Level 2 Strategic Flood Risk Assessment

Spelthorne Borough Council

Level 2 Report

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Quality information

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1. Introduction

1.1 Project Background

1.1.1 The National Planning Policy Framework[1] (NPPF) and associated Planning Practice Guidance (PPG) for Flood Risk and Coastal Change[2] set out the active role Local Planning Authorities (LPAs) should take to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process. The NPPF outlines that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and LPAs should use the findings to inform strategic land use planning.

1.1.2 All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.

1.1.3 If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied.

1.1.4 When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location,

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment,

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate,

d) any residual risk can be safely managed, and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan".

1.1.5 Spelthorne Borough Council (BC) are preparing a Local Plan which contains the overall vision and framework for future development in the area, addressing needs and opportunities in relation to housing, the economy, community facilities and infrastructure, as well as providing a basis for conserving and enhancing the natural and historic environment, mitigating and adapting to climate change, and achieving well designed places. The emerging Local Plan will set out how the local area will develop over at least the next 15 years and once adopted, will replace the 2009 Development Plan.

1.1.6 AECOM has been commissioned by Spelthorne BC to prepare a Level 1 and Level 2 SFRA to inform the ongoing preparation of the emerging Local Plan. This report and associated appendices form the Level 2 SFRA for Spelthorne BC.

1.2 Level 1 SFRA

1.2.1 The purpose of a Level 1 SFRA[3] prepared for Spelthorne BC is to collate and analyse the most up to date readily available flood risk information for all sources of flooding and provide an overview of flood risk issues across the Borough. The Level 1 SFRA provides guidance on:

- The application of the Sequential Test by Spelthorne BC when allocating future development sites to inform their Local Plan, as well as by developers promoting development on windfall

[1] Ministry of Housing, Communities and Local Government. Updated December 2023. *National Planning Policy Framework*. https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] Department for Levelling Up, Housing and Communities. Ministry of Housing, Communities and Local Government. Updated August 2022. *Planning Practice Guidance: Flood Risk and Coastal Change.* http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
[3] AECOM, June 2023 Spelthorne Borough Council Level 1 Strategic Flood Risk Assessment.

sites. The Sequential Test is the decision-making process whereby future development is steered towards areas of lowest flood risk.

- Managing and mitigating flood risk, the application of sustainable drainage systems (SuDS), and the preparation of site-specific Flood Risk Assessments (FRAs).
- Potential flood risk management objectives and policy considerations which may be developed and adopted by Spelthorne BC as formal policies within their emerging Local Plan.

1.3 Level 2 SFRA

1.3.1 The PPG states that where a Level 1 SFRA shows that land outside areas at risk of flooding now or in the future cannot appropriately accommodate all the necessary development, it may be necessary to increase the scope of the SFRA to a Level 2 to provide the information necessary for application of the Exception Test where appropriate. A Level 2 SFRA should consider the detailed nature of the flood characteristics within a flood zone including, where possible:

- flood probability,
- flood depth,
- flood velocity,
- rate of onset of flooding; and
- duration of flood

1.3.2 The Level 2 SFRA provides more detailed information about the nature of flood risk in the Borough. This will enable users to:

- apply the sequential test by identifying the severity and variation in risk *within* medium and high flood risk areas,
- establish whether proposed allocations or windfall sites, on which the emerging Local Plan will rely, are capable of being made safe throughout their lifetime without increasing flood risk elsewhere, and
- begin to apply the Exception Test, where relevant.

1.3.3 Appendix A provides borough wide mapping of flood risk datasets to enable comparison of the flood risk across the study area.

1.3.4 Appendix B provides site assessment sheets for specific sites that may be proposed for allocation within the emerging Local Plan. Based on the findings of the Level 2 SFRA, Spelthorne BC removed some of the sites from consideration due to flood risk constraints. In some cases, the phasing of the sites within the Local Plan has been altered, to provide further time for flood risk management measures to be implemented prior to the development of the site.

Exception Test

1.3.5 The purpose of the Exception Test is to ensure that, where it may be necessary to locate development in areas at risk of flooding, new development is only permitted in Flood Zone 2 and Flood Zone 3 where the flood risk is clearly outweighed by other sustainability factors and where the development will be safe during its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, considering climate change.

1.3.6 Table 1-1 identifies when the Exception Test is required. It is noted that some types of development are not permitted, regardless of the application of the Exception Test.

1.3.7 Full details of the vulnerability classifications for different types of development can be found in the Level 1 SFRA and in Table 2[4] of the PPG (Flood Risk and Coastal Change).

1.3.8 The NPPF states that for the Exception Test to be passed it must be demonstrated that:

[4] *Planning Practice Guidance (PPG) flood risk and coastal change. Table 2: Flood risk vulnerability and flood zone 'incompatibility'* https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

1.3.9 Both elements of the test will have to be passed for development to be permitted.

1.3.10 In order to determine Part A of the Exception Test, applicants should assess their scheme against the objectives set out in the Spelthorne BC Sustainability Appraisal[5]. In order to demonstrate satisfaction of Part B of the Exception Test, relevant flood risk management and mitigation measures should be applied and demonstrated within a site-specific flood risk assessment (FRA). Chapter 5 'Managing and Mitigating Flood Risk' and Chapter 6 'Preparing Site Specific Flood Risk Assessments (FRAs)' within the Level 1 SFRA should be referred to in order to support Part B of the Exception Test.

Table 1-1 Flood risk vulnerability and Flood Zone 'incompatibility' (PPG, 2022)

Vulnerability Classification		Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone	1	✓	✓	✓	✓	✓
	2	✓	Exception Test Required	✓	✓	✓
	3a	Exception Test Required [a]	×	Exception Test Required	✓	✓
	3b	Exception Test Required [b]	×	×	×	✓ [b]

✓ - Exception Test is not required × - Development should not be permitted

"a" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
"b" In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere.*

1.4 Site Screening

1.4.1 A number of factors are influencing the spatial strategy in Spelthorne Borough and a large pool of sites has been under consideration during the preparation of the emerging Local Plan. Spelthorne BC have undertaken the Sequential Test and are left with a list of sites for consideration within this Level 2 SFRA.

1.4.2 AECOM have undertaken a Level 2 SFRA for each of these sites. Appendix B contains the site assessment proformas. These are listed in groups in Appendix B, reflecting the increasing risk of flooding:

- Group 1 Brownfield sites at low risk of flooding from rivers and surface water.
- Group 2 Greenfield sites at low risk of flooding from rivers and surface water.
- Group 3 Sites at low risk of flooding from rivers, and medium to high risk of flooding from surface water (either on the site or on the access route).
- Group 4 Sites within Flood Zone 2 extent but not within modelled defended climate change extents.
- Group 5: Sites at risk of flooding from rivers (Flood Zone 2 or 3), with access that is low hazard rating.

[5] Spelthorne Borough Council (May 2022) Spelthorne Draft Local Plan Sustainability Appraisal. https://www.spelthorne.gov.uk/article/17637/Emerging-Local-Plan-Evidence-Base-and-Supporting-Documents

- Group 6: Sites wholly in Flood Zone 3, with access at low hazard.
- Group 7: Sites in Flood Zone 3, with pedestrian access at low hazard.
- Group 8: Sites primarily in Flood Zone 1, with no access that is dry or low hazard.
- Group 9: Sites in Flood Zone 3, with no access that is dry or low hazard.
- Group 10: Sites partially within Flood Zone 3b.

1.5 Consultation

1.5.1 Datasets have been provided by the Environment Agency, and Surrey County Council in their role as the Lead Local Flood Authority (LLFA), to inform the development of the Level 2 SFRA. The report has been circulated for review and further input by the stakeholders.

1.6 Future Updates to the SFRA

1.6.1 SFRAs are intended to be living documents, that are kept up to date as information on flood risk management changes.

1.6.2 The Environment Agency SFRA guidance available online[6] states that in order to remain up to date, it may be necessary to update a SFRA to incorporate any changes to:

- the predicted impacts of climate change on flood risk,
- detailed flood modelling - such as from the Environment Agency or lead local flood authority,
- the local plan, spatial development strategy or relevant local development documents,
- local flood management schemes,
- flood risk management plans,
- local flood risk management strategies,
- national planning policy or guidance.

