Surrey Heath Level 2 Strategic Flood Risk Assessment

Final Report

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This report describes work commissioned by Surrey Heath Borough Council by an instruction dated 11 December 2024. The Client's representative for the contract was Kate Galloway of Surrey Heath Borough Council. Sarah Hambling and Elsa Holm of JBA Consulting carried out this work.

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Acknowledgements

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Abbreviations

AEP	Annual Exceedance Probability
AIMS	Asset Information Management System
AStGWF	Areas Susceptible to Groundwater Flooding
BGS	British Geological Survey
CC	Climate Change
CCTV	Closed Circuit Television
EA	Environment Agency
FAA	Flood Alert Area
FMfP	Flood Map For Planning
FRA	Flood Risk Assessment
FWA	Flood Warning Area
GIS	Geographical Information System
JBA	Jeremy Benn Associates
LiDAR	Light Detection And Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	metres Above Ordnance Datum
NaFRA2	National Flood Risk Assessment 2
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PPG	Planning Practice Guidance
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SCC	Surrey County Council
SHBC	Surrey Heath Borough Council
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems

Definitions

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

Brownfield: A previously developed parcel of land.

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

Design flood: 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.

Dry island: Land which may not be at risk of flooding itself but is surrounded by flood risk and therefore may become cut off during a flood event.

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).

Green infrastructure: A network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs, and urban fringe.

Greenfield: An 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.

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 provide in the Town and Country Planning (Development Management Procedure) (England) Order 2015 (gov.uk).

Natural Flood Management: Techniques that work with nature to reduce the risk of flooding for communities.

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.

Return period: 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: 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.

Risk Management Authority: The Environment Agency, Lead Local Flood Authorities, District and Borough Councils in an area where there is no unitary authority, Coast Protection Authorities in coastal areas, Water and sewerage companies, Internal Drainage Boards, and Highways authorities.

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.

Sustainable Drainage Systems: Sustainable Drainage Systems 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.

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

Introduction and context

This Level 2 Strategic Flood Risk Assessment (SFRA) document was prepared to form part of the evidence base for the Surrey Heath Local Plan 2019 - 2038. It follows on from the Surrey Heath Borough Council (SHBC) Level 1 SFRA published in 2025 and should be read in conjunction.

The primary purpose of the Level 2 SFRA is to provide an appropriate understanding of the level of flood risk affecting development included in the Local Plan. The assessment takes into account all sources of flooding and considers other factors affecting flood risk such as residual risk. The information provided as part of the Level 2 SFRA enables SHBC to apply the exception test to sites in accordance with the National Planning Policy Framework (NPPF, December 2024).

SFRA objectives

The Government's Planning Practice Guidance (PPG, 2022) on Flood Risk and Coastal Change advocates a tiered approach to risk assessment involving Level 1 and Level 2 SFRAs.

After undertaking the sequential test, SHBC have shortlisted sites which cannot be relocated outside of flood risk areas due to additional factors. The Level 2 assessment aims to build on identified risks from the Level 1 to provide a greater understanding of fluvial, surface water, groundwater, sewer, and reservoir related flooding risks to these shortlisted sites. From this, SHBC and developers can make more informed decisions regarding future development. The Level 2 assessment also identifies sites requiring further risk analysis at the site-specific Flood Risk Assessment (FRA) stage.

National Flood Risk Assessment 2

Since the publication of the Level 1 SFRA, the Environment Agency (EA) published their National Flood Risk Assessment 2 (NaFRA2) mapping for surface water on the 28 January 2025, which supersedes the EA's previous mapping.

The data was not available at the time of compiling and finalising the Level 1 SFRA. It is noted within the Level 1 SFRA that the assessment makes use of the best available data at the time of publication and that developers should refer to the latest EA data for any site-specific assessments. It is recommended that SHBC review their Level 1 SFRA on publication of the full NaFRA2 dataset and assess whether any updates are required.

The latest NaFRA2 surface water data has been used to inform this Level 2 SFRA. SHBC's development sites were screened against the new NaFRA2 surface water data, and this was used to inform the requirements for detailed site assessments within this Level 2 SFRA. The surface water assessment methodology is set out in Section 3.4. It was noted that surface water risk is shown to have reduced across many of the sites in the borough between the previous surface water mapping and the new NaFRA2 data.

The EA published the updated NaFRA2 Flood Map for Planning (FMfP) on the 25 March 2025. As this data was not available for the preparation of this SFRA (prepared in January and February 2025), the best available data has been used to inform the detailed site assessments, including the EA's new NaFRA2 Risk of Flooding from Rivers and the Sea dataset. The fluvial assessment methodology is set out in Section 3.2. SHBC and developers should refer to the latest available data in the online EA FMfP (gov.uk) when undertaking any future assessments.

Summary of Level 2 SFRA

SHBC provided 32 sites which were subject to an initial screening exercise through the use of an 'overlap analysis' tool in GIS. The site boundaries were screened against flood risk datasets and a R-A-G (Red-Amber-Green) analysis applied to assess the potential viability of the sites and provide flood risk recommendations. The R-A-G system was applied to the sites on the basis that:

- 'red' sites have significant obstacles or challenges for development which would need consideration if taken forward. These sites may need the exception test to show that the site can be developed safely, from a flood risk perspective. The 'red' sites have been assessed within Appendix A: Detailed Site Assessments.
- 'amber' sites are not identified to have any fluvial flood risk. They are flagged as either having a minimal surface water risk on the site which is likely to be manageable through appropriate SuDS/site design, surface water risk potentially impacting access/escape, or a high risk of groundwater emergence. These are not likely to prevent development but will need to be addressed at the planning application stage. The 'amber' sites have been assessed within Section 5 of this report and the mapping in Appendices B and C.
- 'green' sites have no significant obstacles for development and have therefore not been assessed further within this Level 2 SFRA. However, it is noted sites may need an FRA depending on the location of the site.

The findings of the R-A-G analysis were reviewed with SHBC, and some sites were removed as a consequence of having existing planning permission or where a revision to the site boundary subsequently reduced the risk to the site. This identified 5 'red' sites and 17 'amber' sites.

Detailed site assessments setting out the flood risk analysis and NPPF requirements for each 'red' site, as well as guidance for site-specific FRAs, have been produced. A broadscale assessment of suitable SuDS has been provided giving an indication of where there may be constraints to certain types of SuDS techniques. To accompany each site assessment, flood risk mapping for each of the sites is available in the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

The following points summarise the Level 2 assessment:

- **Fluvial flooding** - There is limited fluvial risk to the proposed development sites across Surrey Heath borough. The main watercourses associated with fluvial risk to the sites within the Level 2 assessment are Windle Brook and unnamed

tributaries of the River Blackwater. The sites with the most significant fluvial risk are Swift Lane Extension (Site 1030) and The Deans (Site 317) which are adjacent to Windle Brook.

- **Flood Warning Areas (FWAs)** - The Deans (Site 317) and Swift Lane Extension (1030) are located within existing EA FWAs. For proposed development within existing EA FWAs, developers should consult the EA to ensure that adequate flood warning procedures and evacuation processes are in place and that Risk Management Authorities (RMAs) are not put under any additional burden.
- **Surface water flooding** - Surface water tends to follow topographic flow routes, along watercourses or pool as isolated pockets of ponding where there are topographic depressions. The majority of sites assessed are at risk from surface water flooding. The sites at most significant surface water risk are Land East of Benner Lane (Site 799) and Swift Lane Extension (Site 1030).
- **Access and escape routes** - The Deans (Site 317), Land East of Benner Lane (Site 799), and Swift Lane Extension (Site 1030) have potential access and escape route issues as a result of fluvial or surface water flood risk along the surrounding roads. This will require further assessment within a site-specific FRA considering depth, velocity, and the associated hazard of the areas of risk. At these sites, consideration should be made as to how safe access and escape routes can be provided during flood events, both for people and emergency vehicles. Consideration should also be given to the nature of the risk, for example whether the flooding forms a flow path or bisects the site meaning access across the site from one side to another may be compromised (e.g. Land East of Benner Lane (Site 799)).
- **Climate change** - Fluvial and surface water climate change mapping indicates that flood extents are predicted to increase. As a result, the depths, velocities, and hazard of flooding may also increase. The significance of the increase will depend on the topography of the site and the climate change percentage allowance used. Site-specific FRAs should confirm the impact of climate change using latest guidance. This Level 2 assessment has used an indicative approach to assess the sensitivity of sites to climate change due to the lack of available data at the time of writing. It is recommended that SHBC work 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 borough.
- **Historic flooding** - Swift Lane Extension (Site 1030) is shown to fall within the EA Historic Flood Map and Recorded Flood Outlines datasets. Property flooding and "wetspot" data provided by SCC did not show any incidences of historic flooding within the sites but there are property flooding records within the vicinity of The Deans (Site 317), The Grange (Site 920), and Swift Lane Extension (Site 1030), and a "wetspot" in close proximity to The Deans (Site 317).
- **Sewer flooding** - 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. Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity to, any of the sites. Further consultation with Thames Water will be required to assess the sewer flood risk to the site.

- **Groundwater flooding** - A number of sites across Surrey Heath borough are shown by the Areas Susceptible to Groundwater flooding (AStGWF) map to have a high susceptibility to groundwater flooding with corresponding high ground water levels shown in the JBA emergence map. An appropriate assessment of the groundwater regime for a site should be carried out at the site-specific FRA stage. Sites included within the detailed site assessments with the greatest risk are Land off Spencer Close (Site 299) and The Grange (Site 920).
- **Reservoirs** - There are two sites, The Deans (Site 317) and Swift Lane Extension (Site 1030), assessed within the detailed site assessments that are shown to be at risk of reservoir flooding during a 'Dry Day' scenario. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is very low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific FRA, including any necessary arrangements for warning and evacuation in the event of a breach or uncontrolled release.
- **Main Rivers** - Any sites located where there is a Main River (including culverted reaches) will require an easement of 10m either side of the watercourse from the top of the bank (a requirement set by the EA for this area). In Surrey Heath borough, this applies to Swift Lane Extension (Site 1030) which is adjacent to Windle Brook. This may introduce constraints regarding what development will be possible and consideration will need to be given to access and maintenance at locations where there are culverts. Developers will be required to apply for appropriate permits so the activity being carried out over easements does not increase flood risk.
- **SuDS** - A strategic assessment of SuDS options was conducted using regional datasets. A detailed site-specific assessment of suitable SuDS techniques would need to be undertaken at application stage to understand which SuDS option would be best. It should be noted that large areas of Surrey Heath borough are shown to have high likelihood of groundwater emergence which is likely to limit the potential for infiltration-based SuDS.

Taking account of the findings of the Level 2 SFRA it is not considered that flood risk poses an insurmountable barrier to the delivery of any of the sites considered through the study, however recommendations for each site will need to be carefully considered and where relevant, sites should be subject to the exception test. The exception test may be required for The Deans (Site 317), The Grange (Site 920), and Swift Lane Extension (Site 1030).

1 Introduction

1.1 Purpose of the Strategic Flood Risk Assessment

Paragraph 171 of the National Planning Policy Framework (NPPF, 2024) (gov.uk) 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.'*

1.2 Levels of SFRA

The Planning Practice Guidance (PPG, 2022) Flood risk and coastal change (gov.uk) advocates a staged approach to risk assessment and identifies two levels of Strategic Flood Risk Assessment (SFRA):

- A Level 1 assessment, which all Local Planning Authorities (LPAs) are required to undertake. 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 and inform the allocation of development in 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 (December 2024) 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 SFRA should consider the detailed nature of the flood characteristics within flood risk area, from all sources of flooding.

This SFRA report fulfils the requirements for a Level 2 assessment of development sites identified for allocation within Surrey Heath borough and has been prepared in accordance with the NPPF (December 2024) and PPG (2022).

This report should be read alongside the Surrey Heath Borough Council (SHBC) Level 1 SFRA (2025) and builds upon information presented within the Level 1 SFRA.

1.3 SFRA objectives

The objectives of this Level 2 SFRA are to:

- Provide detailed assessments of the flood risk at five development sites identified in consultation with SHBC, using the latest available flood risk data, thereby assisting SHBC in applying the exception test to their proposed development sites through the new Local Plan.

- Use available data to provide information and a comprehensive set of maps presenting flood risk from all sources for each site option.
- Where the exception test is required, provide recommendations for making the site safe throughout its lifetime.
- Take into account of the policy and legislation in the NPPF (December 2024), PPG (2022), and Lead Local Flood Authority (LLFA) Sustainable Drainage Systems (SuDS) guidance.

1.4 National Flood Risk Assessment 2

Since the publication of the Level 1 SFRA, the Environment Agency (EA) published their National Flood Risk Assessment 2 (NaFRA2) mapping for surface water on the 28 January 2025, which supersedes the EA's previous mapping.

The data was not available at the time of compiling and finalising the Level 1 SFRA. It is noted within the Level 1 SFRA that the assessment makes use of the best available data at the time of publication and that developers should refer to the latest EA data for any site-specific assessments. It is recommended that SHBC review their Level 1 SFRA on publication of the full NaFRA2 dataset and assess whether any updates are required.

The latest NaFRA2 surface water data has been used to inform this Level 2 SFRA. SHBC's development sites were screened against the new NaFRA2 surface water data, and this was used to inform the requirements for detailed site assessments within this Level 2 SFRA. The surface water assessment methodology is set out in Section 3.4. It was noted that surface water risk is shown to have reduced across many of the sites in the borough between the previous surface water mapping and the new NaFRA2 data.

The EA published the updated NaFRA2 Flood Map for Planning (FMfP) on the 25 March 2025. As this data was not available for the preparation of this SFRA (prepared in February 2025), the best available data has been used to inform the detailed site assessments, including the EA's new NaFRA2 Risk of Flooding from Rivers and the Sea dataset. The fluvial assessment methodology is set out in Section 3.2. SHBC and developers should refer to the latest available data in the online EA FMfP (gov.uk) when undertaking any future assessments.

1.5 Consultation

In addition to the SHBC as the LPA, the following parties were consulted during the preparation of the Level 1 SFRA (which also informed this Level 2 assessment) through data requests and draft report reviews:

- Surrey County Council (SCC) as LLFA;
- the EA; and
- Thames Water.

In addition, the following parties were consulted through data requests during the preparation of the Level 1 SFRA:

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

1.6 How to use this report

Table 1-1 below outlines the contents of this report and details how different users can apply this information.

Table 1-1: Outline of the contents of each section of this report.

Section	Contents	How to use
1. Introduction	Outlines the purpose and objectives of the Level 2 SFRA	For general information and context.
2. Planning framework and flood risk policy	Includes information on the implications of recent changes to planning and flood risk policies and legislation.	Users should refer to this section and the relevant sections of the Level 1 SFRA for any relevant policy which may underpin strategic or site-specific assessments.
3. Information used in the Level 2 SFRA	Summarises the data used in the Level 2 detailed site assessments and mapping.	Users should refer to this section in conjunction with the detailed site assessments (Appendix A) and the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud) to understand the data presented.
4. Level 2 Assessment Methodology	Summarises the sites taken forward to a Level 2 assessment and the outputs produced for each of these sites.	Users should refer to this section in conjunction with the detailed site assessments (Appendix A) and the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud) to understand the data presented.
5. 'Amber sites' assessment	Includes an assessment of flood risk at the 'amber sites' (those sites identified at a lower, but still notable, flood risk than those	This section should be used in conjunction with the 'amber site' mapping. Developers of 'amber sites' should use this section to

Section	Contents	How to use
	requiring a full Level 2 assessment).	understand the flood risk and associated recommendations for their sites.
6. Flood risk management requirements for developers	Identifies the scope of the assessments that must be submitted in Flood Risk Assessments (FRAs) supporting applications for new development. Refers to relevant sections in the Level 1 SFRA for mitigation guidance.	Developers should use this section alongside the relevant sections of the Level 1 SFRA to understand requirements for FRAs, which conditions/guidance documents should be followed, and information on flood mitigation options.
7. Summary of Level 2 assessment and recommendations	Summarises the results and conclusions of the Level 2 assessment, and signposts to the Level 1 SFRA for planning policy recommendations.	Developers and planners should use this section to see a summary of the Level 2 assessment and understand the key messages from the detailed site assessments. Developers should refer to the Level 1 SFRA recommendations when considering requirements for site-specific assessments.
Appendix A: Detailed site assessments	Provides a detailed summary of flood risk for sites requiring a more detailed assessment, which considers flood risk, emergency planning, climate change, broadscale assessment of possible SuDS, exception test requirements, and requirements for site-specific FRAs.	Planners should use this appendix to inform the application of the sequential and exception tests, as relevant. Developers should use these assessments to understand flood risk, access and escape route requirements, climate change, SuDS, and FRA requirements for site-specific assessments.
Appendix B: 'Amber sites' surface water mapping	Provides static mapping of the surface water flood risk to identified 'amber sites'.	Developers of 'amber sites' should use this mapping, in conjunction with Section 5 of this report, to understand the flood risk and associated recommendations for their

Section	Contents	How to use
		sites.
Appendix C: 'Amber sites' groundwater emergence mapping	Provides static mapping of the groundwater emergence risk to identified 'amber sites'.	Developers of 'amber sites' should use this mapping, in conjunction with Section 5 of this report, to understand the flood risk and associated recommendations for their sites.

1.7 SFRA study area

The study area for this Level 2 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 Bagshot, Frimley Green, Mytchett, and Deepcut. The eastern half of the borough is mostly rural but includes the larger villages of Bisley, Lightwater, West End, and Windlesham, and the smaller village of Chobham.

The key watercourses which flow through the borough are the River Blackwater, which flows in a northerly direction along the western border, Hale Bourne / Mill Bourne (which becomes Addlestone Bourne), which flows in a south-easterly direction through the eastern side of the borough, and The Bourne which rises in West End Common and joins the Hale Bourne / Mill Bourne just downstream of Chobham.

For further details and mapping of the study area, see Section 1.3 of the Level 1 SFRA report.

2 Planning framework and flood risk policy

The flood risk management roles and responsibilities for different organisations and relevant legislation, policy, and strategy are detailed within Section 2 of the SHBC Level 1 SFRA (2025).

This contains details on:

- Key legislation for flood and water management.
- Key national, regional, and local policy documents and strategies.
- Roles and responsibilities for flood risk management in Surrey Heath borough.

Due to the recent completion of the Level 1 SFRA, there have been no updates to legislation, policy, or strategies since publication.

3 Information used in the Level 2 SFRA

This section outlines the datasets used in assessing the Local Plan proposed development sites in the Level 2 SFRA. For further information on the different sources of flood risk and their prominence with Surrey Heath, users should refer to Section 4 and Appendix D of the Level 1 SFRA. However, it should be noted that the Level 1 SFRA has not currently been updated to reflect the latest NaFRA2 data as the dataset has not been published in full.

3.1 Historic flooding

The EA's Historic Flood Map and Recorded Flood Outlines datasets have been used to understand whether historic flooding has been recorded at the sites. One of the sites, Swift Lane Extension (Site 1030), has been assessed within the detailed site assessments in Appendix A and is located within the EA's Historic Flood Map and Recorded Flood Outlines extent.

SCC provided a dataset of their "wetspots", which are locations 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. There were no wetspots identified within any of the sites requiring detailed assessments. However, approximately 18m northwest of The Deans (Site 317), there is a current wetspot on Bridge Road (B3029).

SCC also provided a record 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. There were no records of property flooding within any of the sites. However, The Deans (Site 317), The Grange (Site 920), and Swift Lane Extension (Site 1030) have nearby roads with records of property flooding.

It is important to note that the absence of historic flood records does not mean that an area has never flooded, only that records are not held. For previously undeveloped sites, it is likely that historic flooding incidents may have gone unreported due to a lack of site use or interest. In addition, it is also possible that flooding mechanisms have changed since the date of a recorded flooding incident, making it more or less likely for flooding to occur on site.

3.2 Fluvial flooding

In agreement with the EA, the EA’s Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment and the EA's Addlestone Bourne 2007 hydraulic model has also been used to inform the fluvial flood risk for relevant sites (for the 1% AEP event only as no modelled extents were available for the 3.3% or 0.1% AEP events),

The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk.

However, the sites assessed within this Level 2 SFRA are not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in March 2025. At this time the Flood Zones should be compared with the assessment in this report.

Of the five detailed site assessments in Appendix A, three of the sites are shown to be at fluvial flood risk, namely The Deans (Site 317), The Grange (Site 920), and Swift Lane Extension (Site 1030).

3.3 Flood defences

For sites where existing flood defences provide a reduction in the flood risk to the site, it is important to understand the standard of protection these structures and measures provide. It is also necessary to understand how this level of protection changes over time, considering the implications of climate change.

If flood defences are required to protect a development site, evidence will be required to show that the new development does not adversely impact and increase flood risk to other areas, for example that there is no net loss in floodplain storage in circumstances where this is a material consideration. It will need to be established that these defences can be appropriately managed and maintained during the lifetime of the development. In some cases, it will be a requirement to demonstrate that there is an appropriate level of commitment to the maintenance of the standard of protection afforded by existing defences, where reliance is placed on the standard they provide.

Current flood defence information has been taken from the EA's Asset Information Management System (AIMS) Spatial Defences dataset. This dataset includes all flood defences currently owned, managed, or inspected by the EA and includes information pertaining to their current condition and standard of protection.

There is an embankment within the northern and eastern sides of Swift Lane Extension (Site 1030). This is a privately owned asset, and is not noted to be inspected, and does not appear to be functioning as a flood defence based on the RoFfRS outlines. Developers for sites benefitting from or near to assets identified in AIMS should contact the Environment Agency to understand any implications of the asset for developing the site with regard to flood risk. None of the other sites assessed within the detailed site assessments in Appendix A are shown to be offered protection by formal flood defences.

3.4 Surface water flooding

Mapping of surface water flood risk in the Surrey Heath borough has been taken from the EA's Risk of Flooding from Surface Water (RoFSW) mapping, as updated in January 2025 with the publication of NaFRA2. Surface water flood risk is subdivided into the following four categories:

- **High:** An area has a chance of flooding greater than 3.3% AEP (1 in 30) each year.
- **Medium:** An area has a chance of flooding between 1% AEP (1 in 100) and 3.3% AEP (1 in 30) each year.
- **Low:** An area has a chance of flooding between 0.1% AEP (1 in 1,000) and 1% AEP (1 in 100) each year.
- **Very Low:** An area has a chance of flooding of less than 0.1% AEP (1 in 1,000) each year.

There are a number of key differences noted with the EA's updated NaFRA2 RoFSW mapping compared with the previous RoFSW mapping:

- No velocity and hazard information is currently available within the NaFRA2 RoFSW mapping.
- The NaFRA2 RoFSW mapping is filtered based on depth, whereas the previous mapping was filtered based on hazard.
- In areas where the new NaFRA2 RoFSW mapping overlaps the RoFfRS (areas shown to be at fluvial risk) the flood risk extents have been removed from the RoFSW mapping, i.e. it no longer shows flow paths along any watercourses represented within the fluvial mapping.

The results should be used for high-level assessments. If a particular site is indicated in the EA mapping to be at risk from surface water flooding, a more detailed assessment may be required to understand the flood risk more accurately at a site-specific scale. Such an assessment should use the RoFSW in partnership with other sources of local flooding information to confirm the presence of a surface water risk at that particular location.

At the time of this assessment, the available surface water NaFRA2 data was limited to extents and depths (based on probability bands). It is anticipated that hazard and velocity data will be made available, and this should be utilised by developers when undertaking site-specific FRAs. It should also be noted that there are areas of the NaFRA2 surface water data which do not appear to be representative of the topography, shown in the EA LiDAR, as well as areas that are not noted to have been post-processed, i.e. the extents across the lakes to the west of Land off Spencer Close (Site 299). It is anticipated that these extents will be further refined in future iterations of the mapping. Developers should use the Check the long term flood risk for an area in England (gov.uk) in the first instance to view the latest available data.

Of the five detailed site assessments in Appendix A, the highest risk of surface water flooding is shown at Land East of Benner Lane (Site 799) and Swift Lane Extension (Site 1030).

3.5 Climate change

There is limited climate change data available for use within this Level 2 SFRA assessment as the climate change data currently published as part of the NaFRA2 RoFSW and RoFfRS datasets is not provided with a suitable allowance for use in planning, i.e. currently only the central climate change uplift for the 2050s epoch has been published. Following the publication of the NaFRA2 surface water mapping, the climate change surface water mapping produced as part of the Level 1 SFRA is also no longer suitable to use as it does not reflect the latest areas of risk.

The following sections set out the climate change allowances for the borough and the approach taken within this SFRA. Developers should undertake detailed modelling of climate change allowances as part of a site-specific FRA, following the climate change guidance (gov.uk) set out by the EA.

