The Flood Risk Regulations (FRRs) 2009 translated the European Union (EU) Floods Directive into UK law, setting the requirement for Member States to complete an assessment of flood risk, known in England as a Preliminary Flood Risk Assessment (PFRA). This information was then used to identify areas where there is a significant risk of flooding (Flood Risk Areas), where States had to undertake Flood Risk and Hazard Mapping and produce Flood Risk Management Plans (FRMPs). This cycle was repeated on a six-yearly basis.

As of 1 January 2024, the Retained EU Law (Reform and Revocation) Bill automatically repealed any retained EU law (REUL) not otherwise preserved or replaced in UK law before the end of 2023, including the FRRs 2009 which transposed the EU Floods Directive into legislation. This is because much of the FRRs is duplicated in existing domestic legislation, namely the Flood and Water Management Act 2010. The EA and LLFAs in England will therefore no longer be required to comply with a third cycle of planning, however the Government expects to see continued implementation of the FRMPs 2021-2027. The objectives and measures from the second cycle FRMPs are presented in the EA Flood Plan Explorer (gov.uk).

The SCC PFRA 2011 (surreycc.gov.uk) identified one Indicative Flood Risk Area (IFRA) within the SCC administrative boundary: the London IFRA. This IFRA extends into the north of Surrey but lies outside of the Surrey Heath Borough. As part of the SCC PFRA Addendum 2017 (gov.uk), Farnborough and Reigate were also identified as Flood Risk Areas, however, these areas are also located outside of the Surrey Heath Borough.

The EA PFRA (2018) (gov.uk) for river, seas and reservoir flooding identified 25 Flood Risk Areas in the Thames RBD, but none of these affect the borough.

2.3.3 Flood and Water Management Act (2010)

The FWMA was passed in April 2010 following the recommendations made within the Pitt Review (2009) following the flooding in 2007. It aims to improve both flood risk management and the way water resources are managed.

The FWMA has created clearer roles and responsibilities and helped to define a more risk-based approach to dealing with flooding. This included the creation of a lead role for Local

Authorities, as LLFAs, designed to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA. Schedule 3 of the FWMA 2010 is expected to be implemented by the Government following periods of consultation, making SuDS mandatory for new developments in England. Further information on Schedule 3 is provided in Section 9.1.

The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by Local Authorities and other key partners. The integration and synergy of strategies and plans at national, regional, and local scales is increasingly important to protect vulnerable communities and deliver sustainable regeneration and growth.

2.3.4 The Water Framework Directive and Water Environment Regulations and River Basin Management Plans

The purpose of the WFD is to deliver improvements across Europe in the management of water quality and water resources through a series of plans called RBMPs for each River Basin District. The EA manages the RBMPs and must review and update them every six years. The first cycle of RBMPs were published in 2009 and were most recently updated in 2022. The borough falls under the Thames RBMP (gov.uk).

2.3.5 Catchment Flood Management Plans

Surrey Heath Borough lies within the Thames CFMP (gov.uk) area and falls within Sub-area 3: Towns and Villages in open floodplain (South) - Rural Wey. Sub Area 3 has preferred Policy Option 2 - Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.

Proposed actions in this area relevant to the emerging SHLP include:

- Investigating opportunities to maintain river flow capacities through urban areas, whilst reducing maintenance in undeveloped areas to allow flood storage on floodplain.
- Focussing efforts on flood warning, awareness, and providing guidance to those at risk to better prepare and respond to flooding.
- Enhancing biodiversity by creating new and improved habitats, along with opportunities for recreation and navigation.

2.3.6 Local Flood Risk Management Strategy (LFRMS)

The LFRMS for Surrey (surreycc.gov.uk) was published in 2017 and sets out seven principles which support the strategy's vision: 'To make Surrey more resilient to flooding on a long-term basis through a co-ordinated approach with residents and partners'. These are:

- A long term vision: we will reduce the impact of flooding in Surrey and future proof project outcomes on a sustainable, long term basis that considers the effect of climate change.

- A catchment-based approach: we will use a holistic catchment based approach to assess and manage the integrated flood risk within Surrey and upstream/downstream river catchments
- Partnership working: we will work in co-operation with partner risk management authorities to mitigate the risk of flooding in the county while achieving cross-cutting corporate goals.
- Community resilience: we will empower communities to be more resilient to flooding by supporting them to reduce risk, recover from incidents more quickly and lessen the disruptive impacts of flooding.
- Enhancing growth and wellbeing: we will ensure that efforts to reduce flood risk in Surrey enhance and protect the social, environmental and economic wellbeing of Surrey.
- Sustainable flood risk management through planning and development: we will use the opportunities presented by new development and regeneration to make communities more resilient to flooding.
- Capital investment: we will invest in flood alleviation schemes that reduce the risk of flooding to people, property and the natural environment where a robust business case indicates that this will provide value for money and that wide social, environmental and economic benefits will be achieved.

The LFRMS then sets out eight objectives, covering information, maintenance, risk management and authority responsibility, land owner responsibility, resilience, planning, investment, and investigation, which describe the main ways in which local flood risk is managed in Surrey.

SCC also publish an annual impact report which summarises the progress made towards the objectives as laid out in the Surrey LFRMS. The Impact Report 2023-24 (surreycc.gov.uk) is the latest impact report and sets out the progress made across the 2023-24 financial year across the entire SCC administrative area. Specific works undertaken in Surrey Heath include community engagement with commencement of discussions and/or ongoing consultation with those associated to the Chobham Flood Alleviation Scheme works.

2.3.7 Local policy and guidance for SuDS

The 2024 NPPF states that: ‘Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal.’ (Paragraph 182) and 'development should only be allowed in areas at risk of flooding where… it can be demonstrated that… c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate' (Paragraph 181). When considering major planning applications, local planning authorities (LPAs) should consult the relevant LLFA on the management of surface water to satisfy that:

- The proposed minimum standards of operation are appropriate.

- Using planning conditions or planning obligations there are clear arrangements for on-going maintenance over the development's lifetime.

At the time of writing this SFRA, the following documents and policies are relevant to SuDS and surface water in the study area. Hyperlinks are provided to external documents:

- SuDS Manual (C753) (ciria.org), published in 2007 and updated in 2015.
- Defra Non-statutory technical standards for sustainable drainage systems (gov.uk), 2015
- Defra National Standards for sustainable drainage systems Designing, constructing (including LASOO best practice guidance), operating, and maintaining drainage for surface runoff (gov.uk), 2011
- Building Regulations Part H (MHCLG) (gov.uk), 2010
- SCC LLFA SuDS Guidance and LLFA Pro-forma checklist (surreycc.gov.uk)

The 2024 NPPF states that flood risk should be managed "using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding" (Paragraph 172). Alongside flood risk management, SuDS can provide amenity, biodiversity, recreation, community, and water resources benefits. Where possible, priority should be given to SuDS that can deliver multiple benefits.

2.3.8 Water Cycle Studies

Water Cycle Studies (WCS) assist local authorities to select and develop growth proposals that minimise impacts on the environment, water quality, water resources, infrastructure, and flood risk and help to identify ways of mitigating such impacts.

Hart, Rushmoor, and Surrey Heath commissioned AECOM in 2016 to conduct the Hart, Rushmoor and Surrey Heath Water Cycle Study (WCS) (surreyheath.gov.uk), which was completed in May 2017. The purpose of this joint partnership Water Cycle Study (WCS) was to guide the preparation of local authority Local Plans and ensure that future development does not harm the water environment in the study area.

The WCS has considered four potential development scenarios within the study area, evaluating each for water supply, wastewater, and environmental capacity. It identifies water quality issues, necessary infrastructure upgrades, and potential constraints. The study offers solutions to address these constraints, ensuring that future major developments, both planned and potential, can proceed. It also includes recommendations to support the delivery of these developments. An update to the WCS focused on Surrey Heath is currently being produced.

2.3.9 Surface Water Management Plans

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location and establish a long-term action plan to manage surface water in a particular area. They are intended to influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning, and future developments.

At the time of publication of this SFRA document, no SWMP has been undertaken for the borough.

2.3.10 Water Resources Management Plans (WRMPs)

Under the duties set out in sections 37A to 37D of the Water Industry Act 1991, all water companies across England and Wales must prepare and maintain a WRMP. This must be prepared at least every five years and reviewed annually.

WRMPs should set out how a water company intends to achieve a secure supply of water for their customers and a protected and enhanced environment.

Thames Water published their Water resources management plan 2024 (thameswater.co.uk) in October 2024. This revised 2024 plan looks ahead across the period between 2025 and 2075 and demonstrates long-term plans to accommodate the impacts of population growth, drought, environmental legislations and climate change.

2.3.11 Drainage and Wastewater Management Plans (DWMPs)

Water and sewage companies must produce a Drainage and Wastewater Management Plan (DWMP), covering a minimum of 25 years, which looks at current and future capacity, pressures, and risks to their networks such as climate change and population growth. They detail how a company plans to work with RMAs and drainage asset owners to manage future pressures. The water and sewage company for the study area is Thames Water.

Thames Water's DWMP [Final 2023] (thameswater.co.uk) provides evidence to support and inform their PR24 business plan, which covers the period from 2025 to 2030. The Thames Water DWMP sets out a long term strategic plan that will set out how wastewater systems, and the drainage networks that impact them, are to be extended, improved and maintained to ensure they are robust and resilient for the next 25 years, until 2050. The DWMP will be renewed on a 5 year cycle with cycle 1 published in May 2023. Thames Water's aim is 'To identify future catchment risks to our drainage and wastewater treatment systems and develop sustainable, efficient solutions to address them'.

3 Planning policy for flood risk management

This section summaries national planning policy for development and flood risk.

3.1 National Planning Policy Framework and Guidance

The NPPF (December 2024) (gov.uk) sets out the Government's planning policies for England. It must be considered in the preparation of Local Plans and is a material consideration in planning decisions. The NPPF advises on how flood risk should be considered to guide the location of future development and FRA requirements. The NPPF states that:

“Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards” (Paragraph 171).

The Flood Risk and Coastal Change PPG (gov.uk), last updated August 2022, sets out how the policy should be implemented. Diagram 1 in the PPG (Paragraph: 007 Reference ID: 7-007-20220825) sets out how flood risk should be considered in the preparation of Local Plans.

3.2 The sequential test

Firstly, land at the lowest risk of flooding from all sources should be considered for development. A test is applied called the ‘sequential test’ to do this. Figure 3-1 summarises the sequential test. The LPA will apply the sequential test to strategic allocations. As set out in the FRA Standing Advice (gov.uk), for all other developments, evidence must be supplied to the LPA, with a planning application, that the development has passed the test if any proposed building, access and escape route, land-raising or other vulnerable element will be:

- in Flood Zone 2 or 3;
- in Flood Zone 1 and the SFRA shows it will be at increased risk of flooding during its lifetime; or
- subject to sources of flooding other than rivers or sea,

The LPA should define a suitable search area for the consideration of alternative sites in the sequential test. The sequential test can be undertaken as part of a Local Plan Sustainability Appraisal. Alternatively, it can be demonstrated through a free-standing document, or as part of Strategic Housing Land / Employment Land Availability Assessments.

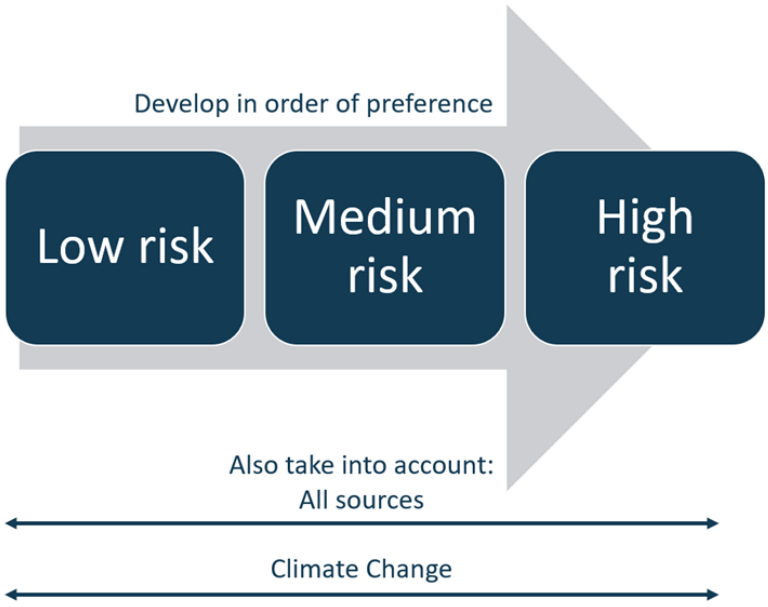


Figure 3-1: The sequential test.

Whether any further work is needed to decide if the land is suitable for development will depend on both the vulnerability of the development and the Flood Zone it is proposed for. Table 2 of the PPG (gov.uk) (Paragraph: 079 Reference ID: 7-079-20220825) shows whether, having applied the sequential test first, the vulnerability of development is not compatible with a particular Flood Zone and where the exception test is required to determine the suitability of that vulnerability of development to the Flood Zone.

Figure 3-2 illustrates the sequential test as a process flow diagram using the information contained in this SFRA to assess potential development sites against areas of flood risk and development vulnerability compatibilities. This is a stepwise process, but a complex one, as several of the criteria used are qualitative and based on experienced judgement. The process must be documented, and evidence used to support decisions recorded.

In addition, the risk of flooding from other sources and the impact of climate change must be considered when considering which sites are suitable to allocate.

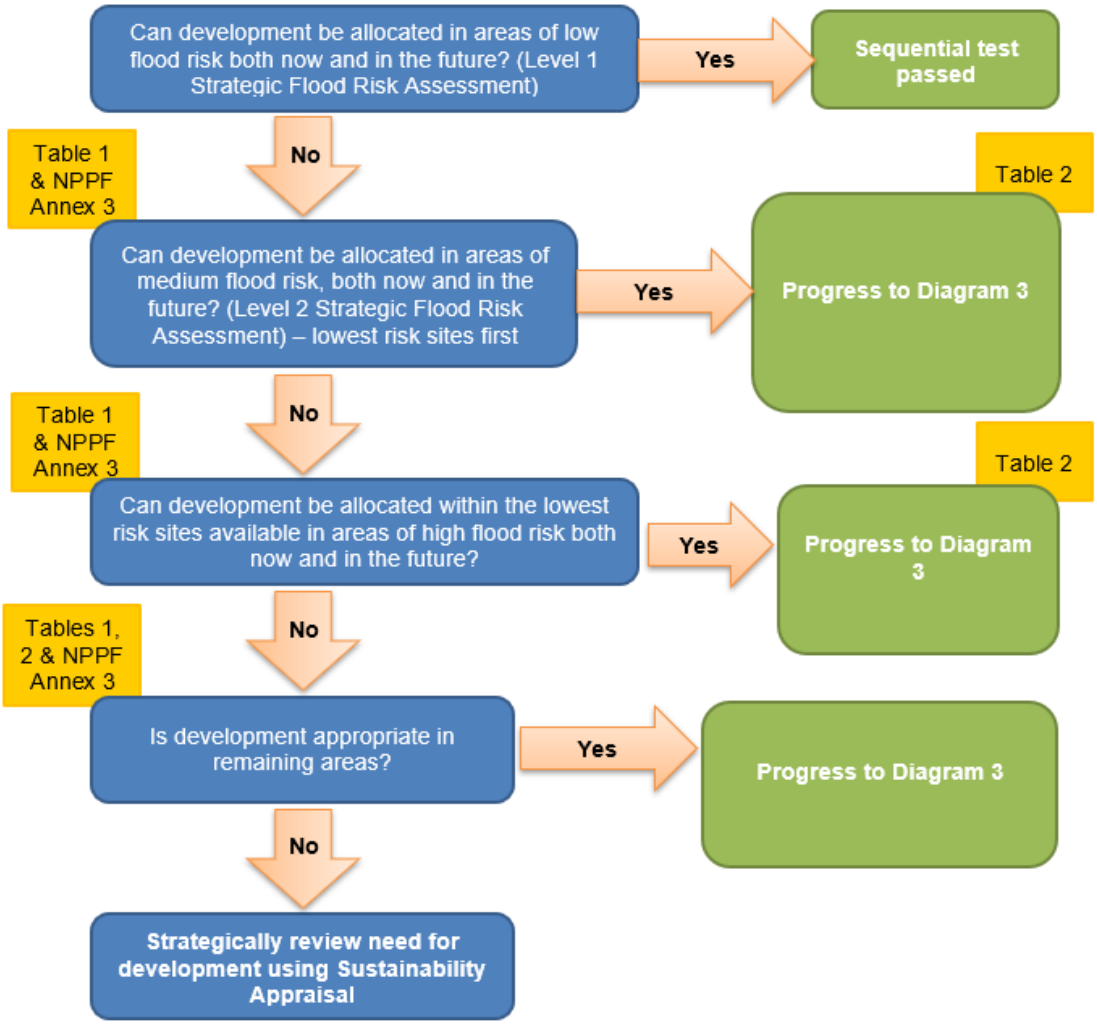


Diagram 2 of PPG: Flood Risk and Coastal Change (paragraph 026, Reference ID 7-026-20220825) Revised August 2022.

Figure 3-2: Application of the sequential test for plan preparation.

3.2.1 The risk-based approach

The NPPF takes a risk-based approach to development in flood risk areas.

Since July 2021, the approach has adjusted the requirement for the sequential test (as defined in Paragraph 172 of the NPPF) so that all sources of flood risk are to be included in the consideration.

The updated PPG further states in Paragraph 23 of the Flood risk and coastal change guidance: "Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk".

The general implications of these are summarised as follows:

- The sequential test must be based on mapping that enables decision making according to a prioritisation based on a risk-based sequence (for river and sea flooding national mapping is available that describes low, medium and high-risk flood zones but comparable mapping of this specific type and quality is not available for other sources; for river and sea flooding the risk zones are based on the assumption that no flood risk management features are present).
- The other sources of flood risk that can potentially be included in the sequential test are surface water, groundwater, sewer flooding and reservoir flooding (or other water impounding features such as canals).
- It follows that proposed new development placed in locations at high or medium risk from flooding from other sources now and in the future (note that the explicit requirement to include climate change in the test, as set out in the August 2022 PPG will require the preparation of additional modelling and mapping or use of proxies) should be accompanied by evidence that the exception test can be satisfied (in a Level 2 SFRA).

A basic requirement for the sequential test to be performed is that appropriate, competent mapping can be prepared to enable logical comparison of the flood risk from different sources at alternative locations, both now and in the future, as this is fundamental to establishing a logical “risk sequence”.

Appendix C discusses the availability of data for assessing the risk from different sources of flooding both now and in the future within the sequential test. It highlights limitations of currently available data and identifies a preferred approach. It includes a user guide for the Council to use the data supplied in the SFRA through the application of the sequential test for different sources of risk.

3.3 The exception test

It will not always be possible for all new development to be located on land that is not at risk from flooding. To further inform whether land should be allocated, or Planning Permission granted, a greater understanding of the scale and nature of the flood risks is required. In these instances, the exception test will be required. Diagram 3 of the PPG (gov.uk) (Paragraph: 033 Reference ID: 7-033-20220825) summarises the exception test (Figure 3-3).

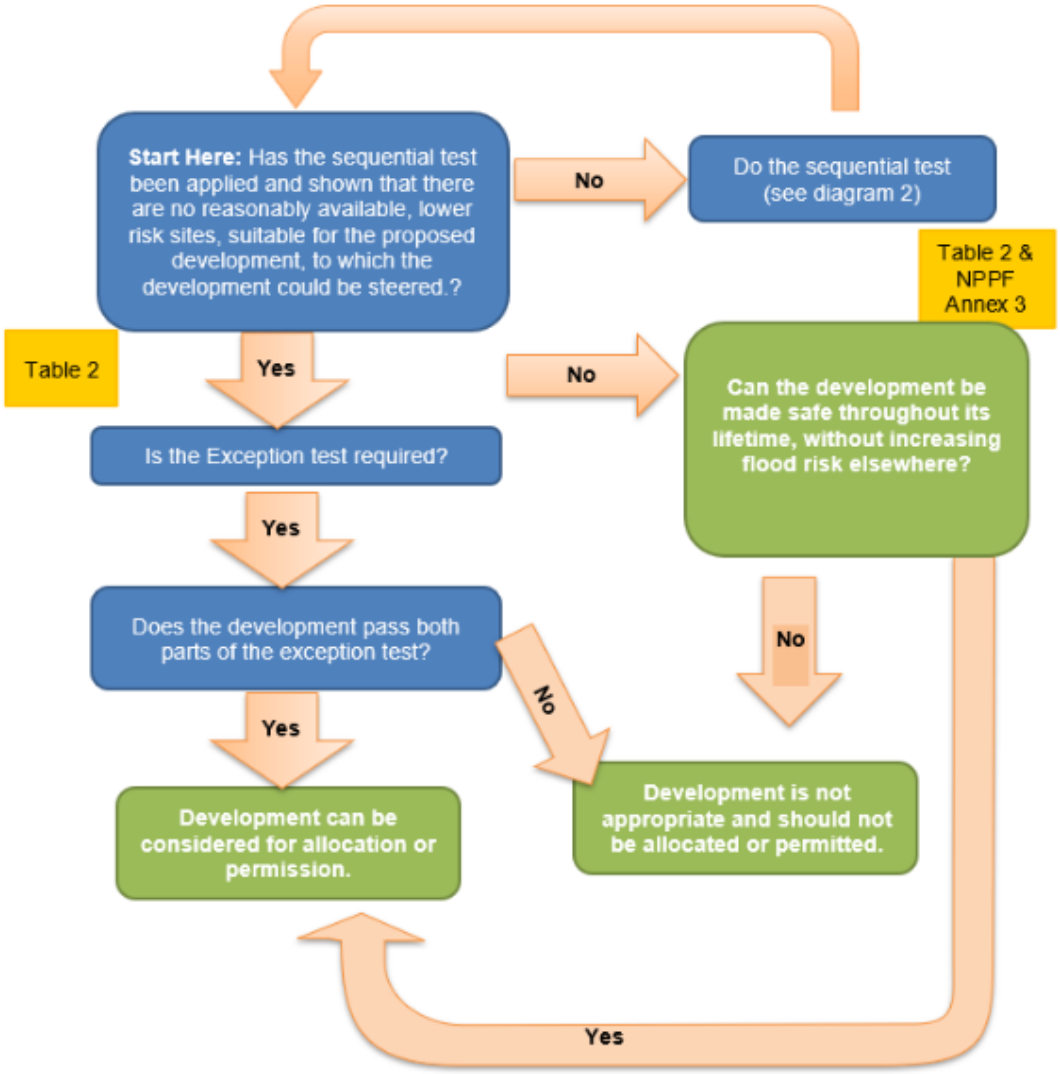
Table 2 of the PPG (gov.uk) sets out the requirements for the exception test but does not reflect the need to avoid flood risk from sources other than rivers and the sea. There is no guidance on how to consider other sources of flood risk. The exception test should only be applied, following the application of the sequential test, in the following instances:

- 'Essential infrastructure' in Flood Zone 3a or 3b
- 'Highly vulnerable' development in Flood Zone 2 (this is NOT permitted in Flood Zone 3a or 3b)

- 'More vulnerable' development in Flood Zone 3a (this is NOT permitted in Flood Zone 3b)

While the exception test is not explicitly required for sites at risk from other sources of flooding, Surrey Heath Borough Council should follow a similar principle where sites are proposed that are at risk from other sources of flooding, carefully weighing up the wider benefits of development against the risk, ensuring that site users can be kept safe through the lifetime of the development and ensuring residual risk can be safely managed.

For sites proposed for allocation within the Local Plan, the LPA should use the information in this SFRA to inform the exception test. At the planning application stage, the developer must design the site such that it is appropriately flood resistant and resilient in line with the recommendations in national and local planning policy and supporting guidance and those set out in this SFRA. This should demonstrate that the site will still pass the flood risk element of the exception test based on the detailed site level analysis.



† Diagram 3 of PPG: Flood Risk and Coastal Change (paragraph 033, Reference ID 7-033-20220825) Revised August 2022.

Figure 3-3: Application of the exception test to plan preparation.

There are two parts to demonstrating a development passes the exception test that should be considered by the LPA when allocating development sites, and developers when required (see Section 3.4.2 for exception test requirements for individual planning applications).

Part A: Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk.

