Harborough District Level 2 Strategic Flood Risk Assessment

Final

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This report describes work commissioned by Harborough District Council, by an instruction dated 8 October 2024 by Lesley Aspinall. The Client's representative for the contract was Lesley Aspinall of Harborough District Council. Lucy Briscoe and George Wiggin of JBA Consulting carried out this work.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between October and November 2024 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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- Harborough District Council
- Environment Agency
- Leicestershire County Council
- Neighbouring Authorities
- Anglian Water
- Severn Trent Water
- Canal and River Trust

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Abbreviations

1D	1 Dimensional
2D	2 Dimensional
AEP	Annual Exceedance Probability
BGS	British Geological Survey
CFMP	Catchment Flood Management Plan
CIRIA	A company that provides research and training in the construction industry
Defra	Department of the Environment, Food and Rural Affairs
DTM	Digital Terrain Model
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FRMP	Flood Risk Management Plan
GSPZ	Groundwater Source Protection Zone
IDB	Internal Drainage Boards
LASOO	Local Authority SuDS Officer Organisation
LFRMS	Local Flood Risk Management Strategy
LIDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NaFRA	National Flood Risk Assessment
NPPF	National Planning Policy Framework
NVP	Nitrate Vulnerable Zones
PPG	Planning Policy Guidance

PFRA	Preliminary Flood Risk Assessment
RBMP	River Basin Management Plans
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan

Definitions

1D model: One-dimensional hydraulic model, typically representing a watercourse and structures within the channel (for example bridges and culverts).

2D model: Two-dimensional hydraulic model, typically representing the floodplain flows.

Brownfield: Previously developed parcel of land.

Annual Exceedance Probability (AEP): The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.

Critical Drainage Areas: A discrete geographic area where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, Main River and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting houses, businesses and/or local infrastructure.

Design flood: This is a flood event of a given annual flood probability, which is generally taken as:

- 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 chance each year),
- Plus, an appropriate allowance for climate change.

Exception Test: Set out in the NPPF, the Exception Test is a method used to demonstrate that flood risk to people and property will be managed appropriately. The Exception Test is applied following the Sequential Test.

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

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

Flood Risk Area: An area determined as having a significant risk of flooding in accordance with guidance published by Defra

Flood Risk Regulations: Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.

Flood and Water Management Act (2010): Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England.

Fluvial Flooding: Flooding resulting from water levels exceeding the bank level of a river.

Functional Floodplain: The land where water has to flow or be stored in times of flood.

Greenfield: Undeveloped parcel of land.

Lead Local Flood Authority (LLFA): County councils and unitary authorities which lead in managing local flood risks (risks of flooding from surface water, groundwater and ordinary (smaller) watercourses). The London Borough of Newham is a lead local flood authority.

Local Planning Authority (LPA): The local government body which is responsible by law to exercise planning functions for a particular area.

Main River: A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers.

Natural Flood Management (NFM): A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes to store or slow down flood waters before they can damage flood risk receptors (e.g., people, property, infrastructure, etc.).

Ordinary Watercourse: All watercourses that are not designated Main River. Local Authorities or, where they exist, IDBs have similar permissive powers as the Environment Agency in relation to flood defence work. However, the riparian owner has the responsibility of maintenance.

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

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 (RMA): Operating authorities who’s remit and responsibilities concern flood and/or coastal risk management.

Sequential Test: Set out in the NPPF, the Sequential Test is a method used to steer new development to areas with the lowest probability of flooding.

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

Standard of Protection (SoP): Defences are provided to reduce the risk of flooding (typically from a river, sea or surface water). A Standard of Protection is usually described in terms of an AEP flood event. For example, a flood embankment could be described as providing a 1% AEP Standard of Protection.

Sustainable Drainage Systems (SuDS): Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.

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

Executive Summary

The Level 2 Strategic Flood Risk Assessment (SFRA) document was created with the purpose of supporting the review and update of the Harborough Local Plan. In this SFRA, 178 potential development sites were screened with 13 proposed allocations identified as having significant risk of flooding and/or access and egress issues, which have been assessed in 12 site summary tables. This SFRA incorporates recent changes to national and local planning policy and considers the cumulative impacts of development across the district.

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

The aim of the Level 2 assessment is to build on identified risks from the Level 1 SFRA for proposed development sites, to provide a greater understanding of fluvial, surface water, groundwater, and reservoir related flooding risks to the site. The Level 2 assessment also helps Harborough District Council answer the Flood Risk portion of the Exception Test to ensure the development is safe for its lifetime. From this, the Council and Developers can make more informed decisions and pursue development in an effective and efficient manner. The Level 2 assessment also identifies sites for further risk analysis at the site-specific Flood Risk Assessment (FRA) stage.

The Level 2 assessment includes detailed assessments of the proposed site options. These include:

- Providing an up-to-date Strategic Flood Risk Assessment, taking into account the most recent policy and legislation in the National Planning Policy Framework (2023).
- An assessment of all sources of flooding including fluvial flooding, surface water flooding, groundwater flooding and the potential increase in fluvial, surface water and tidal flood risk due to climate change, and how these may be mitigated.
- An assessment of existing flood warning and emergency planning procedures, including an assessment of safe access and egress during an extreme event.
- Advice and recommendations on the likely applicability of sustainable drainage systems for managing surface water runoff.
- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as evidence base for use in the emerging Local Plan.
- Advice on whether the sites are likely to pass the second part of the Exception Test and the Sequential Test with regards to flood risk and on the requirements for a site-specific FRA and outline specific measures or objectives that are required to manage flood risk.

As part of the Level 2 SFRA, detailed site summary tables have been produced for the proposed allocation sites, where the screening identified significant flood risk issues. To accompany the site summary tables, there are Geo-PDF maps, with mapped flood risk outputs.

The site summary tables produced detail the flood risk to each site, the NPPF requirements, and guidance for site-specific FRAs. A broadscale assessment of suitable SuDS options have been provided, giving an indication where there may be constraints to certain types of SuDS techniques. Each site has a Geo-PDF map with the respective flood risk outputs. Most sites that are situated in close proximity to watercourses are shown to be at significant fluvial flood risk.

The following points summarise the Level 2 Assessment:

- **Fluvial Flooding** - some areas of Harborough are at greater risk than others. The sites most at risk are 8054 and 12231 with risk from the River Welland. Site 8631 encounters fluvial flood risk from the River Sence, and is likely to encounter risk from the Wash Brook. A number of sites namely 8241, 8247, 10248, 10253, 10595, 10649, are in the vicinity of ordinary watercourses, and the risk to these sites will need to be quantified as part of a detailed site-specific Flood Risk Assessment.
- **Surface Water** - surface water flood risk is widespread across Harborough. Water predominantly flows into and along topographically low-lying areas, including Market Harborough, and Lutterworth into watercourses such as the River Welland, River Sence, River Swift, and into the larger unnamed watercourses. Most of the sites with a detailed Level 2 summary table are at surface water flood risk. The degree of flood risk varies, with some sites being only marginally affected, and other sites being more significantly affected. Sites taken forward to the Level 2 SFRA identified to be at greatest risk of surface water flooding are 8054, 8155, 8631, 10240, 10248, 10253, and 12231.
- **Access and Egress** - Several sites with detailed Level 2 summary tables have potential access and egress issues as a result of fluvial and surface water flooding on the surrounding roads. These sites are: 8054, 8143, 8234, 8631, 10253, 10595, and 12231. Whilst not at significant risk within the site boundary, some sites screened are shown to have potential access/egress issues in the event of surface water/ fluvial flooding, namely 8151, 8205, 8208, 8238, and 10554. Consideration should be made to these sites as to how safe access and egress can be provided during flood events, both to people and emergency vehicles. Also, consideration should be given to the nature of the risk, for example whether the flooding forms a flow path or bisects the site where access from one side to another may be compromised.
- **Effects of Climate Change** - fluvial and surface water climate change mapping indicates that flood extents are generally predicted to increase. As a result, the flood depths, velocities, and hazard of flooding may also increase. The

significance of the increase tends to be dependent on the topography of the site and the climate change percentage allowance used.

  - **Surface water** - The 3.3% AEP +25% and +35% and the 1% AEP +25% and +40% climate change surface water events have been derived from the RoFfSW dataset as an indication of climate change to surface water flood risk. The RoFfSW 1% AEP plus 40% climate change surface water events are larger than their respective present day 1% AEP events, with extents similar to the present day 0.1% AEP events, showing Harborough to be highly sensitive to increases in surface water flooding due to climate change.
  - **Fluvial** - Climate change allowances for the 3.3% and 1% AEP events have been derived from hydraulic modelling of the models listed in Section 4.2. The Rivers Welland, Upper Sence, Stonton Brook, Medbourne Brook, Langton Brook, and Great Easton Brook models show the 1% AEP plus Central climate change allowance to be predominantly larger than the modelled present day 1% AEP fluvial events but similar to the modelled present day 0.1% AEP fluvial events.
  - All sites taken forward to a Level 2 assessment are sensitive to changes in surface water and fluvial flood risk due to climate change. Sites most sensitive to climate change are 8054, 8631, 10248, 10253, and 12231.
  - Site specific FRAs and site drainage and management plans should confirm the impact of climate change using the latest guidance. It is recommended that Harborough District Council work with other Risk Management Authorities (RMAs) to review the long-term sustainability of existing and new developments in these areas when developing climate change plans and strategies for the District.

- **Sewer flooding** - sewer flooding records from the water companies were unavailable, Anglian Water and Severn Trent Water's DWMP provides details for sewers in the general area of the sites.
- **Historic Flooding** - historic data provided by Leicestershire County Council as the LLFA showed one instance of recorded flooding within the study area from the Section 19 reporting in Kibworth Harcourt and Kibworth Beauchamp. However, Harborough District Council hold records of flooding from recent adverse weather events such Storm Babet and Storm Henk. Leicestershire County Council hold information on the flooding caused by Storm Henk. No sites assessed encounter historic flood extents from information provided.
- **Groundwater** - the JBA Groundwater Flood Data Map indicates the majority of the south and east of Harborough is at negligible risk from groundwater emergence due to the nature of the local geological deposits. There majority of the District is at low risk, however area that are at moderate to high risk are located along the south-eastern boundary of the district. In these areas there is a risk to subsurface assets and surface manifestation of groundwater is likely. The areas where emergence is likely are around the River Welland, River Jordan, and

River Avon, particularly in the Lutterworth and Market Harborough and the areas surrounding the settlements. Sites most affected by ground water are 8241 and 10248.

- **Canals** - There is one canal in the Harborough study area, the Grand Union Canal (including the Market Harborough Arm). These have the potential to interact with other watercourses and become flow paths during flood events or in a breach scenario. Site 8143 is at potential risk from breach or overtopping of the Grand Union Canal. While sites 8247 is in the vicinity of the canal, it is far enough away, on higher ground, that extents from breaches or over topping are unlikely to reach the site.
- **Reservoirs** - There is a potential risk of flooding in Harborough that is posed by reservoirs within and outside of this study area. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific Flood Risk Assessments (where relevant). No sites taken to a Level 2 assessment are within 'Wet Day' or 'Dry Day' scenario flood extents.

Requirements for Developers

- Any sites located where there is a Main River (including culverted reaches of Main River) will require an easement of 8m (9m in the EA Anglian Region) either side of the watercourse from the top of the bank. This may introduce constraints regarding what development will be possible and consideration will also need to be given for 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.
- A strategic assessment of SuDS options has been undertaken using regional datasets. A detailed site-specific assessment of suitable SuDS techniques should be undertaken at site-specific level to understand which SuDS options are most appropriate. This may need to include infiltration testing to determine the suitability of infiltration methods.
- At the planning application stage, developers may need to undertake more detailed hydrological and hydraulic assessments of unmodelled watercourses and surface water interactions so that the potential effects of proposals can be evaluated at site level and ensure there is no increase in risk off-site as result of development. The modelling should evidence flood extents, depths, velocities, and hazard (including latest climate change allowances), inform development zoning within the site and prove, if required, whether the Exception Test can be passed.
- For sites allocated within the Local Plan, the Local Planning Authority should use the information in this SFRA to inform the Exception Test. At planning application

stage, the developer must adopt an approach in line with the Sequential Test when assessing the feasibility of site allocations. This will ensure that appropriate flood resistance and resilience measures are put in place, which align with the recommendations in National and Local Planning Policy and supporting guidance as well as those set out in this SFRA.

- For developments that have not been allocated in the Local Plan, developers must undertake the Sequential Test followed by the Exception Test (if required) and present this information to the Local Planning Authority for approval. Developers will need to apply the Exception Test and use information in a site-specific Flood Risk Assessment to inform this test at planning application stage. The Exception Test should be applied where there is development which is classed as;
    - More vulnerable in Flood Zone 3a
    - Highly vulnerable in Flood Zone 2 (this is NOT permitted in Flood Zone 3a or 3b)
    - Essential infrastructure in Flood Zone 3a or 3b
    - Any development with significant* risk in the surface water 1% AEP event plus 40% climate change allowance flood extent.