3.5.1 Impact of climate change on fluvial flood risk

Climate change is expected to increase the peak flows of rivers, meaning that flows which were previously thought to be extreme will now be considered far more possible. Areas benefiting from flood defences will find the standard of protection changes over time with overtopping of defences more likely unless they are upgraded.

Peak river flow climate change allowances developed by the EA are divided into a series of Management Catchments. Surrey Heath borough is covered by two Management Catchments, with the relevant allowances for each Management Catchment detailed in Table 3-1 and Table 3-2.

Table 3-1: 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 2125)
Upper end	28	36	71
Higher Central	15	17	36
Central	10	9	24

Table 3-2: 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 2125)
Upper end	23	25	46
Higher Central	11	10	23

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 2125)
Central	7	4	14

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.5.2 Impacts of climate change on surface water flooding

Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This increased rainfall intensity will affect land and urban drainage systems, resulting in surface water flooding, due to the increased volume of water entering the systems.

Peak rainfall climate change allowances developed by the EA are divided into the same Management Catchments as peak river flows and are detailed in Table 3-3 and Table 3-4.

Table 3-3: 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) for 3.3% AEP	Total potential change (%) anticipated for '2050s' (2022 to 2060) for 1% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) for 3.3% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) for 1% AEP
Upper end	35	40	35	45
Central	20	20	25	25

Table 3-4: 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) for 3.3% AEP	Total potential change (%) anticipated for '2050s' (2022 to 2060) for 1% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) for 3.3% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) for 1% AEP
Upper end	35	40	35	40
Central	20	20	25	25

Following the publication of the NaFRA2 surface water mapping, the climate change surface water mapping produced as part of the Level 1 SFRA is no longer suitable to use as it does not reflect the latest areas of risk. Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.6 Groundwater flooding

Two datasets were 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, showing the degree to which areas are susceptible to groundwater flooding 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.
- The JBA Groundwater Emergence map, showing the likelihood of groundwater emergence posing a risk to both surface and subsurface assets, based on predicted groundwater levels during a 1% AEP event. Surface water mapping and topographic data is used to gain an understanding of the overland flow routes which may be impacted by this emergence.

The PPG (2022) states that all sources of flooding should be considered as part of the sequential test, including groundwater emergence risk. However, it should be noted that this data is not directly comparable to other datasets (for example the EA's RoFSW), and therefore cannot categorise an area as high, medium, or low risk on its own. The map

should be interpreted as an initial indicative tool to assess groundwater flood risk at preliminary stages of planning/site allocation. Where mapping indicates a risk of groundwater flooding a detailed assessment should be undertaken to confirm the risk to the site as part of any planning application, which may require ground investigations.

The JBA groundwater emergence mapping is categorised into five different classes; a detailed description of the classes is in Table 3-5 below.

Table 3-5: 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.
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.

Of the five detailed site assessments completed, the greatest risk of groundwater emergence is identified at Land off Spencer Close (Site 299) and The Grange (Site 920).

3.6.1 Impact of climate change on groundwater flooding

The impact of climate change is more uncertain for groundwater flooding associated with rivers and land catchments and those watercourses where groundwater has a large influence on winter flood flows. Changes in frequency and intensity of groundwater flooding due to climate change would depend on the flooding mechanism and geological characteristics.

Milder wetter winters may increase the frequency of groundwater flooding incidents in areas that are already susceptible, but warmer drier summers may counteract this effect by drawing down groundwater levels to a greater extent during the summer months.

3.7 Reservoir flooding

The risk of inundation as a result of a breach or failure of a number of reservoirs within the area has been identified from the EA's Reservoir Flood Extents dataset (gov.uk). Although

it is predicted that there is a risk to life if these reservoirs were to fail, the risk of such an event occurring is very low.

This dataset consists of flood extents for two scenarios including 'Wet Day' and 'Dry Day', for all large, raised reservoirs. The 'Dry Day' scenario shows flood extents in the event that reservoirs were to fail and release the water they hold when local rivers are at normal levels. The 'Wet Day' scenario shows flood extents in the event that reservoirs were to fail and release the water they hold when local rivers are in flood.

Flood extents are not included for smaller reservoirs or for reservoirs commissioned after the reservoir modelling programme began in October 2016. Furthermore, only those reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the Reservoir Act 1975.

Of the five detailed site assessments carried out for this Level 2 SFRA, The Deans (Site 317) and Swift Lane Extension (Site 1030) were assessed to be at residual risk of flooding from reservoirs included in the EA mapping.

3.8 River networks

Main Rivers are represented by the EA's Statutory Main River layer. Ordinary Watercourses are represented by the OS Watercourse Link dataset. Caution should be taken when using these layers to identify culverted watercourses which may appear as straight lines but, in reality, are not. Developers should check if a Flood Risk Activity Permit (FRAP) or any other permits or permissions will be needed prior to any activities being carried out to any Main Rivers. In Surrey Heath borough, this applies to Swift Lane Extension (Site 1030) which is adjacent to Windle Brook.

Developers should be aware of the need to identify the route of, and flood risk associated with, culverts. CCTV condition survey will be required to establish the current condition of the culvert and hydraulic assessments will be necessary to establish culvert capacity of both culverts on site and those immediately offsite that could pose a risk to the site. The risk of flooding should be established using site survey, including the residual risk of culvert blockage.

3.9 Sewer flooding

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.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

3.10 Residual risk

The residual flood risk to sites is identified as where potential blockages or overtopping/breach of defences could result in the inundation of a site, with the sudden release of water with little warning.

Several sites assessed within Surrey Heath borough are near culverted sections of watercourses which flow beneath roads, railway lines, and footpaths, and present a residual flood risk should they become blocked or collapse. Potential culvert blockages that may affect a site were identified on OS Mapping and the OS Watercourse Link layer to determine where watercourses flow into culverts or through structures (i.e. bridges) in the vicinity of the sites. Any potential locations were flagged in the detailed site assessments.

Sites potentially affected by residual risk of culvert blockages are:

- The Grange (Site 920).
- Land off Spencer Close (Site 299).
- The Deans (Site 317).

The potential impacts of residual risk at sites will need to be considered by the developer as part of a site-specific FRA.

3.11 Canal flooding

There is one canal within the borough, the Basingstoke Canal, which is jointly owned by Surrey and Hampshire County Councils through the Basingstoke Canal Authority (BCA) (hants.gov.uk).

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 Mytchett and Frimley Green.

The canal has the potential to interact with other watercourses in the study area. These watercourses have the potential to become flow paths if the canal overtopped or breached. Any development proposed adjacent to a canal should include a detailed assessment of how a canal breach would impact the site, as part of a site-specific FRA. The Canal and River Trust (canalrivertrust.org.uk) provide guidance on development near canals.

None of the sites assessed within Appendix A are located within close proximity of the Basingstoke Canal.

3.12 Depth, velocity, and hazard to people

Fluvial and surface water depth information has been made available as part of the NaFRA2 RoFfRS and RoFSW datasets. This is split into depths bands and shows the probability of the risk exceeding a certain depth within each event. Velocity, and hazard information is not currently available as part of the RoFfRS and RoFSW datasets so have not been included as part of this Level 2 SFRA and will need to be considered further during a site-specific FRA. It is anticipated that further data will be published as part of the

next NaFRA2 release in March 2025. Developers should refer to the EA's online flood mapping in the first instance to assess the latest available data.

3.13 SuDS suitability

The hydraulic and geological characteristics of each site have been assessed to determine the factors that potentially constrain schemes for surface water management. This assessment is designed to inform the early-stage site planning process and is not intended to replace site-specific detailed drainage assessments. A high-level assessment of suitability of SuDS is included in the site assessments in Appendix A.

The assessment is based on catchment characteristics, topography, JBA's Groundwater Emergence mapping, and British Geological Survey (BGS) mapping. Further information on the topography, geology, and soils of Surrey Heath borough is detailed in Section 4 of the Level 1 SFRA Main Report.

Other datasets used to determine factors such as potential water quality and flood constraints include:

- Historic landfill sites.
- Groundwater Source Protection Zones.
- Nitrate Vulnerable Zones.
- Detailed River Network.
- RoFSW mapping.
- Flood Zones derived as part of this Level 2 SFRA.

This data was then collated to provide an indication of particular groups of SuDS systems which might be suitable at a site. SuDS techniques were categorised into five main groups, as shown in Table 3-6. This assessment should not be used as a definitive guide as to which SuDS would be suitable but used as an indicative guide of general suitability. Further site-specific investigation should be conducted to determine what SuDS techniques could be used on a particular development, informed by detailed ground investigations.

Table 3-6: Summary of SuDS categories.

SuDS Type	Technique
Source Controls	Green Roof, Rainwater Harvesting, Pervious Pavements, Rain Gardens
Infiltration	Infiltration Trench, Infiltration Basin, Soakaway
Detention	Pond, Wetland, Subsurface Storage, Shallow Wetland, Extended Detention Wetland, Pocket Wetland, Submerged Gravel Wetland, Wetland Channel, Detention Basin
Filtration	Surface Sand Filter, Sub-Surface Sand Filter, Perimeter Sand Filter, Bioretention, Filter Strip, Filter Trench
Conveyance	Dry Swale, Under-drained Swale, Wet Swale

The suitability of each SuDS type for the development sites has been described in the detailed site assessments, where applicable. The assessment of suitability is broadscale and indicative only; more detailed assessments should be carried out during the site planning stage to confirm the feasibility of different types of SuDS.

Further site-specific investigation should be conducted to determine what SuDS techniques could be utilised at a particular development. The result of this assessment does not remove the requirements for geotechnical investigation or detailed infiltration testing.

SuDS in Surrey Heath borough should be designed in accordance with SCC's SuDS guidance. 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 Sustainable Drainage System Design Guidance (surreycc.gov.uk) webpage provides further information.

The Surface Water Management roles and responsibilities for different organisations and relevant legislation, policy and strategy are detailed within Section 9 of the Level 1 SFRA.

This contains detail on:

- Role of the LLFA and LPA in surface water management.
- Sources of SuDS guidance.
- Other surface water considerations including Groundwater Vulnerability Zones, Groundwater Source Protection Zones, and Nitrate Vulnerable Zones.

3.14 Emergency Planning

Flood Warning Areas (FWAs) and Flood Alert Areas (FAAs) are detailed in the EA's GIS datasets and can be used to inform emergency planning. FAAs inform the EA when there is flooding first in the catchment, irrespective of properties, hence this coverage tends to apply to whole watercourses or stretch of coastline. FWAs are derived from the extreme flood outline (0.1% AEP event), focussed on communities, properties, and/or infrastructure. Modelled depth, velocity and hazard data can be used to understand safe access and escape routes for each site.

FWAs and FAAs are often similar to the EA Flood Zones and therefore may be updated in future following the updates to the EA Flood Map for Planning. Developers should refer to the EA webpages for FWAs (gov.uk) and FAAs (gov.uk) for the latest coverage.

4 Level 2 Assessment Methodology

This section outlines how sites were screened against flood risk datasets to determine which sites required a Level 2 detailed site assessment. It also identifies other sites, referred to in this SFRA as 'amber sites', at lower risk with general recommendations for developers. The number assigned to each site correspond to its SLAA ID.

4.1 Site screening

SHBC provided 32 sites which have been screened using a GIS tool against available flood risk information and spatial data to identify sites requiring further assessment within this Level 2 SFRA. These sites were screened against the following data:

- The proportion of the site in each Flood Zone based on the February 2025 RoFfRS dataset (see Section 3.2 for a summary of how the Flood Zones were derived for this SFRA and Section 3.5 for an overview of how climate change has been considered).
- The proportion of the site shown to be at risk from surface water flooding in the RoFSW mapping for the 3.3%, 1%, and 0.1% AEP events (see Section 3.5 for an overview of how climate change has been considered).
- Whether the site is within, or partially within, the reservoir 'Dry Day' or 'Wet Day' flood extents.
- Whether the site is within, or partially within, the Environment Agency (EA) Historic Flood Map dataset.
- Whether the site is within 10m of watercourses shown within the EA Detailed River Network dataset.
- The proportion of the site with groundwater emergence levels within 0.5m of the ground surface using the JBA Groundwater Emergence Map.

A R-A-G (Red-Amber-Green) system was applied to the sites on the basis that:

- 'red' sites have significant obstacles or challenges for development which would need consideration if taken forward. These sites may need the exception test to show that the site can be developed safely, from a flood risk perspective. The 'red' sites have been assessed within Appendix A: Detailed Site Assessments.
- 'amber' sites are not identified to have any fluvial flood risk. They are flagged as either having a minimal surface water risk on the site which is likely to be manageable through appropriate SuDS/site design, surface water risk potentially impacting access/escape, or a high risk of groundwater emergence. These are not likely to prevent development but will need to be addressed at the planning application stage. The 'amber' sites have been assessed within Section 5 of this report and the mapping in Appendices B and C.
- 'green' sites have no significant obstacles for development and have therefore not been assessed further within this Level 2 SFRA. However, it is noted sites may need an FRA depending on the location of the site.

The screening also provides an opportunity to identify sites which may show to be 100% in Flood Zone 1, but upon visual inspection in GIS, have an ordinary watercourse flowing through or adjacent to them. Although there are no Flood Zone maps available for these watercourses, it does not mean the watercourse does not pose a risk, it just means no modelling has yet been undertaken to identify the risk.

Flood Zones are not provided for specific sites or smaller watercourses. For this reason, the Flood Zones are not of a resolution to be used as application evidence to provide the details of possible flooding for individual properties or sites and for any sites with watercourses on, or adjacent to the site. The RoFSW has been used to assess flood risk for any watercourses not represented within the RoFfRS dataset (as noted in Section 3.4, the updated RoFSW mapping no longer represents any smaller watercourses represented within the fluvial mapping). In these cases, the surface water mapping is considered comparable to fluvial flooding from smaller watercourses and is therefore a reasonable representation of the floodplain of such watercourses to use for a strategic assessment.

4.2 Sites taken forward to a Level 2 assessment

The findings of the R-A-G analysis were reviewed with SHBC, and some sites were removed as a consequence of having existing planning permission or where a revision to the site boundary subsequently reduced the risk to the site.

This identified 5 'red' sites with significant obstacles or challenges for development which would need consideration if taken forward. This includes all sites identified to be at fluvial flood risk and which may require the exception test to show that the site can be developed safely, from a flood risk perspective.

This Level 2 SFRA therefore provides detailed site assessments for the following 'red' sites:

- Land off Spencer Close (Site 299).
- The Deans, Bridge Road (Site 317).
- Land East of Benner Lane (Site 799).
- Swift Lane Extension (Site 1030).
- The Grange, St Catherines Road (Site 920).

Appendix A provides the detailed site assessments, and mapping outputs are displayed on the Council's accompanying Interactive Mapping Portal (surreyheath.hub.xmap.cloud).

A further 17 'amber' sites were identified which do not have any fluvial flood risk and therefore do not require the exception test. However, they are flagged as either having a minimal surface water risk on the site which is likely to be manageable through appropriate SuDS/site design, surface water risk potentially impacting access/escape, or a high risk of groundwater emergence. These are not likely to prevent development but will need to be addressed at the planning application stage. The 'amber' sites do not require a full assessment of risk from all sources of flood risk, as per the 'red' sites but a high level overview of the risk to the site is provided in Section 5 alongside general recommendations for developers.

4.3 Detailed site assessments

As part of the Level 2 SFRA, detailed site assessments have been produced for the five 'red' sites. The site assessments can be found in Appendix A. Each site assessment sets out the following information:

- Basic site information.
- Location of the site in the catchment.
- Area, current land use (greenfield/brownfield), proposed site use.
- Current and proposed site vulnerability.
- Sources of flood risk.
- Existing drainage features.
- Fluvial – proportion of site at risk including description from mapping/modelling.
- Surface Water – proportion of site at risk including description from RoFSW mapping using available depth information.
- Reservoir flood risk in both the 'Dry Day' and 'Wet Day' scenarios.
- Flood history - historic incidents on or surrounding the site from the EA Recorded Flood Outline and Historic Flood Map datasets.
- Flood risk management infrastructure.
- Description of residual risk.
- Emergency planning.
- FWAs and FAAs.
- Access and escape routes.
- Fluvial climate change - summary of available climate change allowances and increase in flood extent compared to the 1% AEP event (Flood Zone 3a).
- Surface water climate change - summary of available climate change allowances and increase in flood extent compared to the 1% AEP event.
- Requirements for drainage control and impact mitigation.
- Broadscale assessment of possible SuDS to provide indicative surface water drainage advice for each site assessed for the Level 2 SFRA.
- Groundwater Source Protection Zones.
- Nitrate Vulnerable Zones.
- Historic landfill sites.
- NPPF (December 2024) Planning implications.
- Exception test requirements.
- Requirements and guidance for site-specific FRA (including consideration of opportunities for strategic flood risk solutions to reduce flood risk).
- Key messages – summarising considerations if development proceeds.

4.4 Cumulative Impact Assessment

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume and potential effects of increased volumes of runoff from proposed development. Whilst the loss of storage or potential

increase in flow volume for individual developments may only have 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.

Within the Level 1 SFRA, a Cumulative Impact Assessment (CIA) was undertaken, based on the Water Framework Directive (WFD) catchments. For each catchment the CIA assesses the sensitivity to increases in fluvial and surface water flood risk, the prevalence of historic flooding incidents, and the degree of proposed new development both within SHBC and across neighbouring authorities within cross-boundary catchments. The results were combined to identify the catchments most sensitive to increased risk.

The sites provided by SHBC were compared within the high-risk catchments identified within the CIA. The following sites were found to be located in a high-risk catchment:

- Land East of Knoll Road (Site 27).
- London Road Block, London Road (Site 814).
- Princess Royal Barracks.
- Camberley Centre, France Hill Drive (Site 240).
- Camberley Station, Station House (Site 25).
- York Town Car Park, Sullivan Road (Site 833).
- Sir William Siemens Square, Chobham Road (Site 907).
- Former Portesbery School (Site 1015).
- St James House (Site 1005).
- Land at Loen, St Catherines Road (Site 887).
- Land off Spencer Close (Site 299).
- 280 Gordon Avenue (Site 314).
- Burwood House Hotel, 15 London Road (Site 717).
- 439 - 445 London Road (Site 295).
- Land Rear of 1 - 47 Sullivan Road (Site 424).
- Former Premier Site, Newfoundland Road (Site 846).
- The Grange, St Catherines Road (Site 920).
- Land adjacent to Sherrard Way (Site 912).
- 61 - 63 London Road (Site 21).
- Pinehurst (Site 801).

For sites found to be in high-risk catchments as outlined above, developers should refer to the recommendations set out in Section 10.1.6 of the Level 1 SFRA Main Report.

5 'Amber sites' assessment

5.1 Overview

As set out in Section 4.2, 17 sites that are being taken forward by SHBC were identified as 'amber sites'. These sites are not shown to be at risk of fluvial flooding but were designated as 'amber' sites based on the surface water risk on or surrounding the site (10 sites as shown in Section 5.2) and/or groundwater emergence potential at the site (15 sites as shown in Section 5.3). These sites did not require a full review of flood risk from all sources however there is still a risk to be managed on site, therefore, some high level analysis and recommendations for development are captured below.

5.2 'Amber sites' assessment - surface water

5.2.1 Sites overview

Table 5-1 provides an overview of the risk to each of the 'amber sites' identified based on surface water risk. The surface water risk to the 'amber sites' was not deemed significant enough to require a full site assessment; however, a minor risk to the site and/or potential impacts on access and escape routes has been identified and should be considered further within a site-specific FRA.

Appendix B provides figures showing the 'amber sites' identified to be at risk of surface water flooding.

Table 5-1: Description of the surface water risk at the 'amber sites'.

SLAA ID	Location	Description of surface water risk
25	Camberley Station, Station House	In the 3.3% AEP event, outside of the site there is an area of ponding along the Ascot to Guildford railway line, running parallel to the southern boundary. This ponding encroaches marginally into the southeast of the site. In the 1% AEP event, there is a new area of isolated ponding that forms in the east of the site. In the 0.1% AEP event, this area of ponding in the east increases in its coverage. The surface water flood risk from the railway line also encroaches further into the site, including from the southwest boundary. In the 0.1% AEP event, there is also a flow path along Heathcote Road that crosses into the site from the eastern boundary. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.

SLAA ID	Location	Description of surface water risk
907	Sir William Siemens Square, Chobham Road	There is a square in the centre of the site, encircled by Sir William Siemens Way. In the 3.3% AEP event, there are five areas of ponding. This pooling is located in the northwest and east of the square, as well as covering parts of The Boulevard and Sir Williams Siemens Way south of the square. In the 1% AEP event, these ponding extents increase. There is a large flow path forming outside of the south of the site, that marginally encroaches the boundary. In the 0.1% AEP event, this flow path covers slightly more of the south. There is also a new area of ponding that covers the entire building to the southeast of the square, as well as a new area of risk along the north and east of the northeastern building. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.
1015	Former Portesbery School	There is no surface water flood risk to the site in the 3.3% and 1% AEP events. In the 0.1% AEP event, there is an area of isolated ponding in the centre of the site, located directly south of the final stretches of the road (Hillside). The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.
1005	St James House	There is no surface water flood risk to the site in the 3.3% and 1% AEP events. In the 0.1% AEP event, there are large areas of risk on the streets surrounding the site, particularly to the north and west. Surface water is shown to enter the site from the north, covering an area in the northwest. SCC have reported that they hold historic records of internal property flooding in close proximity to the site. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.
314	280 Gordon Avenue	There is no surface water flood risk to the site in the 3.3% AEP event. In the 1% AEP event, there is an area of ponding in the residential area to the east of the site that encroaches marginally along the eastern boundary. In the 0.1% AEP event, there is a flow path along the Ascot to Aldershot railway line that is flowing southwest. This flow path joins the ponding to the east and covers much of the north of the site and part of the southeast. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.
1004	St Margarets Cottage and the Ferns	In the 3.3%, 1%, and 0.1% AEP events, there are three areas of isolated ponding. One area of pooling is in the southwest, the next is just north of St Margarets Cottage, and the final is located on and to the west of the driveway from Woodlands Lane leading to the Ferns. The flood extents increase progressively between the 3.3%, 1%, and 0.1% AEP events.
844	Land at	In the 3.3% and 1% AEP events, there is a large area of ponding

SLAA ID	Location	Description of surface water risk
	Chamness, Woodlands Lane	that covers much of the southeast of the site, including almost all of the southern boundary. In the 0.1% AEP event, the flood extents increase further and there is a new are of ponding in the southwest.
801	Pinehurst	In the 3.3% AEP event, there are three areas of ponding in the site. Two are located in the northeast, and the third further south. In the 1% AEP event, these flood extents increase, and the most southernmost area of ponding joins the pooling closest to the eastern border. In the 0.1% AEP event, the areas at risk of surface water flood risk increases further, particularly towards the southwest. In the 0.1% AEP event, all the areas of pooling are connected.
814	London Road Block, London Road	In the 3.3% AEP event, there are two areas of ponding in the site. The smaller area of pooling is located in the west, directly south of the road leading into the site from Park Street. The larger area of pooling covers much of the buildings and car park situated east of Sparvell Way. In the 1% and 0.1% AEP events, these two flood extents increase in size. In the 0.1% AEP event, the pooling in the west extends all the way down to the southern border. SCC have reported that they hold historic records of internal property flooding along the High Street, which runs parallel to the eastern boundary before continuing south. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.
27	Land East of Knoll Road	In the 3.3% AEP event, there is an area of isolated ponding in the centre of the site. In the 1% AEP event, this area of ponding increases in its coverage, and there are two new areas of pooling. The new areas of risk are located northwest and further east of the Camberley Library, In the 0.1% AEP event, there is also flood risk in the south of the site and along the eastern and western borders. The flood extents surround the east of the building in the northwest of the site, also covering much of it in the south and southwest. SCC have reported that they hold historic records of internal property flooding along the High Street, which is located approximately 100m west of the site. The area surrounding the site is noted to be at surface water risk and is designated a Critical Drainage Area by the LLFA.

5.2.2 Planning implications

The developer should undertake a site-specific FRA at the planning stage and take particular consideration of the surface water flow routes/areas at risk and how these will impact the site itself as well as access and escape routes.