The LPA will need to set out the criteria used to assess the exception test and provide clear advice to enable applicants to provide evidence to demonstrate that it has been passed. If the application fails to prove this, the LPA should consider whether the use of planning conditions and / or planning obligations could allow it to pass the exception test. If this is not possible, this part of the exception test has failed, and planning permission should be refused.

Wider sustainability objectives should be considered, such as those set out in Local Plan Sustainability Appraisals. These generally consider matters such as biodiversity, green infrastructure, housing, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.

The sustainability issues the development will address and how far doing so will outweigh the flood risk concerns for the site should also be considered, e.g., by facilitating wider regeneration of an area, providing community facilities, infrastructure that benefits the wider area etc.

Part B: Demonstrating 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.

In circumstances where the potential effects of proposed development are material a Level 2 SFRA is likely to be needed to inform the exception test for strategic allocations to provide evidence that the principle of development can be supported. At the planning application stage, a site-specific FRA will be needed. Both will need to consider the actual and residual risk and how this will be managed over the lifetime of the development.

3.4 Applying the sequential test and exception test to individual planning applications

3.4.1 Applying the sequential test

Surrey Heath Borough Council are responsible for considering the extent to which sequential test considerations have been satisfied.

Developers are required to apply the sequential test to all development sites, unless the site is:

- A strategic allocation and the test has already been carried out by the LPA as part of preparing the Local Plan, or
- A change of use (except to a caravan, camping or chalet site, or to a mobile home or park home site), or
- A minor development (householder development, small non-residential extensions with a footprint of less than 250m²), or
- A development in fluvial Flood Zone 1 unless there are other flooding issues in the area of the development (i.e. surface water, groundwater, reservoir, sewer flooding).

It should also be noted that residential sub-divisions are exempted from the definition of minor development and therefore, by default, should also be subject to the sequential test.

The SFRA contains information on all sources of flooding and takes into account the impact of climate change. This should be considered when a developer undertakes the sequential test, including the consideration of reasonably available sites at lower flood risk.

Local circumstances must be used to define geographical scope of the sequential test (within which it is appropriate to identify reasonably available alternatives). To determine the appropriate search area criteria, include the catchment area for the type of development being proposed. For some sites this may be clear, e.g. school catchments, in other cases it may be identified by other Local Plan policies. For some sites, e.g. regional distribution sites, it may be suitable to widen the search area beyond LPA administrative boundaries.

The sources of information on reasonably available sites may include but is not restricted to:

- Site allocations in Local Plans
- Sites with Planning Permission but not yet built out
- Strategic Housing and Economic Land Availability Assessments (SHELAAs)/ five-year land supply/ annual monitoring reports
- Locally listed sites for sale

It may be that a number of smaller sites or part of a larger site at lower flood risk form a suitable alternative to a development site at high flood risk.

Ownership or landowner agreement in itself is not acceptable as a reason not to consider alternatives.

3.4.2 Applying the exception test

Where a development proposal is in accordance with an allocation made in a Local Plan following the application of the sequential and exception tests, the exception test will only be required to be repeated if:

- Elements of the development that were key to it satisfying the exception test at the plan-making stage (such as wider sustainability benefits to the community or measures to reduce flood risk overall) have changed or are not included in the proposed development; or
- The understanding of current or future flood risk has changed significantly.

For developments that have not been allocated in the Local Plan or where the sequential test was not applied at the development plan stage and new information becomes available that identifies a flood risk, developers must undertake the sequential and exception tests and present this information to the LPA for approval. The Level 1 SFRA can be used to scope the flooding issues that a site-specific FRA should investigate in more detail to inform the exception test for windfall sites.

The applicant will need to provide information that the application can pass both parts of the exception test.

4 Understanding flood risk across the borough

This section explores the key sources of flooding in the borough and the factors that affect flooding including topography, soils, and geology. The main sources of flooding affecting the study area are from watercourses, surface water, and sewers, as detailed in information provided by SHBC, SCC, the EA, and Thames Water.

This is a strategic summary of the risk in the study area to inform the application of the sequential and exceptions tests. Developers should use this section to scope out the flood risk issues they need to consider in greater detail in a site-specific FRA to support a Planning Application. Information in this section should not be used to inform flood risk at a property-level.

4.1 Defining flood risk

Section 3 (subsection 1) of the Flood and Water Management Act 2010 (FWMA) (gov.uk) defines the risk of a potentially harmful event (such as flooding) as 'a risk in respect of an occurrence is assessed and expressed (as for insurance and scientific purposes) as a combination of the probability of the occurrence with its potential consequences.'
Figure 4-1 sets out this definition of risk.

Figure 4-1: Conceptual model depicting how risk can be defined.

4.1.1 Source-Pathway-Receptor model

Flood risk can be assessed using the Source-Pathway-Receptor model where:

- The source is the origin of the floodwater, principally rainfall.
- A pathway is a route or means by which a receptor can be affected by flooding, which includes rivers, drains, sewers, and overland flow.
- A receptor is something that can be adversely affected by flooding, which includes people, their property, and the environment.

This is a standard environmental risk model common to many hazards and should be the starting point of any assessment of flood risk. All these elements must be present for flood risk to arise. Having applied the Source-Pathway-Receptor model it is possible to mitigate the flood risk by addressing the source (often very difficult), blocking, or altering the pathway, or removing the receptor, e.g., steer development away.

The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. It is therefore important to define the components of flood risk to apply this guidance in a consistent manner.

4.1.2 Probability

The probability of flooding is expressed as a percentage based on the average frequency measured or extrapolated from records over many years. A 1% probability indicates the flood level that is expected to be reached on average once in a hundred years, i.e., it has a 1% chance of occurring in any one year, not that it will occur at least once every hundred years.

4.1.3 Consequences

The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g., financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), the receptors that are present and the vulnerability of these receptors (type of development, nature, e.g., age-structure, of the population, presence, and reliability of mitigation measures etc).

4.2 Historical flooding

The following sections detail information on known historic flooding incidents and hotspots identified in information provided by the EA, SCC as the LLFA, and Surrey Fire and Rescue Service.

Information on sewer flooding across the study area is included in Section 4.6 and a list of historic flooding incidences provided by Thames Water is available in Table 4-5.

4.2.1 EA Historic Flood Map and Recorded Flood Outlines

The EA's Historic Flood Map (HFM) (gov.uk) shows areas of land that have been previously subject to flooding in the area. This includes flooding from rivers, the sea and groundwater springs, but excludes surface water. There are records of historic flooding along the western boundary of the borough where the River Blackwater flows past the settlements of Mytchett, Frimley Green, Frimley and Camberley, and in central eastern areas of the borough where the Hale Bourne/Addlestone Bourne flows nearby the settlements of Bagshot, Chobham, West End and Bisley.

The EA Recorded Flood Outlines (gov.uk) dataset shows several records of historic flood events within the borough.

In the western half of the borough:

- March 1947 – fluvial flooding due to channel capacity exceedance (no raised defences) along the River Blackwater. North western areas of the borough including the A30 (London Road) were affected.
- September 1968 – fluvial flooding due to channel capacity exceedance along the River Blackwater. During this event, the low-lying land to the west of Frimley Green and the land located west of the Ascot to Guildford line, including the commercial areas of Riverside Way and Yorktown Industrial Estate, Camberley were impacted.

In the eastern half of the borough:

- March 1947 – fluvial flooding due to channel capacity exceedance (no raised defences) along the Mill Bourne and The Bourne. During this event, land to the south of Fairoaks Airport was impacted.
- September 1968 – fluvial flooding due to channel capacity exceedance (no raised defences) along the Windle Brook, Hale Bourne, Mill Bourne, Trulley Brook and The Bourne. During this event, the settlements and land in close proximity to these watercourses were affected.
- November 1974 – fluvial flooding due to channel capacity exceedance (no raised defences) along the Mill Bourne and The Bourne. During this event, land to the south of Fairoaks Airport was impacted.
- January 2003 – fluvial flooding due to channel capacity exceedance (no raised defences) along the Mill Bourne and The Bourne. During this event, land to the south of Fairoaks Airport was impacted.

4.2.2 Surrey Fire and Rescue Service

Surrey Fire and Rescue were consulted as part of the preparation of this SFRA and the locations of known historic flood incidences within the last 5 years (2019 to 2024) were provided. Please note that multiple incidences could have been recorded at the same properties. Table 4-1 and Figure 4-2 display this data using truncated postcodes to avoid identifying specific properties.

Table 4-1: Flood incident data from Surrey Heath Fire Service.

Postcode	No. of properties affected within postcode area	Area covered by postcode.
GU15 1	5	Central western areas of the borough, covering south eastern areas of Camberley.
GU15 2	15	Lies within the central western areas of the borough and covers the southern areas of Camberley.
GU15 3	14	Central north western areas of the borough, covering central areas of Camberley.
GU15 4	7	North western areas of the borough, covering land to the north of Camberley.
GU16 6	9	Lies within the south central and south western areas of the borough, covers the settlements of Mytchett, Frimley Green and Deepcut and into Westend Common.
GU16 7	7	Located adjacent to western boundary of the borough and covers the western areas of Frimley.
GU16 8	2	Lies within the central western areas of the borough and covers the eastern areas of Frimley.
GU18 5	6	Lies within the south central and south western areas of the borough, covers the settlements of Mytchett, Frimley Green and Deepcut and into Westend Common.
GU19 5	7	Located adjacent to western boundary of the borough and covers the western areas of Frimley.
GU20 6	4	Located within the central northern areas of the borough, covering the settlement of Windlesham.
GU24 8	8	Contains eastern areas of the borough, covering the settlements of Chobham and Mimbridge.
GU24 9	4	Lies within the central southern areas of the borough, covering the settlement of Bisley.

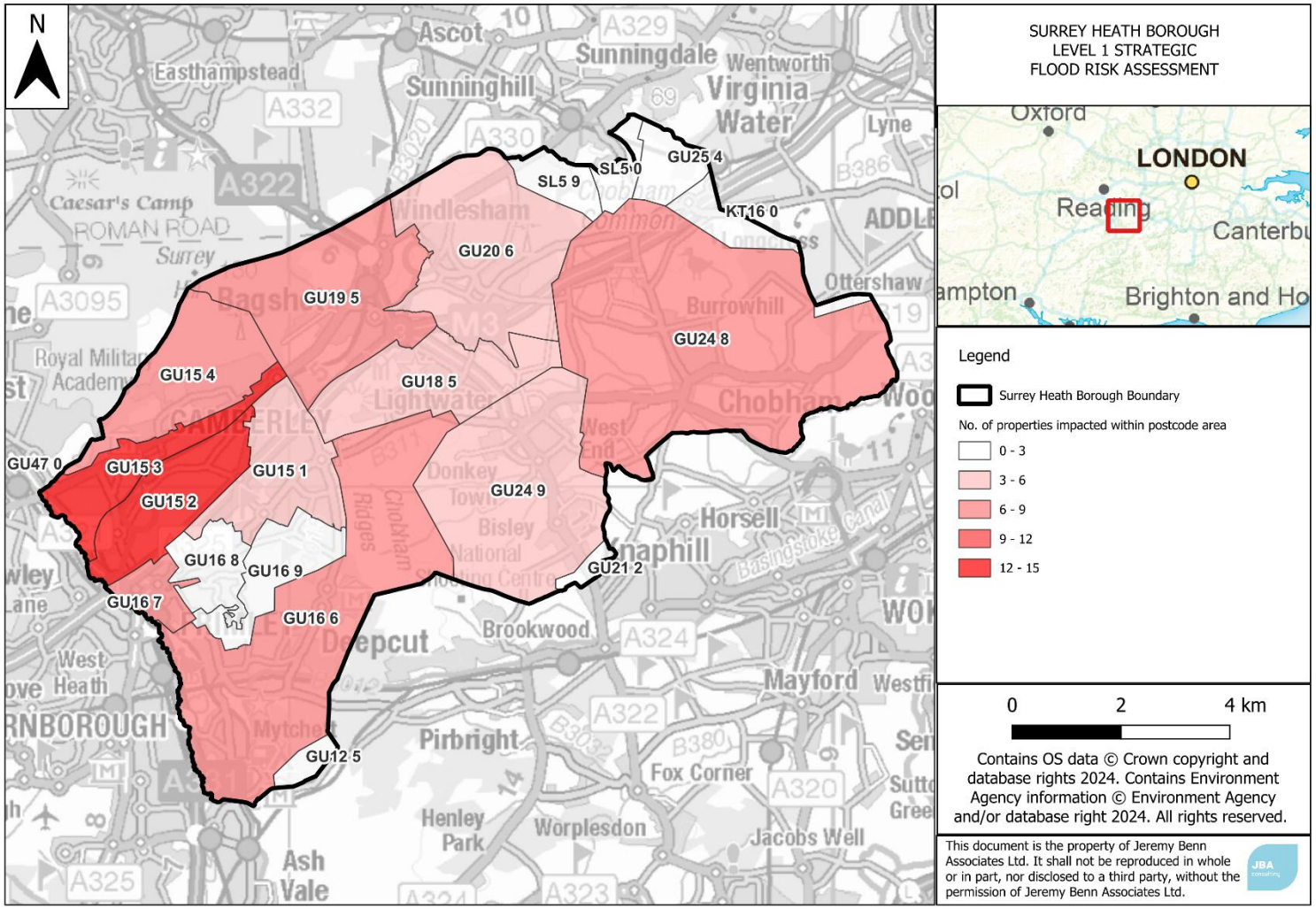


Figure 4-2: Flood incident data from Surrey Heath Fire Service showing the number of properties with reported incidences over the past 5 years.

4.2.3 Surrey County Council

4.2.3.1 Section 19 Flood Investigations

Under the Flood and Water Management Act (2010), Surrey County Council as Lead Local Flood Authority (LLFA) has a duty to investigate significant flooding, to the extent it deems 'necessary or appropriate' and publish a report. These are published on the Surrey S19 Flood Investigations webpage (surreycc.gov.uk).

One S19 report is available for Surrey Heath borough covering flooding over the Winter 2013/2014 period. The main cause of the widespread flooding across Surrey Heath was the exceptional and unprecedented amount of rainfall that fell over the months of December, January and February 2013/14.

The report identifies seven sites which were affected by flooding across Surrey Heath, with approximately 10 incidences of internal property flooding reported across the borough. The sites identified are located within Camberley and Lightwater. Within Camberley, flood incidents caused by surface water occurred on Robins Bow, Middleton Road, the Maultway and a short section of the A30 (London Road). There were a number of instances of internal property flooding in the Camberley area. Within Lightwater, flood incidents resulting from a combination of both surface water and fluvial flooding impacted Grasmere Road, Blackstroud Lane East and West and Burnt Pollard Lane.

4.2.3.2 Wetspots

SCC use the term "wetspot" to record the location of a reported, recurring flood incident which is unlikely to be solved through their day-to-day activities. This might be a problem caused by or affecting the highway, or be an issue affecting homes, businesses or important infrastructure. The public are able to report a wetspot through the Surrey County Council website (surreycc.gov.uk).

Each wetspot is assessed and given a score (0 to 150+) to reflect its risk level (Table 4-2 and Table 4-3). The key factors that contribute to a high score include risk to safety, property flooding, disruption to critical services, social and economic impacts, and long duration and/or high frequency of flooding. Work is prioritised in the highest scoring wetspots.

There are four wetspot statuses:

- **Current** - The wetspot is an active flooding location but has not been prioritised for work.
- **In progress** - The wetspot is being investigated for works to mitigate the risk; either through SSC or third party negotiations.
- **Resolved** - Works have been carried out to try and reduce flooding and the site is awaiting review during a heavy rainfall event to ensure the works have been successful.

- **Dormant** - The wetspot has no recorded instances of flooding within the last two years and is being kept for information only.

Within the study area there are 21 wetspots. The wetspots located in the east are detailed in Table 4-2, and those located in the west are detailed in Table 4-3. The 'Current' and 'In progress' wetspots are also displayed in Figure 4-3. SCC's Flooding and wetspots webpage (surreycc.gov.uk) provides further information.

Table 4-2: Wetspots identified by SCC across the east of Surrey Heath borough.

Wetspot ID	Location in the east	Status	Risk Level
SH040	Castle Grove Road, Chobham	Dormant	Medium
SH028	Guildford Road, Bagshot	Dormant	Lower
SH030	Riverside Avenue, Lightwater	Dormant	Medium
SH003	Philpot Lane, Chobham	Current	Medium
SH008	High Street, Chobham	Dormant	Medium
SH019	Guildford Road, Bisley	Resolved	Lower
SH005	Station Road, Chobham	Resolved	Lower
SH018	Chertsey Road, Chobham	Dormant	Medium
SH039	Windlesham Road, Chobham	Dormant	Lower
SH063	Bracknell Road, Bagshot	Resolved	Lower
SH061	Bridge Road, Bagshot	Current	Medium
SH065	Bagshot Green, Bagshot	Current	Medium
SH066	New Rd, Windlesham	Current	Lower
SH027	Lightwater By-pass, Lightwater	Current	Medium

Table 4-3: Wetspots identified by SCC across the west of Surrey Heath borough.

Wetspot ID	Location in the west	Status	Risk Level
SH017	London Road, Camberley	Resolved	Lower
SH007	Upper Chobham Road, Camberley	Current	Lower
SH004	Lake Road, Deepcut	Current	Medium
SH062	Mytchett Road, Camberley	Current	Medium
SH057	Station Road, Frimley	Dormant	Medium
SH025	Frimley Road, Frimley	In Progress	Medium

Wetspot ID	Location in the west	Status	Risk Level
SH059	Watchetts Drive, Camberley	Current	High

4.2.3.3 Property flooding

SCC provided its records of property flooding, with the records aggregated to the roads (where a property has flooded the entire road has been identified) to avoid identifying any individual properties. It should be noted that this does not mean that the entire road highlighted is at risk of flooding.

Figure 4-4 and Figure 4-5 display this data, in the east and west of the borough respectively. The main concentration of incidents is shown in the urban centres of Chobham, Lightwater, and Bagshot in the east of the borough.

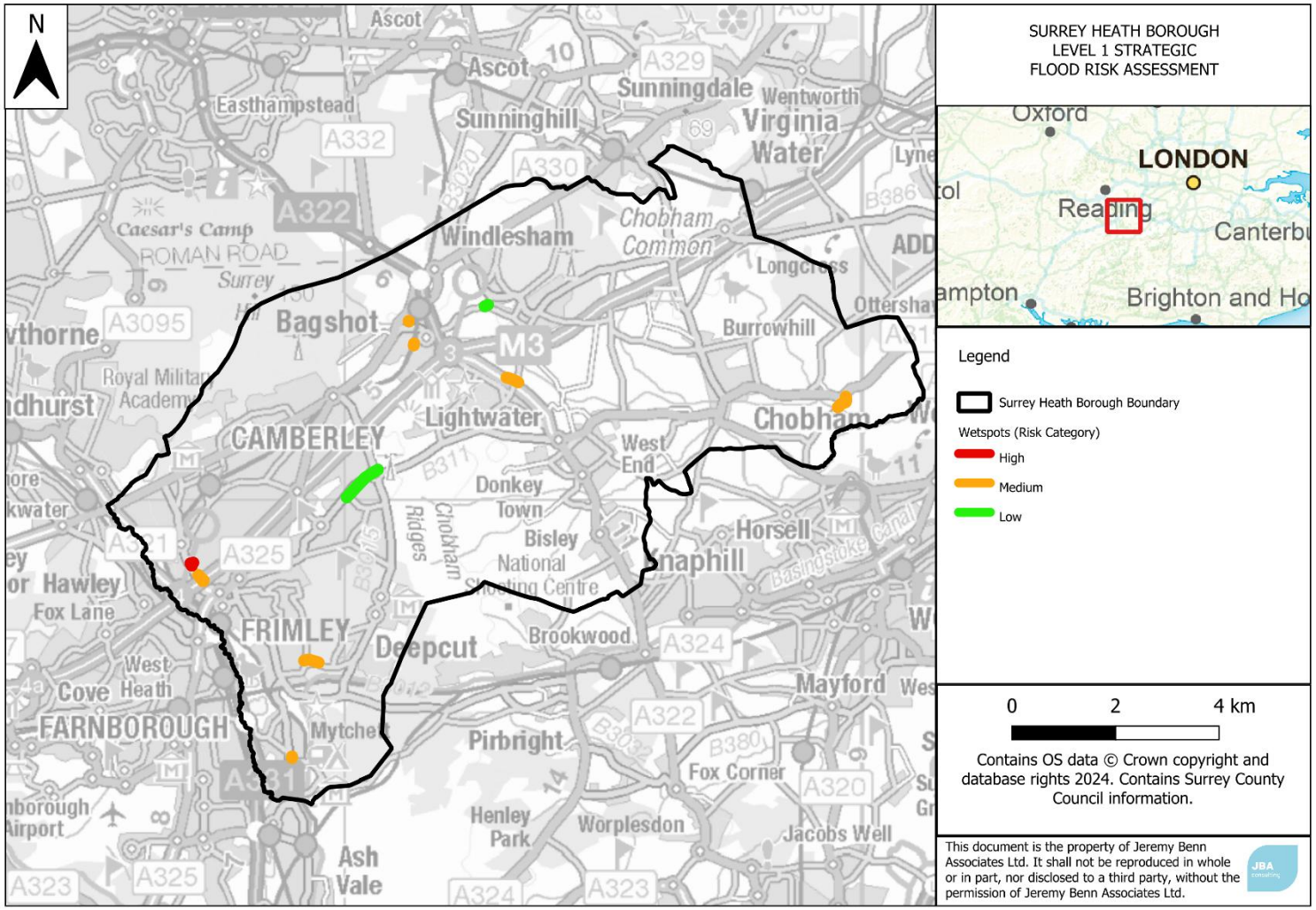


Figure 4-3: Locations of current and in progress "wetspots" displayed by assigned risk category as designated by Surrey County Council.

