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Sandwell Level 2 Strategic Flood Risk Assessment

Final version

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This report describes work commissioned by Philippa Smith, on behalf of Sandwell Metropolitan Borough Council, by an instruction dated 19th February 2024. The Client's representative for the contract was Philippa Smith of Sandwell Metropolitan Borough Council. Elise Coughlin of JBA Consulting carried out this work.

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- Sandwell Metropolitan Borough Council
- Environment Agency;
- Severn Trent Water;
- The Canal and Rivers Trust; and,
- Planners at the neighbouring authorities

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Abbreviations

AEP	Annual Exceedance Probability
AIMS	Asset Information Management System
CIA	Cumulative Impact Assessment
CRT	Canal and Rivers Trust
DTM	Digital Terrain Model
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency

FAA	Flood Alert Area
FMfP	Flood Map for Planning
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FWA	Flood Warning Area
GIS	Geographic Information System
Ha	Hectare
IDB	Internal Drainage Board
JBA	Jeremy Benn Associates
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	metres Above Ordnance Datum
MBC	Metropolitan Borough Council
NaFRA2	National Flood Risk Assessment (second iteration)
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
RMA	Risk Management Authority
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems

Executive Summary

Introduction

This Level 2 Strategic Flood Risk Assessment (SFRA) document was created with the purpose of providing evidence of understanding of flood risk to support the redevelopment and strategic development of Sandwell. Three sites are being progressed to detailed assessment as part of the Level 2 SFRA.

Level 2 SFRA Outputs

The Level 2 assessment includes a detailed assessment of the areas of Sandwell which cover the sites being evaluated. This includes:

- An assessment of all sources of flooding including fluvial flooding, surface water flooding and the potential increase in these flood risks due to climate change, plus groundwater flooding.
- Reporting on current conditions of flood defence infrastructure, where applicable.
- 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 (SuDS) for managing surface water runoff.
- Advice on whether the site is likely to pass the second part of the Exception Test with regard to flood risk and on the requirements for a site-specific FRA.

Summary of Key Messages

- At least 80% of all sites are within Environment Agency's (EA's) Flood Zone 1, with no risk of fluvial flooding in these areas. It is important to note that the EA's Flood Zones are based on undefended outlines and do not take account of flood defences in the area.
- All sites are at risk in the surface water climate change scenarios, however access and egress is still possible for all sites in the climate change events.
- Access and egress is impeded for all sites during the surface water design event, however access would still be available via foot.
- Risk of breach has been identified due to the proximity of Direct 2, Roway Lane (EMP2-3) and Land off Bilport Lane (SEC1-7) to canals. Breach extents must be confirmed with detailed modelling in a site-specific Flood Risk Assessment.
- Due to the nearby canals, Direct 2, Roway Lane (EMP2-3) and Land off Bilport Lane (SEC1-7) have residual risk. Lion Farm Estate (SM2) is at residual risk of breach to Whiteheath Brook within the site.

Recommendations

Considering the Exception Test for the proposed sites in Sandwell

To pass the Exception Test, it must be shown that the development will provide wider sustainability benefits that outweigh the risk and that the development will be safe throughout its lifetime without increasing risk elsewhere. The former is a planning-related consideration and the Level 2 SFRA helps to answer the latter part of the Test.

In principle, it is possible for all three sites to pass the flood risk element of the Exception Test by:

- Siting development within the settlement away from the highest areas of risk into Flood Zone 1 where Flood Zone 1 is present within sites.
- Considering safe access / egress in the event of a flood (from all parts of the site, if say the site is severed by a flood flow path).
- Adequately considering residual risk from defence breaching or overtopping, for example through a flood warning and evacuation plan.
- Designing buildings with habitable floor levels above the design flood event, including an allowance for freeboard and / or providing safe refuge for residents to shelter during an extreme event above the 0.1% AEP flood level including climate change.
- Using areas in Flood Zone 2 for the least vulnerable parts of the development in accordance Table 2 of the NPPF. Highly vulnerable development (for example police and ambulance stations, basement dwellings and caravans and mobile homes) should not be permitted in Flood Zone 3 and no development at all should be permitted in Flood Zone 3b (aside from essential infrastructure, such as a bridge crossing the lowest points of a site and water compatible development).
- If other solutions are not possible, increasing the elevation of land for whole or parts of the sites could be implemented to prevent flood flows affecting the land up to the design level. Land raising within the floodplain to make development viable is not recommended by the EA.
- Testing flood mitigation measures if these are to be implemented, to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required an another).
- Considering space for green infrastructure in the areas of highest flood risk.

Direct 2, Roway Lane (EMP2-3) and Lion Farm Estate (SM2) are at greater risk of surface water and fluvial flooding and will require careful consideration and mitigation to pass the flood risk element of the Exception Test.

Consideration should be given to the surface water risk where this is high, with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk may come from surface water.

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

Strategic-level interventions which reduce the risk to the wider Sandwell area may also enable sites to be brought forward.

Production of a Local Adaptation and Resilience plan for Sandwell would help to identify the need to safeguard land, habitats, infrastructure and development for roll back or relocation as well as the provision to safeguard land for flood risk management infrastructure.

1 Introduction

1.1 Purpose of the Strategic Flood Risk Assessment

Paragraph 166 of the National Planning Policy Framework (NPPF) (2024) 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 relevant organisations, such as Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards (IDBs).

This Level 2 SFRA document was create with the purpose of informing decisions for securing allocation for regeneration and strategic development of Sandwell Metropolitan Borough Council (MBC) within the Sandwell MBC Local Plan and the preparation of sustainable policies for the long-term management of flood risk.

1.2 Local Plan

The current Sandwell MBC Local Plan can be found at the link below. This SFRA will aid in informing the Local Plan. The Local Plan aims to establish a planning framework that identifies available land for housing, employment and infrastructure for future development.

- Sandwell MBC Draft Regulation 18 Local Plan (2023)

1.3 Levels of SFRA

The published guidance on 'How to prepare a strategic flood risk assessment' advocates a tiered approach to risk assessment and identifies the following two levels of SFRA:

- Level 1: where flooding is not a major issue in relation to potential site allocations and where development pressures are low. The assessment should be of sufficient detail to identify all flood risk areas and to enable application of the Sequential Test.
- Level 2: where it is not possible to allocate all land for development outside flood risk areas or where there may be high numbers of applications in flood risk areas on sites not identified in the local plan. A Level 2 SFRA needs to be detailed enough to identify which development allocation sites have the least risk of flooding. It should also contain the information needed to apply the Exception Test and, if relevant, enable a decision to be made on whether development can be made safe without increasing flood risk elsewhere.

The report fulfils the requirements for a Level 2 SFRA for the Sandwell Local Plan update.

1.4 SFRA Objectives

The objectives of the Level 2 SFRA are to:

1. 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 their Local Plan.
2. Using available data, provide information and comprehensive mapping presenting flood risk from all sources for the site.
3. Where the Exception Test is required, provide recommendations for making the site safe throughout its lifetime.
4. Take into account most recent policy and legislation in the NPPF, Planning Practice Guidance (PPG) and Lead Local Flood Authority (LLFA) SuDS guidance.
5. Consider whether the catchment is sensitive to new development in flood risk terms by undertaking a Cumulative Impact Assessment (CIA) and further review policy and recommendations for these catchments.

1.5 Context of the Level 2 Assessment

Sandwell MBC have proposed three sites to go forward for a Level 2 assessment. This is based on the different sources of flood risk and the proportions of these risks, as indicated by the Level 1 site screening results (Appendix M, Level 1 SFRA). The sites assessed for the Level 1 SFRA were narrowed down based on fluvial risk, surface water risk, access and egress and proximity to watercourses and canals. These proposed sites for Level 2 assessment were sent to Sandwell MBC for review. Of these sites, the council proposed three sites likely to have a change of use within the plan period, and therefore would be required for a Level 2 assessment. The council accepts that these sites are at risk of flooding in both the present day and climate change scenarios. To secure allocation with the new Sandwell Local Plan, the council, in accordance with the NPPF, is required to evidence its understanding of flood risk and demonstrate how this might be managed and mitigated via a Level 2 SFRA.