The following considerations should be made for development in areas with a risk from surface water flooding:

- Development should be steered away from existing flow paths and the areas of surface water risk on the site.
- Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
- The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.
    - Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- Arrangements for safe access and escape routes will need to be provided for the 1% AEP surface event with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.
    - For any sites bisected by surface water flow paths, access and escape arrangements should be considered for each area of the site, should access between areas of the site not be possible.
- Provisions for safe access and escape routes should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

5.3 'Amber sites' assessment - groundwater emergence

5.3.1 Sites overview

The JBA Groundwater Emergence Map (5m resolution) was used to locate areas where groundwater is most likely to emerge. Sites with considerable areas where groundwater levels are predicted to be within 0.5m of the surface level were identified. The RoFSW mapping and LiDAR data were then used to identify where any groundwater emerging in these locations is most likely to flow. Table 5-2 provides an overview of the groundwater emergence risk at each of the identified 'amber sites'.

Appendix C provides figures showing the groundwater emergence risk to each site.

Table 5-2: Description of the groundwater emergence risk at the 'amber sites'.

SLAA ID	Location	Description of groundwater emergence risk
240	Camberley Centre, France Hill Drive	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire site. Based on the site's underlying topography, any groundwater emerging is likely to flow east towards France Hill Drive.
25	Camberley Station, Station House	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. From assessing the 0.1% AEP surface water flooding outputs, any groundwater emerging may pool in the east of the site. It could also flow to the southwest border, where a flow path is formed along the Ascot to Guildford line and encroaches onto the site.
907	Sir William Siemens Square, Chobham Road	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are either at or very near (within 0.025m of) the ground surface in the south of the site. The remainder of the site has groundwater levels between 0.025m and 0.5 below the ground surface. The 0.1% AEP surface water flood extents show that there is a large area of ponding in the centre of the site. There is also a significant flow path just south of the site. Any groundwater emerging on the site is likely to pool in the centre or join the flow path in the south.

SLAA ID	Location	Description of groundwater emergence risk
1015	Former Portesbery School	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. Based on the 0.1% AEP surface water flooding outputs, any groundwater emerging may pond in the centre of the site.
1005	St James House	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. From assessing the 0.1% AEP surface water flooding outputs, any groundwater emerging may flow towards and/or pool in the northwest of the site.
887	Land at Loen, St Catherines Road	The EA's AStGWF dataset (1km resolution) indicates groundwater flood susceptibility of less than 25% across the entire site. JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.5m and 5m in the central portion of the site, as well as in parts of the northeast and northwest. The remainder of the site has groundwater levels between 0.025m and 0.5m below the ground surface. Based on the underlying topography, any groundwater emerging is likely to flow off the site, either towards the south or the west.
408	Land rear of 192-210 London Road	The EA's AStGWF dataset (1km resolution) shows groundwater flood susceptibility of between 50% and 75% across the entire site. The JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire site. The topography of the site suggests that any groundwater that emerges flows off the site, likely towards the northwest or northeast.
314	280 Gordon Avenue	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are either at or very near (within 0.025m of) the ground surface for the entire site. Based on the 0.1% AEP surface water flooding outputs, any groundwater that emerges is likely to pool in the north of the site, in the south east, or along the eastern boundary.
757	Land North of	The EA's AStGWF dataset (1km resolution) shows groundwater flood susceptibility of between 50% and 75% across the entire

SLAA ID	Location	Description of groundwater emergence risk
	Guildford Road	site. The JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are predominantly between 0.025m and 0.5m below the ground surface. The site is split in two sections, and in the eastern section there is an area in the south where groundwater levels are at least 5m below the ground surface. The 0.1% AEP surface water flood extents show that in the east of the two site sections, there is an area of ponding in the southeast. Any groundwater that emerges is likely to pool here, or, based on the topography, flow northwards towards the South Western Main Line.
21	61 - 63 London Road	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. From assessing the 0.1% AEP surface water flooding outputs, any groundwater emerging is likely to flow towards the south of the site, where a significant flow path encroaches onto the southern boundary.
801	Pinehurst	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. Based on the 0.1% AEP surface water flooding outputs, any groundwater that emerges is likely to pool in the centre of the site, or in northeast.
814	London Road Block, London Road	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. From assessing the 0.1% AEP surface water flooding outputs, any groundwater emerging is likely to pool in the southwest of the site and/or in the central southern portion of the site.
27	Land East of Knoll Road	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are between 0.025m and 0.5m below the ground surface for the entire of the site. The 0.1% AEP surface water flood extents show there are areas of ponding along the eastern, western, and southern boundaries. There is also ponding across much of the northern and central portions of the site, as well as a smaller area in the southeast.

SLAA ID	Location	Description of groundwater emergence risk
		Any groundwater that emerges is likely to pool across these locations.
447	Broadford, Castle Grove Road	The EA's AStGWF dataset (1km resolution) does not indicate that the site is susceptible to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) shows that groundwater levels are either at or very near (within 0.025m of) the ground surface for the entire site. The topography of the site suggests that any groundwater emerging on the site will flow in a northerly direction and drain to The Bourne, which flows along the northern site boundary.
912	Land adjacent to Sherrard Way	The EA's AStGWF dataset (1km resolution) indicates that the site has between a 50% and 75% susceptible to groundwater flooding. The JBA Groundwater Emergence Map (5m resolution) emulates this showing that across most of the site groundwater levels are either at or very near (within 0.025m of) the ground surface. There is a small area in the centre of the site shown to be at negligible risk of groundwater emergence due to the nature of the underlying geological deposits. The topography of the site suggests that any groundwater emerging on the site will flow in a westerly direction and drain the River Blackwater, which flows through the west of the site.

5.3.2 Planning implications

As the sites within Table 5-2 have been identified as susceptible to groundwater flooding, additional investigation work may be required to support the detailed design of the site and drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level.

The following considerations should be made for development in areas with a higher risk from groundwater flooding:

- A sequential approach should be adopted to the site layout, steering more vulnerable development to the lowest areas of flood risk.
- High groundwater levels could be a potential constraint in the design of the surface water drainage system, and this should be consulted with SCC as LLFA.
- Attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity.
- Below ground development such as basements are not appropriate in areas of higher groundwater flood risk.
- Infiltration testing may be required in accordance with BRE365 at the locations of and depths commensurate with proposed infiltration features. This is particularly important in areas where the underlying geology means that the site is more impermeable.

A Hydrogeological Risk Assessment (HRA) should be undertaken for all proposed developments where high groundwater emergence levels have been identified. The scope and detail required for the HRA will vary depending on the scale of sub-surface construction proposed and the local geological and hydrogeological conditions. Developers should consult SHBC as LPA for further guidance.

6 Flood risk management requirements for developers

This section provides guidance on site-specific FRAs and other principles for managing flood risk in new development. Further information on site design and mitigation measures is available in the following sections of the Level 1 SFRA Main Report:

- 8.2.3 Site layout and design.
- 8.2.4 Modification of ground levels.
- 8.2.5 Raised floor levels.
- 8.2.8 Buffer strips.
- 8.2.9 Making space for water.
- 8.3 Resistance and resilience measures.

6.1 Early consultation with statutory and non-statutory consultees

Developers should consult with the EA, the LLFA (SCC), 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 charge for data and/or advice requested by developers or landowners.

6.2 Site-specific FRAs

6.2.1 What is a site-specific FRA?

A site-specific FRA is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site and should accompany a planning application where required. It is recommended that the assessment is undertaken by a suitably qualified person. The assessment should demonstrate how flood risk will be managed now and over the development's lifetime, taking both climate change and the vulnerability of users into account. The developer should check whether they are required to apply the sequential test prior to commencing with a site-specific FRA.

The objectives of a site-specific FRA are to 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 these effects and risks are adequate and appropriate.
- The nature of residual risk and whether this can be safely managed.
- The evidence, if necessary, for the LPA to apply the sequential test.
- The evidence, if applicable, to show whether the development will be safe and pass the exception test.

6.2.2 When is an FRA required?

As set out in Flood risk assessments: applying for planning permission (gov.uk), a site-specific FRA is required for all development (including minor development and changes of use) proposed:

- In Flood Zones 2, 3, or 3b.
- Within Flood Zone 1 with a site are of 1 hectare or more.
- In areas with critical drainage problems.
- Within Flood Zone 1 where the LPA's SFRA (or latest EA mapping) shows it will be at increased risk of flooding during its lifetime.
- That increases the vulnerability classification and may be subject to sources of flooding other than rivers or sea.

It is recommended that site-specific FRAs are also undertaken for proposals with a site area of less than 1 hectare in Flood Zone 1 where they could be affected by sources of flooding other than rivers or sea (e.g. surface water) regardless of the vulnerability classification of the development.

6.2.3 What level of detail is needed in 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. The SFRA can be used by developers as a starting point to identify the initial flood risk to a site however a pre-application consultation is key to define the scope of the FRA and identify data requirements, making sure that latest available datasets are used.

6.2.4 Guidance for FRAs

FRAs should follow the approach recommended by the NPPF (December 2024) (and associated guidance) and guidance provided by the EA and the LLFA. Guidance and advice for developers on the preparation of site-specific FRAs is available from the following websites:

- Standing Advice on Flood Risk (gov.uk),
- Flood Risk Assessment for Planning Applications (gov.uk); and
- Site-specific Flood Risk Assessment: Checklist (gov.uk).

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.

Where no recent detailed hydraulic modelling is present, it is recommended that developers construct new, or update existing, detailed hydraulic models at these sites as part of a site-specific FRA using channel, structure, and topographic survey to confirm flood risk during the 1% AEP plus climate change 'design event'. Site-specific flood modelling will likely need to be developed in locations where it is necessary to understand the effects of proposed development schemes on the existing flood flow paths and flood volume storage, in the present day and in the future. Developers should refer to the EA Flood Map for Planning

(gov.uk). in the first instance and undertake early consultation with the EA to determine FRA requirements.

Developers should seek to go beyond managing the flood risk and support opportunities to reduce the causes and impacts of flooding, whilst enhancing and conserving the natural environment. PPG: Flood risk and coastal change (gov.uk) Paragraphs 062 - 067 provide further information.

6.3 Emergency planning

Safe access and escape routes from the site should be provided in the design flood event. The developer should seek to incorporate an emergency plan, and a safe refuge point if the development site has been identified to be at risk of flooding. The LPA, LLFA, and Emergency Services should be consulted when designing an emergency plan and will need to be satisfied with any emergency plan produced. The plan will need to consider the likely duration and onset of flooding (Section 6.3.1).

Section 8.5 of the Level 1 SFRA report discusses NPPF (December 2024) requirements and provides further information on what an emergency plan will need to consider and signposts to other relevant information and guidance on emergency planning. SCC's Prepare For Emergencies (surreycc.gov.uk) provides further information.

This Level 2 assessment has identified two proposed sites, The Deans (Site 317) and Swift Lane Extension (Site 1030), located within existing EA FWAs and/or FAAs. For proposed development within existing EA FWAs, developers should consult the EA to ensure that adequate flood warning procedures and evacuation processes are in place and that Risk Management Authorities (RMAs) are not put under any additional burden. It should be noted that the EA is not directly responsible for flood evacuation processes.

6.3.1 Duration and onset of flooding

The duration and onset of flooding affecting a site depends on several factors:

- Position within a river catchment: sites at the top of a catchment are likely to flood sooner than those lower down. The duration of flooding tends to be longer for areas lower in river catchments.
- Upstream storage: upstream reservoirs within a catchment may provide some online flood storage that reduces the flood risk downstream and delays the onset of flooding.
- Timing of peak flow: at the confluence of larger watercourses and smaller tributaries, there may be different timings of peak flows, for example smaller tributaries would peak much earlier than the larger catchments.
- The preceding weather conditions prior to the flooding: wet weather lasting several weeks will lead to saturated ground. Rivers respond much quicker to rainfall in these conditions.
- Whether a site is defended: if the defences were to fail, a site could be affected by very fast flowing and hazardous water within 15 minutes of a breach

developing (depending on the size of the breach and the location of the site in relation to the breach), causing danger to life.

- Catchment geology: the permeability of a catchment affects its response time, for example chalk catchments take longer to respond than clay catchments.

The principal source of flooding also affects the duration and onset. Table 6-1 provides guidelines on the typical response time that may be expected for fluvial and surface water flooding. However, these are only broad guidelines, and it is recommended that a site-specific FRA refines this information based on more detailed modelling work where necessary, and assessment within an emergency response plan.

Table 6-1: Guidelines on the duration and onset of flooding

Principal source of flooding	Duration	Onset
Surface water	Up to 4 hours	Within 30 minutes
Fluvial	Between 4 and 24* hours	Within 2 to 8 hours

*Depending on where in the catchment a site is located, flooding could be rapid and flashy in the upper catchment (e.g. small tributaries) and slower responding and longer in duration in the lower catchment.

7 Summary of Level 2 assessment

7.1 Overview

This Level 2 SFRA delivers site-specific guidance and recommendations for sites in the SHBC study area. As part of the Level 2 SFRA, five detailed site assessments have been produced and can be found in Appendix A. Flood risk mapping at these sites can be viewed through the Council's Interactive Mapping Portal (surreyheath.hub.xmap.cloud). The Level 2 SFRA should be read in conjunction with the Level 1 SFRA which delivers a strategic assessment of all sources of flooding across the authority area.

7.2 Recommendations

7.2.1 Level 1 SFRA

Recommendations from this report should be considered in addition to recommendations from the Level 1 SFRA, which still stands for the site allocations and any windfall development that comes forward. The recommendations for the Level 1 SFRA are set out in Section 10 of the Level 1 SFRA Main Report.

7.2.2 Level 2 SFRA

When required, to pass the exception test it must be shown that the development will provide wider sustainability benefits that outweigh the risk, and that the development will be safe throughout its lifetime without increasing risk elsewhere. The former is a planning-related consideration and the Level 2 SFRA provides the LPA with evidence to answer the latter part of the test.

Some of the sites assessed in this Level 2 SFRA are at greater risk and will require careful consideration and significant mitigation to pass the flood risk element of the exception test, while other sites are likely to be able to pass the flood risk element of the exception test by:

- Undertaking a sequential approach to site planning so development is steered away from areas within the site at the highest risk.
- Considering safe access/escape routes in the event of a flood (from all parts of the site, if say the site is severed by a flood flow path). If access and escape routes are affected, a Flood Response Plan may be required.
- Finished floor levels should be above the estimated flood level (Fluvial 1% AEP event with an allowance for climate change), including an allowance for freeboard.
- Using areas in Flood Zone 2 for the least vulnerable parts of the development in accordance with Table 2 in the PPG (2022). No development should be permitted in Flood Zone 3b (aside from Essential Infrastructure).
- Considering space for green infrastructure in the areas of highest flood risk.

If a site is split in future into smaller land parcels for development, and some of those parcels are in areas of flood risk, the exception test may need to be re-applied by the developer at the planning application stage.

In some cases, it may be appropriate for the developer to contribute to the improvement of maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e. SuDS).

Developers should, where required, undertake more detailed hydrological and hydraulic assessments of the watercourses, including latest climate change allowances, to verify flood extent in order to inform the sequential approach within the site and demonstrate, as required, that the exception test is satisfied.

7.3 Guidance for windfall sites and sites not assessed in the Level 2 SFRA

The following points should be considered when developing windfall sites, or sites not assessed within this Level 2 SFRA:

- Where no recent detailed hydraulic modelling is present, it is recommended that developers construct new, or update existing, detailed hydraulic models at these sites as part of a site-specific FRA using channel, structure, and topographic survey to confirm flood risk during the 1% AEP plus climate change 'design event'. Site-specific flood modelling will likely need to be developed in locations where it is necessary to understand the effects of proposed development schemes on the existing flood flow paths and flood volume storage, in the present day and in the future. Developers should refer to the EA Flood Map for Planning (gov.uk) in the first instance and undertake early consultation with the EA to determine FRA requirements.
- If a site's boundary includes or borders an EA Main River (including a culverted reach of a Main River), an easement of 10m is required from both banks for access and maintenance (a requirement set by the EA in this area). Any future development will require a flood risk permit for any activity within 10m of a Main River. Further information relating to this can be viewed on the government website Flood risk activities: environmental permits (gov.uk).
- If an ordinary watercourse is within or immediately adjacent to the site area, consultation with the SCC as the LLFA should be undertaken. If alterations or discharges are proposed to the watercourse, a land drainage consent will be required.
- Where necessary, blockages of nearby culverts may need to be simulated in a hydraulic model to confirm residual risk to the site.
- Surface water risk should be considered in terms of the proportion of the site at risk in the 3.3%, 1% and 0.1% AEP events (with an appropriate allowance for climate change), whether the risk is due to isolated minor ponding or deeper pooling of water, or whether the risk is due to a wider overland flow route.
- Surface water risk and mitigation should be considered as part of a detailed site-specific FRA and surface water drainage strategy.

- Access and escape routes should be considered at the site, but also in the vicinity of the site, for example, a site may be at low flood risk from any particular source, but in the immediate locality, access/escape routes to and from the site could be restricted for vehicles and/or people.

7.4 Use of SFRA data and future updates

It is important to recognise that the SFRA has been developed using the best available information at the time of preparation. This relates both to the current risk of flooding from all sources and the potential impacts of future climate change.

The SFRA should be a 'living document', and as a result should be updated when new information on flood risk, flood warning or new planning guidance or legislation becomes available. Additional guidance should be sought from SHBC, SCC as LLFA, the EA, and Thames Water where relevant to ensure the most up to date information is considered within any new assessments. Such information may be in the form of:

- Policy/legislation updates (provided by the Government, SHBC, or SCC as LLFA).
- Flood event information following a flood event (provided by SHBC or SCC as LLFA).
- New hydraulic modelling results (provided by the EA).
- EA flood map updates (provided by the EA).
- New flood defence or alleviation schemes (provided by SHBC, SCC as LLFA, or the EA).

The EA regularly reviews their flood risk mapping, and it is important that they are approached to determine whether updated information is available prior to commencing a detailed FRA. The EA are currently undertaking new nationalised modelling (NaFRA2). The initial outputs have been utilised within this Level 2 assessment however the Flood Map for Planning has not been updated at the time of writing. It is also anticipated that further surface water hazard and velocity data will be made available, alongside further climate change mapping. Developers should refer to the latest EA mapping/modelling when undertaking a site-specific FRA to understand the latest data availability and determine any additional modelling requirements.

7.5 Neighbourhood plans

Flood risk should be fully addressed in development plan preparation and in bringing forward policies for the allocation of land. Therefore, SFRA findings should be used in the production of neighbourhood plans.

Neighbourhood planners can use the information in the Level 1 and Level 2 SFRAs on the sources of flood risk across Surrey Heath borough and the flood risk mapping, to assess the risk of flooding to sites within their community. The SFRA will also be helpful for developing community level flood risk policies in high flood risk areas.

Appendices

A Detailed site assessments

Appendix A: Detailed Site Assessments

A1-C01

28 March 2025

Prepared for:
Surrey Heath Borough Council

www.jbaconsulting.com

Level 2 Strategic Flood Risk Assessment - Land off Spencer Close (Site 299)

A1-C01

28 March 2025

Prepared for:
Surrey Heath Borough Council

www.jbaconsulting.com

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Land off Spencer Close (Site 299). The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Surrey Heath Level 1 SFRA and read the Surrey Heath Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** Land off Spencer Close. Situated in Frimley Green directly northeast of the intersection of the Ascot to Aldershot and the South Western Main railway lines. The location is mapped in Figure 1-1.
- **Site area:** 1.47 ha.
- **Existing site use:** Greenfield.
- **Proposed site use:** Residential.
- **Current site vulnerability:** Less vulnerable.
- **Proposed site vulnerability:** More vulnerable.

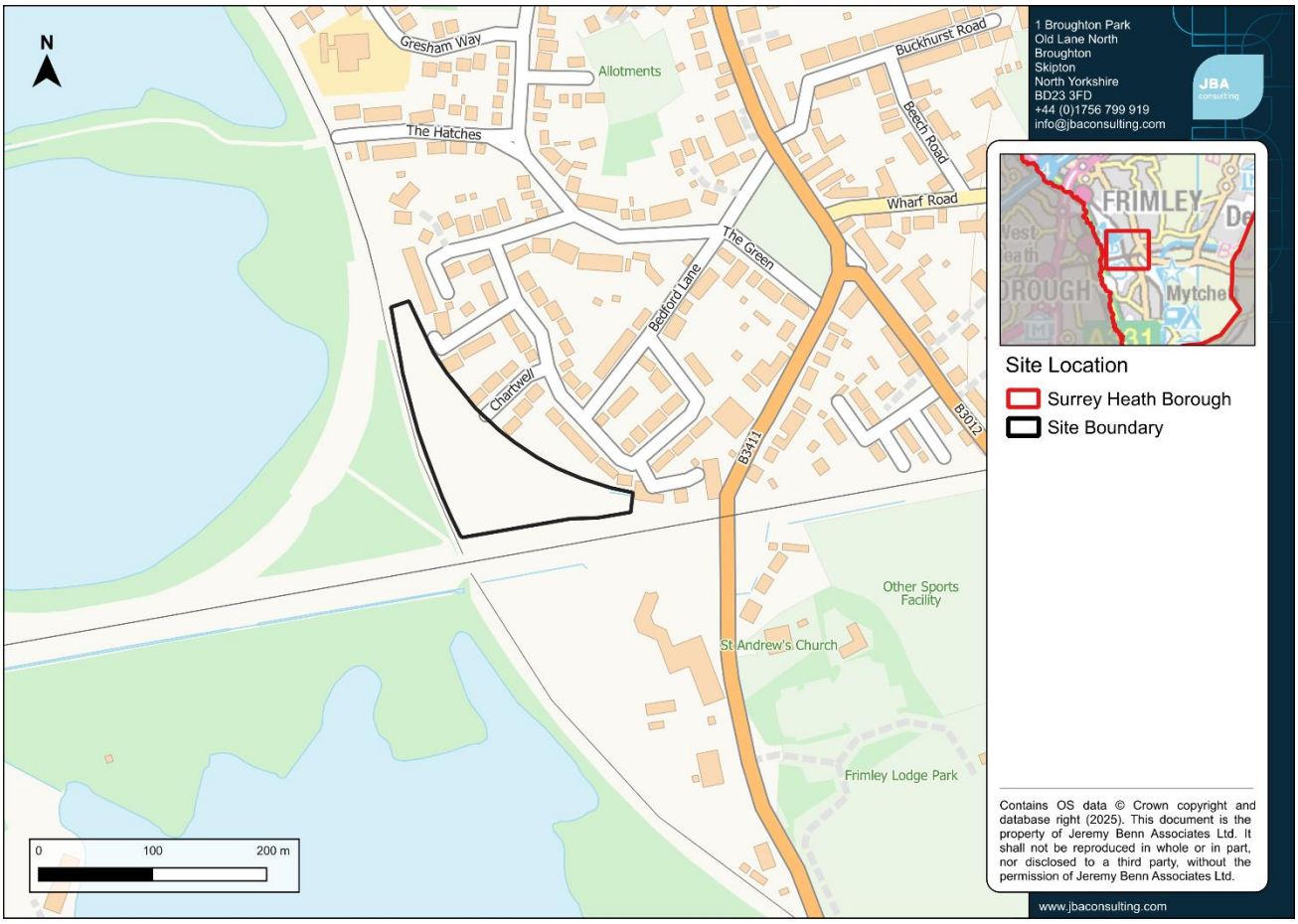


Figure 1-1: Site location.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR shows that higher ground is concentrated in the eastern and northern areas of the site. A stretch of elevated terrain runs through the site parallel to the eastern border but is not directly adjacent to it. The southwest of the site is at a lower elevation, as is the area directly along the eastern border. The site has a maximum elevation of 68.8mAOD in the southeast of the site. The minimum elevation is also in the southeast of the site but closer to the eastern border, at 63.1mAOD.

Immediately south of the site, a raised railway embankment supports the South Western Main Line. Broadly, the terrain to the east of the site is at a higher elevation, gradually sloping downward towards the lakes and the River Blackwater to the west.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of sand that forms the Camberley Sand Formation.
- Superficial deposits consisting of sand and gravel.

Soils at the site consist of:

- Loamy soils with naturally high groundwater.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the downstream reach of the River Blackwater (Aldershot to Cove Brook confluence at Hawley) catchment. The site is approximately 450m east of the River Blackwater, which flows north and converges with Cove Brook near Hawley.

The catchment is made-up of a combination of urban and rural areas. Built-up regions include Aldershot and Ash further upstream of the River Blackwater, as well as Frimley and Mytchett closer downstream. Rural areas include the region south and east of Tongham, and the woodlands east of Frimley. The east of the catchment also comprises of parts of Mytchett Woods and the Ash Ranges nature reserve.

2.2 Existing drainage features

The site is approximately 450m east of the River Blackwater, which flows north and converges with Cove Brook near Hawley. Online mapping shows that a tributary of the River Blackwater originates as an open channel within the southeast corner of the site. It is then culverted beneath the raised elevation in the south of the site and the South Western Main line. The tributary then flows as an open channel parallel to the railway before joining the River Blackwater just east of the A331.

