Sandwell Metropolitan Borough Council Level 1 Strategic Flood Risk Assessment

Final Version

September 2024

Prepared for:

Sandwell Metropolitan Borough Council

www.jbaconsulting.com

Document Status

Issue date	September 2024
Issued to	Philippa Smith
BIM reference	MIZ-JBA-XX-XX-RP-Z-0001-A1-C01-Level_1_SFRA
Revision	A1-C01
Prepared by	Elise Coughlin BSc (Hons) Graduate Flood Resilience Analyst Harvey Clark Trainee Technician
Reviewed by	Edmund Mumford MSc BSc Insert Position
Authorised by	Imogen Barnsley BSc PhD Project Manager Ed Hartwell BSc MSc MCIWEM C.WEM FRGS Project Director

Carbon Footprint

The format of this report is optimised for reading digitally in pdf format. Paper consumption produces substantial carbon emissions and other environmental impacts through the extraction, production and transportation of paper. Printing also generates emissions and impacts from the manufacture of printers and inks and from the energy used to power a printer. Please consider the environment before printing.

Contract

JBA Project Manager	Imogen Barnsley BSc PhD
Address	Regus, Ground Floor Lakeside Building 1000, Western Road, Portsmouth, Hampshire, PO6 3EZ
JBA Project Code	2024s0196

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 and Harvey Clark of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of Sandwell Metropolitan Borough Council and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability for any use that is made of this Report except to Sandwell Metropolitan Borough Council for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by JBA. This Report cannot be relied upon by any other party without the prior and express written agreement of JBA.

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

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 February and June 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.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

JBA disclaims any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to JBA's attention after the date of the Report.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based

on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JBA specifically does not guarantee or warrant any estimates or projections contained in this Report.

Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Acknowledgements

We would like to acknowledge the assistance of:

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

Contents

List of Figures

List of Tables

Abbreviations

ABD	Areas Benefitting from Defences
AEP	Annual Exceedance Probability
BGS	British Geological Survey
CFMP	Catchment Flood Management Plan
CIA	Cumulative Impact Assessment
CIRIA	Construction Industry Research and Information Association
DEFRA	Department for Environment, Food and Rural Affairs
DTM	Digital Terrain Model
EA	Environment Agency
EU	European Union
FAA	Flood Alert Areas
FCERM	Flood and Coastal Erosion Risk Management Strategy
FCRIP	Flood and Coastal Resilience Innovation Programme
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FRMP	Flood Risk Management Plan
FWA	Flood Warning Areas
FWMA	Flood and Water Management Act
FWS	Flood Warning Service
GI	Green Infrastructure
GSPZ	Groundwater Source Protection Zone
HELAA	Housing and Economic Land Availability Assessment
IDB	Internal Drainage Board
JBA	Jeremy Benn Associates
LFRMS	Local Flood Risk Management Strategy
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
mAOD	metres Above Ordnance Datum
MBC	Metropolitan Borough Council
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment

PPG	Planning Practice Guidance
RBD	River Basin District
RBMP	River Basin Management Plan
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SHELAA	Strategic Housing and Employment Land Availability Assessment
SoP	Standard of Protection
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
SWDS	Surface Water Drainage Strategy
SWMP	Surface Water Management Plan
UKCP18	UK Climate Projections 2018
WFD	Water Framework Directive

Executive Summary

Introduction

Sandwell Metropolitan Borough Council (MBC) have commissioned JBA Consulting to update the Level 1 Strategic Flood Risk Assessment (SFRA) in line with the updated Local Plan. The Level 1 SFRA provides an understanding of the risk from all types of flooding across Sandwell MBC and presents clear and robust evidence. It also provides useful information to inform future Infrastructure Planning and Neighbourhood Plans. It replaces the 2020 Black Country Authorities Level 1 SFRA.

SFRA Objectives

The key objectives of the Level 1 SFRA are to:

- Inform the Sandwell MBC Local Plans by assessing flood risk from all sources, current and future.
- Identify which locations are most and least vulnerable to flooding from all relevant sources.
- Produce a comprehensive set of maps presenting flood risk from all sources, including historic records, that can be used as evidence base for flood management purposes.
- Identify areas where further assessment of flood risk is needed and provide sufficient detail to enable the Sequential Test to be applied to inform allocations of land for development.
- Provide clear advice for developers undertaking site-specific flood risk assessments.
- Assess or identify existing and proposed flood defences and the maintenance requirements of these defences.
- Summarise the role that the Lead Local Flood Authority (LLFA) will play in the management of flood risk.
- Consider outputs from the Preliminary Flood Risk Assessment (PFRA) and any local flood risk strategies.
- Assess the role and functionality of culverts and their potential to cause or exacerbate flood risk.
- Take into account climate change.
- Assess the cumulative impact that development will have on flood risk.
- Produce clear and specific recommendations and guidance identifying responsible agencies and actions where appropriate, in order for Sandwell MBC to implement recommendations effectively.

SFRA outputs

The following outputs are available:

- Identification of **policy and technical updates**.
- Recommendations of the criteria that should be used to assess future development proposals and the **development of a Sequential Test and Sequential Approach** to flood risk.
- Assessment of the potential increase in **flood risk due to climate change**.
- Appraisal of **all potential sources of flooding**, including Main River, ordinary watercourse, surface water, sewers, groundwater, reservoirs and canals.
- **Mapping** showing distribution of flood risk across all flood zones from all sources of flooding including climate change allowances.
- Reporting on the **Standard of Protection** (SoP) provided by existing flood risk management infrastructure.
- Assessment of **strategic flood risk solutions** that can be implemented to reduce risks.
- **Flood Risk Assessment (FRA) guidance for developers**.
- Guidance for developers on the use of **Sustainable Drainage Systems (SuDS)**.
- An assessment of the implications of climate change for flood risk over an appropriate time period;
- Locations where additional development may significantly increase flood risk elsewhere;
- Identification of methods of reducing flood risk within the plan area (including identifying potential pieces of land that should be safeguarded from development in order to help manage flooding).

Summary of flood risk in Sandwell MBC

Parts of Sandwell are at risk from the following sources; fluvial, surface water, groundwater, sewers, reservoir inundation and canal overtopping/breaches. This study has shown that the most significant sources of flood risk in Sandwell are fluvial and surface water.

- *Fluvial flooding*: The primary fluvial flood risk is along the River Tame, Stour and Smestow Brook and the tributaries of these watercourses. These present fluvial flood risk to the main urban centres, including, but not limited to Walsall, Bescot, Willenhall, Horseley Heath, Dudley Port, North Stourbridge and Newton. Recent significant flooding events across Sandwell occurred in July 2007 and 2008 and June 2016. There is a particularly high risk of flooding due to culverted watercourses blocking, becoming overwhelmed or failing.
- *Surface water*: Surface water flooding is most likely caused by intense rainfall. There are many areas at high risk of surface water flooding in Sandwell, due to the heavily urbanised nature of the area that impedes natural infiltration and drainage.

- *Sewer*: The sewers in Sandwell are managed by Severn Trent Water. Severn Trent Water provided their Hydraulic Flood Risk Register which denotes one sewer flooding incident in Tipton, which occurred in 2004.
- *Groundwater*: The JBA Groundwater Emergence Map indicates that there are areas in the borough with groundwater levels of between 0.5 and 0.025m below the ground surface. The 2020 SFRA recognises that as pumping and abstraction regimes have ceased or been changed, that local groundwater flooding incidences have occurred along the boundary between Dudley and Sandwell areas. It is therefore anticipated that groundwater flooding issues are likely to be localised in their nature, affecting limited areas and a small number of properties.
- *Canals*: There are seven canals in Sandwell; These have the potential to interact with other watercourses and become flow paths during flood events or in a breach scenario. There have been no incidences of breach and overtopping on these canals.
- *Reservoirs*: There is a potential risk of flooding from reservoirs both within Sandwell and those outside. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from the reservoirs is relatively low. However, there is a residual risk of a reservoir breach and this should be considered in any site-specific FRAs (where relevant).

How to use this report

Planners

The SFRA provides **recommendations** regarding **all sources of flood risk** in Sandwell which can be used to inform policy on flood risk within the Local Plan. This includes how the cumulative impact of development should be considered and how new development could bring wider flood risk benefits to existing communities

It provides the latest flood risk data and guidance to **inform the Sequential Test** and provides guidance on **how to apply the Exception Test**. Sandwell MBC will use this information to apply the Sequential Test to strategic allocations and identify where the Exception Test will also be needed.

The SFRA provides **guidance for developers**, which can be used by Development Management staff to assess whether site specific FRAs meet the required quality standard.

Developers

For sites that are not strategic allocations, developers will need to use the information in this SFRA to help apply the Sequential Test. For all sites, whether strategic allocations or windfall sites, developers will need to apply the Exception Test and use information in a site-specific FRA to inform this test at planning application stage.

When assessing sites not identified in the Local Plan (windfall sites), developers should use evidence provided in this SFRA to apply the **Sequential Test** and provide evidence to show that they have adequately considered reasonably available sites at lower flood risk.

This is a strategic assessment and does not replace the need for site specific FRAs where a development is either within Flood Zones 2 or 3 or greater than a hectare in Flood Zone 1. In addition, a surface water drainage strategy will be needed for all major developments in any Flood Zone to satisfy Sandwell MBC.

Developers can use the information in this SFRA, alongside site specific research to help to scope out what additional work will be needed in a detailed FRA. To do this they should refer to **Chapter 5: Understanding flood risk in Sandwell MBC** and the **flood maps in the appendices**.

At the planning application stage, developers may need to undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extent (**including applying the latest climate change allowances**, due to be updated by the Environment Agency (EA) in 2020), inform master planning and prove, if required, whether the Exception Test can be passed.

Developers need to ensure that new development does not increase surface water runoff from a site. **Chapter 10** provides information on the surface water drainage requirements of Sandwell MBC. SuDS should be considered at the earliest stages that a site is developed which will help to minimise costs and overcome any site-specific constraints.

FRAs will need to identify how flood risk will be mitigated to ensure the development is safe from flooding. In high risk areas the FRA will also need to consider emergency arrangements, including how there will be safe access and egress from the site.

Developers should contribute to the wider strategic vision for flood risk management and drainage in an area where possible. Any developments located within an area protected by **flood defences**, where the condition of those defences is 'fair' or 'poor', where the future maintenance is uncertain or where the standard of protection is not of the required standard (either now or in the future) should be identified and the use of developer contributions considered to fund improvements.

Recommendations for future work

A Level 2 SFRA may be necessary where there are sites that are to be taken forward for development in Flood Zones 2 or 3 or where there is a significant risk of flooding from other sources. This would inform the Exception Test required in the National Planning Policy Framework (NPPF). Further detailed work could also support local strategic drainage planning for larger strategic development areas and/ or high flood risk catchments likely to see a relatively large degree of development.

1 Introduction

This section outlines the purpose of a SFRA and the outputs. It introduces the study area and explains key flood risk management concepts.

1.1 Purpose of the Strategic Flood Risk Assessment

"Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the EA and other relevant flood risk management authorities, such as LLFAs and internal drainage boards (IDBs)" (NPPF, paragraph 166).

JBA Consulting were commissioned by Sandwell (MBC), to update the Level 1 SFRA in line with the updated Local Plan. This SFRA will replace the 2020 Black Country Authorities Level 1 SFRA. The 2024 SFRA will be used to inform decisions on the location of future development and the preparation of sustainable policies for the long-term management of flood risk.

This Level 1 SFRA (2024) document supersedes the previous Level 1 SFRA (2020). The report has updated the content that was included in the previous SFRA and to provide a comprehensive and robust evidence base to support the production of the Sandwell MBC's Draft Regulation 18 Local Plan 2023.

The SFRA update is also required to be compliant with the latest guidance described in the 2021 revision to the NPPF and subsequent minor amendments, the implications of the August 2022 changes to the Planning Practice Guidance (PPG) and subsequent minor amendments and support the selection of site allocations in the Local Plan Review and to provide information and guidance to be used in the preparation of FRAs in support of site specific planning applications. The evidence in this SFRA shall also be used to support the formulation of Neighbourhood Plans.

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 PPG identifies a tiered approach to risk assessment and identifies the following two levels of SFRA:

- Level One: 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 Two: where land outside Flood Zones 2 and 3 cannot appropriately 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 report fulfils the Level 1 SFRA requirements.

1.4 SFRA objectives

The key objectives of the Level 1 SFRA are to:

- Inform the Sandwell MBC Local Plans by assessing flood risk from all sources, current and future.
- Identify which locations are most and least vulnerable to flooding from all relevant sources.
- Produce a comprehensive set of maps presenting flood risk from all sources, including historic records, that can be used as evidence base for flood management purposes.
- Identify areas where further assessment of flood risk is needed and provide sufficient detail to enable the Sequential Test to be applied to inform allocations of land for development.
- Provide clear advice for developers undertaking site-specific flood risk assessments.
- Assess or identify existing and proposed flood defences and the maintenance requirements of these defences.
- Summarise the role that the LLFA will play in the management of flood risk.
- Consider outputs from the PFRA and any local flood risk strategies.
- Assess the role and functionality of culverts and their potential to cause or exacerbate flood risk.
- Take into account climate change.
- Assess the cumulative impact that development will have on flood risk.
- Produce clear and specific recommendations and guidance identifying responsible agencies and actions where appropriate, in order for Sandwell MBC to implement recommendations effectively.

1.5 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 is an overview of the study area and the neighbouring authorities displayed in Figure 1-1.

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.

The sewerage company for the entire study area is Severn Trent Water. South Staffordshire Water provide the potable water. Sandwell MBC is the LLFA and LPA. The Sow and Penk IDB operates to the north of the Borough.