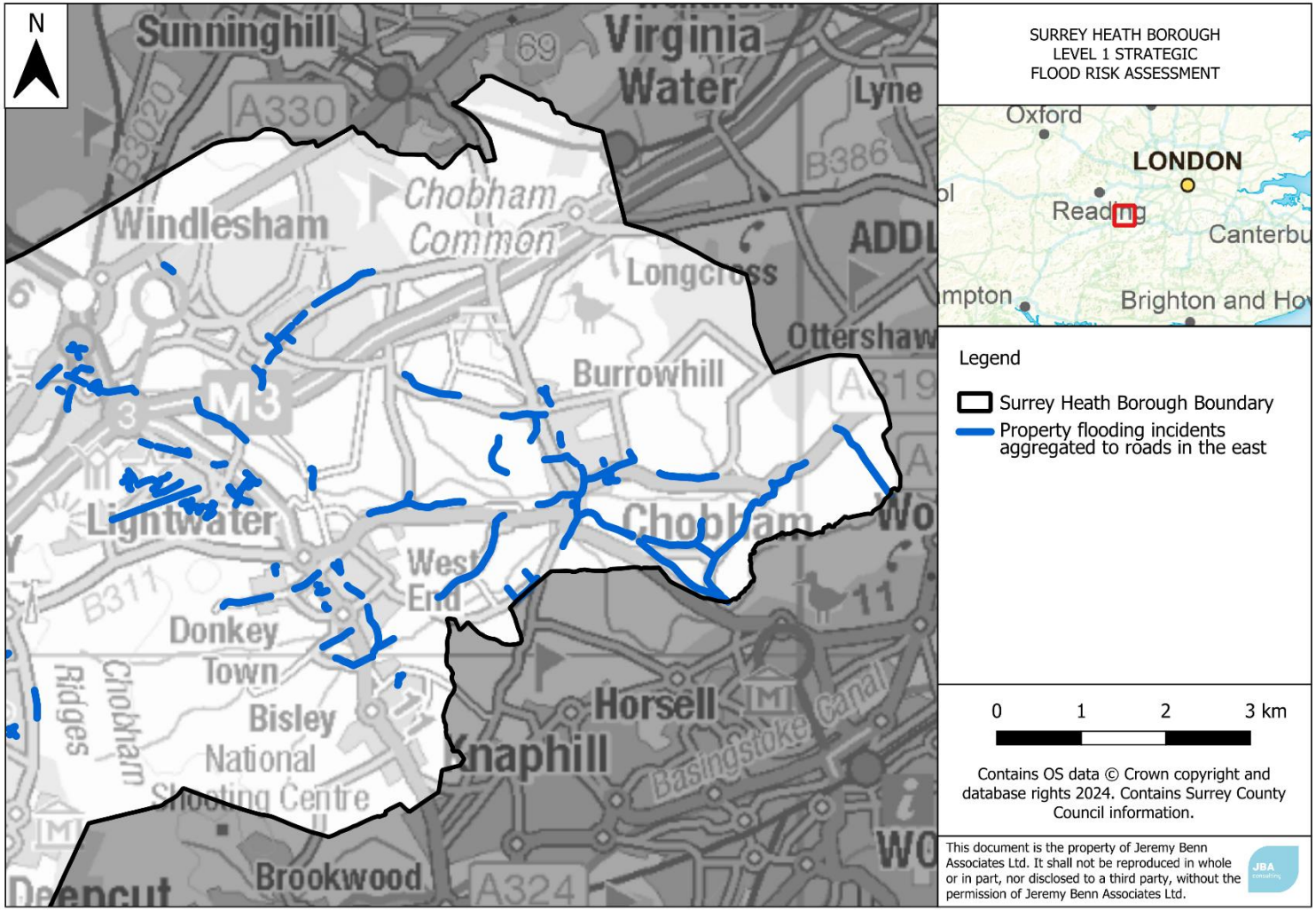


Figure 4-4: Property flooding incidents in the east of the Borough, from Surrey County Council records, aggregated to roads

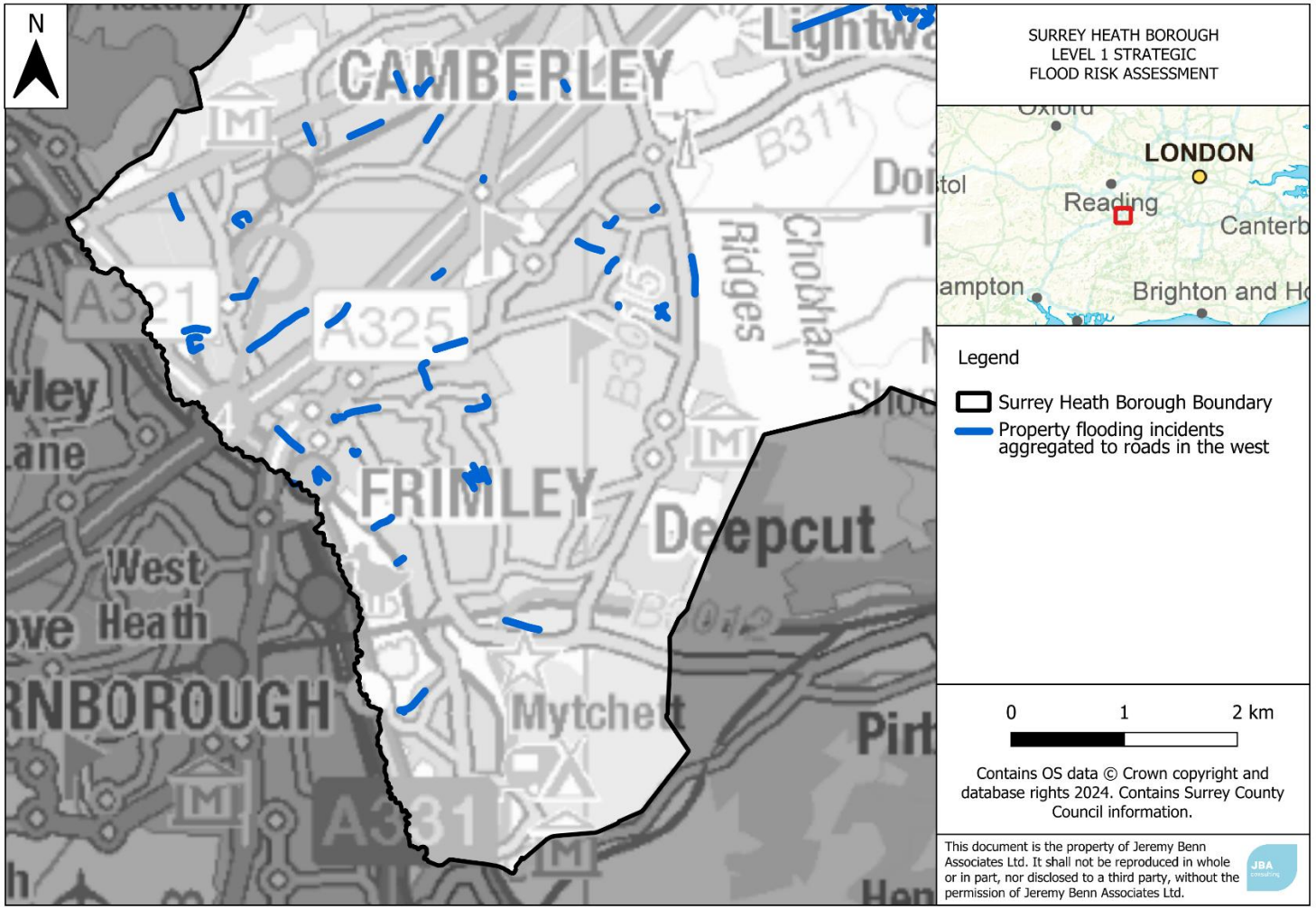


Figure 4-5: Property flooding incidents in the west of the Borough, from Surrey County Council records, aggregated to roads.

4.3 Topography, geology, and soils

The topography, geology and soil are all important in influencing the way the catchment responds to a rainfall event. The degree to which a material allows water to percolate through it, the permeability, affects the extent of overland flow and therefore the amount of run-off reaching the watercourse. Steep slopes or clay rich (low permeability) soils will promote rapid surface runoff, whereas more permeable rock such as limestone and sandstone may result in a more subdued response.

4.3.1 Topography

Figure 4-6 shows the topography of the study area. The topography of Surrey Heath Borough is varied as it lies within two main river catchments; the River Blackwater and the Hale Bourne/Addlestone Bourne which respectively drain the western and eastern areas of the borough. The Chobham Ridges run centrally through the borough, dividing the two catchments.

To the west of these upland areas, the land gently slopes down from east to west through the settlements of Camberley, Frimley and Mytchett to the low-lying areas of the River Blackwater valley located along the western boundary of the borough.

To the east of the Chobham Ridges, the land slopes steeply down from west to east through open heathland to the villages of Bagshot, Lightwater, West End and Bisley. Through these settlements the land then slopes more gently downhill towards the south eastern areas where the Hale Bourne/Addlestone Bourne leaves the borough.

The National LIDAR Programme (gov.uk) provides elevation data at 1m spatial resolution for all of England.

4.3.2 Geology

The bedrock geology of the borough largely comprises of sand formations which are generally relatively permeable.

The western areas of the borough are mostly underlain by the Camberley Sand Formation, consisting of sand. This formation is found under the settlements of Mytchett, Deepcut, Frimley and the eastern parts of Camberley. Within the north western areas of the borough, the Albany Industrial Estate, Frimley and the western areas of Camberley, including the Thames Water Sewage Treatment Works (STW) and Yorktown Industrial Estate are located above the Windlesham Formation which comprises of sand, silt, and clay.

The Windlesham Formation is also found within the central areas of the borough between the settlements of Bagshot, Windlesham, Lightwater, West End and Bisley. To the north of Windlesham and south east of Brick Hill, there are a couple of isolated patches of the Camberley Sand Formation amongst the Windlesham Formation.

To the south and eastern areas of the borough at the settlements of Chobham and Mimbridge, the bedrock largely comprises of the Bagshot Formation, consisting of sand.

There are also some patches of the Windlesham Formation located towards the eastern boundary of the borough at Fairoaks Airport.

A map detailing the extents of this bedrock and further superficial geology across the borough can be viewed online in the British Geology Society Geology Viewer (bgs.ac.uk).

The EA also provides mapping of different types of aquifers, the underground layers of water-bearing permeable rock from which groundwater can be extracted. Aquifers are designated as either principal or secondary aquifers. Principal aquifers are designated by the EA as strategically important rock units that have high permeability and water storage capacity. The majority of the study area is situated within a Secondary A bedrock aquifer, with the exception of a small area to the north of the A30, along the northern boundary close to Sunningdale which is classified as non-productive (Figure 4-7).

4.3.3 Soils

The soils across the borough are varied with areas that are naturally wet but also areas that are freely draining soils.

Following the course of the River Blackwater, the floodplain soils adjacent to Mytchett and Frimley are characterised as loamy and clayey with naturally high groundwater, whilst the floodplain soils to the north of Frimley are characterised as loamy soils with naturally high groundwater. These latter soil types are also found in Mytchett and the western areas of Frimley Green, Frimley and Camberley.

Away from the River Blackwater valley, the soils gradually change from naturally wet to freely draining. In the centre of Camberley and the eastern areas of Frimley, the soils are characterised as naturally wet, very acidic sandy loamy soils. They then change to freely draining, very acidic sandy and loamy soils within the eastern areas of Camberley and to the east of Frimley and Mytchett, and at Deepcut.

The soils within the heathlands between Chobham Ridge and the settlements of Bagshot, Lightwater, West End and Bisley are also characterised as naturally wet, very acidic sandy and loamy soils. This soil type is also found within Windlesham and Chobham Common. The soils within Bagshot, Lightwater, West End, Bisley and southern areas of Windlesham are characterised as slowly permeable, seasonally wet loamy and clayey soils. Following the course of the Hale Bourne/Addlestone Bourne, the soils are characterised as loamy soils with naturally high groundwater. The British Geological Survey website (bgs.ac.uk) provides data on soils across the borough.

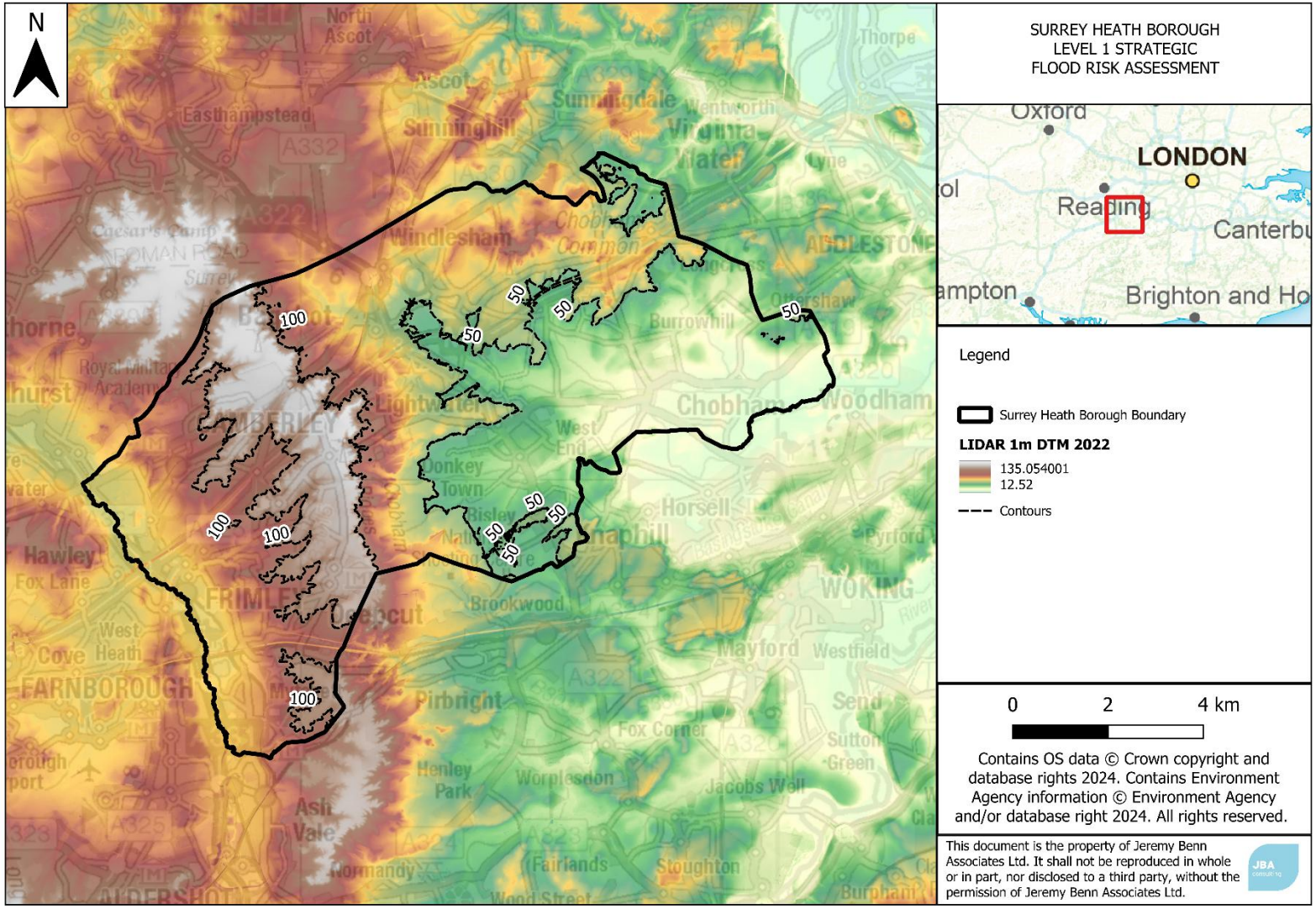


Figure 4-6: EA 1m LiDAR data showing the topography across the borough.

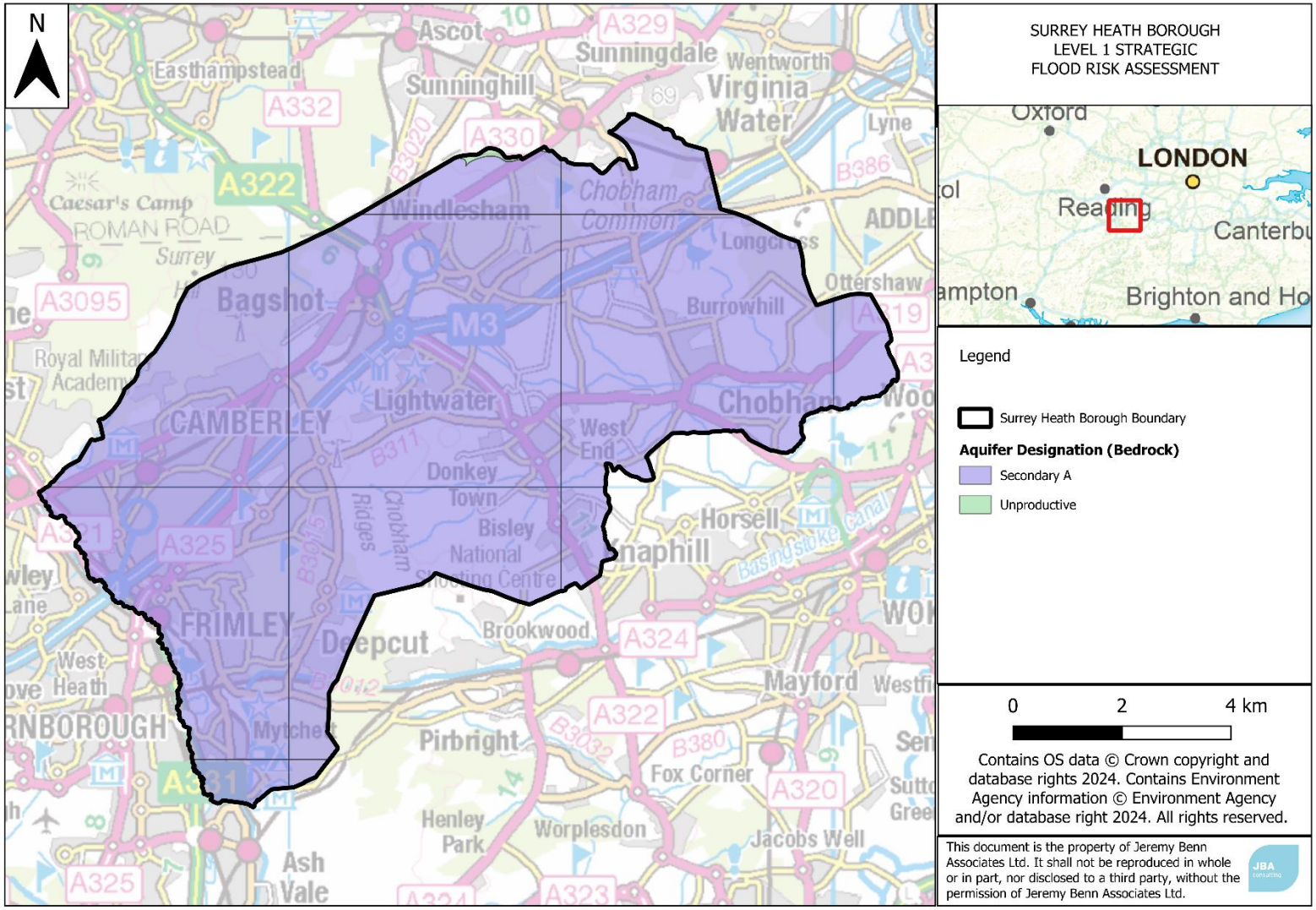


Figure 4-7: Aquifer designations based on bedrock geology across the borough.

4.4 Fluvial flood risk

4.4.1 Flood Zones

Fluvial flood risk across the borough is assessed based on Flood Zones. The definition of the Flood Zones is provided below. The Flood Zones do not consider defences, except when considering the functional floodplain. This is important for planning long term developments as long-term policy and funding for maintaining flood defences over the lifetime of a development may change over time.

The Flood Zones are:

- Flood Zone 1: Low risk: less than a 0.1% chance of river flooding in any given year.
- Flood Zone 2: Medium risk: between a 1% and 0.1% chance of river flooding in any given year.
- Flood Zone 3a: High risk: between a 3.3% and 1% chance of river flooding in any given year.
- Flood Zone 3b: Functional Floodplain: land where water has to flow or be stored in times of flood (greater than a 3.3% chance of river flooding in any given year). Only water compatible and essential infrastructure are permitted in this zone and should be designed to remain operational in times of flood, resulting in no loss of floodplain or blocking of water flow routes. Annex 3 of the NPPF (gov.uk) provides information on flood risk vulnerability.

Important note on Flood Zone information in this SFRA

The Flood Zone maps for the study area are shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud). These have been derived from the EA's Flood Map for Planning (FMfP) (gov.uk) and detailed hydraulic modelling received from the EA. Table 4-4 provides details of the available modelling and their extents are shown in Figure 4-8.

Table 4-4: Details of EA hydraulic models within the borough.

Model	Year	Software	Defences in model?	Included in EA FMfP?
Addlestone Bourne	2007	ISIS (1D only)	No	Yes
Blackwater	2007 (CC uplifts re-run 2017)	ISIS-TUFLOW (1D-2D)	Yes	Yes
Blackwater Tribs Model 10	2012	ISIS-TUFLOW (1D-2D)	No	Yes
Blackwater Tribs Model 12	2012	ISIS-TUFLOW (1D-2D)	No	Yes
Chertsey Bourne	2005	ISIS (1D only)	No	Yes

Flood Zones 2 and 3a used within this SFRA show the same extent as the online EA's Flood Map for Planning (FMfP) which incorporates latest modelled data.

The EA Flood Zones do not cover all catchments or ordinary watercourses with areas <3km². As a result, whilst the EA Flood Zones may show an area is in Flood Zone 1, there may be a flood risk from a smaller watercourse(s) not shown in the Flood Zones.

None of the existing hydraulic models have been run for the 3.3% AEP event to delineate the functional floodplain. In agreement with the EA, where the 3.3% AEP output is not available, the next available output has been used as a conservative proxy. This is the case for the following model:

- Addlestone Bourne - 1% AEP undefended (same extent as Flood Zone 3a)
- Blackwater (2007) - 1% AEP defended
- Blackwater Tribs Model 10 (2012) - 1% AEP undefended (same extent as Flood Zone 3a)
- Blackwater Tribs Model 12 (2012) - 1% AEP undefended (same extent as Flood Zone 3a)
- Chertsey Bourne - 1% AEP undefended (same extent as Flood Zone 3a)

In areas outside of the detailed model coverage, Flood Zone 3a has been used as a conservative proxy for Flood Zone 3b. Further work should be undertaken as part of a detailed site-specific FRA to define and refine the extent of Flood Zone 3b where no detailed modelling exists. Caution should also be applied where the conservative Flood Zone 3b extent encompasses existing urban areas which would not otherwise be "designed to flood".

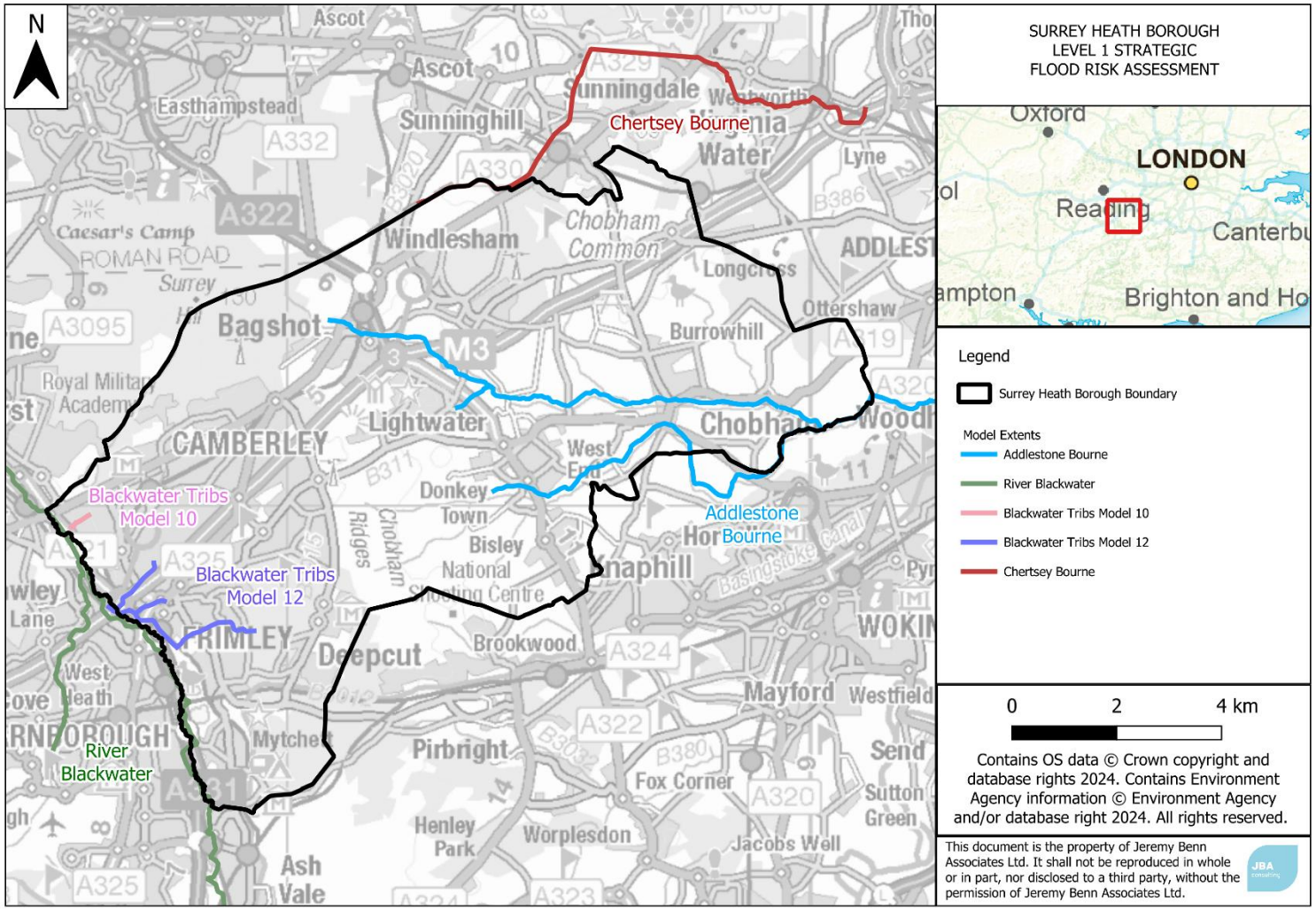


Figure 4-8: Extents of the available fluvial hydraulic models across the borough.

4.4.2 Fluvial flood risk across the borough

The major watercourses flowing through the borough are:

- The River Blackwater.
- The Hale Bourne/Addlestone Bourne which includes the statutory main rivers of Windle Brook, Hale Bourne, Mill Bourne along the northern river course and the Trulley Brook and The Bourne along the southern river course.