The main objectives of the Level 2 SFRA are stated above in Section 1.4, it will also be used:

- To assess flood risk when making decisions on planning applications;
- By applicants when preparing planning applications;
- To help inform any future Sandwell Neighbourhood Plans undertaken by others.

1.6 Consultation

SFRAs should be prepared in consultation with other Risk Management Authorities (RMAs). The following parties (external to Sandwell MBC) were consulted and provided data as part of the Level 1 SFRA and the same data has been used to inform the Level 2 SFRA:

- Environment Agency
- Canal & River Trust
- Severn Trent Water
- South Staffs Water
- Neighbouring Authorities to Sandwell MBC:
  - City of Wolverhampton Council
  - Walsall District Council
  - Birmingham District Council
  - Dudley District Council

1.7 How to use this report

Table 1-1: SFRA User Guide

Section	Contents	How to use
1. Introduction	Outlines the purpose and objectives of the Level 2 SFRA.	For general information and context.
2. Summary of Information from the Level 1 SFRA	Includes an overview of the information included in the Sandwell MBC Level 1 SFRA (September 2024), including information on the Planning Framework and Flood Risk Policy, Planning Policy for Flood Riks Management, Surface Water Management and SuDS and Flood Risk Management Requirements for Developers.	Users should refer to this section to identify which sections of the Level 1 SFRA to use to research any relevant policy which may underpin strategic or site-specific assessments.
3. Climate Change Guidance	Outlines the latest climate change guidance published by the Environment Agency and how this was applied to the SFRA. Sets out how developers should apply the guidance to inform site-specific Flood Risk Assessments.	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
4. Level 2 Strategic Flood Risk Assessment	Summarises the Level 2 assessment of the settlement sites and the data used to inform the assessment.	This section should be used in conjunction with site summary tables mapping to understand the data presented. Developers should refer back to this section when understanding requirements for a site-specific FRA.
5. Summary of Level 2 assessment and recommendations	Summarises the results and conclusions of the Level 2 assessment and makes recommendations for planning policy and development.	Developers and planners should use this section to provide an overview of the Level 2 assessment.
Appendix A: A.1 Site summary tables A.2 PDF mapping	Detailed assessment of the risk to specific sites identified by Sandwell MBC and likely actions required to bring the site forward under Sequential / Exception Tests.	Developers and planners should use this section to provide an overview of the risk to specific sites.

1.8 L2 SFRA Study Area

Sandwell MBC is located in the West Midlands and is situated to the north-west of Birmingham. The area is made up of six towns: Oldbury, Rowley Regis, Smethwick, Tipton, Wednesbury and West Bromwich and covers an area of 86km^2, with a population of approximately 341,000.

There are a number of rivers and canals that flow and connect through the area. The main rivers include, but are not limited, to the River Tame, the River Stour, Mousesweet Brook, Brandhall Brook and Hockley Brook. There are seven canals in Sandwell, these include Walsall Canal, Tame Valley Canal, Gower Branch Canal, Birmingham Canal, Titford Canal, Rushall Canal and Dudley Canal.

Three sites have been put forward for a Level 2 assessment, based on the risk of flooding from different sources as illustrated by the site screening spreadsheet (Appendix M of the Level 1 SFRA) (September 2024). These sites that have been listed for further consideration are shown in Figure 1-1. The main watercourses in the study area are shown in Figure 1-2.