Mytchett Lake is also located southwest of the site, and the four Frimley Pits Fishery lakes are west and northwest of the site. Basingstoke Canal runs approximately 530m away east of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment. The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk. However, the site within this assessment is not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in 2025. At this time the Flood Zones should be compared with the assessment in this report.

2.3.2 Description of risk to the site

The EA's RoFfRS dataset do not show any fluvial flood risk to this site.

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. This was updated in January 2025 using the EA's NaFRA2 outputs. The 3.3%, 1%, and 0.1% AEP extents and depth information have been made available for use in this assessment. Velocity and hazard information is not currently available as part of NaFRA2.

2.4.2 Description of risk to the site

Table 2-1 shows the extent of the site at risk in the 3.3%, 1%, and 0.1% AEP events, as well as the maximum depths within the site boundary.

During the 3.3% AEP event, less than 1% of the site is at risk of surface water flooding. There is an area of isolated ponding on Spencer Close which encroaches onto the site from the northeast boundary. The maximum depths of this ponding remain below 0.20m.

In the 1% AEP event, the extent of the site at risk increases marginally to 1%. There are two new areas of ponding, one extends slightly into the site from the southern boundary, while the larger one is located on the southeast boundary. Compared to the 3.3% AEP event, these depths are shown to exceed 0.30m but not to reach 0.60m.

During the 0.1% AEP event, the surface water flood risk increases to cover 19% of the site. A flow path forms along the lower elevation area of the eastern boundary. The extent of ponding in the south increases from the 1% AEP event. A large area of ponding develops covering much of the southwest side of the site, as well as a new area of ponding forming on the northwest boundary. The maximum depths exceed 0.60m along the lower elevations along the eastern boundary but are not predicted to reach 0.90m.

It should be noted that the area of ponding which develops in the southwest side of the site does not appear to be representative of the topography of the site, shown in the EA LiDAR. This shows that there are lower elevations further north in the site where it would be expected that this surface water would pond.

Table 2-1: Existing surface water flood risk based on the RoFSW map

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	Less than 1	1	19
Maximum depth (m)	Less than 0.20	Exceeds 0.30 Less than 0.60	Exceeds 0.60 Less than 0.90

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).*

2.5 Reservoir

The site is not shown to be at risk of reservoir flooding during the 'dry day' or 'wet day' scenario from the EA reservoir flood maps.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the entire site has a greater than 75% susceptibility to groundwater flooding.

The JBA Groundwater Emergence Map (5m resolution) supports this, indicating that in the southwest of the site, and along parts of the eastern border, groundwater levels are either at or very near (within 0.025m) the ground surface. There is a stretch in the east of the site parallel to the border, as well as an area in the north, where groundwater levels are between 0.5m and 5m below the ground surface. However, the remainder of the site has groundwater levels that are between 0.025m and 0.5m below the ground surface.

Based on the RoFSW, and topography of the site, it is likely that any groundwater that emerges will pool along the eastern boundary and in the southwest of the site.

The risk of groundwater to the site should be confirmed as part of a site-specific flood risk assessment, which is likely to require ground investigations as part of a Hydrogeological Risk Assessment. Subsurface development is unlikely to be appropriate, and any development proposals will need to demonstrate that they will not increase the risk of flooding on or off site by displacing groundwater or impeding subsurface flows. This is also likely to severely limit the types of SuDS that are appropriate for the site.

2.7 Sewers

Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. The site is located in GU16 6.

There have been 15 recorded sewer flooding incidents in total. This includes:

- 4 cases of 1 incident between 10 and 20 years ago of internal property flooding.
- 1 case of 2 of more incidents in the last 10 years of external property flooding.
- 3 cases of 1 incident in the last 10 years of external property flooding.
- 7 cases of 1 incident between 10 and 20 years ago of external property flooding.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

2.8 Flood history

The EA's historic flooding and recorded flood outline datasets do not have a record of any flooding on or surrounding the site.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.1.2 Description of risk to the site

The site is not shown to be at fluvial risk in the 0.1% AEP event.

3.2 Surface water

3.2.1 Available data

Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.2.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows the site is likely to be quite sensitive to greater increases in rainfall as a result of climate change. In the 1% AEP event there is minor ponding along the eastern and southern border, covering 1% of the site. However, the percentage of the site at risk increases by 18% in the 0.1% AEP event, with greater coverage along the borders and in the southwest. The maximum depths also increase with depths not predicted to reach 0.60m in the 1% AEP event, but in the 0.1% AEP event they are predicted to reach 0.60m.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

Mapping shows that an unnamed tributary of the River Blackwater emerges as an open channel in the southeast corner of the site and is then culverted through the site and beneath the South Western Main Line. The presence of this watercourse/culvert configuration should be confirmed as part of a site-specific flood risk assessment. This could pose a residual risk to the site in the event of a blockage, which could cause water to back up in the southeast corner of the site. The raised topography adjacent to the eastern boundary within the site means that any residual flood risk is likely to remain confined along the eastern boundary and not encroach further into the site.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The site is currently only accessible via a single residential street in the northeast, Spencer Close. This street's only junction is to Winston Close, which then branches out to a number of other residential roads. There is another street that lies south of Spencer Close which leads toward the site, but access is blocked by a wall. With railway lines bordering the west and south of the site, there is no existing entry from these directions.

5.2.2 Fluvial

Safe access and escape routes are shown to be maintained at this location in all modelled fluvial events.

5.2.3 Surface water

Safe access and escape routes are likely maintained in all surface water events, including the 0.1% AEP event. There is surface water ponding on Spencer Close at the entrance to the site in all events, however the maximum depths are not predicted to reach 0.20m in the 3.3% AEP and 1% AEP events. In the 0.1% AEP event, predicted depths are shown to exceed 0.2m but not predicted to reach 0.3m. Therefore, safe access and escape is likely to be possible however the velocity and associated hazard of the surface water risk should also be assessed within a site-specific FRA.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- The site is considered to be highly susceptible to groundwater flooding. Groundwater flooding could occur at the surface which may flow to and pool within topographic low spots during very wet winters. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required as part of a Hydrogeological Risk Assessment to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate at this site.
- BGS data indicates that the underlying geology is sand which is likely to be free draining, however, the local soils are identified to be loamy with naturally high groundwater, which may limit infiltration potential within the winter months. This should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is not located within a historic landfill site.
- Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during the 0.1% AEP event along the eastern boundary of the site. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints. Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- The areas of surface water risk along the eastern and southern site boundaries should be integrated into the site drainage strategy as blue-green infrastructure.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies (River Blackwater) and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. The unnamed watercourse within the site appears to drain into the lakes located to the west of the site. It is recommended that the developer consults the lake operators to understand any impacts that drainage from the site may have on these waterbodies.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

The exception test is not required for this site because the entire site is located in fluvial Flood Zone 1.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is greater than one hectare in Flood Zone 1.
- Is subject to surface water flooding.
- Is at high risk of groundwater emergence.
- Is identified as being at increased flood risk in the future, due to climate change.

All sources of flooding should be considered as part of a site-specific FRA, including the residual risk associated with the culverted watercourse within the site.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Development should be steered outside of the flow path along the eastern and southern borders of the site. Developers should consider utilising these areas as a green corridor or as a location for SuDS.

The risk of surface water ponding in the site should be further assessed within a site-specific FRA (acknowledging the limitations of the current mapping as described in Section 2.4). Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.

The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

The unnamed watercourse within the site appears to drain into the lakes located to the west of the site. It is recommended that the developer consults the lake operators to understand any impacts that drainage from the site may have on these waterbodies.

If proposed works affect an ordinary watercourse, Surrey County Council as the Lead Local Flood Authority should be contacted to obtain prior written consent. Any watercourses should be accommodated within the site layout and should not be culverted except for where access is required. The site layout should allow for access to any watercourse for maintenance and they should generally be located within publicly accessible areas.

Arrangements for safe access and escape will need to be provided for the 1% AEP surface event with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

The risk of groundwater to the site should be confirmed as part of a site-specific FRA, which is likely to require ground investigations as part of a Hydrogeological Risk Assessment. Subsurface development is unlikely to be appropriate, and any development proposals will need to demonstrate that they will not increase the risk of flooding on or off site by displacing groundwater or impeding subsurface flows. This is also likely to severely limit the types of SuDS that are appropriate for the site.

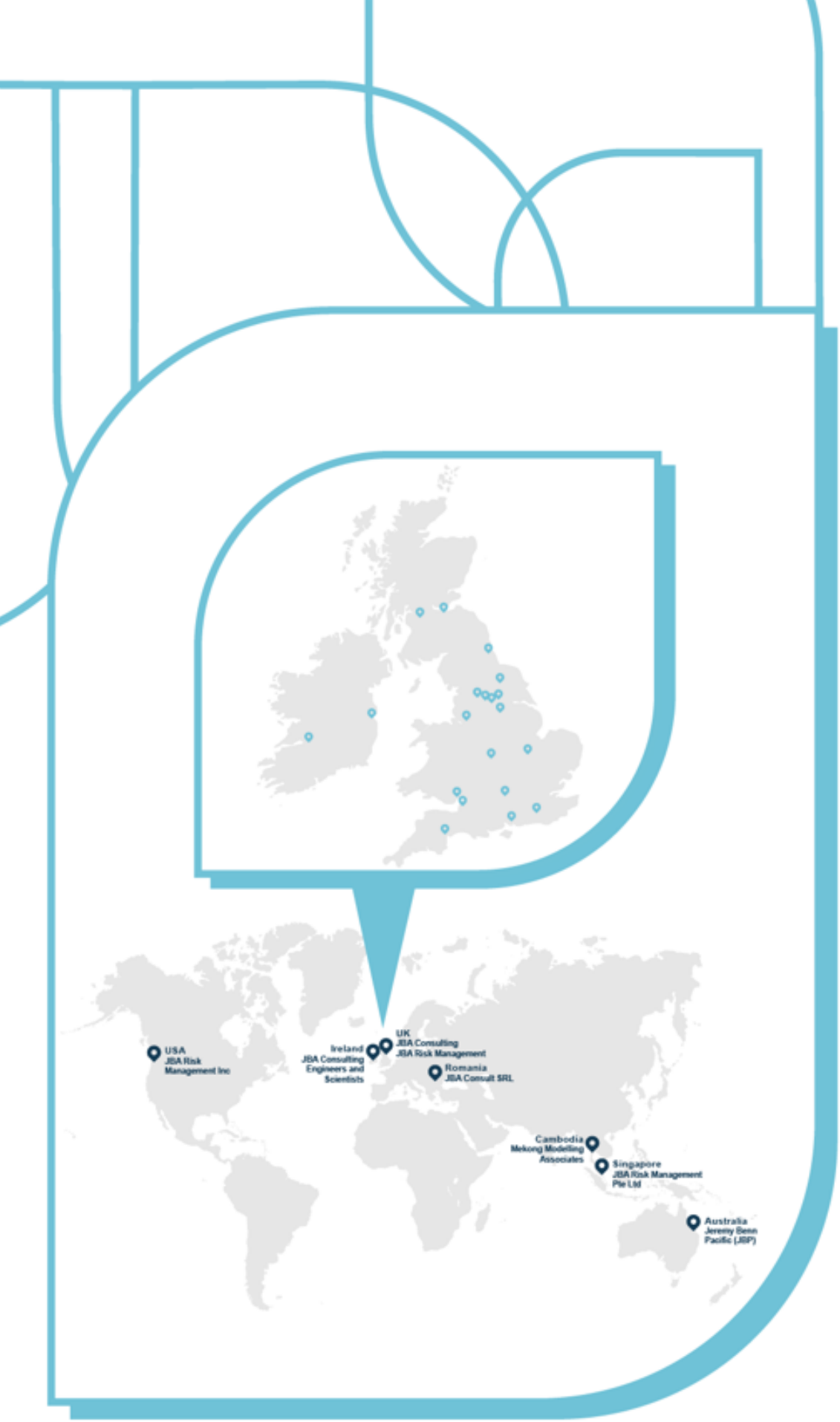
8 Conclusions

The site is not at fluvial risk but is at risk of surface water flooding. During the 0.1% AEP event, 19% of the site is at risk. A flow path forms along the lower elevation area of the eastern boundary, and there is a large area of ponding covering much of the southwest of the site, as well pooling along the southern and northern boundaries. Safe access and escape routes are likely maintained in all surface water events. There is also a high likelihood of groundwater emergence across much of the site, and a residual flood risk from the culverted watercourse in the southeast of the site.

As the site is not at fluvial flood risk, the exception test is not required. However, a site-specific FRA will be required. This is because the proposed development site is one hectare or greater in Flood Zone 1, is at risk of surface water and groundwater flooding, and is identified as being at increased flood risk in the future.

The following points should be considered in development of this site:

- Development should be located outside of the flow paths along the eastern and southern borders of the site. Developers should consider utilising these areas as a green corridor or as a location for SuDS.
- The risk of surface water ponding in the site should be further assessed within a site-specific FRA (acknowledging the limitations of the current mapping as described in Section 2.4). Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.
- The site may be at significant risk of groundwater flooding. Investigations will be required as part of a site-specific FRA to confirm the risk to the site. If a significant risk is present, the Local Planning Authority should satisfy themselves that the risk can be safely managed considering the 'more vulnerable' nature of the development, and that residents of the site will not be put at risk.
- Safe access and escape should be demonstrated in the 1% AEP plus climate change surface water event, including an assessment of the depth, velocity, and hazard of the surface water risk.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development in one area, compensatory flood storage will be required in another).



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Level 2 Strategic Flood Risk Assessment - The Deans, Bridge Road (Site 317)

A1-C01

28 March 2025

Prepared for:

Surrey Heath Borough Council

www.jbaconsulting.com

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for The Deans, Bridge Road (Site 317). The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Surrey Heath Level 1 SFRA and read the Surrey Heath Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** The Deans, Bridge Road. Situated in Bagshot. The location is mapped in Figure 1-1.
- **Site area:** 0.16 ha.
- **Existing site use:** Brownfield, existing commercial buildings onsite.
- **Proposed site use**: Residential.
- **Current site vulnerability:** Less vulnerable.
- **Proposed site vulnerability:** More vulnerable.

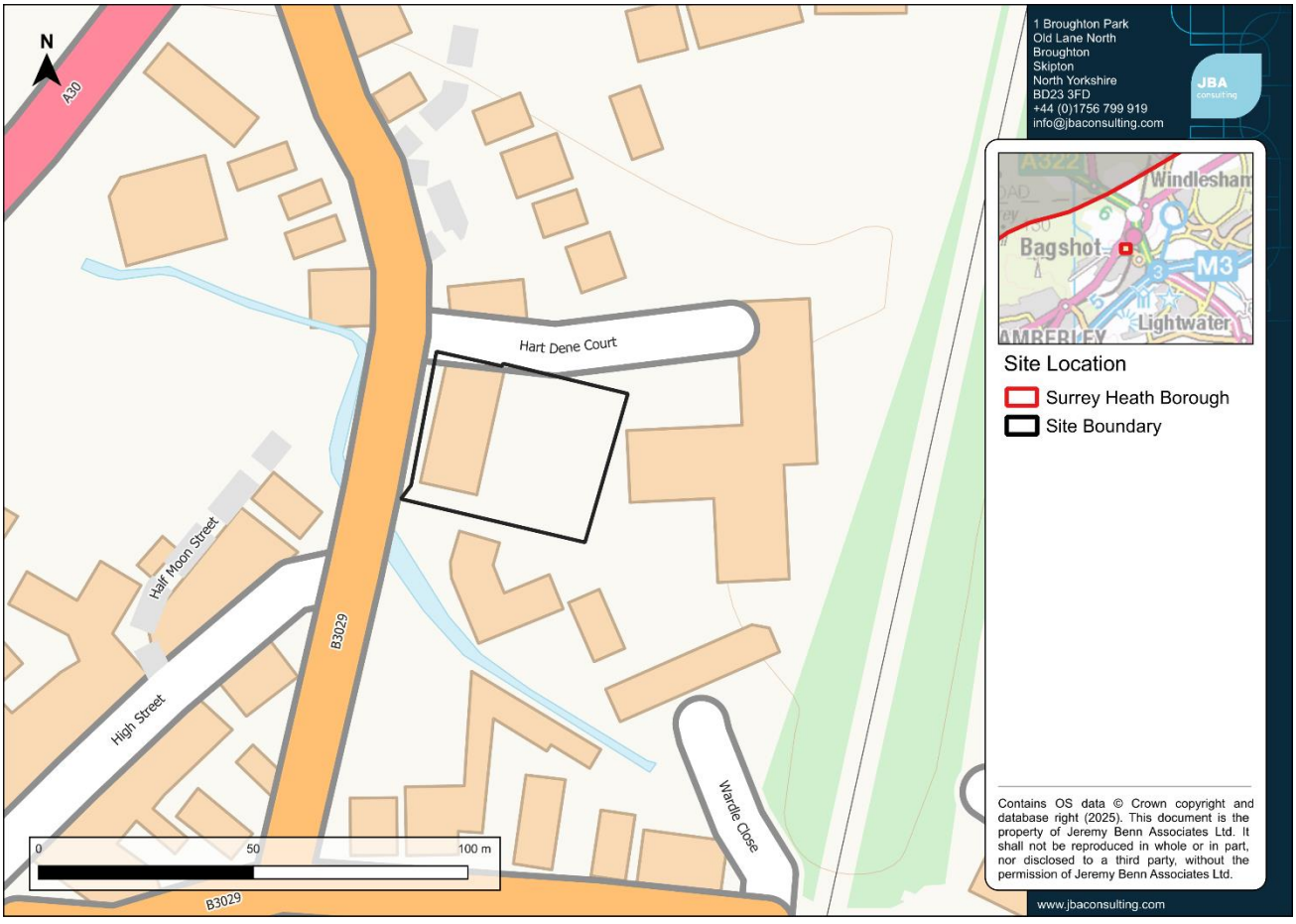


Figure 1-1: Site location.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR shows that the northeast of the site is at a lower elevation, with higher ground located in the west and southeast. There is also an area of lower elevation by the southern boundary. The site has a maximum elevation of 56.9mAOD in the southwestern corner of the site. The minimum elevation is in the southern border of the site, at 56.2mAOD.

It should be noted that the higher elevation land across the western side of the site aligns with the building footprint of the existing commercial buildings onsite. Whilst the land may be higher in this area, this higher land could also be a function of the filtering processes undertaken in producing the LiDAR not fully removing these buildings.

Approximately 60m east of the site, a raised railway embankment supports the Ascot to Guildford railway line. Broadly, outside of the site the terrain to the north is at a higher elevation, sloping downward towards the Windle Brook, which flows past the west and south of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of sand, silt, and clay that form the Windlesham Formation.
- Superficial deposits made up of clay, silt, sand and gravel.

Soils at the site consist of:

- Fen peat soils.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream reach of the Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham) catchment. The catchment area upstream of the site is approximately 10km^2. At the closest point, the site is within 10m east of the Windle Brook which becomes the Hale/Mill Bourne downstream. The watercourse then flows southeast and converges with the Addlestone Bourne east of Chobham.

The catchment features widespread rural land, along with a number of settlements and built-up areas. Bagshot, where the site is located, is among the villages in the area, with Lightwater situated in the middle reaches of the river and Chobham located further downstream.

2.2 Existing drainage features

There are no drainage features apparent within the site boundary.

Windle Brook flows parallel to the western border of the site, before it is culverted underneath Bridge Road (B3029) close to the southwest boundary corner. The watercourse then continues to flow southeast, south of the site. A tributary of Windle Brook joins the watercourse approximately 55m south of the site, after having been culverted flowing northeast beneath Bagshot town centre.

2.3 Fluvial

2.3.1 Available data

The EA's Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment. The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk. However, the site within this assessment is not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in 2025. At this time the Flood Zones should be compared with the assessment in this report.

The EA's RoFfRS outputs were also compared to the Addlestone Bourne 2007 model outputs for the 1% AEP event as the latest hydraulic modelling for this watercourse.

2.3.2 Description of risk to the site

As shown in Table 2-1, over half of the site (53%) is shown to be located in Flood Zone 2, with the remainder being located in Flood Zone 1. The site is not located within Flood Zone 3a or 3b.

Outside of the site boundary, Windle Brook overtops north of the culvert beneath Bridge Road (B3029) to the norther of the site. Directly downstream, significant fluvial flooding also occurs in all AEP events between the Bridge Road Culvert and (B3029) and the culvert inlet at Wardle Close. Windle Brook is also joined by its tributary at the section between these two culverts.

The fluvial flood extents are not shown to reach the site in the 3.3% or 1% AEP events. However, in the 0.1% AEP event, the fluvial flood extents follow the lower topography of the site and cover most of the eastern areas of the site, as well as parts of the north and the southern border. Depths are mostly shown to remain below 0.20m across the site. There are small areas where depths are predicted to exceed 0.20m but no areas where depths are predicted to reach 0.30m. The fluvial flood risk at the site is reflective of the underlying topography data, however, there are potential concerns with the accuracy of the LiDAR (Section 1.2) in the area of the existing commercial buildings. Should this area of land not be at a higher elevation, as currently shown in the LiDAR, this would likely change the fluvial flood risk to the site and result in a greater proportion of the site being in Flood Zone 2.

The 1% AEP modelled flood extent from the Addlestone Bourne model shows larger extents than the 1% AEP RoFfRS output and does impact the northeastern and northwestern corners of the site. However, this flood extent is not shown to be representative of the underlying LiDAR as the topography of the site.

Detailed hydraulic modelling should be undertaken as part of a site-specific FRA, including a topographic survey of the site, to refine the fluvial flood risk to the site.

Table 2-1: Existing fluvial flood risk based on EA RoFfRS*

Event	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
Percentage of site at risk* (%)	47	53	0	0
Maximum depth (m)	N/A	Exceeds 0.20 Less than 0.30	N/A	N/A

**The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).*

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. This was updated in January 2025 using the EA's NaFRA2 outputs. The 3.3%, 1%, and 0.1% AEP extents and depth information have been made available for use in this assessment. Velocity and hazard information is not available as part of NaFRA2.

2.4.2 Description of risk to the site

Table 2-2 shows the extent of the site at risk of surface water flooding in the 3.3%, 1%, and 0.1% AEP events, as well as the maximum depths within the site boundary.

According to the RoFSW dataset, there is no risk to the site in the 3.3% and 1% AEP events. However, in the 0.1% AEP event, there is an area of isolated surface water ponding in the northeast of the site. This area of pooling covers 7% of the site and has maximum depths of less than 0.20m.

Table 2-2: Existing surface water flood risk based on the RoFSW map

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	0	0	7
Maximum depth (m)	N/A	N/A	Less than 0.20

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).*

2.5 Reservoir

Reservoir flood mapping shows that almost the entire site (81%), aside from the southwestern corner and a small area in the north, is affected by the 'dry day' flood extent from Surrey Hill reservoir, 500m upstream from the site. There is no 'wet day' scenario flood extent available for Surrey Hill reservoir.

The residual risk of reservoir flooding at the site will need to be considered further at the site-specific Flood Risk Assessment (FRA) stage. An emergency plan may be required, demonstrating that the residual risks to the site can be safely managed and that appropriate evacuation plans are in place.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the entire site has less than 25% susceptibility to groundwater flooding. The JBA Groundwater Emergence Map (5m resolution) aligns with this, showing that the site has negligible risk. This means that the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

2.7 Sewers

Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. The site is located in GU19 5.

There have been 20 recorded sewer flooding incidents in total. This includes:

- 18 cases of 1 incident between 10 and 20 years ago of internal property flooding.
- 2 cases of 1 incident between 10 and 20 years ago of external property flooding.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

2.8 Flood history

The EA's historic flooding and recorded flood outline datasets do not have a record of any flooding on or surrounding the site.

Surrey County Council provided a dataset of their "wetspots" which are locations of a reported, recurring flood incident which is unlikely to be solved through their day-to-day activities. There are no wetspots within the site boundary. However, approximately 18m northwest of the site there is a current wetspot on Bridge Road (B3029), with a medium risk rating.

Surrey County Council also provided a record 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. There is no record of property flooding within the site boundary. However, approximately 10m southwest of the site, the High Street has been identified as having a record of internal property flooding.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.1.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows the site is very sensitive to increased fluvial risk as a result of climate change. The site is not shown to be at fluvial risk during the 1% AEP RoFfRS flood extent and is only at risk in the northeastern and northwestern corners in the 1% AEP Addlestone Bourne model extent. However, in the 0.1% AEP event 53% of the site is at risk. The main area of risk is across the eastern half of the site.