Tributaries of these watercourses include smaller ordinary watercourses and numerous unnamed drains. There are also several ponds and lakes within the study area. A map of the key watercourses is included in Figure 1-2 and are shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

The primary fluvial flood risk in the borough is where these watercourses run past and through developed areas. For example, in the western areas of the borough the River Blackwater and its tributaries present a fluvial flood risk to the settlements of Mytchett, Frimley, and Camberley. Whilst, in the eastern areas of the borough the Windle Brook, Mill Bourne and their tributaries present a fluvial flood risk to the villages of Bagshot, and Chobham.

The flood risk associated with the major locations in the borough are detailed in Appendix D. The impacts of climate change on fluvial flooding are discussed in Section 5.3.1.

4.5 Surface water flooding

Surface water runoff is most likely to be caused by intense downpours e.g. thunderstorms. At times the amount of water falling can completely overwhelm the drainage network, which are not typically designed to cope with extreme storms. The flooding can also be complicated by blockages to drainage networks, sewers being at capacity and/ or high-water levels in watercourses that cause local drainage networks to back up.

The EA's Risk of Flooding from Surface Water mapping (RoFSW) (gov.uk) has been used to assess surface water risk within this SFRA. These maps are intended to provide a consistent standard of assessment for surface water flood risk across England and Wales in order to help LLFAs, the EA, and any potential developers to focus their management of surface water flood risk.

The RoFSW is derived primarily from identifying topographical flow paths of existing watercourses or dry valleys that contain some isolated ponding locations in low lying areas. They provide a map which displays different levels of surface water flood risk depending on the annual probability of the land in question being inundated by surface water. The RoFSW should not be used to understand flood risk for individual properties but is suitable for high level assessments such as SFRAs for local authorities.

The RoFSW mapping highlights several communities in the study area at risk from surface water flooding. Surface water flow paths generally follow the topography of existing watercourses, although there are some areas at risk from isolated ponding. Additionally, surface water flow routes are also established on roads such as the M3 and within urban

areas, particularly within Camberley, Bagshot and West End. This highlights the potential risk to transport networks while posing a risk to buildings which water can be routed to. The RoFSW mapping for the study area can be found in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

The impacts of climate change on surface water flooding are discussed in Section 5.3.2.

4.6 Sewer flooding

Sewer flooding occurs when intense rainfall/river flooding overloads sewer capacity (surface water, foul or combined), and/or when sewers cannot discharge to watercourses due to high water levels. Sewer flooding can also be caused by blockages, collapses, equipment failure or groundwater infiltration into sewer pipes.

Since 1980, the Design and Construction Guidance (formerly known as Sewers for Adoption) mean that new surface water sewers have been designed to have capacity for a 3.3% AEP rainfall event, although until recently this did not apply to smaller private systems. This means that sewers can be overwhelmed in larger rainfall and flood events.

New developments should not cause additional pressures on existing sewers due to the requirements to maintain greenfield runoff rates. However, increases in rainfall as a result of climate change can lead to existing sewers becoming overloaded, although this can be mitigated through the use of well-designed SuDS to reduce surface water runoff.

Thames Water is the water company responsible for the management of the sewerage networks across the study area. Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. Table 4-5 displays this data using truncated postcodes to avoid identifying specific streets or properties. The flooding incidences are classified as follows:

- I = Internal property flooding
- E = External property flooding
- A = 2 or more incidents in the last 10 years
- B = 1 incident in the last 10 years
- C = 1 incident between 10 and 20 years ago

The general area covered by the postcode is also detailed.

Table 4-5: Number of properties with sewer flooding incidences recorded by Thames Water.

Postcode	AI	BI	CI	AE	BE	CE	Total	Area covered by postcode
GU12 5	0	0	0	0	0	2	2	Mostly lies outside of the borough – crosses into the southern areas of the borough to the south east of Mytchett.
GU15 1	0	6	3	2	13	3	27	Central western areas of the borough, covering south eastern areas of Camberley.
GU15 2	0	4	1	2	20	4	31	Lies within the central western areas of the borough and covers the southern areas of Camberley.
GU15 3	0	0	4	0	2	7	13	Central north western areas of the borough, covering central areas of Camberley.
GU15 4	0	0	0	0	0	2	2	North western areas of the borough, covering land to the north of Camberley.
GU16 6	0	0	4	1	3	7	15	Lies within the south central and south western areas of the borough, covers the settlements of Mytchett, Frimley Green and Deepcut and into Westend Common.
GU16 7	0	0	12	1	3	1	17	Located adjacent to western boundary of the borough and covers the western areas of Frimley.
GU16 8	0	2	1	0	8	2	13	Lies within the central western areas of the borough and covers the eastern areas of Frimley.
GU16 9	0	0	4	0	0	0	4	Located within the central western areas of the borough, covering areas to the east of Frimley and the northern areas of Frimley Green.
GU18 5	0	1	1	2	12	1	17	Lies within the central areas of the borough, covering Lightwater and the rural areas adjacent to the A322.
GU19 5	0	0	18	0	0	2	20	Lies within the central northern areas of the

Postcode	AI	BI	CI	AE	BE	CE	Total	Area covered by postcode
								borough, covering Bagshot and the rural areas to north west of the settlement.
GU20 6	0	0	0	0	0	2	2	Located within the central northern areas of the borough, covering the settlement of Windlesham.
GU21 2	0	0	0	0	1	0	1	Mostly lies outside of the borough – crosses into central southern areas of the borough and covers areas to south of Bisley.
GU24 8	0	0	0	1	4	2	7	Contains eastern areas of the borough, covering the settlements of Chobham and Mimbridge.
GU24 9	0	1	1	0	2	2	6	Lies within the central southern areas of the borough, covering the settlement of Bisley.

4.7 Groundwater flooding

In general, less is known about groundwater flooding than other sources of flooding and availability of data is limited. Groundwater flooding can be caused by:

- High water tables, influenced by the type of bedrock and superficial geology.
- Seasonal flows in dry valleys, which are particularly common in areas of chalk geology.
- Rebounding groundwater levels, where these have been historically lowered for industrial or mining purposes.
- Where there are long culverts that prevent water easily getting into watercourses.
- Perched aquifers underlain by impermeable geology, particularly in low lying areas.

Groundwater flooding is different to other types of flooding. It can last for days, weeks, or even months and is much harder to predict and warn for. Monitoring does occur in certain areas, for example where there are major aquifers or when mining stops.

Two datasets have been used to assess potential areas that are likely to be at higher risk of groundwater flooding.

The EA's Areas Susceptible to Groundwater Flooding (AStGWF) dataset, shows the degree to which areas are susceptible to groundwater emergence based on geological and hydrogeological conditions. It does not show the likelihood of groundwater flooding occurring, i.e., it is a hazard, not risk, based dataset. This is included in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

The JBA Groundwater Emergence map (Figure 4-9), shows the likelihood of groundwater emergence posing a risk to both surface and subsurface assets, based on predicted groundwater levels. This divides groundwater emergence into five categories (Table 4-6). This mapping is shown in Appendix E.

Table 4-6: JBA Groundwater Emergence Map Category Descriptions.

Category	Potential risk
Groundwater levels are either at or very near (within 0.025m of) the ground surface.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
Groundwater levels are between 0.025m and 0.5m below the ground surface.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
Groundwater levels are between 0.5m and 5m below the ground surface.	There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.

Category	Potential risk
Groundwater levels are at least 5m below the ground surface.	Flooding from groundwater is not likely.
No risk.	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.

It should be noted that these datasets only identify areas likely to be at risk of groundwater emergence and do not allow prediction of the likelihood of groundwater flooding or quantification of the volumes of groundwater that might be expected to emerge in a given area.

The areas at most risk of groundwater emergence are discussed in Appendix D. In high-risk areas, a site-specific risk assessment for groundwater flooding may be required to fully inform the likelihood of flooding.

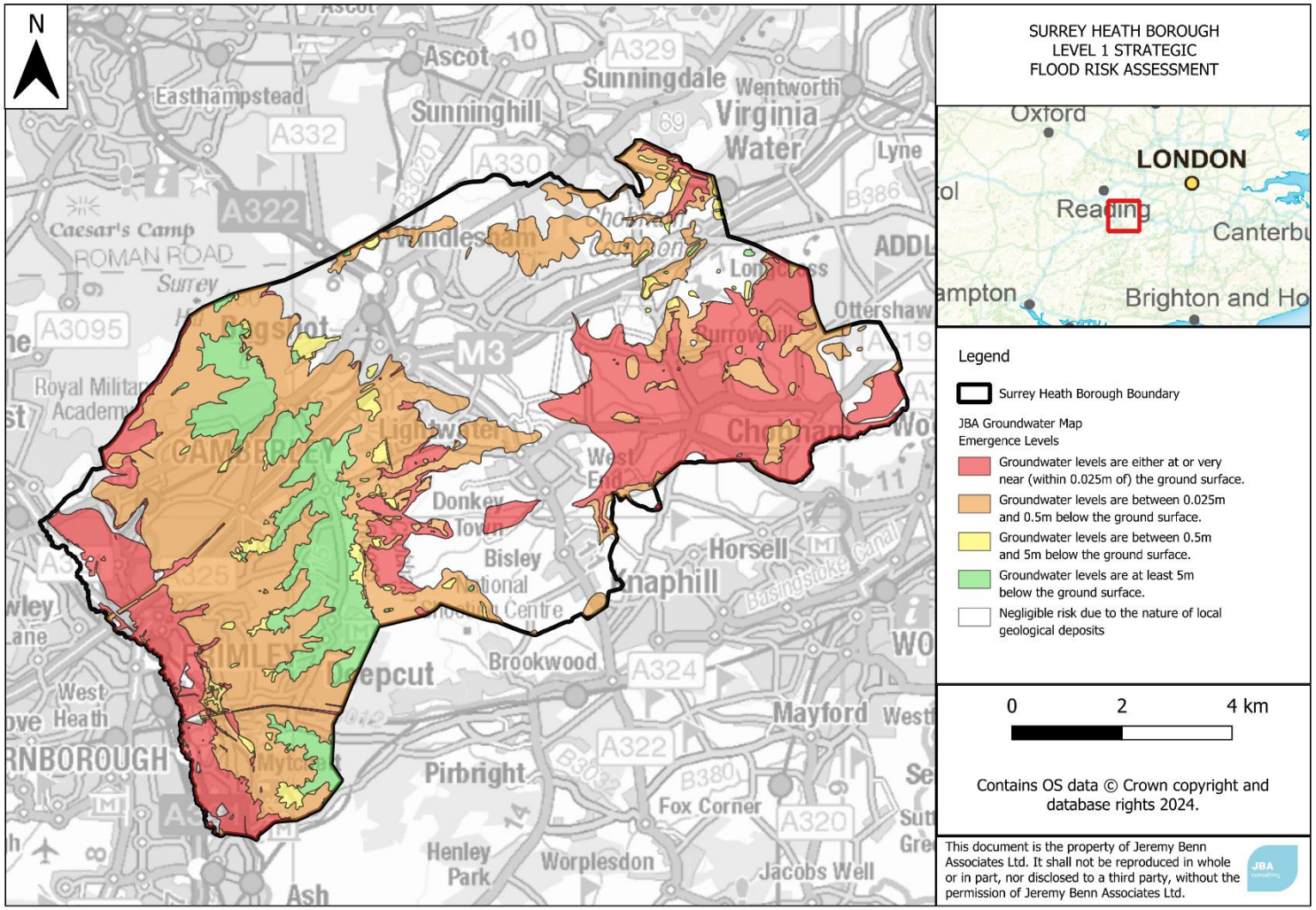


Figure 4-9: JBA Groundwater Map showing groundwater emergence levels across the borough.

4.8 Flooding from canals

Canals are regulated waterbodies and are unlikely to flood unless there is a sudden failure of an embankment or a sudden ingress of water from a river in areas where they interact closely. Embankment failure can be caused by:

- Culvert collapse
- Overtopping
- Animal burrowing
- Subsidence/ sudden failure e.g., collapse of former mine workings
- Utility or development works close or encroaching onto the footings of a canal embankment.

Flooding from a breach of a canal embankment is largely dictated by canal and ground levels, canal embankment construction, breach characteristics and the volume of water within the canal that can discharge into the lower lying areas behind the embankment. The volume of water released during a breach is dependent on the pound length (i.e. the distance between locks) and how quickly the operating authorities can react to prevent further water loss, for example by the fitting of stop boards to restrict the length of the canal that can empty through the breach, or repair of the breach.

There is one canal within the borough (shown in Figure 4-10), the Basingstoke Canal. The Basingstoke Canal runs through the southernmost area of the borough, parallel to the South Western Main Line and then along the eastern side of Mychett and Frimley Green.

The Basingstoke Canal is jointly owned by Surrey and Hampshire County Councils with the Basingstoke Canal Authority (BCA) (hants.gov.uk) set up in 1992 to manage the Basingstoke Canal on behalf of the two County Councils. The BCA are responsible for ensuring the canal remains safe, maintaining navigation, and conserving nature.

No information on whether there have been any historic instances of breaches and/or overtopping along the canal was provided by the BCA within the timescales of this SFRA.

The canal has the potential to interact with other watercourses in the study area, namely the River Blackwater, which has the potential to become a flow path if the canal was overtopped or breached.

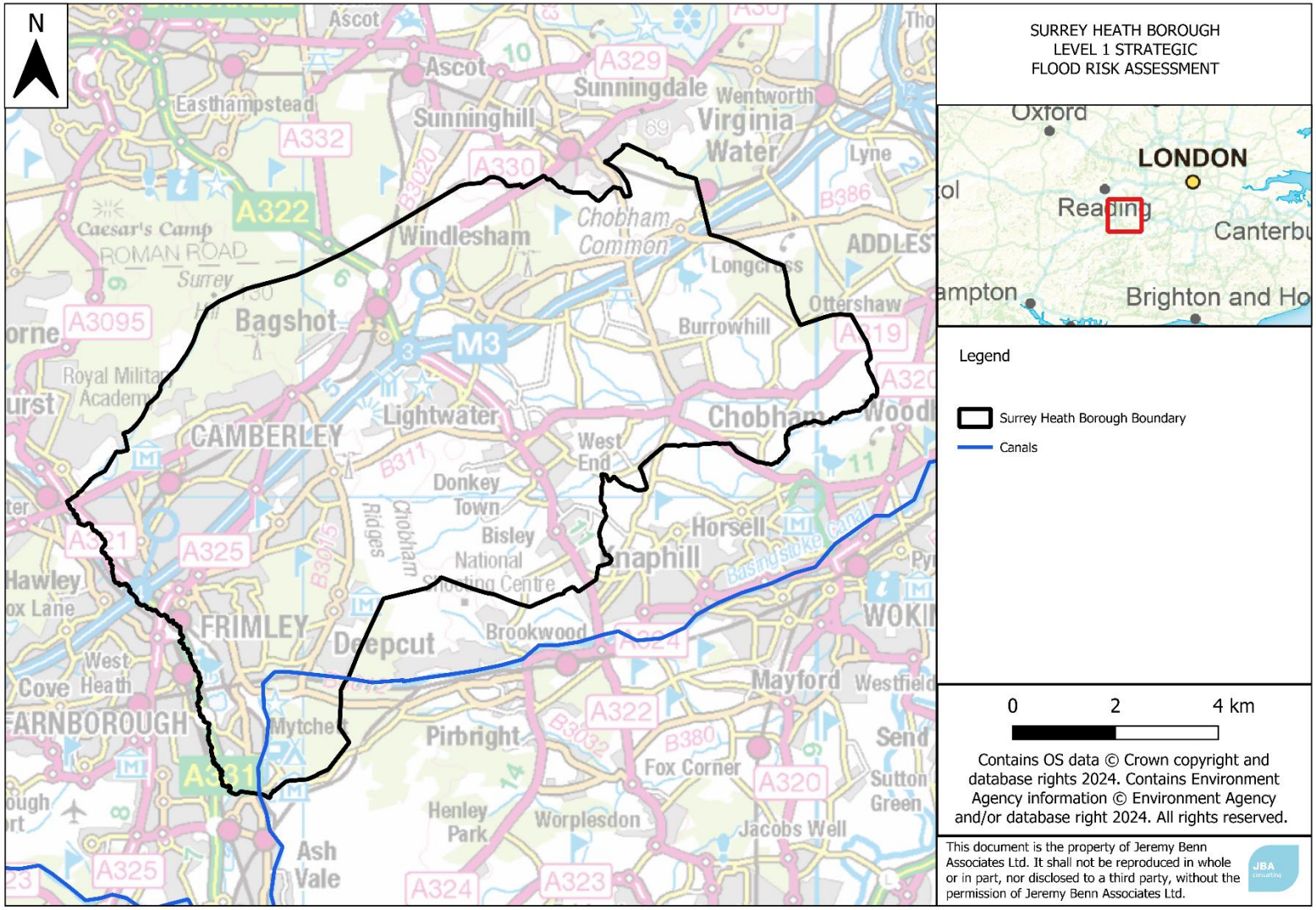


Figure 4-10: Location of the canals in the borough.

4.9 Flooding from reservoirs

Reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the Reservoirs Act 1975 (gov.uk) and are on a register held by the EA. The level and standard of inspection and maintenance required by a Supervising Panel of Engineers under the Act means that the risk of flooding from reservoirs is very low. Some reservoirs are designated as high risk by the EA, where an uncontrolled release of water could put people's lives at risk and are subject to increased inspection and maintenance requirements. However, this designation does not mean they are at a high risk of flooding.

Flooding from reservoirs occurs following partial or complete failure of the control structure designed to retain water in the artificial storage area. Reservoir flooding is very different from other forms of flooding; it may happen with little, or no warning and evacuation will need to happen immediately. The likelihood of such flooding is difficult to estimate but is extremely low compared to flooding from other sources. It may not be possible to seek refuge upstairs from floodwater as buildings could be unsafe or unstable due to the force of water from the reservoir breach or failure.

The EA hold mapping showing what might happen if reservoirs fail. Developers and planners should check the Long-Term Risk of Flooding (gov.uk) before using the reservoir data shown in this SFRA to make sure they are using the most up to date mapping.

The EA provide two flooding scenarios for the reservoir flood maps: a ‘dry-day’ and a ‘wet-day’. The ‘dry day’ scenario shows the predicted flooding which would occur if the dam or reservoir fails when rivers are at normal levels. The ‘wet day’ scenario shows the predicted worsening of the flooding which would be expected if a river is already experiencing an extreme natural flood. It should be noted that these datasets give no indication of the likelihood or probability of reservoir flooding. The EA maps represent a credible worst-case scenario. In these circumstances it is the time to inundation, the depth of inundation, the duration of flooding and the velocity of flood flows that will be most influential.

The EA also provides the 'fluvial contribution' extent which shows the extent of river flooding added to the reservoir model to determine the impacts of failure on a wet day. This can be compared with the FMfP Rivers and Sea dataset to see the impact the reservoir flooding has.

The current mapping shows that there are four reservoirs located within the borough with residual risk of flood extents impacting the study area (detailed in Table 4-6).

There are three further reservoirs located outside the borough whose flood extents impacts the borough (detailed in Table 4-8).

The reservoir locations are shown in Figure 4-11. The reservoir flood mapping for both the ‘dry day’ and ‘wet day’ scenarios in the study area is shown in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

In addition to the risk of inundation, those considering development in areas affected by breach events should also assess the potential hydraulic forces imposed by the rapid flood

event and check that that the proposed infrastructure fabric can withstand the loads imposed on the structures by a breach event.

Section 8.4.3 provides further considerations for developing in the vicinity of reservoirs.

Table 4-7: Reservoirs within the borough with flood extents that impact the borough.

Reservoir	Easting and Northing	Reservoir owner	Risk Category	Lead Local Flood Authority
Mytchett Lake	489220, 154295	Surrey County Council	High-Risk	Surrey County Council
Sandhurst Upper Lake	486761, 160759	Ministry of Defence	High-risk	Surrey County Council
Sandhurst Lower Lake	486150, 160550	Ministry of Defence	High-risk	Bracknell Forest Council
Surrey Hill Reservoir	488692, 163917	South East Water Ltd	High-risk	Surrey County Council

Table 4-8: Reservoirs located outside the borough but where the flood extents impact the borough.

Reservoir	Easting and Northing	Reservoir owner	Risk Category	Lead Local Flood Authority	Does reservoir impact study area in 'dry day' scenario?
Cove Brook Flood Storage Reservoir	485460, 155360	Environment Agency	High-risk	Hampshire County Council	Yes
Crowthorne Reservoir (Cells 2 & 3)	487135, 164660	South East Water Ltd	High-risk	Bracknell Forest Council	Yes
Hawley Lake	484300, 157500	Ministry of Defence	High-risk	Hampshire County Council	Yes

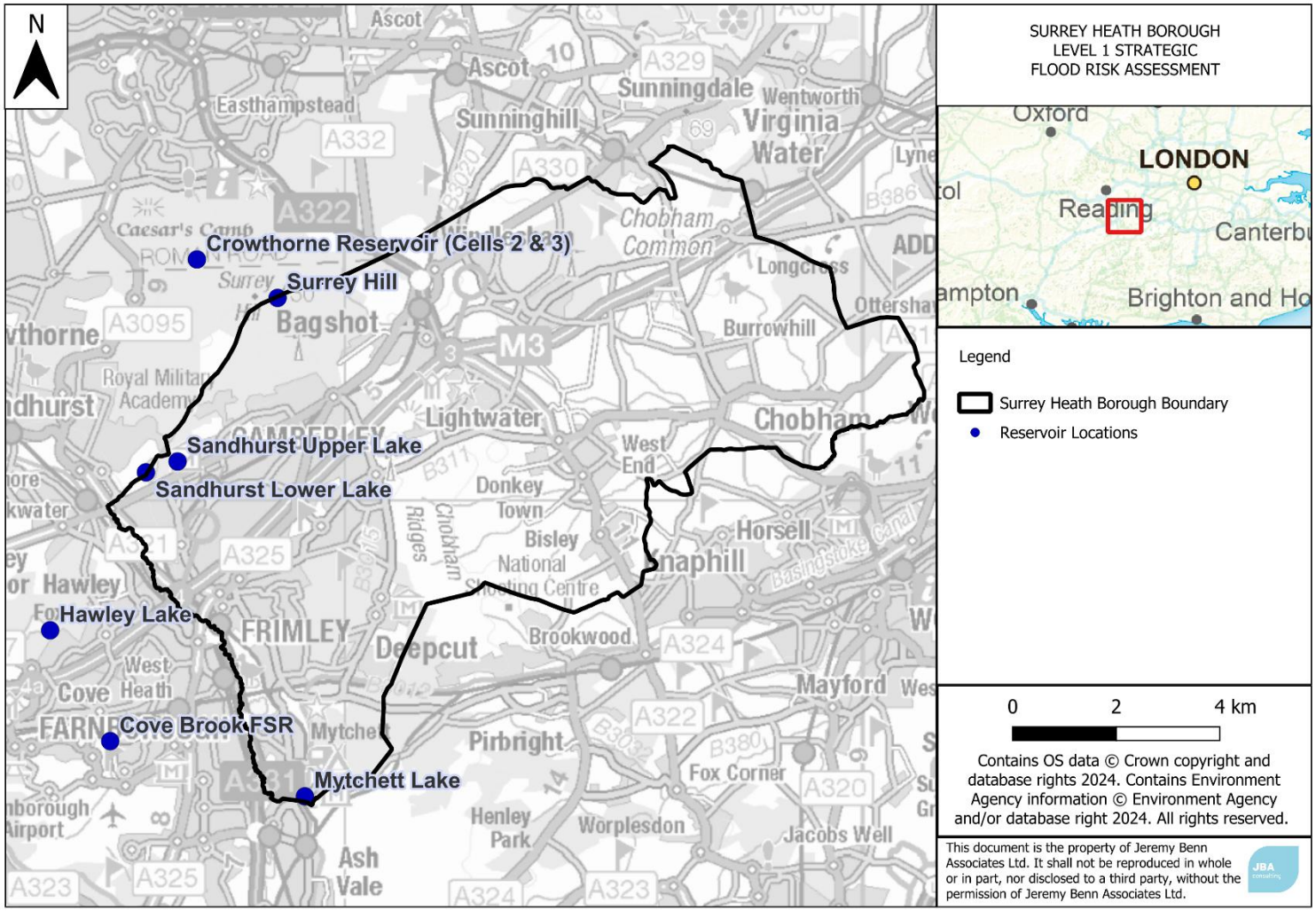


Figure 4-11: Reservoirs with flood extents that impact the borough.