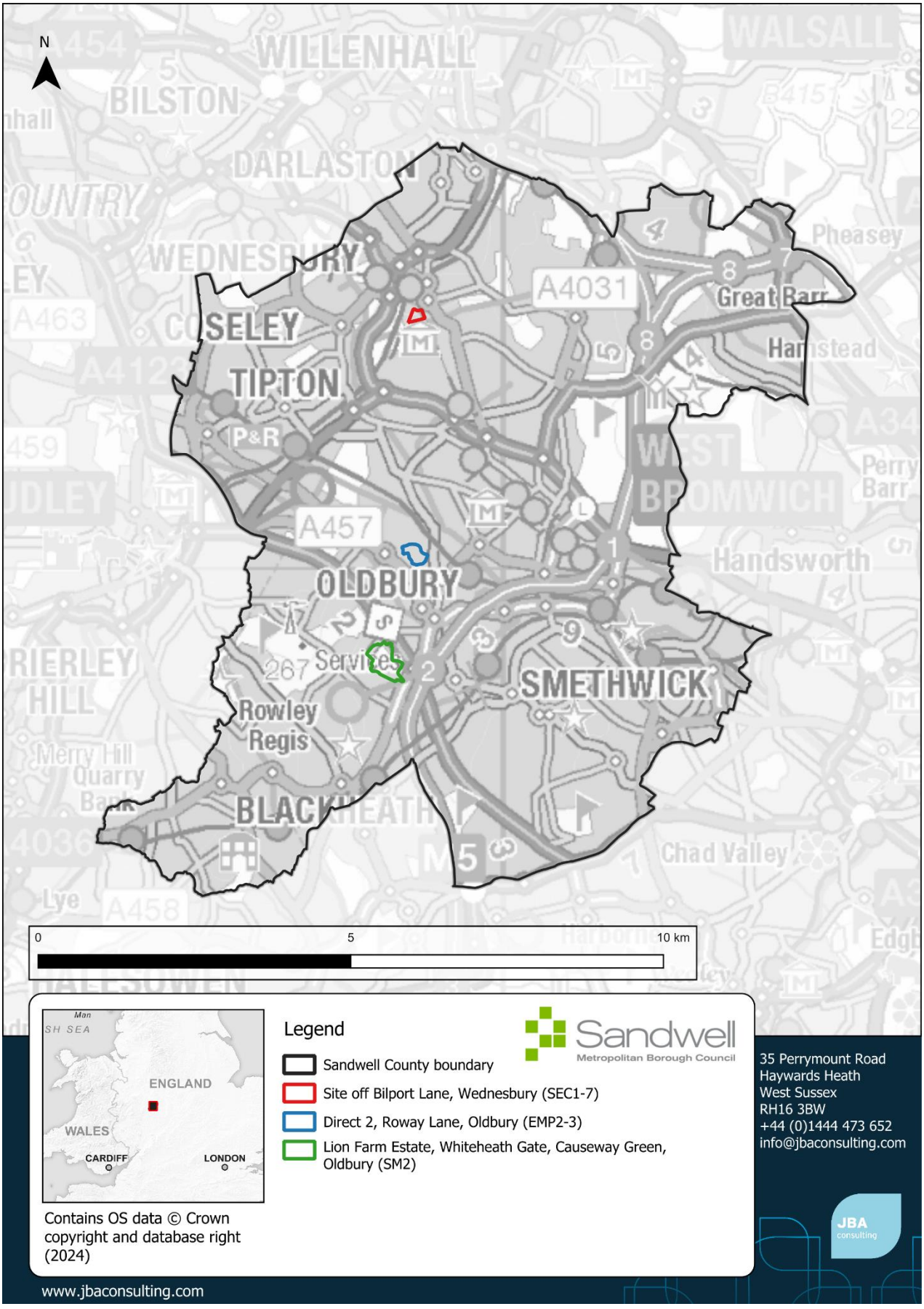


Figure 1-1: Overview Map of Study Area

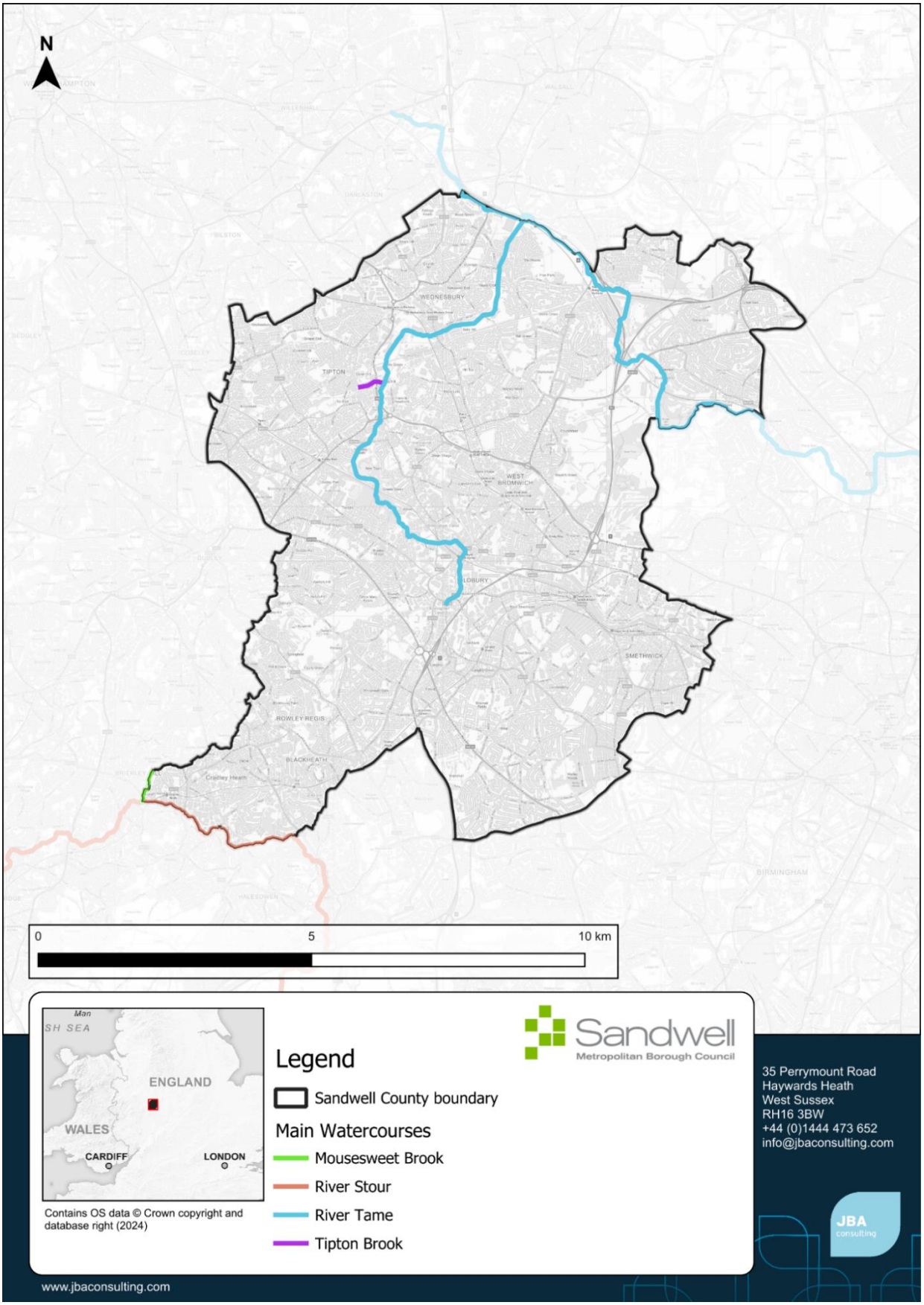


Figure 1-2: Main rivers and other watercourses within Sandwell

2 Summary of Information from the Level 1 SFRA

2.1 The Planning Framework and Flood Risk Policy

The Flood Risk Management (FRM) roles and responsibilities for different organisations and relevant legislation, policy and strategy are detailed within the Sandwell MBC Level 1 SFRA (Section 2).

This contains detail on:

- Flood risk policy and strategy;
- Roles and responsibilities for Flood Risk Management in Sandwell;
- Relevant legislation;
- Relevant Flood Risk Policy and Strategy Documents;
- Key legislation for flood and water management; and,
- Key national, regional and local documents and strategies.

2.2 Planning Policy for Flood Risk Management

Information on planning policy for flood risk management is detailed in the Level 1 SFRA (Section 3). This contains detail on:

- The NPPF and PPG;
- The risk-based approach;
- The Flood Zone definitions;
- The Sequential and Exception Tests;
- Existing Local Plan policy on development and flood risk; and,
- Relevant local policy on development and flood risk.

2.3 Surface Water Management and SuDS

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

This contains detail on:

- Role of the LLFA and LPA in surface water management;
- Sustainable Drainage Systems (SuDS);
- Sources of SuDS guidance; and,
- Other surface water considerations: Groundwater Vulnerability Zones; Groundwater Source Protection Zones; Nitrate Vulnerable Zones.

2.4 Flood Risk Management Requirements for Developers

The Flood Risk Management requirements for developers and relevant legislation, policy and strategy are detailed within the Sandwell MBC Level 1 SFRA (Section 8) (September 2024).

This contains detail on:

- General principles for new developments;
- Requirements for site-specific Flood Risk Assessments;
- Local requirements for mitigation measures;
- Resistance and resilience measures;
- Reducing flood risk from other sources; and,
- Emergency planning.

2.5 Developer contributions

In some cases, and following the application of the Sequential Test, it may be appropriate for the developer to contribute to the improvement of flood defence provision that would benefit both proposed new development and the existing local community. Developer contributions can also be made to maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e. SuDS). The council should only use planning obligations to secure contributions where it is satisfied that the contribution will fund works / measures which are:

- Necessary to make the development acceptable in planning terms;
- Directly related to the development; and
- Fairly and reasonably related in scale and kind to the development (Paragraph 57, NPPF).

3 Climate Change Guidance

3.1 Relevant allowances for Sandwell

Table 3-1 shows the peak river flow allowances that apply to Sandwell for fluvial risk. For large catchments (more than 5km^2) with rural land use, these allowances should be used. The central allowance should be used for all developments except essential infrastructure, for which the higher central allowance should be used. The epoch considered will be dependent on the anticipated lifetime of the development. Residential development can be assumed to have a lifetime of at least 100 years, unless there is specific justification for considering a different period. For example, the time in which flood risk or coastal change is anticipated to affect it, where a development is controlled by a time-limited planning condition. The lifetime of a non-residential development depends on the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment.

The uplifts provided are for the Tame Anker and Mease and the Severn Middle Worcestershire Management Catchments.

Table 3-1: Peak river flow allowances for the Tame Anker and Mease Management Catchment

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	24%	30%	51%
Higher central	15%	17%	30%
Central	10%	11%	22%

Table 3-2: Peak river flow allowances for the Severn Middle Worcestershire Management Catchment

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	25%	38%	67%
Higher central	16%	21%	40%
Central	12%	15%	30%

Table 3-3 and Table 3-4 show the peak rainfall intensity allowances that apply when considering surface water flood risk. These should be used for site-scale applications (for example, drainage design), and for surface water flood mapping in small catchments (less than 5km^2) and urbanised drainage catchments. For development with:

- A lifetime beyond 2100: the Upper End allowances for the 2070s epoch should be considered for both the 3.3% and 1% AEPs.
- A lifetime of between 2061 and 2100: the Central allowance for the 2070s epoch should be considered for both the 3.3% and 1% AEPs.
- A lifetime of up to 2060: the Central allowance for the 2050s epoch should be considered for both the 3.3% and 1% AEPs.

The uplifts provided are for the Tame Anker and Mease and Severn Middle Worcestershire Management Catchments.

Table 3-3: Peak rainfall intensity allowances for the Tame Anker and Mease Management Catchment

% Annual Exceedance Probability event	Epoch	Central allowance	Upper end allowance
3.3%	2050s	20%	35%
3.3%	2070s	25%	35%
1%	2050s	20%	40%
1%	2070s	25%	40%

Table 3-4: Peak rainfall intensity allowances for the Severn Middle Worcestershire Management Catchment

% Annual Exceedance Probability event	Epoch	Central allowance	Upper end allowance
3.3%	2050s	20%	35%
3.3%	2070s	25%	35%
1%	2050s	20%	40%
1%	2070s	25%	40%

4 Level 2 Strategic Flood Risk Assessment

Table 4-1 highlights all the datasets used in the Level 2 SFRA to assess the Local Plan sites against flood risk.