1.6.3 The SFRA may also need to be reviewed after a significant flood event.

1.6.4 In agreement with the Environment Agency, this version of the SFRA is based on the currently published modelled outputs for the River Thames (between Datchet and Teddington 2023). These outputs have been included on updates to Flood Zones 2 and 3 on the Flood Map for Planning (Rivers and Sea)[7] in November 2023. The SFRA also references the River Ash modelling (2019) which is currently still used by the Environment Agency.

1.6.5 The Environment Agency National Flood Risk Management 2 (NaFRA2) project is ongoing which will lead to changes in flood products and is due to be published in 2024.

1.6.6 The Environment Agency are currently updating the Lower Colne model. Spelthorne BC should obtain the new study when available and review the outputs to determine whether an update to this SFRA is required.

1.6.7 Implementation of the River Thames Scheme (RTS) would result in a reduction in modelled flood levels in Spelthorne, which will need be reflected in future versions of the SFRA.

1.6.8 **It is noted that future changes to modelling, planning guidance, or climate change impacts may alter the level of risk posed to a specific site. The most up-to-date data must be used throughout the planning process to inform ongoing site planning and development design.**

[6] How to prepare a strategic flood risk assessment https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment
[7] Flood Map for Planning (Rivers and Sea) https://flood-map-for-planning.service.gov.uk/

2. Datasets

2.1 Overview

2.1.1 The following datasets and sources of information have been obtained to inform the Level 2 SFRA.

2.2 River Modelling Outputs

2.2.1 As part of the Environment Agency's national programme of coastal and fluvial modelling studies, hydraulic models have been developed for the Main Rivers in the Borough including the River Thames, River Ash, Sweep's Ditch, Pool End Ditch and River Colne. These are described in turn in the subsections below, along with a summary of the outputs that have been used to inform the Level 2 SFRA site assessments.

2.2.2 The Environment Agency's online guidance 'Flood risk assessments: climate change allowances[8]' sets out the climate change allowances for peak river flows that should be considered. The allowances vary by management catchment which are sub-catchments of river basin districts. The management catchments of relevance to the Spelthorne study area are described in Table 2-1.

2.2.3 The guidance states that for SFRAs the *central* and *higher central* allowance should be used. When preparing site specific FRAs, the allowance that should be considered is based on the Flood Zone and the vulnerability classification of the development. For example, where More Vulnerable development is proposed in Flood Zone 3, the *central* allowance should be applied.

2.2.4 The allowances that have been used within this Level 2 SFRA are detailed in the subsections below. These take into account the allowance specified in the guidance (as noted in Table 2-1) as well as considering what modelled flood extents are available within the received models.

Table 2-1 Peak river flow allowances for management catchments in Spelthorne (use 1961 to 1990 baseline)

Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
London Management	Upper end (95th)	26%	30%	54%
	Higher central (70th)	14%	14%	27%
	Central (50th)	10%	7%	17%
Colne Management	Upper end (95th)	30%	38%	72%
	Higher central (70th)	16%	16%	35%
	Central (50th)	10%	8%	21%
Maidenhead and Sunbury Management	Upper end (95th)	32%	45%	81%
	Higher central (70th)	19%	25%	47%
	Central (50th)	14%	17%	35%

River Thames

2.2.5 As part of the Lower Thames, Jubilee River and River Ash Modelling Study[9], a 1D-2D model was developed to provide high resolution floodplain mapping of the Lower Thames catchment between

[8] Environment Agency (published 2016 and updated May 2022) Flood risk assessments: climate change allowances. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[9] Lower Thames, Jubilee River and River Ash Modelling Study, JBA Consulting, July 2020.

Marlow and Hammersmith as well as enabling the impact of the proposed River Thames Scheme (RTS) updates to be tested and the economic impacts to be quantified in more detail.

2.2.6 Modelled flood extents have been developed for events where the River Thames represents the main source of flooding (Thames dominated) and conversely when the tributaries are the key source of flooding (Tributary dominated). **In Spelthorne BC, the outputs from both scenarios should be considered, as shown in** Figure 2-1**.**

2.2.7 **A small section of land between the Wraysbury Reservoir and the River Colne was not included in the 2023 Thames modelling update. For this area, reference should be made to the previous version of the modelling:** *Lower Thames, Jubilee River and River Ash Modelling Study. Lower Thames and Jubilee River Modelling Report. JBA Consulting, July 2020.* This is included in the Level 1 SFRA. No sites were identified within this area as part of the Level 2 SFRA.

2.2.8 Due to the number of hydraulic models and the number of versions of hydraulic models covering Spelthorne, the Environment Agency have provided a shapefile showing which model/model version to use in which area across Spelthorne. This is shown in Figure 2-1. This shows that for the majority of the Borough, the Thames 2023 (Thames dominated) model should be used with some areas where the Thames 2023 (Thames dominated) and Thames 2023 (Tributary dominated) should be used. A very small area of the Thames 2019 model should be used as this area was excluded from the revised 2023 model extent.