1.6 Consultation

The following parties (external to Sandwell MBC) have been consulted during the preparation of this version of the SFRA:

- EA
- 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

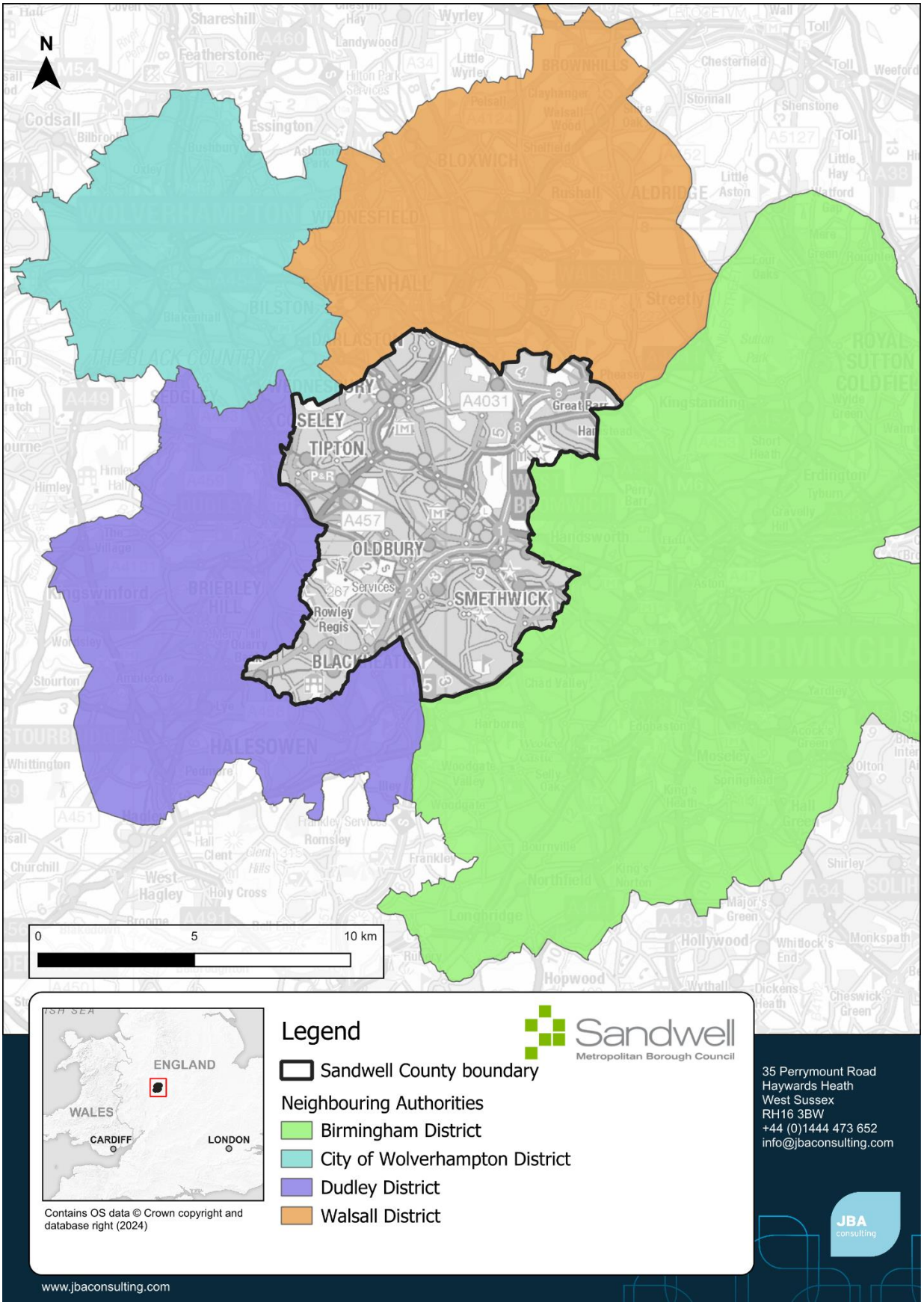


Figure 1-1: Sandwell MBC alongside its neighbouring authorities

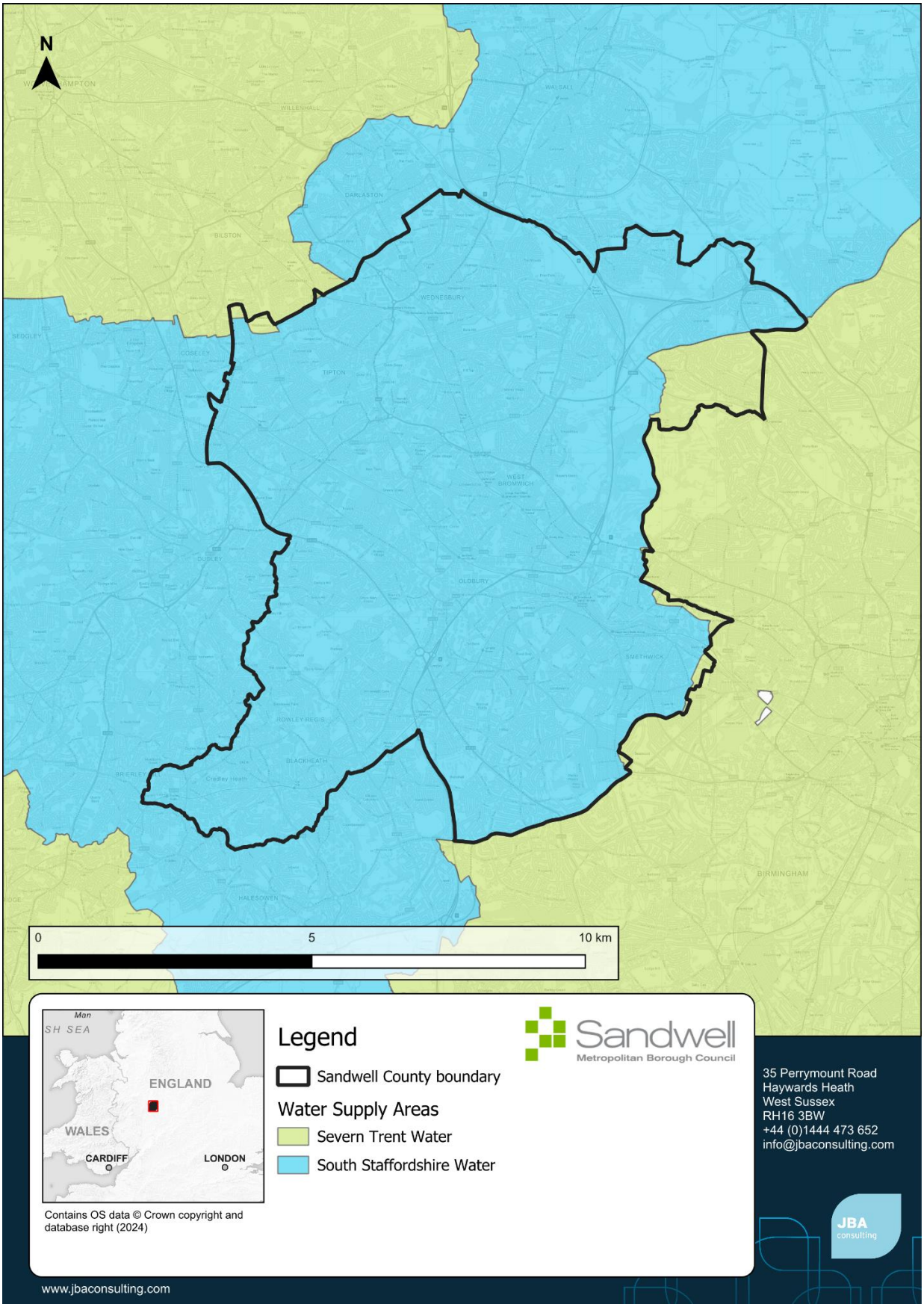


Figure 1-2: Water companies across Sandwell MBC

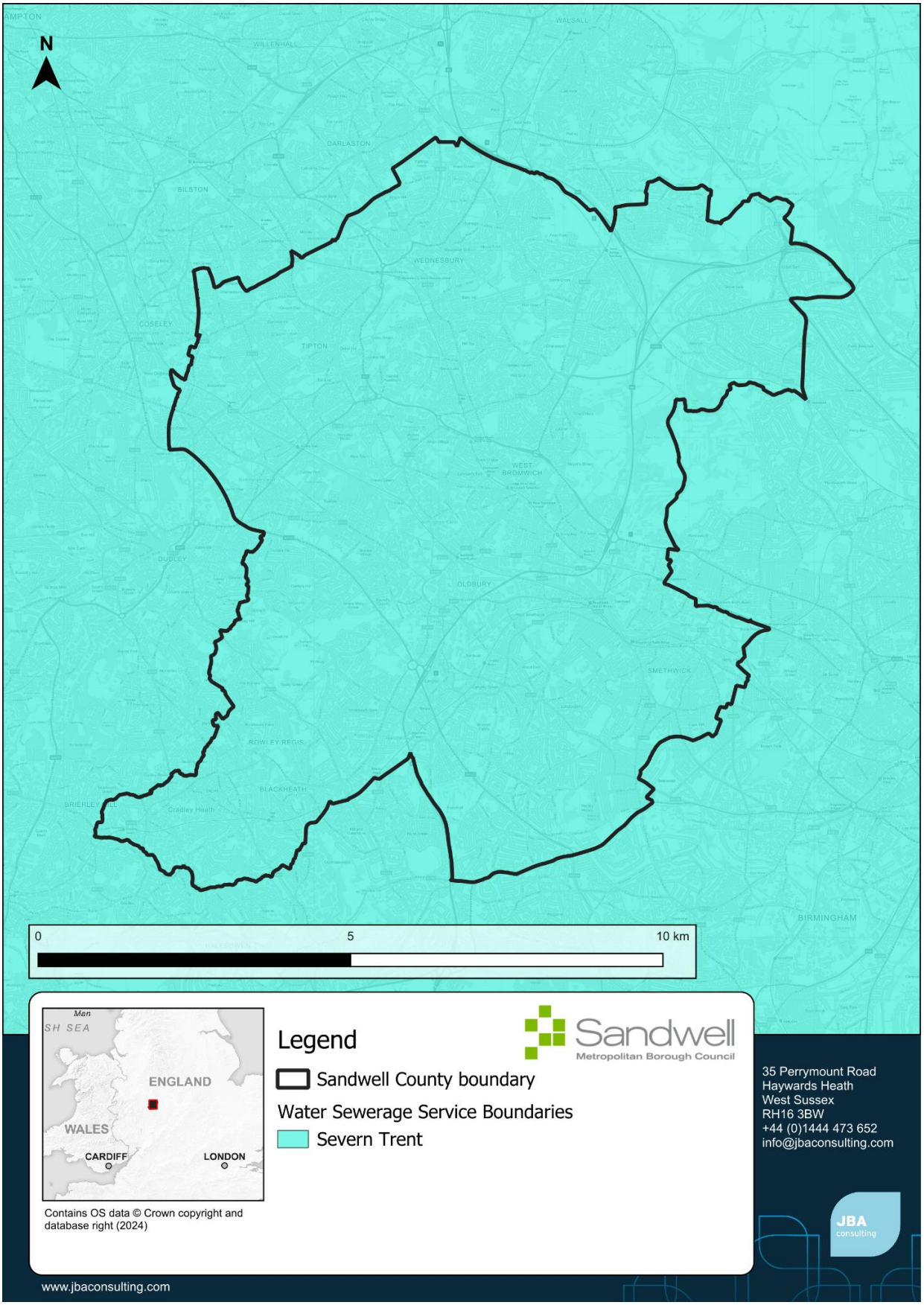


Figure 1-3: Approximate sewerage undertaker boundaries for Sandwell MBC

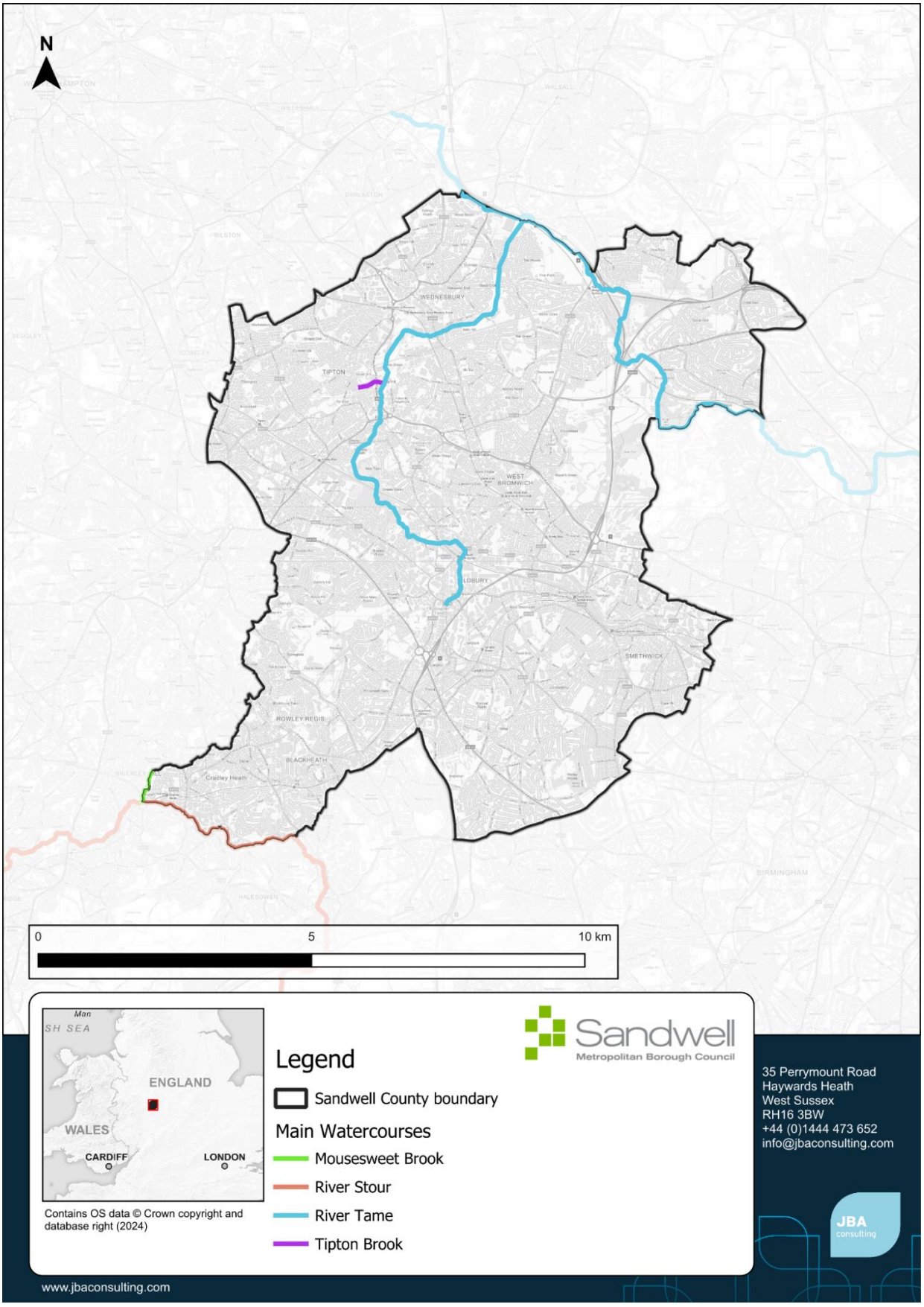


Figure 1-4: Main watercourses in Sandwell MBC

1.7 Use of SFRA data

It is important to recognise that Level 1 SFRAs are high level strategic documents and, as such, do not go into detail on an individual site-specific basis. The SFRA has been developed using the best available information at the time of preparation. This relates both to the current risk of flooding from all sources, and the potential impacts of future climate change.

Hyperlinks to external guidance documents / websites are provided throughout the SFRA.

SFRAs should be a 'living document', and as a result should be updated when new information on flood risk, new planning guidance, or legislation becomes available. New information on flood risk may be provided by Sandwell MBC, the EA, Severn Trent Water and South Staffordshire Water. Such information may be in the form of:

- New hydraulic modelling results
- Flood event information following a flood event
- Policy/ legislation updates
- EA flood map updates
- New flood defence schemes etc.

The EA regularly reviews their flood risk mapping, and it is important that they are approached to determine whether updated information is available prior to commencing a FRA. It is recommended that the SFRA is reviewed internally, in line with the EA's Flood Zone map updates to ensure 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.

1.8 Structure of this report

Section	Contents
Executive Summary	Focuses on how the SFRA can be used by planners, developers and neighbourhood planners
1. Introduction	Provides a background to the study, the Local Plan stage the SFRA informs, the study area, the roles and responsibilities for the organisations involved in flood management and how they were involved in the SFRA Provides a short introduction to how flood risk is assessed and the importance of considering all sources
2. Flood risk policy and strategy	Sets out the relevant legislation, policy and strategy for flood risk management at a national, regional and local level.