Table 4-1: Datasets used in the Level 2 SFRA

Source of flood risk	Data used to inform the assessment	Date data was received	Data supplied by
Historic (all sources)	Historic Flood Map and Recorded Flood Outlines	May 2024	Environment Agency
	Historic flood incidents / records	May 2024	Sandwell MBC
	Historic sewer incidents	July 2024	Severn Trent Water
Fluvial (depths, velocities, hazard - present day and climate change)	Flood Map for Planning Flood Zones	March 2024	Environment Agency
	Modelled present day and climate change fluvial extents	April 2024	Environment Agency
Surface Water (extents, depths, velocities, hazard - present day and climate change)	Surface water present day	March 2024	Environment Agency
	Surface water plus climate change	June 2024	JBA Consulting
Groundwater	Bedrock geology / superficial deposits dataset	March 2024	Environment Agency
	JBA's Groundwater Flood Risk Map	May 2024	JBA Consulting
Reservoir	Reservoir Flood Extents dataset	March 2024	Environment Agency

4.1 Historic flooding

4.1.1 Data used to inform historic flood risk

Historic flooding was assessed using records of historic flooding events from Sandwell MBC and historic sewer incidences from Severn Trent Water.

4.2 Fluvial flood risk

4.2.1 Data used to inform fluvial risk

The EA's Flood Map for Planning (FMfP) flood zones were used to model Flood Zone 2 and Flood Zone 3 flood risk across the Level 2 sites. For Flood Zone 3b, the 3.3% and 2% AEP defended scenarios were used from EA modelling data. For areas outside of the detailed model coverage, Flood Zone 3a has been used as a conservative indication of Flood Zone 3b.

Table 4-2 shows the models provided by the EA were used to determine the risk of climate change to the sites. Modelled data was used where the model outputs were more conservative than the climate change allowances. Where modelled uplift data was unavailable or not conservative, proxy flood zone data was used. For the Central and Higher Central climate change allowances for both Management Catchments, refer to Table 3-1 and Table 3-2. The climate change modelled scenarios used were:

- Flood Zone 3a (1% AEP) plus Central climate change
- Flood Zone 3a (1% AEP) plus Higher Central climate change
- Flood Zone 3b (3.3% AEP) plus Central climate change
- Flood Zone 3b (3.3% AEP) plus Higher Central (30%) climate change

Where areas are covered by indicative flood zones, further work should be undertaken as part of a detailed site-specific FRA to define flood extents where no detailed modelling exists.

Table 4-2: EA Models used for the SFRA

Model	Age	Management Catchment	FZ2	FZ3a	FZ3b	FZ3a + CC		FZ3b + CC	
						Central	Higher Central	Central	Higher Central
Black Country*	2017	Tame Anker and Mease	1000yr	100yr	30yr	20%	30%	Flood Zone 3a	
Brandhall Brook	2011	Tame Anker and Mease	1000yr	100yr	50yr	20%	FZ2	Flood Zone 3a	
River Stour	2010	Severn Middle and Worcestershire	1000yr	100yr	50yr	Flood Zone 2		Flood Zone 3a	
River Tame	2009	Tame Anker and Mease	1000yr	100yr	50yr	20%	FZ2	Flood Zone 3a	
Stour and Hinckley	2013	Severn Middle and Worcestershire	1000yr	100yr	50yr	Flood Zone 2		Flood Zone 3a	

* Note that the Black Country model is made up of Groveland, Hobnail, Swan, Tipton and Whiteheath models.

4.2.2 Assessment of fluvial risk

The northern and eastern borders of Land off Bilport Lane, Wednesbury (SEC1-7) are in Flood Zone 2 due to the proximity to the River Tame. Small areas to the north-west and north-east of the site are in Flood Zone 3b. The north and east of the site is within the extents of the Flood Zone 3a plus Central and Higher Central climate change models and the Flood Zone 3b plus Higher Central model. Direct 2, Roway Lane, Oldbury (EMP2-3) is not at risk of fluvial present-day flooding. However, the west of the site is within the Flood Zone 3a plus Higher Central climate change model extent. Lion Farm Estate (SM2) is at risk of present-day fluvial flooding as shown in both the Flood Map for Planning and the Whiteheath fluvial model. Flood extents are situated around Whiteheath Brook, with an area in Flood Zone 3b. The flood extents are similar to the present-day scenarios for all three climate change scenarios. It is noted that watercourses on SM2 appear to be culverted, which may affect the true risk to the site, which should be investigated and confirmed through a site-specific FRA.

4.2.3 Sites at risk of fluvial plus climate change flooding

JBA have undertaken a site screening exercise as part of this level 2 SFRA to identify sites which are at risk of flooding. Flood risk extent thresholds of 20% (for areas less than 2ha) and 25% (for areas greater than 2ha) were used to identify sites where a detailed level 2 assessment was required, as agreed with Sandwell MBC. Screening was based on Flood

Zone 3a plus Central climate change for fluvial flooding, Flood Zone 3b plus Upper End climate change and the 1% AEP plus climate change (40%) for Risk of Flooding from Surface Water. Following the analysis, a number of sites were identified which were particularly sensitive to climate change. Table 4-3 provide details of these sites where the difference in fluvial flood extents between the Central and Higher Central allowances was found to be significant. Information used within the screening exercise is provided in bold. Further analysis of the flood risk to these sites should be carried out through site-specific Flood Risk Assessments to better understand the sensitivity of sites to flood risk and improve confidence in the predicted flood extents.

Table 4-3: Sites which were found to be sensitive to fluvial flooding under projected climate change scenarios

	Fluvial Flood Zone 3 plus Central Climate Change	Fluvial Flood Zone 3 plus Higher Central Climate Change
Mill Street, Great Bridge (SH5)	**8.85%**	58.65%
Friar Street, Wednesbury (SH28)	**0.00%**	21.08%
Land between Addington Way and River Tame, Temple (SH36)	**11.18%**	32.93%

4.3 Surface water flood risk

4.3.1 Data used to inform surface water flood risk

Present day surface water flood extents, depths, hazard and velocities were downloaded from Defra data services for the 3.3% AEP, 1% AEP and 0.1% AEP scenarios. The surface water plus climate change scenarios were modelled by JBA for the following: 3.3% plus Upper End climate change, 1% plus Upper End climate change and 0.1% plus Upper End climate change.

4.3.2 Assessment of surface water flood risk

During the Level 1 site screening assessment, sites at risk of surface water flooding were identified. Some sites had multiple sources of flooding or were at severe risk of surface water flooding. For these sites, a site-specific Level 2 SFRA site table was completed. These sites were Direct 2, Roway Lane, (EMP2-3), site off Bilport Lane (SEC1-7), and Lion Farm Estate (SM2). A summary of surface water risk is covered in Section 4.3.2.1. Site-specific details can be found in the relevant site tables.

A further ten sites were flagged as being at significant risk of surface water flooding, but with no risk of flooding from other sources to the site. The extent threshold at which sites are considered for Level 2 assessment is 25% of surface water coverage for sites >2 Ha and 20% for sites <2 Ha. Below these thresholds, risk is very likely to be manageable through locating development in areas of the site at low risk, and/or appropriate SUDS. As these sites are only at risk of surface water flooding, a complete site summary table was not thought appropriate. Therefore, Section 4.3.3 provides a summary of the risks of surface water flooding to each of the 10 sites identified, along with proposed mitigation strategies.

4.3.2.1 Summary of surface water flood risk for sites with detailed Level 2 site table

Direct 2, Roway Lane (EMP2-3) is at risk of surface water flooding in both present day and climate change scenarios, with the west of the site being at a slightly greater risk. Site off Bilport Lane (SEC1-7) is at risk of surface water flooding in the present day and climate change scenarios. The greatest risk of flooding is in the south-east of the site. Lion Farm Estate (SM2) is also at risk of surface water flooding in both the present day and climate change scenarios. The greatest extents are in the centre of the site, around Whiteheath Brook, with extents in the north of the site, particularly in the climate change scenarios.