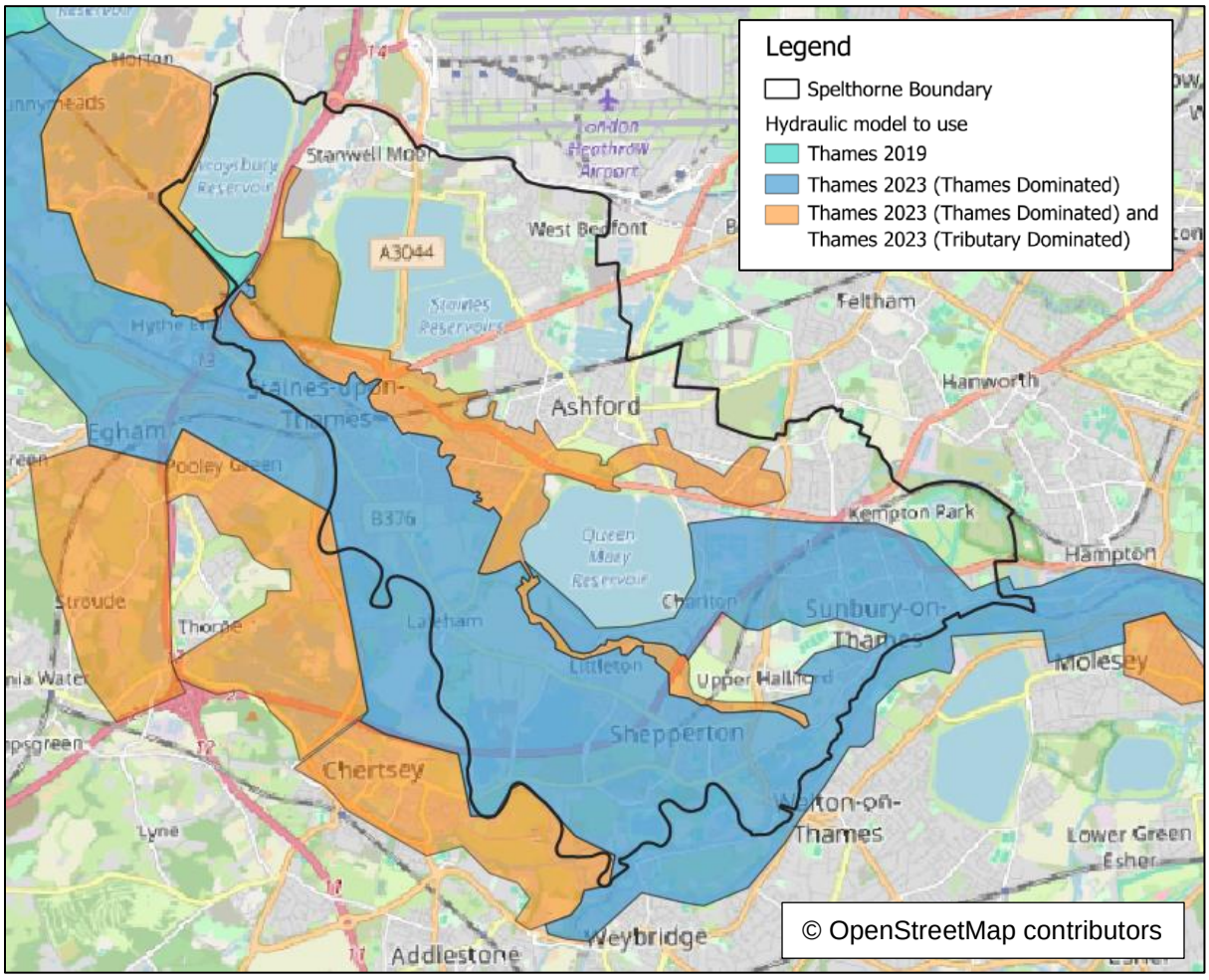

Figure 2-1 Hydraulic models to use across Spelthorne to inform SFRA

2.2.9 The following scenarios were undertaken in the Lower Thames Modelling Study:

- Defended scenarios for the following Annual Exceedance Probability (AEP) events: 50%, 20%, 10%, 5%, 3.33%, 2%, 2%, 1.33%, 1%, 0.5%, 0.1%. The 3.3% AEP flood extent has been used

as the starting point from which to delineate Flood Zone 3b Functional Floodplain for Spelthorne BC, as mapped in the Level 1 SFRA and the site assessments in Appendix B.

- Climate change scenarios: Increases in peak flows of 10%, 20%, 25%, 35% and 81% have been applied to the 1% AEP modelled event. For areas in the London management catchment these modelled outputs provide good coverage for the central allowance (17%) and higher central allowance (27%). For areas in the Maidenhead and Sunbury management catchment, the 35% allowance is suitable for the central allowance (35%) and the 81% allowance could be used as a conservative outline for the higher central (47%).
- Undefended scenarios for the 1% and 0.1% AEP events (to inform the development of Flood Zones 3 and 2 respectively on the Flood Map for Planning (Rivers and Sea)).

2.2.10 The following outputs were produced from the modelling: maximum flood extent, maximum depth, maximum velocity, maximum hazard rating, maximum water level. It is noted that information on the rate of onset of flooding and the duration of flooding has not been made available from these datasets.

2.2.11 Maps showing the maximum flood depths and hazard rating for the 1% AEP including 35% allowance for climate change are included in **Appendix A Figure 1, 2, 3 and 4** and the site proformas (Appendix B) where required.

2.2.12 Flood 'hazard' categorises the danger to people for different combinations of flood water depth and velocity. The derivation of these categories is based on the methodology set out by Defra in Flood Risks Assessment Guidance for New Development FD2320/TR2[10] using the following equation:

*Flood Hazard Rating = ((v+0.5)*D) + DF Where v = velocity (m/s), D = depth (m), DF = debris factor*

Flood Hazard		Description
Low	HR < 0.75	Caution – Flood zone with shallow flowing water or deep standing water
Moderate	0.75 ≥ HR ≤ 1.25	Dangerous for some (i.e. children) – Danger: flood zone with deep or fast flowing water
Significant	1.25 > HR ≤ 2.0	Dangerous for most people – Danger: flood zone with deep fast flowing water
Extreme	HR > 2.0	Dangerous for all – Extreme danger: flood zone with deep fast flowing water

2.2.13 **From December 2023, the Environment Agency are pausing all updates to the Flood Zones on Flood Map for Planning. The last quarterly update was published in November 2023. The next update will be published in Summer 2024, and then Spring 2025. After this time, the Flood Map for Planning will be updated quarterly. The Flood Map for Planning (Rivers and Sea) available online should be consulted for the most up to date Flood Zones 2 and 3a.**

River Ash

2.2.14 The River Ash Modelling Update[11] was completed in 2019 and forms part of the wider-arching Lower Thames, Jubilee River and River Ash Modelling study (JBA July 2020), examining river flood risk along two particular tributaries of the River Thames:

- The River Ash, a tributary of the River Colne in Staines-Upon-Thames; and
- Staines Aqueduct, a man-made channel mainly used for water supply purposes by Thames Water.

2.2.15 **The Thames 2023 (Tributary dominated) modelling incorporates the Ash 2019 model with some improvements. In time, the 2023 River Thames (Tributary dominated) model outputs will be used for decision making along the River Ash, however at the time of preparing this SFRA, the Ash 2019 modelling is still being used by the Environment Agency for decision making. Therefore, the Environment Agency have requested that the River Ash 2019 model outputs be included in this version of the SFRA as well.**

[10] Defra and Environment Agency (2005) FD2320/TR2 Flood Risk Assessment Guidance for New Development.
[11] JBA Consulting, 2019, River Ash Modelling Update.

2.2.16 The following scenarios were undertaken in the River Ash Modelling Update:

- Defended scenarios for the following AEP events: 50%, 20%, 10%, 5%, 3.33%, 2.5%, 2%, 1.33%, 1%, 0.5%, 0.1%. The 3.3% AEP flood extent has been used as the starting point from which to delineate Flood Zone 3b Functional Floodplain for Spelthorne BC, as mapped in the Level 1 SFRA and the site assessments in Appendix B.
- Climate change scenarios: 15%, 25%, 35% and 70% increase in peak flows applied to the 1% AEP modelled event. For areas in the London management catchment these modelled outputs provide good coverage for the central allowance (17%) and higher central allowance (27%).
- Undefended scenarios for the 1% and 0.1% AEP events (to inform the development of Flood Zones 3 and 2 respectively on the Flood Map for Planning (Rivers and Sea)).

2.2.17 The following outputs were produced from the modelling: maximum flood extent, maximum depth grid, maximum velocity, maximum hazard rating, maximum water level.

2.2.18 Maps showing the maximum flood depths and hazard ratings for the 1% AEP including 35% allowance for climate change are included in **Appendix A Figure 5 and 6**, and the site proformas in Appendix B where required.

2.2.19 It is noted that information on the rate of onset of flooding and the duration of flooding has not been made available from these datasets.

River Colne Modelling

2.2.20 Modelling of the River Colne was supplied by the Environment Agency from the Lower Colne Modelling and Mapping Study[12]. The model is a 1D-2D linked model. The section within the Spelthorne Borough is solely in 1D.

2.2.21 The following scenarios were undertaken:

- Defended scenarios for the following AEP events: 50%, 20%, 10%, 5%, 2%, 1% and 0.1%. The 2% AEP flood extent has been used as the starting point from which to delineate Flood Zone 3b Functional Floodplain for Spelthorne BC, as mapped in the Level 1 SFRA and the site assessments in Appendix B.
- Climate change scenarios: 20% increase in peak flows applied to the 1% AEP modelled event in accordance with the Environment Agency guidance 2011 and UKCIP09. Modelling results for the full suite of new allowances, as set out in Table 2-1, are not currently available. It is not currently within the scope of this SFRA to re-run the River Colne model to account for the new climate change allowances. As noted in Table 2-1, the central allowance for the Colne management catchment is 21% and therefore the available dataset is a suitable reference point. In the absence of any further modelled climate change scenarios it is proposed to use the 1 in 1000 year (0.1% AEP) defended outline as a proxy for the higher central (35%) climate change outline within this Level 2 SFRA.
- Undefended scenarios for the 1% and 0.1% AEP events (to inform the development of Flood Zones 3 and 2 respectively on the Flood Map for Planning (Rivers and Sea)).

2.2.22 The following outputs were produced from the modelling: maximum flood extent, maximum depth grid, maximum velocity, maximum hazard rating, maximum water level. However, it is noted that hazard and velocity outputs are only available for those sections of the model in 2D, and it is therefore not available for the Spelthorne Borough.

2.2.23 **Appendix A Figure 7** shows the maximum flood depth map for the 0.1% AEP modelled event. This is included in the site proformas in Appendix B, where required.

2.2.24 **The Environment Agency are updating the Lower Colne model. When these datasets are published, they should be used to update the SFRA and inform flood risk assessments. The Environment Agency will use the outputs from these modelling studies to revise Flood Zones 2 and 3 on the Flood Map for Planning (Rivers and Sea). Updates are made on a quarterly basis.**

[12] Mott MacDonald, April 2012, Lower Colne Modelling and Mapping Study.