Section	Contents
3. Planning policy for flood risk management	Provides an overview of both national and existing Local Plan policy on flood risk management This includes the Flood Zones, application of the Sequential Approach and Sequential/Exception Test process. Provides guidance for the Councils and Developers on the application of the Sequential and Exception Test for both allocations and windfall sites, at allocation and planning application stages.
4. Impact of Climate Change	Outlines the latest climate change guidance published by the EA and how this was applied to the SFRA Sets out how developers should apply the guidance to inform site specific FRAs
5. Understanding Flood Risk in Sandwell MBC	Provides an overview of the characteristics of flooding affecting the study area and key risks including historical flooding incidents, flood risk from all sources and flood warning arrangements.
6. Flood alleviation schemes and assets	Provides a summary of current flood defences and asset management and future planned schemes. Introduces actual and residual flood risk.
7. Cumulative impact of development, schemes and strategic solutions	This section provides a summary of the catchments with the highest flood risk and development pressures, considers opportunities for strategic flood risk solutions and makes recommendations for local planning policy based on these.
8. Guidance for developers	Guidance for developers on FRAs, considering flood risk from all sources
9. Surface water management and SuDS	An overview of SuDS, Guidance for developers on Surface Water Drainage Strategies (SWDS), considering any specific local standards and guidance for SuDS from the LLFA.
10. Summary and Recommendations	Summarises sources of flood risk in the study area and outlines planning policy recommendations

Section	Contents
Appendices: • Appendix A: SFRA User Guide • Appendix B: Flood Map for Planning Flood Zones • Appendix C: Modelled Present Day Fluvial Flood Risk • Appendix D: Modelled Fluvial plus Climate Change Flood Risk • Appendix E: Risk of Flooding from Surface Water • Appendix F: Impact of Climate Change on RoFSW • Appendix G: Risk of Flooding from Groundwater • Appendix H: Risk of Flooding from Reservoirs • Appendix J: Risk of Flooding from Sewers • Appendix K: Flood Alert and Warning Areas • Appendix L: Bedrock Geology in Sandwell • Appendix M: Superficial Deposits in Sandwell • Appendix N: Cumulative Impact Assessment Results • Appendix N: Level 1 Site Screening Results	

1.9 Understanding flood risk

This section provides useful background information on how flooding arises and how flood risk is determined.

1.9.1 Sources of flooding

Flooding can occur from many different and combined sources and in many different ways, as illustrated in Table 1-1. Major sources of flooding include:

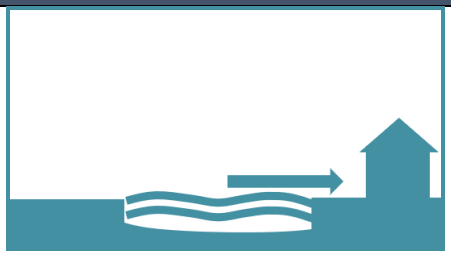
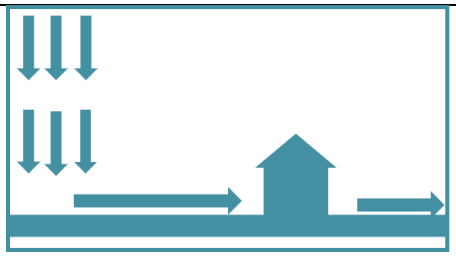
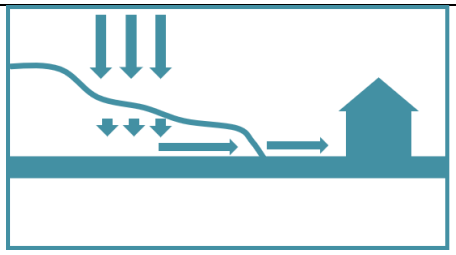
- **Fluvial (rivers)** - inundation of floodplains from rivers and smaller watercourses; inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels; overtopping or

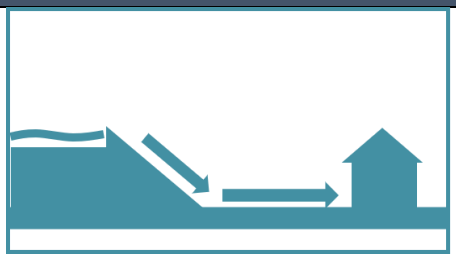
breaching of defences; blockages of culverts; blockages of flood channels/corridors.

- **Surface water** - direct run-off from land due to exceeding the infiltration rate of the soil or the capacity of the drainage network. It is generally caused by intense short periods of rainfall and usually affects lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage, or drainage blocked by debris and sewer flooding.
- **Groundwater** – rising water table; most likely to occur in low-lying areas underlain by permeable rock (aquifers) or groundwater recovery after pumping for mining or industry has ceased.
- **Infrastructure failure** - reservoirs; canals; industrial processes; burst water mains; blocked sewers or failed pumping stations.

Flood hazards vary greatly between different sources of flooding due to variations in the speed of onset or inundation, flood water depths and duration. Interactions can also occur between different types of flooding, for example groundwater entering sewer systems. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

Table 1-1: Description and illustration of each different type of flooding

Flooding type	Description	Illustration
Fluvial (River)	River flows exceed the capacity of the river channel, with water spilling out on to the floodplain. Can include breach or overtopping of flood defences.	
Surface water	Water falls onto the ground and is unable to soak into the ground due to impermeable surfaces or rainfall intensities exceeding the infiltration rate into the soil or the capacity of the drainage network.	
Groundwater	Water is stored in rock layers underground. The water table rises as infiltration exceeds the drainage from the aquifer or permeable layer, leading to the water table rising to the surface through springs or wetted areas.	

Flooding type	Description	Illustration
Residual risk	Breach or overtopping of a raised structure storing water, such as a reservoir or flood defence.	

1.10 Likelihood and consequence

Flood risk is a combination of the likelihood of flooding and the potential consequences arising. It is assessed using the source – pathway – receptor model as shown in Figure 1-5 below. This is a standard environmental risk model common to many hazards and should be the starting point of any assessment of flood risk. However, it should be remembered that flooding could occur from many different sources and pathways, and not simply those shown in the illustration below.

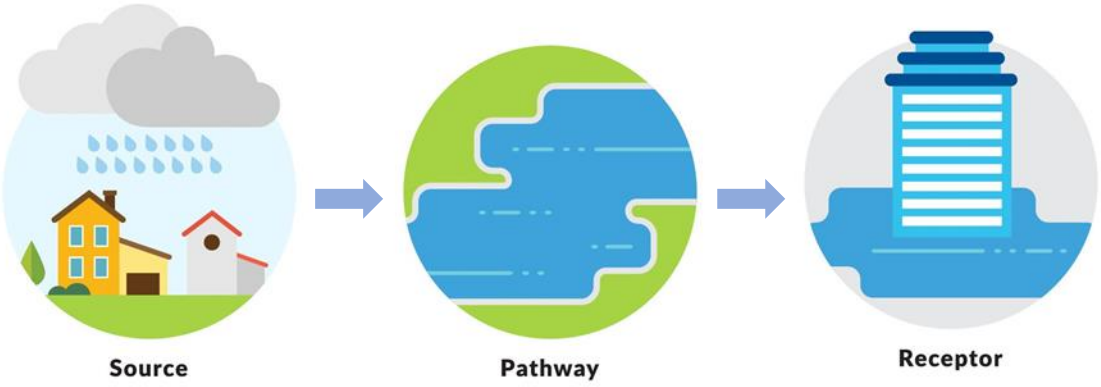


Figure 1-5: Diagram summarising the source-pathway-receptor model

The principal sources are rainfall, snowmelt and high groundwater levels and the most common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets and the receptors can include people, their property and the environment. All these elements must be present for flood risk to arise. Mitigation measures have little or no effect on sources of flooding, but they can block or impede pathways or increase the resilience of receptors.

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

1.11 Likelihood

The likelihood of flooding is often measured by a percentage probability or by stating how regularly it may occur on average. Many everyday practitioners refer to a 1% Annual Exceedance Probability (AEP) flood as a 1 in 100-year flood. However this does not mean that the flood will only happen once every 100 years. Instead, the chance of a flood of this magnitude occurring in any given year is 1% and it is therefore possible that two 100-year floods could happen within a single year. Higher probability flood events may occur between the larger events.

Drainage systems and flood defences are designed to provide SoP from events with specific magnitudes. Some examples of SoP are as follows:

- Surface water drains and sewers are designed to have a surcharged capacity (the water in the sewer system is at or below ground level) for a 3.3% AEP event.
- Fluvial defences are often built to protect against a 1% AEP event.
- Drainage for new highways is designed to a 3.3% AEP event. However, the majority of the existing highway network is not built to modern standards. The AEP of a flooding event which exceeds the highway drainage network in some areas could be 10% or higher.

1.12 Consequence

The consequences of flooding include fatalities, property damage and disruption to lives and businesses, with severe social and economic implications for people. Consequences of flooding depend on the hazards caused by flooding such as the depth of water, speed of flow, rate of onset and duration, and the vulnerability of receptors such as the type of development and population demographics.

1.13 Risk

Risk varies depending on the severity of the event, the source of the water, the pathways of flooding (such as the condition of flood defences) and the vulnerability of receptors as mentioned above. Flood risk as an equation is then expressed in terms of the following relationship, as displayed in Figure 1-6.

Figure 1-6: Conceptual model depicting how risk can be defined

2 Flood risk policy and strategy

The overarching aim of development and flood risk planning policy in the UK is to ensure that the potential risk of flooding is taken into account at every stage of the planning process. This section of the SFRA provides an overview of the planning framework and flood risk policy. In preparing the subsequent sections of this SFRA, appropriate planning and policy amendments have been acknowledged and taken into account.

2.1 Roles and responsibilities for Flood Risk Management in Sandwell MBC

There are different organisations that cover Sandwell MBC which have responsibilities for flood risk management, known as Risk Management Authorities (RMAs). These are shown on Table 2-1, with a summary of their responsibilities.

It is important to note that land and property owners are responsible for the maintenance of watercourses either on or next to their properties. Property owners are also responsible for the protection of their properties from flooding as well as other management activities, for example by maintaining riverbeds/ banks, controlling invasive species and allowing the flow of water to pass without obstruction. More information can be found in the EA publication 'Owning a Watercourse' (2018).

Table 2-1: Roles and responsibilities for flood risk management within Sandwell MBC

Risk Management Authority	Strategic Level	Operational Level	Planning Role
EA	Strategic overview for all sources of flooding National Strategy Reporting and general supervision	Main rivers (e.g. River Tame, River Stour,) Reservoirs	Statutory consultee for development in Flood Zones 2 and 3 or within 20m of a Main River
Sandwell MBC as LLFA	PFRA Local Flood Risk Management Strategy (LFRMS)	Surface Water Groundwater Ordinary Watercourses (consenting and enforcement) Ordinary watercourses (works)	Statutory consultee for major developments
Sandwell MBC as	Local Plans as LPA	Determination of	As left

Risk Management Authority	Strategic Level	Operational Level	Planning Role
LPA		Planning Applications as LPAs Managing open spaces under Council ownership	
Water Companies: Severn Trent Water	Asset Management Plans, supported by Periodic Reviews (business cases) Develop Drainage and Wastewater Management Plans (DWMPs)	Public sewers and water supply	Non-statutory consultee
Highways Authorities: *Highways Agency (motorways and trunk roads)* Sandwell MBC; *(All other adopted roads in respective Council areas)*	Highway drainage policy and planning	Highway drainage	Internal planning consultee regarding highways design standards and adoptions

2.2 Relevant legislation

The following legislation is relevant to development and flood risk in Sandwell MBC:

- Flood Risk Regulations (2009) transpose the EU Floods Directive (2000) into UK law and require the EA and LLFAs to produce PFRAs and identify where there are nationally significant Flood Risk Areas. For the Flood Risk Areas, detailed flood maps and a Flood Risk Management Plan (FRMP) is produced. This is a six-year cycle of work and the second cycle started in 2017.
- Town and Country Planning Act (1990), Water Industry Act (1991), Land Drainage Act (1991), Environment Act (2021) and Flood and Water Management Act (FWMA) (2010) – as amended and implanted via secondary legislation. These set out the roles and responsibilities for organisations that have a role in Flood Risk Management (FRM).

- Land Drainage Act (1991) and Environmental Permitting Regulations (2016) 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. An Environmental Permit is required for works within 8m of any flood defence structure on or within the flood plain of a main river.
- Water Environment Regulations (2017) transpose the European Water Framework Directive (2000) into law and require the EA to produces River Basin Management Plans (RBMPs). These aim to ensure that the water quality of aquatic ecosystems, riparian ecosystems and wetlands reach 'good status'.
- Other environmental legislation such as the Habitats Directive (1992), Environmental Impact Assessment Directive (2014) and Strategic Environmental Assessment Directive (2001) can be appropriately applied to strategic and site-specific developments to guard against environmental damage.

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 Sandwell MBC area.
- Set the strategic policy and direction for 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 Sandwell MBC.
- 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

	Document, lead author and date	Information	Policy and measures	Development design requirements	Next update due (if known)
National	National Flood and Coastal Erosion Risk Management Strategy for England (Environment Agency) 2022	No	Yes	No	-
	National Planning Policy Framework (DLUHC) 2023	No	No	Yes	-
	Planning Practice Guidance (DLUHC & MHCLG)	No	No	Yes	-
	Building Regulations Part H (MCHLG) 2010	No	No	Yes	-
Regional	River Trent Catchment Flood Management Plan (Environment Agency) 2009	Yes	Yes	No	-
	Humber Flood Risk Management Strategy (Environment Agency) 2008	Yes	Yes	No	-
	Humber River Basin Management Plan (Environment Agency) 2022	No	Yes	No	-
	Severn River Basin Management Plan (Environment Agency) 2023	No	Yes	No	-
	Climate Change Guidance for Development and Flood Risk (Environment Agency) 2022	No	No	Yes	-
Local	Local Flood Risk Management Strategy (The Black Country) 2015	Yes	Yes	No	-
	Drainage and Wastewater Management Plan (Severn Trent Water) 2023	Yes	Yes	No	-
	Sandwell Preliminary Flood Risk Assessment (2011) and Addendum (2017)	Yes	No	No	-

2.3 Key national, regional and local policy documents and strategies

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

The National Flood and Coastal Erosion Risk Management Strategy for England (2020) (FCERM) provides the overarching framework for future action by all risk management authorities to tackle flooding and coastal erosion in England. The EA brought together a wide range of stakeholders to develop the strategy collaboratively. The Strategy is much more ambitious than the previous one from 2011 and looks ahead to 2100 and the action needed to address the challenge of climate change. A progress update to the Strategy was published in 2022 outlining what had been achieved by 2022 and the roadmap to achieving the goals set out in the Strategy until the year 2026.

The Strategy has been split into three high level ambitions: climate resilient places; today's growth and infrastructure resilient in tomorrow's climate; and a nation ready to respond and adapt to flooding and coastal change. The strategy outlines strategic objectives relating to these ambitions, with specific measures to achieve these.