4.3.3 Sites flagged for surface water flood risk

Due to the risk of surface water flooding and the more vulnerable nature of the development (i.e. residential development), Each site included in this section will require a Flood Risk Assessment as well as a Drainage Strategy, once the Exception Test has been passed, in order to demonstrate that the site will be safe for its users in its design lifetime. Table 4-4 shows the surface water coverage in the present day and climate change scenarios for each site, as well as a summary of access and egress.

Table 4-4: Surface water risk to sites

Sites	Surface Water Coverage (%) in X% AEP event					Can access and egress be maintained?
	3.3%	1%	0.1%	3.3% + 35% climate change	1% + 45% climate change	
Brierley Lane, Tipton (SG1)	8.31	5.74	17.81	20.33	30.64	Yes
Cape Arm, Cranford Street (SH55)	2.90	5.83	81.46	47.35	90.82	No
Cranford Street / Heath Street / Canal (SH54)	10.65	11.43	28.62	43.26	53.19	No
Elbow Street, Old Hill (SH20)	0.00	9.96	35.83	41.56	47.54	No

Sites	Surface Water Coverage (%) in X% AEP event					Can access and egress be maintained?
	3.3%	1%	0.1%	3.3% + 35% climate change	1% + 45% climate change	
Brierley Lane, Tipton (SG1)	8.31	5.74	17.81	20.33	30.64	Yes
Langley Maltings, Western Road, Langley (SH14)	11.13	14.12	20.89	38.41	46.49	Yes
Langley Swimming Centre, Vicarage Road, Oldbury (SH40)	3.86	17.07	50.85	47.35	72.75	No
Lion Farm Estate (SM2)	1.72	6.07	17.10	18.69	26.49	No
Summerton Road, Oldbury (SH31)	3.17	2.37	22.32	14.63	30.57	Yes
Thandi Coach Station (SH61)	3.18	7.89	56.79	43.67	73.56	Yes
Used Car Sales site on corner of Lower Church Lane (SH29)	2.76	29.59	42.14	39.66	74.49	Yes

4.3.3.1 Surface water extents

The surface water plus climate change extents are greater than the present-day extents for each of the sites, particularly in the 1% AEP plus 45% climate change scenario. In many cases, this means that access and egress cannot be maintained. Where access and egress has been shown to be maintained, it is because there are multiple access points to the site.

4.4 Safe access and egress

Guidance for safe access and egress can be found online in the government's Flood Risk Assessment Guidance for New Development technical report FD2320/TR2. The Intermediate Approach guidance states that safe access and egress can only be maintained with depths at or below 0.20m and velocities at or below 4.00 m/s, as shown in Table 13.1 of the Guidance report. Based on this information, a summary for each site has been provided below in Table 4-5.

Table 4-5: Access and egress routes

Sites	Access and Egress	Summary
Brierley Lane, Tipton (SG1)	Access route is available from the north-west of the site, along Brierley Lane. There are no flood depths in this area in the 1% AEP plus 40% climate change ("design event") scenario, therefore a safe dry route for people and vehicles is available.	Safe access and egress can be maintained along Brierley Lane.
Cape Arm, Cranford Street (SH55)	Flood depths along Cranford Street reach levels greater than 1.20m in the design event and the velocity is 1.00-2.00m/s. Similar flood depths and velocities occur along Abberley Street to the south-east of the site. The resulting hazard along both routes is 'Danger for all'. It is therefore unlikely that safe access and egress can be maintained for this site.	Access and egress cannot be maintained because of surface water.
Cranford Street / Heath Street / Canal (SH54)	Flood depths and velocities along Cranford Street (south of the site) and John Guest Close (west of the site) during the design event result in a 'Danger for all' hazard category. It is therefore unlikely that safe access and egress can be maintained for this site.	Access and egress cannot be maintained because of surface water.
Elbow Street, Old Hill (SH20)	Flood depths along Heathfield Way, to the east of the site, reach 0.60m with a maximum velocity of 2.00m/s. This equates to a 'Danger for all' hazard. It is therefore unlikely that safe access and egress can be maintained for this site.	Access and egress cannot be maintained because of surface water.
Langley Maltings, Western Road, Langley (SH14)	Access is available along Western Road at the north of the site. There are small areas of flooding which have a velocity of less than 0.25m/s and depths of 0.15-0.30m, however these areas can be avoided therefore access and egress is considered viable and safe for people and vehicles.	Safe access and egress can be maintained along Western Road.

Sites	Access and Egress	Summary
Langley Swimming Centre, Vicarage Road, Oldbury (SH40)	Flood depths are the shallowest along Brookfields Road to the west of the site, going east, with depths of less than 0.15m. The velocity of water is between 1.00 and 2.00m/s along this route. This results in a hazard rating of 'Danger for some' which means this route will not be accessible for children, the elderly and infirm.	Access and egress is unlikely to be maintained along Brookfields Road because of surface water.
Lion Farm Estate (SM2)	Refer to the site table in Appendix A.1 for site-specific access and egress information.	Access and egress is unlikely to be maintained along Newbury Lane because of surface water.
Summerton Road, Oldbury (SH31)	Flood depths and velocities are the lowest to the south of the site in the design event, with a break in flood extents in Summerton Road. This allows for safe access and egress for both people and vehicles along Mendi Road, via Summerton Road.	Safe access and egress can be maintained along Summerton Road.
Thandi Coach Station (SH61)	Flood depths to the south of the site along Cranford Street are less than 0.15m and velocities between 1.00 and 2.00m/s. The resulting hazard is 'Low - Caution', therefore safe access and egress is viable.	Safe access and egress can be maintained along Cranford Street.
Used Car Sales site on corner of Lower Church Lane (SH29)	The majority of the site is at risk of surface water flooding, however there is no flooding to the north-west of the site, along Park Lane East. Therefore, a safe dry route for people and vehicles is available.	Safe access and egress can be maintained along Park Lane East.

4.4.1 Geology

The bedrock geology across all of the sites consists of sandstone with subordinate mudstone. This means that the permeability is variable as sandstone is more permeable than mudstone and is therefore better for drainage. Cape Arm, Cranford Street (SH55), Cranford Street / Heath Street / Canal (SH54), Langley Maltings, Western Road, Langley (SH14), Langley Swimming Centre, Vicarage Road, Oldbury (SH40) and Thandi Coach Station (SH61) all have superficial deposits present, consisting of diamicton. This is generally permeable due to its unsorted to poorly sorted nature, therefore allowing for drainage of surface water.

4.4.2 SuDS guidance

The guidance listed below is relevant to these sites due to their characteristics:

- BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff.
- There are six sites that have canals located in close proximity (within 200m of the site). Three of these sites have a canal running along the site boundary, these are Cranford Street (SH54), Langley Maltings (SH14) and Summerton Road (SH31). The sites which have a canal located within 200m of its boundary are Cape Arm, Cranford Street (SH55), Thandi Coach Station (SH61) and the Used Car Sales site (SH29).
- Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscape techniques.
- Development at these sites should not increase flood risk either on or off site. The design of the surface water management proposals should consider the impacts of future climate change over the projected lifetime of the development.
- Opportunities to incorporate infiltration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality.

4.5 Flood Risk Assessment guidance

- Consultation with Sandwell MBC, South Staffordshire Water, Severn Trent Water, Canal and River Trust and the Environment Agency should be undertaken at an early stage.
- The developer will need to show, through a site-specific Flood Risk Assessment, that future users of the development will not be placed in danger from flood

hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG).