3.2 Surface water

3.2.1 Available data

Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential

impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.2.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows that the site is not very sensitive to greater surface water risk as a result of climate change. There is no risk to the site in the 1% AEP event. There is a small area of ponding which develops in the 0.1% AEP event covering 7% of the site, however depths are shown to remain below 0.20m.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

Windle Brook is culverted beneath Bridge Road (B3029) near the site's southwestern boundary corner. Windle Brook is shortly joined by a tributary downstream of this culvert, and the watercourse is then culverted again under Wardle Close and the Ascot to Guildford railway line. These culverts could pose a residual risk to the site in the event of a blockage, which could cause water to back up and encroach onto the site.

The site is also at residual risk of reservoir flooding as a result of a breach of Surrey Hill reservoir.

5 Emergency planning

5.1 Flood warnings and alerts

The site is located in the 'Windle Brook at Bagshot' EA Flood Warning Area and the 'Windle Brook and Hale, Mill and Addlestone Bournes' Flood Alert Area.

5.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The site can be accessed via Bridge Road (B3029) which runs parallel to the western boundary. There is currently a junction by the southwest corner of the site, with a lane that leads into the site. Hart Dene Court connects to Bridge Road (B3029) and runs along the site's northern border. While access from Hart Dene Court could be possible, it is important to note that the northern boundary is currently fenced off.

5.2.2 Fluvial

There is fluvial flood risk where Windle Brook is culverted beneath Bridge Road shown in all events. However, this bridge is not represented within the fluvial mapping. EA LiDAR shows that the channel level is approximately 1.5m lower than the bridge level in this area and the flood extents do not appear to show any overtopping onto the bridge. Therefore, the flood extents shown in this area should not have any implication for access and escape to the site.

In all modelled fluvial flood events, there is a significant area of flood risk which forms to the south of the site, along the unnamed tributary of Windle Brook. Therefore, safe access and escape area assessed based on accessing the site from the north.

Both junctions on Bridge Road (B3029), the one to the south of the site and the one to Hart Dene Court, are clear from fluvial flood risk in the 3.3% AEP event.

In the 1% AEP event, access and escape are also likely maintained. While the junction at the south of the site remains clear, there is flooding on Bridge Road (B3029) northwest of the site and at the Hart Dene Court junction. However, the flood depths along the road are predicted to remain below 0.20m.

In the 0.1% AEP event, almost the entirety of Hart Dene Court is at risk of fluvial flooding. There is also risk along much of Bridge Road (B3029) to the north of the site. However, access and escape are likely to still be maintained, as the maximum depths at the road junction exceed 0.20m but are not predicted to reach 0.30m. Further assessment should be

undertaken as part of a site-specific FRA, taking account of the velocity and associated hazard of the flows to demonstrate that safe access and escape can be maintained.

5.2.3 Surface water

In the 3.3% AEP and 1% AEP events, access and escape are maintained. Both junctions on Bridge Road (B3029), the one to the south of the site and the one to Hart Dene Court, are free from surface water flood risk. There is an area of isolated surface water ponding on Bridge Road (B3029) to the southwest of the site, but maximum depths could be passable as they do not exceed 0.20m.

In the 0.1% AEP event, access and escape are also maintained. Both junctions remain clear, and while there is a new area of ponding northwest of the site on Bridge Road (B3029), the maximum depths are predicted to remain below 0.20m.

5.3 Dry islands

In the 0.1% AEP fluvial event a dry island is form encompassing the western portion of the site. However, fluvial depths along the access to the north of the site are not predicted to exceed 0.30m so safe access and escape to the dry island are likely to be maintained but this should be considered further as part of a site-specific FRA, including an assessment of velocity and hazard.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- The site is considered to have very low susceptibility to groundwater flooding, this should be confirmed through additional site investigation work. If site investigation work indicates there may be potential groundwater issues a Hydrogeological Risk Assessment may be required. Below ground development such as basements may still be susceptible to groundwater flooding.
- BGS data indicates that the underlying geology is sand, silt, and clay which is likely to be with highly variable permeability. The local soils are identified to be naturally wet fen peat soils which may limit infiltration potential within the winter months. This should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is not located within a historic landfill site.
- Where possible, proposed attenuation features such as basins, ponds and tanks should be located outside of Flood Zone 2 to avoid the potential risks to the hydraulic capacity or structural integrity of these features. Surface water outfalls that discharge into Windle Brook may be susceptible to surcharging due to water levels in Windle Brook. The impacts of flood flows will need to be considered in terms of the attenuation storage requirements of the site and placement of the outfalls.
- Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the Lead Local Flood Authority. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints. Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies (Windle Brook) and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

The Addlestone Bourne model shows the 1% AEP extent (Flood Zone 3) encroaches on the site, however, this model extent is not shown to be representative of the underlying topography and the EA RoFfRS extent shows the site is only impacted by Flood Zone 2. However, as set out in Section 1.2 there are concerns of the current representation of the site within the EA LiDAR. The fluvial flood risk to the site should be reviewed as part of a site-specific FRA. Should Flood Zone 3a be shown to impact the site and 'More Vulnerable' development be proposed within the extent of Flood Zone 3a, the exception test will be required for this site. 'More Vulnerable' development will not be permitted in any areas of the site that lie within Flood Zone 3b.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is at fluvial flood risk.
- Is subject to surface water flooding.
- Is at risk of reservoir flooding.
- Is identified as being at increased flood risk in the future, due to climate change.

All sources of flooding should be considered as part of a site-specific FRA.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere. The site should be designed so that the more vulnerable parts of the development are steered outside of the areas of fluvial flood risk.

A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

Arrangements for safe access and escape will need to be provided for the 1% AEP fluvial and surface events with an appropriate allowance for climate change, considering depth,

velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

8 Conclusions

The site is at risk of both surface water and fluvial flooding and is also at reservoir flood risk. The most significant source of flood risk to the site is fluvial. In the 0.1% AEP fluvial event, the flood extents follow the lower topography of the site and cover 53% of the site, which includes most of the eastern areas of the site, as well as parts of the north and the southern border. The Addlestone Bourne model shows the 1% AEP extent encroaches on the site, however, this model extent is not shown to be representative of the underlying topography.

The Addlestone Bourne model shows the 1% AEP extent (Flood Zone 3) encroaches on the site, however, this model extent is not shown to be representative of the underlying topography and the EA RoFfRS extent shows the site is only impacted by Flood Zone 2. However, as set out in Section 1.2 there are concerns of the current representation of the site within the EA LiDAR. The fluvial flood risk to the site should be reviewed as part of a site-specific FRA. Should Flood Zone 3a be shown to impact the site and 'More Vulnerable' development be proposed within the extent of Flood Zone 3a, the exception test will be required for this site. 'More Vulnerable' development will not be permitted in any areas of the site that lie within Flood Zone 3b.

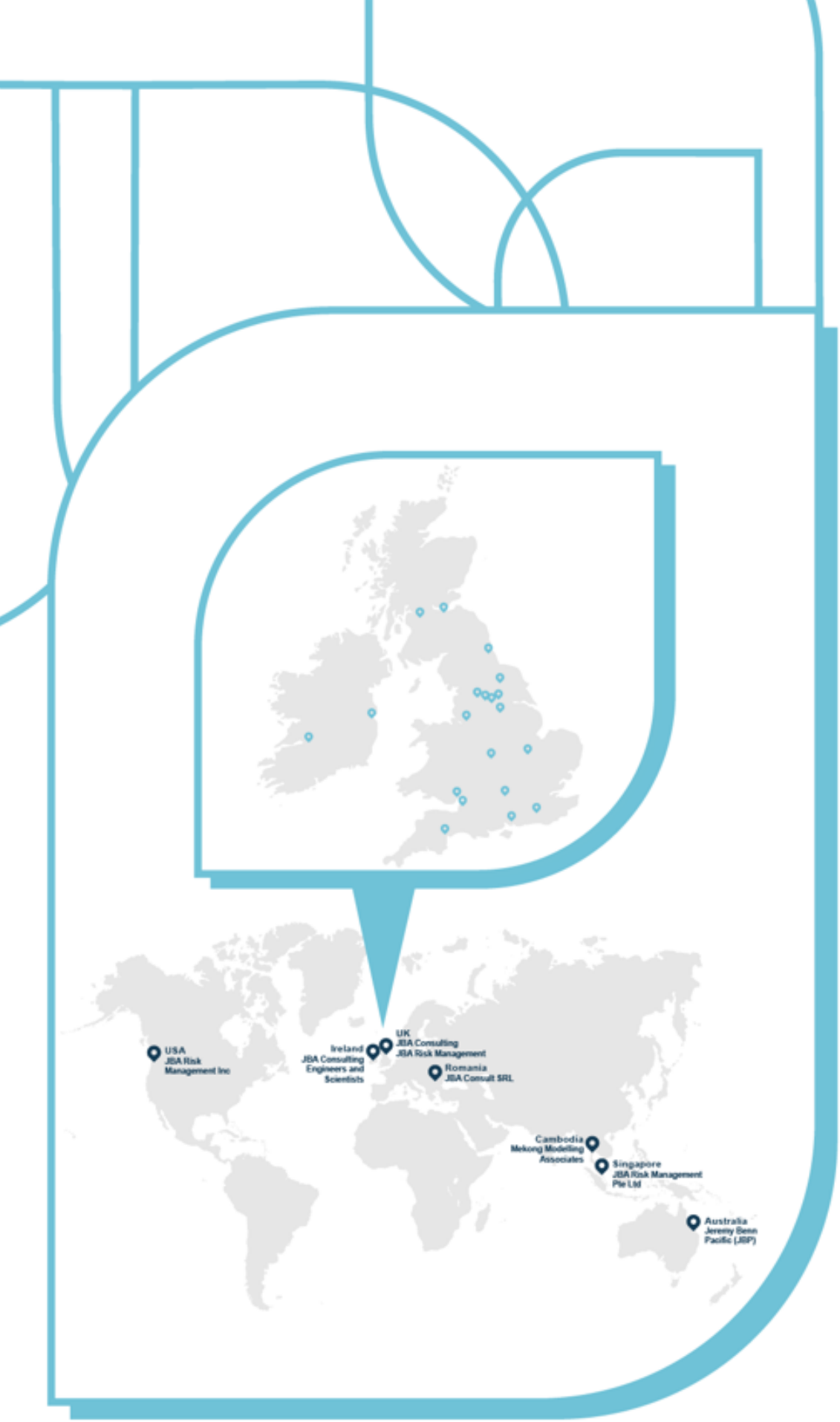
A site-specific FRA will be required, because the proposed development site is in Flood Zone 2, is subject to surface water flooding, is at reservoir flood risk, and is identified as being at increased flood risk in the future, due to climate change.

The following points should be considered in development of this site:

- Detailed hydraulic modelling should be undertaken as part of a site-specific FRA, including a topographic survey of the site, to refine the fluvial flood risk to the site.
- Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere. The site should be designed so that the more vulnerable parts of the development are steered outside of the areas of fluvial flood risk.
- Safe access and escape routes should be demonstrated in the 1% AEP plus climate change fluvial and surface water events, taking consideration of the dry island which forms in the west of the site during the 0.1% AEP fluvial event. Currently this Level 2 assessment suggests that safe access and escape are likely to be maintained, however, further assessment of the fluvial risk to the site should be undertaken as part of a site-specific FRA, including an assessment of velocity and hazard.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit

development in one area, compensatory flood storage will be required in another).

- The residual risk of reservoir flooding at the site will need to be considered further at the site-specific Flood Risk Assessment (FRA) stage. An emergency plan may be required, demonstrating that the residual risks to the site can be safely managed and that appropriate evacuation plans are in place.



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Level 2 Strategic Flood Risk Assessment - Land East of Benner Lane (Site 799)

A1-C01

28 March 2025

Prepared for:

Surrey Heath Borough Council

www.jbaconsulting.com

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Land East of Benner Lane (Site 799). The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Surrey Heath Level 1 SFRA and read the Surrey Heath Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** Land East of Benner Lane. Located on the eastern edge of West End, a village and civil parish. The location is mapped in Figure 1-1.
- **Site area:** 1.07 ha.
- **Existing site use:** Greenfield.
- **Proposed site use:** Residential.
- **Current site vulnerability:** Less vulnerable.
- **Proposed site vulnerability:** More vulnerable.

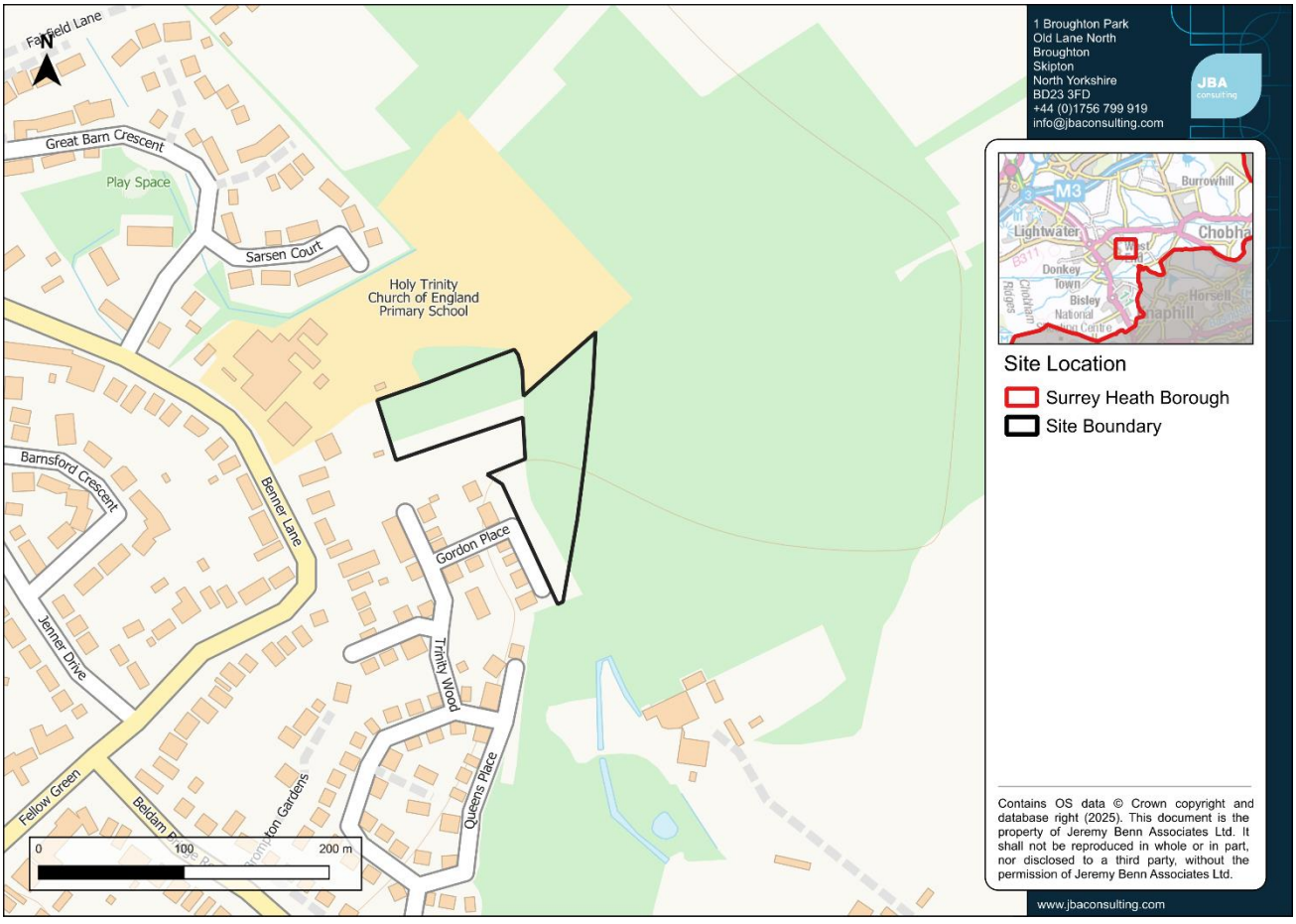


Figure 1-1: Site location.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR indicates that there is raised land to the east and west of the site, with the central and southern regions lying at a lower elevation. The site has a maximum elevation of 42.7mAOD on the northeast boundary of the site. The minimum elevation is located in the southern point of the site, at 37.9mAOD.

On a wider scale, the terrain to the west of the site is at a higher elevation. To the east and south of the site, the land slopes downwards towards Addlestone Bourne watercourse. North of the site, the topography lowers towards Hale Bourne.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of sand, silt, and clay that form the Windlesham Formation.
- There is no data on the superficial deposits in the site.

Soils at the site consist of:

- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the midstream reach of the Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge) catchment. The catchment area upstream of the site is 11.63km². The site is located approximately 130m north of an unnamed tributary of Addlestone Bourne. The tributary is approximately 350m in length, and the Addlestone Bourne flows in an eastward direction, where it converges with the Hale/Mill Bourne east of Mimbridge.

The catchment contains a number of villages and built-up areas, in additional to widespread rural land. The villages of West End and Bisley are situated to the north and south of the catchment respectively, and both are positioned along the middle reaches of the Addlestone Bourne. Further downstream, in the southeast of the site, are the urban areas of Knaphill and Horsell. Rural areas include the Bisley and Pirbright Ranges upstream in the west of the catchment, as well as the land further downstream south of Chobham.

2.2 Existing drainage features

There are no drainage features apparent within the site boundary or within the immediate vicinity of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment. The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk. However, the site within this assessment is not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in 2025. At this time the Flood Zones should be compared with the assessment in this report.

2.3.2 Description of risk to the site

The EA's RoFfRS dataset do not show any fluvial flood risk to this site.

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. This was updated in January 2025 using the EA's NaFRA2 outputs. The 3.3%, 1%, and 0.1% AEP extents and depth information have been made available for use in this assessment. Velocity and hazard information is not available as part of NaFRA2.

2.4.2 Description of risk to the site

Table 2-1 shows the extent of the site at risk of surface water flooding in the 3.3%, 1%, and 0.1% AEP events, as well as the maximum depths within the site boundary.

There is a surface water flow path that flows through the centre of the site, which is present in all events. The flow path begins approximately 50m to the north of the site on the grounds of Holy Trinity Primary School. It flows through the north of the site and then parallel to the southwest boundary, before continuing south to Beldam Bridge Road outside of the site.

In the 3.3% AEP event, the flow path covers 8% of the site. Depths are mainly predicted to remain below 0.30m with a small area shown to reach 0.30m in the north and at the southern boundary. None of the flow path is predicted to reach 0.60m in depth. In the 1% AEP event, the flood extents increase to 12% and the maximum depths are predicted to reach 0.30m but not exceed 0.60m. There are more areas in the south of the site reaching these depths. In the 0.1% AEP event, the percentage of the site at risk increases further to 22% and the maximum depths remain between 0.30m and 0.60m across a larger area of the flow path.

Table 2-1: Existing surface water flood risk based on the RoFSW map

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	8	12	22
Maximum depth (m)	Exceeds 0.30 Less than 0.60	Exceeds 0.30 Less than 0.60	Exceeds 0.30 Less than 0.60

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).*

2.5 Reservoir

The site is not shown to be at risk of reservoir flooding during the 'dry day' or 'wet day' scenario from the EA reservoir flood maps.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the northern portion of the site has less than 25% susceptibility to

groundwater flooding. The southern portion of the site is not considered to be susceptible to groundwater flooding.

The JBA Groundwater Emergence Map (5m resolution) aligns with this, showing that the site has negligible risk. This means that the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

2.7 Sewers

Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. The site is located across two postcode areas: GU24 9 in the west and GU24 8 in the east.

In GU24 9 there have been 6 recorded sewer flooding incidents in total. This includes:

- 1 case of 1 incident in the last 10 years of internal property flooding.
- 1 case of 1 incident between 10 and 20 years ago of internal property flooding.
- 2 cases of 1 incident in the last 10 years of external property flooding.
- 2 cases of 1 incident between 10 and 20 years ago of external property flooding.

In GU24 8 there have been 7 recorded sewer flooding incidents in total. This includes:

- 1 case of 2 or more incidents in the last 10 years of external property flooding.
- 4 cases of 1 incident in the last 10 years of external property flooding.
- 2 cases of 1 incident between 10 and 20 years ago of external property flooding.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

2.8 Flood history

The EA’s historic flooding and recorded flood outline datasets do not have a record of any flooding on or surrounding the site

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.1.2 Description of risk to the site

The site is not shown to be at fluvial risk in the 0.1% AEP event.

3.2 Surface water

3.2.1 Available data

Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.2.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows the site is likely to be sensitive to greater increases in rainfall as a result of climate change. The percentage of the site covered by the flow path increases from 12% in the 1% AEP event, to 22% in the 0.1% AEP event.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

There is no residual risk to the site from flood risk management structures.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change surface water event. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The site is currently only accessible via Gordon Place, located by the south west boundary of the site. Gordon Place is a cul-de-sac, and to reach a main road (Beldam Bridge Road) requires travelling approximately 280m south along Trinity Wood and either Beldam Bridge Gardens or Queen's Place.

5.2.2 Fluvial

Safe access and escape routes are shown to be maintained at this location in all modelled fluvial events.

5.2.3 Surface water

As a flow path bisects the site, careful consideration needs to be taken on how to access Gordon Place from the eastern part of the site. In the 3.3%, 1%, and 0.1% AEP event, it may be possible to pass across the flood area. The maximum depths are shown to reach 0.30m but remain below 0.60m and depths along large parts of the flow path are not predicted to reach 0.30m. However, further assessment of the velocities and associated hazard will be required, as it may be that the surface water is shallow but fast-flowing and may present a significant hazard. Future development could also consider access to the site via Trinity Wood to the north, or the residential area to the west.

Access and escape routes are maintained in the 3.3% AEP event. The route from Gordon Place to Beldam Bridge Road remains clear from surface water flood risk. There is flooding on Beldam Bridge Road, however, depths are not predicted to reach 0.30m.

In the 1% AEP event, access and escape routes are also likely to be maintained. The route to Beldam Bridge Road remains clear, and while there is increased flooding on Beldam Bridge Road with maximum depths between 0.30m and 0.60m, most of the surface water risk is shown to not exceed 0.30m in depth.

In the 0.1% AEP event, access and escape is also likely possible to and from the site. In these two events, there is new surface water flooding on Beldam Bridge Gardens, however depths are below 0.20m and the main road can also be accessed by travelling via Queen's

Place. Additionally, there is increased flooding on Beldam Bridge Road. This increased coverage in surface water flood risk is particularly the case in the 0.1% AEP event, where there is a flow path formed along much of the road. However, the flooding may be passable, as although maximum depths are between 0.30m and 0.60m, most of the surface water risk is shown to not exceed 0.30m in depth.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- The site is considered to have very low susceptibility to groundwater flooding, this should be confirmed through additional site investigation work. Below ground development such as basements may still be susceptible to groundwater flooding.
- BGS data indicates that the underlying geology is sand, silt, and clay which is likely to be with highly variable permeability. This should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is not located within a historic landfill site.
- Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during all modelled AEP events. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints. Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- The flow path running through the entire site in the north and along the south west border should be integrated into the site drainage strategy as blue-green infrastructure.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. This includes the increase in the extent of the flow path which runs through the site.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies (Addlestone Bourne) and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

The exception test is not required for this site because the entire site is located in fluvial Flood Zone 1.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is greater than one hectare in Flood Zone 1.
- Is subject to surface water flooding.

All sources of flooding should be considered as part of a site-specific FRA.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Development should be steered outside of the flow path bisecting the site, which runs southwards through the north of the site and then parallel to the southwest boundary. Developers should consider utilising this area as a green corridor or as a location for SuDS.