The Strategy was laid before parliament in July 2020 for formal adoption and published alongside a New National Policy Statement for FCERM. The statement sets out five key commitments which will accelerate progress to better protect and better prepare the country for the coming years:

1. Upgrading and expanding flood defences and infrastructure across the country,
2. Managing the flow of water to both reduce flood risk and manage drought,
3. Harnessing the power of nature to not only reduce flood risk, but deliver benefits for the environment, nature, and communities,
4. Better preparing communities for when flooding and erosion does occur, and
5. Ensuring every area of England has a comprehensive local plan for dealing with flooding and coastal erosion.

The Flood and Coastal Erosion Risk Management Strategy Roadmap to 2026 describes how the National FCERM Strategy for England will be translated into practical actions until the year 2026, and what aspirations it hopes to achieve. By defining actions, the Strategy Roadmap supports the government's £5.2 billion FCERM Investment Programme in decision making for allocating funds.

The Strategy Roadmap also incorporates innovating programmes to improve evidence on the costs and benefits of new resilience actions. Improving the knowledge base will help inform future approaches and investments in flood and coastal risk management. The three programmes which address this are:

- The Flood and Coastal Resilience Innovation Programme (FCRIP) which enables local authorities, businesses and communities to test and demonstrate innovative actions.
- The Adaptive Pathways Programme which develops long term investment plans for managing flood and coastal change to 2100 and beyond.

- The Coastal Transition Accelerators Programme which supports communities in areas at significant risk of coastal erosion to transition and adapt to changing climate.

The Strategy Roadmap describes a cross-disciplinary, multi-organisational approach to assessing and addressing flood and coastal erosion risk in England, including the funding structures, and with sensitivity to sustainability and the environment.

2.3.2 River Basin Management Plans

RBMPs are prepared under the Water Framework Directive (WFD) and assess the pressure facing the water environment in River Basin Districts. The Sandwell area falls within the Humber and Severn RBMPs.

The Humber and Severn RBMPs, managed by the EA, have been updated since the first cycle in 2009. The latest version was published in December 2022. Water quality and flood risk can go hand in hand in that flood risk management activities can help to deliver habitat restoration techniques. The Humber RBMP includes such examples whereby land management techniques have been designed to reduce flood risk whilst also reducing sediment loss and improving water quality. The plans include an assessment of river basin characteristics, a review of the impact on human activity, statuses of water bodies, and an economic analysis of water use and progress since the first plan in 2009. The Plans are currently being reviewed.

The Humber and Severn RBMPs were updated in 2022 and describe the challenges that threaten the water environment and how these challenges can be managed. Measures are presented for each significant water management issue in the river basin district which are:

- Physical modifications
- Managing pollution from wastewater
- Managing pollution from towns, cities and transport
- Changes to natural flow and levels of water
- Managing invasive non-native species
- Managing pollution from rural areas

2.3.3 Flood Risk Regulations

The 2009 Flood Risk Regulations implement the 2007 European Floods Directive in England and Wales. They require a six year cycle of assessment, mapping and planning.

The PFRAs are part of the six-year cycle of assessment, mapping and planning. These were last undertaken by the Councils in 2017:

Sandwell MBC PFRA (2011) and Addendum (2017).

The PFRA identified the following areas as those that are considered be nationally significant in terms of the degree of localised flooding that could be experienced:

- Birmingham – this covers.; Oldbury in Sandwell

- The EA undertook a PFRA for river, sea and reservoir flooding in 2018. No nationally significant areas were identified for river, sea or reservoir flooding in Sandwell MBC.

Flood Risk Management Plans (FRMPs) are also part of the six-year cycle of assessment, mapping and planning required under the Flood Risk Regulations. The Environment Agency led the development of the Humber and Severn FRMPs, which were published in 2016 and updated in April 2023. The FRMPs summarise the flooding affecting the area and describes the measures to be taken to address the risk in accordance with the Flood Risk Regulations, focussing on areas of nationally significant flood risk. The FRMPs draw on policies and actions identified in Catchment Flood Management Plans (CFMPs) and LFRMS.

2.3.4 Catchment Flood Management Plans

CFMPs are a high-level strategic plan providing an overview of flood risk across each river catchment. The EA use CFMPs to work with other key-decision makers to identify and agree long-term policies for sustainable flood risk management.

There are six pre-defined national policies provided in the CFMP guidance and these are applied to specific locations through the identification of 'Policy Units'. These policies are intended to cover the full range of long-term flood risk management options that can be applied to different locations in the catchment.

The six national policies are:

- No active intervention (including flood warning and maintenance). Continue to monitor and advise.
- Reducing existing flood risk management actions (accepting that flood risk will increase over time)
- Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time from this baseline)
- Take further action to sustain the current level of flood risk (responding to the potential increases in risk from urban development, land use change and climate change)
- Take action to reduce flood risk (now and/or in the future)
- Take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment.

Sandwell MBC is covered by the River Severn CFMP (2009) and the River Trent CFMP (2009). Within these CFMPs, Sandwell MBC is covered by Policy Option 5 – Areas of moderate to high flood risk where further action can generally be taken to reduce flood risk.

In these Policy Options, there are specific 'actions' to manage flood risk in the area. The actions relevant to Sandwell MBC in the **Trent CFMP** are:

- Provide a more accurate and community focused flood warning service;

- Conclude River Tame flood risk management strategy;
- Reduce the incidence of foul water flooding by involving Severn Trent Water Ltd more in flood risk management;
- Investigate and promote opportunities to create green corridors along watercourses through Sandwell MBC;
- Produce and implement an integrated urban drainage strategy;
- Investigate flood resilience for infrastructure, including roads, rail, electricity, gas, oil, water and telecommunications at risk of flooding within the nearby city of Birmingham;
- Identify locations where flood storage ponds or wetland areas could be developed within the urban areas, with associated habitat creation;
- Produce an integrated flood defence asset management strategy.

The actions relevant to Sandwell MBC in the **Severn CFMP** are:

- Ensure floodplains are not inappropriately developed. Follow the 'Sequential Approach' and consider land swapping opportunities;
- Encourage compatibility between urban open spaces and their ability to make space for rivers to expand as flood flows occur. One example of a flood-compatible use is playing fields. Develop strategies to create 'blue corridors' by developing/redeveloping to link these flood-compatible spaces;
- Raise awareness of flooding among the public and key partners, especially major operators of infrastructure, allowing them to be better prepared. Encourage them all to increase the resilience and resistance of vulnerable buildings, infrastructure and businesses;
- Develop better understanding of flooding from surface water, from drainage systems, and from 'non-main' watercourses. Produce a strategy for operation and investment, integrating all these with main rivers;
- Review how effective and sustainable each flood defence is;
- Review maintenance operations to ensure they are proportionate to flood risk;
- Manage fly-tipping [on floodplains and in channels]
- Avoid excessive silt accumulation in artificial channels [either by channel modifications or by de-silting].

2.3.5 The Black Country Local Flood Risk Management Strategy (2015)

Sandwell MBC is responsible for developing, maintaining, applying and monitoring a LFRMS. The Black Country Local Flood Risk Management Strategy is used as a means by which the LLFA co-ordinates Flood Risk Management on a daily basis.

The high-level objectives proposed in the strategy for managing flood risk include:

- Develop plans to reduce existing flood risk taking account of people, communities and the environment;
- Ensure that the area remains an attractive place for business and that flood risk is clearly communicated to the public to increase public awareness;

- Ensure that planning decisions take full account of flood risk and that emergency plans are effective so that individuals and communities understand the risks along with their role in an emergency;
- Develop a clear understanding of flood risk across Sandwell MBC and identify national, regional and local funding mechanisms to deliver flood risk management solutions;
- Provide a clear explanation of the roles and responsibilities of the flood management authorities and how Sandwell MBC will coordinate and drive partnership approaches to manage and reduce this risk; and
- Ensure that the natural and historic environment is considered in all flood risk management activities, and where possible enhanced through flood risk management schemes.

2.3.6 LLFAs, surface water and SuDS

The 2023 NPPF states that: 'Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate' (Para 175). When considering planning applications, local planning authorities should consult the relevant 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

Sandwell MBC's requirements for new developers on SuDS are set out on their draft Local Plan, which can be found on their website, alongside supporting documents.

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, although incorporating SuDS is only a requirement for major development, it is best practice for all development.

2.3.7 Water Cycle Studies

Water Cycle Studies (WCS) – whether scoping, outline or detailed – assist Councils to select and develop sustainable development allocations in locations where there is minimal impact on the environment, water quality, water resources, infrastructure, and flood risk. WCS's provide the required evidence, and an agreed strategy, to ensure that planned growth occurs within environmental constraints (and where possible contributes to environmental improvements), with the appropriate infrastructure in place in a timely manner so that planned allocations are deliverable. This is undertaken by identifying areas where there may be conflict between any proposed development, the requirements of the environment and by recommending potential solutions to these conflicts. At the time of writing this SFRA, a WCS for Sandwell MBC was being prepared alongside the study.

2.3.8 Surface Water Management Plans

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location. SWMPs are undertaken, when required, by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. They are produced to understand the flood risks that arise from local flooding, which is defined by the FWMA (2010) as flooding from surface runoff, groundwater, and Ordinary Watercourses. SWMPs establish a long-term action plan to manage surface water in a particular area and are intended to influence future capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future developments.

2.3.9 Partnership working across Sandwell MBC

Figure 2-1 shows how partnership working between RMAs is structured across Sandwell MBC.

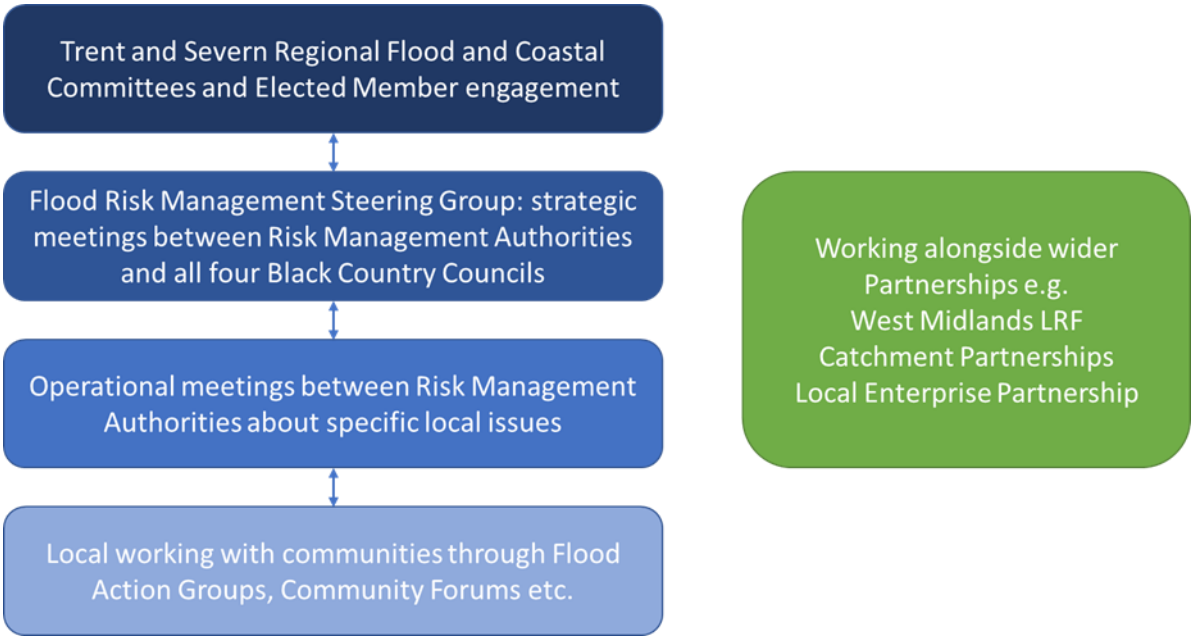


Figure 2-1: Partnership working in Sandwell MBC

3 Planning policy for flood risk management

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

3.1 National Planning Policy Framework and Guidance

The revised NPPF was published in February 2019 and last amended in December 2023. The NPPF details the UK Government's planning policies for England. The NPPF must be taken into account in the preparation of local plans and is a material consideration in planning decisions. The NPPF defines Flood Zones, how these should be used to allocate land and flood risk assessment requirements. The NPPF (paragraph 166) states that:

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

The PPG was first published in March 2014 and last updated in May 2024and sets out how the NPPF should be implemented. Diagram 1 of the PPG sets out how flood risk should be considered in the preparation of Local Plans.

3.2 The risk-based approach

The NPPF takes a risk-based approach to development in flood risk areas. Since July 2021 the approach has adjusted the requirement for the Sequential Test (as defined in Para 168 of the NPPF) so that all sources of flood risk are included in the consideration. At the time of preparation of the 2023 SFRA no updated guidance (PPG) has been published to describe how the approach to the Sequential Test should be modified. The requirement has been addressed by adopting the approach set out in the sections below.

3.2.1 The Flood Zones

The definition of the Flood Zones is provided below. Flood Zones 2 and 3a do not take into account defences. This is important for planning long term developments as long-term policy and funding for maintaining flood defences over the lifetime of a development may change over time.

The Flood Zones do not take into account surface water, sewer or groundwater flooding or the impacts of canal or reservoir failure. They do not consider 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.

The Flood Zones are:

- **Flood Zone 1 (low probability):** Land having a less than 0.1% annual probability of river or sea flooding. All land uses are appropriate in this zone. For development proposals on sites comprising one hectare or above, the

vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a site-specific FRA.

- **Flood Zone 2 (medium probability):** Land having between a 1% and 0.1% annual probability of river flooding; or having land between a 0.5% and 0.1% annual probability of sea flooding. Essential infrastructure, water compatible infrastructure, less vulnerable and more vulnerable land uses (as set out by NPPF) are appropriate in this zone. Highly vulnerable land uses are permitted provided they pass the Exception Test. All developments in this zone require an FRA.
- **Flood 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 flooding. Developers and the local authorities should seek to reduce the overall level of flood risk, relocating development sequentially to areas of lower flood risk and attempting to restore the floodplain and make open space available for flood storage. Water compatible and less vulnerable land uses are permitted in this zone. Highly vulnerable land uses are not permitted. More vulnerable land uses and essential infrastructure are only permitted if they pass the Exception Test. All developments in this zone require an FRA.
- **Flood Zone 3b (functional floodplain):** this zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Only water compatible and essential infrastructure are permitted in this zone and should be designed to remain operational in times of flood, resulting in no loss of floodplain or blocking of water flow routes. They must also be safe for users and not increase flood risk elsewhere. Essential Infrastructure will only be permitted if it passes the Exception Test. Where development is appropriate in this flood zone all applications require an FRA. Functional floodplain will normally comprise:
    - 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 (such as 0.1% annual probability of flooding).
    - LPAs should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the EA.

Flood Zone 3b, unlike other Zones, shows flood risk that accounts for the presence of existing flood risk management features and flood defences, as land afforded this standard of protection is not appropriately included as functional floodplain.

3.2.2 The Sequential Test

Firstly, land at the lowest risk of flooding and from all sources should be considered for development. A test is applied called the 'Sequential Test' to do this. Figure 3 1 summarises the Sequential Test. The LPA will apply the Sequential Test to strategic allocations. For all other developments, developers must supply evidence to the LPA, with a Planning Application, that the development has passed the test.