- Developers should consult with Severn Trent Water to ensure that the development aims to help achieve the targets of the Drainage and Wastewater Management Plan.
- Development plans should use their Level 1 and 2 SFRA for Sandwell, as well as the Local Flood Risk Management Strategies to identify cumulative flood risk issues. It should also promote an integrated approach to water management. Drainage should be designed and implemented in ways that promote multiple benefits.
- Any FRA should be carried out in line with the NPPF; Flood Risk and Coastal Change PPG; Sandwell MBC's Local Plan Policies and Sustainable Drainage Design and Evaluation Guide for developers.
- The risk from surface water flow routes should be quantified as part of a site-specific Flood Risk Assessment, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to greenfield rates.
- Flood resilience and resistance measures should be implemented where appropriate during the construction phase e.g. raising of floor levels. These measures should be assessed to make sure that flooding is not increased elsewhere. If floor levels cannot be raised to meet the minimum requirements, developers will need to:
    - Raise them as much as possible;
    - Consider moving vulnerable uses to upper floors;
    - Include extra flood resistance and resilience measures.
- Other examples of flood resistance and resilience measures include:
    - Using flood resistant materials that have low permeability to at least 600mm above the estimated flood level;
    - Making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level.
    - By raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.

4.6 Data used to inform 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 and surface water events. The following events have been assessed:

Fluvial:

- 3.33% AEP, 1% AEP and 0.1% AEP depth, hazard and velocity data.
- 3.33% plus Central climate change (20%) and 1% AEP plus Central climate change (20%) depth, hazard and velocity data

Surface water:

- 3.3% AEP, 1% AEP and 0.1% AEP, depth, hazard and velocity data.
- 3.3% AEP plus Upper End climate change, 1% AEP plus Upper End climate change and 0.1% AEP plus Upper End climate change, depth, hazard and velocity data.

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 4-6. Developers should also test the impact of climate change depths, hazard and velocities on the site at the Flood Risk Assessment (FRA) stage.

Table 4-6: DEFRA's flood hazard categories

Flood hazard rating d x (v+0.5)	Degree of flood hazard	Description
<0.75	Low	Caution - "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	Moderate	Danger for some - "Danger: Flood zone with deep or fast flowing water"
1.25 - 2.00	Significant	Danger for most - "Danger: Flood zone with deep fast flowing water"
>2.00	Extreme	Danger for all - "Extreme danger: Flood zone with deep fast flowing water"

As part of a site-specific FRA, developers may need to undertake more detailed hydrological and hydraulic assessments of the modelled watercourses where additional information can be added to verify flood depth, hazard and velocity based on the relevant 1% AEP event plus climate change, using the relevant climate change allowances based on the type of development and its associated vulnerability classification. Please refer to Section 3 for the relevant climate change allowances for Sandwell.

4.7 Groundwater

4.7.1 Data used to inform Groundwater risk

In comparison to fluvial, tidal and surface water flooding, current understanding of the risks posed by groundwater flooding is limited and mapping of flood risk from groundwater sources is in its infancy. Groundwater level monitoring records are available for areas on Major Aquifers. However, for lower lying valley areas, which can be susceptible to groundwater flooding caused by a high water table in mudstones, clays and superficial alluvial deposits, very few records are available. The majority of Sandwell is at little to no risk of groundwater flooding, however there are areas to the south-east, south-west and north that are in gridcodes 3 and 4, see Table 4-7. Additionally, there is an increased risk of groundwater flooding where long reaches of watercourse are culverted as a result of elevated groundwater levels not being able to naturally pass into watercourses and be conveyed to less susceptible areas.

Mapping of groundwater has been based on the JBA Groundwater Emergence mapping dataset. This dataset shows variations in the risk of groundwater emergence at the surface. This is based on the predicted difference between groundwater level and the ground surface for a 1% AEP event. Five zones are defined to describe the risk of groundwater being: at or very near the ground surface; between 0.025m and 0.5m below the ground surface; between 0.5m and 5m below the ground surface; at least 5m below the ground surface; and negligible risk of groundwater flooding. It should be noted that these risk bands are based on the risk of emergence, and not surface flooding due to groundwater. The modelling for JBA's mapping involves simulating groundwater levels for a range of return periods (including 75, 100 and 200 years). Groundwater levels are then compared ton ground surface levels to determine the head difference in metres. The JBA Groundwater Emergence mapping categorises the head difference (m) into five feature classes based on the 1% AEP model outputs which are outlined in Table 4-7.

Table 4-7: JBA Groundwater Emergence Map categories

Gridcodes	Flood depth range during a 1% AEP flood event	Groundwater flood risk
1	Groundwater levels are either at or very near (within 0.025m of) the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
2	Groundwater levels are between 0.025m and 0.5m below the ground surface	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.

Gridcodes	Flood depth range during a 1% AEP flood event	Groundwater flood risk
3	Groundwater levels are between 0.5m and 5m below the ground surface	There is a risk of flooding to subsurface assets but surface manifestation of groundwater is unlikely.
4	Groundwater levels are at least 5m below the ground surface	Flooding from groundwater is not likely.
-	Low risk	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological conditions.

It is important to note that the modelled groundwater levels are not predictions of typical groundwater levels. Rather they are flood levels, i.e. groundwater levels that might be expected after a winter recharge season with 1% AEP, so would represent an extreme scenario.

It should be noted that the JBA Groundwater Emergence map is suitable for general broad-scale assessment of the groundwater flood hazard in an area, but it is not explicitly designed for the assessment of flood hazard at the scale of a single property. It should also be noted that the map identifies areas where groundwater Is likely to emerge, but not necessarily where water may flow towards and cause flooding once it has emerged. In high-risk areas, a site-specific risk assessment for groundwater flooding is recommended to fully inform the likelihood of flooding.

4.7.2 Assessment of groundwater risk

None of the Level 2 sites are at significant risk of groundwater flooding.

4.8 Reservoirs

4.8.1 Data used to inform reservoir risk

The EA's Reservoir Flood Extents data was used to inform reservoir flood risk as a result of reservoir breach or failure.

4.8.2 Assessment of reservoir risk

Direct 2, Roway Lane (EMP2-3) and Lion Farm Estate (SM2) are not at risk of flooding from reservoirs. The northern boundary of site SEC1-7, along the River Tame, is at risk of failure in the dry day scenario.

4.9 Sewer Flooding

4.9.1 Data used to inform sewer flooding

The sewer flooding incidence dataset used for this report was requested from Severn Trent Water. The majority of Sandwell is within the Central Spa Severn Trent DWMP Level 2 Strategic Planning Area, however the south-west of the county around Cradley Heath is in the Middle Severn Planning Area. In the Central Spa catchment, Sandwell is within the Minworth (Birmingham) sub-catchment and is in the long-term priority band (Band 0) for sewer risk up until 2050 where the priority increases to medium-term priority (Band 1). The descriptions of these bands and the table of risk priorities within the sub-catchment can be found in Tables 6a and 9 of the DWMP for the Central SPA catchment, respectively.

In the Middle Severn catchment, the south-west of Sandwell is within the Roundhill (Dudley) sub-catchment and is in the medium-term priority band (Band 1) up to 2030 where the priority becomes short-term (Band 2). The descriptions of these bands and the table of risk priorities within the sub-catchment can be found in Tables 6a and 9 of the DWMP for the Middle Severn SPA catchment, respectively.

4.10 Duration and onset of flooding

Sections 4.10 and 4.11 are designed to be used as advice for developers on completing a site-specific FRA and can be used in conjunction with the site-specific flood risk information given above and in the site summary tables in Appendix A.1.

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

- The position of the site within a river / surface water 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 the lower catchments.
- Tributaries with small catchment areas will respond faster and result in flashier storm hydrographs than those of a larger Main River. However, manmade incidental flood attenuation features in the floodplain will hold water back, such as road embankments. These will affect the speed of water travelling downstream by slowing it down.
- The principal source of flooding: where this is surface water, depending on the intensity and the 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. Groundwater levels in Sandwell are typically higher in the north-east of the borough, around the River Tame due to the sand and gravel geology.
- 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.

The information in this document should be used as a guide only, therefore it is recommended that a site-specific FRA refines this information, based on more detailed modelling work where necessary.