The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

Arrangements for safe access and escape will need to be provided for the 1% AEP surface event with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

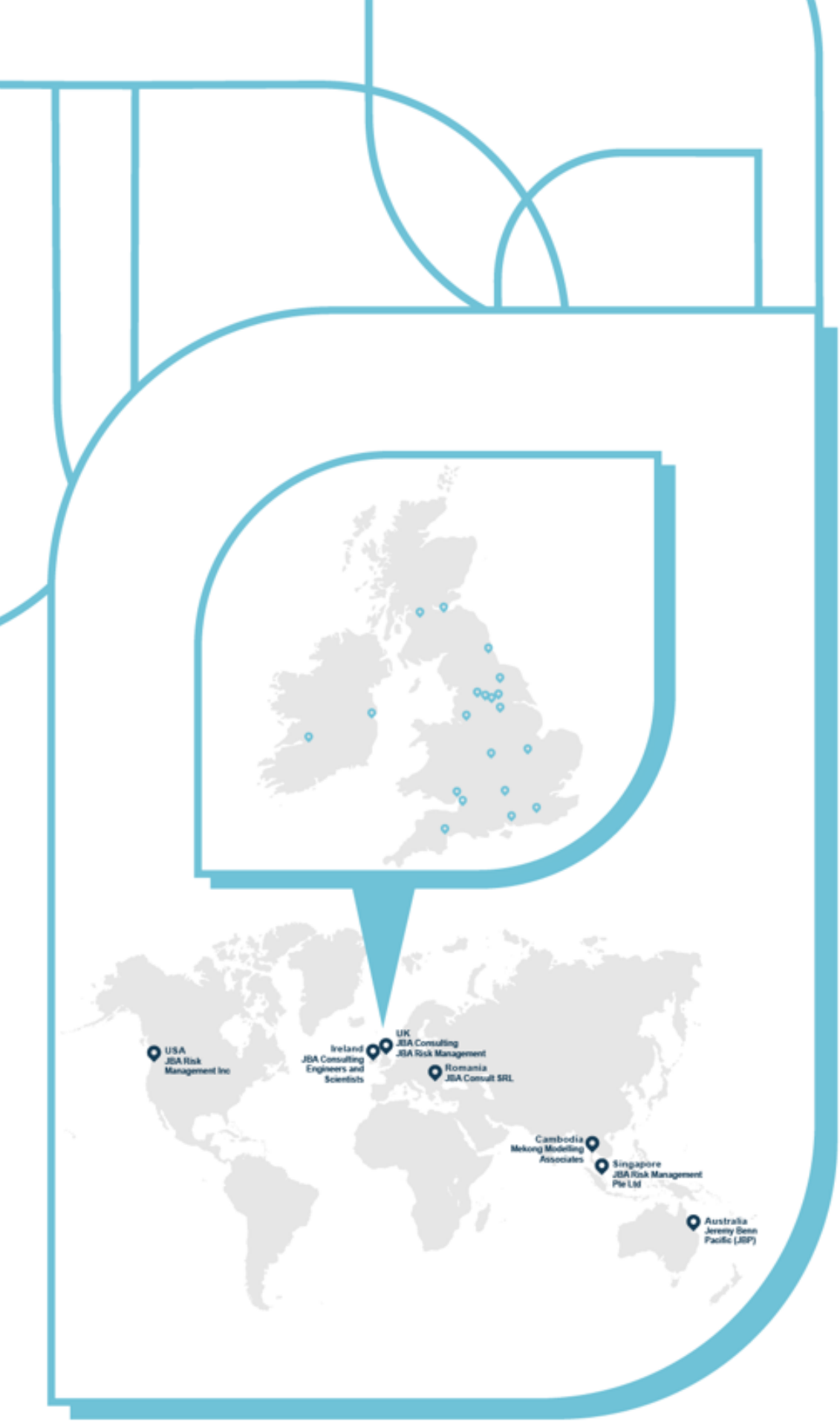
8 Conclusions

The site is not at fluvial risk but is at risk of surface water flooding. There is a surface water flow path that bisects the centre of the site, which is present in all events. In the 0.1% AEP event, this flow path covers 22% of the site.

As the site is not at fluvial flood risk, the exception test is not required. However, a site-specific FRA will be required. This is because the proposed development site is one hectare or greater in Flood Zone 1 and is at risk of surface water flooding.

The following points should be considered in development of this site:

- Development should be steered outside of the flow path bisecting the site, which runs southwards through the north of the site and then parallel to the southwest boundary. Developers should consider utilising this area as a green corridor or as a location for SuDS.
- The risk of surface water flooding in the site should be further assessed within a site-specific FRA (acknowledging the limitations of the current mapping as described in Section 2.4). Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.
- Safe access and escape should be demonstrated in the 1% AEP plus climate change surface water event using an appropriate allowance for climate change. This should consider depth, hazard, and velocity as whilst this assessment has shown that predicted surface water depths within and surrounding the site predominantly remain below 0.30m (and therefore are likely to be passable by emergency vehicles), the predicted surface water may be of high velocity and consequently be associated with significant hazard to people.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development in one area, compensatory flood storage will be required in another).



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Level 2 Strategic Flood Risk Assessment - Swift Lane Extension (Site 1030)

A1-C01

28 March 2025

Prepared for:
Surrey Heath Borough Council

www.jbaconsulting.com

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Swift Lane Extension (Site 1030). The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Surrey Heath Level 1 SFRA and read the Surrey Heath Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** Swift Lane (G&T Site). In Bagshot, adjacent to Bagshot Community Recycling Centre. The location is mapped in Figure 1-1.
- **Site area:** 1.23 ha.
- **Existing site use:** Brownfield, existing Gypsy and Traveller site.
- **Proposed site use:** Extension to the east side of the Gypsy and Traveller site to include capacity for an additional 5 pitches.
- **Current site vulnerability:** Highly vulnerable.
- **Proposed site vulnerability:** Highly vulnerable.

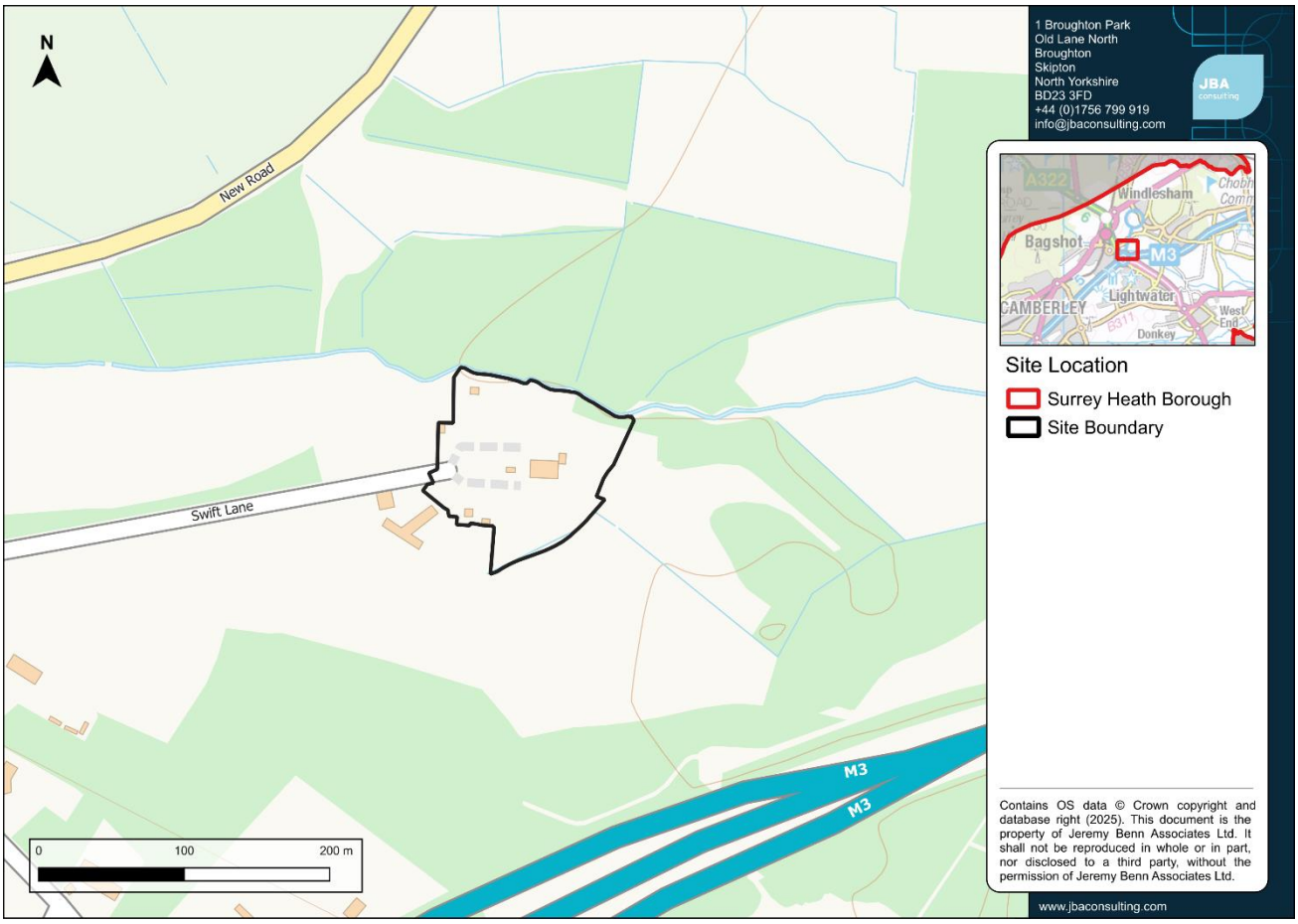


Figure 1-1: Site location.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR shows that higher ground is located in the north of the site, adjacent to Windle Brook. There are lower elevation areas in the central eastern portion of the site, along the channel of Windle Brook along the northern site boundary, by the southwestern border, and along the majority of the southeastern border. The site has a maximum elevation of 53.5mAOD by the northern boundary. The minimum elevation is along the Windle Brook channel in the northeast of the site, at 48.0mAOD.

The site is raised above the level of the Windle Brook. The land adjacent to Windle Brook on the north bank lies at a much lower elevation than the site elevation on the south bank.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of sand, silt, and clay that form the Windlesham Formation.
- Superficial deposits composed of peat.

Soils at the site consist of:

- Fen peat soils, in the northern portion of the site.
- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, in the southern portion of the site.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream reach of the Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham) catchment. The catchment area upstream of the site is approximately 13km^2. Windle Brook flows east along the northern border of the site which later becomes the Hale/Mill Bourne. The watercourse then flows southeast and converges with the Addlestone Bourne east of Chobham.

The catchment features widespread rural land, along with a number of settlements and built-up areas. Bagshot, where the site is located, is among the villages in the area, with Lightwater situated in the middle reaches of the river and Chobham located further downstream.

2.2 Existing drainage features

Windle Brook flows in an easterly direction along the northern border of the site.

There are also several drainage channels that run through the fields to the east and north of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment. The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk. However, the site within this assessment is not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in 2025. At this time the Flood Zones should be compared with the assessment in this report.

The EA's RoFfRS outputs were also compared to the Addlestone Bourne 2007 model outputs for the 1% AEP event as the latest hydraulic modelling for this watercourse.

2.3.2 Description of risk to the site

As shown in Table 2-1, the majority of the site (98%) is located in Flood Zone 1. The site is located 2% in Flood Zone 2, and 1% in Flood Zone 3a and in Flood Zone 3b.

In the 3.3%, 1%, and 0.1% AEP events, the fluvial risk encroaches on the northern site boundary however the risk is shown to remain confined along the lower elevations along Windle Brook.

In the 3.3% and 1% AEP events, maximum depths exceed 0.60m but do not reach 0.90m. In the 0.1% AEP event, this rises to 0.90m but depths do not reach 1.2m.

The 1% AEP modelled flood extent from the Addlestone Bourne model shows similar extents, however, it encroaches slightly further into the site in the centre of the site. However, this flood extent is not shown to be representative of the underlying LiDAR as the topography of the site in this area is significantly higher than the level of the brook. It is likely that the flood risk in this area is a function of how the watercourse is represented within the modelling.

Table 2-1: Existing fluvial flood risk based on EA RoFfRS*

Event	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
Percentage of site at risk* (%)	98	2	1	1
Maximum depth (m)	N/A	Exceeds 0.90 Less than 1.20	Exceeds 0.60 Less than 0.90	Exceeds 0.60 Less than 0.90

**The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).*

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. This was updated in January 2025 using the EA's NaFRA2 outputs. The 3.3%, 1%, and 0.1% AEP extents and depth information have been made available for use in this assessment. Velocity and hazard information is not available as part of NaFRA2.

2.4.2 Description of risk to the site

Table 2-2 shows the extent of the site at risk of surface water flooding in the 3.3%, 1%, and 0.1% AEP events, as well as the maximum depths within the site boundary.

In the 3.3% AEP event, there is an area of isolated surface water ponding in the central northeastern portion of the site, as well as a flow path along the southeastern boundary. These two areas of risk cover 5% of the site. In the 3.3% AEP event, the maximum depths exceed 0.30m along the southeastern boundary but do not reach 0.60m.

In the 1% AEP event, the percentage of the site at risk rises to 8%. There are two new smaller areas of isolated ponding, one to the southeast of the current pooling, and one to the southwest. In the 1% AEP event, the maximum depths exceed 0.60m on the southeastern boundary.

In the 0.1% AEP event, the area at risk doubles from the 1% AEP event. The flow path and ponding areas expand, increasing the risk of surface water flooding, particularly in the central eastern portion of the site. In the 0.1% AEP event, the maximum depths increase to exceed 0.90m on the southeastern boundary.

Table 2-2: Existing surface water flood risk based on the RoFSW map

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	5	8	16
Maximum depth (m)	Exceeds 0.30 Less than 0.60	Exceeds 0.60 Less than 0.90	Exceeds 0.90 Less than 1.20

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 1% AEP includes the 3.3% AEP percentage).*

2.5 Reservoir

Reservoir flood mapping shows that the northern boundary (1% of the site) is affected by the 'dry day' flood extent from Surrey Hill reservoir. There is no 'wet day' scenario flood extent available for Surrey Hill reservoir.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the entire site has less than 25% susceptibility to groundwater flooding. The JBA Groundwater Emergence Map (5m resolution) aligns with this, showing that the site has negligible risk. This means that the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

2.7 Sewers

Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. The site is located in GU19 5.

There have been 20 recorded sewer flooding incidents in total. This includes:

- 18 cases of 1 incident between 10 and 20 years ago of internal property flooding.
- 2 cases of 1 incident between 10 and 20 years ago of external property flooding.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

2.8 Flood history

The EA's historic flooding and recorded flood outline datasets show that in September 1968 Windle Brook exceeded its capacity and overtopped. This storm event resulted in the entirety of the site being flooded. There are no recent flood events recorded within the EA datasets. However, a site-specific FRA should investigate the mechanism of the historic flood event in September 1968 and whether there have been changes to the site since this event. This is necessary to identify whether a similar event could occur in future, or if there are any mitigating factors that suggest the site is no longer at risk.

Surrey County Council also provided a record 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. There has been internal property flooding on Swift Lane, which leads to the site from the west.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.1.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows the site is not likely to be sensitive to increased fluvial flood risk as a result of climate change. The elevation of the site shows that the fluvial extent remains confined to the northern boundary and does not extend further south into the site.

3.2 Surface water

3.2.1 Available data

Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.2.2 Description of risk to the site

Comparing the 0.1% AEP extent with the 1% AEP extent shows that the site is likely sensitive to greater increases in surface water risk as a result of climate change. The area at risk doubles, from 8% to 16%, and maximum depths increase. The main increase in extent is in the area of ponding within the central northeastern portion of the site.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset indicates the presence of an embankment within the site that runs parallel to the boundary, approximately 10-20 metres into the site. It forms a semi-circle extending through the northern, eastern, and southeastern sections of the site. However, this is noted to be a privately owned asset and is not noted to be inspected. The eastern side of the embankment is not represented within the underlying LiDAR and the embankment does not appear to be functioning as a flood defence based on the RoFfRS outlines.

The developer should contact the Environment Agency to understand any implications of the asset for developing the site with regard to flood risk.

4.2 Residual risk

There is no residual risk to the site from flood risk management infrastructure.

5 Emergency planning

5.1 Flood warnings and alerts

The site is located in the 'Windle Brook at Bagshot' EA Flood Warning Area and the 'Windle Brook and Hale, Mill and Addlestone Bournes' Flood Alert Area.

5.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The only existing access to the site is via Swift Lane. This lane is to the west of the site and connects to Bagshot Bypass (A322).

5.2.2 Fluvial

Safe access and escape routes are shown to be maintained at this location in all modelled fluvial events.

5.2.3 Surface water

There is a large area of ponding on Swift Lane towards the entrance of the site in all surface water events. This may impact access and escape as the maximum depths within the area of ponding are shown to exceed 0.30m in all modelled flood events. However, the depths are not predicted to reach 0.60m. Further assessment will need to be undertaken as part of a site-specific FRA considering the velocity and associated hazard of the surface water ponding as safe access and escape will need to be demonstrated in the 1% AEP plus climate change surface water event.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- The site is considered to have very low susceptibility to groundwater flooding, this should be confirmed through additional site investigation work. Below ground development such as basements may still be susceptible to groundwater flooding.
- BGS data indicates that the underlying geology is sand, silt, and clay which is likely to be with highly variable permeability. The local soils are identified to be both fen peat soils and slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, which may limit infiltration potential within the winter months.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site has areas within its boundary designated by the Environment Agency as being a historic landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA, to determine potential mitigation for contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and EA) at an early stage to understand possible constraints.
- Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the Lead Local Flood Authority. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints. Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- Windle Brook flowing along the northwest boundary should be integrated into the site drainage strategy as blue-green infrastructure.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies (Windle Brook) and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies Gypsy and Traveller development as 'Highly Vulnerable'.

Should 'Highly Vulnerable' development be proposed within the extent of Flood Zone 2, the exception test will be required for this site. 'Highly Vulnerable' development is not permitted in Flood Zone 3a and 3b.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is greater than one hectare in Flood Zone 1.
- Is partially located within Flood Zones 2 and 3.
- Is subject to surface water flooding.
- Is identified as being at increased flood risk in the future, due to climate change.

All sources of flooding should be considered as part of a site-specific FRA.

The site has areas within its boundary designated by the Environment Agency as being a historic landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA, to determine potential mitigation for contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and EA) at an early stage to understand possible constraints.

A site-specific FRA should also investigate the mechanism of the historic flood event in September 1968 and whether there have been changes to the site since this event. This is necessary to identify whether a similar event could occur in future, or if there are any mitigating factors that suggest the site is no longer at risk.

The developer should contact the Environment Agency to understand any implications of the existing embankment shown in the AIMS dataset for developing the site with regard to flood risk.

If proposed works affect an ordinary watercourse, Surrey County Council as the Lead Local Flood Authority should be contacted to obtain prior written consent. Any watercourses should be accommodated within the site layout and should not be culverted except for where access is required. The site layout should allow for access to any watercourse for maintenance and they should generally be located within publicly accessible areas.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Development should be steered outside of the areas at risk of surface water ponding along the southeastern boundary. Development should also be steered away from the fluvial flood risk along the northern boundary. Developers should consider utilising these areas as a green corridor or as a location for SuDS.

The risk of surface water ponding within the central northeastern portion of the site should be further assessed within a site-specific FRA. Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.

The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

Arrangements for safe access and escape will need to be provided for the 1% AEP fluvial and surface events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

8 Conclusions

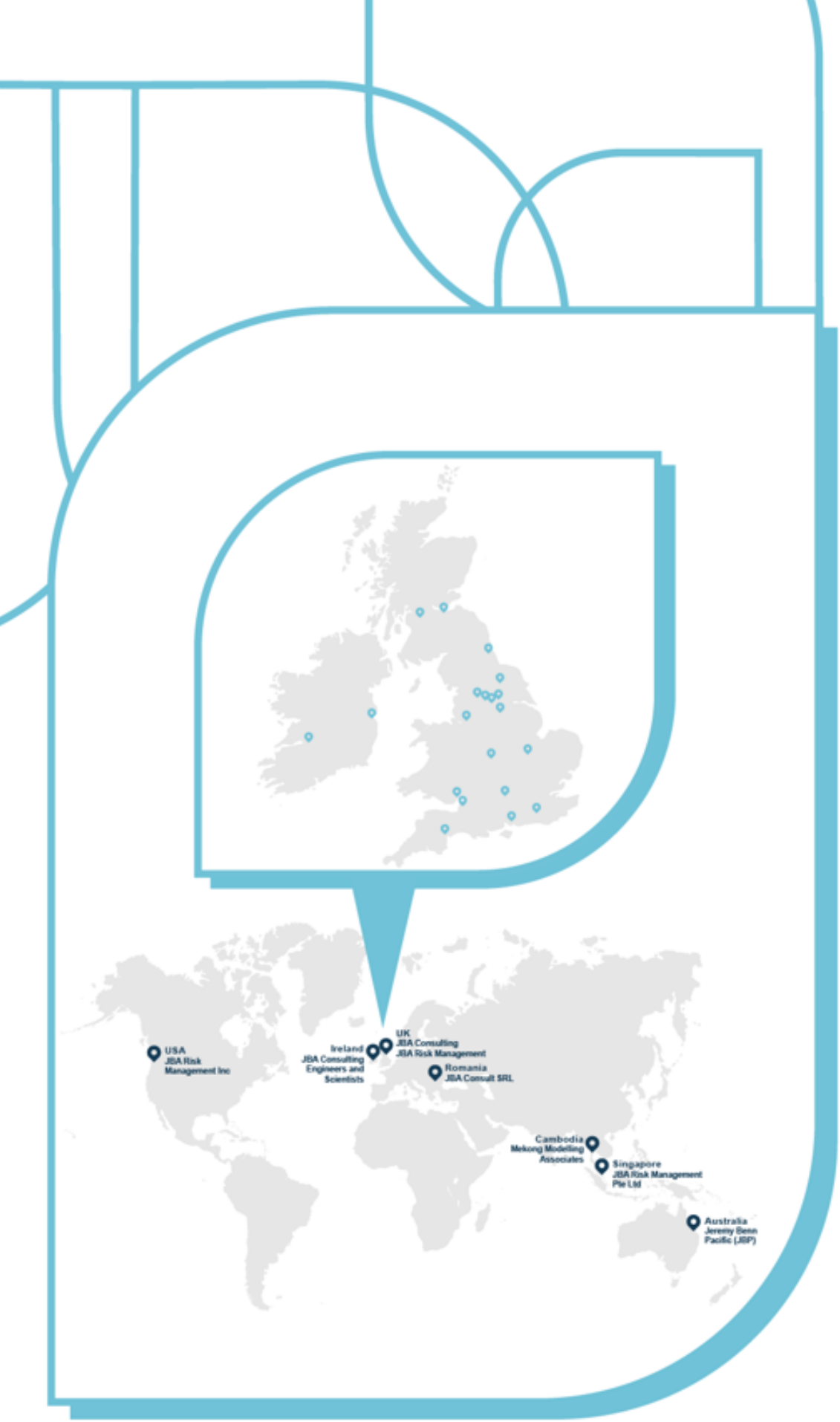
The site is both at fluvial and surface water flood risk. The fluvial flood risk is confined to the northern boundary along the path of Windle Brook. The central eastern portion of the site and the southeastern boundary are at risk of surface water flooding.

Should 'Highly Vulnerable' development be proposed within the extent of Flood Zone 2, the exception test will be required for this site ('Highly Vulnerable' development is not permitted in Flood Zone 3). A site-specific FRA will also be required because the proposed development site is partially located in Flood Zones 2 and 3, is subject to surface water flooding, and is identified as being at increased flood risk in the future, due to climate change.

The following points should be considered in development of this site:

- Development should be steered outside of the areas at risk of surface water along the southeastern boundary. Development should also be steered away from the fluvial flood risk along the northern boundary, by Windle Brook. Developers should consider utilising these areas as a green corridor or as a location for SuDS.
- Further assessment of the risk to the site should be undertaken within a site-specific FRA to refine the fluvial flood risk to the site. This site-specific FRA should either show that the site is not at fluvial risk or that the exception test can be passed.
- A site-specific FRA should also investigate the mechanism of the historic flood event in September 1968 and whether there have been changes to the site since this event. This is necessary to identify whether a similar event could occur in future, or if there are any mitigating factors that suggest the site is no longer at risk.
- The risk of surface water ponding in the site should be further assessed within a site-specific FRA. Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere.
- Safe access and escape should be demonstrated in the 1% AEP plus climate change fluvial and surface water events. This Level 2 assessment has shown that safe access and escape may be impeded by the surface water ponding along the access road, however, further assessment of this risk should be undertaken within a site-specific FRA, to include consideration of the velocity and hazard of the risk.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.

- The site has areas within its boundary designated by the Environment Agency as being a historic landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA, to determine potential mitigation for contamination and the impact this may have on SuDS.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development in one area, compensatory flood storage will be required in another).



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Level 2 Strategic Flood Risk Assessment - The Grange, St Catherines Road (Site 920)

A1-C01

28 March 2025

Prepared for:

Surrey Heath Borough Council

www.jbaconsulting.com

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for The Grange, St Catherines Road (Site 920). The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Surrey Heath Level 1 SFRA and read the Surrey Heath Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** The Grange, St Catherines Road. Situated east of Frimley, and adjacent to the Frith Hill woodland area. The location is mapped in Figure 1-1.
- **Site area:** 2.92 ha.
- **Existing site use:** Predominantly greenfield with a couple of existing residential buildings in the north end of the site.
- **Proposed site use:** Residential.
- **Current site vulnerability:** More vulnerable.
- **Proposed site vulnerability:** More vulnerable.