The LPA should work with the EA to define a suitable area of search for the consideration of alternative sites in the Sequential Test. The Sequential Test can be undertaken as part of a Local Plan Sustainability Appraisal. Alternatively, it can be demonstrated through a free-standing document, or as part of Strategic Housing Land or Employment Land Availability Assessments (SHELAAs).

Whether any further work is needed to decide if the land is suitable for development will depend on both the vulnerability of the development and the Flood Zone it is proposed for. Table 2 of the NPPG defines the vulnerability of different development types to flooding. Table 3 of the NPPG shows whether, having applied the Sequential Test first, that vulnerability of development is suitable for that Flood Zone and where further work is needed.

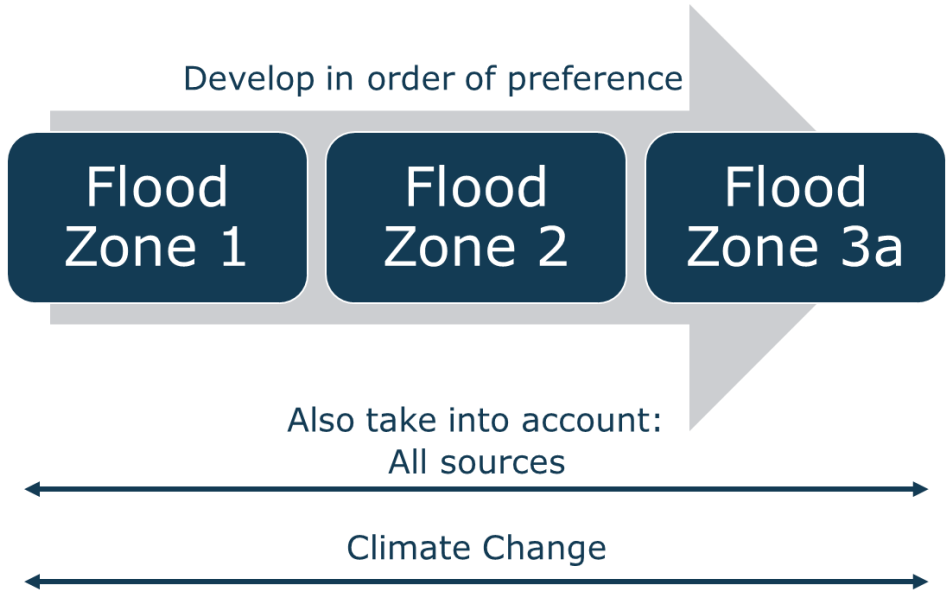


Figure 3-1: Diagram summarising the concept of the Sequential Test

Figure 3-1 illustrates the Sequential Test as a process flow diagram using the information contained in this SFRA to assess potential development sites against areas of flood risk and development vulnerability compatibilities.

This is a stepwise process, but a challenging one, as a number of the criteria used are qualitative and based on experienced judgement. The process must be documented, and evidence used to support decisions recorded.

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

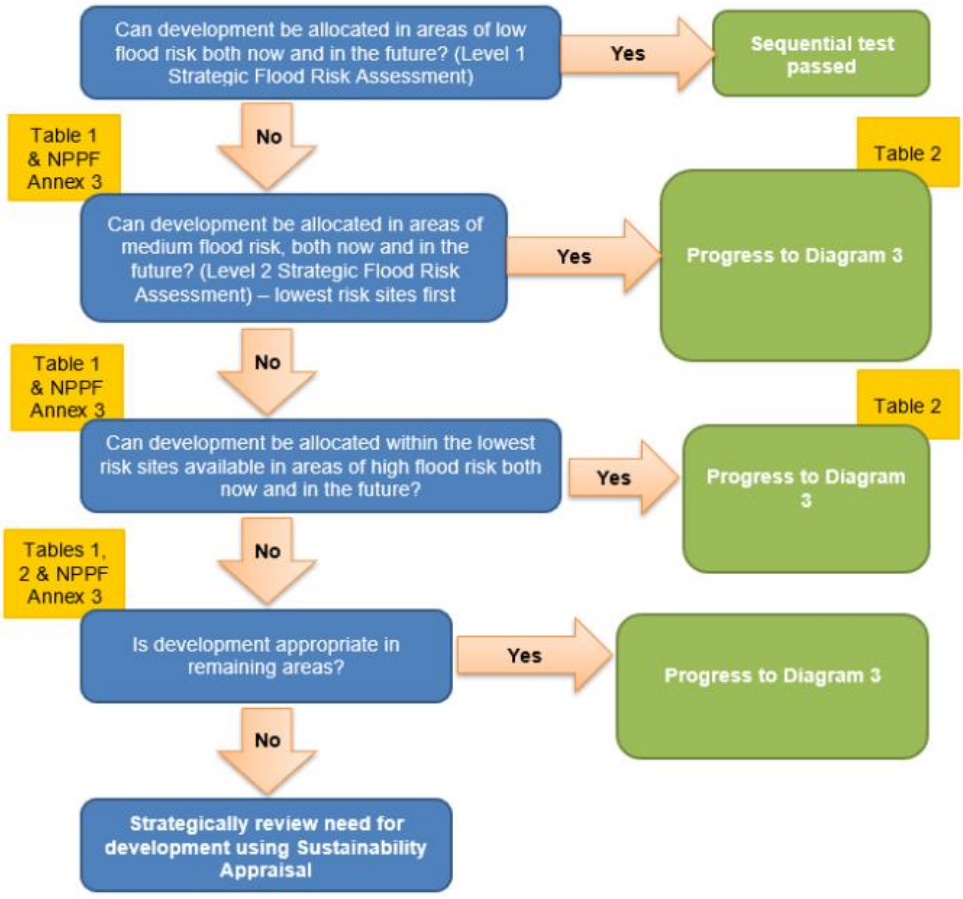


Figure 3-2: Application of the Sequential Test for plan preparation

3.2.3 The Exception Test

It will 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. Diagram 3 of the PPG (Figure 3-3) summarises the Exception Test.

The Exception Test should only be applied following the application of the Sequential Test. It applies in the following instances:

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

Any development where a higher risk of surface water has been identified (surface water Zone B) and the site does not clearly show that development can be achieved away from the flood risk.An LPA should apply the Exception Test to strategic allocations. For all developments, developers must supply evidence to the LPA, with a Planning Application, that the development has passed the test. This is because when a site-specific Flood Risk Assessment is done, more information on the exact measures that can manage the risk is available.

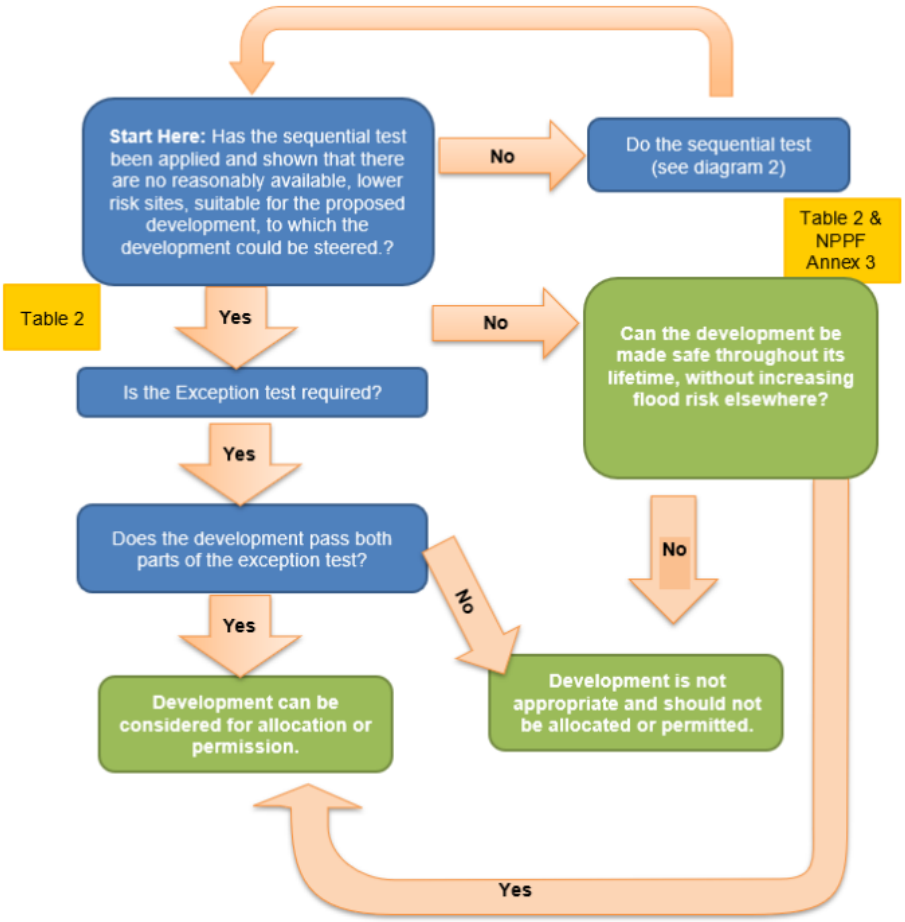


Figure 3-3: Application of the Exception Test to plan preparation

3.3 Using the SFRA to apply the Sequential and Exception Tests to the Local Plan

This SFRA provides the main evidence required on flood risk to carry out the Sequential Test. This process also enables those sites that have passed the Sequential Test, and may require the Exception Test, to be identified. A Local Plan Sustainability Appraisal should be used to support any decision to locate development in higher flood risk areas in terms of wider strategic planning objectives.

It is recommended that planners use the information in this report to apply the Sequential Test alongside wider strategic planning objectives as follows:

- Using the information on the Flood Zones, can development be allocated into the lowest flood risk areas?
- Using the information on climate change, is there likely to be a significant increase in flood risk due to climate change? They should form a judgement based on the likely lifetime of a development (e.g. 60 years for commercial and 100 years for residential) as to whether the site is likely to become at unacceptable risk of flooding over time.

Where there are flood defences, the results of the climate change modelling will not be directly comparable with the Flood Map for Planning, because it does not take the defences into account. Should a site rely heavily on defences for protection, a Level 2 SFRA is

recommended that can explore in greater detail what the impact of climate change on flood hazard, depth and velocity over the lifetime of a development to inform the Exception Test, should this be required.

Having applied this analysis, should there be any sites allocated in areas of high flood risk, Table 3 of the NPPG should be consulted to see if the Exception Test would apply, with reference to the flood risk vulnerability of the development. If so, it is recommended that these sites proceed to a Level 2 SFRA to further advise on the likelihood of the allocation passing the Exception Test. In addition, sites that are at high risk of flooding from other sources and/ or where there may be significant impacts due to climate change would benefit from Level 2 SFRA.

Once the process has been completed, the LPA should then be able to allocate appropriate development sites through the Local Plan as well as prepare flood risk policy including the requirement to prepare site-specific FRAs for all allocated sites that remain at risk of flooding.

3.4 Applying the Sequential Test and Exception Test to individual planning applications

3.4.1 The Sequential Test

Sandwell MBC, taking account of views from other relevant parties, is responsible for considering whether the Sequential Test has been satisfied.

When appropriate Developers are required to apply the Sequential Test to development sites, unless the site is either:

- a strategic allocation and the test has already been carried out by the LPA
- a change of use (except to a caravan, camping or chalet site, or to a mobile home or park home site)
- a minor development (householder development, small non-residential extensions with a footprint of less than 250m^2); or
- a development in Flood Zone 1 unless there are other flooding issues in the area of the development (e.g., surface water, groundwater, sewer flooding).

The SFRA contains information on all sources of flooding and taking into account the impact of climate change. This should be considered when a developer is preparing the Sequential Test, including the consideration of reasonably available sites at lower flood risk now and in the future, but more detailed site specific information should also be prepared where appropriate.

Sandwell MBC as the LPA must use local knowledge to define the area of application of the Sequential Test (within which it is appropriate to identify reasonably available alternatives). The criteria used to determine the appropriate search area relate to the catchment area for the type of development being proposed. For some sites this may be clear e.g., school catchments, in other cases it may be identified by other Local Plan policies. For some sites

e.g., regional distribution sites, it may be suitable to widen the search area beyond LPA administrative boundaries.

The sources of information on reasonably available sites may include:

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

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

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

3.4.2 The Exception Test

If, following application of the Sequential Test, it is not possible for the development to be located in areas with a lower probability of flooding the Exception Test must then be applied if required (as set out in Diagram 3 of the PPG). Developers are required to apply the Exception Test to all applicable sites (including strategic allocations).

The applicant will need to provide information that the application can pass both parts of the Exception Test:

- *Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk using a method agreed with Sandwell MBC.*
- *Demonstrating that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

The site-specific FRA should demonstrate that the site will be safe, and the people will not be exposed to hazardous flooding from any source. A site specific FRA should consider actual and residual risk and how this will be managed over the lifetime of the development, including:

- the design, operation and maintenance of any flood defence infrastructure;
- access and egress;
- design of the development to manage and reduce flood risk wherever possible;
- resident awareness;
- flood warning and evacuation procedures, including whether the developer would increase the pressure on emergency services to rescue people during a flood event; and
- any funding arrangements required for implementing measures.

3.5 Existing Local Plan policy on development and flood risk

Once adopted, the Sandwell Draft Local Plan will replace the Black Country Core Strategy (2011). The policies relevant to development and flood risk in the Sandwell Draft Local Plan are outlined below.

- Policy SDS1 - Development Strategy: Sandwell MBC will make sure that decisions on planning proposals minimise and mitigate the likely effects of climate change, recognising the multifunctional benefits that open spaces, landscaping, trees, nature conservation habitats and both green and blue infrastructure can deliver in doing so.
- Policy SCC4 - Flood Risk: In line with the NPPF, a Sequential Test will be applied to all developments to ensure development takes place in areas with the lowest flood risk and consider the impact of climate change over the lifetime of that development. Developers should set out how their mitigation designs will ensure that there is no net increase to fluvial flood risk downstream and where practicable how the development could help mitigate against downstream fluvial risk.

3.6 Relevant local policy on development and flood risk

Sandwell MBC

- The Site Allocations and Delivery Development Plan Document is a key aspect of Sandwell MBC's LDF and builds on the Black Country Core Strategy, providing greater detail to development within the Borough until 2021 and considers site constraints, environmental opportunities and relevant policy for site areas of growth.
- The Revised Residential Design Guide SPD (2014) considers layout, street design and good practice to assist developers to link adopted policy to the aims of Building for Life 12 so that design solutions for proposed housing layouts are fully informed and include acceptable design principles. Section 6: Drainage states that SuDS must be considered on all new developments and includes design guidance in line with CIRIA C697: The SuDS Manual, guidance for Highways Technical Approval submissions and guidance on SuDS adoption and maintenance.

3.7 Existing Area Action Plans

- Smethwick Action Plan (2008) Tipton Area Action Plan (2008)
  The Action Plan includes local policies relating to individual development sites Tip 1 – Tip 7 as identified on the AAP Proposals Map. Development schemes are to be designed in accordance with national, regional and local standards which seek to enhance the environment, including flood risk, biodiversity and geodiversity and take account of climate change. Developments should take opportunities to extend natural habitats, encourage ‘climate-proofed’ developments and enhance natural and built heritage assets. Development sites near the Tipton Brook should

take opportunities to daylight the brook and create a more naturalised channel within the new Community Open Space areas.