4.10 Flood alerts and flood warnings

The EA is the lead organisation for providing warnings of river flooding. Flood Warnings are supplied via the Flood Warning System (FWS) service, to homes and business within Flood Zones 2 and 3. The EA Sign up for Flood Warnings (gov.uk) page provides further information on how to sign up for these warnings.

There are currently four Flood Alert Areas (FAA) and six Flood Warning Areas (FWAs) covering the borough. Flood Alerts are issued when there is water out of bank for the first time anywhere in the catchment, signalling that 'flooding is possible', and therefore FAAs usually cover the majority of main river reaches.

Flood Warnings are issued to designated FWAs (i.e., properties within the extreme flood extent which are at risk of flooding), when the river level hits a certain threshold; this is correlated between the FWA and the gauge, with a lead time to warn that 'flooding is expected'.

4.11 Summary of flood risk in the borough

A table summarising all sources of flood risk to key settlements in the study area can be found in Appendix D. For this summary, the borough has been delineated into three sub-areas. These sub-areas are based on watercourse catchments and key settlements. The sub-areas are detailed below:

- Sub-area 1 - This sub-area covers the western areas of the borough. This sub-area is largely urban with the settlements of Camberley, Frimley, Frimley Green, Mytchett and Deepcut.
- Sub-area 2 - This sub-area is located in the north central and eastern parts of the borough. This sub-area is largely rural and includes the small settlements of Bagshot, Lightwater, Windlesham and Chobham.
- Sub-area 3 - This sub-area is located in the south central and eastern parts of the borough. This sub-area is largely rural and includes the small settlements of West End and Bisley in addition to Castle Green and Mimbridge.

5 Impact of Climate Change

Climate change projections show an increased chance of warmer, wetter winters and hotter, drier summers with a higher likelihood of more frequent and intense rainfall. This is likely to make severe flooding happen more often.

The PPG sets out that the sequential test must take into account all sources of flood risk and climate change and the NPPF sets out that flood risk should be managed over the lifetime of a development, taking climate change into account. This section sets out how the impact of climate change should be considered.

5.1 Revised climate change guidance

The Climate Change Act 2008 (legislation.gov.uk) creates a legal requirement for the UK to put in place measures to adapt to climate change and to reduce carbon emissions by at least 80% below 1990 levels by 2050. This was updated in June 2019 under the Climate Change Act 2008 (2050 Target Amendment) Order (legislation.gov.uk) to a 100% reduction (or net zero) by 2050.

In 2018, the Government published new UK Climate Projections (UKCP18). The EA used these projections to update their climate change guidance for new developments with regards to updated fluvial and rainfall allowances. The EA published updated climate change guidance for fluvial risk in July 2021 on how allowances for climate change should be included in both strategic and site-specific FRAs. The guidance adopts a risk-based approach considering the vulnerability of the development and considers risk allowances on a management catchment level, rather than a river basin level. The guidance was further updated in May 2022 to address the changes to the requirements for peak rainfall allowances.

5.1.1 Applying the Climate Change Guidance

Developers will need to undertake a detailed assessment of climate change as part of the planning application process when preparing FRAs. Developers should refer to Flood Risk Assessments: Climate Change Allowances (gov.uk) for the latest guidance.

To apply the appropriate climate change guidance to a site, it is important to know which Management Catchment (assigned by the EA) that the development site is located in. Surrey Heath borough lies across two Management Catchments:

- The east of the borough lies within the 'Wey and tributaries' Management Catchment.
- The west of the borough lies within the 'Loddon and tributaries' Management Catchment.

Further guidance on site-specific FRAs can be found in Section 8.2.

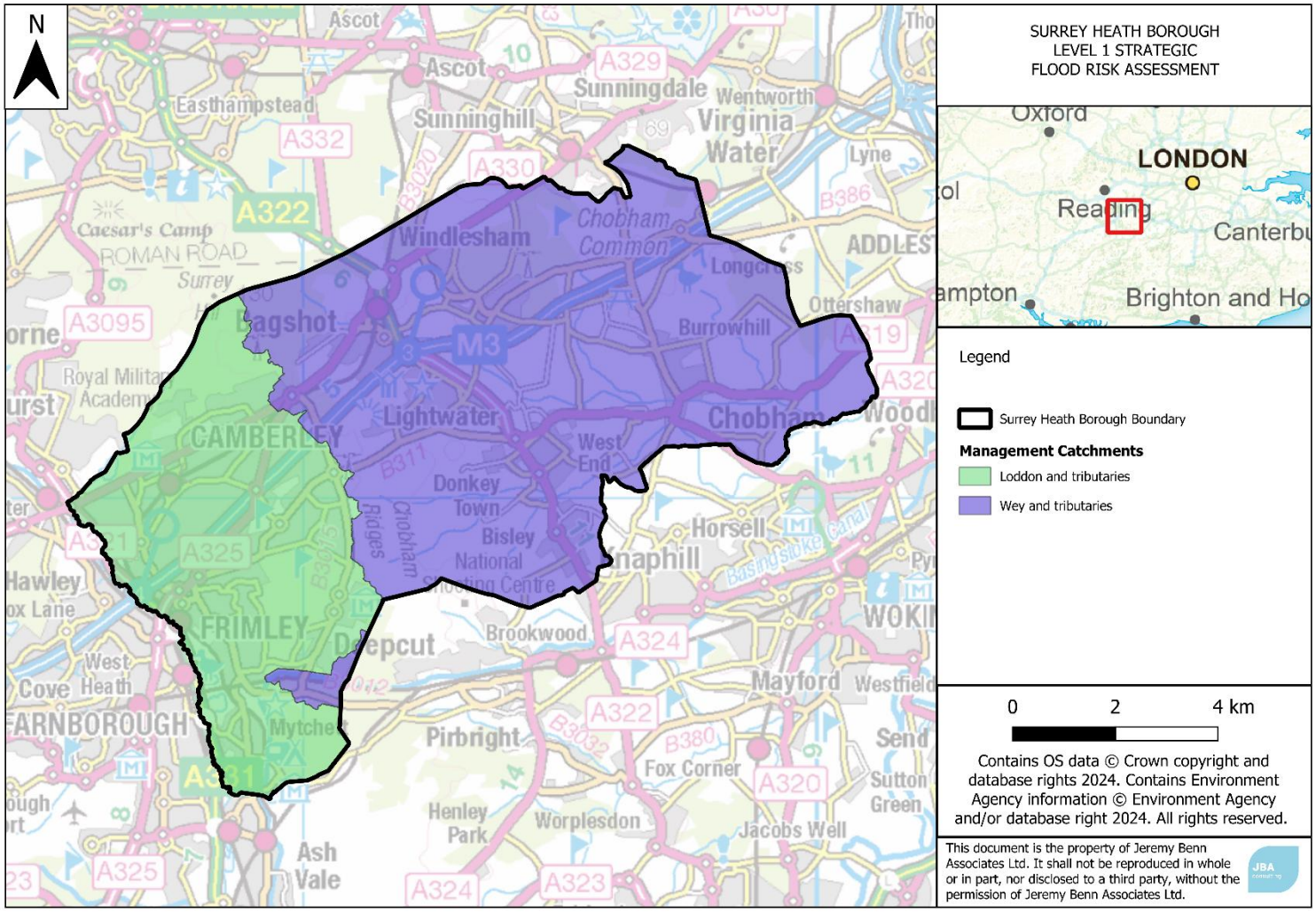


Figure 5-1: Management Catchments (assigned by the EA) across the borough.

5.2 Relevant allowances for the study area

Table 5-1 and Table 5-2 shows the updated peak river flow allowances that apply across the study area for fluvial flood risk for the 'Wey and tributaries' and 'Loddon and tributaries' Management Catchments respectively.

The range of allowances are based on percentiles which describe the proportion of possible scenarios that fall below an allowance level:

- The central allowance is based on the 50th percentile (exceeded by 50% of the projections in the range).
- The higher central allowance is based on the 70th percentile (exceeded by 30% of the projections in the range).
- The upper end allowance is based on the 95th percentile (exceeded by 5% of the projections in the range).

Table 5-1: Peak river flow allowances for the 'Wey and tributaries' Management Catchment.

Allowance category	Total potential change (%) anticipated for '2020s' (2015 to 2039)	Total potential change (%) anticipated for '2050s' (2040 to 2069)	Total potential change (%) anticipated for '2080s' (2070 to 2115)
Central	10	9	24
Higher central	15	17	36
Upper end	28	36	71

Table 5-2: Peak river flow allowances for the 'Loddon and tributaries' Management Catchment.

Allowance category	Total potential change (%) anticipated for '2020s' (2015 to 2039)	Total potential change (%) anticipated for '2050s' (2040 to 2069)	Total potential change (%) anticipated for '2080s' (2070 to 2115)
Central	7	4	14
Higher central	11	10	23
Upper end	23	25	46

Table 5-3 shows the updated rainfall intensity allowances that apply across the study area for surface water flood risk for the different Management Catchments. These allowances supersede the previous country wide allowances. These allowances should be used for site-specific applications and for surface water flood mapping in small catchments (less than 5km^2) and urbanised drainage catchments.

Table 5-3: Peak rainfall intensity allowances for small and urban catchments for the 'Wey and tributaries' Management Catchment.

Allowance category	Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP	Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP
Upper end	35	40	35	45
Central	20	20	25	25

Table 5-4: Peak rainfall intensity allowances for small and urban catchments for the 'Loddon and tributaries' Management Catchment.

Allowance category	Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP	Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP
Upper end	35	40	35	40
Central	20	20	25	25

5.3 Representing climate change in the Level 1 SFRA

The models received from the EA (as detailed in Table 4-4) were reviewed to determine their age, type of model, and the outputs available. A pragmatic approach was then taken to determine a methodology which aims to make best use of the available model data whilst balancing the emerging SHLP timescales and budgets. More detailed modelling of different climate change scenarios may need to be considered further if and when a Level 2 assessment is required or during a site-specific Flood Risk Assessment.

The sections below detail the approaches taken to consider climate change for fluvial, and surface water flooding within this SFRA.

5.3.1 Fluvial climate change

At this stage of Level 1 strategic assessment, we do not intend to re-run any models due to the Council's timescales and costs involved, due to the number of models within the study area. Therefore, the sections below set out the best available data which has been used to assess fluvial climate change.

5.3.1.1 3.3% AEP (Functional floodplain - Flood Zone 3b)

None of the EA hydraulic models provided for this SFRA currently have available outputs for 3.3% AEP plus climate change events.

Flood Zone 3a (1% AEP) of the EA's Flood Map for Planning has been used as an indication of the likely 3.3% AEP plus climate change extent in the absence of modelled outputs. For Ordinary Watercourses where there is no national mapping available, the 1% AEP risk of surface water flooding dataset has been used as a proxy to infer risk.

5.3.1.2 1% AEP (Flood Zone 3a)

The following models have suitable climate change allowances to represent the impacts of climate change on Flood Zone 3a (1% AEP) for the 2080s epoch:

- Blackwater (2007): +15% (~Central) and +25% (~Higher Central) (defended outputs)
- Blackwater Tribs Model 10 (2012): +20% (between Central and Higher Central) (undefended outputs - no defences in model)
- Blackwater Tribs Model 12 (2012): +20% (between Central and Higher Central) (undefended outputs - no defences in model)

For the areas outside of these extents with no hydraulic modelling (or no suitable climate change outputs), the 0.1% AEP extent (Flood Zone 2) has been used as an indicative climate change extent. This is appropriate given the Upper End climate change estimates are often similar to the 0.1% AEP/ Flood Zone 2 extents; therefore, the differences in the effects of climate change are anticipated to be minimal.

5.3.1.3 0.1% AEP (Flood Zone 2)

None of the EA hydraulic models provided currently have available outputs for 0.1% AEP plus climate change events. Uplifting existing models with climate change allowances for the 0.1% AEP event presents significant time and cost implications. It also presents practical issues as most models are not built to run events of this magnitude, and often present instabilities and an inability to run. As such, it is not proposed to assess the 0.1% AEP event with climate change within the SFRA.

If development is proposed within close proximity of the 0.1% AEP event (Flood Zone 2) this risk should be considered further in a site-specific Flood Risk Assessment.

5.3.2 Surface water climate change

The Risk of Flooding from Surface Water Mapping dataset can be used as an indication of surface water risk, and the risk from smaller watercourses, which are too small to be covered by the EA’s Flood Zones.

The following modelled climate change uplifts were run as part of this SFRA and are presented in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud):

- 3.3% AEP with +35% uplift (2070s Upper End allowance)
- 1% AEP with +40/45% uplift (2070s Upper End allowance)

5.4 Impacts of climate change across the borough

This section explores which areas of the borough are most sensitive to increases in flood risk due to climate change. It should be noted that areas that are already at high risk will also become at increasing risk in future and the frequency of flooding will increase in such areas.

It is recommended that the Council works with other RMAs to review the long-term sustainability of existing and new development in these areas when developing climate change plans and strategies for the study area.

5.4.1 Impact of climate change on fluvial flood risk

The sensitivity of an area to climate change can be analysed through comparison between present day flood extents and with climate change uplifts applied.

The 1% AEP plus climate change defended model flood extents have been compared with the defended 1% AEP flood extent along the River Blackwater. Areas along the River Blackwater identified as most sensitive to fluvial impacts of climate change are:

- Along the River Blackwater in the north west of the study area around Admirality Park and areas off Stanhope Road.
- Along the River Blackwater in the west of the study area around Watchmoor Nature Reserve.

The 1% AEP plus climate change undefended model flood extents have been compared with the undefended 1% AEP flood extent for the River Blackwater tributaries (as there are no defences within the fluvial models for these areas). Areas along the tributaries identified as most sensitive to fluvial impacts of climate change are:

- Areas east of Frimley Station in the west of the study area, particularly off Bailey Close and Sheridan Road, Frimley.
- Areas around Albany Park Industrial Estate in Frimley, to the east of the rail embankment.

Where no detailed modelling exists the 1% AEP flood extent (Flood Zone 3a) can be compared against the 0.1% AEP flood extent (Flood Zone 2), for an indication of areas sensitive to climate change. Areas in the study area identified as most sensitive to fluvial impacts of climate are:

- Along the Bourne River in the south east of the borough, covering the area between Station Road and Broadford Lane to the south of Chobham.
- Areas in Coxhill Green to the east of Philpot Lane to the borough boundary.
- Areas to the east of Chobham High Street, including Chobham Cricket Ground Village Hall, and residential properties.
- Large areas along Windle Brook affecting areas within Bagshot, from Bagshot substation to east of Bridge Road and also residential areas off Freemantle Road in the east of the village.

- Along Trulley Brook, affecting areas either side of Lucas Green Road, and between Guildford Road and Ford Road, between West End and Bisley.
- Large rural areas to the east of Bagshot and north of Lightwater off Windle Brook.

5.4.2 Impacts of climate change on surface water flood risk

The 1% AEP surface water event with the 2070s upper end climate change uplift can be compared to the present day 1% AEP extent for an indication of areas most sensitive to climate change.

Across the borough areas in the study area most sensitive to changes in surface water flood risk are typically in low lying, urban locations, along watercourses. In particular, the following areas are sensitive to increased surface water flooding due to climate change:

- Areas southwest of Windlesham in Bagshot along the Windle Brook, predominantly in fields between the M3 and New Road and along the watercourse within the town centre.
- Along the unnamed tributary, north of London Road, north of Windlesham.
- Along The Bourne watercourse north of Bisley and across agricultural land near Mimbridge.

5.4.3 Impacts of climate change on groundwater flood risk

There is no modelling data available to assess climate change impacts on groundwater. The assessment would depend on the flooding mechanism, historic evidence of known flooding and geological characteristics, for example prolonged rainfall in a chalk catchment. Flood risk could increase when groundwater is already high or emerged, causing additional overland flow paths or areas of still ponding.

A high likelihood of groundwater flooding may mean infiltration SuDS are not appropriate, and groundwater monitoring may be recommended.

5.4.4 Adapting to climate change

PPG: Climate Change (gov.uk) Paragraph 003 (Reference ID: 6-003-20140612) contains information and guidance for how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Paragraph 005 (Reference ID: 6-005-20140306) also provides considerations for the LPA on dealing with the uncertainty of climate risks and accounting for climate change in a realistic way within developments.

6 Flood alleviation schemes and assets

This section provides a summary of existing flood alleviation schemes and assets in the borough. Planners should note the areas that are protected by defences where further work to understand the actual and residual flood risk through a Level 2 SFRA may be beneficial. Developers should consider the benefit they provide over the lifetime of a development in a site-specific FRA.

6.1 Asset management

RMAs hold databases of flood risk management and drainage assets according to their jurisdiction as follows:

- The EA holds a national database that is updated by local teams.
- The LLFA holds a database of significant local flood risk assets, required under Section 21 of the FWMA (2010).
- Highways Authorities hold databases of highways drainage assets, such as gullies and connecting pipes.
- Water Companies hold records of public surface water, foul and combined sewers, the records may also include information on culverted watercourses.
- The databases include assets RMAs directly maintain and third-party assets. The drainage network is extensive and will have been modified over time. It is unlikely that any RMA contains full information on the location, condition, and ownership of all the assets in their area. They take a prioritised approach to collecting asset information, which will continue to refine the understanding of flood risk over time.

Developers should collect the available asset information and undertake further survey as necessary to present an understanding of current flood risk and the existing drainage network in a site-specific FRA.

6.2 Standards of Protection

Flood defences are designed to give a specific Standard of Protection (SoP), reducing the risk of flooding to people and property in flood prone areas. For example, a flood defence with a 1% AEP SoP means that the flood risk in the defended area is reduced to at least a 1% chance of flooding in any given year.

Over time the actual SoP provided by the defence may decrease, for example due to deterioration in condition or increases in flood risk due to climate change. The understanding of SoP may also change over time as RMAs undertake more detailed surveys and flood modelling studies.

It should be noted that the EA's on-going hydraulic modelling programme may revise flood risk datasets and, therefore, the SoP offered by flood defences in the area may differ from those discussed in this report.

6.3 Maintenance

Different authorities have responsibilities relating to maintenance of flood risk assets, set out in Table 6-1. It is important that the authorities work in partnership to maintain flood risk assets and manage flood risk across the study area.

Table 6-1: Flood risk asset maintenance responsibilities.

Authority	Asset maintenance responsibilities
EA	Permissive powers to maintain and improve main rivers, ultimate responsibility for maintaining watercourses rests with the landowner.
Local Authorities	Permissive powers to maintain and improve ordinary watercourses, ultimate responsibility for maintaining watercourses rests with the landowner.
LLFA	Permissive powers, limited resources are prioritised and targeted to where they can have the greatest effect
Highways Authorities	Duty to maintain public roads, making sure they are safe, passable, and the impacts of severe weather have been considered. Responsible for maintaining sections of watercourses where they are crossed by highways.
Water Companies	Duty to effectually drain their area. What this means in practise is that assets are maintained to common standards and improvements are prioritised for the parts of the network that do not meet this standard e.g., where there is frequent sewer flooding.
Riparian Owners	Responsible for the protection of their properties from flooding as well as other management activities, for example by maintaining riverbeds/ banks, controlling invasive species, and allowing the flow of water to pass without obstruction.

There is potential for the risk of flooding to increase in areas where flood alleviation measures are not maintained regularly. Breaches in raised flood defences are most likely to occur where the condition of a flood defence has degraded over time. Drainage networks in urban areas can also frequently become blocked with debris and this can lead to blockages at culverts or bridges.

Developers should not assume that any defence, asset, or watercourse is being or will continue to be maintained throughout the lifetime of a development. They should contact the relevant RMA about current and likely future maintenance arrangements and make future users of the development aware of their obligations to maintain watercourses.

Formal structural defences are given a rating based on a grading system for their condition. A summary of the grading system used by the EA for condition is provided in Table 6-2.

Table 6-2: Grading system used by the EA to assess flood defence condition.

Grade	Rating	Description
1	Very good	Cosmetic defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce the performance of the asset.
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation required.
5	Very poor	Severe defects resulting in complete performance failure.

Source: Condition Assessment Manual – EA 2006

6.4 Major flood risk management assets in the borough

The EA retired the Flood Map for Planning 'Areas Benefiting from Defences' (ABD) dataset in December 2022. This dataset will no longer be available on online mapping. Instead, a developer can enter an address into the EA Flood Map for Planning (gov.uk) to get information about their specific site and request flood risk assessment data for planning (also known as Product 4).

The EA now provide a dataset called the 'Reduction in risk of flooding from rivers and sea' which provides areas that are offered some level of reduced flood risk from defences, but with no defined SoP. A small area located along The Bourne River north of Bisley is shown to have reduced flood risk due to the defences along The Bourne River in the south of the borough. Each cell has been assigned a suitability rating to show at what scale it is generally appropriate to use the data to assess flood risk, and how suitable the data is for a range of different uses. The data for the borough is classified as 'County to town' suitability, which is suitable for identifying approximate extents, shallower and deeper areas, but is unlikely to be reliable for a local area and is very unlikely to be reliable for identifying individual properties at risk.

The EA 'AIMS' (Asset Information Management System) flood defence dataset gives information on flood defence assets within the study area which are owner, maintained and/or operated by the EA. For further details of specific defences, developers should refer to the AIMS Spatial Flood Defences dataset (gov.uk), which can be downloaded from the EA website and viewed in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

Key flooding assets owned and maintained by SCC are included within their Flood Asset Register (surreycc.gov.uk) where they are known to cause or allow the major flooding of properties, critical infrastructure, or block major roads when the asset is not functioning to an adequate level. This register currently includes seven assets within the borough.

6.5 Existing and future flood alleviation schemes

Within the Surrey Heath SFRA 2021 (surreyheath.gov.uk) it was stated that the Chobham Flood Alleviation Scheme was being constructed to alleviate the risk of flooding from surface water in the area. The scheme has not yet commenced. Subject to funding and resources, the scheme is expected to commence in 2026/27 with partial completion by 2030.

The EA is currently developing a Business Case for the Addlestone Bourne NFM Flood Alleviation Scheme (detailed further in Section 7.4).

6.6 Actual and residual flood risk

A Level 2 SFRA (for strategic allocations) or developer site-specific FRA will need to consider the actual and residual flood risk taking into consideration the presence of flood and drainage assets in greater detail (although it should be noted that Flood Zone 3b is based on the actual flood risk).

6.6.1 Actual flood risk

This is the risk to the site considering existing flood mitigation measures and any planned to be provided through new development. Note that it is not likely to be acceptable to allocate developments in existing undefended areas on the basis that they will be protected by developer works, unless it can be demonstrated there is a wider community benefit.

The assessment of the actual risk should consider that:

- The level of protection afforded by existing defences might be less than the appropriate standards and hence may need to be improved if further growth is contemplated.
- The flood risk management policy for the defences will provide information on the level of future commitment to maintain existing standards of protection. If there is a conflict between the proposed level of commitment and the future needs to support growth, then it will be a priority for this to be reviewed.
- The standard of safety must be maintained for the intended lifetime of the development. Over time the effects of climate change will erode the present-day SoP afforded by defences and so commitment is needed to invest in the maintenance and upgrade of defences if the present-day levels of protection are to be maintained and where necessary, land secured and safe-guarded that is required for affordable future flood risk management measures.
- By understanding the depth, velocity, speed of onset and rate of rise of floodwater it is possible to assess the level of hazard posed by flood events from the respective sources.

6.6.2 Residual risk

Residual risk is the risk that remains after the effects of flood risk infrastructure have been considered. It is important that these risks are quantified to confirm that the consequences can be safely managed. The residual risk can be:

- The effects of a larger flood than defences were designed to alleviate. This can cause overtopping of flood banks, failure of flood gates to cope with the level of flow or failure of pumping systems to cope with the incoming amount of water.
- Failure of the defences or flood risk management measures, such as breaches in embankments or walls, failure of flood gates to open or close or failure of pumping stations.

This SFRA does not assess the probability of failure other than noting that such events are very rare. However, in accordance with the NPPF, all sources of flooding need to be considered. If a breach or overtopping event were to occur, then the consequences to people and property could be high. It is the responsibility of the developer to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed.