The Flood Map for Planning (Rivers and Sea) available online should be consulted for the most up to date Flood Zones 2 and 3a.

2.3 Risk of Flooding from Surface Water

Flood Extents

2.3.1 The Environment Agency's Risk of Flooding from Surface Water (RoFSW) mapping includes GIS layers showing the extent of flooding from surface water that could result from a flood with a 3.33%, 1% and 0.1% chance of happening in any given year.

2.3.2 It is noted that the Risk of Flooding from Surface Water is not to be used at property level. Because of the way they have been produced and the fact that they are indicative, the maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence. However, the mapping provides a useful source of information to identify the risk of surface water flooding to the wider area in which a site is located, and the general patterns of surface water flow and ponding.

2.3.3 Mapping for the whole study area is included in the Level 1 SFRA, Appendix B Figures 11A-11D. Mapping local to each of the sites considered in this Level 2 SFRA is provided in the site proformas in Appendix B.

Impact of Climate Change

2.3.4 The Environment Agency's online guidance 'Flood risk assessments: climate change allowances'[13] sets out the climate change allowances for peak rainfall intensity allowances for specific 'management catchments' and provides advice on applying climate change projections when preparing flood risk assessments. The allowances for the management catchments of relevance to Spelthorne Borough are set out in the Level 1 SFRA (Table 3-6 and Table 3-7) and range from 20-40%.

2.3.5 The ROFSW mapping does not contain a specific climate change scenario. Instead, the 0.1% AEP flood outputs from the RoFSW mapping have been used as a proxy for the 1% AEP including an allowance for climate change. It is recognised that this is a conservative approach, however this provides a useful identification of areas that could be at risk in the future as a result of more extreme rainfall events.

2.4 Groundwater Flooding

Areas Susceptible to Groundwater Flooding

2.4.1 Areas Susceptible to Groundwater Flooding (AStGWF) is an Environment Agency dataset included within the Level 1 SFRA[3]. It is a strategic scale map showing where groundwater flooding could occur. It shows the proportion of each 1km grid square where geological and hydrogeological conditions indicate that groundwater might emerge.

2.4.2 The susceptible areas are represented by one of four categories showing the proportion of each 1km square that is susceptible to groundwater emergence. It does not show the likelihood of groundwater flooding occurring.

- <25%
- >=25%<50%
- >=50%<75%
- >=75%

2.4.3 The absence of values for any grid square means that no part of that square is identified as being susceptible to groundwater emergence. The map identifies areas where further investigation is needed to assess whether groundwater flooding may affect property or infrastructure.

[13] Environment Agency (published 2016 and updated May 2022) Flood risk assessments: climate change allowances. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

2.4.4 Mapping for the whole study area is included in the Level 1 SFRA, Appendix B Figure 12.

BGS Susceptibility to Groundwater Flooding

2.4.5 The British Geological Survey (BGS) dataset 'Susceptibility to Groundwater Flooding' is mapped within the Surrey County Council Local Flood Risk Management Strategy[14] (LFRMS) and has been referred to within the Level 2 SFRA.

2.4.6 The information shown in the Susceptibility to Groundwater Flooding mapping is based on conceptual understanding of the regional geology and hydrogeology and is therefore only an indication of where groundwater flooding may occur. It does not indicate hazard or risk, any information on the depth to which groundwater flooding may occur, nor the likelihood of the occurrence of an event of a particular magnitude. This information should not be used in isolation to make planning decisions at any scale or to indicate the risk of groundwater flooding, but it does provide a high level overview of the potential for groundwater flooding. The map shows the following information:

- **Limited potential for groundwater flooding to occur**: In this area there is a limited potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur.
- **Potential for groundwater flooding of property situated below ground level**: In this area there is the potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur in property or infrastructure below ground level, such as basements.
- **Potential for groundwater flooding to occur at surface**: In this area there is the potential, based on an understanding of the underlying geology and hydrogeological conditions, that groundwater flooding may occur above the ground.

2.4.7 All other areas are not considered to be prone to groundwater flooding.

Impact of Climate Change

2.4.8 Most climate change models indicate an increased likelihood of drier summers, albeit with more intense rainfall when it occurs, and wetter winters. As groundwater flooding occurs primarily as a response to extended periods of rain during late autumn and early winter, there may be an increased risk of groundwater flooding arising from these changing rainfall patterns. However, the complex relationship between rainfall, recharge, groundwater storage and flow make the response to climate change uncertain.

2.4.9 As a result, no further modelling or mapping has been undertaken to specifically identify the risk of groundwater flooding in the future as a result of climate change. It is considered that the locations of groundwater flooding are likely to remain similar to those identified in the BGS mapping, however the impact of climate change may be to increase the frequency and severity of groundwater flooding in those locations. This has been taken into account when undertaking the site specific assessments.

2.5 Reservoir Flooding

2.5.1 The Environment Agency Long Term Flood Risk Map[15] identifies those areas that could flood in the unlikely event that a reservoir failed.

2.5.2 The likelihood of reservoir flooding is much lower than other forms of flooding. Current reservoir regulation, which has been further enhanced by the Flood and Water Management Act, aims to make sure that all reservoirs are properly maintained and monitored in order to detect and repair any problem[16].

[14] Surrey County Council, 2017, Local Flood Risk Management Strategy Refresh. https://www.surreycc.gov.uk/people-and-community/emergency-planning-and-community-safety/flooding-advice/more-about-flooding/surrey-local-flood-risk-management-strategy
[15] Long Term Flood Risk Map https://flood-warning-information.service.gov.uk/long-term-flood-risk/map
[16] Press Release: 'Reservoir flood maps published' https://www.gov.uk/government/news/reservoir-flood-maps-published

2.5.3 Mapping for the whole study area is included in the Level 1 SFRA, Appendix B Figure 14. The majority of the study area is at risk of flooding from reservoirs when river levels are normal or when there is also flooding from rivers.

2.6 Historic Flood Records

Recorded Flood Outlines

2.6.1 The Borough has a history of significant flooding events, specifically from the River Thames, with major events occurring in 1894, six between 1900 and 1929, 1947, 1959, 1974, 2003 2009, 2012 and 2013/2014. The Environment Agency dataset 'Recorded Flood Outlines' has been used to inform the Level 2 SFRA site assessments.

Lead Local Flood Authority Records

2.6.2 In their role as the LLFA, SCC has duties to record and investigate flood incidents relating to local sources of flooding, namely flooding from surface water, groundwater and ordinary watercourses. SCC has provided a number of GIS layers to inform the Level 1 SFRA that relate to past flood events. These datasets are presented spatially in the Level 1 SFRA Appendix A Figures 9A-9D.

2.6.3 A summary of each dataset as provided below:

- **Internal property flooding**: road locations along which internal property flooding has been reported to SCC.
- **External property flooding**: road locations along which external property flooding has been reported to SCC.
- **Historical Flooding Incidents**: indicative road location along which a flood event has occurred that has been investigated by SCC and a Section 19 Flood Investigation Report has been prepared.
- **SCC Wetspots**: 'Wetspot' is a term used by SCC as the LLFA to describe the location of a surface water flooding incident that has been reported. The wetspot database is continually updated to produce a comprehensive map and record of all the identified wetspots in Surrey. Information from Surrey risk management authorities informs the database. SCC currently prioritises capital works at wetspots throughout the county based on a number of factors. These factors include safety, internal property flooding, social impact and duration of flooding. Details of these specific factors have not been supplied for the purposes of the SFRA.

2.6.4 An updated version of the SCC wetspot dataset was provided in December 2021 for use within this Level 2 SFRA site assessments.

Sewer Flooding Records

2.6.5 Thames Water provided an extract from their register of flooded properties for the study area to inform the Level 1 SFRA. This shows properties that have been affected by sewer flooding (as reported to Thames Water) within the last 20 years. Due to data protection requirements, this data has not been provided at the individual property level; rather the register comprises the number of properties within 4 digit postcode areas that have experienced flooding, either internally or externally, over the last 20 years. It should be noted that it is likely that there have also been unreported sewer flooding incidents in this area over this time period.