    **Flood risk issues are not always black and white - the significance of issues requires professional judgement, based on the location, topography and nature (including depth, velocity and hazard) of flooding, rather than simply whether part of a site is within a given flood extent. This would be determined as part of a Level 2 assessment.*

The Level 1 SFRA can be used to scope the flooding issues that a site-specific FRA should investigate in more detail to inform the Exception Test for windfall sites.

It is recommended that as part of the early discussions relating to development proposals, developers discuss requirements relating to site-specific FRA and drainage strategies with both the Local Planning Authority and the Lead Local Flood Authority (LLFA), to identify any potential issues that may arise from the development proposals.

1 Introduction

1.1 Purpose of the Strategic Flood Risk Assessment

Paragraph 166 of the National Planning Policy Framework (NPPF) (December 2023) states that strategic policies should be informed by a Strategic Flood Risk Assessment (SFRA) 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 (EA) and other flood risk management authorities. Such as Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards.

The Planning Practice Guidance (PPG) (2022) advocates a staged approach to risk assessment and identifies two levels of SFRA:

- Level 1 SFRA (L1): where flooding is not a major issue and where development pressures are low. The assessment should be sufficiently detailed to allow application of the Sequential Test. Level 1 is completed first to understand whether a Level 2 assessment is required.
- Level 2 SFRA (L2): where land outside the EA's Flood Zones 2 and 3 (and land outside areas affected by other sources of flooding as per the Exception Test requirements) cannot accommodate all the necessary development creating the need to apply the NPPF's Exception Test. In these circumstances, the assessment should consider the detailed nature of the flood characteristics within a Flood Zone and assessment of other sources of flooding.

This SFRA report fulfils the requirements for a Level 2 assessment of strategic sites identified for potential allocation within Harborough District and has been prepared in accordance with the NPPF (December 2023) and PPG (2022).

This report should be read alongside the Harborough District Council Level 1 SFRA (2024) and builds upon the information presented in the Level 1 SFRA.

1.2 SFRA Objectives

The Objective of this Level 2 SFRA are to:

- Provide individual flood risk analysis for site options using the latest available flood risk data, thereby assisting the council in applying the Exception Test to their proposed site options, in preparation of the update to the Harborough District Local Plan.
- Use the best 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 most recent policy and legislation in the NPPF, PPG and LLFA Sustainable Drainage Systems (SuDS) guidance.

1.3 Consultation

SFRAs should be prepared in consultation with other risk management authorities. The following parties (external to Harborough District Council as the Local Planning Authority (LPA)) have been consulted during the preparation of this Level 2 SFRA:

- Environment Agency
- Leicestershire County Council (LCC) as Lead Local Flood Authority (LLFA)
- Canal and River Trust
- Severn Trent Water (STW)
- Anglian Water (AW)

1.4 How to Use This Report

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

Table 1-1: Outline of the contents of each section of this report and how they should be applied.

Section	Contents	How to use
1. Introduction	Outlines the purpose and objectives of the Level 2 SFRA	For general information and context.
2. The Planning Framework and Flood Risk Policy	Includes information on the implications of recent changes to planning and flood risk policies and legislation, as well as documents relevant to the study. For more detail, please refer to Sections 2 and 3 of the Level 1 SFRA.	Users should refer to this section for any relevant policy which may underpin strategic or site-specific assessments.
3. Sources of Information Used in Preparing the Level 2 SFRA	Summarises the data used in the Level 2 assessments and Geo-PDF mapping. Outlines the latest climate change guidance published by the Environment Agency and how this was applied to the SFRA.	Users should refer to this section in conjunction with the summary tables and Geo-PDF mapping to understand the data presented. This section should be used to understand the climate change allowances for a range of epochs and conditions, linked to the vulnerability of a development.

Section	Contents	How to use
	Sets out how developers should apply the guidance to inform site-specific Flood Risk Assessments.	Developers should refer back to this section when understanding requirements for a site-specific Flood Risk Assessment (FRA).
4. Level 2 Assessment Methodology	Summarises the sites taken forward to a Level 2 assessment and the outputs produced for each of these sites.	This section should be used in conjunction with the site summary tables and Geo-PDF mapping to understand the data presented.
5. Flood Risk Management Requirements for Developers	Identifies the scope of the assessments that must be submitted in FRAs supporting applications for new development. Refers back to relevant sections in the L1 SFRA for mitigation guidance.	Developers should use this section to understand requirements for FRAs and what conditions/ guidance documents should be followed. Developers should also refer to the L1 SFRA for further information on flood mitigation options.
6. Surface Water Management and SuDS	Refers back to relevant sections in the L1 SFRA for information on SuDS and surface water management.	Developers should use this section to understand the suitability of SuDS across the study area and refer to the L1 SFRA for further information on types of SuDS, the hierarchy and management trains information.
7. Summary of Level 2 Assessment and Recommendations	Summarises the results and conclusions of the Level 2 assessment, and signposts to the L1 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 site summary tables. Developers should refer to the L1 SFRA recommendations when considering requirements for site-specific assessments.

Section	Contents	How to use
Appendix A: Site Summary Tables and GeoPDFs	Provides a detailed summary of flood risk for sites requiring a more detailed assessment. The section considers flood risk, emergency planning, climate change, broadscale assessment of possible SuDS, exception test requirements and requirements for site-specific FRAs. Provides Geo-PDF mapping for each Level 2 assessed site displaying flood risk at and around the site.	Planners should use this section to inform the application of the Sequential and Exception Tests, as relevant. Developers should use these tables to understand flood risk, access and egress requirements, climate change, SuDS, and FRA requirements for site-specific assessments. Planners and developers should use these maps in conjunction with the site summary tables to understand the nature and location of flood risk.
Appendix B: GeoPDF User Guide	The associated User Guide providing details of the layers used within the interactive PDF mapping.	See the User Guide within Appendix B: GeoPDF Mapping and User Guide.
Appendix C: Sites Carried Forward to a Level 2 Assessment	Provides a table which lists all the sites that were screened for the Level 2 assessment and have been deemed as having significant flood risk. The table details fluvial and surface water flood risk from EA datasets (FMfP and RoFfSW) and hydraulic modelling.	Developers should use this table to understand flood risk for site-specific assessments.

1.5 SFRA Study Area

Harborough District covers an area of approximately 600km^2 and has a population of approximately 97,600[1]. The district is predominantly rural, with the largest settlements

1 Harborough population change, Census 2021 – ONS

comprising Market Harborough (population 24,171), Lutterworth (population 10,833) and Broughton Astley (population 9,647)[2].

Harborough District saw the largest increase in population in the East Midlands between 2011 and 2021, increasing by 14.3%[3]. Figure 1-1 shows the study area and the neighbouring authorities. There are nine authorities that border Harborough District. These authorities are:

- Melton Borough Council
- Rutland County Council
- North Northamptonshire Council
- West Northamptonshire Council
- Rugby Borough Council
- Blaby District Council
- Oadby and Wigston Borough Council
- Leicester City Council
- Charnwood Borough Council

The main named rivers that flow through Harborough and along the district boundary are the River Avon, River Chater, River Jordan, River Sence, River Soar, River Swift, and the River Welland. There are unnamed watercourses and smaller named watercourses that form tributaries to theses rivers, all of which are shown in Figure 1-2. Additionally, the Grand union canal crosses the district as shown in Figure 1-3.

2 United Kingdom: East Midlands (Local Authority Districts and Parishes) - Population Statistics, Charts and Map (citypopulation.de)