- West Bromwich Area Action Plan (2012)
  The Action Plan includes local policies relating to the regeneration of West Bromwich, particularly the town centre. Policies include allocation of sites for new shops and offices and the regeneration of many existing spaces. Policy WBP9 references a small area between Birmingham canal and the train line in which appropriate assessments will need to take place when these sites come forwards for redevelopment at a site-specific level.

4 Impact of Climate Change

4.1 Revised Climate Change Guidance

The revised NPPF (December 2023) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. The NPPF and PPG describe how FRAs should demonstrate how flood risk will be managed over the lifetime of the development, taking climate change into account.

The NPPF also states that the 'Sequential Approach should be used in areas known to be at risk now or in the future from any form of flooding' (para 168).

4.2 Applying the climate change guidance

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. Planning policy and decisions on planning applications have roles in mitigating climate change and adapting to its impacts.

In 2018, the Met Office published new UK Climate Projections (UKCP18). The EA has since updated their guidance on climate change allowances for tidal (in 2019), river flow (in 2021) and rainfall intensity (in 2022) for new developments. This includes information on how these allowances should be included in both SFRAs and FRAs. The guidance adopts a risk-based approach considering the vulnerability of the development and (in the case of fluvial and rainfall intensity) considers risk allowances on a management catchment level.

Developers should check on the government website for the most recent guidance before undertaking a detailed FRA. To further support this, the EA can provide a preliminary opinion to applicants on their proposals at pre-application stage. There may be a charge associated with this.

4.3 Relevant allowances for Sandwell MBC

Climate change is expected to increase the frequency, extent and impact of flooding, reflected in peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water runoff and there may be increased storm intensity in summer. Rising river levels may also increase flood risk.

The peak river flow allowances provided in the guidance show the anticipated changes to peak flow for the management catchment (sub-catchment of river basin districts) within which the subject watercourse is located. Once the management catchment has been identified, guidance on uplift in peak flows are provided for three allowance categories, Central, Higher Central and Upper End which are based on the 50th, 70th and 95th percentiles respectively. The allowance category to be used is based on the vulnerability classification of the development and the flood zones within which it is located.

These allowances (increases) are provided in the form of figures for the total potential change anticipated, for three climate change periods:

- The ‘2020s’ (2015 to 2039)
- The ‘2050s’ (2040 to 2069)
- The ‘2080s’ (2070 to 2125)

The time period used in the assessment depends upon the expected lifetime of the proposed development. Residential development should be considered for a minimum of 100 years, whilst the lifetime of a non-residential development depends upon the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment. Further information on what is considered to be the lifetime of development is provided in the PPG.

Sandwell MBC is located across the ‘Tame Anker and Mease’ and 'Severn Middle Worcestershire' management catchments.. Maps showing the extent of the management catchments are published by the EA.

Table 4-1 and Table 4-2 display the peak river flow allowances that apply to the Tame Anker and Mease Management Catchment and Severn Middle Worcestershire Management Catchment respectively for fluvial flood risk. Climate change scenarios have been run for relevant fluvial models for the 3.3%, 1% and 0.1% AEP events in line with the PPG requirements to assess high, medium and low risk both now and in the future.

Table 4-1: 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 4-2: 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%

The Flood Zone and flood risk vulnerability classification should be considered when deciding which allowances apply to the development or the plan. Vulnerability classifications are found in the PPG. The EA guidance states that both the central and higher central allowances should be assessed in strategic flood risk assessments. Specific

guidance for which climate change allowance estimates should be applied can be found in the EA guidance on climate change allowances. For site specific FRAs, the central allowances should be used in most instances with the exception of 'essential infrastructure' where the guidance is to use the 'higher central' allowance.

Currently there in no guidance on considering the impact of climate change on flood risk to development located within Flood Zone 1.

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 EA have developed a peak rainfall allowances map which shows anticipated changes in peak rainfall intensity which can be used for site-scale applications (like drainage design), surface water flood mapping in small catchments (less than 5km^2) and urbanised drainage catchments.

The guidance suggests that direct rainfall modelling may not be suited to larger (>5km2) catchment with rural land use. In these instances, the guidance states that the fluvial flood risk affected by climate change should be assessed using uplifts from peak river flow allowances (Section 5.4).

Sandwell MBC is located within the Tame Anker and Mease Management Catchment and the Severn Middle Worcestershire Management Catchment for peak rainfall intensity. The EA's peak rainfall climate change allowances by management catchment mapping provides the allowances that should be used (Table 4-3 and Table 4-4).

Table 4-3: 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 4-4: 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%

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

For this SFRA, the following climate change uplifts have been applied to the EA Risk of Flooding from Surface Water (RoFSW) dataset:

- 3.3% AEP 2070s upper end climate change allowance – 35% uplift
- 1% AEP 2050s upper end climate change allowance – 40% uplift

It is worth noting that at present a 40% uplift for the upper end allowance, but note that if/when this changes, the new uplift takes precedence.

All rainfall intensity climate change uplifts should be applied to both the 3.3% and 1% AEP events. The recommended epoch and use of either the central or upper end allowances should be based on the design lifetime of the proposed development. Further details are provided within the EA guidance on climate change allowances. For development with a lifetime beyond 2100 the Upper end allowance should be used. For development with a shorter lifetime the Central allowance can be used.

4.4 Requirements for site-specific Flood Risk Assessments

When undertaking a site-specific FRA, developers should:

- Confirm which national guidance on climate change and new development applies by visiting GOV.uk.
- Apply this guidance when deciding the allowances to be made for climate change, having considered the potential sources of flood risk to the site (using this SFRA), the vulnerability of the development to flooding and the proposed lifetime of the development. If the site is just outside the indicative climate change extents in this SFRA, the impact of climate change should still be considered because these may get affected should the more extreme climate change scenarios materialise.
- Chapter 8 provides further details on climate change for developers, as part of the FRA Guidance.

4.4.1 Adapting to climate change

The PPG 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.

5 Understanding Flood Risk in Sandwell MBC

This section is a strategic summary of the flood risk within Sandwell MBC's administrative area. This section explores the factors affecting flooding within Sandwell MBC's administrative area – including topography, soils and geology – as well as the key sources of flooding.

Developers should use this chapter to scope out the flood risk issues they need to consider in greater detail in a site-specific FRA to support a Planning Application.

5.1 Historical flooding

Sandwell MBC has a history of documented flood events, with the main sources being fluvial and surface water. Significant historic flood events are highlighted in Table 5-1.

As the borough is relatively high in both the Trent and Severn catchments, the risk of fluvial flooding is perceived to be quite low. The main sources of flooding tend to be a combination of surface water runoff, blockage of drainage infrastructure, maintenance or debris issues and interactions between different sources of flooding in the urban environment.

The most serious flood on the Brandhall Brook occurred in September 1998, which affected 25 properties in the Brook Road area, 10 of which were damaged by internal flooding. This flood risk has now been mitigated by creating upstream flood storage on the golf course as part of the conditions placed on a nearby development.

Table 5-1 shows historic flooding events recorded by Sandwell MBC and also shows the EA's indicative flood risk areas, and historic sewer flooding incidences from Severn Trent Water. It can be seen that there are notable clusters of flooding around the main urban areas of Halesowen, Tipton and Smethwick however, historic flooding is widespread throughout the study area.

Table 5-1: Historic flooding in Sandwell MBC

Sandwell		
Areas Affected	**Cause of Flooding**	**Years of event**
Tipton and Tividale	Storms caused widespread flooding resulting in 6 domestic properties and 4 commercial properties in Tipton flooding and 4 domestic properties in Tividale flooding.	June 2020 & August 2020
West Bromwich	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016

Sandwell		
Wednesbury	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016
Rowley Regis	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016
Smethwick	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016
Oldbury	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016
Tipton	A high intensity storm which resulted in excessive surface water runoff and sewer network capacity exceedance.	June 2016
Biddleston Grove, Brakendale Drive and Spruce Road, Yew Tree	Blockage of grid at upstream end of culverted watercourse	Unknown
Monksfield Avenue, Grove Vale	Overtopping of Red House Park pool/possible blockage of outfall grid	Unknown
Spouthouse Lane, Hamstead	Flooding from the Gorse Farm Woods as overland flow. A culvert blockage also occurred.	Unknown
Chatsworth Road, West Bromwich	Overland surface water flows from higher land and groundwater flows.	Unknown
Beaconsfield Street, West Bromwich	Blockage of grid	Unknown
Rosefield Road and Watery Lane, Smethwick	Flooding from surcharging manholes along culverted watercourse/surface water sewers	Unknown
Smethwick	Highway flooding and	Unknown

Sandwell		
	entering factory in Rabone Lane.	
Brook Road, Titford	Flooding from Brandhall Brook.	Unknown
Penncricket Lane, Titford	Backing up of flows at culvert entrance.	Unknown

During Autumn 2019, there were additional flooding events with a wider scale impact. On the 30th September there was heavy rainfall across the West Midlands which resulted in flooding across Sandwell and beyond on the 30th September and the 1st October. There was torrential rain on the 25th, 26th and 27th October which resulted in road closures and train cancellations. The M5 had two lanes closed around Rowley Regis. A water mains pipe burst in a house in Tipton on the 14th October, which caused substantial damage. Severe rainfall on the 7th and 8th October also caused widespread flooding to roads across Sandwell MBC.

The EA's historic flood map and recorded flood outlines data has been consulted and has shown that there is no spatial data illustrating historic flood risk in the borough. Sandwell MBC were also consulted and provided emergency call out data from August 2020 to June 2023. This infers that the towns of Tipton, Oldbury, Smethwick, Wednesbury, Rowley Regis and West Bromwich are prone to flooding. The Sandwell Flood Plan further illustrates that in June 2016, the same towns experienced flooding as a result of a high intensity storm which lead to excessive surface water runoff and sewer network capacity exceedance.

5.2 Topography, geology, soils and hydrology

The topography, geology and soils are all important in influencing the way the catchment responds to a rainfall event. The degree to which a material allows water to percolate through it (the permeability) affects the amount of surface water run-off reaching the watercourse. Steep slopes or clay rich (low permeability) soils cause rapid surface runoff, whereas more permeable rock such as limestone and sandstone can mean a catchment takes longer to respond to rainfall.

Topography

The topography of Sandwell is dominated by the two watersheds for two main rivers. To the southwest the River Stour and its surrounding catchment drains into the River Severn. To the northeast the River Tame drains into the Trent. The topography can be defined by steep sided valleys and narrow waterway corridors. This combined with the heavily culverted waterways or concreted channels can cause a flashy and a ‘rapid response’ response to rainfall. Figure 5-1 shows the topography of Sandwell.

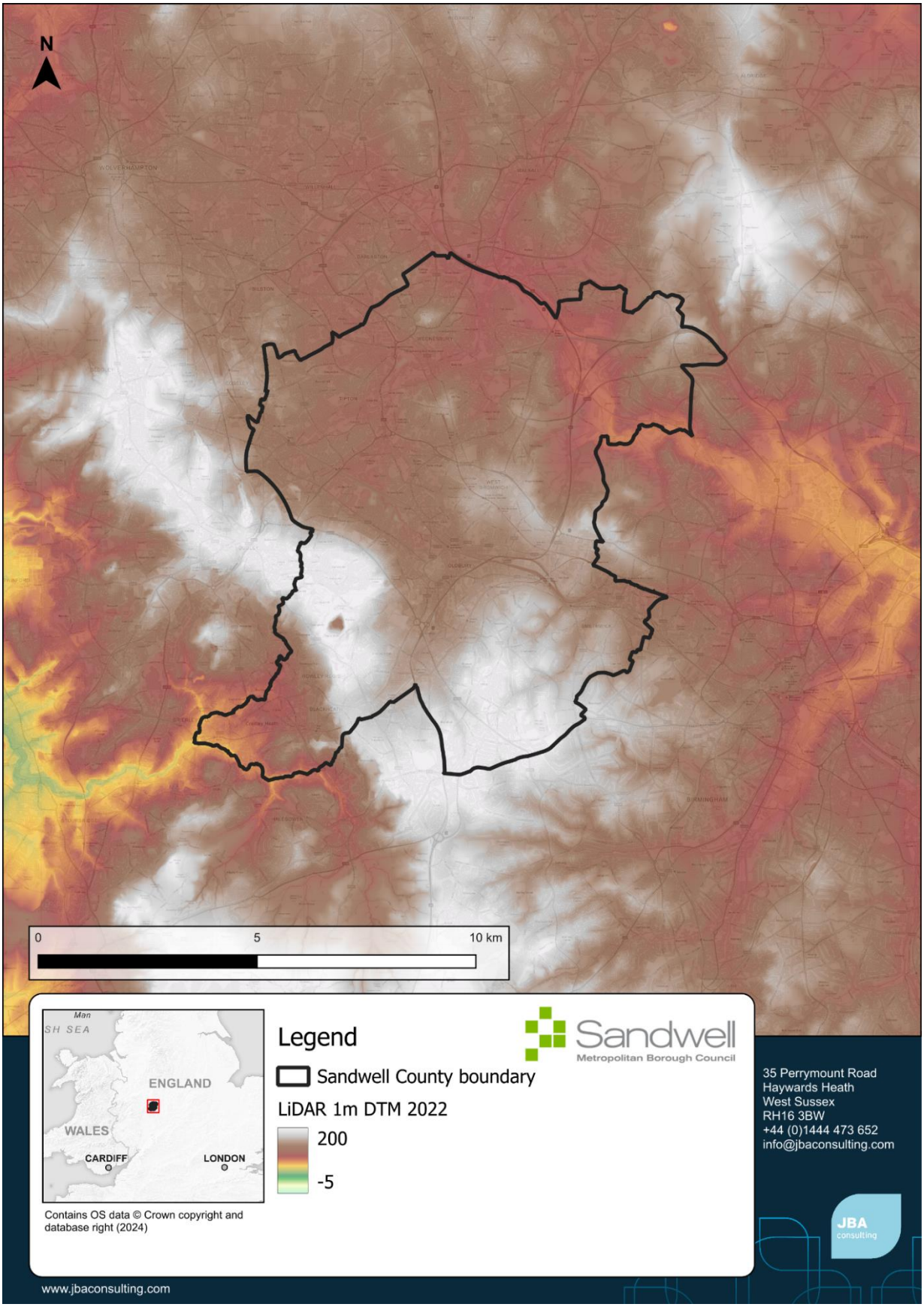


Figure 5-1: Topography of Sandwell

Geology and soils

Figure 5-2: Bedrock geology in Sandwell and Figure 5-3 show the bedrock (solid permeable) formations in the study area and the superficial (permeable, unconsolidated (loose)) deposits. These are classified as the following:

- Principal: layers of rock or drift deposits with high permeability which, therefore, provide a high level of water storage
- Secondary A: rock layers or drift deposits capable of supporting water supplies at a local level and, in some cases, forming an important source of base flow to rivers
- Secondary B: lower permeability layers of rock or drift deposits which may store and yield limited amounts of groundwater
- Secondary undifferentiated: rock types where it is not possible to attribute either category A or B
- Unproductive Strata: rock layers and drift deposits with low permeability and therefore have negligible significance for water supply or river base flow.