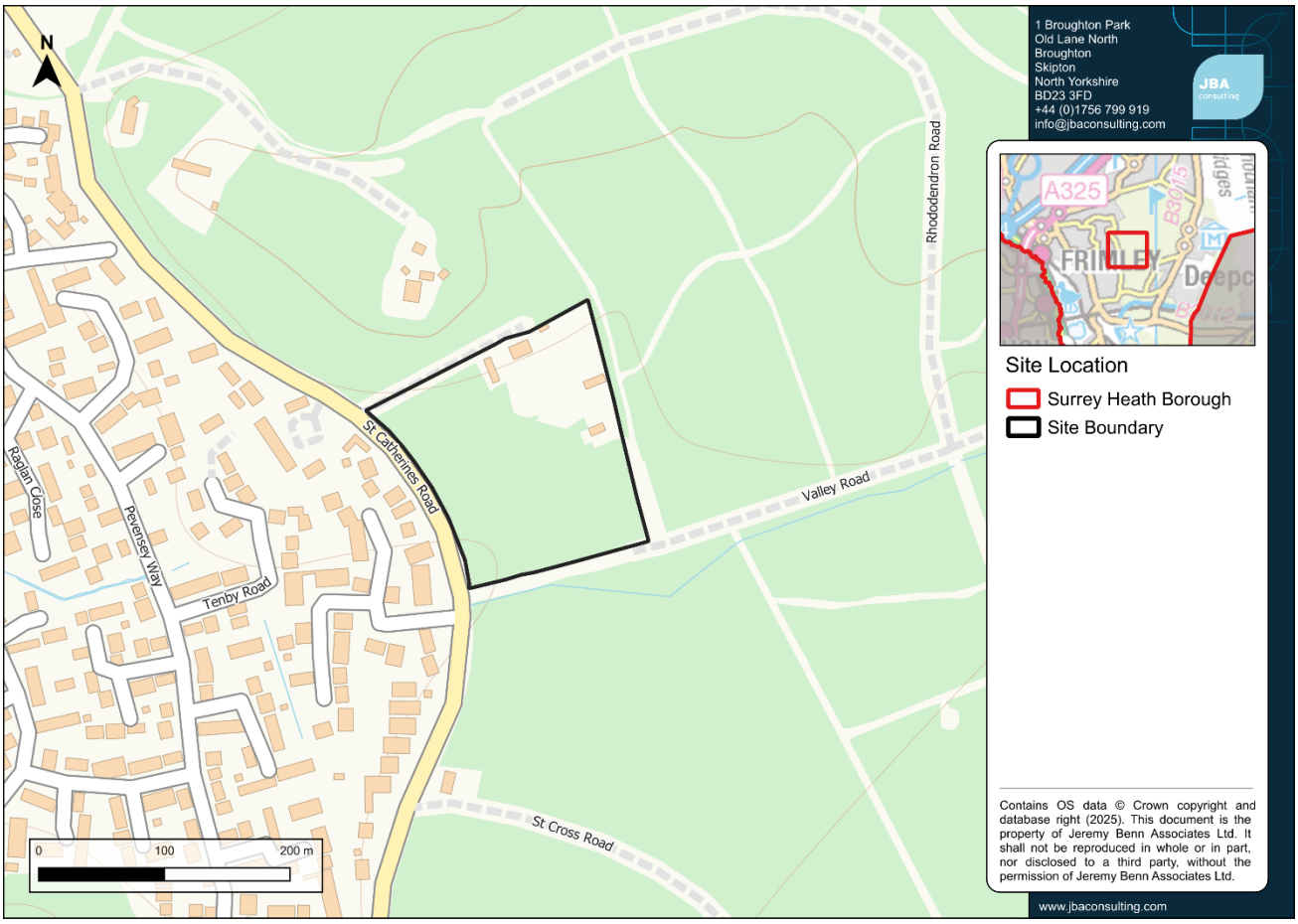


Figure 1-1: Site location.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR shows that the site slopes downhill from higher ground in the northeast of the site to lower ground in the southwest corner of the site. The site has a maximum elevation of 91.8mAOD by the northern boundary. The minimum elevation is in the southwest corner of the site, at 78.7mAOD.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of sand that forms the Camberley Sand Formation.
- There is no data on the superficial deposits in the site.

Soils at the site consist of:

- Freely draining very acid sandy and loamy soils.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the downstream reach of the Blackwater (Aldershot to Cove Brook confluence at Hawley) catchment. The site is approximately 1.8km east of the River Blackwater, which flows north and converges with Cove Brook near Hawley. A tributary of the River Blackwater flows westwards parallel to the southern border, and the catchment area from this tributary upstream of the site is approximately 1.4km^2.

The catchment is made-up of a combination of urban and rural areas. Built-up regions include Aldershot and Ash further upstream of the River Blackwater, as well as Frimley and Mytchett closer downstream. Rural areas include the region south and east of Tongham, and the woodlands east of Frimley. The east of the catchment also comprises of parts of Mytchett Woods and the Ash Ranges nature reserve.

2.2 Existing drainage features

There are no drainage features apparent within the site boundary.

There is an unnamed tributary of the River Blackwater that flows westwards parallel to the southern border, within approximately 15 metres of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Risk of Flooding from Rivers and Sea (RoFfRS) dataset has been used to inform the Flood Zones within this assessment. The RoFfRS was updated in January 2025 based on the EA's updated National Flood Risk Assessment (NaFRA2). The RoFfRS takes account of flood defences and the condition they are in and would therefore not usually be used to represent Flood Zones 2 and 3a (which should be the undefended) flood risk. However, the site within this assessment is not shown to be protected by any formal flood defences shown to be represented within the modelling and therefore the RoFfRS was deemed to be the best available data to inform this assessment as the EA's Flood Map for Planning (FMfP) has not yet been updated in-line with the NaFRA2 outputs. The EA's Flood Map for Planning (FMfP) is due to be updated later in 2025. At this time, the Flood Zones should be compared with the assessment in this report.

2.3.2 Description of risk to the site

As shown in Table 2-1, the majority of the site (92%) is located in Flood Zone 1 and is not shown to be at fluvial flood risk. The site is located 8% in Flood Zone 2, 3% in Flood Zone 3a, and 2% in Flood Zone 3b.

In the 3.3% AEP event, there is fluvial flood risk from a tributary of the River Blackwater, which encroaches into the southeastern boundary of the site. In the 1% and 0.1% AEP

events, the extent of the flood risk increases in the south of the site. However, maximum depths remain below 0.20 in all three modelled events.

Table 2-1: Existing fluvial flood risk based on EA RoFfRS*

Event	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
Percentage of site at risk* (%)	92	8	3	2
Maximum depth (m)	N/A	Less than 0.20	Less than 0.20	Less than 0.20

**The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).*

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment. This was updated in January 2025 using the EA's NaFRA2 outputs. The 3.3%, 1%, and 0.1% AEP extents and depth information have been made available for use in this assessment. Velocity and hazard information is not available as part of NaFRA2.

2.4.2 Description of risk to the site

The EA's RoFSW dataset do not show any surface water flood risk to this site.

2.5 Reservoir

The site is not shown to be at risk of reservoir flooding during the 'dry day' or 'wet day' scenario from the EA reservoir flood maps.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the entire site has less than 25% susceptibility to groundwater flooding. However, the JBA Groundwater Emergence Map (5m resolution) suggests that the entire site has groundwater emergence levels that are between 0.025m and 0.5m below the ground surface.

Based on the topography of the site, it is likely that if any groundwater emerges it will flow in a south-westerly direction across the site.

The risk of groundwater to the site should be confirmed as part of a site-specific Flood Risk Assessment (FRA), which is likely to require ground investigations as part of a Hydrogeological Risk Assessment. Subsurface development is unlikely to be appropriate,

and any development proposals will need to demonstrate that they will not increase the risk of flooding on or off site by displacing groundwater or impeding subsurface flows. This is also likely to severely limit the types of SuDS that are appropriate for the site.

2.7 Sewers

Thames Water provided records of sewer incidents within the borough, which includes reported internal and external sewer flood incidents within the last 20 years. The site is located in GU16 9.

There have been 4 recorded sewer flooding incidents in total. This includes 4 cases of 1 incident between 10 and 20 years ago of internal property flooding.

Due to the data being provided in a truncated format (5-digit postcode) for data protection, it cannot be determined whether any of these sewer flood incidents are within, or in close proximity, to the site and further consultation with Thames Water will be required to assess the sewer flood risk to the site.

2.8 Flood history

The EA's historic flooding and recorded flood outline datasets do not have a record of any flooding on or surrounding the site.

Surrey County Council also provided a record 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. Approximately 200m west of the site, there has been external flooding on Sandringham Way. There has also been flooding on Pevensey Way and Raglan Close, as well as the footpath/cycle path connecting these roads.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

Within the EA's RoFfRS Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on fluvial risk will need to be considered at the site-specific FRA stage.

3.1.2 Description of risk to the site

The southern end of the site is shown to be sensitive to increased risk with climate change as the 0.1% AEP extent encroaches further into the site than the 1% AEP extent. However, depths are predicted to remain below 0.2m and most of the site is still not shown to be at fluvial risk.

3.2 Surface water

3.2.1 Available data

Within the EA's RoFSW Climate Change dataset, the 'Central' allowance for the 2050s epoch has been applied to the 3.3%, 1%, and 0.1% AEP events. As set out in the EA's climate change guidance (gov.uk), this allowance is only deemed suitable for development with a lifetime up to 2060. All sites assessed within this Level 2 SFRA are proposed to be residential which should be assumed to have a lifetime of at least 100 years. Therefore, in the absence of suitable modelled climate change data, the 0.1% AEP event has been used as a proxy for the 1% AEP plus climate change event. Further assessment of the potential impacts of climate change on surface water will need to be considered at the site-specific FRA stage.

3.2.2 Description of risk to the site

The site is not shown to be at surface water flood risk in the 0.1% AEP surface water event.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

An unnamed tributary of the River Blackwater is culverted under St Catherines Road just outside of the site's southwestern boundary corner. This could pose a residual risk to the site in the event of a blockage, which could cause water to back up and encroach on the site.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The site can currently be accessed via St Catherines Road, which runs parallel to the western boundary of the site. Valley Road also provides access and runs along the southern boundary (although there is a gate at the entrance on St Catherines Road), while an unnamed track follows the eastern border through the woodland, joining Rhododendron Road in the north. Finally, there is also a lane along the northern boundary from St Catherines Road, which leads to the existing property on site called The Grange.

5.2.2 Fluvial

In the 3.3%, 1%, 0.1% AEP events, there is risk of fluvial flooding in the south of the site, but access and escape are likely maintained. The risk in these events covers most of Valley Road running along the southern border. Parts of St Catherines Road is also at risk southwest of the site, and southeast of the site on the track that runs along the eastern border. However, according to the RoFfRS data, the depths of this fluvial flooding along these access points are 0.20m or below, which can be passable. The site can also still be accessed from the north.

5.2.3 Surface water

Safe access and escape routes are shown to be maintained at this location in all modelled surface water events.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

- Groundwater levels are indicated to be less than 0.5m below ground level during a 1% AEP event. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate at this site.
- BGS data indicates that the underlying geology is sand which is likely to be free draining. The local soils are identified to be very acid sandy and loamy soils, which are also free draining. This should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is not located within a historic landfill site.
- Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the Lead Local Flood Authority. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints. Developers should refer to SCC's Sustainable Design Guidance (surreycc.gov.uk) which provides information on how to address SuDS for non-major and major applications, and pre-application planning advice.
- Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Consideration should be made to the existing condition of receiving waterbodies (River Blackwater) and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

Should 'More Vulnerable' development be proposed within the extent of Flood Zone 3a, the exception test will be required for this site. 'More Vulnerable' infrastructure should not be permitted within Flood Zone 3b.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is greater than one hectare.
- Is partially located within Flood Zones 2 and 3.
- Is at high risk of groundwater emergence.

All sources of flooding should be considered as part of a site-specific FRA.

A detailed hydraulic model of the tributary of the River Blackwater will be required at FRA stage to accurately represent the risk from this watercourse and set the height of any mitigation measures.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Development should be steered outside of the Flood Zones 2 and 3 in the south of the site.

The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

Arrangements for safe access and escape will need to be provided for the 1% AEP fluvial and surface events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

The risk of groundwater to the site should be confirmed as part of a site-specific FRA, which is likely to require ground investigations as part of a Hydrogeological Risk Assessment. Subsurface development is unlikely to be appropriate, and any development proposals will need to demonstrate that they will not increase the risk of flooding on or off site by displacing groundwater or impeding subsurface flows. This is also likely to severely limit the types of SuDS that are appropriate for the site.

If proposed works affect an ordinary watercourse, Surrey County Council as the Lead Local Flood Authority should be contacted to obtain prior written consent. Any watercourses should be accommodated within the site layout and should not be culverted except for where access is required. The site layout should allow for access to any watercourse for maintenance and they should generally be located within publicly accessible areas.

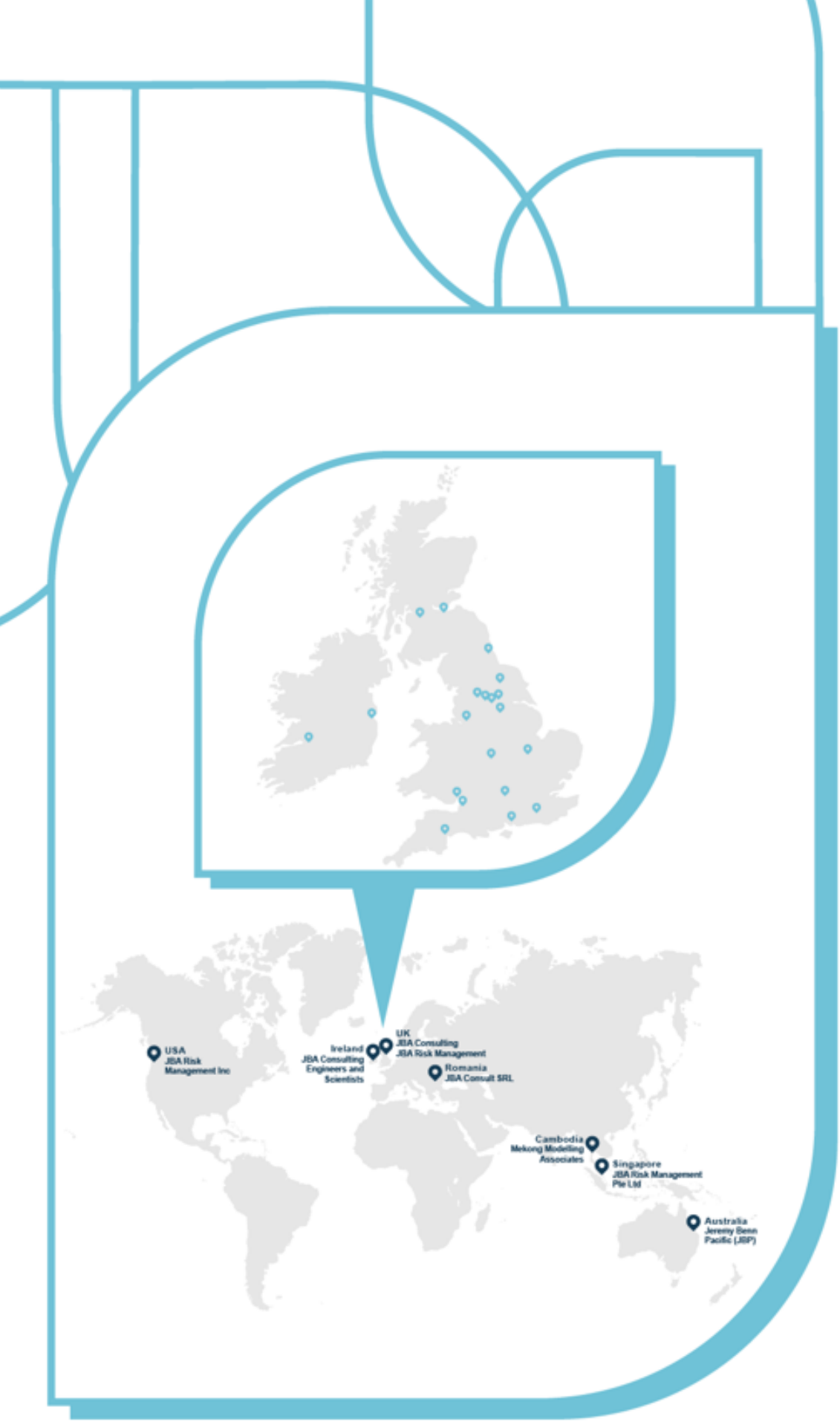
8 Conclusions

The site is not at surface water flood risk but is at risk of fluvial flooding from a tributary of the River Blackwater overtopping, which encroaches into the southeastern boundary of the site.

Should 'More Vulnerable' development be proposed within the extent of Flood Zone 3a, the exception test will be required for this site. 'More Vulnerable' infrastructure should not be permitted within Flood Zone 3b. A site-specific FRA will be required, as the proposed development site is one hectare or greater, located within Flood Zones 2 and 3, and is at high risk of groundwater emergence.

The following points should be considered in development of this site:

- A detailed hydraulic model of the tributary of the River Blackwater will be required at FRA stage to accurately represent the risk from this watercourse and set the height of any mitigation measures.
- Development should be steered outside of the Flood Zones 2 and 3 in the southeast of the site. Further assessment of the fluvial risk at the site will likely be required within a site-specific FRA to include assessment of the depths, hazard, and velocity of risk at the site. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
- Safe access and escape should be demonstrated in the 1% AEP plus climate change fluvial and surface water events using the appropriate allowances for climate change. This assessment has shown the safe access and escape are likely to be maintained.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- The risk of groundwater to the site should be confirmed as part of a site-specific FRA, which is likely to require ground investigations as part of a Hydrogeological Risk Assessment. Subsurface development is unlikely to be appropriate, and any development proposals will need to demonstrate that they will not increase the risk of flooding on or off site by displacing groundwater or impeding subsurface flows. This is also likely to severely limit the types of SuDS that are appropriate for the site.



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B 'Amber sites' surface water mapping

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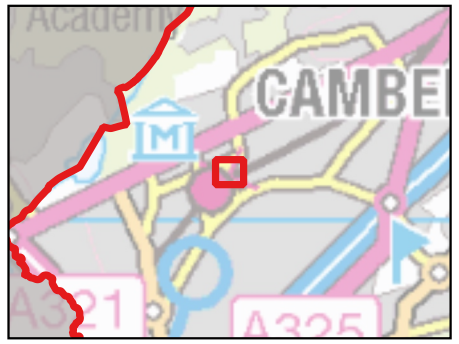

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

907 - Sir William Siemens Square, Chobham Road

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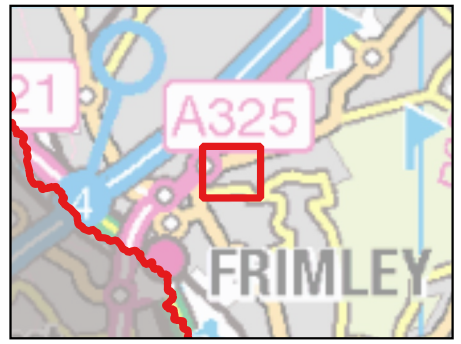

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

1015 - Former Portesbery School

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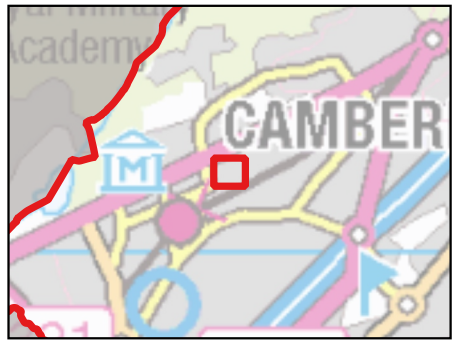

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

1005 - St James House

1 Broughton Park
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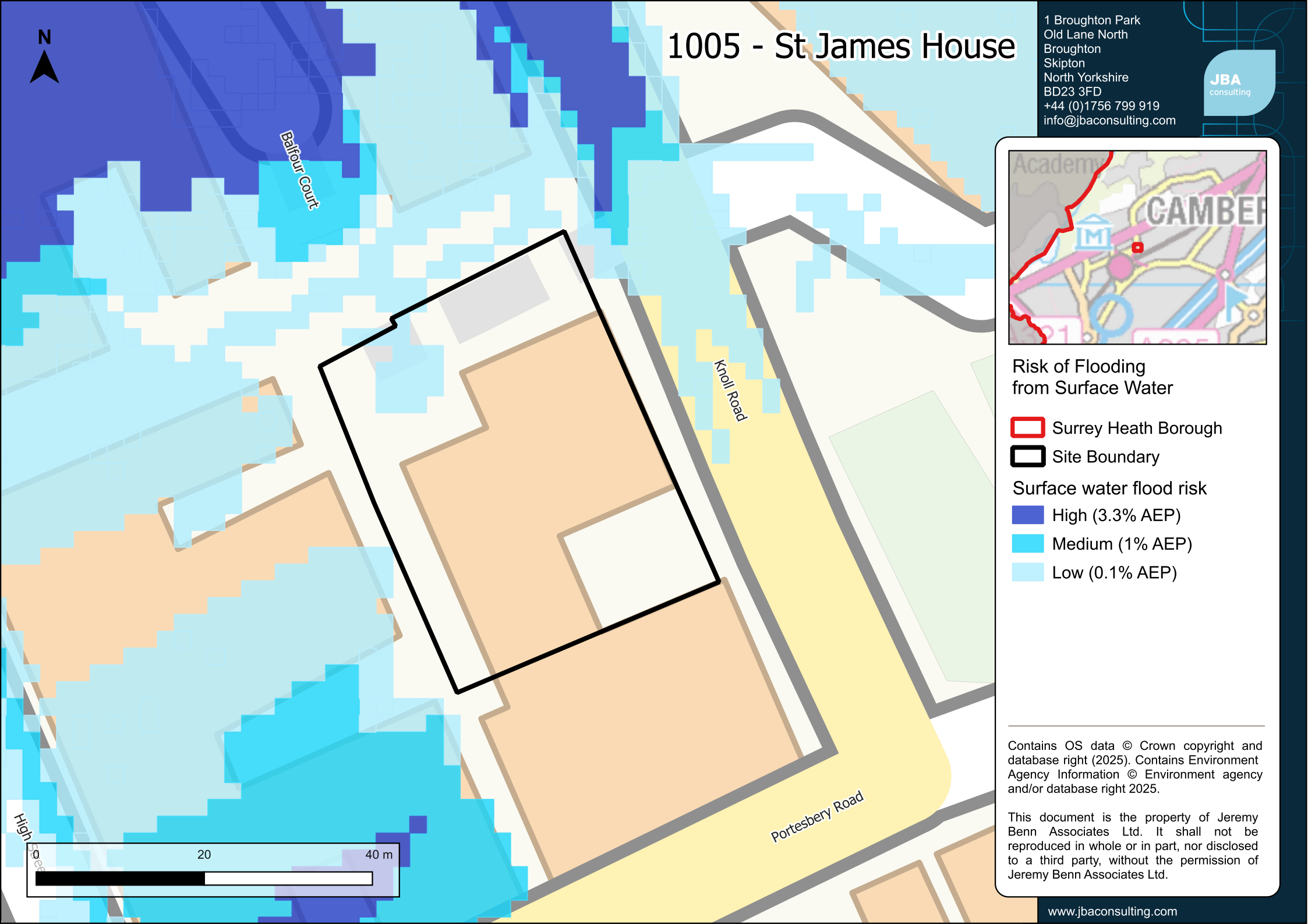

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

314 - 280 Gordon Avenue

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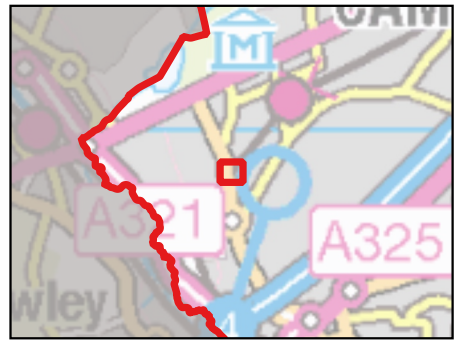

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

1004 - St Margarets Cottage and the Fenns

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info@jbaconsulting.com

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

844 - Land at Chamness, Woodlands Lane

1 Broughton Park
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+44 (0)1756 799 919
info@jbaconsulting.com

Risk of Flooding from Surface Water

- Surrey Heath Borough
- Site Boundary

Surface water flood risk

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)