3 https://www.ons.gov.uk/visualisations/censuspopulationchange/E07000131/

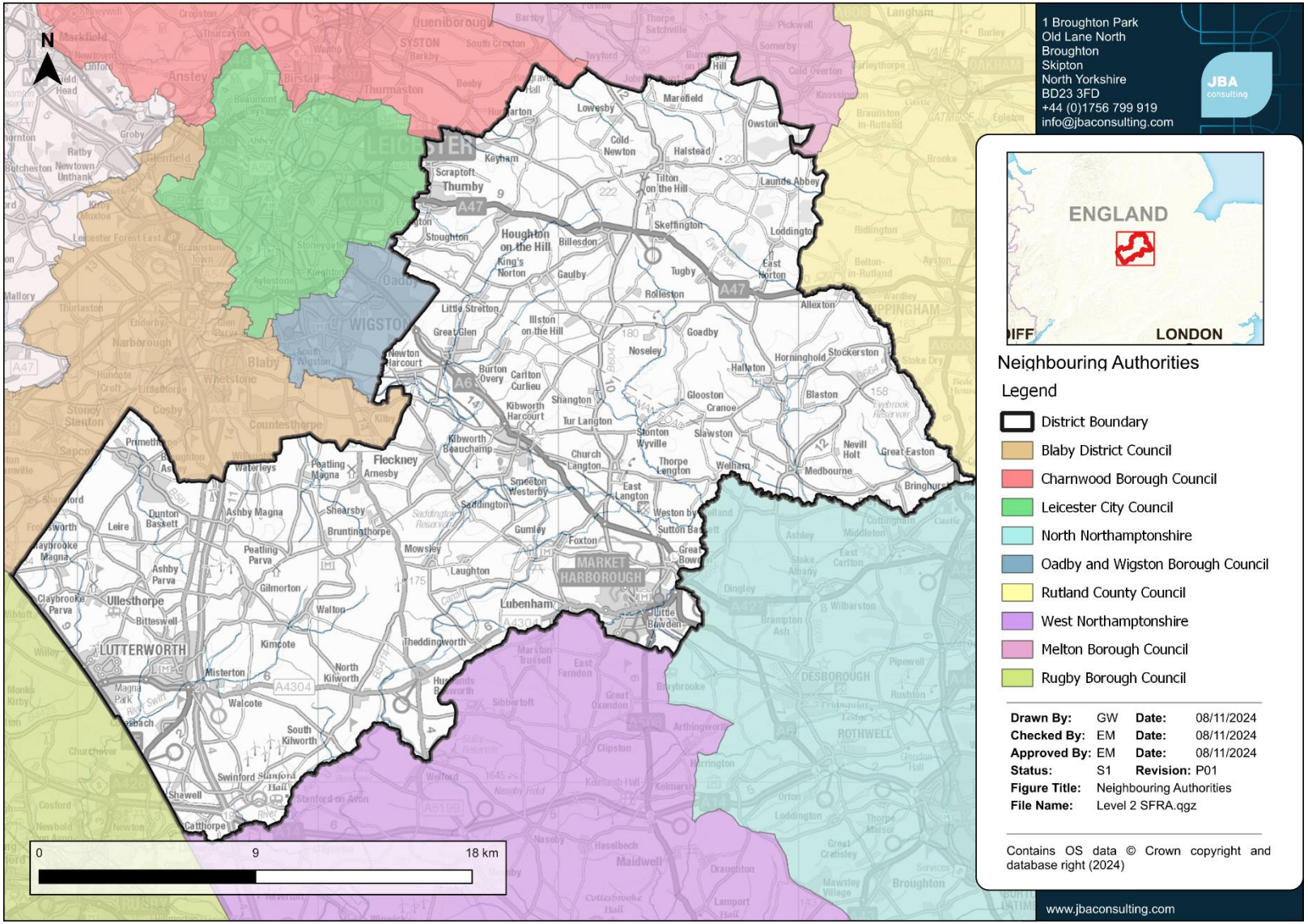


Figure 1-1: Neighbouring Authorities

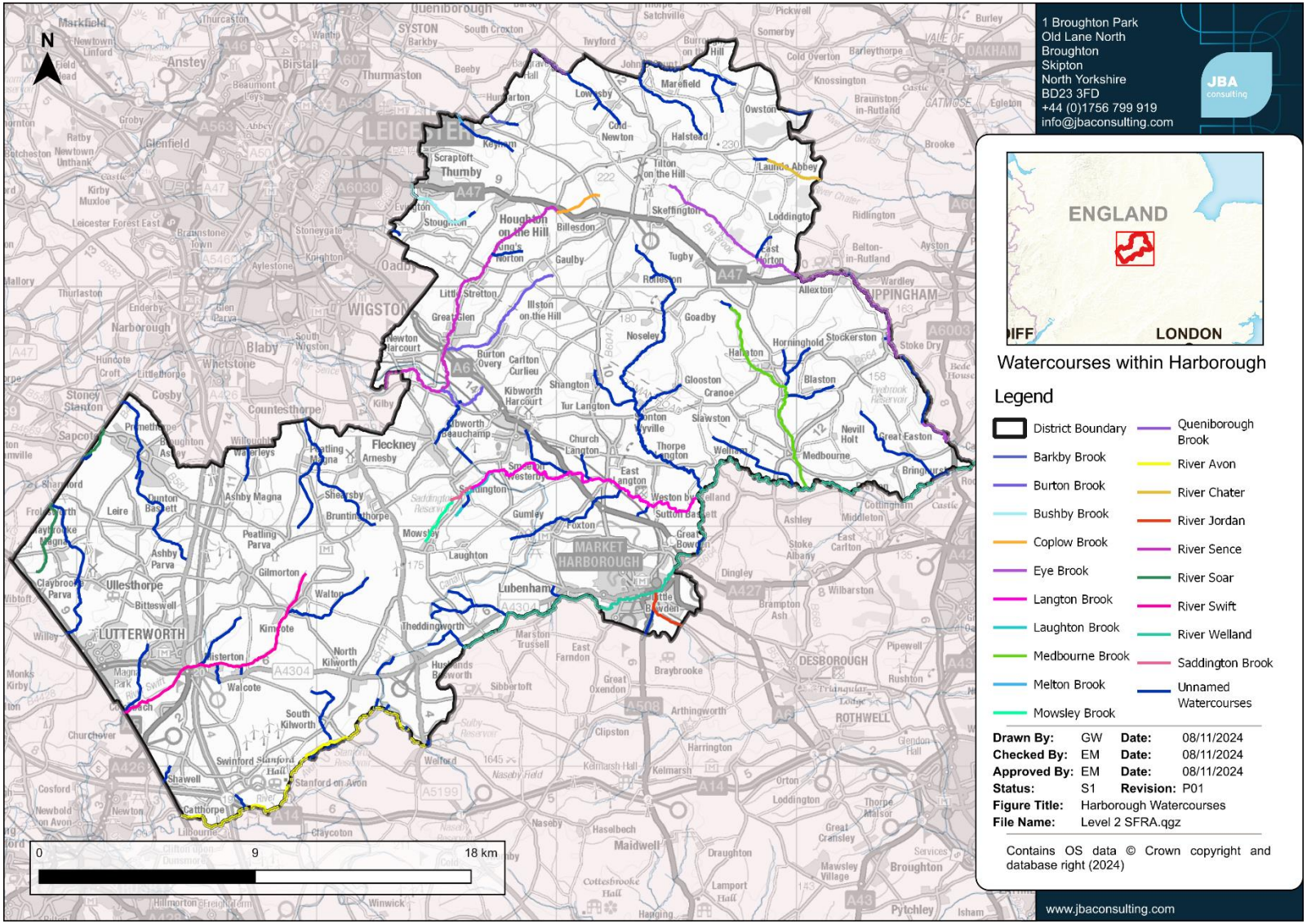


Figure 1-2: Watercourses within Harborough

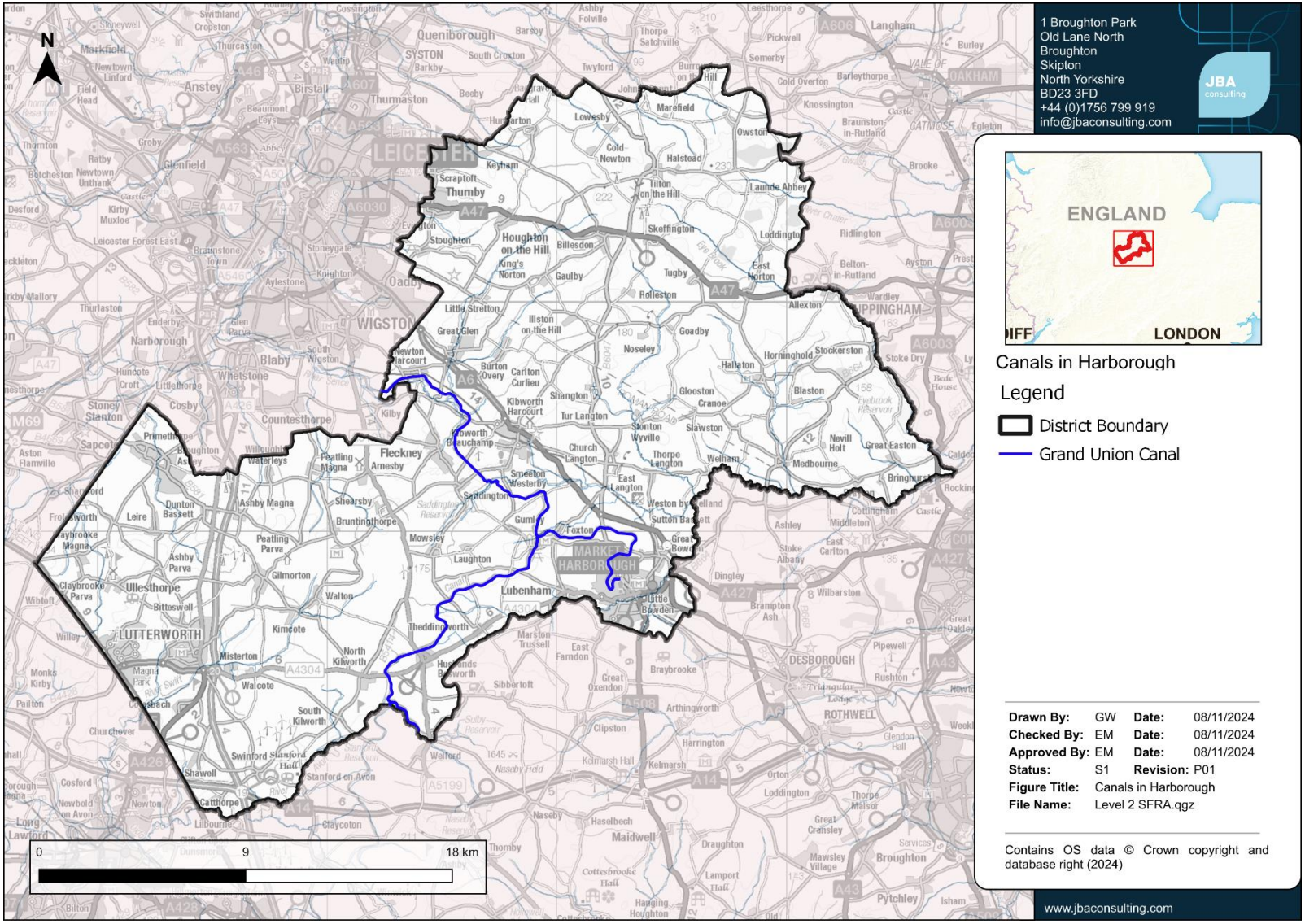


Figure 1-3: Canals in Harborough

2 The Planning Framework and Flood Risk Policy

2.1 National Planning Policy Framework and Guidance

The revised National Planning Policy Framework (NPPF) was updated in December 2023 the NPPF sets out the Government's planning policies for England and how these are expected to be applied . The framework is based on core principles of sustainability and forms the national policy framework in England, also accompanied by a number of Planning Practice Guidance (PPG) notes. It must be accounted for in the preparation of local plans and is a material consideration in planning decisions.

2.1.1 Planning Practice Guidance

An updated version of the PPG was published in August 2022. This advises on 'how to take account of and address the risks associated with flooding and coastal change in the planning process'. The guidance outlines the steps required when preparing strategic policies. Further details regarding the PPG can be found in the Level 1 SFRA.

2.1.2 The Sequential Test

The Sequential Test aims to ensure that areas of little or no flood risk are prioritised for development over areas at a higher risk of flooding. This means areas at a medium or high risk of flooding from any source, now or on the future should be avoided for development where possible.

2.1.3 The Exception Test

It may not always be possible for all new development to be allocated on land that is not at risk from flooding. To further inform whether land should be allocated, or Planning Permission granted, a greater understanding of the scale and nature of the flood risks is required. In these instances, the Exception Test will be required.

The Exception Test should only be applied following the application of the Sequential Test. It applies in the following instances, where it is not possible for development to be located in areas with a lower risk of flooding:

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

- Any development with significant* risk in the surface water 1% Annual Exceedance Probability (AEP) event plus 40% climate change allowance flood extent.

**Flood risk issues are not always black and white - the significance of issues requires professional judgement, based on the location, topography and nature (including depth, velocity and hazard) of flooding, rather than simply whether part of a site is within a given flood extent. This would be determined as part of a Level 2 assessment. This is ultimately decided by the RMAs just as the LPA and EA, which are informed by site specific FRAs and the SFRAs.*

It is noted that the EA's Flood Map for Planning Flood Zones represent undefended fluvial outputs. In this SFRA, modelled defended fluvial events for the following watercourses are used due to the presence of flood defences in Harborough:

- Eye Brook
- Great Easton Brook
- Langton Brook
- Medbourne Brook
- Stonton Brook
- Willow Brook
- River Chater
- River Jordan
- River Soar
- River Sence
- River Welland

Developers will need to show that any residual risk to sites can be safely managed and supported by detailed modelling.

Flood Zone 3b, the functional floodplain, is based on the fluvial defended modelled 3.3% AEP event extent for the aforementioned watercourses (where necessary). More information on the parameters used to run and uplift the models can be found in Appendix G of the Level 1 SFRA.

2.2 Use of SFRA Data

This SFRA has been developed using the best available information, supplied at the time of preparation. This relates both to the current risk of flooding from rivers, the sea, surface water and groundwater and, where available, the potential impacts of future climate change.

Datasets used to inform this SFRA may be updated following the publication of this SFRA and new information on flood risk may be produced by Risk Management Authorities. This new information (such as updated mapping and modelling) may supersede the information included in this SFRA. Guidance should be sought from Harborough District Council and

the Environment Agency as appropriate to check the most up to date source of information is used for future flood risk assessment

2.3 Roles and Responsibilities for Flood Risk Management

Risk Management Authorities (RMAs) are comprised of different organisations that have responsibilities for flood risk management. The RMAs in and around Harborough are displayed below in Table 2-1, alongside a summary of their responsibilities.

Table 2-1: Roles and responsibilities of different organisations for flood risk management

Risk Management Authority	Strategic Level	Operational Level	Planning Role
Environment Agency.	Strategic overview for all sources of flooding, national strategy, reporting and general supervision.	Main rivers, reservoirs and tidal flooding.	Statutory consultee for development in Flood Zones 2 and 3 for coastal and fluvial extents.
Leicestershire County Council as Lead Local Flood Authority (LLFA).	Preliminary Flood Risk Assessment and Local Flood Risk Management Strategy.	Surface water, groundwater and ordinary watercourses (consenting, enforcement and works).	Statutory consultee for all major developments.
Harborough District Council as Local Planning Authority (LPA).	Local Plan production.	Determination of Planning Applications and managing open spaces under Council ownership.	Determination of Planning Applications and managing open spaces under Council ownership.

Risk Management Authority	Strategic Level	Operational Level	Planning Role
Water Companies: Severn Trent Water Anglian Water	Asset Management Plans supported by Periodic Reviews (business cases) and Develop Drainage and Wastewater Management Plans (DWMPs).	Public sewers.	Non-statutory consultee for all major developments. Also provides comments below this threshold where a specific request is received from Council Adoption of SuDS under Sewerage Sector Guidance.
Highways Authorities: National Highways (for motorways and trunk roads) Leicestershire County Council as Local Highway Authority (for other adopted roads).	Highway drainage policy and planning.	Highway drainage Local Highway Authority can adopt some highway drainage features.	Internal planning consultee regarding highways and design standards and options of highways.

2.4 Relevant Legislation

The following legislation is relevant to development and flood risk in Harborough District:

- Flood Risk Regulations (2009) - these transpose the European Floods Directive (2000) into law and require the Environment Agency and LLFAs to produce Preliminary Flood Risk Assessments and identify where there are nationally significant Flood Risk Areas. For the Flood Risk Areas, detailed flood maps and a Flood Risk Management Plan is produced; this is done in a six-year cycle. As of 31 December 2023 the Flood Risk Regulations (2009) have been revoked from UK Law as part of a review into retained EU legislation. This was done as the Flood Risk Regulations duplicate existing domestic legislation, namely the Flood and Water Management Act 2010. The Government expects to see the continued implementation of Flood Risk Management Plans 2021-2027, with funding for this still in place over the 6-year period.
- Town and Country Planning Act (1990), Water Industry Act (1991), Land Drainage Act (1991), Environment Act (1995), Flood and Water Management Act (2010) – as amended and implanted via secondary legislation. These set out the roles and responsibilities for organisations that have a role in FRM.
- The Land Drainage Act (1991 as amended) and also set out where developers will need to apply for additional permission (as well as planning permission) to undertake works to an Ordinary Watercourse or Main River.

- The Water Environment Regulations (2017) – these transpose the European Water Framework Directive (2000) into law and require the Environment Agency to produce River Basin Management Plans (RBMPs). These aim to ensure that the water quality of aquatic ecosystems, riparian ecosystems and wetlands reaches 'good' status.
- Other environmental legislation such as the Environment Act (2021), Habitats Directive (1992), Environmental Impact Assessment Directive (2014) and Strategic Environmental Assessment Directive (2001) also apply as appropriate to strategic and site-specific developments to guard against environmental damage.