The bedrock geology in Sandwell is predominantly siltstone and sandstone with subordinate mudstone. Across the north of the borough coal, iron and ferricrete are also present. The abundance of siltstone sandstone and mudstone across the borough indicates varied levels of permeability with sandstone the most porous and mudstone the least. The British Geological Survey (BGS) Map Viewer indicates that the majority of the borough is made up of highly productive aquifers in which flow is virtually through all fractures and other discontinuities. In the south-east of the borough, there is an area of highly productive aquifers with significant intergranular flow.

Superficial deposits are located across Sandwell, in particular the eastern half of the borough. Till deposits are present from north to south of the borough and are located in towns including Wednesbury, West Bromwich and Smethwick. Alluvium is present in the north-east of Sandwell and glacial sand and gravel deposits are located in the north-west. Both forms of deposits are much less abundant than till. Till is a generally permeable deposit.

The area is well known for having ample mineral resources, with the name ‘Black Country’ associated with the south Staffordshire coal seam '30 foot seam' which lies below the area. Additionally, there has been both limestone and coal mining in the area which gives indications to the underlying geology.

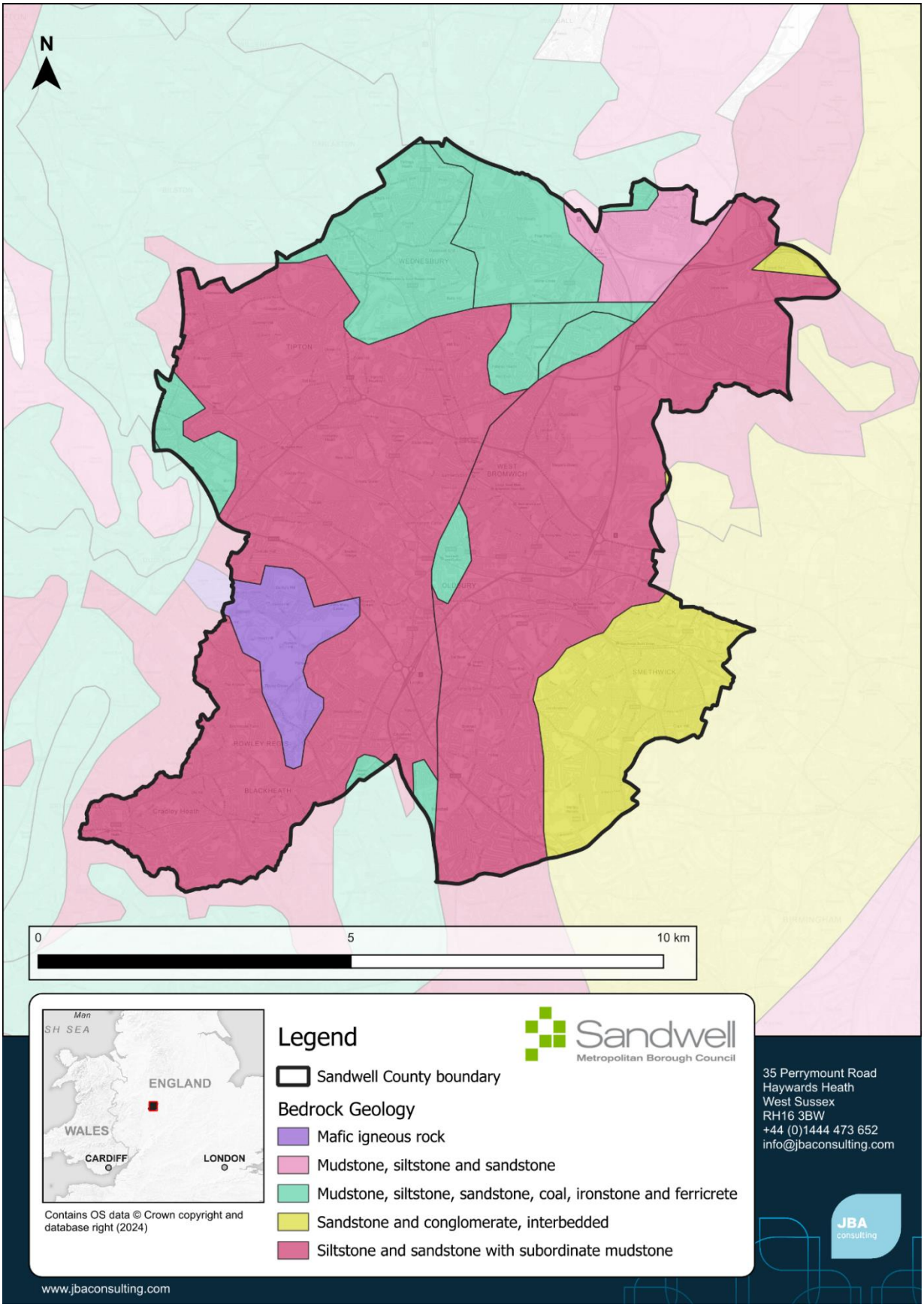


Figure 5-2: Bedrock geology in Sandwell

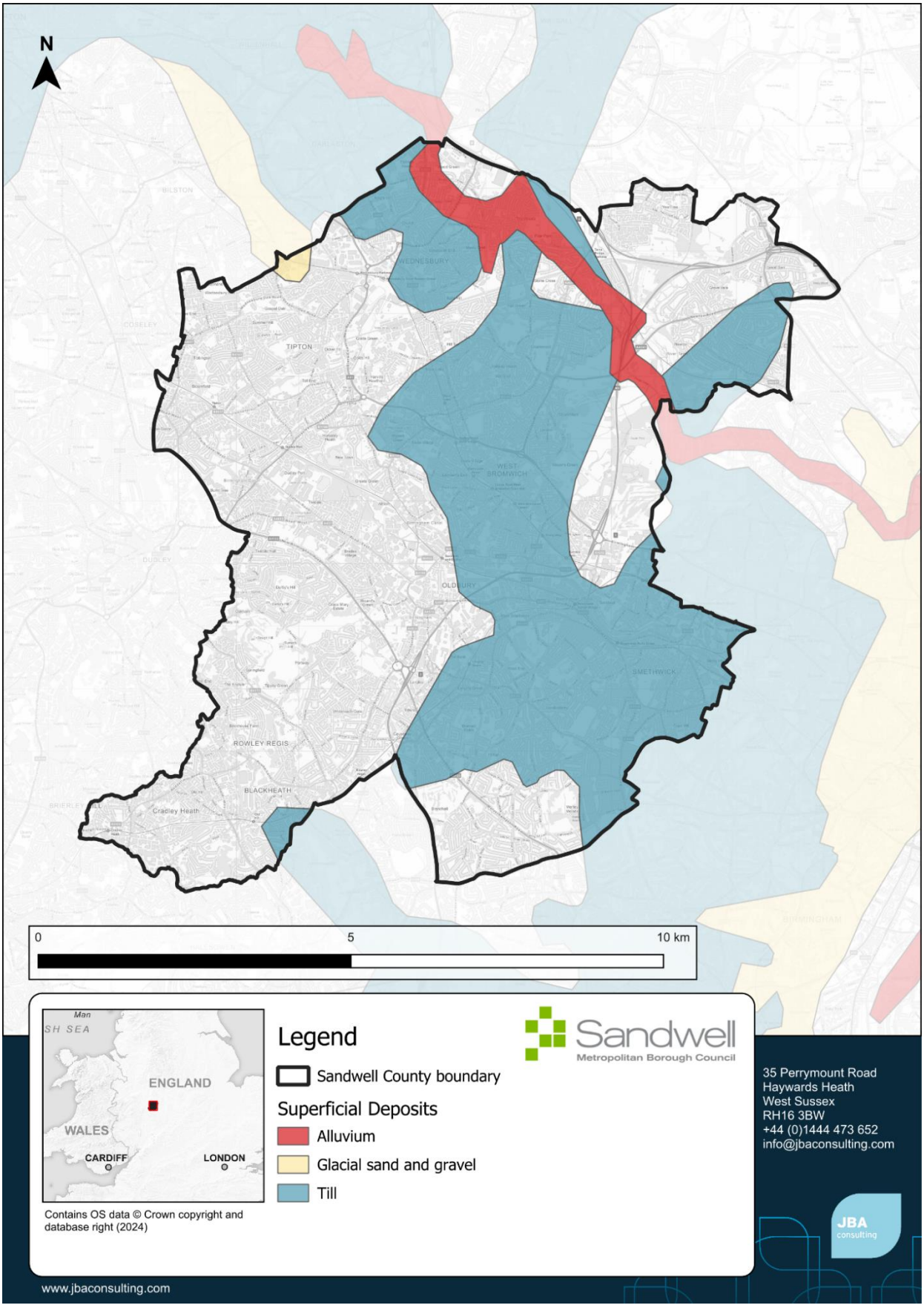


Figure 5-3: Superficial deposits in Sandwell

5.3 Watercourses

The major rivers in Sandwell are the River Stour and the River Tame which drain into the rivers Severn and Trent, respectively. Other main watercourses are the Brandhall Brook and the Mousesweet Brook.

Figure 1-4 shows the key watercourses in the study area.

5.4 Fluvial (river) flood risk

The main areas at risk of flooding in Sandwell are Horseley Heath, Newton (especially around the M6 Motorway) and areas around Wednesbury and Oldbury.

The Flood Zone maps for Sandwell MBC are shown in Appendix B.

Flood Zones 2 and 3a reflect the EA's Flood Map for Planning Flood Zones at the time of preparing the SFRA (see Appendix B). A combination of modelling outputs provided by the EA has created SFRA Flood Zones 2, 3a and 3b (see Appendix C). Fluvial plus climate change outputs have also been produced using this data and can be found in Appendix D.

For Flood Zone 3b, the 3.3% and the 2% AEP defended scenarios have been used. For areas outside of detailed model coverage, Flood Zone 3a is used as a conservative indication of Flood Zone 3b. This information is compiled in the 'Indicative Flood Zone 3b' output.

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

Refer to Figure 1-4 for the main watercourses in Sandwell.

5.5 Culverted watercourses

The watercourses in Sandwell are predominantly culverted. There are two significant exceptions to this; the River Tame, which is responsible for draining most of the borough, and the River Stour, which is located in the south-west. The LLFAs hold some data on culverted watercourses, but given how extensive the network is, detailed records do not exist for every culvert.

Where a watercourse passes through a development site an opportunity exists to restore the watercourse to a more natural condition, for example by opening up culverts (where known), reinstating a natural, sinuous channel and restoring functional floodplain (places where water is designed to flow or be stored at times of flood). Doing so can help to reduce flood risk, improve water quality, benefit biodiversity and add amenity value.

Where a watercourse passes through a site (open or culverted) the developer should demonstrate that they have considered the above matters in developing their proposals for development. Alongside this, an easement either side of the watercourse is likely to be required. If culverted watercourse runs through a site developers should contact the Environment Agency (Main Watercourses) or Sandwell MBC (Ordinary Watercourses) for advice.

5.6 Surface water flooding

Flooding from surface water runoff (or 'pluvial' flooding) is usually caused by intense rainfall that may only last a few hours and usually occurs in lower lying areas, often where the natural (or artificial) drainage system is unable to cope with the volume of water. Surface water flooding problems can be inextricably linked to issues of poor drainage, or drainage blockage by debris, and sewer flooding. This can be made worse by local insufficient drainage capacity. Where discharge is directly to a watercourse, locally high-water levels can cause back-up and prevent water from draining into the drainage system.

The EA's RoFSW mapping shows that Newton, Oldbury, Tipton, Wednesbury and Smethwick are at risk of surface water flooding. The mapping shows that surface water predominantly follows topographical flow paths of existing watercourses or dry valleys and can pond in low-lying areas. Whilst in the majority of cases the risk is confined to roads, there are notable prominent run-off flow routes around properties, e.g. properties situated at the foot of surrounding hills. The RoFSW mapping for Sandwell MBC can be found in Appendix E.

The surface water flow paths in Sandwell drain northwards from the South-West /South to the lower elevations in the North and North-East, with the M6 being particularly affected by pluvial flow paths.

5.7 Groundwater flooding

In general, less is known about groundwater flooding than other sources. Groundwater flooding can be caused by:

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

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

Mapping of groundwater flood risk has been based on the JBA Groundwater Emergence mapping dataset. The dataset is a strategic scale map showing groundwater flood areas on a 1km square grid and illustrates where groundwater may emerge. The data indicates that groundwater levels in the south-east, as well as some areas in the north-east and south, of Sandwell are between 0.025m and 0.5m below the ground surface. Small areas in the north-east, south-east, north-west and south-west have groundwater levels at or very near (within 0.025m of) the ground surface.

Mapping of the district has been provided showing the risk from groundwater flooding dataset and is shown in Appendix G. Notable areas at higher risk from groundwater flood

are around the M6 in the north-east of the borough, around Smethwick in the south-east and in Cradley Heath in the south-west of Sandwell.

Whilst the likelihood of groundwater flooding in Sandwell MBC is relatively low, the area that borders Sandwell and Dudley has experienced some groundwater flooding in the past from high water tables. The BGS provides further information on groundwater flooding on their website.

5.8 Flooding from canals

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

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

Flooding from a breach of a canal embankment is largely dictated by canal and ground levels, canal embankment construction, breach characteristics and the volume of water within the canal that can discharge into the lower lying areas behind the embankment. The volume of water released during a breach is dependent on the pound length (i.e. the distance between locks) and how quickly the operating authorities can react to prevent further water loss, for example by the fitting of stop boards to restrict the length of the canal that can empty through the breach, or repair of the breach. The Canal and River Trust monitor embankments at the highest risk of failure and have equipment in place to steam breaches in the highest risk locations.

There are seven canals in Sandwell, which are part of an extensive canal network including culverts and feeder streams, these are shown in Figure 5-4. Canal breach and overtopping data has been requested from the Canal and Rivers Trust, however no data has been received at the time of this draft. According to the Black Country 2018 SFRA, there have been no records of canal breach or overtopping in recent years within Sandwell.