801 - Pinehurst

1 Broughton Park
Old Lane North
Broughton
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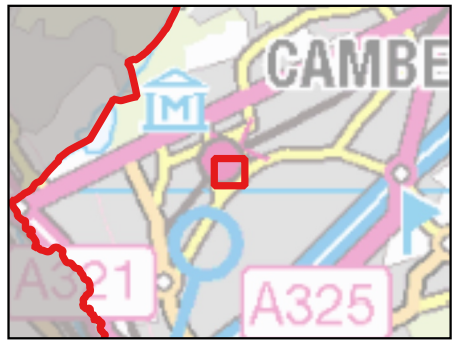

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814 - London Road Block, London Road

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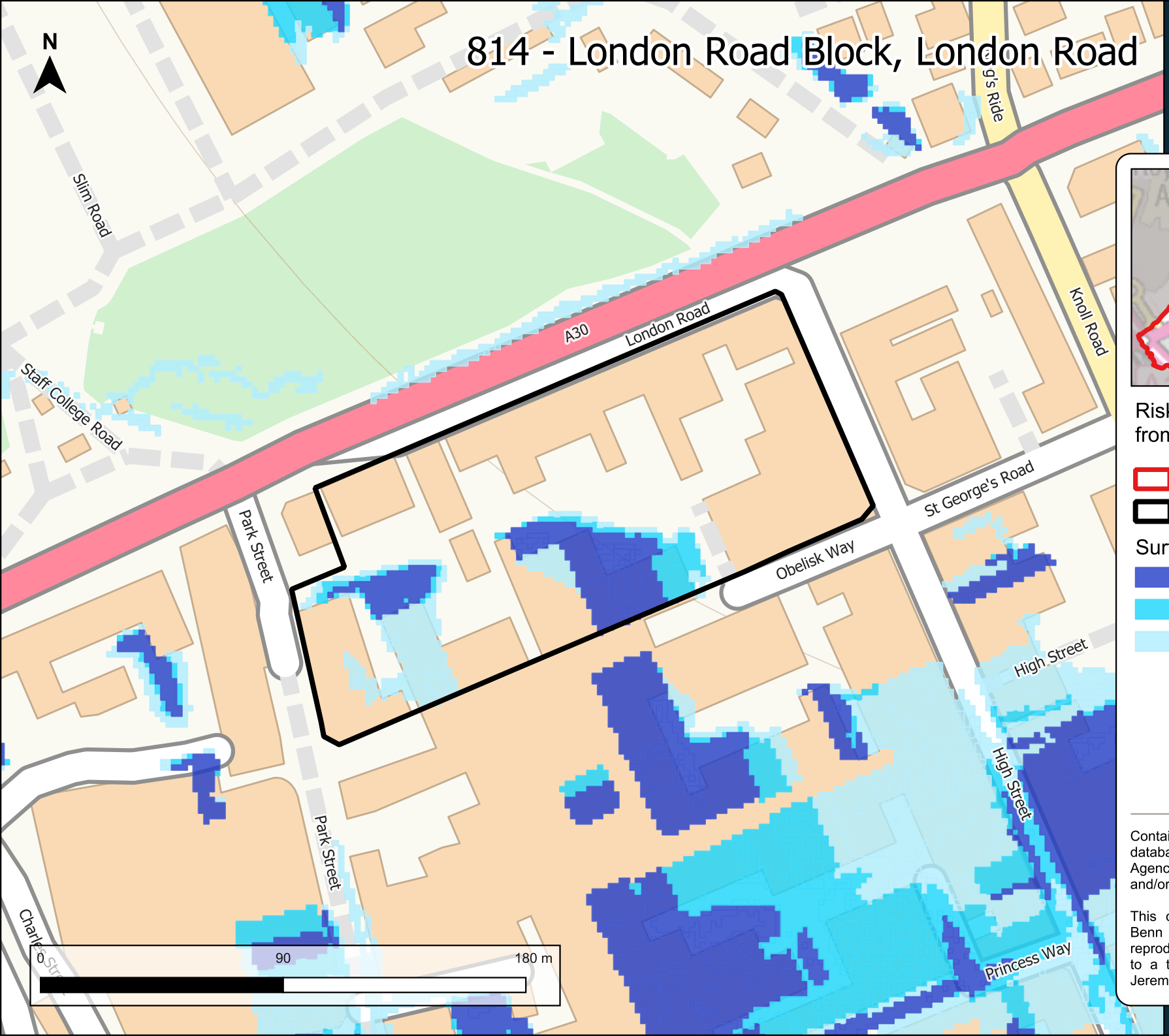

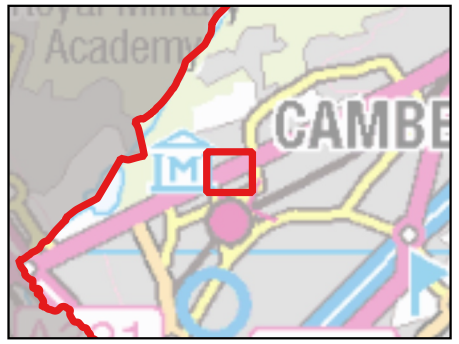

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27 - Land East of Knoll Road

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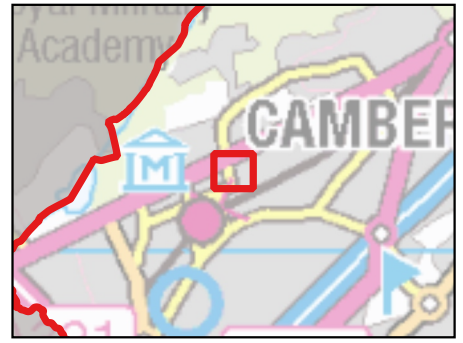

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- Surrey Heath Borough
- Site Boundary

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- Medium (1% AEP)
- Low (0.1% AEP)

C 'Amber sites' groundwater emergence mapping

240 - Camberley Centre, France Hill Drive

1 Broughton Park
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Skipton
North Yorkshire
BD23 3FD
+44 (0)1756 799 919
info@jbaconsulting.com

JBA Groundwater Emergence Map

- Surrey Heath Borough
- Site Boundary

Groundwater Level

- Less than 0.025m below the ground surface
- Between 0.025m and 0.5m below the ground surface
- Between 0.5m and 5m below the ground surface
- At least 5m below the ground surface
- Negligible risk of groundwater emergence due to underlying geological deposits

N

Southwell Park Road

France Hill Drive

Religious Grounds

France Hill Drive

Cambrian Close

South Camberley Primary and Nursery School

Firwood Drive

0 50 100 m

25 - Camberley Station, Station House

1 Broughton Park
Old Lane North
Broughton
Skipton
North Yorkshire
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info@jbaconsulting.com

N

Portesbery Road
High Street
Pembroke Broadway
Camberley
Park Lane
Upper Gordon
Heathcote Road
Middle Gordon Road

0 50 100 m

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907 - Sir William Siemens Square, Chobham Road

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North Yorkshire
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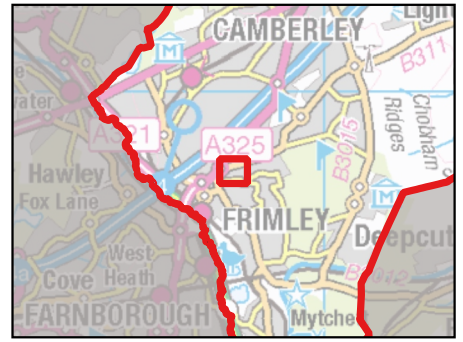

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1015 - Former Portesbery School

1 Broughton Park
Old Lane North
Broughton
Skipton
North Yorkshire
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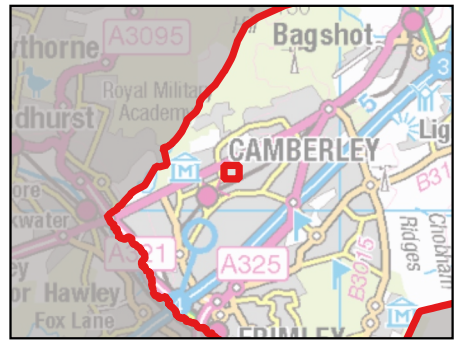
info@jbaconsulting.com

N

Lancaster Drive
Townside Place
Camberley Park
Play Space
Langley Drive
Hillside
Potten Close
Portesbery Road

0 60 120 m



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1005 - St James House

1 Broughton Park
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Broughton
Skipton
North Yorkshire
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info@jbaconsulting.com

N

Balfour Court

Knoll Road

Portesbery Road

High

0 20 40 m

JBA Groundwater Emergence Map

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887 - Land at Loen, St Catherines Road

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North Yorkshire
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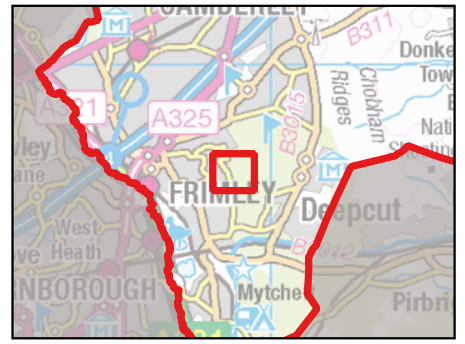
info@jbaconsulting.com



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408 - Land rear of 192-210 London Road

1 Broughton Park
Old Lane North
Broughton
Skipton
North Yorkshire
BD23 3FD
+44 (0)1756 799 919
info@jbaconsulting.com

N

A30

Lupin Close

Earlswood Park

JBA Groundwater Emergence Map

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- Site Boundary

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0 90 180 m

314 - 280 Gordon Avenue

1 Broughton Park
Old Lane North
Broughton
Skipton
North Yorkshire
BD23 3FD
+44 (0)1756 799 919
info@jbaconsulting.com

N

Oakley Road
Brook Road
B3411
Rideway Close
Gordon Avenue
Bridge End
Watchetts Road

0 40 80 m

JBA Groundwater Emergence Map

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447 - Broadford, Castle Grove Road

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Old Lane North
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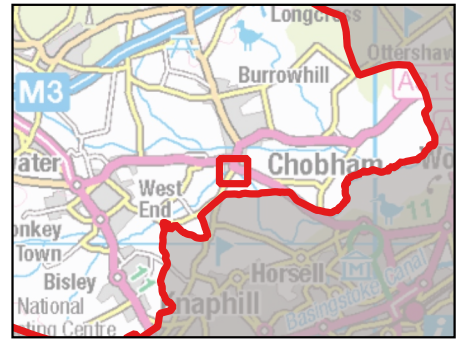
info@jbaconsulting.com



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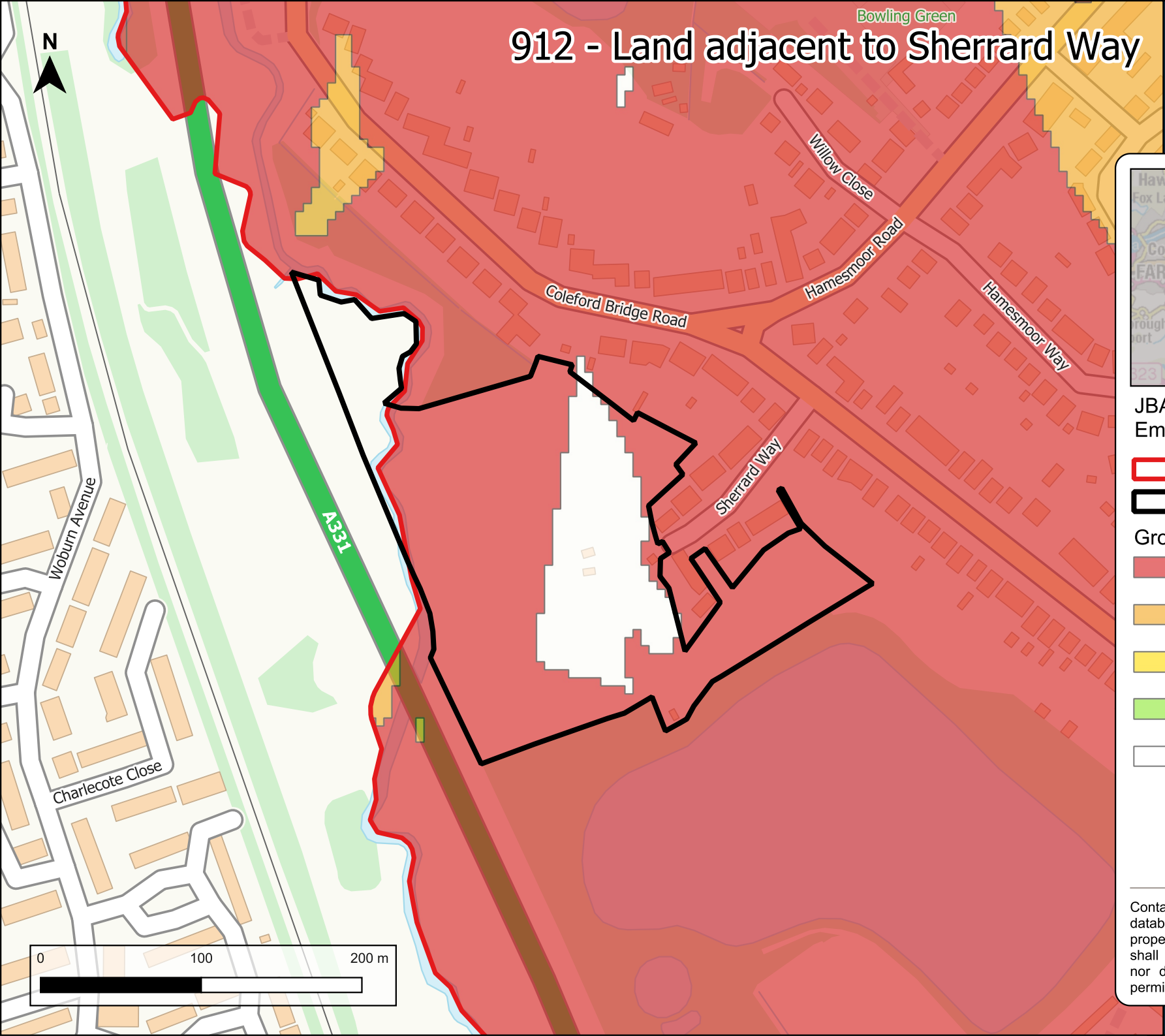
912 - Land adjacent to Sherrard Way



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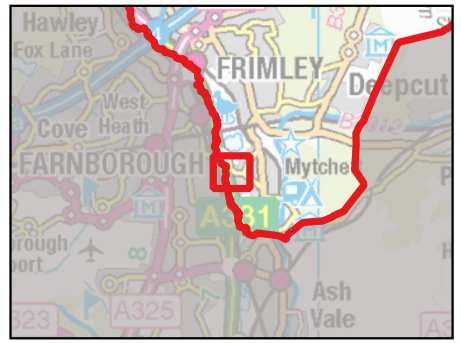
JBA consulting



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757 - Land North of Guildford Road

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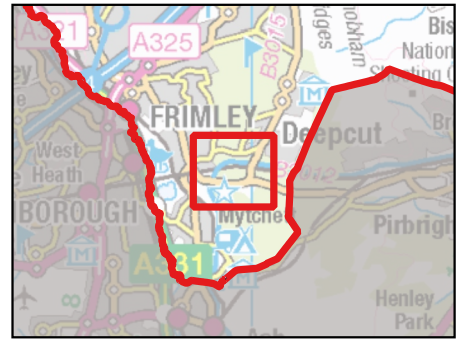

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21 - 61 - 63 London Road

1 Broughton Park
Old Lane North
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Skipton
North Yorkshire
BD23 3FD
+44 (0)1756 799 919
info@jbaconsulting.com

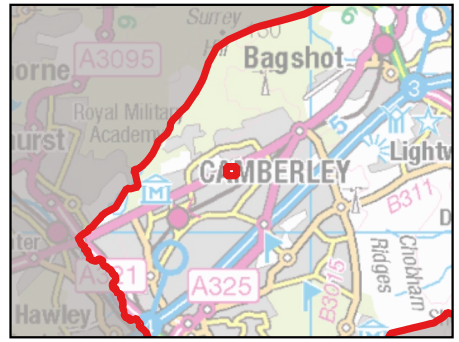
N

A30

London Road

Knightsbridge Road

0 40 80 m



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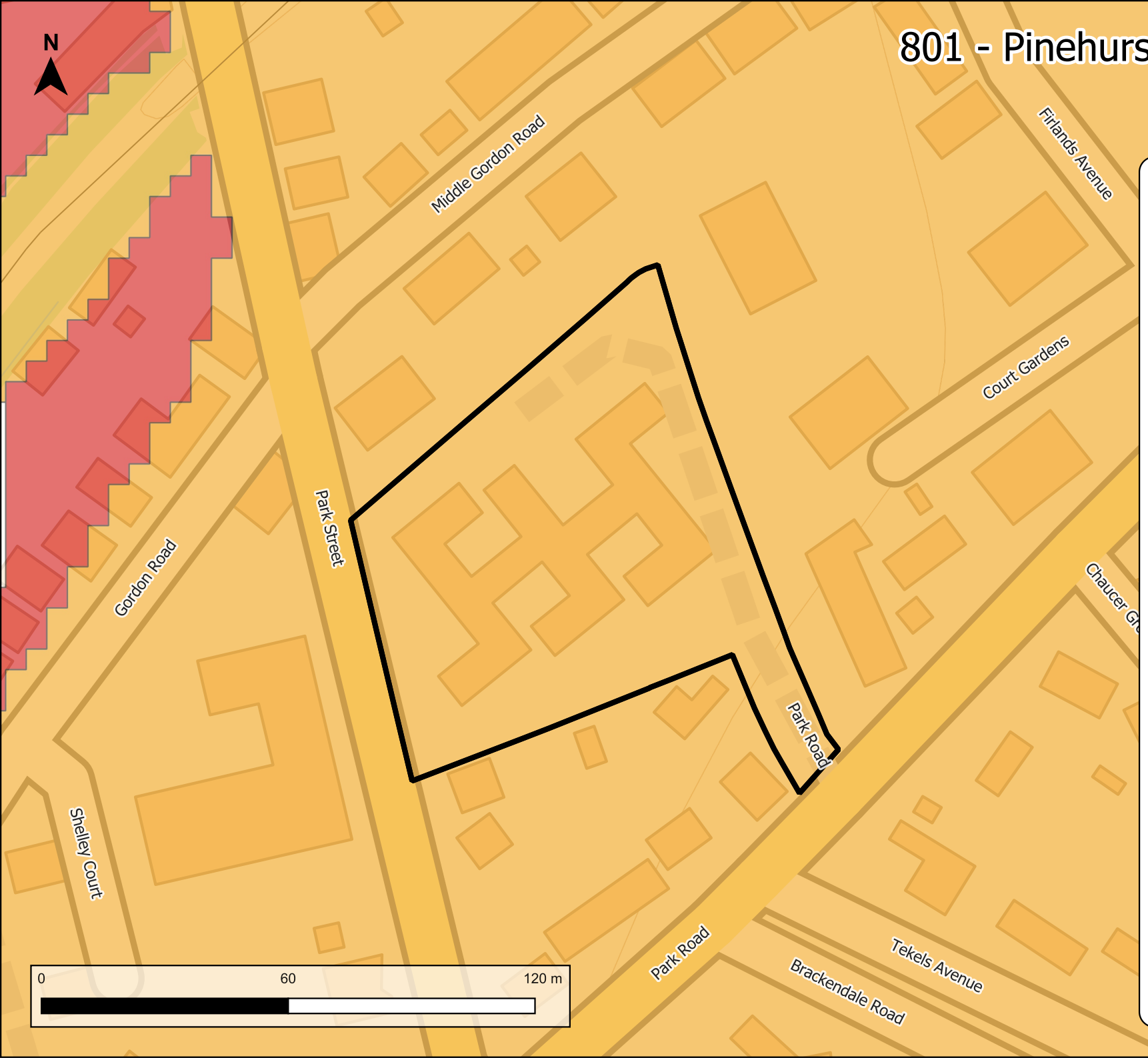

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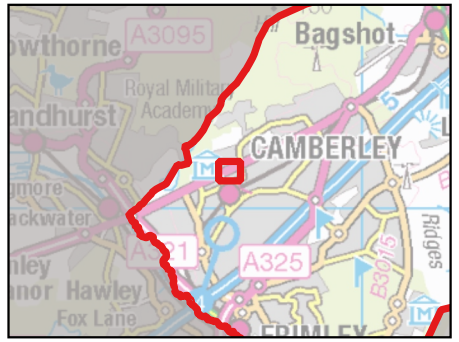

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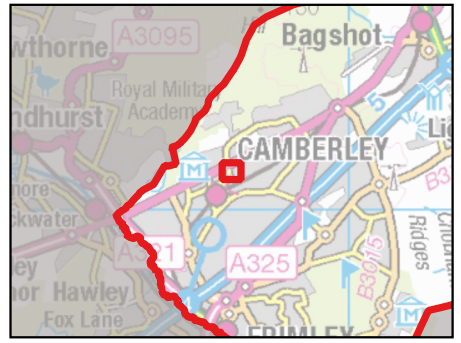

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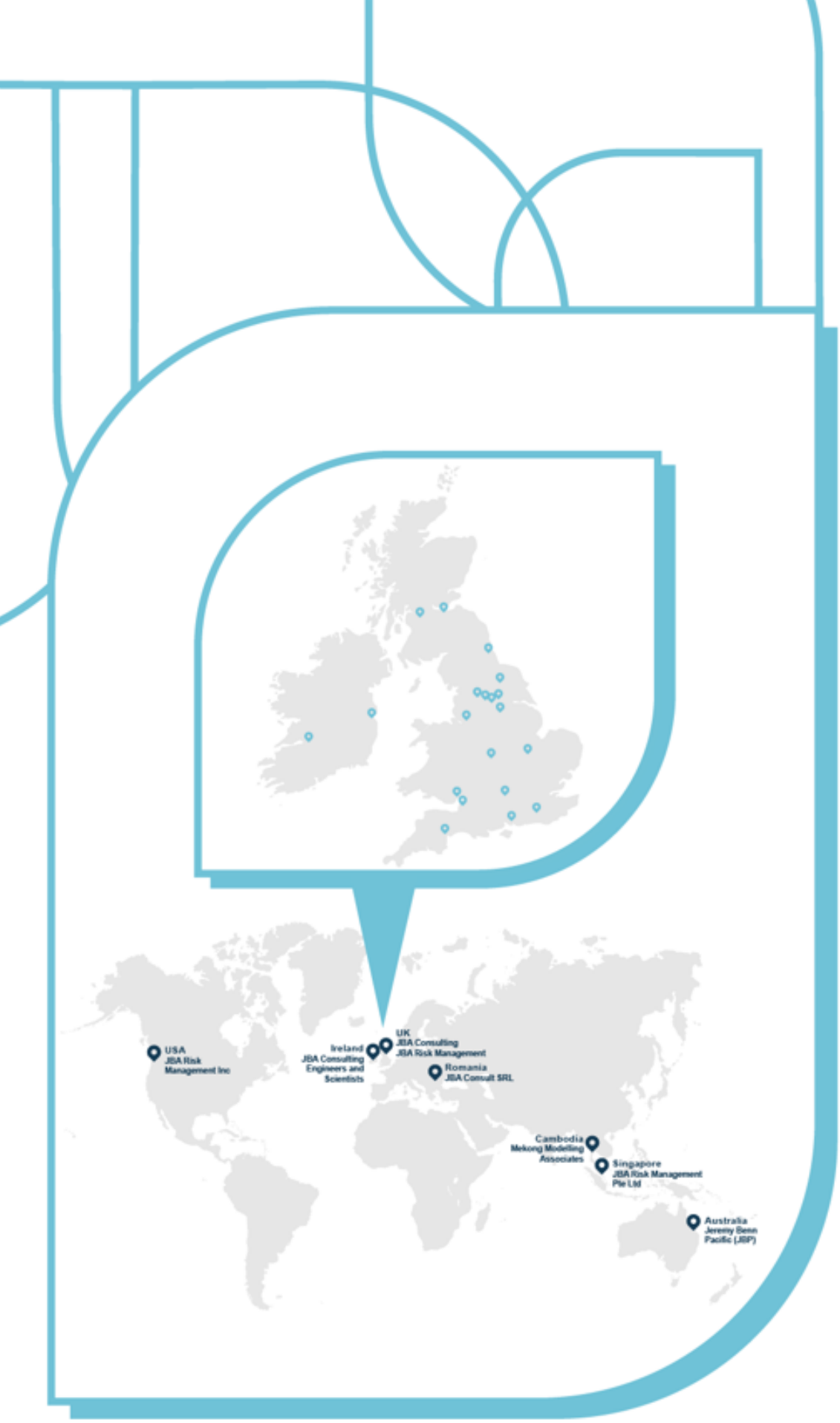

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