4.11 River Networks

Main Rivers are represented by the EA's Statutory Main River Map. Caution should be taken when using this data to identify culverted watercourses which may appear as straight lines but in reality, are not.

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

4.12 Cumulative Impacts

The Level 1 SFRA Cumulative Impact Assessment (CIA) identified the majority of Sandwell as highly sensitive to increased runoff as a result of the cumulative impacts of development. It states: *'All new development should give consideration to the inclusion of Sustainable Drainage Systems (SuDS) within the site design. It is essential that new development does not increase runoff and aims to reduce runoff as far as reasonably practicable beyond present rates. Details of potential SuDS applicability are provided within the Level 2 Site Summary Tables contained in Appendix A.1.'*

This section of the Level 1 SFRA lists the measures developers should undertake to help alleviate cumulative impacts. This should go beyond SuDS by bringing in additional measures. Such measures include (but are not limited to) making space for water, contributions to wider community flood risk schemes and natural flood risk management.

4.13 Emergency planning

4.13.1 Data used to inform emergency planning

Flood Alert Areas (FAAs) and Flood Warning Areas (FWAs) are available as GIS datasets from the Defra data services platform. FAAs are geographical areas where it is possible for flooding of low-lying land and roads to occur from rivers, sea and in some locations groundwater. FWAs are geographical areas where flooding is expected to occur and where a Flood Warning Service is provided.

Modelled depth, hazard and velocity data from hydraulic modelling can be used to understand safe access and egress around development sites, in particular analysis of the hazard data for the design flood event can be used to assess whether safe access is likely to be possible.

4.13.2 Assessment of Flood Warning

The north of Direct 2, Roway Lane (EMP2-3) and north-west of Land off Bilport Lane (SEC1-7) are within the West Midlands FAA as a result of flooding from the Upper River Tame. Lion Farm Estate (SM2) is not within a Flood Alert or Warning Area.

4.14 Flood Risk Management Infrastructure

4.14.1 Data used to inform flood risk management infrastructure

Flood defences are represented by the EA's Asset Information Management System (AIMS) Spatial Defences dataset. Their current condition and standard of protection are based on those recorded in the tabulated GIS data.

4.14.2 Assessment of flood defences

Land off Bilport Lane (SEC1-7) does not have any formal flood defences in its proximity. Direct 2, Roway Lane (EMP2-3) has engineered high ground situated parallel to the north-east of the site, between the site and the River Tame. The elevation of the engineered high ground is approximately 132m AOD. The elevation along the adjacent site boundary is approximately 114m AOD, therefore the site is at risk of residual overtopping of the defences. There is an area of engineered high ground parallel to the northern boundary of Lion Farm Estate (SM2), however this is located on the opposite bank of the watercourse to the site.

4.15 Residual Risk

Residual risk to the site is identified as where potential blockages of culverts/structures or overtopping / breach of defences could result in the inundation of a site, possibly with the sudden release of water with little warning.

Residual risk from breaches to flood defences, whilst rare, needs to be considered in FRAs. Considerations include the location of a breach, when it would occur and for how long, the depth of the breach (toe level), the loadings on the defence and the potential for multiple breaches. There are currently no national standards for breach assessments and there are various ways of assessing breaches using hydraulic modelling. Work is currently being undertaken by the EA to collate and standardise these methodologies.

There is no available breach modelling where the Level 2 sites are located, therefore it is recommended that if a site is in close proximity to flood defences, then breach modelling should be carried out. This will show the flood impact in the event of a failure or overtopping of existing structures or defences. The Canal and Rivers Trust (CRT) were contacted for

the Level 1 SFRA, however no data was provided. Developers should still contact the CRT for their own site-specific assessments.

4.15.1 Assessment of residual risk

Birmingham Canal flows approximately 500m to the north and south of Direct 2, Roway Lane (EMP2-3). Despite the distance between the site and the canal, LiDAR DTM data shows that both areas of the canal are at a greater elevation than the site itself, with a difference in elevation of as much as 40m AOD. Therefore, this site is considered to be at residual risk of canal overtopping or breach. Land off Bilport Lane (SEC1-7) is also at residual risk of canal breach or overtopping from the Tame Valley Canal, which is situated approximately 130m south of the site. This site is also at residual risk of reservoir breach, as mentioned in Section 4.8. There is a road bridge situated approximately 250m downstream of Direct 2, Roway Lane (EMP2-3). The opening is relatively large but there is still a small risk of culvert blockage. Bridge Street Viaduct is directly downstream of Land off Bilport Lane (SEC1-7). There is a large opening but there is still a small residual risk of potential culvert blockage. More information on residual risk can be found on the Canal and River Trust website. Lion Farm Estate (SM2) may be at residual risk from the collapse or blockage of culverts on site, which will need to be confirmed as part of a site-specific FRA.

5 Summary of Level 2 assessment and recommendations

5.1 Summary of Key Messages

As part of the Level 2 SFRA, three detailed site summary tables have been produced for the Level 2 sites assessed. The tables below provide a summary of the site tables, which are shown in Appendix A.1.

Table 5-1: EMP2-3 flood risk summary

Site code	Direct 2, Roway Lane (EMP2-3)
Current land use	Brownfield
Proposed land use	Employment
Site area and location	8.2ha, Direct 2, Roway Lane, Oldbury
General level of flood risk	**Fluvial** - 83% of the site is in Flood Zone 1 and 17% of the site is in Flood Zone 2. 17% of the site is at risk in the FZ3a plus Higher Central climate change scenario. **Surface water** - 6% of the site is at risk in the 1% AEP scenario. 43% of the site is at risk in the design event (1% AEP plus 40% climate change) scenario.
Risk of breach	The site is considered to be at residual risk residual risk of overtopping or breach of the Birmingham Canal due to the canal's higher elevation than the site itself.
Access and egress issues	In the design flood event (1% AEP plus 40%), access and egress is impeded from Roway Lane and West Bromwich Street. Arrangements for safe access and egress will need to be demonstrated for the design flood event.

Table 5-2: SEC1-7 flood risk summary

Site code	Site off Bilport Lane (SEC1-7)
Current land use	Brownfield
Proposed land use	Employment
Site area and location	3.4ha, Site off Bilport Lane, Wednesbury
General level of flood risk	**Fluvial** - 95% of the site is in Flood Zone 1. 5% of the site is at risk of flooding in the FZ3a plus Higher Central climate change scenario. **Surface water** - 2% of the site is at risk in the 1% AEP scenario. 24% of the site is at risk in the design event (1% AEP plus 40% climate change scenario.
Risk of breach	The site is at residual risk of breach or overtopping of the Tame Valley Canal, which is approximately 130m south of the site. The site is also at residual risk of reservoir breach in the dry day scenario.
Access and egress issues	In the design flood event (1% AEP plus 40% climate change) access and egress is slightly impeded from Bilport Lane and the access from Holloway Bank (north) is fully impeded. Arrangements for safe access and egress will need to be demonstrated for the design flood event.

Table 5-3: SM2 flood risk summary

Site code	Lion Farm Estate (SM2)
Current land use	Playing fields
Proposed land use	Mixed use: allotment / green space (10%), residential (30%), employment (20%), 5x full size pitches (40%)
Site area and location	21ha, Lion Farm Estate, Whiteheath Gate, Causeway Green, Oldbury, B69 1EF
General level of flood risk	**Fluvial** - 91% of the site is in Flood Zone 1, 6% of the site is at risk of flooding in the FZ3a plus Higher Central climate change scenario. **Surface water** - 8% of the site is at risk in the 1% AEP scenario. 26% of the site is at risk in the design event (1% AEP plus 40% climate change scenario.
Risk of breach	The site may be at residual risk of flooding from the potential culverted watercourse located within the site.

Site code	Lion Farm Estate (SM2)
Access and egress issues	In the design flood event (1% AEP plus 40% climate change) access and egress is impeded from Newbury Lane and Oldbury Road. Arrangements for safe access and egress will need to be demonstrated for the design flood event.