2.5 Relevant Flood Risk Policy and Strategy Documents

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

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

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

Scale	Document, lead author, and date	Relevant direct legislation	Specific information impacting Harborough District	Policy and Measures	Development design requirements	Next update due
National	National Flood and Coastal Erosion Risk Management Strategy (Environment Agency) 2020	Flood and Water Management Act (2010)	No	Yes	No	2026
National	National Planning Policy Framework (MHCLG) 2023	Planning and Compulsory Purchase Act 2004 as amended & The Town and Country Planning (Local Planning) (England) Regulations 2012 as amended	No	Yes	Yes	-
National	National Planning Practice Guidance (MHCLG) 2019	Planning and Compulsory Purchase Act 2004 as amended & The Town and Country Planning (Local Planning) (England) Regulations 2012 as amended	Yes	No	Yes	-

Scale	Document, lead author, and date	Relevant direct legislation	Specific information impacting Harborough District	Policy and Measures	Development design requirements	Next update due
National	The Climate Crisis: a guide for Local Authorities on Planning for Climate Change (TCPA) 2023	N/A	Yes	Yes	No	-
Regional	Humber River Basin Management Plan (Environment Agency) 2022 Anglian River Basin Management Plan (Environment Agency) 2022 Severn River Basement Management Plan (Environment Agency) 2022	WFD (Section 2.3)	Yes	Yes	No	2027
Regional	Humber River Basin Flood Risk Management Plan (Environment Agency) 2022 Anglian River Basin Flood Risk Management Plan (Environment Agency) 2022 Severn River Basement Flood Risk Management Plan (Environment Agency) 2022	Flood Risk Regulations (Section 2.3)	Yes	Yes	No	-

Scale	Document, lead author, and date	Relevant direct legislation	Specific information impacting Harborough District	Policy and Measures	Development design requirements	Next update due
Regional	River Trent Catchment Flood Management Plan (Environment Agency) 2010 River Welland Catchment Flood Management Plan (Environment Agency) 2009	N/A	Yes	Yes	No	-
Regional	Climate change guidance for development and flood risk (Environment Agency) 2022	N/A	No	No	Yes	-
Regional	Severn Trent Drainage and Wastewater Management Plan (Severn Trent Water) 2023	N/A	Yes	Yes	No	-
Local	Leicestershire County Council Local Flood Risk Management Strategy 2024	FWMA	Yes	No	Yes	-
Local	Sustinable Drainage - SuDS Manual 2015	N/A	Yes	No	Yes	-
Local	Leicestershire County Council Preliminary Flood Risk Assessment 2017	N/A	No	No	No	-

Scale	Document, lead author, and date	Relevant direct legislation	Specific information impacting Harborough District	Policy and Measures	Development design requirements	Next update due
Local	Leicestershire Strategic Plan 2022	N/A	No	Yes	Yes	2026

2.6 LLFAs, Surface Water and SuDS

The NPPF (2023) states that:

- 'Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate' (Paragraph 175)

When considering planning applications, local planning authorities should consult the LLFA on the management of surface water in order to satisfy that:

- The proposed minimum standards of operation are appropriate
- Through the use of planning conditions or planning obligations there are clear arrangements for on-going maintenance over the development's lifetime.

At the time of writing this SFRA, documents and policies relevant to SuDS and surface water for Harborough District are:

- CIRIA SuDS Manual (C753) (2015) as recommended by Leicestershire County Council
- Leicestershire County Councils guidance notes on managing an ordinary watercourse
- Defra's non-statutory technical standards for sustainable drainage systems (2015)
- Defra's National Standards for Sustainable Drainage Systems; designing, constructing (including LASOO best practice guidance), operating and maintaining drainage for surface runoff (2011)
- Building Regulations Part H (MHCLG) 2010

The 2023 NPPF states that flood risk should be managed "using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding". As such, HDC expect SuDS to be incorporated on minor developments in areas of risk as well as all major development.

2.7 Updated Strategic Flood Risk Assessment Guidance

There have been several updates (the latest being in May 2024) to the 'How to prepare a strategic Flood Risk Assessment' guidance including a new section on setting up governance arrangements when preparing your SFRA which lists who to consult and when, and what to include in Level 1 SFRAs. It also includes links to various nature strategies, management plans and local design guidance on improving the clarity on the sequential test and use of SuDS. This Level 2 assessment is undertaken in accordance with this guidance.

3 Sources of Information Used in Preparing the Level 2 SFRA

3.1 Topography, Geology, Soils, and Watercourses

Topography, geology, soils, and watercourses data were obtained from the following sources:

- Topography data was obtained from the Environment Agency's 1m LiDAR Composite Digital Terrain Model (DTM) 2022.
- Bedrock Geology and Superficial Deposits data was procured from the British Geological Society's (BGS) 50K mapping dataset.
- Soils data was sourced from Cranfield University Soilscapes mapping.
- Watercourses data – main rivers were mapped using the Environment Agency's Statutory Main River Map dataset, and ordinary watercourses from the Environment Agency's (Partner Only) Detailed River Network (DRN) dataset. Caution should be taken when using these layers to identify culverted watercourses which may appear as straight lines but in reality, are not.

3.2 Historic Flooding

The historic flood risk within Harborough District Council's administrative area has been assessed using the following:

- The Environment Agency's 'Recorded Flood Outlines' have been used to understand whether historic flooding has been recorded at all sites. The dataset takes into account the presence of defences, structures and other infrastructure, where they existed at the time of flooding.
- Canal and River Trust's recorded flooding incidents (June 2024).

It is important to note that the absence of historic flood records does not mean than 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. More information on historic flooding can be found in Section 4.1 of the Level 1 SFRA.

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 defences have been taken from the Environment Agency's Asset Information Management System (AIMS) Spatial Defences dataset. Their current condition and standard of protection are based on those recorded in the tabulated shapefile data. The Council's asset register was also obtained in the Level 1 SFRA.

The main flood defences in the study area are located along the main water courses: River Jordan, River Welland, River Sence, River Soar, River Swift, River Avon, Langton Brook, and the Medbourne Brook. These are mostly comprised of natural/engineered high ground, embankments and flood walls. The condition of these defences varies from poor to good, with the Standard of Protection varying between the defences.

3.4 Flood Zones from the EA's Flood Map for Planning

Flood Zones are discrete areas of land identified to be at risk from flooding from rivers and sea. They represent the undefended scenario. Table 3-1 outlines the definition of Flood Zones as per the PPG.

Table 3-1: Definition of the Flood Zones as per the Planning Practice Guidance

Flood Zone	Definition
Zone 1 – Low probability	Land having a less than 0.1% annual probability of river or sea flooding.
Zone 2 – Medium probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding.
Zone 3a – High probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea.

Flood Zones 1, 2 and 3a have been taken from the Environment Agency's 'Flood Map for Planning' and do not take into account flood defences. The Flood Map for Planning is based on generalised modelling to provide an indication of flood risk. Whilst the generalised modelling is typically suitable for use on a large scale, they are not provided for specific sites or for land where the catchment of the watercourse is less than 3km^2.

For watercourses with smaller catchments, the Risk of Flooding from Surface Water (RoFSW) map provides an indication of the floodplain of small watercourses and ditches. It is more accurate in upper to mid river valley locations than lower valley locations near the coast. This is because it does not represent the floodplain for small watercourses as well in topographically flat areas where the flow routes are not as well defined.

Even where more detailed models of Main Rivers have been used by the Environment Agency to inform the Flood Map for Planning, they will be largely based on remotely detected ground model data and not topographic survey.

In addition, the Flood Map for Planning does not account for surface water, sewer or groundwater flooding or the impacts of canal or reservoir failure or climate change. Hence there could still be a risk of flooding from other sources and the level of flood risk will change over time during the lifetime of a development.

For these reasons, the Flood Map for Planning is 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. Accordingly, for site-specific assessments it will be necessary to perform more detailed studies in circumstances where flood risk is an issue.

3.5 Climate Change

The Environment Agency published updated climate change guidance in 2022 on how allowances for climate change should be included in both strategic and site-specific FRAs. The guidance adopts a risk-based approach considering the vulnerability of the development.

In 2018 the government published new UK Climate Projections (UKCP18). The Environment Agency have used these to further update their climate change guidance for new developments with regards to updated fluvial, rainfall, and tidal allowances. The new climate change allowances were released in July 2021 for peak river flows, May 2022 for peak rainfall allowances, and December 2019 for sea level allowances. These should be used when undertaking a detailed Flood Risk Assessment.

To apply the climate change guidance, the following information needs to be known:

- The vulnerability of the development.
- The likely lifetime of the development – in general at least 75 years is used for commercial development (depending on the development's characteristics) and 100 years for residential, but this needs to be confirmed in an FRA.
- The River Basin in which the site is located.

The Climate Change Act 2008 creates a legal requirement for the UK to put in place measures to adapt to climate change and to reduce carbon emissions by at least 80% below 1990 levels by 2050.

The NPPF sets out that flood risk should be managed over the lifetime of a development, taking climate change into account.

3.6 Flooding from Rivers

3.6.1 Fluvial Modelling

The Environment Agency has undertaken fluvial modelling for the Eye Brook, Great Easton Brook, Langton Brook, Medbourne Brook, River Chater, River Jordan, River Soar, Stonton Brook, River Sence, Upper Soar, River Welland, Willow Brook as displayed in Table 3-2. This provides a more accurate representation of actual flood risk within Harborough than the Environment Agency's Flood Map for Planning, as it accounts for the presence of flood defence structures along these rivers. Further information about the models used is available in Appendix B of the Level 1 SFRA.

Table 3-2: Details regarding the fluvial flood risk modelling used to inform this SFRA

Model name	Software
Eye Brook (2016)	MIKE11
Great Easton Brook (2016)	MIKE11
Langton Brook (2016)	MIKE11
Medbourne Brook (2016)	MIKE11
River Chater (2016)	MIKE11
River Jordan (2016)	MIKE11
Soar (2022)	ESTRY-TUFLOW
Stonton Brook (2016)	MIKE11
Upper Sence (2022)	FLOOD MODELLER-TUFLOW
Upper Soar (2018)	FLOOD MODELLER-TUFLOW
Welland (2016)	MIKE11
Willow Brook (2021)	ESTRY-TUFLOW

The following Annual Exceedance Probability events for the fluvial scenarios have been assessed:

- 3.3% AEP (1 in 30-yr)*
- 2% AEP (1 in 50-yr)
- 1% AEP (1 in 100-yr)
- 0.1% AEP (1 in 1000-yr)

*Areas within the modelled 3.3% AEP extent should be considered as Flood Zone 3b (the functional floodplain), which is defined as land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively, or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events. Where modelled results are not available, the 1% AEP extent

should be considered as a proxy for Flood Zone 3b Where the 1% AEP extent has been used as a proxy, hydraulic modelling should be carried out to confirm the location of Flood Zone 3b at FRA stage.

3.6.2 Impacts 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 frequent. Areas benefiting from flood defences will find the standard of protection changes over time with overtopping of defences more likely in future unless they are upgraded.

Peak river flow climate change allowances developed by the Environment Agency are divided into a series of Management Catchments. The district of Harborough falls under three management catchments: The Avon Warwickshire Management Catchment, the Soar Management Catchment and the Welland Management Catchment. The climate change allowances for fluvial flood risk are shown in Table 3-3, Table 3-4, and Table 3-5 respectively.

This SFRA provides a strategic assessment of climate change risk; developers should undertake detailed modelling of climate change allowances as part of a site-specific FRA, following the Climate Change Guidance set out by the Environment Agency.

Table 3-3: Climate change allowances for fluvial flood risk for the Avon Warwickshire Management Catchment

Allowance Category	Total potential chance anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Upper end	22%	31%	59%
Higher central	12%	14%	32%
Central	7%	8%	21%

Table 3-4: Climate change allowances for fluvial flood risk for the Soar Management Catchment

Allowance Category	Total potential chance anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Upper end	28%	35%	60%
Higher central	18%	21%	37%
Central	14%	16%	28%

Table 3-5: Climate change allowances for fluvial flood risk for the Welland Management Catchment

Allowance Category	Total potential chance anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Upper end	22%	26%	53%
Higher central	10%	10%	28%
Central	5%	4%	17%

3.6.3 Climate Change Uplifts for Fluvial Hydraulic Modelling

Climate change allowances from existing Environment Agency modelling was used in this SFRA. The following model outputs were used to represent climate change:

- River Soar (AECOM, 2022) - 1% AEP (+20%, +30%, +50%)
- Willow Brook (AECOM, 2022) - 1% AEP (+20%, +30%, +50%)
- Upper Soar (CH2MHill, 2018) - 1% AEP (+20%, +30%, +50%)
- Upper Sence (JBA, 2022) - 1% AEP (+28%, 37%, +60%)
- River Chater (Mott MacDonald, 2016) - 1% AEP (+20%)*
- River Jordan (Mott MacDonald, 2016) - 1% AEP (+20%)*
- River Welland (Mott MacDonald, 2016) - 1% AEP (+20%)*
- Eye Brook (Mott MacDonald, 2016) - 1% AEP (+20%)*
- Great Easton Brook (Mott MacDonald, 2016) - 1% AEP (+20%)*
- Langton Brook (Mott MacDonald, 2016) - 1% AEP (+20%)*
- Medbourne Brook (Mott MacDonald, 2016) - 1% AEP (+20%)*
- Stonton Brook (Mott MacDonald, 2016) - 1% AEP (+20%)*

**According to the hydraulic modelling reports obtained from the EA, these models were only simulated for a +20% climate change allowance uplift. However, this uplift falls within the +/-10% range of the latest Central climate change allowance and is more conservative than the current Central allowance of +17%. This was therefore deemed appropriate to use in this Level 1 SFRA. Should a Level 2 SFRA be required, the necessary model simulations may be re-run to determine the Higher Central and Upper End climate change allowances.*

Where the available climate change simulations for these models are within +/-10% of the latest climate change allowances, these have been deemed appropriate for use within this SFRA. Developers will need to apply the latest climate change allowances in any site-specific assessment.