The risk from overtopping of defences is based on the relative heights of property or defence, the distance from the defence level and the height of water above the crest level of the defence. The Defra and EA Flood Risks to People guidance document (gov.uk) provides standard flood hazard ratings based on the distance from the defence and the level of overtopping. Any sites located next to defences or perched ponds/ reservoirs, may need overtopping modelling or assessments at the site-specific FRA stage, and climate change needs to be taken in to account.

A breach of a defence occurs when there is a failure in the structure and a subsequent ingress of flood water. Flood flows from breach events can be associated with significant depths and flow velocities in the immediate vicinity of the breach location and so FRAs must include assessment of the hazards that might be present so that the safety of people and structural stability of properties and infrastructure can be appropriately considered. Whilst the area in the immediate vicinity of a breach can be subject to high flows, the whole flood risk area associated with a breach must also be considered as there may be areas remote from the breach that might, due to topography, involve increased depth hazards.

Considerations include the location of a breach, when it would occur and for how long, the depth of the breach (toe level), the loadings on the defence and the potential for multiple breaches. There are currently no national standards for breach assessments and there are various ways of assessing breaches using hydraulic modelling. Work is currently being undertaken by the EA to collate and standardise these methodologies. It is recommended that the EA are consulted if a development site is located near to a flood defence, to understand the level of assessment required and to agree the approach for the breach assessment.

Guidance on site-specific FRAs can be found in Section 8.2.

7 Cumulative impact of development and strategic solutions

7.1 Introduction

The cumulative impact of development should be considered at both the Local Plan making stage and the planning application and development design stages. Paragraph 171 of the NPPF (2024) states:

'Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.'

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume from any source, as well as the impact of increased flows on flood risk downstream. Whilst the loss of storage for individual developments may only have a minimal impact on flood risk, the cumulative effect of multiple developments may be more severe. Similarly, the effect of the loss of surface water flow paths / exceedance paths from sewers, surface water ponding and infiltration can also give rise to cumulative effects and potentially exacerbate flood risk. There are also risks of development causing modified flow regimes from sites creating an alignment in peak flows in downstream watercourses and resulting in greater flood risk as a result of the development.

All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments comply with the latest guidance and legislation relating to flood risk and sustainable drainage, and appropriate consideration is given to flow paths and storage, proposals should normally not increase flood risk downstream.

Local planning policies can also be used to identify areas where the potential for development to increase flood risk is highest and identify opportunities for such new development to positively contribute to decreases in flood risk downstream.

7.2 Methodology

For the Cumulative Impact Assessment (CIA), Surrey Heath Borough was assessed at a catchment level using the Water Framework Directive (WFD) catchments, with these catchments shown in Figure 7-1. There are a total of 10 WFD catchments which fall within the borough to some extent. The 'Chertsey Bourne (Chertsey to River Thames confluence)' was excluded from the assessment, as only 0.08% of the upstream end of the catchment falls within the borough.

There are four stages to the Level 1 CIA:

- Assess sensitivity to increases in fluvial and surface water flood risk.
  - This will be assessed by calculating the change in the building area shown to flood from the 1% AEP to the 0.1% AEP events for fluvial and surface water flooding respectively, given as a percentage of the total building area in the catchment.
  - The OS Open Zoomstack Local Buildings layer was used to identify the built area within the catchments as this is an open data source which provides full coverage of the borough and cross boundary catchments.
- Identify historic flooding incidents.
  - Identify the total number of historic flooding incidents within each catchment.
  - The historic data was represented as point data, where each point represents a location where it is known there has been at least one flood event (however, the nature and scale of these flood events varies significantly).
  - Historic data was only available for Surrey Heath Borough and was therefore only included in the overall assessment for catchments where 50% of their area lies within the borough: 'Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge)' and 'Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)'.
- Assess the catchments with the highest degree of proposed new development.
  - This will be assessed by calculating the area of proposed new development within each catchment, expressed as a percentage of the total catchment area.
  - At this stage the whole area of each development will be considered, with no land use assumptions for the development areas.
- Identify the most sensitive catchments to increased risk.
  - Rank catchments in each category.
  - Discussion of catchments which are at higher risk in all categories/individual categories.
  - Policy recommendations for developments in higher risk catchments.

Table 7-1 summarises the datasets used within the Surrey Heath CIA.

The final results of this assessment gave a rating of low, medium, or high sensitivity to increased risk for each metric, for each catchment within the study area. The rating of each catchment in each of these assessments was combined to give an overall ranking.

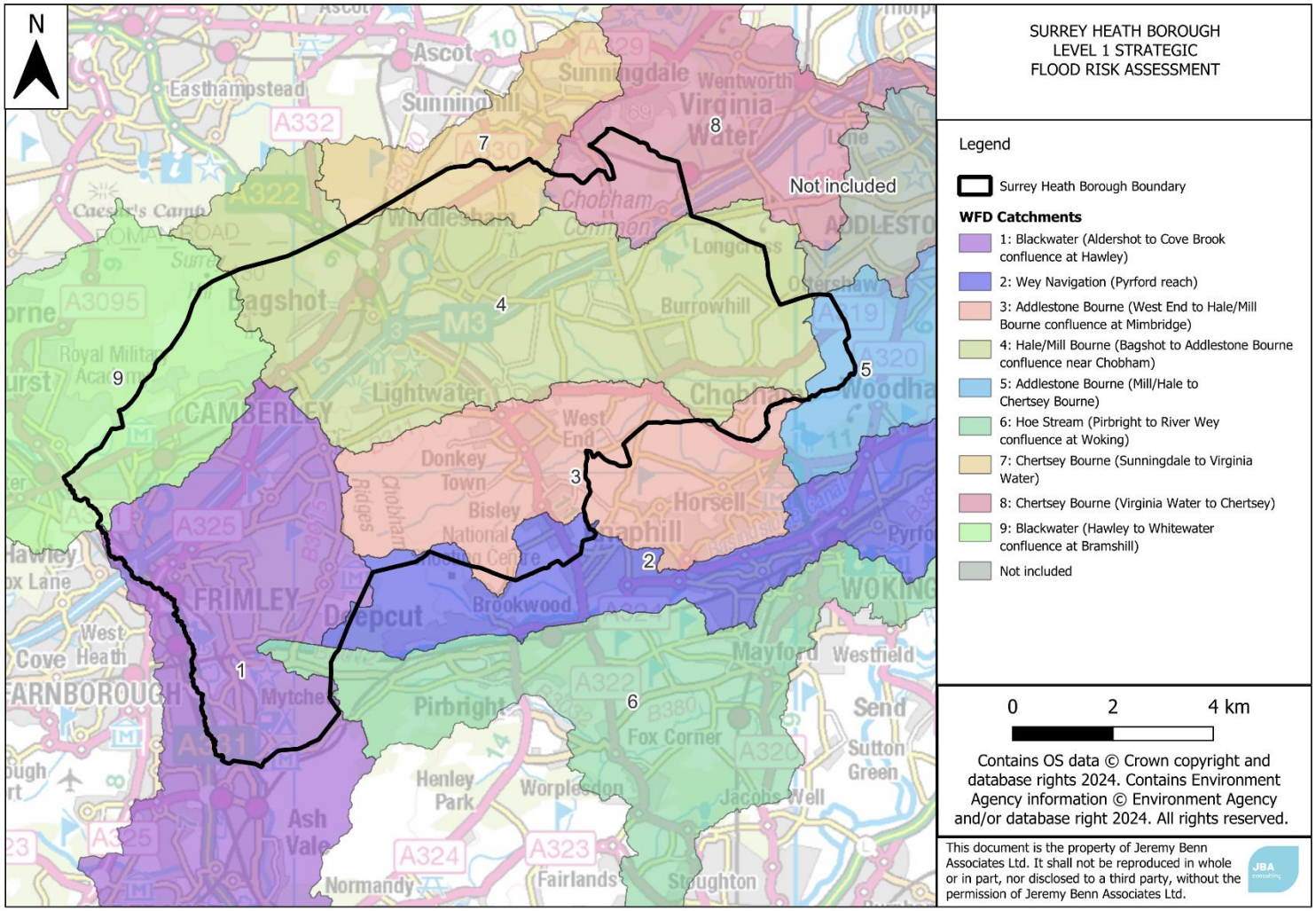


Figure 7-1: WFD Catchments across Surrey Heath Borough.

Table 7-1: Summary of datasets used within the Broadscale CIA.

Dataset	Coverage	Sources of Data	Use of Data
Catchment boundaries	Surrey Heath Borough and neighbouring authorities	Water Framework Directive Catchments	Assessment of susceptibility to cumulative impacts of development by catchment
OS Open Zoomstack Local Buildings	Surrey Heath Borough and neighbouring authorities	Ordnance Survey (Open Source)	Built area for the assessment of flood risk
Risk of Flooding from Surface Water	Surrey Heath Borough and neighbouring authorities	EA	Assessing the built area at risk of surface water flooding within each catchment
Fluvial Flood Zones 2 and 3a	Surrey Heath Borough and neighbouring authorities	EA Flood Map for Planning	Assessing the built area at risk of fluvial flooding within each catchment
Historic Property Flooding Incidents (aggregated to property roads (*))	Surrey Heath Borough	Historic data provided by Surrey County Council	Assessing the historic flood data within each catchment.
Surrey Fire and Rescue Service Historic Flooding Incidents	Surrey Heath Borough	Historic data provided by Surrey Fire and Rescue Service	Assessing the historic flood incident data within each catchment.
Future development areas (recently built out sites/sites under construction/sites with planning permission/previously allocated sites/currently allocated sites)	Surrey Heath Borough and neighbouring authorities (excluding Woking Borough)	Surrey Heath Borough and neighbouring authorities (excluding Woking Borough)	Assessing the impact of proposed future development on risk of flooding

(*) where a property has flooded the entire road has been identified to avoid identifying any individual properties

7.2.1 Ranking the results

The results for each assessment were ranked into high, medium, and low susceptibility to increased risk as shown in Table 7-2.

The ranking results were combined from the three assessments to give an overall high, medium, and low ranking for all catchments within Surrey Heath Borough. Each catchment was assigned a score for each assessment based on its ranking (high = 3, medium = 2, low = 1) and these were then averaged to produce a final score and ranking.

There is currently no national guidance available for assessing the cumulative impacts of development. These rankings provide a relative assessment of the catchments within Surrey Heath Borough and are not comparable across other boroughs/districts. The thresholds used have been based on natural breaks in the data and professional judgement.

Table 7-2: Ranking assessment criteria

Flood risk ranking	Percentage of building area at increased risk of fluvial flooding	Percentage of building area at increased risk of surface water flooding	Total number of historic flooding incidents	Percentage area of catchment covered by new development
Low risk	<=3	<=3.5	<=50	<=0.5
Medium risk	<=4.5, >3	<=4.5, >3.5	<=100, >50	<=4, >0.5
High risk	>4.5	>4.5	>100	>4

7.2.2 Assumptions

The assumptions made when conducting the CIA are shown in Table 7-3.

Table 7-3: Assumptions of the CIA.

Assessment aspect	Details of limitation in method	Justification of method used
Fluvial flood risk	Used the Flood Map for Planning Flood Zone 2 as an indicative estimate of the impacts of climate change across the district.	Although detailed climate change modelling was available for some watercourses, the broader Flood Map for Planning covers the entire area of the catchments both within and outside the district and therefore provided a consistent approach for this high level assessment.

Assessment aspect	Details of limitation in method	Justification of method used
Surface water flood risk	Used the 0.1% AEP extent from the Risk of Flooding from Surface Water Map as an indicative estimate of the impacts of climate change across the study area.	Although the Risk of Flooding from Surface Water Map was uplifted for climate change as part of this study, the uplifts were only applied to the study area, the Risk of Flooding from Surface Water Map covers the entire area of the catchments both within and outside the study area and therefore provided a consistent approach for this high level assessment.
Historic Flooding Incidents	Only flooding incidents recorded that could be georeferenced to produce GIS files were used. Each point or line feature represents a location where it is known there has been at least one flood incident. The severity of the historic flooding event relating to the point/line feature has not been considered, just the total number of points within each catchment where there has been a flood incident.	GIS data sources provided the most accurate results possible for the location of historic flooding incidents across the borough.
Historic Flooding Incidents	Historic data provided by Surrey County Council and Surrey Fire and Rescue only covered Surrey Heath Borough and therefore does not provide data across some of the larger cross-boundary catchments.	Best available historic data has been used. To reduce any impacts of the limited data coverage, for catchments where greater than 50% of their area lies outside the borough, the historic assessment was not included within the overall ranking as the count is likely to be a considerable underestimate for these catchments.
Development	Sites provided by SHBC are their housing allocations from the Regulation 19 Local Plan (provided 30 July 2024). This assessment assumes all of these sites are taken forward to development. Have not considered whether sites are greenfield or brownfield sites (with	This is a reasonable worst-case scenario as we do not have further information to inform which sites are most likely to go forward to development.

Assessment aspect	Details of limitation in method	Justification of method used
	brownfield regeneration having the potential to reduce flood risk) or the proposed allocation type and land use of the site.	

7.3 Overall rankings

A Red-Amber-Green (RAG) rating was applied to the catchments, with red being high, amber being medium, and green being low sensitivity to increased flood risk. The RAG ratings are shown in Table 7-2. Table 7-4 sets out the results of each assessment and average score for each catchment. The catchments with an average score of greater than 2 were deemed high risk.

The following catchments are identified as high risk:

- Addlestone Bourne (Mill/Hale to Chertsey Bourne)
- Blackwater (Aldershot to Cove Brook confluence at Hawley)
- Blackwater (Hawley to Whitewater confluence at Bramshill)

The following catchments are identified as medium risk:

- Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge)
- Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)
- Hoe Stream (Pirbright to River Wey confluence at Woking)
- Wey Navigation (Pyrford reach)

The results of the RAG assessments are shown in Figure 7-2.

Specific recommendations for catchments identified as high risk, alongside broadscale recommendations applicable across the whole borough, are set out in Section 10.1.6.

Table 7-4: Results for each assessment and overall average score for each catchment.

Catchment	Percentage of building area at increased risk of fluvial flooding	Percentage of building area at increased risk of surface water flooding	Total number of historic flooding incidents	Percentage area of catchment covered by new development	Average Score
Addlestone Bourne (Mill/Hale to Chertsey Bourne)	2	3	2	-	2.33
Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge)	1	3	2	2	2.00
Blackwater (Aldershot to Cove Brook confluence at Hawley)	3	3	3	-	3.00
Blackwater (Hawley to Whitewater confluence at Bramshill)	1	3	3	-	2.33
Chertsey Bourne (Sunningdale to Virginia Water)	2	1	1	-	1.00
Chertsey Bourne (Virginia Water to Chertsey)	3	1	1	-	1.67
Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)	1	1	3	3	2.00
Hoe Stream (Pirbright to River Wey confluence at Woking)	2	2	2	-	2.00
Wey Navigation (Pyrford reach)	1	2	3	-	2.00

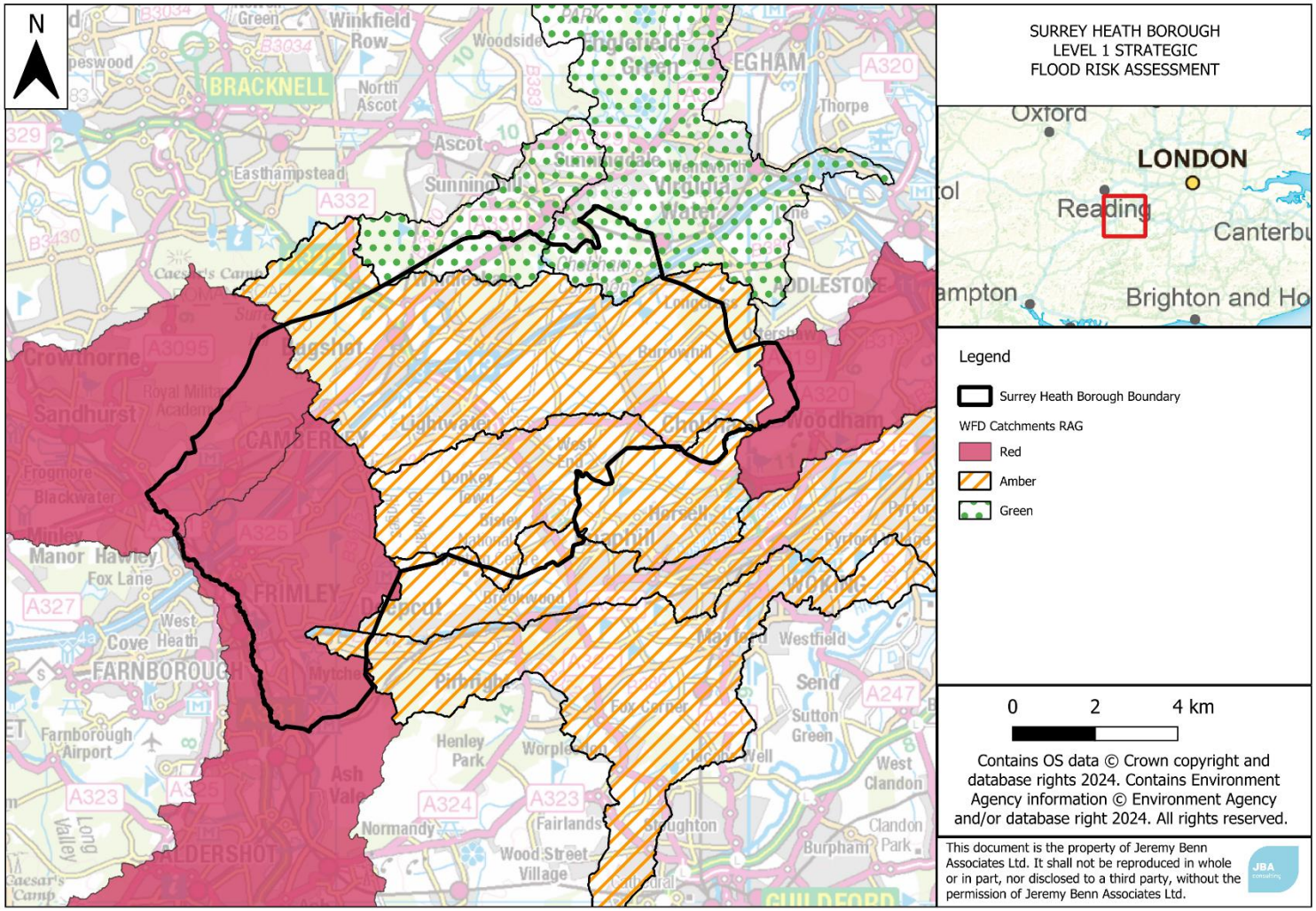


Figure 7-2: Results of the RAG assessment for Surrey Heath Borough.

7.3.1 Addlestone Bourne (Mill/Hale to Chertsey Bourne)

The 'Addlestone Bourne (Mill/Hale to Chertsey Bourne)' catchment is located in the east of the borough. Its upstream extent is within the borough, but the catchment largely falls outside of the borough, within Runnymede Borough, with a small portion also within Woking Borough.

The upstream end of the catchment within Surrey Heath is predominantly rural, becoming more urbanised downstream where it includes the settlements of Addlestone, Ottershaw, and Chertsey South.

This catchment was identified to be highly sensitive to increases in fluvial flood risk with climate change, with a medium sensitivity to increases in surface water flood risk. The primary fluvial risk is in the downstream end of the catchment just upstream of the confluence of the Addlestone Bourne and River Thames where the fluvial extent widens considerably, however, there is also fluvial risk further upstream along Addlestone Bourne.

There is currently no development proposed within this catchment in Surrey Heath. However, use of NFM techniques and oversized SuDS on any windfall sites proposed within this catchment, or any development sites further upstream along Addlestone Bourne, could provide the opportunity for betterment, decreasing fluvial flood risk downstream along the path of the Addlestone Bourne. The EA are currently developing a Business Case for NFM within the Addlestone Bourne catchment (see Section 7.4).

7.3.2 Blackwater (Aldershot to Cove Brook confluence at Hawley)

The 'Blackwater (Aldershot to Cover Brook confluence at Hawley)' covers the southwest area of the borough. The downstream end of the catchment lies within the borough, whilst upstream the catchment mostly lies across Rushmoor Borough and Guildford Borough.

The catchment is predominantly urban, containing Aldershot upstream of the borough and then the settlements of Frimley, Frimley Green and Mytchett within the borough itself.

This catchment was identified to be highly sensitive to increases in both surface water and fluvial flood risk with climate change and also ranked as high risk due to the proportion of new development proposed within the catchment.

There are several small greenfield sites proposed in the east of the catchment within the borough which could utilise NFM techniques and oversized SuDS to reduce surface water flows which are generally channelled in a westerly direction towards the Blackwater River. Surrey Heath Borough Council could also work in partnership with Rushmoor Borough and Guildford Borough to identify any opportunities for NFM techniques and oversized SuDS in the upstream end of the catchment to reduce the flood risk along the Blackwater River within the borough. Partnership working is also key to ensure that any upstream development in Rushmoor or Guildford Boroughs does not have negative impacts downstream in Surrey Heath.

7.3.3 Blackwater (Hawley to Whitewater confluence at Bramshill)

The 'Blackwater (Hawley to Whitewater confluence at Bramshill)' catchment covers a small area in the northwest of the borough. The majority of this catchment falls within Hart District and Bracknell Forest Borough.

The central area of this catchment along the Blackwater River is largely urbanised, covering the settlement of Camberley within the borough, and Blackwater, Yateley, and Sandhurst downstream. However, the wider catchment area further from the watercourse becomes more rural.

This catchment was identified to be highly sensitive to increases in both surface water and fluvial flood risk with climate change however it ranked as low risk for the proportion of new development proposed within the catchment.

There are a number of brownfield sites proposed within the borough across Camberley. Use of oversized SuDS on these sites may provide opportunities for betterment. Development within this catchment is unlikely to impact flood risk within Surrey Heath borough, as the catchment lies mostly downstream of the borough, however recommendations detailed above for the upstream catchment within the borough (Blackwater (Aldershot to Cove Brook confluence at Hawley)) may provide opportunities to reduce flood risk within this catchment.

As both this catchment and the Blackwater (Aldershot to Cove Brook confluence at Hawley) catchments lie within the wider Blackwater catchment the implications of potential development within one catchment on the other catchment should be considered.

7.4 Natural Flood Management (NFM)

NFM is used to protect, restore, and re-naturalise the function of catchments and rivers to reduce flood risk. A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes in order to store or slow down flood waters before they can damage flood risk receptors (e.g., people, property, infrastructure, etc.).

Techniques and measures, which could be applied in the study area include:

- Creation of Offline Storage Areas
- Re-meandering streams (creation of new meandering courses or reconnecting cut-off meanders to slow the flow of the river)
- Targeted woodland planting
- Reconnection and restoration of functional floodplains
- Restoration of rivers and removal of redundant structures, i.e. weirs and sluices no longer used or needed
- Installation or retainment of large woody material in river channels
- Improvements in management of soil and land use
- Creation of rural and urban SuDS

To maximise the benefits of NFM, it is important that land which is likely to be needed for NFM is protected by safeguarding land for future flood risk management infrastructure. This

is particularly important for infrastructure that reduces the risk of flooding to large amounts of existing development, or where options for managing risk in other ways are limited to achieve multiple benefits for flood risk and the environment.

It is important to recognise the value of maintenance or restoration of natural riparian zones, such as grasslands, which protect the soils from erosion and 'natural' meadows which can tolerate flood inundation. The use of green infrastructure throughout river corridors can also play a vital role in enhancing the river environment as well as safeguarding land from future development, protecting people and buildings from flooding and reducing flood risk downstream.

The EA published an evidence base (gov.uk) for working with natural processes to reduce flood risk to support the implementation of NFM, with maps showing locations with the potential for NFM measures. These maps are intended to be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them.

The EA are currently developing a Business Case for the Addlestone Bourne Flood Alleviation Scheme which aims to reduce the risk of flooding to communities through NFM. Hydraulic modelling has identified three areas within Surrey Heath Borough (Chobham, Bagshot Park, and Windlesham) which provide enough benefits to meet the business case requirements. The EA are currently engaging with partners and stakeholders as they continue to develop the proposals. Any land identified with potential for NFM across these areas and the wider catchment should be safeguarded from future development.

SCC provided their 'Catchment Action Plans' dataset which details actions being taken by RMAs across the borough, including monitoring, complete, current, and future actions. Several of these actions detail ongoing smaller works looking at using NFM techniques and opportunities to attenuate flows across the catchment to manage known flooding issues.