5.2 Recommendations

To pass the Exception Test, it must be shown that the development will provide wider sustainability benefits that outweigh the flood risk and that the development will be safe throughout its lifetime without increasing risk elsewhere. The former is a planning-related consideration and the Level 2 SFRA helps to answer the latter part of the Test.

In principle, it is possible for all sites to pass the flood risk element of the Exception Test by:

- Siting development within the settlement away from the highest areas of risk into Flood Zone 1 where Flood Zone 1 is present within sites.
- Considering safe access / egress in the event of a flood (from all parts of the site, if say the site is severed by a flood flow path).
- Adequately considering residual risk from defences breaching or overtopping, for example through a flood warning and evacuation plan.
- Designing buildings with habitable floor levels above the design flood event, including an allowance for freeboard and / or providing safe refuge for residents to shelter during an extreme event above the 0.1% AEP flood level including climate change.
- Using areas in Flood Zone 2 for the least vulnerable parts of the development where development cannot be wholly placed within Flood Zone 1,. No development should be permitted in Flood Zone 3b (aside from essential infrastructure, such as a bride crossing the lowest points of the site).
- Testing flood mitigation measures if these are to be implemented, to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).
- Considering space for green infrastructure in the areas of highest flood risk.

Direct 2, Roway Lane (EMP2-3) is at greater risk of surface water and fluvial flooding and will require careful consideration and mitigation to pass the flood risk element of the Exception Test.

Lion Farm (SM2), Direct 2, Roway Lane (EMP2-3) and Land off Bilport Lane (SEC1-7) have been identified to potentially have issues with safe access and egress during the design flood event. This should be assessed further through a site-specific Flood Risk Assessment and if necessary, a Flood Response Plan should be produced.

Mill Street, Great Bridge (SH5), Friar Street, Wednesbury (SH28) and Land between Addington Way and River Tame, Temple (SH36) have been identified to be particularly sensitive to the impacts of climate change. Further analysis of the flood risk to these sites should be carried out through site-specific Flood Risk Assessments to better understand the sensitivity of sites to flood risk and improve confidence in the predicted flood extents.

Where development is located in close proximity to a watercourse space should be left between the development and to watercourse to provide access for maintenance. Where watercourses are culverted within a development site consideration should be given to daylighting the channel to provide biodiversity, amenity and flood risk enhancements.

A number of sites within Sandwell MBC have been identified to be at risk of flooding from a reservoir breach. Consideration should be given to the possible impacts of this during a site-specific Flood Risk Assessment and where necessary a Flood Response Plan should be produced.

Finished floor levels for residential properties should be 600mm above the 1 in 100-year plus climate change flood level. This will protect and promote areas for future flood alleviation schemes.

A carefully considered and integrated flood resilient and sustainable drainage design should be put forward and a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan should be submitted along with the FRA.

Consideration should be given to the surface water risk where this is high, with regards to the Exception Test. For example, a site may pass the test based on fluvial or tidal flood risk alone, but greater risk may come from surface water.

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

Strategic-level interventions which reduce the risk to the wider Sandwell area may also enable sites to be brought forward.

Production of a Local Adaptation and Resilience plan for Sandwell would help to identify the need to safeguard land, habitats, infrastructure and development for roll back or relocation as well as the provision to safeguard land for flood risk management infrastructure.

In some cases, and following the application of the Sequential Test, it may be appropriate for the developer to contribute to the improvement of flood defence provision that would benefit both proposed new development and the existing local community. Developer contributions can also be made to maintenance and provision of flood risk management assets, flood warning and the reduction of surface water flooding (i.e. SuDS).

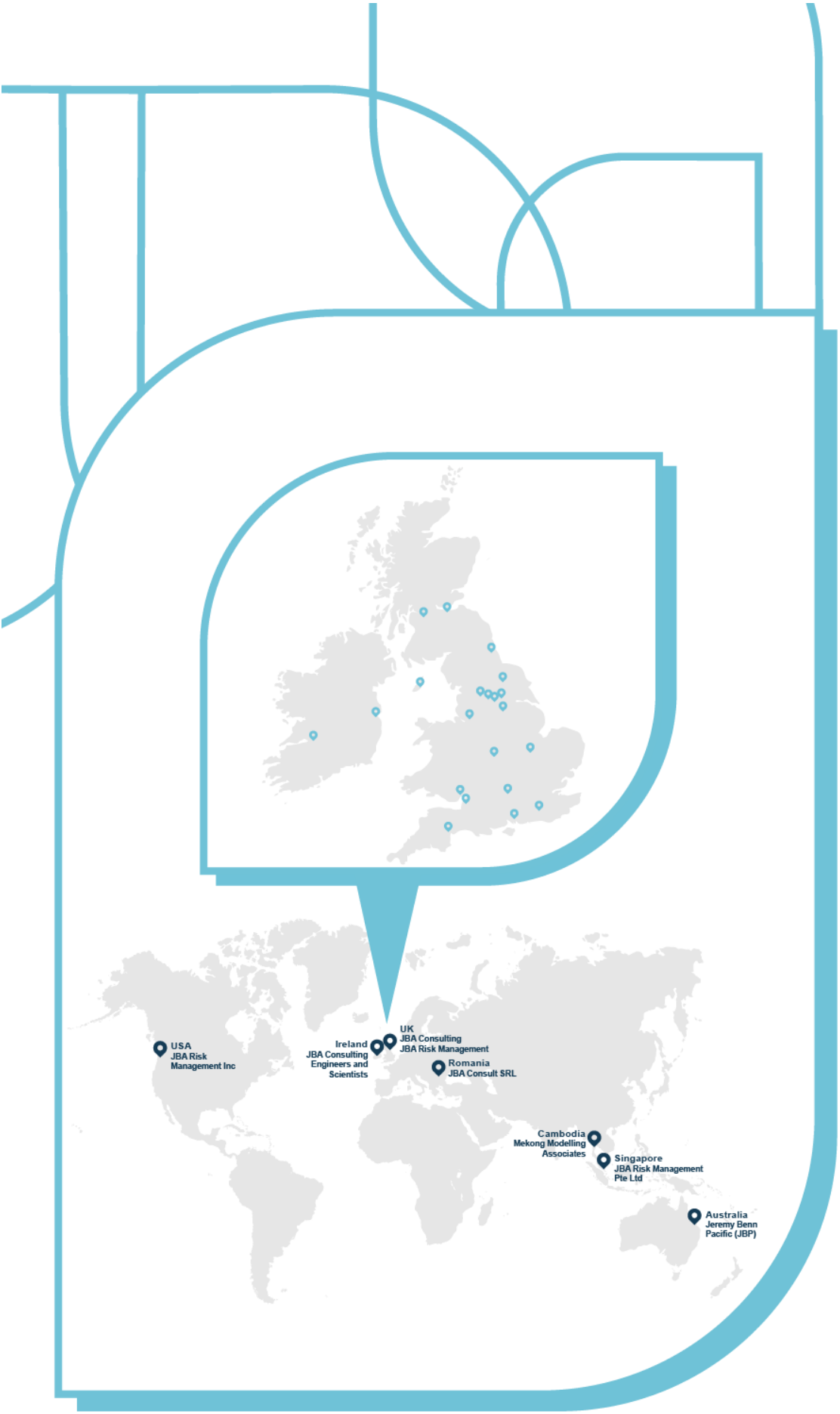
The Local Planning Authority, Lead Local Flood Authority and Environment Agency should be approached to determine whether updated information is available prior to commencing a detailed site-specific Flood Risk Assessment. The Environment Agency is in the process of developing a new National Flood Risk Assessment (NaFRA2) to improve the evaluation of fluvial and surface water flood risks and the impacts of climate change. The updated

methodology, which differs from the previous version, will include assessments from local models. Once completed, this update will allow for more accurate tracking of risk changes over time. New Flood Map for Planning data is due to be released in March 2025.

A Appendices

A.1 Site Summary Tables

A.2 Site Summary Table mapping



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