3.7 Surface Water Flooding

3.7.1 Present Day Risk of Flooding from Surface Water

Mapping of surface water flood risk in Harborough has been taken from the Environment Agency's Risk of Flooding from Surface Water (RoFSW) mapping. 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-yr) each year.
- **Medium**: An area has a chance of flooding between 1% AEP (1 in 100-yr) and 3.3% AEP (1 in 30-yr) each year.
- **Low**: An area has a chance of flooding between 0.1% AEP (1 in 1,000-yr) and 1% AEP (1 in 100-yr) each year.
- **Very Low**: An area has a chance of flooding of less than 0.1% AEP (1 in 1,000-yr) each year.

The results should be used for high-level assessments. If a particular site is indicated in the Environment Agency mapping to be at risk from surface water flooding, a more detailed assessment should be required to illustrate 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.

Detailed modelling based on site survey will be necessary where there is a significant risk of surface water flooding. It is the intention that the Environment Agency will prepare updated and improved surface water mapping in the course of updating the National Flood Risk Assessment 2 (NaFRA2). It is anticipated that this data will be available in Spring 2025 and at that time it is recommended that the surface water risk assessment is reviewed. It is not anticipated that the updated mapping will fundamentally change the locations identified to be at risk from surface water flooding, but the improved analysis techniques will reduce some of the uncertainties associated with the assessment.

3.7.2 Impacts of Climate Change on Surface Water Flood Risk

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.

The potential impacts of surface water plus climate change will likely need to be considered at site-specific assessment stage. In May 2022, the Environment Agency updated the surface water climate change projections, which are now based on management catchments - as mentioned in Section 3.6.2. Table 3-6, Table 3-7, and Table 3-8 shows the peak rainfall intensity allowances for the management catchments that apply in Harborough when considering surface water flood risk. Both the central and upper end allowances should be considered to understand the range of impact.

Table 3-6: Climate change allowances for peak rainfall intensity for the Avon Warwickshire

Management Catchment

Allowance Category	Total Potential change anticipated for '2050s' (2040 to 69)	Total potential change anticipated for '2070s' (2061 to 2125)
3.3% AEP Central	20%	25%
3.3% AEP Upper end	35%	35%
1% AEP Central	20%	25%
1% AEP Upper end	40%	40%

Table 3-7: Climate change allowances for peak rainfall intensity Soar Management Catchment

Allowance Category	Total Potential change anticipated for '2050s' (2040 to 69)	Total potential change anticipated for '2070s' (2061 to 2125)
3.3% AEP Central	20%	25%
3.3% AEP Upper end	35%	35%
1% AEP Central	20%	25%
1% AEP Upper end	40%	40%

Table 3-8: Climate change allowances for peak rainfall intensity for the Welland Management Catchment

Allowance Category	Total Potential change anticipated for '2050s' (2040 to 69)	Total potential change anticipated for '2070s' (2061 to 2125)
3.3% AEP Central	20%	25%
3.3% AEP Upper end	35%	35%
1% AEP Central	20%	25%
1% AEP Upper end	40%	40%

3.7.3 Climate Change Uplifts for Surface Water Hydraulic Modelling

The latest peak rainfall intensity allowances have been applied to the Environment Agency's RoFSW as part of the Harborough Level 1 SFRA, and have been used in the Level 2 Assessment.

3.7.4 Critical Drainage Areas

A critical drainage area (CDA) is defined as “a discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer and/or river) often cause flooding in a Flood Risk Area during severe weather thereby affecting people, property or local infrastructure.” These can cover wide areas within both rural and urban environments and are typically where manmade drainage infrastructure has been identified as at critical risk of failure, resulting in flooding. An absence of CDAs does not mean there are no areas with potential drainage problems.

There are no critical drainage areas identified within the Harborough District Council boundary.

3.8 Sewer Flooding

3.8.1 Impact of Climate Change on Sewers

Surface water and fluvial flooding with climate change have the potential to impact the sewerage system, so careful management of these is needed for development. Due to differing ages of settlements, there will be drainage systems consisting of different types of sewers. Increasing pressures from climate change, urban creep and infill development could impact the performance of the sewerage system. Severn Trent Water and Anglian Water's respective Drainage and Wastewater Management Plans provide a high level indication of the susceptibility of different sewer catchments to sewer flood risk, both now and in the future.

3.9 Groundwater

3.9.1 Impact of Climate Change on Groundwater Flooding

The impact of climate change is uncertain for groundwater flooding associated with rivers and land catchments and those watercourses where groundwater has a large influence on winter flood flows. There is no technical modelling data available to assess climate change impacts on groundwater. It would depend on the flooding mechanism, historic evidence of known flooding and geological characteristics, for example prolonged rainfall in a chalk catchment. Flood risk could increase when groundwater is already high or emerged, causing additional overland flow paths or areas of still ponding.

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.

3.10 Reservoirs

The risk of inundation due to reservoir breach or failure of reservoirs within the area has been assessed using the Environment Agency's Risk of Flooding from Reservoirs dataset.

This dataset displays a prediction of the credible worst-case scenario. The dataset gives no indication of the likelihood or probability of reservoir flooding. The Reservoir Flood Maps do not describe the risk of flooding (simply a credible worst case) and data includes layers for:

- 'Dry day' – Individual flood extents for all large, raised reservoirs in the event that they were to fail and release the water held on a "dry day" when local rivers are at normal levels.
- 'Wet day' – Individual flood extents for all large, raised reservoirs in the event that they were to fail and release the water held on a "wet day". A wet day is assumed to be a failure at the same time as experiencing a river flood with a 1 in 1000 chance of occurring in any year.
- 'Fluvial contribution' – The extent of river flooding added to the reservoir model to determine the impacts of failure on a wet-day.

Reservoirs that have a significant impact during the Wet day and Dry day scenarios across the study area are:

- Eyebrook (Tata Steel UK limited)
- Medbourne Flood Storage Reservoir (Environment Agency)
- Naseby (Canal and River Trust)
- Rolleston Lake (The Rolleston Hall Estates Limited)
- Saddington (Canal and River Trust)
- Stanford (Severn Trent Water)
- Sulby (Canal and River Trust)
- Welford (Canal and River Trust)

The extents should be taken into consideration as part of the site-specific Flood Risk Assessment.

3.11 Residual Risk

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

Some sites are also at significant risk of reservoir flooding during the 'Wet Day' and 'Dry Day' flood events. Despite the risk being residual, in the very unlikely event that the reservoirs fail, it is predicted that there is a risk to life. For sites at risk of reservoir flooding, developers will need to produce flood warning and evacuation plans in consultation with the LPA emergency planning team.

Culverts with the potential to affect sites in the event of a blockage were identified on OS Mapping and the Environment Agency's Detailed River Network 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 following site summary tables for site 10595

Canals also pose a residual risk from breaches to or overtopping of the channel, with the Grand Union Canal running through the central to southern area of Harborough. The canal has the potential to interact with other watercourses and become flow paths during flood events, overtop or breach.

3.12 Adapting to Climate Change

The NPPG Climate Change guidance contains information and guidance for how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Examples of adapting to climate change include:

- Considering future climate risks when allocating development sites to ensure risks are understood over the development's lifetime.
- Considering the impact of and promoting design responses to flood risk and coastal change for the lifetime of the development.
- Considering availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality.
- Promoting adaptation approaches in design policies for developments and the public realm for example by building in flexibility to allow future adaptation if needed, such as setting new development back from watercourses; and
- Identifying no or low-cost responses to climate risks that also deliver other benefits, such as green infrastructure that improves adaptation, biodiversity and amenity, for example by leaving areas shown to be at risk of flooding as public open space.
- Considering the standard of protection of defences and sites for future development, in relation to sensitivity to climate change. The Council and developers will need to work with RMAs and use the SFRA datasets to understand whether development is affordable or deliverable. Locating development in such areas of risk may not be a sustainable long-term option.

It is recommended that the differences in flood extents from climate change are compared by the Council when allocating sites, to understand how much additional risk there could be, where this risk is in the site, whether the increase is marginal or activates new flow paths, whether it affects access/ egress and how much land could still be developable overall.

3.13 Depth, Velocity, and Hazard to People

The Level 2 assessment seeks to map the probable depth and velocity of flooding as well as the hazard to people during the defended fluvial 1% AEP event plus an allowance for climate change. The 1% AEP plus climate change flood event has been investigated in further detail because the Level 2 assessment helps inform the Exception Test and usually flood mitigation measures and access/ egress requirements focus on flood events lower than the 0.1% AEP event (e.g. the 1% AEP plus climate change event).

Where detailed model outputs were available, i.e. along the River Welland, the 1% AEP plus climate change depth, velocity and hazard data has been used. This data is only present where models have a 2D element, representing the floodplain in detail. In the absence of detailed hydraulic models (or models with detailed 1D-2D outputs), the Flood Map for Planning dataset has been used, as well as the Risk of Flooding from Surface Water dataset. The depth, hazard, and velocity of the 1% AEP (100-year) surface water flood event has also been mapped and considered in this assessment.

Hazard to people has been calculated using the below formula as suggested in Defra's FD2321/TR2 "Flood Risk to People." The different hazard categories are shown in Table 3-9. Developers should also test the impact of climate change depths, velocities, and hazard on the site, at Flood Risk Assessment stage.

Table 3-9: Defra's FD2321/TR1 "Flood Risks to People" classifications

Degree of Flood Hazard	Flood Hazard Rating	Description
Very Low Hazard	< 0.75	Caution "Flood zone with shallow flowing water or deep standing water"
Moderate	0.75 – 1.25	Dangerous for some (i.e. children) "Danger: flood zone with deep or fast flowing water"
Significant	1.25 – 2.00	Danger for most people "Danger: flood zone with deep fast flowing water"
Extreme	>2.00	Danger for all "Extreme danger: flood zone with deep fast flowing water"

Please note these hazard ratings are expected to be updated imminently. These classifications are based on the guidance of FD2321/TR1 (2006).

As part of a site-specific FRA, developers will need to undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood depth, velocity and hazard based on the relevant 1% AEP plus climate change event, using the relevant climate change allowance based on the type of development and its associated vulnerability classification. Not all this information is known at the strategic scale and the level of resolution may not be appropriate to enable site scale assessment of proposed development schemes.

3.14 Note on SuDS Sustainability

The hydraulic and geological characteristics of each site were 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.

The assessment is based on catchment characteristics and additional datasets such as the JBA Groundwater Flood Data Map (5m resolution) and British Geological Survey (BGS) Soil maps of England and Wales which allow for a basic assessment of the soil characteristics on a site-by-site basis. LiDAR data was used as a basis for determining the topography and

average slope across each development site. Other datasets were used to determine other factors. These datasets include:

- Historic landfill sites
- Groundwater Source Protection Zones
- Detailed River Network
- The Flood Map for Planning

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 3-10. 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 3-10: 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 site options has been described in the summary tables, 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 SuDS guidance and design requirements for Harborough are available in Section 0.

4 Level 2 Assessment Methodology

4.1 Site Screening

Harborough District Council provided 178 sites for assessment. These sites were screened against available flood risk information and spatial data to provide a summary of risk to each site including:

- The proportion of the site in each Flood Zone derived from the level 1 SFRA including modelled data for the watercourses mentioned in Section 2.1.3.
- The proportion of the site shown to be at risk from surface water flooding in each event from the RoFSW data set.
- Whether the site is at risk from groundwater emergence using the JBA Groundwater Flood Data Map (GW5).
- The proportion of the site in the reservoir 'Wet Day' and 'Dry Day' extents.
- Other considerations such as the presence of watercourses in or around the site, and safe access and egress which could affect the viability of development.

The screening provides an opportunity to identify sites that may show to be 100% in Flood Zone 1, but upon inspection using GIS software, have an ordinary watercourse flowing through or adjacent to the site. While Flood Zone maps may not be available for these water courses, it does not mean the watercourse doesn't pose a risk, only that no modelling of the watercourse has been conducted to quantify the risk.

The Flood Zones are not provided for specific sites or land where the catchment of the watercourse falls below 3km^2. 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 any sites with a watercourse in or adjacent to the site. The RoFSW has been used in these cases as it provides a reasonable representation of the floodplain of such watercourses to use for strategic assessment. Detailed modelling of such watercourses will be needed as part of a detailed FRA to support any planning application for such sites.

4.2 Sites Taken Forward to a Level 2 Assessment

Out of the 178 sites provided by Harborough District Council, 13 sites were carried forward to a Level 2 assessment.

A Red-Amber-Green system was applied to the sites on the basis, that:

- Red sites needed a Level 2 assessment and have significant obstacles or challenges for development which will need consideration going forward for development. These sites may need the Exception Test to show that the site can be developed safely from a flood risk perspective. Whilst the Exception Test is only explicitly required within fluvial Flood Zones, red sites may also be at significant risk from other sources which will require careful consideration if the

site is to be bought forwards. These considerations are detailed in the site summary tables. Note that not all Red screened sites have been assessed as Harborough District Council has decided not to bring these forwards either due flood risk, or other considerations.