Other websites that provide further information about ongoing NFM schemes and community works include The Flood Hub (thefloodhub.co.uk) and the Rivers Trust NFM National Map (theriverstrust.hub.arcgis.com).

7.4.1 Opportunities and projects in and/or affecting the borough

7.4.1.1 Catchment Based Approach (CaBA)

The Catchment Based Approach (CaBA) (catchmentbasedapproach.org) was introduced by the Government to establish catchment partnerships throughout England to jointly deliver improved water quality and reduce flood risk, directly supporting achievement of many of the targets set out within the Government's 25-year Environment Plan. CaBA partnerships are actively working in all 100+ river catchments across England and cross-border with Wales.

The Wey Landscape Partnership (surreynaturepartnership.org), hosted by the Surrey Wildlife Trust, covers the eastern side of the borough. Their vision is for 'a healthy and diverse catchment where all interested sectors, groups or individuals may contribute effectively towards restoring the natural environment for the sustainable use of its essential resources, whilst preserving other valued heritage assets; to benefit both people and wildlife today and in the future'. Actions that the Partnership are working to meet are set out in the River Wey Catchment Plan 2018 (surreynaturepartnership.org).

The Loddon Catchment Partnership (arcgis.com), hosted by the South East Rivers Trust, covers the western side of the borough. Their vision is 'for a healthy, functioning and wildlife rich aquatic environment within the River Loddon Catchment, valued and cared for by everyone now and in the future'. Actions that the Partnership are working to meet are set out in the Action Plan (arcgis.com)https://catchmentbasedapproach.org/wp-content/uploads/2020/02/TAM-catchment-action-plan-2020.pdf.

8 Flood risk management requirements for developers

This section provides guidance on site-specific FRAs. These are carried out by (or on behalf of) developers to assess flood risk to and from a site. They are submitted with planning applications and should demonstrate how flood risk will be managed over the development's lifetime, considering climate change and vulnerability of users.

The report provides a strategic assessment of flood risk within the study area. Prior to any construction or development, site-specific assessments will need to be undertaken so all forms of flood risk, the actual and residual risk and SoP and safety at a site are considered in more detail. Developers should, where required, undertake more detailed hydrological and hydraulic assessments of watercourses to verify flood extents (including latest climate change allowances), to inform the sequential approach to developing within the site and prove, if required, whether the exception test can be satisfied.

A detailed FRA may show that a site, windfall or other, is not appropriate for development of a particular vulnerability or even at all. The sequential and exception tests in the NPPF apply to all developments and an FRA should not be seen as an alternative to proving these tests have been met.

8.1 Principles for new development

8.1.1 Apply the sequential and exception tests.

Developers should refer to Section 3 for more information on how to consider the sequential and exception tests. For allocated sites, SHBC should use the information in this SFRA to apply the sequential test. For windfall sites a developer must undertake the sequential test, which includes considering reasonable alternative sites at lower flood risk. Only if it passes the sequential test should the exception test then be applied if required.

Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test will need to be applied as proposals at the application stage will need to demonstrate flood risk is not increased elsewhere and is safe.

Developers should also apply the sequential approach to locating development within the site. The following questions should be considered:

- can risk be avoided through substituting less vulnerable uses or by amending the site layout?
- can it be demonstrated that less vulnerable uses for the site have been considered and reasonably discounted? and
- can the site layout be varied to reduce the number of people, the flood risk vulnerability or the building units located in higher risk parts of the site?

8.1.2 Consult with statutory and non-statutory consultees at an early stage to understand their requirements.

Developers should consult with the EA, SCC as LLFA and Thames Water at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling and foul and surface water drainage assessment and design. It should be noted that some of these consultees may need to charge for advice requested by developers or landowners.

8.1.3 Consider the risk from all sources of flooding and that they are using the most up to date flood risk data and guidance.

The SFRA can be used by developers to scope out what further detailed work is likely to be needed to inform a site-specific FRA. At a site level, developers will need to check before commencing on a more detailed FRA that they are using the latest available datasets. Developers should apply the most up-to-date climate change guidance (last updated in May 2022) and consider climate change adaptation measures. Site-specific consultation with Thames Water will be critical to identify any risk of flooding from the public sewer (especially when a sewer passes through a site) and if the site is located in a reservoir flood zone.

8.1.4 Confirm that the development does not increase flood risk elsewhere.

Section 9 sets out these requirements for taking a sustainable approach to surface water management. Developers should also confirm that mitigation measures do not increase flood risk elsewhere and that floodplain compensation is provided where necessary.

While there are some water compatible developments which the NPPF indicates can be acceptable in functional floodplain (subject to the sequential and exception tests) these are discouraged.

Where appropriate, replacement dwellings should provide a flood risk betterment both on site and to third parties.

In catchments potentially at risk from cumulative effects of development, consideration should be given to locations known to be sensitive to changes in flood risk (these locations might be remote from application sites and could require measures assessed at a catchment scale).

8.1.5 Make the development safe for future users.

Consideration should first be given to minimising risk by planning sequentially across a site. Once risk has been minimised as far as possible, only then should mitigation measures be considered.

The PPG flood risk and coastal change guidance refers to the 'design flood' against which the suitability of a proposed development should be assessed and mitigation measures, if any, are designed. The 'design flood' is defined as the 1% AEP fluvial event or 1% AEP

surface water event, plus an appropriate allowance for climate change. Allowances for climate change can be found in the EA climate change guidance (gov.uk).

Developers should consider both the actual and residual risk of flooding to the site, as discussed in Section 6.6. Further flood mitigation measures may be needed for any developments in an area protected by flood defences, where the condition of those defences is 'fair' or 'poor', and where the SoP is not of the required standard. Flood resistance and resilience measures should be considered to manage any residual flood risk by keeping water out of properties and seeking to reduce the damage caused, should water enter a property. Emergency plans should also account for residual risk, e.g., through the provision of flood warnings and a flood evacuation plans where appropriate.

Safe access and egress will need to be demonstrated during the design flood event. Access requirements are set out in the PPG: Flood Risk and Coastal Change (gov.uk) Paragraph: 047 Reference ID: 7-047-20220825.

8.1.6 Enhance the natural river corridor and floodplain environment through new development.

Developments should demonstrate opportunities to create, enhance, and link green assets. This can provide multiple benefits across several disciplines including flood risk and biodiversity/ecology and may provide opportunities to use the land for an amenity and recreational purposes. Development that may adversely affect green infrastructure assets should not be permitted. Where possible, developers should identify and work with partners to explore all avenues for improving the wider river corridor environment. Developers should open up existing culverts and should not construct new culverts on site except for short lengths to allow essential infrastructure crossings. SCC have a general presumption against culverting of Ordinary Watercourses, with further information on their Ordinary watercourse consents webpage (surreycc.gov.uk).

Where possible, existing watercourses should be incorporated within publicly accessible areas to provide suitable access for future maintenance.

Biodiversity Net Gain (BNG) is a strategy to develop land and contribute to the recovery of nature. It is making sure the habitat for wildlife is in a better state than it was before development. BNG has been applicable since November 2023 for developments in the Town and Country Planning Act 1990, unless exempt, and has been applicable to small sites since April 2024. Further information is available on the Government BNG webpage, here.

8.1.7 Consider and contribute to wider flood mitigation strategy and measures in the area and apply the relevant local planning policy.

Wherever possible, developments should seek to help reduce flood risk in the wider area, e.g., by contributing to a wider community scheme or strategy for strategic measures, such as defences or NFM or by contributing in-kind by mitigating wider flood risk on a development site. Developers must demonstrate in an FRA how they are contributing towards this vision. Further information and guidance on surface water management and SuDS is presented in Section 8.5.1.

8.2 Requirements for site-specific Flood Risk Assessments

8.2.1 When is an FRA required?

Site-specific FRAs are required for all development (including minor development and changes of use) in the following circumstances:

- Proposals on sites of one hectare or greater in Flood Zone 1.
- Proposals in Flood Zones 2 and 3.
- Proposals in an area within Flood Zone 1 which has critical drainage problems (as notified to the LLFA by the EA) (see Section 9.4.4 for more information on critical drainage problems).
- Land identified in this SFRA as being at increased flood risk in the future.
- Proposed for a change of use to a more vulnerable class subject to sources of flooding other than rivers (e.g. surface water).
- Proposals of less than one hectare in Flood Zone 1 which could be affected by sources of flooding other than rivers (e.g. surface water)

8.2.2 Objectives of a site-specific FRA

Site-specific FRAs should be proportionate to the degree of flood risk and the scale, nature, and location of the development. Site-specific FRAs should establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source.
- Whether a proposed development will increase flood risk elsewhere.
- Whether the measures proposed to deal with the effects and risks are appropriate.
- The evidence, if necessary, for the LPA to apply the sequential test; and
- Whether, if applicable, the development will be safe and pass the exception test.

FRAs should follow the approach recommended by the NPPF (and associated guidance) and guidance provided by the EA, and SCC. Guidance and advice for developers on the preparation of site-specific FRAs is available from the following websites with hyperlinks provided:

- Standing Advice on Flood Risk (gov.uk)
- Flood Risk Assessment for Planning Applications (gov.uk); and

- Site-specific Flood Risk Assessment: Checklist (gov.uk)

Defra published National flood risk standing advice for local planning authorities (gov.uk) in 2015, providing guidance for LPAs for reviewing FRAs submitted as part of planning applications.

Guidance should be sought from the EA and the Council at the earliest possible stage, and opportunities should be taken to incorporate environmental enhancements and reduce flooding from all sources both to and from the site through development proposals. Developers should seek to go beyond managing the flood risk and support reduction of wider flood risk, whilst enhancing and conserving the natural environment. Further advice can be found at: Flood risk and coastal change - GOV.UK (www.gov.uk).

8.2.3 Site layout and design

Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Developers should undertake early engagement with the EA, SCC as LLFA, and Thames Water.

The NPPF states that a sequential, risk-based approach should be applied to try to locate more vulnerable land uses away from Flood Zones to higher ground and lower flood risk areas, while more flood-compatible development (e.g., vehicular parking, recreational space) can be located in higher risk areas. Higher risk areas can also be retained and enhanced as natural green space. Whether parking in floodplains is appropriate will be based on the likely flood depths and hazard, evacuation procedures and availability of flood warning.

Waterside areas, or areas along known flow routes, can act as green infrastructure, being used for recreation, amenity, and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should provide safe access to higher ground from these areas and avoid the creation of isolated islands as water levels rise.

When designing sites, developers should consider the hierarchy of drainage options, as stated in the PPG, aiming to discharge surface water runoff as high up the hierarchy as reasonably practicable:

1. into the ground (infiltration)
2. to a surface water body
3. to a surface water sewer
4. highway drain, or another drainage system
5. to a combined sewer

Although PPG sets out surface water sewers and highway drains as having the same level within the drainage hierarchy, SCC have a general presumption against connecting to highway drains. Any section of the highway drainage system only has capacity for draining the identified design area for the rainfall event considered when it was constructed. Additional connections or input will reduce the available capacity for draining the design

area effectively: this will increase the risk of flooding on the highway in this or adjacent areas. Any additional connections will increase the liability in dealing with the discharge of polluted water or deposited pollutants within collected silt. Highway drainage connections where proposed (as a last resort) are considered by SCC on a site by site basis.

8.2.4 Modification of ground levels

Any proposal for modification of ground levels will need to be assessed as part of a detailed FRA. Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for flood waters. However, care must be taken as raising land above the floodplain could reduce conveyance or flood storage in the floodplain and could adversely impact flood risk downstream or on neighbouring land. Raising ground levels can also deflect flood flows, so analyses should be performed to demonstrate that there are no adverse effects on third party land or property.

Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (for it to fill and drain). It should be in the vicinity of the site and within the red line of the planning application boundary (unless the site is strategically allocated). Appendix A3 of the CIRIA Publication C624 (ciria.org) provides guidance on how to address floodplain compensation.

Where proposed development results in a change in building footprint, the developer should confirm that it does not impact upon the ability of the floodplain to store or convey water and seek opportunities to provide floodplain betterment.

Raising levels can also create areas where surface water might pond during significant rainfall events. Any proposals to raise ground levels should be tested to check that it would not cause increased ponding or build-up of surface runoff on third party land. Consideration should be given to the impact of raising ground levels on adjacent properties, particularly the impact of raising ground levels on surface water runoff from a site, with potential to increase surface water flood risk.

Applicants should note that changes to manhole cover levels on public sewer and increase / displace flood risk which will require careful consideration with Thames Water. Applicants should not assume that any alteration to a public sewer, including diversion, will be acceptable as this could have adverse flood risk consequences.

For all developments regardless of any identified sewer flood risk that is identified on or near to the site, it is good practice for the finished floor levels and manhole cover levels (including those that serve private drainage runs) to be higher than the manhole cover level at the point of connection to the receiving sewer. Where the ground level of the site is below the ground level at the point where the drainage connects to the public sewer, care must be taken to ensure that the proposed development is not at increased risk of sewer surcharge.

8.2.5 Raised floor levels

If raised floor levels are proposed, these should be agreed with the Council and the EA. The minimum Finished Floor Level (FFL) may change dependent upon the vulnerability and flood risk to the development.

Developers should refer to the Preparing a flood risk assessment: standing advice (gov.uk) for the latest guidance on FFLs but generally the EA advises the minimum finished floor levels should be set 600mm above the 1% AEP fluvial plus climate change peak flood level, here the appropriate climate change allowances have been used (see Section 5.2). An additional allowance may be required because of risks relating to blockages to the channel, culvert or bridge and should be considered as part of an FRA. Lowering existing FFLs below the existing levels within the 1% AEP plus climate change floodplain would not be acceptable and should be discouraged. New development offers opportunities to improve the resilience of buildings.

Allocating the ground floor of a building for less vulnerable, non-residential, use is an effective way of raising living space above flood levels. Single storey buildings such as ground floor flats or bungalows are especially vulnerable to rapid rise of water (such as that experienced during a breach). This risk can be reduced by use of multiple storey construction and raised areas that provide an escape route.

Similarly, the use of basements should be avoided. Habitable uses of basements within Flood Zone 3 and areas at risk of surface water flooding in the surface water flood zone B should not be permitted, whilst basement dwellings in Flood Zone 2 will be required to pass the exception test.

Where the ground level of a site is below the ground level at the point where the drainage connects to the public sewer, care must be taken to ensure that the proposed development is not at an increased risk of sewer surcharge. It is good practice for the finished floor levels and manhole cover levels (including those that serve private drainage runs) to be higher than the manhole cover level at the point of connection to the receiving sewer. Alternatively, mitigation measures may need to be incorporated into the proposals to protect against sewer surcharge.

8.2.6 Development and raised defences

Construction of localised raised floodwalls or embankments to protect new development is not a preferred option, as a residual risk of flooding will remain. Compensatory storage must be provided where raised defences remove storage from the floodplain.

Where development is located behind, or in an area benefitting from defences, the residual risk of flooding must be considered.

8.2.7 Developer contributions

In some cases, and following the application of the sequential test, it may be appropriate for the developer to contribute to the improvement of flood defence provision that would benefit both proposed new development and the existing local community. Developer contributions

can also be made to maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e., SuDS). This relates to the Community Infrastructure Levy, a charge that can be levied by local authorities on new development in their area to help them deliver the infrastructure needed to support development in their area, and planning obligations including Section 106. The Government website provides further information on the Community Infrastructure Levy (gov.uk) and planning obligations (gov.uk).

8.2.8 Buffer strips

The provision of a buffer strip to allows additional capacity to accommodate climate change and means access to the watercourse, structures and defences is maintained for future maintenance purposes. It also enables the avoidance of disturbing riverbanks, adversely impacting ecology, and having to construct engineered riverbank protection. Any watercourse crossings should ensure that flood risk is not impacted.

The EA in this area require a buffer strip of 10m from both river banks of any main river. Where flood defences are present, these distances should be taken from the toe of the defence.

Building adjacent to riverbanks can cause problems to the structural integrity of the riverbanks and the building itself, making future maintenance of the river much more difficult. Flood Risk Activity Permits (gov.uk) from the EA are likely to be required for development in these areas alongside any permission. There should be no built development within these distances from main rivers / flood defences (where present).

8.2.9 Making space for water

The PPG sets out a clear aim in Flood Zone 3 to create space for flooding by restoring functional floodplain. Generally, development should be directed away from these areas.

All new development close to rivers should consider the opportunity to improve and enhance the river environment. Developments should look at opportunities for river restoration and enhancement as part of the development. Options include backwater creation, de-silting, in-channel habitat enhancement and removal of structures. When designed properly, such measures can have benefits such as reducing the costs of maintaining hard engineering structures, reducing flood risk, improving water quality, and increasing biodiversity. Social benefits are also gained by increasing green space and access to the river.

8.3 Resistance and resilience measures

Resistance measures aim to reduce the amount of floodwater entering the building and resilience measures aim to reduce the damage caused by flood water which has entered the property.

The consideration of resistance and resilience measures should not be used to justify development in inappropriate locations. However, having applied planning policy there may be some instances where development is permitted in high flood risk areas. In these cases, the above measures should be considered before resistance and resilience measures are relied on.

There may also be opportunities for 'change of use' developments to be used to improve the flood resistance and resilience of existing development, which may not have been informed by a site-specific flood risk assessment when it was first constructed.

Further information and guidance on best practice can be found in the following locations:

- Department for Communities and Local Government Improving the Flood Performance of New Buildings: Flood Resilient Construction (gov.uk)
- CIRIA Property Flood Resilience Code of Practice (ciria.org)
- EA Flood resilience construction of new buildings (gov.uk)

8.3.1 Resistance measures

Most of the resistance measures should be regarded as reducing the rate at which flood water can enter a property during an event and considered an improvement on what could be achieved with sandbags. They are often deployed with small scale pumping equipment to control the flood water that does seep through these systems. The effectiveness of these forms of measures is often dependant on the availability of a reliable forecasting and warning system, so the measures are deployed in advance of an event. The following resistance measures are often deployed:

- **Permanent barriers:** can include built up doorsteps, rendered brick walls, and toughened glass barriers.
- **Temporary barriers:** which consist of moveable flood defences which can be fitted into doorways and/or windows. On a smaller scale, temporary snap on covers for airbricks and air vents can also be fitted to prevent the entrance of flood water.
- **Community resistance measures:** these include demountable defences that can be deployed by local communities to reduce the risk of water ingress to several properties. The methods require the deployment of inflatable (usually with water) or temporary quick assembly barriers in conjunction with pumps to collect water that seeps through the systems during a flood.

8.3.2 Resilience measures

Flood resilience measures aim to limit any permanent damage, prevent the structural integrity of the building being compromised and make the clean up after the flood easier. Interior design measures to reduce damage caused by flooding can include electrical circuitry installed at a higher level and water-resistant materials for floors, walls, and fixtures.

8.4 Reducing flood risk from other sources

8.4.1 Groundwater

Groundwater flooding has a very different flood mechanism to any other and so many conventional flood mitigation methods are not suitable. The only way to fully reduce flood risk would be through building design (development form), ensuring floor levels are raised above predicted groundwater levels considering any known groundwater issues. Site design would also need to preserve any flow routes followed by the groundwater overland so that flood risk is not increased downstream.

Infiltration SuDS can cause increased groundwater levels and subsequently may increase flood risk on or off a site. Developers should provide evidence that this will not be a significant risk. Other underground works, such as basements, may also need to be assessed as part of a site-specific FRA in certain prone areas susceptible to groundwater issues.

8.4.2 Surface water and sewer flooding

Developers should discuss public sewerage capacity with the water utility company at the earliest possible stage. It is important that a Surface Water Drainage Strategy (often undertaken as part of an FRA) shows that this will not increase flood risk elsewhere, and that the drainage requirements regarding runoff volumes and rates and SuDS for new development are met.

If residual surface water flood risk remains, the likely flow routes and depths across the site should be modelled. The site should be designed so that these flow routes are preserved and building design should provide resilience against this residual risk.

When redeveloping existing buildings, the installation of some permanent or temporary floodproofing and resilience measures could protect against both surface water and sewer flooding. Non-return valves prevent water entering the property from drains and sewers. Non-return valves can be installed within gravity sewers or drains within a property's private sewer upstream of the public sewerage system. These need to be carefully installed and must be regularly maintained.

Consideration must also be given to attenuation and flow ensuring that flows during the 1% AEP plus climate change storm event are retained within the site if any flap valves shut. This should be demonstrated with suitable modelling techniques. As noted above, early consultation with Thames Water will be critical to understand sewer flood risk especially

when a sewer passes through a site. Where an existing sewer flood risk affects a site, applicants will need to carefully consider how this can be managed with Thames Water. Sewer flood risk could affect the developable area and the detailed design of the site.

8.4.3 Reservoirs

As discussed in Section 4.8, the risk of reservoir flooding is extremely low. However, there remains a residual risk to development from reservoirs which developers should consider during the planning stage.

Developers should contact the reservoir owner for information on:

- The Reservoir Risk Designation.
- Reservoir characteristics: type, dam height at outlet, area/volume, overflow location.
- Operation: discharge rates / maximum discharge.
- Discharge during emergency drawdown.
- inspection / maintenance regime.

Developers should use the above information to:

- Apply the sequential approach to locating development within the site.
- Consider the impact of a breach and overtopping, particularly for sites proposed to be located immediately downstream of a reservoir. This should consider whether there is sufficient time to respond, and whether in fact it is appropriate to place development immediately on the downstream side of a reservoir.
- Assess the potential hydraulic forces imposed by sudden reservoir failure event and check that that the proposed infrastructure fabric could withstand the structural loads.
- Develop site-specific Emergency Plans and/ or off-site Plans if necessary and make the future users of the development aware of these plans. This may need to consider emergency drawdown and the movement of people beforehand.

It should also be understood that the “risk category” of a reservoir is set by the potential damage and loss of life in circumstances where there is a breach or an extreme flood event. Accordingly, it is possible that allocation of new development downstream of an existing reservoir could potentially change the risk category and result in a legal requirement (under the Reservoirs Act 1975) to improve the structural and hydraulic capacity of the dam. As the cost of implementing such works can be substantial consideration should be given to considering the implications and whether it would be more appropriate to place development in alternative locations not associated with such risk.

8.5 Emergency planning

The Civil Contingencies Act 2004 lists Local Authorities, the Environment Agency and emergency services as Category 1 responders, responsible for reducing, controlling, and mitigating the effects of emergencies in both response and recovery phases.

The 2024 NPPF (Paragraph 181) requires site-specific FRAs to demonstrate that "any residual risk can be safely managed; and safe access and escape routes are included where appropriate, as part of an agreed emergency plan."

In accordance with the NPPF, SFRAs, PFRAs and SWMPs can be used in the preparation and execution of a flood emergency plan as they can indicate areas that may be at risk of flooding. These can be provided as part of an FRA or as a separate document. Decisions regarding whether an Emergency Plan is required sits with the LPA, with advice from their Emergency Planning Teams, the Environment Agency and LLFA.

According to the PPG flood risk and coastal change guidance, an emergency plan is needed wherever emergency flood response is an important component of making a development safe; this includes the free movement of people during a 'design flood' and potential evacuation during an extreme flood.

Emergency plans are essential for any site with transient occupancy in areas at risk of flooding, such as holiday accommodation, hotels, caravan, and camping sites (PPG: Flood risk and coastal change paragraph 043).

Emergency Plans should consider:

- The type of flood risk present, and the extent to which advance warning can be given in a flood event.
- The number of people that would require evacuation from the area potentially at risk.
- The vulnerability of site occupants.
- The impact of the flooding on essential services e.g., electricity, gas, telecommunications, water supply and sewerage.
- Safe access and egress for users and emergency services.

Further information is available from the following documents / websites:

- The National Planning Policy Guidance (gov.uk)
- 2004 Civil Contingencies Act (legislation.gov.uk)
- Defra (2014) National Flood Emergency Framework for England (gov.uk)
- FloodRe (floodre.co.uk)
- The EA and Defra's Standing Advice for FRAs (gov.uk)
- SHBC 'Flooding and drainage' (surreyheath.gov.uk) website page
- EA's 'How to plan ahead for flooding' (gov.uk)
- Sign up for Flood Warnings with the EA (gov.uk)
- The National Flood Forum (nationalfloodforum.org.uk)
- 'Prepare for flooding' (gov.uk)
- ADEPT Flood Risk Plans for new development (adeptnet.org.uk)

8.5.1 Local Resilience Forum

Local Resilience Forums (LRFs) are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS, the Environment Agency, and others (Category 1 Responders). LRFs are supported by organisations, known as Category 2 responders, such as the Highways Agency and public utility companies.