2.6.6 This data has also been referred to within the Level 2 SFRA site assessments.

2.7 River Thames Scheme

2.7.1 Proposals under the River Thames Scheme (RTS)[17] would reduce the flood risk to Spelthorne from the River Thames. The RTS covers an area from Egham to Teddington. The scheme will create two sections of new river channel: the Runnymede Channel Section and Spelthorne Channel Section. These two sections, totalling 5 miles (8.5km) will act as new flow routes for excess water when water

[17] https://www.riverthamesscheme.org.uk/

levels in the River Thames rise too high. Improvements will be made to the weirs at Sunbury, Molesey and Teddington to increase the amount of flow that can pass through. It is also proposed to lower the riverbed level downstream of the Desborough Cut.

2.7.2 Section 28 of the River Thames Scheme Flood Modelling Report[18] provides a discussion of the impact of the RTS on flood levels along the Thames during different AEP flood events.

2.7.3 Figure 28.10 extracted from the RTS Report is included in the Level 1 SFRA (Figure 3-3). This shows large reductions in flood extent through Laleham, Staines and Shepperton Green. In Staines, flood levels are modelled to reduce by 0.05-0.5m.

2.8 Cumulative impact of development

2.8.1 The NPPF states that strategic policies should be informed by a strategic flood risk assessment, and should consider cumulative impacts in, or affecting, local areas susceptible to flooding (paragraph 166). The PPG also states that a strategic flood risk assessment should assess the cumulative impact that land use changes and development in areas will have on flood risk (paragraph 009).

2.8.2 It is important that each site manages the risk of flooding from all sources, so flood risk is not increased elsewhere and therefore no cumulative impacts are caused.

2.8.3 Where sites are located adjacent to one another, opportunities should be taken to provide a coordinated approach to flood risk management and surface water management.

2.8.4 As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing development of Staines masterplan and associated infrastructure delivery plans. This will need to be developed in consultation with Emergency Planning and the Environment Agency to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area.

2.8.5 Where allocation sites are identified on adjacent plots, a coordinated approach to surface water management should be undertaken to maximise the flood storage that can be provided.

[18] Galliford Binnies (GB), September 2023. River Thames Scheme Flood Modelling Report P04.

3. Level 2 SFRA Site Assessments

3.1 Proforma template

3.1.1 Site assessment proformas are included in Appendix B. Table 3-1 provides an overview of the fields in the proforma and the source of the information or dataset. An overview of the risk of flooding is provided, based on the available datasets, followed by recommendations for how development could be delivered on the site to meet part (2) of the Exception Test.

Table 3-1 Datasets and information used for Level 2 Site Proformas

Proforma Field	Dataset / information used
Site Description	
Site Name and ID	As provided by Spelthorne BC (Excel sheet and GIS layer of sites).
Area (ha)	The area of the site (hectares).
Proposed use	As provided by Spelthorne BC. **Where this was not specified, mixed-use including residential has been assumed to provide a conservative assessment of the site.**
Vulnerability classification	Defined in accordance with PPG Flood Risk and Coastal Change Table 1.
Flood Zone and Historic Flooding	
Proportion within each Flood Zone and Areas Benefitting from Defences	Flood Map for Planning (Rivers and Sea) Flood Zone 2; Flood Map for Planning (Rivers and Sea) Flood Zone 3; Flood Map for Planning (Rivers and Sea) Areas Benefitting from Defences; Level 1 SFRA Flood Zone 3b Functional Floodplain outline.
Flood Warning Area	Environment Agency Flood Warning Areas.
Recorded River Flooding Outlines in which the site is located	The dates of the flood events that have affected the site, as detailed in the Environment Agency 'Recorded Flood Outlines' dataset and mapped in Level 1 SFRA Appendix B Figures 9A and 9B.
Number of flood records within 500m of the site, (road locations along which there have been reported incidents of flooding from surface water, groundwater or ordinary watercourses):	The number of historic records of flooding from surface water, groundwater or ordinary watercourses within 500m of the site, as detailed in datasets provided by Surrey County Council for the Level 1 SFRA described in Section 2.6 of this report, and the SCC Wetspots dataset. These datasets are all supplied as roads along which flood incidents have been recorded rather than individual properties or point locations.
Sewer flooding records within the post code area in which the site is located:	As provided by Thames Water for the Level 1 SFRA and described in Section 3.5 of the Level 1 SFRA Report.
River Flooding	
Maximum Flood Depth Map	Maximum flood depth map(s) for the watercourses relevant to the site (River Thames / Thames Tributaries / River Ash / River Colne), as described in Section 2.2.
Maximum Flood Hazard Map	Maximum flood hazard map(s) for the watercourses relevant to the site (River Thames / Thames Tributaries / River Ash), as described in Section 2.2.
Surface Water Flooding	
Risk of Flooding from Surface Water Map	Environment Agency dataset obtained from the Defra Data Services Platform.
Groundwater Flooding	
Bedrock Geology	Bedrock geology underlying the site, based on BGS mapping.
Superficial Geology	Superficial geology underlying the site, based on BGS mapping.
Areas Susceptible to Groundwater Flooding	The susceptible areas are represented by one of four categories showing the proportion of each 1km square that is susceptible to groundwater emergence. It does not show the likelihood of groundwater flooding occurring.
BGS Susceptibility for Groundwater Flooding	A BGS dataset mapped within the Surrey County Council LFRMS[14] which gives a high level overview of where groundwater flooding may occur based on a conceptual understanding of regional geology and hydrogeology. Described further in Section 2.4.
Aquifer Designation	The aquifer designations of the underlying bedrock geology and the underlying superficial geology.
Other sources	
Flooding from reservoirs	As identified on the Environment Agency Long Term Flood Risk Map[15].
Summary	
An overview of the risk of flooding to the site now and in the future (as a result of the impacts of climate change) based on the information within the proforma.	
Site Specific Recommendations	
Recommendations for how development could be delivered on the site to meet the requirements of part 2 of the Exception Test (where required) i.e. that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall. Recommendations are made in line with the development management measures presented within the Level 1 SFRA[3] (Chapter 5) and typically address the following:	

- Applying sequential approach within development site,
- Setting back development from the edge of watercourses,
- Finished floor levels,
- Floodplain compensation storage,
- Access and egress arrangements,
- Flood warning and evacuation procedures,
- Surface water management,
- Further investigation of groundwater levels.

3.2 Site assessments

3.2.1 Table 3-2 summarises the findings that are within the site proformas in Appendix B. The sites are grouped in the following table based on increasing risk of flooding. Consideration has been made of the flood risk to the site as well as the access routes to and from the site because a site may be on a 'dry island'. In such cases, where More Vulnerable development is proposed in Flood Zone 1 or 2, the Exception Test is not required, however a site specific FRA will still need to demonstrate how the development will be safe for its lifetime, will not increase flood risk, and where possible, will reduce flood risk overall.

Table 3-2 Summary of flood risk issues and constraints for all sites

Legend	Likelihood of deliverability of site from flood risk perspective
	Some flood risk constraints identified, however considered that flood risk could be managed to ensure development is safe for its lifetime without increasing flood risk elsewhere.
	Significant flood risk constraints identified, such as requirements for safe access and/or floodplain compensation storage. Further discussion required with stakeholders to determine measures required to ensure development is safe for its lifetime without increasing flood risk elsewhere.
	Significant flood risk constraints identified. Unlikely to be able to be managed to ensure development is safe for its lifetime without increasing flood risk elsewhere.