- Amber sites did not need a Level 2 assessment but are flagged in this report for developer considerations (recommendations provided in Section 4.3), but these are likely to be able to be addressed at the planning application stage. These sites are included within this report as they are generally low risk but may have some surface water issues or issues relative to access and egress to the site.
- Green sites that had no significant obstacles for development. However, it is noted sites may need an FRA and drainage strategy depending on the location of the site.

Groundwater flood risk should be considered as part of the site-specific assessments, but there is no equivalent national mapping or datasets to directly compare with fluvial/pluvial risk for allocation purposes. Rather, once sites have been assessed for other sources, a groundwater assessment should be undertaken. The same also applies to reservoir flooding.

It is noted that there are some sites that may be upgraded or downgraded in this assessment. For example, a site may show as Amber, but if there was an area of deep ponding, a prominent flow route bisecting a site, immediate constraints to site access at the boundary, potential for highly vulnerable types of development to occupy a site, it may be moved up to the 'Red' category.

For other sites with less significant but still noteworthy surface water issues, these have been highlighted in Table 4-2 and the LLFA expect the developer to take these into account at an early stage when planning the form and layout of the site, the surface water drainage system and any surface water mitigation measures that may be necessary.

Table 4-1 provides a summary of the sites which have been taken forward to the Level 2 assessment on this basis.

4.3 Recommendations for Sites Not Taken Forward to a Level 2 Assessment

The ‘amber’ sites identified as having some challenges to development, but not requiring a Level 2 assessment, are shown in Table 4-2 below. The risk posed to these sites is from surface water flooding (or an ordinary watercourse that does not present in the EA’s Flood Zones due to catchment size). These sites also have some reservoir flooding and groundwater flooding.

Table 4-1 Sites classified as red taken forward to Level 2 assessment

Site Reference	Allocation	Area (ha)	% in Flood Zone 2	% in Flood Zone 3	% in 0.1%AEP Surface Water Extent	% in 1%AEP Surface Water Extent	% with Groundwater levels <0.5m from surface	Watercourse within 20m of site
8054	-	5.7	10.7	5.3	46.4	11.5	0.0	Yes
8143	MH1	22.1	0.0	0.0	11.9	4.6	0.0	No
8155	B1	7.9	0.0	0.0	19.9	9.0	0.0	No
8234	MH3	76.3	0.0	0.0	13.2	1.6	0.0	No
8241	TB1	8.6	0.0	0.0	13.6	2.0	0.0	No
8247	K1	33.4	0.0	0.0	14.7	5.9	0.0	No
10240	MH7	0.9	0.0	0.0	22.5	15.5	0.0	No
10248	MH6	1.2	0.0	0.0	41.5	19.0	72.0	Yes
10253	MH6	2.4	0.0	0.0	44.8	3.9	70.6	No
10595	MP1	16.4	0.0	0.0	14.1	2.0	0.0	No
10649	U1	2.3	0.0	0.0	18.7	8.1	0.0	No

Table 4-2: Sites screened that were classified as 'Amber'

Site Code	% in FMfP FZ2	% in FMfP FZ3	% in RoFSW 0.1% AEP extent	% in RoFSW 1% AEP extent	% in 'Dry Day' reservoir extent	% in 'Wet Day' reservoir extent	% in JBA Ground-water Flood Map (< 5.0m)	Considerations for Development
8122	0.0	0.0	14.9	5.5	0	0	0	Flow path shown in south of site, but likely to be manageable on site. Site borders the canal and consultation will be needed with the CRT, however the site is likely to be developable with regard to flood risk provided the above is considered.
8139	0.0	0.0	12.6	0.0	0	0	0	Some surface water issues but likely manageable on site
8151	0.0	0.0	6.1	0.0	0	0	0	Access/egress issues, but site itself low risk.
8205	0.0	0.0	4.0	1.7	0	0	0	Access/egress issues, but site itself low risk.
8208	0.0	0.0	4.3	0.0	0	0	0	Access/egress issues, but site itself low risk.
8238	0.0	0.0	7.3	0.0	0	0	0	Access/egress issues, but site itself low risk.

Site Code	% in FMfP FZ2	% in FMfP FZ3	% in RoFSW 0.1% AEP extent	% in RoFSW 1% AEP extent	% in 'Dry Day' reservoir extent	% in 'Wet Day' reservoir extent	% in JBA Ground-water Flood Map (< 5.0m)	Considerations for Development
8245	0.0	0.0	0.9	0.4	0	0	0.0	Significant groundwater risk will require further investigation as part of site-specific FRA, but site otherwise at low risk.
8248	0.0	0.0	9.9	4.3	0	0	0.0	Flow path flows through site, some consideration will be needed
8737	0.0	0.0	19.6	6.1	0	0	0.0	Significant extent of surface water ponding shown, however site is small and this is likely to manageable on site.
8999	0.0	0.0	12.6	0.0	0	0	0.0	Some surface water issues but likely manageable on site
8999	0.0	0.0	12.4	0.0	0	0	0.0	Some surface water issues but likely manageable on site
10318	0.0	0.0	8.5	4.6	0	0	0.0	Significant flow path along north boundary, but majority of site is low risk.
10481	3.7	3.0	16.6	7.9	1.5	10.3	28.5	Surface water risk to north of site likely to be manageable via appropriate SUDS and drainage strategy. Majority of site at no risk.

Site Code	% in FMfP FZ2	% in FMfP FZ3	% in RoFSW 0.1% AEP extent	% in RoFSW 1% AEP extent	% in 'Dry Day' reservoir extent	% in 'Wet Day' reservoir extent	% in JBA Ground-water Flood Map (< 5.0m)	Considerations for Development
10508	0.0	0.0	15.5	7.7	0	0	0.0	Flow path crosses the site in 1% & 0.1% AEP events, likely to be manageable on site
10554	0.0	0.0	5.7	0.9	0	0	0.0	Access/egress issues, but site itself low risk.
10642	0.0	0.0	22.3	5.8	0.0	0.0	0.0	Surface water flow path through site, likely to be manageable via appropriate SUDS and drainage strategy
12179	0.0	0.0	1.9	0.8	0	0	0.0	Significant groundwater risk will require further investigation as part of site-specific FRA, but site otherwise at low risk.
12212	0.0	0.0	12.6	5.8	0	0	8.1	Watercourse flows across north boundary, but site generally low risk
12224	0.0	0.0	15.8	1.9	0.0	0.0	0.0	Surface water flow path through site, likely to be manageable via appropriate SUDS and drainage strategy. Afe access and egress to east of site must be demonstrated (crossing the flow path).

Site Code	% in FMfP FZ2	% in FMfP FZ3	% in RoFSW 0.1% AEP extent	% in RoFSW 1% AEP extent	% in 'Dry Day' reservoir extent	% in 'Wet Day' reservoir extent	% in JBA Ground-water Flood Map (< 5.0m)	Considerations for Development
12225	1.2	8.0	20.2	12.8	0.0	0.0	0.0	Significant risk to south of site from Bushby Brook, but flood extents constrained by topography. No issues provided development located outside area at risk.

The majority of the sites listed in Table 4-2 are at minor surface water risk, only sites 10481 and 12225 encountering fluvial flood risk from Flood Zone 2, and sites 8245, 10318 and 12179 encountering risk from groundwater. For the other sites, access and egress may be impacted in the 3.3%, 1% and/or 0.1% AEP surface water flood events. Raising of access routes should not impede surface water flows.

Access and Egress: If flows are likely to limit access/egress to the sites, this should be considered further as part of a site-specific flood-risk assessment. Developers will need to demonstrate safe access and egress is possible during the 1% AEP surface water event, including an allowance for climate change.

Surface Water Risk: Sites 10508, 10318, 8999, 8737, 8248, and 8139 are affected by surface water risk however these are likely to be manageable at the site. Where proposed development results in a change in building footprint, the developer should ensure that it does not impact upon the ability of the floodplain to store or convey water and, due to strict SuDS measures that will be put in place, seek opportunities to provide floodplain betterment.

Reservoir Flood Risk: Site 10481 is at risk of reservoir flooding during the 'Wet Day' event. Despite the risk being residual, in the very unlikely event that the reservoirs fail, it is predicted that there is a risk to life. Developers will need to produce flood warning and evacuation plans for these sites in consultation with the LPA emergency planning team.

Groundwater Risk: Sites 12179, 10318, and 8245 are at high risk of groundwater flooding. These sites are either completely within or have sections that are located within areas with groundwater levels that are either at or very near (within 0.025m of) the ground surface or between 0.25 and 0.5m of the surface. Further consideration of the local level of risk and mitigation, by a suitably qualified professional, is recommended in consultation with the LPA. This will impact which SuDS are appropriate for the sites, for example, liners will be needed on filtration, detention and conveyance SuDS to prevent the egress of groundwater.

4.4 Site Summary Tables

4.4.1 Site Tables

As part of the Level 2 SFRA, detailed site summary tables and GeoPDFs have been produced for the sites listed in Appendix A. The summary of the sites put forward for assessment from screening can be found in Appendix C. Sites assessed are: 8054, 8234, 8143, 8155, 8241, 8247, 8631 (assessed as Oadby SDA), 10240, 10248, 10253, 10595, 10649, and 12231.

Site 8632 is a cross boundary site, which lies partly within Oadby and Wigston Borough. The site assessment for this site has been undertaken jointly with Oadby and Wigston Borough Council and also forms part of Oadby and Wigston's Level 2 SFRA.

Using the model information combined with the Flood Zones, climate change, Risk of Flooding from Surface Water (RoFfSW) extents and Reservoir mapping, detailed site

summary tables have been produced for the site options (see Appendix A). Each table sets out the following information:

- Basic site information
- Location of site in the catchment
- Area, type of site, current land use (greenfield/ brownfield), proposed site use
- Sources of flood risk
- Existing drainage features
- Fluvial – proportion of site at risk including description from FMfP mapping and modelling including extent, depth, velocity and hazard information where applicable
- Surface Water – proportion of site at risk including description from RoFfSW mapping including extent, depth, velocity and hazard information.
- Reservoir
- Groundwater
- Flood History
- Flood risk management infrastructure
- Description of residual risk including breach of defences and/or blocked culverts
- Emergency Planning
    - Flood Warning Areas
    - Access and egress
- 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 Zone
    - Historic Landfill Site
- NPPF 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 for the Exception Test to be passed
- Mapping information – description of data sources for the following mapped outputs:
    - Flood Zones
    - Climate change
    - Fluvial depth, velocity and hazard mapping
    - Surface water
    - Surface water zones (zones that indicate locations at either low or high risk of flooding from surface water based on the modelled extent of the 1 in 100 year plus 40% climate change allowance surface water flood event. For more information see section 3.2.2 of the Level 1 SFRA).

- Surface water depth, velocity and hazard mapping

4.4.2 Geo-PDF Mapping

To accompany the site summary tables, there are Geo-PDF maps, with all the mapped flood risk datasets per site.

Flood risk information in the Geo-PDF maps include (where available):

- Site boundary and Council boundary
- Title bar showing site name, name of mapped dataset and legend
- Each legend contains:
  - Site boundary,
  - Main River, and;
  - Dataset information.
- Mapped datasets:
  - EA's Flood Warning and Flood Alert Area
  - JBA Groundwater Emergence Mapping
  - EA's Recorded Flood Outlines
  - ES's Recorded Flood Outlines and Historic Flood Maps
  - EA's Flood Map for Planning (Flood Zone 2 and 3)
  - EA's RoFfSW with extent, depth, velocity and hazard (for the 3.3% AEP, 1% AEP, and 0.1% AEP events)
  - EA's RoFfSW with climate change uplifts with extent, depth, velocity and hazard
  - Fluvial modelling – Eye Brook, Great Easton Brook, Langton Brook, Medbourne Brook, River Chater, River Jordan, River Soar, River Welland, Stonton Brook, Upper Sence, Upper Soar and Willow Brook with extent, depth, velocity and hazard
  - Fluvial modelling with climate change uplifts – Eye Brook, Great Easton Brook, Langton Brook, Medbourne Brook, River Chater, River Jordan, River Soar, River Welland, Stonton Brook, Upper Sence, Upper Soar and Willow Brook (with climate change uplifts) with extent, depth, velocity and hazard
  - EA's Reservoir Inundation Mapping – 'Wet Day' and 'Dry Day' scenarios
  - Flood Defences with standardised attributes, detailing bridge abutments, embankments, engineered high ground, natural high ground, flood gates, spillways, and flood walls.

5 Flood Risk Management Requirements for Developers

5.1 Introduction

The Level 1 and 2 SFRA reports provide a strategic assessment of flood risk in Harborough District. Prior to any construction or development, site-specific assessments will need to be undertaken so all forms of flood risk and any defences at a site are considered in more detail. Developers should, where required, undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extent (including latest climate change allowances), to inform the sequential approach within the site and prove, if required, whether the Exception Test can be satisfied.

5.2 Principles for New Developments

Principles for new developments have been outlined within Section 7 of the Level 1 SFRA.