Surrey's Local Resilience Forum (surreycc.gov.uk) provides information and advice on how residents, businesses, and communities together can prepare for, respond to, and recover from emergencies.

The Government website (gov.uk) provides contact details for all local resilience forums across the UK.

8.5.2 Multi Agency Flood Plan

The Civil Contingencies Act (2004) requires Category 1 Responders to maintain plans for preventing emergencies and for reducing, controlling or mitigating the effects of emergencies in both the response and recovery phases. Emergency plans may take the form of either generic plans that describe a response to a wide range of possible scenarios (for example, a Major Incident Plan) or specific plans that deal with a particular kind of emergency. For many parts of England and Wales, flooding poses a significant risk and is well recognised within many Community Risk Registers. LRFs are encouraged to develop a specific flood plan to both complement other plans and to provide more detail to generic Major Incident Plans.

Surrey LRF have produced two-part Multi Agency Flood Plan. Part 1 is applicable to all districts and boroughs across Surrey whereas Part 2 is specific to Surrey Heath. The Plan's purpose is:

- To provide details of areas in the borough prone to flooding, from all types of flooding
- To provide up to date information relevant to the areas prone to flooding, including vulnerable groups, locations of emergency assistance centres, key infrastructure, etc.
- To provide historical data on previous flooding incidents
- To provide maps showing at risk areas
- To provide details regarding the provision of sandbags

In the event of alerts and warnings being issued by the EA, dependent on the risk, agencies may door knock at the highest levels of warning to encourage people to vacate their property. If residents cannot, Surrey Fire and Rescue will rescue these residents.

For further information users should contact Surrey LRF.

9 Surface water management and SuDS

This section provides guidance and advice on managing surface water runoff and flooding.

9.1 Roles of the Lead Local Flood Authority and Local Planning Authority in surface water management

SCC as the LLFA is a statutory planning consultee on the surface water drainage implications for 'major development', providing technical advice and recommendations on the suitability of surface water drainage proposals to the Local Planning Authority. SCC have a paid pre-application advice service which is accessible for all types of development. The Planning Advice - Sustainable Drainage Systems (SuDS) (surreycc.gov.uk) webpage provides further information.

The ultimate decision to approve or refuse a planning application is for the LPA, and Surrey Heath Borough Council should satisfy itself that the development's proposed minimum standards of operation are appropriate and, using planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the lifetime of the development.

It is essential that developers consider sustainable drainage at an early stage of the development process – ideally at the pre-application or master-planning stage. To further inform development proposals at the master-planning stage, pre-application submissions are accepted by the Council. This will assist with the delivery of well designed, appropriate, and effective SuDS. Applicants are also encouraged to engage with Thames Water to discuss their surface water proposals, especially where adoption is proposed.

Currently the implementation of SuDS is driven through planning policy. Schedule 3 of the FWMA 2010 will provide a framework for the approval and adoption of drainage systems, a SuDS Approving Body (SAB) within unitary and county councils, and national standards on the design, construction, operation, and maintenance of SuDS for the lifetime of the development. The previous Government affirmed its commitment for enacting Schedule 3; however, it is currently unknown whether the new Government intends to do this or what the proposed timescales would be.

9.2 Sustainable Drainage Systems (SuDS)

SuDS are designed to maximise the opportunities and benefits that can be secured from surface water management practices.

SuDS provide a means of dealing with the quantity and quality of surface water and can also provide amenity and biodiversity benefits. Given the flexible nature of SuDS, they can be used in most situations within new developments as well as being retrofitted into existing developments. SuDS can also be designed to fit into most spaces, for example, permeable paving could be used in parking spaces or rainwater gardens as part of traffic calming measures.

It is a requirement that 'applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity' (NPPF Paragraph 182).

It is important that SuDS are maintained for the lifetime for the development so that features can function as designed. Consideration should be given to enhancing SuDS to achieve biodiversity net gain.

SuDS should not be used individually but as a series of features in an interconnected system designed to capture water at the source and convey it to a discharge location. Collectively this concept is described as a SuDS Management Train (see Figure 9-1).

The number of treatment stages required within the Management Train depends primarily on the source of the runoff and the sensitivity of the receiving waterbody or groundwater.

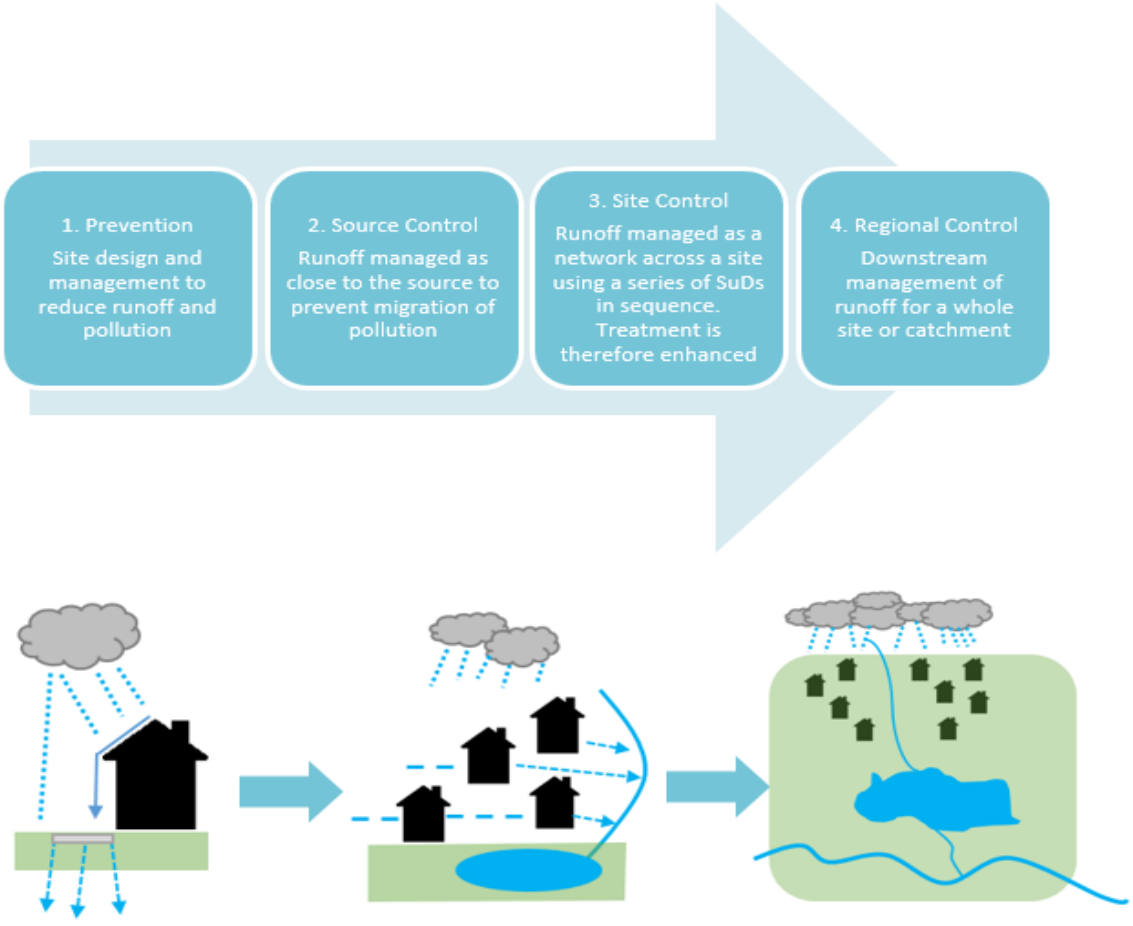


Figure 9-1: SuDS Management Train.

9.3 Sources of SuDS guidance

9.3.1 C753 CIRIA SuDS Manual (2015)

The C753 CIRIA SuDS Manual (2015) (ciria.sharefile.com) provides guidance on planning, design, construction, and maintenance of SuDS. The manual is divided into five sections ranging from a high-level overview of SuDS, progressing to more detailed guidance with progression through the document.

9.3.2 Non-Statutory Technical Guidance, Defra (March 2015)

Non-Statutory Technical Standards for SuDS (gov.uk) provides non-statutory standards on the design and performance of SuDS. It outlines peak flow control, volume control, structural integrity, flood risk management and maintenance and construction considerations.

9.3.3 Non-statutory Technical Guidance for Sustainable Drainage Practice Guidance, LASOO (2016)

The Local Authority SuDS Officer Organisation (LASOO) produced their Practice Guidance (susdrain.org) in 2016 to give further detail to the Non-Statutory technical guidance.

9.3.4 Water Industry Design and Construction Guidance

The Design and Construction Guidance (DCG) (water.org.uk), part of a new Codes for Adoption covering the adoption of new water and wastewater infrastructure by water companies, contains details of the water sector's approach to the adoption of SuDS.

9.3.5 Local Authority SuDS Guidance

The 2024 NPPF states that flood risk should be managed "using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding" (NPPF Paragraph 172).

SHBCs 'Sustainable drainage systems information' (surreyheath.gov.uk) webpage is dedicated to information regarding SuDS. This includes a summary of what SuDS are and links to Surrey County Council's Planning Advice (surreycc.gov.uk).

Surrey County Council also has Sustainable Drainage System Design Guidance (surreycc.gov.uk) with the design criteria detailed in Section 5.

Water. People. Places (susdrain.org) is a guide for master planning sustainable drainage into developments which was prepared by the LLFAs of the southeast of England, including Surrey County Council. This guidance was designed to be used by developers and planners as part of the initial planning and design process for residential, commercial, and industrial development. It intends to provide a consistent approach to best practice design of SuDS at the master planning stage, alongside any local requirements set by the LLFA.

9.4 Other surface water considerations

9.4.1 Groundwater Vulnerability Zones

The EA published new groundwater vulnerability maps in 2015. These maps provide a separate assessment of the vulnerability of groundwater in overlying superficial rocks and those that comprise of the underlying bedrock. The map shows the vulnerability of groundwater at a location based on the hydrological, hydro-ecological, and soil properties within a one-kilometre grid square.

The groundwater vulnerability maps should be considered when designing SuDS. Depending on the height of the water table at the location of the proposed development site, restrictions may be placed on the types of SuDS appropriate to certain areas. Groundwater vulnerability maps can be found on Defra's interactive mapping (defra.gov.uk).

9.4.2 Groundwater Source Protection Zones (GSPZ)

The EA also defines Groundwater Source Protection Zones (GSPZs) near groundwater abstraction points. These protect areas of groundwater used for drinking water. The GSPZ requires attenuated storage of runoff to prevent infiltration and contamination. GSPZs can be viewed on Defra's interactive mapping (defra.gov.uk).

Online mapping shows there are no GSPZs within the borough.

9.4.3 Nitrate Vulnerable Zones

Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. Nitrate levels in waterbodies are affected by surface water runoff from surrounding agricultural land entering receiving waterbodies. The level of nitrate contamination will potentially influence the choice of SuDS and should be assessed as part of the design process.

NVZs can be viewed on the EA's interactive mapping (data.gov.uk). There are no pre appeal NVZ 2021 to 2024 areas affecting the borough.

9.4.4 Critical Drainage Areas

Areas with Critical Drainage Problems (ACDPs) (gov.uk) is land formally notified to the LPA by the EA as having critical drainage problems. Within ACDPs, proposed development may present increased risks of flooding both on and off site if the surface water runoff is not effectively managed. There are currently no ACDPs identified within the study area.

Local Authorities can also choose to designate Critical Drainage Areas (CDAs) within their authority area; however, there are no CDAs currently designated within the borough.

10 Recommendations and next steps

10.1 Recommendations from SFRA findings

10.1.1 Drainage strategies and SuDS

Planners should be aware of the conditions set by the LLFA for surface water management. The future enactment of Schedule 3 of the FWMA means that there will be mandatory standards for delivery and adoption of SuDS in new developments, however, this has not yet been enacted.

Runoff rates from all development sites must be limited to greenfield rates (including brownfield sites) unless it can be demonstrated that this is not practicable. If it is demonstrated that greenfield rates are not practicable then the runoff rates should be restricted to the closest rate that is practicable but not exceeding the existing brownfield runoff rate.

Space should be provided for the inclusion of SuDS on all allocated sites, outline proposals and full planning applications. SuDS design should demonstrate how constraints have been considered and preference should be given to systems that provide multiple benefits e.g. landscape enhancement, biodiversity, recreation, amenity, leisure, and the enhancement of historical features. The SCC SuDS Guidance (surreycc.gov.uk) sets out a sustainability hierarchy for SuDS techniques with preference towards the most sustainable techniques.

SuDS must be designed appropriately for the area. Large parts of Surrey Heath Borough are underlain by sandstone geology which is likely to be relatively permeable; therefore, infiltration SuDS may be appropriate in these areas. However, geology is highly variable, and infiltration testing must still be undertaken to determine whether infiltration rates are suitable for the use of infiltration SuDS.

Planning applications for phased developments should be accompanied by a drainage strategy, which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase. Applicants will need to demonstrate a holistic and co-ordinated approach to both foul and surface water drainage and the management of flood risk.

SuDS should be designed based on the SuDS management train to prevent and control pollutants to prevent the ‘first flush’ polluting the receiving waterbody.

SuDS should be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual.

10.1.2 Residual risk

Residual risk is the risk that remains after mitigation measures are considered. All residual risks to a site should be considered during the planning stage as part of site-specific FRAs.

There are limited flood defences in the borough and the existing flood defences are shown to offer a low design SoP and the current SoP is not known. Any development in areas protected by these flood defences should consider the residual risk of overtopping or breach of these defences.

Other residual risks that may be applicable to development sites within the borough include potential breaches or overtopping of the reservoirs and canal, and blockages or failure of infrastructure, such as culverts.

10.1.3 Safe access and egress

Safe access and egress will need to be demonstrated at all development sites.

If raised access routes are required, an assessment must be made to check this will not displace floodwater elsewhere.

Emergency vehicular access should be possible during times of flood. If at risk, then as assessment should be made to detail the flood duration, depth, velocity, and flood hazard rating in the 1% AEP plus climate change flood event, in line with FD2320.

Where development is located behind, or in an area benefitting from defences, consideration should be given to the potential safety of the development, FFLs and for safe access and egress in the event of rapid inundation of water due to a defence breach with little warning.

10.1.4 River restoration and habitat improvement

Developments should be used as an opportunity to enhance the existing river corridor. Natural drainage features should be maintained, and opportunities identified for river restoration/enhancement to make space for water.

Opportunities should be identified to maintain and enhance permeable surfaces and greenspaces to help reduce surface water runoff whilst promoting other benefits, including biodiversity and wellbeing.

There should be no built development within 10m from the top of the banks of a main river, as required by the EA, and within a suitable buffer of an ordinary watercourse for the preservation of the watercourse corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement.

In-line with the stance set out by SCC, culverting of open watercourses should be avoided except where essential to allow highways and/or other infrastructure to cross, in line with CIRIA’s Culvert design and operation guide (C689) and to restrict development over culverts. Day-lighting existing culverts should be promoted through new developments.

Countryside Stewardship schemes (gov.uk) should be promoted to help prevent soil loss and reduce runoff from agricultural land whilst also providing biodiversity and habitat improvements.

10.1.5 Emergency planning and flood awareness

Improved emergency planning and flood awareness provide an opportunity to mitigate against flood risk. The following recommendations should be considered:

- The Council should work with emergency planning colleagues through the Resilience Partnership Team to identify areas at highest risk and locate most vulnerable receptors. For major developments, robust emergency (evacuation) plans should be produced and implemented.
- Increased flood awareness and sign-up to the EA Flood Warnings (gov.uk) should be promoted across the borough.
- For proposed development within existing EA FWAs, along the River Blackwater and Hale / Addlestone Bourne, developers should consult the EA to ensure that adequate flood warning procedures and evacuation processes are in place and that RMAs are not put under any additional burden.
- Exceedance flows, both within and outside of the site, should be appropriately designed to minimise risks to both people and property.

10.1.6 Recommendations from the CIA

SHBC should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the area, along the River Blackwater and Hale / Addlestone Bourne, to other local authorities in order to minimise any cross boundary issues of cumulative impacts of development.

Where required, site-specific FRAs should explore opportunities to provide wider community flood risk benefits through new developments. Measures that can be put in place to contribute to a reduction in flood risk downstream should be considered. This may be either by the provision of additional storage on site e.g. through oversized SuDS, NFM techniques, green infrastructure, and green-blue corridors, and/ or by providing a Partnership Funding contribution towards any flood alleviation schemes.

Specific recommendations for those catchments identified to be at high sensitivity to increased flood risk within the CIA are set out below.

Recommendations for high risk catchments

The following recommendations are made for high risk catchments:

- The LLFA and LPA should consult with Local Not-For-Profit organisations such as wildlife trusts, rivers trusts, and catchment partnerships. This will help to understand ongoing and upcoming projects where NFM, flood storage and

attenuation, and environmental betterment may be possible alongside developments and aid in reducing flood risk.

- The LPA should work closely with the EA and the LLFA to identify any areas of land that should be safeguarded for any future flood alleviation schemes and NFM features (i.e. the Addlestone Bourne FAS). The EA Working with Natural Processes (WWNP) mapping can help identify where NFM features may be suitable (see Section 7.2 for further details). Investigations should seek to determine where developments have the potential to contribute towards works to reduce flood risk and enable regeneration in catchments as well as contributing to the wider provision of green infrastructure.
- Use of oversized SuDS should be considered, where viable, to provide betterment beyond the existing greenfield runoff rate.
- Opportunities for retrofitting of SuDS in existing developed areas should be sought to reduce runoff rates from existing developments.

Specific recommendations are made for each of the high risk catchments below:

- **Addlestone Bourne (Mill/Hale to Chertsey Bourne)**: There is currently no development proposed within this catchment in Surrey Heath. However, use of NFM techniques and oversized SuDS on any windfall sites proposed within this catchment, or any development sites further upstream along Addlestone Bourne, could provide the opportunity for betterment, decreasing fluvial flood risk downstream along the path of the Addlestone Bourne. The EA are currently developing a Business Case for NFM within the Addlestone Bourne catchment (see Section 7.4).
- **Blackwater (Aldershot to Cover Brook confluence at Hawley)**: There are several small greenfield sites proposed in the east of the catchment within the borough which could utilise NFM techniques and oversized SuDS to reduce surface water flows which are generally channelled in a westerly direction towards the Blackwater River. Surrey Heath Borough Council could also work in partnership with Rushmoor Borough and Guildford Borough to identify any opportunities for NFM techniques and oversized SuDS in the upstream end of the catchment to reduce the flood risk along the Blackwater River within the borough.
- **Blackwater (Hawley to Whitewater confluence at Bramshill):** There are a small number of brownfield sites proposed within the borough across Camberley. Use of oversized SuDS on these sites may provide opportunities for betterment. Development within this catchment is unlikely to impact flood risk within Surrey Heath borough, as the catchment lies mostly downstream of the borough, however recommendations detailed above for the upstream catchment within the borough (Blackwater (Aldershot to Cove Brook confluence at Hawley)) may provide opportunities to reduce flood risk within this catchment.

10.2 Requirements for a Level 2 SFRA

Following the application of the sequential test, where sites cannot be appropriately accommodated in low-risk areas, the Council will apply the NPPF's exception test. In these circumstances, a Level 2 SFRA may be required, to assess in more detail the nature and implications of the flood characteristics.

As part of this Level 1 SFRA, an initial site screening exercise using site boundaries and flood risk data has been undertaken for the Council to help inform the application of the sequential test and subsequent potential requirement for a Level 2 SFRA.

10.3 SFRA report recommendations

10.3.1 Updates to SFRA

SFRAs are high-level strategic documents and, as such, do not go into detail on an individual site-specific basis. This SFRA has been developed using the best available information, supplied at the time of preparation.

Over time, new information will become available to inform planning decisions. When using the SFRA to prepare FRAs it is important to check that the most up to date information is used.

The EA regularly reviews its hydrology, hydraulic modelling, and flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA.

The EA are currently producing new national flood risk mapping (NaFRA2) which is expected to be available in 2025, although these timescales are subject to change due to the complexities of the project.
Developers should check the online Flood Map for Planning (gov.uk) in the first instance to identify any major changes to the Flood Zones and the long-term flood risk mapping portal for any changes to flood risk from surface water or inundation from reservoirs.

Other datasets used to inform this SFRA may also be updated periodically and following the publication of this SFRA, new information on flood risk may be provided by RMAs.

Appendices

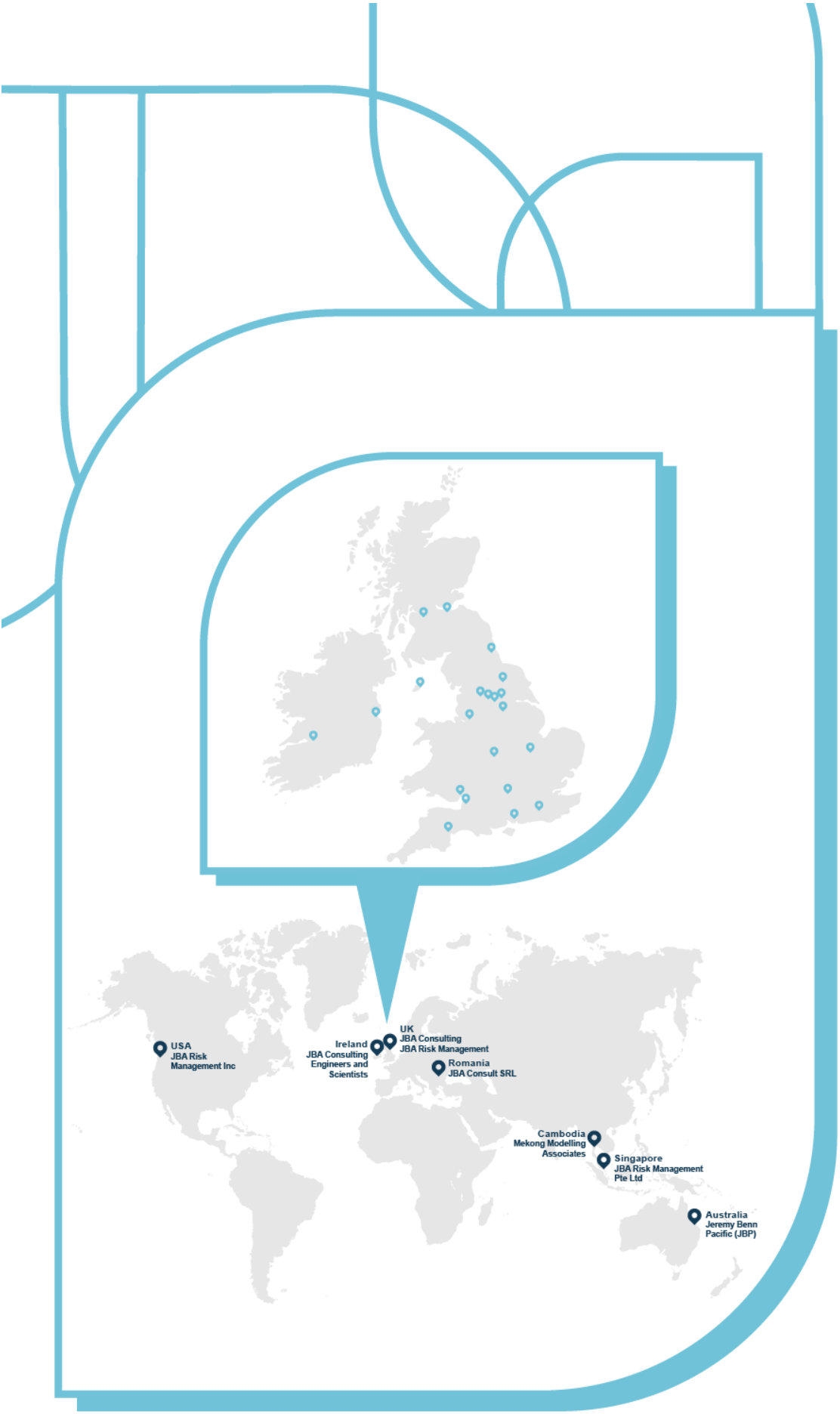
A Interactive Mapping Portal User Guide

B Data Sources used in this SFRA

C Guide for using available flood risk data in applying the sequential test

D Summary of flood risk across the borough

E JBA Groundwater Emergence Mapping



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