Site ID	Area	Address	Units	Land Type	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)	Exception Test Required	Summary
Group 1: Brownfield sites at low risk of flooding from rivers and surface water										
AT3/009	0.26	Ashford Telephone Exchange, Church Road	20	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future. Geological mapping indicates there may be potential for groundwater flooding at surface. As part of site specific proposals ground investigation should be undertaken to determine ground conditions and groundwater levels in proximity to the site.
AT3/016	0.24	23-31 (not 11-19), Woodthorpe Road	120	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future. Geological mapping indicates there may be potential for groundwater flooding at surface. As part of site specific proposals ground investigation should be undertaken to determine ground conditions and groundwater levels in proximity to the site.
SE1/005	0.8	Benwell House, Green Street	39	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
SE1/020	0.43	Sunbury Adult Education Centre, The Avenue	30	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
SE1/025	0.25	Elmbrook House, 18-19, Station Road	50	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
Group 2: Greenfield sites at low risk of flooding from rivers and surface water										
HS1/009	4.88	Bugle Nurseries, 171, Upper Halliford Road	79	GB, MIXED	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
HS1/012b	2.34	Land east of Upper Halliford Road (Site B), Upper Halliford Road	41	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
LS1/024	1.62	Land at Staines Road West and Cedar Way, Staines Road West	77	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future.
SN1/006	4.83	Land to the west of Long Lane and South of Blackburn Trading Estate, Long Lane	200	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The site is susceptible to surface water ponding in the south.
ST1/043	0.27	Land East of 355, London Road	3	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers and surface water flooding now and in the future. The site is immediately adjacent to the Staines Reservoir and therefore in potential danger in the event of a breach.
Group 3: Sites at low risk of flooding from rivers, and medium to high risk of flooding from surface water										
AE3/006	1.31	158-166, Feltham Road	75	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping identifies that the site is susceptible to surface water flooding along the edge of the existing development which could increase in the future as a result of the impacts of climate change.
AS1/001	3.98	Tesco Extra, Town Lane	350	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The risk of flooding from surface water mapping indicates the site is susceptible to surface water flooding and there are records of flooding in the local area which could increase in the future as a result of the impacts of climate change.
AS1/003	0.43	Staines Fire Station, Town Lane	50	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The area to the east of the site along the B378 and along the northern side of the A30, (in the vicinity of the culverted watercourses), are shown to be at risk of surface water flooding on the Risk of Flooding from Surface Water mapping which could increase in the future as a result of the impacts of climate change.
AS1/011	0.3	Land at Former Bulldog Nurseries, London Road	24	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The area to the east of the site along the B378 and along the northern side of the A30, (in the vicinity of the culverted watercourses), are shown to be at risk of surface water flooding on the Risk of Flooding from Surface Water mapping which could increase in the future as a result of the impacts of climate change.
AS2/001	0.25	Ashford Youth Club, Kenilworth Road	5	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The local area including Kenilworth Road and Cumberland Road are shown to be at risk of surface water flooding on the Risk of Flooding from Surface Water mapping which could increase in the future as a result of the impacts of climate change.
AS2/006	3.33	Land east of Desford Way, Desford Way	15	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping indicates part of the site is at low risk of flooding from surface water which could increase in the future as a result of the impacts of climate change.

AT1/002	1.15	Ashford Sports Club, Woodthorpe Road	108	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping shows that the site may be susceptible to surface water flooding during the 0.1% AEP flood event, indicating that the site could be at risk of surface water flooding in the future as a result of the impacts of climate change.
AT3/007	0.2	Ashford Multi-storey car park, Church Road	55	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping does not indicate the site is particularly susceptible to surface water flooding. However, the surrounding area including Clarendon Road and Fordbridge Road are shown to be at risk of surface water flooding.
HS1/002	1.68	Land at Croysdale Avenue, Croysdale Avenue	67	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping does not indicate the site is particularly susceptible to surface water flooding. The site is currently greenfield land. However, parts of Hazelwood Drive are shown to be potentially susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change.
HS1/012	1.6	Land East of Upper Halliford, Nursery Road	60	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping does not indicate the site is particularly susceptible to surface water flooding. There are some locations of ponding.
HS2/004	0.66	Land South of Nursery Road, Nursery Road	41	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping identifies the site is susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change.
SE1/008	0.25	Telephone Exchange, Green Street	14	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping identifies that the site may be susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change.
SN1/005	1.75	Land at Northumberland Close	80	GB, GF	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping identifies that the site may be susceptible to surface water ponding on the eastern side which is likely to increase in the future as a result of the impacts of climate change.
SN1/012	2.19	Stanwell Bedsits, De Havilland Way	175	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water mapping identifies that the site may be susceptible to surface water ponding on the eastern side along Whitley Close which is likely to increase in the future as a result of the impacts of climate change.
ST2/006	1.36	Builders Yard, Gresham Road	343	URBAN, PDL	100	0	0	0	N	The site is shown to be at low probability of flooding from rivers. The Risk of Flooding from Surface Water Map identifies the potential for surface water to pond along the nearby roadways which is likely to increase in the future as a result of the impacts of climate change.
Group 4: Sites within Flood Zone 2 extent but not defended modelled extents										
SC1/013	0.25	RMG Warehouse & Delivery Office, 47-79, Staines Road West	22	URBAN, PDL	0	100	0	0	N	The site is shown to be within Flood Zone 2, medium probability of flooding from rivers, on the Flood Map for Planning. The Risk of Flooding from Surface Water mapping shows that the local area is susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change.
SC1/019	0.23	Sunbury Social Services Centre, 108 Vicarage Road	11	URBAN, PDL	94	6	0	0	N	The site is shown to be within Flood Zone 1 and Flood Zone 2, low and medium probability of flooding from rivers, on the Flood Map for Planning.
SC1/021	2.1	Land at Spelthorne Grove, Spelthorne Grove	250	URBAN, PDL	6	94	0	0	N	The site is shown to be within Flood Zone 2, medium probability of flooding from rivers, on the Flood Map for Planning. The Risk of Flooding from Surface Water mapping shows that the local area including the Escot Road to the west of the site may be susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change`.
SE1/003	0.75	Builders Yard, Staines Road East	75	URBAN, PDL	3	97	0	0	N	The site is shown to be within Flood Zone 2, medium probability of flooding from rivers, on the Flood Map for Planning. The Risk of Flooding from Surface Water mapping identifies that the area to the east of the site and adjacent to the railway line may be susceptible to surface water flooding which is likely to increase in the future as a result of the impacts of climate change.
SE1/024	0.97	Annandale House, 1, Hanworth Road	295	URBAN, PDL	41	59	0	0	N	The site is shown to be within Flood Zone 1, low probability of flooding from rivers, and Flood Zone 2, medium risk of flooding from rivers, on the Flood Map for Planning. The Risk of Flooding from Surface Water mapping does not identify that the site is susceptible to surface water flooding.
Group 5: Sites at risk of flooding from rivers (Flood Zone 2 or 3), with access that is at low hazard rating										
SC1/006	3.75	Tesco Extra, Escot Road	225	URBAN, PDL	92	8	0	0	N	The majority of the site is in Flood Zone 1, low probability of flooding from rivers. A small area in the south is within Flood Zone 2 and shown to be at risk of flooding from the River Thames during the 1% AEP event including 35% climate change allowance. (Land to the west of the site is also at risk during this design event). Development should be steered away from this area at risk. Access/egress is available to the north of the site.
RL1/011	6.06	Land at Staines and Laleham Sports Club, Worple Road	52	GB, GF	20	80	10	0	N	Site is at Low and Moderate hazard. Access/egress that is dry or at low hazard during the 1% AEP event including 35% climate change allowance is available for the site, along Worple Road north to Kingston Road, and then east to the A308. Development of the site must ensure that the risk of flooding to surrounding areas is not increased, and where possible is reduced. Therefore, any increase in building footprint within the design flood extent (1% AEP including climate change) will need to be compensated on a level for level and volume for volume basis within the site.
ST1/031	0.26	Thameside Arts Centre, Wyatt Road	19	URBAN, PDL	0	100	0	0	N	Site is at Low and Moderate hazard. Access that is at low hazard during the 1% AEP event including 35% climate change allowance is achievable via Wyatt Road or Edgell Road, onto Budebury Road and then Gresham Road onto Kingston Road. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced.
ST3/004	0.92	34-36 (OAST House) /Car park, Kingston Road	180	URBAN, PDL	94	6	0	0	N	Only the edge of the site is shown to flood. Access that is dry or Low hazard during the 1% AEP event including climate change allowance is achievable north west along Kingston Road and then east along London Road.
ST3/012	0.59	Staines Telephone Exchange, Fairfield Avenue	180	URBAN, PDL	0	80	20	0	Y	Site is at Low and Moderate hazard from the River Thames during the design event. Access that is dry or at low hazard rating during the 1% AEP event including climate change allowance is achievable along Fairfield Avenue and onto London Road. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced.