5.3 Requirements for Site-Specific Flood Risk Assessments

5.3.1 When is an FRA Required

Site-specific FRAs are required in the following circumstances:

- Proposals of 1 hectare or greater in Flood Zone 1.
- Proposals for new development (including minor development such as non-residential extensions, alterations which do not increase the size of the building or householder developments and change of use) in Flood Zones 2 and 3.
- Proposals for new development (including minor development and change of use) in an area within Flood Zone 1 which has critical drainage problems (as notified to the LPA by the Environment Agency).
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

An FRA may also be required for some specific situations:

- If the site may be at risk from the breach of a local defence (even if the site is actually in Flood Zone 1); the Environment Agency should be contacted to agree the breach assessment approach.
- Where evidence of historical or recent flood events have been passed to the LPA.
- In an area where surface water flood risk is a material consideration.
- Land identified in an SFRA as being at increased risk in the future.

5.3.2 Objectives of Site-Specific FRAs

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

- whether a proposed development will be at risk of flooding, from all sources, both now and in the future, taking into account climate change
- whether a proposed development will increase flood risk elsewhere
- whether the measures proposed to deal with the effects and risks are appropriate
- the evidence, if necessary, for the local planning authority to apply the Sequential Test; and
- whether, if applicable, the development will be safe and pass the Exception Test.

FRAs should follow the approach recommended by the NPPF (and associated guidance) and guidance provided by the Environment Agency and Harborough District Council (as listed in Section 0) and Section 3.1 in the Level 1 SFRA report. Guidance and advice for developers on the preparation of site-specific FRAs include:

- Standing Advice on Flood Risk (Environment Agency);
- Flood Risk Assessment for Planning Applications (Environment Agency);
- FRA Guidance Note (Environment Agency SHWG area);
- Site-specific Flood Risk Assessment: CHECKLIST (NPPF PPG, Defra).

Guidance for local planning authorities for reviewing Flood Risk Assessments submitted as part of planning applications has been published by Defra in 2015 – Flood Risk Assessment: Local Planning Authorities.

5.4 Local Requirements for Site Specific Flood Risk Assessments

The Level 1 SFRA provides details on the following mitigation measures in Section 7.3, and should be referred to alongside this report:

- Site layout and design (7.3.1)
- Modification of ground levels (7.3.2)
- Raised floor levels (7.3.3)
- Development and raised defences (7.3.4)
- Developer contributions (7.3.5)
- Buffer strips (7.3.6)
- Making space for water (7.3.7)

5.5 Flood Warning and Emergency Planning

Section 8.5 of the Level 1 SFRA discusses NPPF requirements and what a Flood Response Plan (also known as an Emergency Plan) will need to consider and other relevant information on emergency planning. Further information is provided by the Leicester, Leicestershire and Rutland Local Resilience Forum in reducing flood risk from

other sources. Section 7.7 of the Level 1 SFRA discusses how to reduce flood risk from other sources, such as groundwater, surface water and sewer flooding.

5.6 Reservoirs

The risk of reservoir flooding is extremely low. However, there remains a residual risk to development from reservoirs and the allocation of proposed new development downstream of a reservoir can have implications for the risk designation of the reservoir. This can trigger the need for substantive investment in the reservoir assets so that a flood can be safely passed. Accordingly, care should be taken when allocating development downstream of a reservoir so that the implications with respect to risk designation and any necessary investment to improve the safety of the asset are appropriately addressed. Section 7.6.3 of the Level 1 SFRA sets out guidance and requirements for reservoir risk.

5.7 Duration and onset of Flooding

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

- The position of the site within a river catchment, with those at the top of a catchment likely to flood sooner than those lower down. The duration of flooding tends to be longer for areas in lower catchments.
- Upstream reservoirs in these catchments will provide some online flood storage that reduce the flood risk downstream and delays the onset of flooding. At the confluence of the 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 principal source of flooding: where this is surface water, depending on the intensity and location of the rainfall, flooding could be experienced within 30 minutes of the heavy rainfall event e.g., a thunderstorm. Typically, the duration of flooding for areas at risk of surface water flooding or from flash flooding from small watercourses is short (hours rather than days).
- 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, noting that 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, for example chalk catchments take longer to respond than typical clay catchments.

Guidelines for onset and duration of flooding are shown in Table 5-1.

Table 5-1: Guidelines on the duration and onset of flooding

Principal source of flooding	Duration	Onset
Surface water	Up to 4 hours	Within 30 minutes
Fluvial	4 – 24* hours	Within 2 – 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.*

It is recommended that a site-specific Flood Risk Assessment refines this information, based on more detailed modelling work where necessary.

6 Surface Water Management and SuDS

The Level 1 SFRA summarises guidance and advice on managing surface water runoff and flooding in Section 8. Below is a guide to what is included in sections not expanded on here, for reference alongside this Level 2 SFRA:

- Section 8.2 – Role of the LLFA and LPA in surface water management
- Section 8.3 – Sustainable Drainage Systems (SuDS)

6.1 Sources of SuDS Guidance

6.1.1 Harborough Local Plan, Policy CC4 Sustainable Drainage

As part of the Adopted Harborough Local Plan 2031 Policy CC4, the natural drainage of surface water from new developments into the ground will be preferred where possible. Surface water runoff should be managed as close to its source as possible in line with the following drainage hierarchy:

- Store rainwater for later use.
- Discharge into the ground (infiltration).
- Discharge to a surface water body.
- Discharge to a surface water sewer, highway drain or other drainage system.
- Discharge to a combined sewer.

6.1.2 C753 CIRIA SuDS Manual (2015)

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

6.1.3 Non-statutory Technical Guidance, Defra (March 2015)

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

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

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

6.2 Groundwater Vulnerability Zones

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

The groundwater vulnerability maps should be considered when designing SuDS. Depending on the height of the water table at the location of the proposed development site, restrictions may be placed on the types of SuDS appropriate to certain areas. Groundwater vulnerability maps can be found on Defra's Interactive MagicMap website.

6.3 Groundwater Source Protection Zones (GSPZ)

The Environment Agency also defines Groundwater Source Protection Zones (SPZs) near groundwater abstraction points. These protect areas of groundwater used for drinking water. The GSPZ requires attenuated storage of runoff to prevent infiltration and contamination. Groundwater Source Protection Zones can be viewed on the Defra Interactive MagicMap website. There are no GSPZs in the Harborough District area.

6.4 Nitrate Vulnerable Zones

Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. Nitrate levels in waterbodies are affected by surface water runoff from surrounding agricultural land entering receiving waterbodies. The level of nitrate contamination will potentially influence the choice of SuDS and should be assessed as part of the design process. The NVZ coverage can be viewed on Defra's Interactive MagicMap website. There are currently three NVZ areas covering Harborough: the River Welland NVZ, the Soar R NVZ, and the River Avon (to confluence with River Severn) NVZ.

6.5 SuDS Suitability Across the Area

The suitability of SuDS techniques is dependent upon many variables, including the hydraulic and geological characteristics of the catchment.

The permeability of the underlying soils can determine the infiltration capacity and percolation capacities. As such, a high-level review of the soil characteristics has been undertaken using British Geological Survey (BGS) soil maps of England and Wales which allow for a basic assessment of the soil characteristics and infiltration capacity. A high-level assessment of the suitability of SuDS is included in the site tables in Appendix A. This is based on national datasets, and it should be assessed in more detail when designing SuDS.

This strategic assessment should not be used as a definitive site guide as to which SuDS would be suitable but rather as an indicative guide of general suitability based solely on soil type. Several other factors can determine the suitability of SuDS techniques including land contamination, the depth and fluctuation of the water table, the gradient of local topography

and primary source of runoff etc. When considering NVZs and if areas have pollutants, infiltration may only be suitable where treatment measures are provided, prior to any discharge to surface or groundwaters.

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 and does not substitute the results of site-specific assessments and investigations. The LLFA should be consulted at an early stage to ensure SuDS are implemented and designed in response to site characteristics and policy factors.

7 Summary of Level 2 Assessment and Recommendations

7.1 Assessment Methods

The aim of the Level 2 assessment is to build on identified risks from Level 1 for proposed development sites, to provide a greater understanding of fluvial, surface water, groundwater, and reservoir related flooding risks to the site. From this, the Local Council and Developers can make more informed decisions and pursue development in an effective and efficient manner.

The Level 2 assessment also identifies sites for further risk analysis at the site-specific Flood Risk Assessment (FRA) stage. In this SFRA, 124 proposed development sites were screened with 12 identified to have significant risk of flooding and/or access and egress issues, which have been assessed in 12 site summary tables.

Sites were assigned a category of Red, Amber or Green depending on flood risk:

- **Green**- sites that are at low risk of flooding from all sources. A Flood Risk Assessment will still be required for these sites if they are greater than 1 ha, in line with the National Planning Policy Framework.
- **Amber**- Sites that are generally at low risk of flooding but have specific considerations that will need to be addressed through a site-specific Flood-Risk Assessment at the planning application stage e.g. flood risk to access/egress routes. These specific considerations are noted in Table 4-2
- **Red**- Sites with significant flood risk issues that will need to be addressed if the site is to be developed. Red sites will require the Exception Test to be passed if the Exception Test will need to be applied to the site. A red rating does not mean that a site should not be developed, rather it is a sign that careful consideration should be given to the present issues to ensure users of the site will be safe throughout its lifetime and that there will be no increase to risk off site. It should be noted that in many cases, it is likely that development of these sites will present the opportunity to address existing issues. These opportunities are highlighted in the site-specific summary tables (Appendix A).

Following the screening, 12 detailed site summary tables have been produced for the following sites:

- 8054
- 8143
- 8155
- 8234
- 8241

- 8247
- 8631 (assessed as Oadby SDA as part of a joint assessment with Oadby and Wigston Borough Council)
- 10240
- 10248
- 10253
- 10595
- 10649
- 12231

The summary tables set out the flood risk to each site, including Flood Zone coverage, maps of extent, depth, and velocity of flooding as well as hazard mapping for the 1% AEP plus an allowance for climate change surface water event. Climate change mapping has also been produced to indicate the impact which different climate change allowances may have on the sites (where models are available) or using Flood Zone 2 as an indication of climate change. Each table also sets out the NPPF requirements for the site as well as guidance for site-specific FRAs.

A broadscale assessment of suitable SuDS options has been provided giving an indication where there may be constraints to certain sets of SuDS techniques. This assessment is indicative, and more detailed assessments should be carried out during the site planning stage to confirm the feasibility of different types of SuDS. It may be possible that those SuDS techniques highlighted as possibly not being suitable can be designed to overcome identified constraints.

Consideration has also been given to the safety implications for development with respect to surface water flood risk. This reflects the requirement to consider the application of the Exception Test in circumstances where flood risk cannot be avoided.

7.2 Summary of Key Site Issues

Harborough District Council provided 178 sites for assessment. 13 sites were carried forward for Level 2 assessment. Detailed site summary tables that set out the flood risk to each site, NPPF requirements for the site, and guidance for site specific FRAs have been produced for each site taken forwards. A broadscale assessment of suitable SuDS options has been provided, giving an indication where there may be constraints to certain types of SuDS techniques.

The following points summarise the Level 2 Assessment:

- **Fluvial Flooding** - some areas of Harborough are at greater risk than others. The sites most at risk are 8054 and 12231 with risk from the River Welland. Site 8631 has fluvial risk from the River Sence, and is likely to be at fluvial risk from the Wash Brook. A number of sites namely 8241, 8247, 10248, 10253, 10595,

10649, are in the vicinity of ordinary watercourses, and the risk to these sites will need to be quantified as part of a detailed site-specific Flood Risk Assessment.

- **Surface Water** - surface water flood risk is widespread across Harborough. Water predominantly flows into and along topographically low-lying areas, including Market Harborough, and Lutterworth into watercourses such as the River Welland, River Sence, River Swift, and into the larger unnamed watercourses. Most of the sites with a detailed Level 2 summary table are at surface water flood risk. The degree of flood risk varies, with some sites being only marginally affected, and other sites being more significantly affected. Sites taken forward to the Level 2 SFRA identified to be at greatest risk of surface water flooding are 8054, 8155, 10240, 10248, 10253, and 12231.
- **Access and Egress** - Several sites with detailed Level 2 summary tables have potential access and egress issues as a result of fluvial and surface water flooding on the surrounding roads. These sites are: 8054, 8143, 8234, 8631, 10253, 10595, and 12231. Whilst not at significant risk within the site boundary, some sites screened are shown to have potential access/egress issues in the event of surface water/ fluvial flooding, namely 8151, 8205, 8208, 8238, and 10554. Consideration should be made to these sites as to how safe access and egress can be provided during flood events, both to people and emergency vehicles. Also, consideration should be given to the nature of the risk, for example whether the flooding forms a flow path or bisects the site where access from one side to another may be compromised.
- **Effects of Climate Change** - fluvial and surface water climate change mapping indicates that flood extents are generally predicted to increase. As a result, the flood depths, velocities, and hazard of flooding may also increase. The significance of the increase tends to be dependent on the topography of the site and the climate change percentage allowance used.
    - **Surface water** - The 3.3% AEP +25% and +35% and the 1% AEP +25% and +40% climate change surface water events have been derived from the RoFfSW dataset as an indication of climate change to surface water flood risk. The RoFfSW 1% AEP plus 40% climate change surface water events are larger than their respective present day 1% AEP events, with extents similar to the present day 0.1% AEP events, showing Harborough to be highly sensitive to increases in surface water flooding due to climate change.
    - **Fluvial** - Climate change allowances for the 3.3% and 1% AEP events have been derived from hydraulic modelling of the models listed in Section 4.2. The Rivers Welland, Upper Sence, Stonton Brook, Medbourne Brook, Langton Brook, and Great Easton Brook models show the 1% AEP plus Central climate change allowance to be predominantly larger than the modelled present day 1% AEP fluvial events but similar to the modelled present day 0.1% AEP fluvial events.

- All sites taken forward to a Level 2 assessment are sensitive to changes in surface water and fluvial flood risk due to climate change. Sites most sensitive to climate change are 8054, 8631, 10248, 10253, and 12231.
- Site specific FRAs and site drainage and management plans should confirm the impact of climate change using the latest guidance. It is recommended that Harborough District Council work with other Risk Management Authorities (RMAs) to review the long-term sustainability of existing and new developments in these areas when developing climate change plans and strategies for the District.

- **Sewer flooding** - Sewer flooding records from the water companies were unavailable, Anglian Water and Severn Trent Water's DWMP provides details for sewers in the general area of the sites.
- **Historic Flooding** - Historic data provided by Leicestershire County Council as the LLFA showed one instance of recorded flooding within the study area from the Section 19 reporting in Kibworth Harcourt and Kibworth Beauchamp. However, Harborough District Council hold records of flooding from recent adverse weather events such Storm Babet and Storm Henk. Leicestershire County Council hold information on the flooding caused by Storm Henk. No sites assessed encounter historic flood extents from information provided.
- **Groundwater** - The JBA Groundwater Flood Data Map indicates the majority of the south and east of Harborough is at negligible risk from groundwater emergence due to the nature of the local geological deposits. There majority of the District is at low risk, however area that are at moderate to high risk are located along the south-eastern boundary of the district. In these areas there is a risk to subsurface assets and surface manifestation of groundwater is likely. The areas where emergence is likely are around the River Welland, River Jordan, and River Avon, particularly in the Lutterworth and Market Harborough and the areas surrounding the settlements. Sites most affected by ground water are 8241 and 10248.
- **Canals** - There is one canal in the Harborough study area, the Grand Union Canal. This has the potential to interact with other watercourses and become flow paths during flood events or in a breach scenario. Site 8143 is at potential risk from breach or overtopping of the Grand Union Canal. While sites 8247 is in the vicinity of the canal, it is far enough away, on higher ground, that extents from breaches or over topping are unlikely to reach the site.
- **Reservoirs** - There is a potential risk of flooding in Harborough that is posed by reservoirs within and outside of this study area. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific Flood Risk Assessments (where relevant). No sites taken to a Level 2 assessment are within 'Wet Day' or 'Dry Day' scenario flood extents.

7.3 Requirements for Developers

- Any sites located where there is a Main River (including culverted reaches of Main River) will require an easement of 8m (9m in the EA Anglian Region) either side of the watercourse from the top of the bank. This may introduce constraints regarding what development will be possible and consideration will also need to be given for 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.
- A strategic assessment of SuDS options has been undertaken using regional datasets. A detailed site-specific assessment of suitable SuDS techniques should be undertaken at site-specific level to understand which SuDS options are most appropriate. This may need to include infiltration testing to determine the suitability of infiltration methods.
- At the planning application stage, developers may need to undertake more detailed hydrological and hydraulic assessments of unmodelled watercourses and surface water interactions so that the potential effects of proposals can be evaluated at site level and ensure there is no increase in risk off-site as result of development. The modelling should evidence flood extents, depths, velocities, and hazard (including latest climate change allowances), inform development zoning within the site and prove, if required, whether the Exception Test can be passed.
- For sites allocated within the Local Plan, the Local Planning Authority should use the information in this SFRA to inform the Exception Test. At planning application stage, the developer must adopt the sequential approach when assessing the feasibility of site allocations. This will ensure that appropriate flood resistance and resilience measures are put in place, which align with the recommendations in National and Local Planning Policy and supporting guidance as well as those set out in this SFRA.
- For developments that have not been allocated in the Local Plan, developers must undertake the Sequential Test followed by the Exception Test (if required) and present this information to the Local Planning Authority for approval. Developers will need to apply the Exception Test and use information in a site-specific Flood Risk Assessment to inform this test at planning application stage. The Exception Test should be applied where there is development which is classed as;
    - More vulnerable in Flood Zone 3a
    - Highly vulnerable in Flood Zone 2 (this is NOT permitted in Flood Zone 3a or 3b)
    - Essential infrastructure in Flood Zone 3a or 3b
    - Any development with significant* risk in the surface water 1% AEP event plus 40% climate change allowance flood extent.

**Flood risk issues are not always black and white - the significance of issues requires professional judgement, based on the location, topography and nature (including depth, velocity and hazard) of flooding, rather than simply whether part of a site is within a given flood extent. This would be determined as part of a Level 2 assessment.*

- Whilst the Exception Test is not explicitly required by the NPPF/PPG where a site is at significant risk from other sources of flooding, or where flooding impedes access/egress regardless of whether the site itself is at risk, the NPPF/PPG do require that all sources of flooding are considered both now and into the future. In these circumstances, the Council should carefully weigh up the benefits of developing such sites against the risk, and developers should demonstrate to the Council's satisfaction that the site can be developed in a way that ensures users of the site are safe in the event of a flood from any source, both now and throughout the lifetime of the development. The Level 1 SFRA and mapping can be used to scope the flooding issues that a site-specific FRA should investigate in more detail to inform the Sequential and Exception Tests for windfall sites.
- It is recommended that as part of the early discussions relating to development proposals, developers discuss requirements relating to site-specific FRA and drainage strategies with both the Local Planning Authority and the Lead Local Flood Authority (LLFA), to identify any potential issues that may arise from the development proposals.

7.4 Planning Policy Recommendations

The planning policy recommendations in Section 11 of the Level 1 SFRA still stand for the site allocations and any windfall development that come forward. Recommendations in the L2 SFRA are as follows:

- Finished floor levels should be above the 1% AEP plus climate change peak flood level.
- Combine infiltration (e.g. permeable surfaces) and attenuation (e.g. balancing ponds and flood storage reservoirs) SuDS techniques to overcome constraints to the area of a site set aside for infiltration systems caused by development pressures.
- Where appropriate, opportunities for betterment should be sought where surface water flooding issues are present, which could be implemented through Supplementary Planning documents for individual settlements.
- Encourage the use of permeable surfacing in gardens and use measures to optimise drainage and reduce runoff.
- Consider opportunities for water conservation through rainwater harvesting and water butts where appropriate for new and existing development.
- Promote land management practices where appropriate to attenuate runoff and alleviate potential issues downstream.

7.5 Guidance for Windfall Sites and Sites Not Assessed in the L2 SFRA

- For sites not covered by the Environment Agency's Flood Zones, or where Flood Zones do exist, but no detailed hydraulic modelling is present, it is recommended that developers construct detailed hydraulic models at these sites as part of a site-specific FRA using channel, structure, and topographic survey, to confirm flood risk. Site-specific flood modelling will probably 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.
- If a site's extents either include or borders with a Main River (including a culverted reach of Main River), an easement of 8m is required from either bank for access and maintenance. Any future development will require a flood risk permit from any activity within 8m of a Main River.
- If an ordinary watercourse is within or immediately adjacent to the site area, consultation with the Lead Local Flood Authority 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% AEP (30-year), 1% AEP (100-year) or 0.1% AEP (1,000-year) events, 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 Flood Risk Assessment and Surface Water Drainage Strategy.
- Access and egress should be considered at the site, but also in the vicinity of the site, for example, a site may have low surface water risk, but in the immediate locality, access/ egress to and from the site could be restricted for vehicles and/ or people.
- Sites where there is a canal within or immediately adjacent to the site area, developers should consult the Canals and Rivers Trust. Any proposed alterations to the canal or discharges must be agreed with the Canals and Rivers Trust.
- If a site is located within 250m of a landfill site, there could be amenity, dirt, and contamination issues. Sites could be sensitive from the perspective of controlled waters and therefore any redevelopment must ensure there is no pollution risk to the water environment.

7.6 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 rivers, 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. New information on flood risk may be provided by Harborough District Council, the Highways Authority, Severn Trent Water, Anglian Water, and the Environment Agency. Such information may be in the form of:

- New hydraulic modelling results
- Flood event information following a future flood event
- Policy/legislation updates
- Environment Agency flood map updates
- New flood defence or alleviation schemes.

The Environment Agency regularly reviews their flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a detailed Flood Risk Assessment. It is recommended that the SFRA is reviewed when there are significant updates to the Environment Agency's Flood Zone mapping. This will ensure the latest data is still represented in the SFRA, allowing a cycle of review and a review of any updated data by checking with the above bodies for any new information.

7.6.1 Neighbourhood Plans

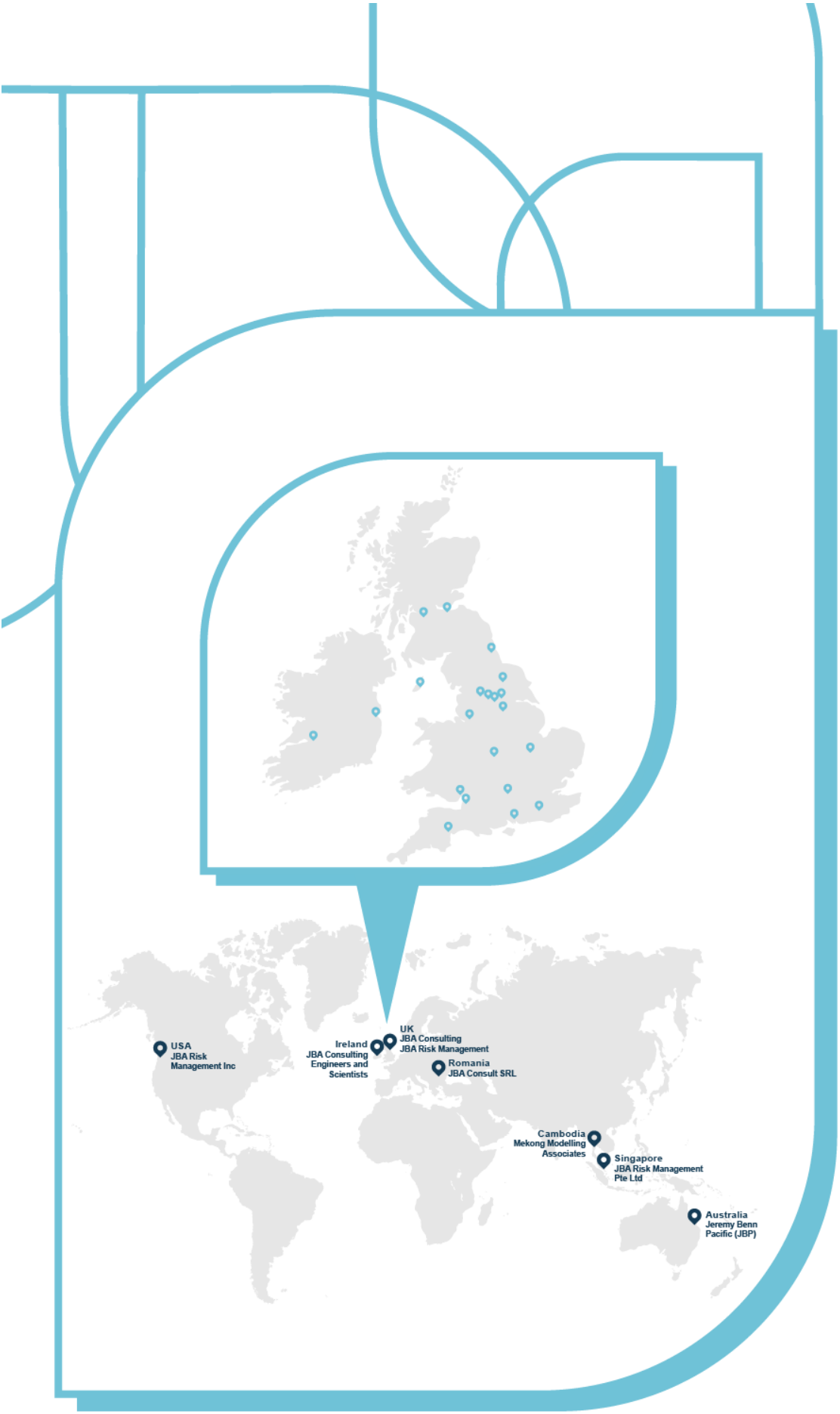
Flood risk should be fully addressed in the plan preparations and in bring forward policies for the allocation of land and therefore the SFRA findings should be used in production of Neighbourhood Plans.

Neighbourhood planners can use the information in the Level 1 and Level 2 SFRAs on the sources of flood risk across Harborough 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.

The Level 1 Harborough SFRA highlights on a broad scale where flood risk from fluvial, surface water, groundwater, and the effects of climate change are most likely. The maps are useful to provide a community level view of flood risk but may not identify if an individual property is at risk of flooding or model small scale changes in flood risk. Local knowledge of flood mechanisms will need to be included to complement the broadscale mapping.

A Site Summary Tables and GeoPDFs

B Summary of Flood Risk to Screened Sites



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