ST3/014	1.25	Birch House/London Road, Fairfield Avenue	400	URBAN, PDL	34	66	0	0	N	Part of the site is at Low hazard during the design event for the River Thames. Access that is dry or at low hazard rating during the 1% AEP event including climate change allowance is achievable along London Road. Development should be steered away from the western part of the site which is shown to be at risk during the 1% AEP event including climate change.
Group 6: Sites wholly in Flood Zone 3, with access at low hazard										
AT1/012	0.47	Ashford Community Centre, Woodthorpe Road	32	GB, PDL	0	4	95	1	Y	Site at Moderate hazard, northern edge adjacent to River Ash at Significant hazard. Access at Low hazard during the 1% AEP event including climate change is achievable south along Woodthorpe Road. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced. Development should be set back from the River Ash.
Group 7: Sites in Flood Zone 3, with pedestrian access at low hazard										
ST1/037	1.26	Thameside House, South Street	140	URBAN, PDL	74	20	6	0	Y	Risk on site varies, high in south west quarter, low in the remaining area. Vehicular access is at Moderate and Significant hazard. Pedestrian access shown to be available at Low hazard beneath railway line, through to George Street and Kingston Road. Further consultation with Emergency Planning and the Environment Agency is required to determine safety of occupants. The south western part of the site is at risk of flooding during the design flood event (1% AEP including climate change). In this area, in order to ensure that future development does not increase the risk of flooding to the surrounding areas, the built footprint of the new development should not exceed that of the existing building and where possible should be reduced.
ST4/009	5.13	The Elmsleigh Centre and adjoining land, South Street	850	PDL, URBAN	25	9	66	0	Y	Site is at Significant hazard. Vehicular access route has Moderate and Significant hazard during 1% AEP incl. CC. Pedestrian access shown to be available at Low hazard beneath railway line, through to George Street and Kingston Road. Further consultation with Emergency Planning and the Environment Agency is required to determine safety of occupants. In order to ensure that future development does not increase the risk of flooding to the surrounding areas, the built footprint of the new development should not exceed that of the existing building and where possible should be reduced.
Group 8: Sites primarily in Flood Zone 1 with no access that is dry or low hazard										
SH1/010	0.11	Shepperton Library, High Street	10	URBAN, PDL	100	0	0	0	N	The site is within Flood Zone 1, low probability of flooding from rivers, however access routes to the site are at Moderate hazard rating during 1% AEP event including climate change. Consultation with Emergency Planners and the Environment Agency will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services.
SH1/015	0.31	Shepperton Youth Centre, Laleham Road	25	URBAN, PDL	4	96	0	0	N	The site and access routes are at Moderate - Significant hazard rating during 1% AEP event including climate change. Consultation with Emergency Planners will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced.
SH2/003	0.17	Shepperton Delivery Office, 47, High Street	10	URBAN, PDL	100	0	0	0	N	The site is not at risk of fluvial flooding, however access routes to the site are at Moderate hazard rating during 1% AEP event including climate change. Consultation with Emergency Planners will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services.
ST4/004	0.88	96-104, Church Street	100	URBAN, PDL	29	71	0	0	N	The site is at Low – Moderate hazard. Access to the site is at Moderate - Significant hazard during 1% AEP event including climate change. Consultation with Emergency Planners will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced.
ST4/019	0.24	Debenhams site, 35-45, High Street	150	URBAN, PDL	95	5	0	0	N	The majority of the site (95%) is in Flood Zone 1, low probability of flooding from rivers. The site is not shown to be at risk during the design event. However, access routes to the site are at Moderate - Significant hazard rating during the design event (1% AEP event including climate change). As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing Staines Development Framework and associated masterplanning and Infrastructure Delivery Plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area.
ST4/023	2.29	Two Rivers Retail Park Terrace, Mustard Mill Road	750	URBAN, PDL	80	20	0	0.	N	Most of the site (80%) is in Flood Zone 1, low probability of flooding from rivers, and 20% is in Flood Zone 2 medium probability. The site is not shown to be at risk of flooding the design event (1% AEP event including climate change), however access routes to the site are at Moderate hazard rating. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing Staines Development Framework and associated masterplanning and Infrastructure Delivery Plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area.
ST4/024	0.24	Frankie & Benny's/Travelodge, Two Rivers, Hale Street	55	URBAN, PDL	2	98	0	0	N	The site is largely within Flood Zone 2, medium probability of flooding from rivers. Modelling of the River Thames shows that the site is not at risk during the design event (1% AEP including 35% climate change), however access routes to the site are at risk of flooding with Low – Significant hazard rating. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing Staines Development Framework and associated masterplanning and Infrastructure Delivery Plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area.

ST4/025	0.92	Land at Coppermill Road, Coppermill Road	15	GB, GF	92	8	0	0	N	The site itself it not shown to flood from the River Colne during the 0.1% AEP flood event, however the local area and access is at risk of flooding. The local area is also shown to be at risk of surface water flooding, which is likely to increase in the future due to the impacts of climate change. Consultation with Emergency Planners will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services. A revised model for the Lower Colne is due to be published by the Environment Agency later in 2023/2024, and it is assumed this will contain the relevant climate change allowances for consideration in this management catchment. If safe access cannot be provided, this site should not be allocated.
ST4/028	0.11	William Hill/Vodafone, 91, High Street	14	URBAN, PDL	74	26	0	0	N	The edge of the site is at Low hazard and the access routes are at Moderate- Significant hazard during the 1% AEP event including climate change. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing Staines Development Framework and associated masterplanning and Infrastructure Delivery Plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area.
Group 9: Sites in Flood Zone 3, with no access that is dry or low hazard										
ST1/028	0.15	Leacroft Centre, Leacroft	17	URBAN, PDL	0	16	84	0	Y	The site is at Low to Moderate hazard, and access routes are at Moderate - Significant hazard rating during 1% AEP event including climate change. Consultation with Emergency Planners will be required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services. There is built development on the existing site. In order to ensure that future development does not increase the risk of flooding, the built footprint of new development of the site should not exceed that of the existing building and where possible should be reduced.
ST4/010	0.25	Riverside Surface Carpark, Thames Street	35	URBAN, PDL	0	0	100	0	Y	The site is at Significant hazard rating. Any future development will need to demonstrate no loss in floodplain storage during the 1% AEP event including climate change event. As the existing site is a car park, this will either require buildings to be floodable or raised with floodplain storage beneath. This is unlikely to be considered acceptable for More Vulnerable development. The additional requirement to deliver safe development on the remainder of the site, is providing safe access (dry or Low hazard) for occupants to an area outside the floodplain during the design flood event (1% AEP) including an allowance for climate change. The mapping for the River Thames indicates there is currently no access dry of low hazard route available during the 1% AEP including 35% climate change allowance. In order to cross the railway line and leave the floodplain, parts of the route along the A308 are defined as Significant hazard. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing masterplan development and associated infrastructure delivery plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services.
ST4/026	0.25	Communications House, South Street	120	URBAN, PDL	0	28	72	0	Y	The site and access routes are at Moderate to Significant hazard rating during the 1% AEP event including climate change. The built footprint of the new development should not exceed that of the existing building and where possible should be reduced. The key requirement to deliver safe development on the remainder of the site, is providing safe access (dry or Low hazard) for occupants to an area outside the floodplain during the design flood event (1% AEP) including an allowance for climate change. The mapping for the River Thames indicates there is currently no access dry of low hazard route available during the 1% AEP including 35% climate change allowance. In order to cross the railway line and leave the floodplain, parts of the route along the A308 are defined as Significant hazard. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing masterplan development and associated infrastructure delivery plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services.
Group 10: Sites partially within Flood Zone 3b										
ST4/002	0.9	Bridge Street Car Park, Hanover House & Sea Cadet Building, Bridge Street	158	URBAN, PDL	1	10	41	48	Y	Development is not permitted in areas of Flood Zone 3b Functional Floodplain. This part of the site should be retained as floodplain and steps taken to restore the land to provide a more natural edge of the River Thames. The key requirement to deliver safe development on the remainder of the site, is providing safe access (dry or Low hazard) for occupants to an area outside the floodplain during the design flood event (1% AEP) including an allowance for climate change. The mapping for the River Thames indicates there is currently no access dry of low hazard route available during the 1% AEP including 35% climate change allowance. In order to cross the railway line and leave the floodplain, parts of the route along the A308 are defined as Significant hazard. As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing masterplan development and associated infrastructure delivery plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. The built footprint of the new development should not exceed that of the existing building and where possible should be reduced.
ST4/011	0.36	Thames Lodge, Thames Street	40	URBAN, PDL	0	0	70	30	Y	Development is not permitted in areas of Flood Zone 3b Functional Floodplain. This part of the site should be retained as floodplain and steps taken to restore the land to provide a more natural edge of the River Thames. The key requirement to deliver safe development on the remainder of the site, is providing safe access (that is dry or at low hazard) for occupants to an area outside the floodplain during the design flood event (1% AEP) including an allowance for climate change. The modelling for the River Thames indicates there is currently no dry or low hazard access route available during the 1% AEP including 35% climate change allowance. In order to cross the railway line and leave the floodplain, parts of the route are defined as Significant hazard ('Danger for Most'). As a number of sites are being identified for potential redevelopment in Staines town centre, a wider plan for access to and from the town should be implemented as part of the ongoing development of Staines masterplan and associated infrastructure delivery plans. This will need to be developed in close consultation with Emergency Planning to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Such an access route will also be available for existing properties within the Staines area and will therefore improve the flood risk management measures for the area. The built footprint of the new development should not exceed that of the existing building and where possible should be reduced.

3.2.2 Sites identified in Groups 1-4 should seek to restrict surface water runoff rates to greenfield rates; demonstrate sustainable approaches to the management of surface water making use of SuDS; and incorporate soft landscaping, planting, and permeable surfacing. A preliminary Hydrogeological Risk Assessment (HRA) should be undertaken to determine ground conditions and groundwater levels in proximity to the site, and to identify whether the proposed development will impact on groundwater, either from subsurface construction or from changes to surface water drainage. The potential impact of climate change will be included within this assessment. Should the preliminary HRA identify potential for impact, a full HRA should be prepared to identify proposed mitigation measures.

3.2.3 Two sites have significant proportions of their area within the 3.3% AEP (1 in 30 year) modelled flood extent. New development should not be permitted within this flood extent (Flood Zone 3b). Redevelopment of existing buildings may be permitted, but only where the vulnerability of the development is not increased (and where possible reduced) and the number of occupants does not increase. This will significantly limit the number of units that can be delivered on these sites:

- ST4/002 Car Park, Hanover House and Sea Cadet Building, Bridge Street, TW18 4TG
- ST4/011 Thames Lodge, Thames Street

3.2.4 For all sites within Staines, a wider plan for access must be implemented as part of the ongoing Staines Development Framework and associated masterplanning and Infrastructure Delivery Plans. This will need to be developed in consultation with Emergency Planning teams and the Environment Agency to ensure the safety of occupants, and not place an unacceptable additional burden on the emergency services. Phasing of the sites over the local plan period should take into account when this provision of improved access can be delivered.

3.2.5 There are also isolated sites where access that is dry or at Low hazard is not available. Further consultation with Emergency Planners and the Environment Agency is required to discuss the safety of occupants, and not place an unacceptable additional burden on the emergency services.

- SH1/015 Shepperton Youth Centre, Laleham Road, TW17 8EJ
- ST1/028 Leacroft Centre, Leacroft
- SH1/010 Shepperton Library, High Street
- SH2/003 Shepperton Delivery Office, 47, High Street
- ST4/004 96-104, Church Street
- ST4/025 Land at Coppermill Road, Coppermill Road
- ST4/019 Debenhams site, 35-45, High Street, TW18 4QU
- ST4/023 Two Rivers Retail Park Terrace, Mustard Mill Road, Staines
- ST4/024 Frankie & Benny's/Travelodge, Two Rivers, Hale Street, Staines
- ST4/028 William Hill / Vodafone, Monsoon, High Street
- ST4/010 Riverside Surface Carpark, Thames Street, TW18 4UD
- ST4/026 Communications House, South Street, Staines

3.2.6 The following sites are located entirely within the design flood extent (1% AEP including climate change), and currently used for non-residential 'Less Vulnerable' uses. For these sites, it will not be possible to provide level-for-level and volume-for-volume floodplain compensation storage *within* the development sites for any increase in building footprint. As a result, the built footprint of the new development of the site should not exceed that of the existing development. This may limit the number of units that can be delivered on the sites. Alternatively, some of the proposed development units could be designed to enable the free flow and storage of floodwater at ground level, with development located at higher levels, subject to further discissions with the Environment Agency. This may be achieved through the provision of undercroft open space with residential development at first floor level and above. However, it must be demonstrated that this area will be available for flood storage, and this

would need to be communicated to future occupants. Voids are not an acceptable method of floodplain compensation and will not be appropriate here.

- ST1/031 Thameside Arts Centre, Wyatt Road, TW18 2AY
- ST3/012 Staines Telephone Exchange, Fairfield Avenue, TW18 4AB
- AT1/012 Ashford Community Centre, Woodthorpe Road
- ST4/009 The Elmsleigh Centre and adjoining land, South Street
- SH1/015 Shepperton Youth Centre, Laleham Road, TW17 8EJ
- ST4/010 Riverside Surface Carpark, Thames Street, TW18 4UD
- ST4/026 Communications House, South Street
- ST4/002 Car Park, Hanover House and Sea Cadet Building, Bridge Street, TW18 4TG
- ST4/011 Thames Lodge, Thames Street

3.2.7 Of these, ST4/010 (Riverside Surface Carpark, Thames Street, TW18 4UD) and ST4/002 (Car Park, Hanover House and Sea Cadet Building, Bridge Street, TW18 4TG) currently do not have existing buildings within the sites. In order for future development not to impact on the ability of the floodplain to store water, this would require buildings to be floodable or raised with floodplain storage beneath. This is unlikely to be considered acceptable for More Vulnerable development.

3.2.8 It is noted that following review of previous draft versions of the Level 2 SFRA, Spelthorne BC have removed the following sites from their Local Plan site allocations. These are retained with the Level 2 SFRA to provide a full evidence base; however, the sites are not currently proposed for allocation.

- ST4/002 Car Park, Hanover House and Sea Cadet Building, Bridge Street, TW18 4TG
- ST4/010 Riverside Surface Carpark, Thames Street, TW18 4UD
- ST1/028 William Hill / Vodafone, Monsoon, High Street
- ST4/011 Thames Lodge, Thames Street

Appendix A Borough-Wide Mapping

A.1 River Thames Mapping

Figure 1 River Thames (Thames dominated) Maximum Flood Depth Map (1% AEP plus 35% climate change)

Figure 2 River Thames (Thames dominated) Maximum Flood Hazard Map (1% AEP plus 35% climate change)

A.2 Thames Tributaries Mapping

Figure 3 River Thames (Tributary dominated) Maximum Flood Depth Map (1% AEP plus 35% climate change)

Figure 4 River Thames (Tributary dominated) Maximum Flood Hazard Map (1% AEP plus 35% climate change)

A.3 River Ash Mapping

Figure 5 River Ash Maximum Flood Depth Map (1% AEP plus 35% climate change)

Figure 6 River Ash Maximum Flood Hazard Map (1% AEP plus 35% climate change)

A.4 River Colne Mapping

Figure 7 River Colne Maximum Flood Depth Map (0.1% AEP)

Appendix B Site Assessments

Appendix C Staines Central Maps