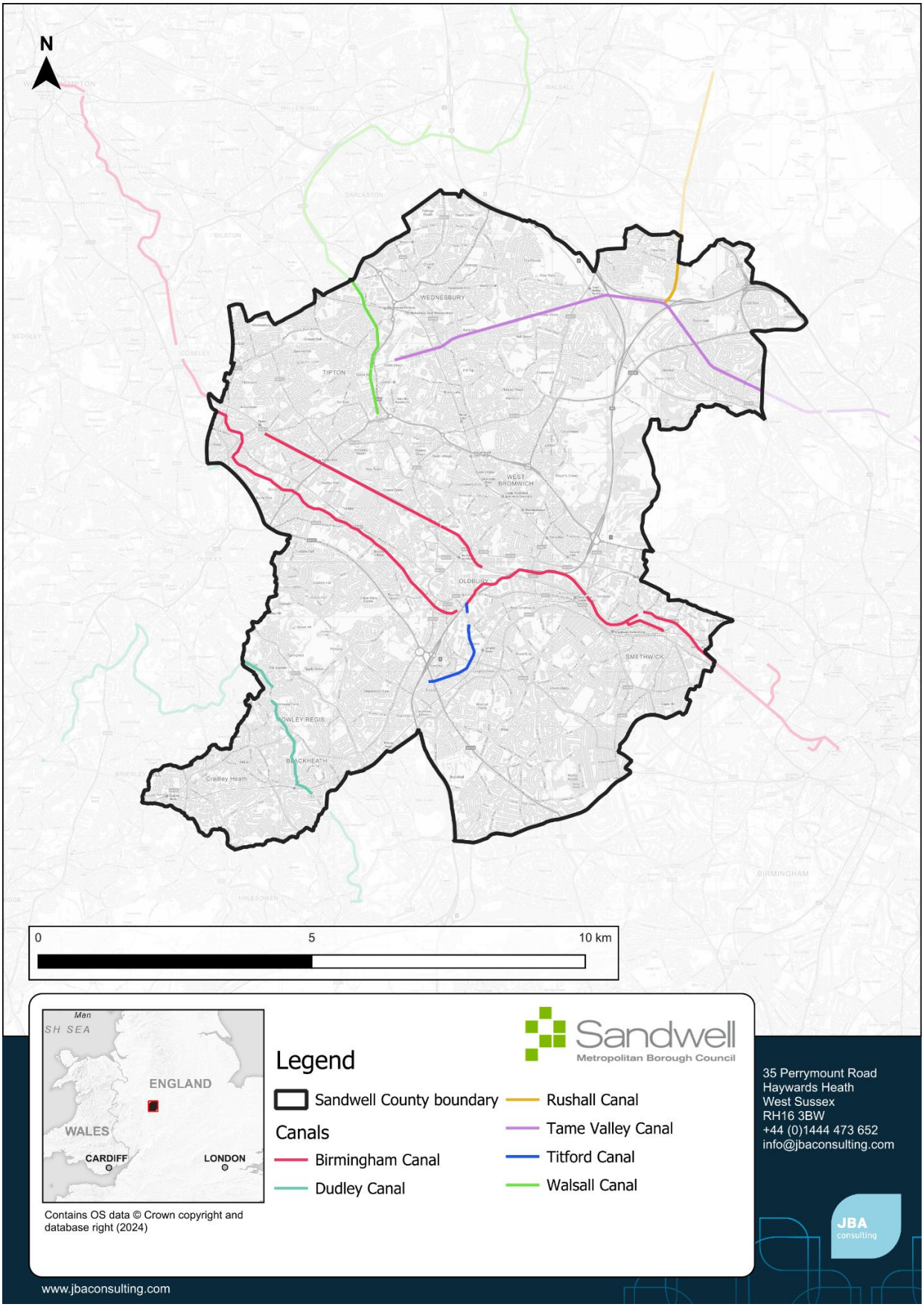


Figure 5-4: Canals in Sandwell

5.9 Flooding from sewers

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

Since 1980, the Sewers for Adoption guidelines mean that new surface water sewers have been designed to have capacity for a rainfall event with a 1 in 30-year chance of occurring in any given year, although until recently this did not apply to smaller private systems. This means that sewers may be overwhelmed in larger rainfall and flood events. Existing sewers can also become overloaded as new development adds to the surface water discharge to their catchment, or due to incremental increases in roofed and paved surfaces at the individual property scale (urban creep). Sewer flooding is therefore a problem that could occur in many locations across the study area.

Data from Seven Trent Water obtained for the 2018 Black Country SFRA shows one incident of sewer flooding along Locarno Road in Tipton, which occurred in October 2004. This dataset was supplied on 03/01/2019. Data has been requested from Severn Trent Water, which we are now in the process of obtaining. Note that in this version the data obtained for the Black Country 2018 SFRA has been used, however once this updated information has been received this section will be updated in a later version.

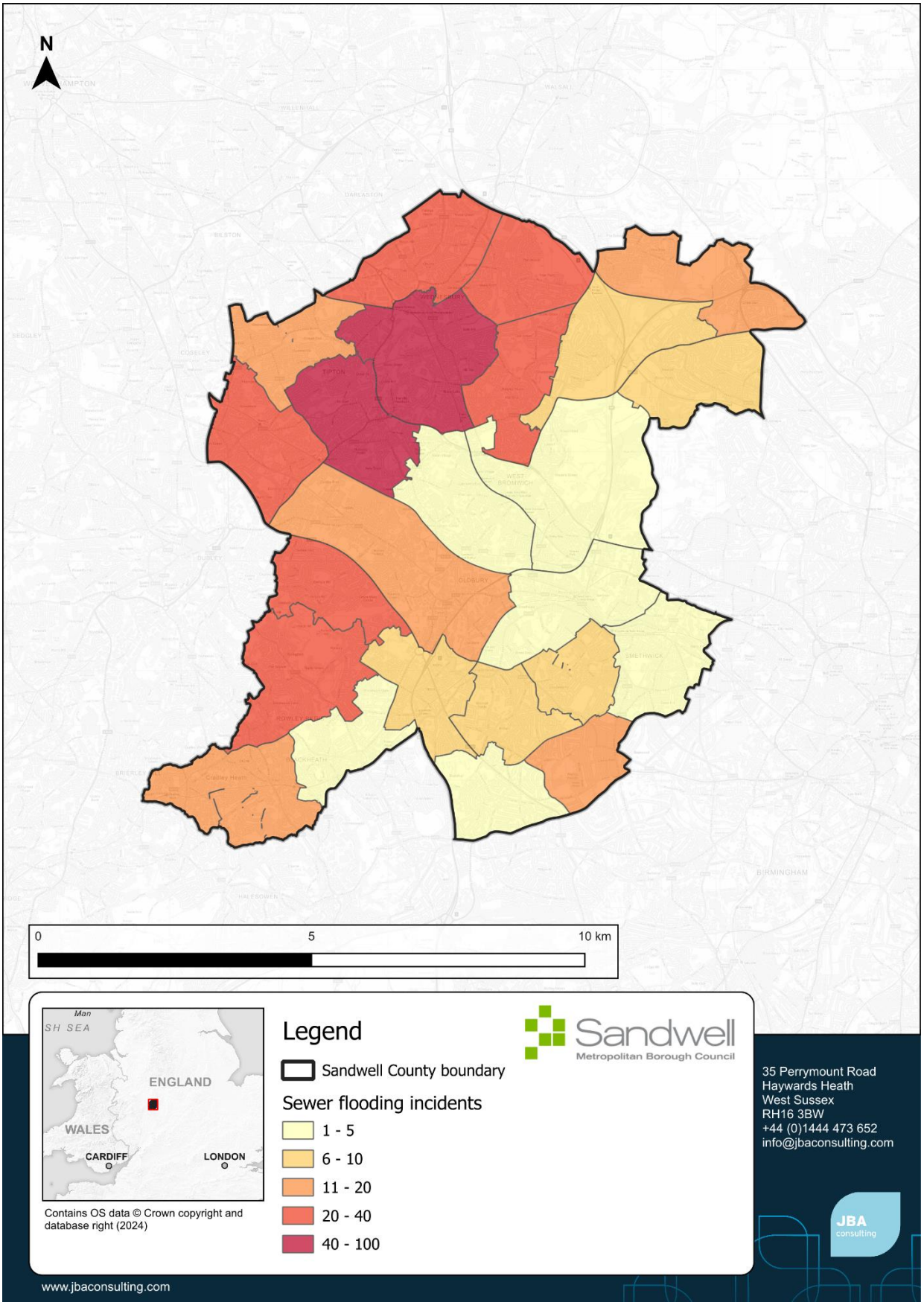


Figure 5-5: Sewer flood incidents

5.10 Flooding from reservoirs

Reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the Reservoir Act 1975 and are on a register held by the EA. The level and standard of inspection and maintenance required under the Act means that the risk of flooding from reservoirs is very low.

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

The EA hold mapping showing what might happen if reservoirs fail. They are currently updating the mapping and new data should be available in late 2020. Developers and Planners should check the Long-Term Risk of Flooding website before using the reservoir mapping shown in this SFRA to make sure they are using the most up to date mapping.

The current mapping shows that there are 14 reservoirs that may affect Sandwell; this includes reservoirs located within the study area and a number of reservoirs outside of the area whose inundation mapping is shown to affect Sandwell. These are shown in Table 5-2: Reservoirs that may potentially affect Sandwell MBC in the event of a breach.

Table 5-2: Reservoirs that may potentially affect Sandwell MBC in the event of a breach

Reservoir	Location - grid reference	Reservoir Owner	Local Authority Area	Reservoir within Council's area?
Barr Beacon No.1	SP0610097400	South Staffordshire Water Plc	Walsall	No
Barr Beacon No.2	SP0610097600	South Staffordshire Water Plc	Walsall	No
Bescot	SP0130095800	Environment Agency	Walsall	No
Dartmouth Boating Lake	SP0150091400	Sandwell MBC	Sandwell	Yes
Great Barr Lower Lake	SP0557494794	BCG Lakes Ltd	Walsall	No
Lodge Farm	SO9370087400	Dudley Council	Dudley	No
Perry Hall	SP0601991697	Environment Agency	Birmingham	No
Perry Pool	SP0680092700	Birmingham City Council	Birmingham	No
Rotton Park	SP0430086800	Canal & River Trust	Birmingham	No
Sandwell Valley Storage Lake	SP0320092600	Environment Agency	Sandwell	Yes
Shavers End No.2	SO0328491182	South Staffordshire Water Plc	Dudley	No
Sheepwash Country Park	SO9750091700	Environment Agency	Sandwell	Yes
Sneyd Reservoir	SJ9816902364	Walsall MBC	Walsall	No
Swan Pool	SP0240092000	Sandwell MBC	Sandwell	Yes

5.11 Flood alerts and flood warnings

The EAis the lead organisation for providing warnings of river flooding. Flood Warnings are supplied via the Flood Warning System (FWS) service, to homes and business within Flood Zones 2 and 3.

There are currently three Flood Alert Areas (FAA) and 11 Flood Warning Areas (FWAs) covering Sandwell MBC. A list of the Flood Alert and Flood Warning Areas is available in Table 5-3: Flood alert areas and Table 5-4.

Table 5-3: Flood alert areas

Flood Alert Code	Flood Alert Name	Watercourse/s	Coverage
033WAF330	River Stour and Smestow Brook in the Black Country and South Staffordshire	River Stour, Smestow Brook	Along Sandwell borderin Cradley Heath area, south-west Sandwell.
033WAF303	Upper Tame	River Tame, Ford Brook	Low-lying land and roads between Horseley Heath and Castle Vale on the River Tame and Bescot on the Ford Brook.
033WAF340	Upper Tame at Sandwell Valley	River Tame	Around Forge Mill Lake in Newton, north-east Sandwell.

Table 5-4: Flood warning areas

Flood Warning Code	Flood Warning Name	Watercourse	Coverage
033FWF3LUTLEY	Lutley Gutter at Halesowen	River Stour	Along Corngreaves Road in Cradley Heath, south-west Sandwell.
033FWF3TAME007	River Tame at Snadwell and Forge Mill Farm	River Tame	West of Forge Mill Lake, adjacent to Forge Lane in Newton, north-east Sandwell.
033FWF3HALESOWEN	River Stour at Halesowen	River Stour	Along Hayseech Road, Halesowen, south-west Sandwell.

Flood Warning Code	Flood Warning Name	Watercourse	Coverage
033FWF3TAME005	River Tame at Bescot	River Tame	Three separate warning areas adjacent to the River Tame in Bescot, north-east Sandwell.
033FWF3CRADLEY	River Stour at Cradley Heath	River Stour	Adjacent to the River Stour, parallel to MacArthur Road in Cradley Heath, south-west Sandwell.
033FWF3TAME001	River Tame at Horseley Heath and Great Bridge	River Tame	Two main areas: north of the Birmingham Canal and south of the A461 in Horseley Heath, north-west Sandwell.
033FWF3TAME006	River Tame at Ray Hall Water Works	River Tame	Areas around the M5 and M6, north-west of Newton, north-east Sandwell.
033FWF3TAME003	River Tame at Holloway Bank	River Tame	Around Woden Road South, parallel to the River Tame, in Wednesbury, north Sandwell.
033FWF3TAME004	River Tame at Wednesbury	River Tame	Roads neighbouring the River Tame including William Green Road and Collins Road, Wednesbury, north Sandwell.

Flood Warning Code	Flood Warning Name	Watercourse	Coverage
033FWF3TAME008	River Tame at Hamstead	River Tame	Along Hamstead Road and Walcot Drive, Newton, north-east Sandwell.
033FWF3TAME002	River Tame at Golds Hill	River Tame	North and south of the Tame Valley Canal at Tipton, north-west Sandwell.

6 Flood alleviation schemes and assets

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

6.1 Asset management

RMAs hold databases of flood risk management and drainage assets:

- The EA holds a national database that is updated by local teams.
- The LLFA holds a database of significant local flood risk assets, required under Section 21 of the FWMA (2010).
- Highways Authorities hold databases of highways drainage assets, such as gullies and connecting pipes.
- Water Companies hold records of public surface water, foul and combined sewers, the records may also include information on culverted watercourses.

The databases include assets RMAs directly maintain and third-party assets. The drainage network is extensive and will have been modified over time. It is unlikely that any RMA has full information on the location, condition and ownership of all the assets in their area. They take a prioritised approach to collecting asset information, which will continue to refine the understanding of flood risk over time.

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

6.2 Standards of Protection

Flood defences are designed to give a specific SoP, reducing the risk of flooding to people and property in flood prone areas. For example, a flood defence with 100-year SoP means that the flood risk in the defended area is reduced to at most a 1% chance of flooding in any given year.

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

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

Developers should consider the SoP provided by defences and residual risk as part of a detailed FRA.

6.3 Maintenance

The EA and Local Authorities have permissive powers to maintain and improve Main Rivers and Ordinary Watercourses, respectively. There is no legal duty to maintain watercourses, defences or assets and maintenance and improvements are prioritised based on flood risk. The ultimate responsibility for maintaining watercourses rests with the landowner.

Highways Authorities have a duty to maintain public roads, making sure they are safe, passable and the impacts of severe weather have been considered. Water Companies have a duty to effectively drain their area. What this means in practice is that assets are maintained to common standards and improvements are prioritised for the parts of the network that do not meet this standard e.g. where there is frequent highways or sewer flooding.

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

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

6.4 Major flood risk management assets in Sandwell MBC

The Flood Map for Planning contains information on the Reduction in Risk of Flooding from Rivers and Sea due to Defences. This shows where areas have reduced flood risk from rivers and sea due to the presence of flood defences.

There are also additional flood defences on Main Rivers in Sandwell MBC and these are shown on

Table 6-1. There are no ‘Areas benefitting from defences’ associated with these defences because they provide a lesser degree of protection than a 1 in 100-year flood event.

Table 6-1: Flood defences in Sandwell on Main Rivers

Watercourse	Location	NGR	Type	Design SoP	Approximate length	Condition rating	Comments
River Tame	Forge Mill Lake	402915 292890	Embankment	50 Years	1650.08m	Fair (3) to Good (2)	Embankments on both sides of the river, separating from the Forge Mill Lake.
River Tame	Hamstead	404513 292811	Embankment	50 Years	236.06m	Poor (4)	Earth Embankment parallel to the train line between the river and the line.
River Tame	Charlemont	402219 294162	Embankment	50-100 Years	787.12m	Fair (3) to Good (2)	Embankments both sides of the River protecting properties in Keverley Grove and Manorford Avenue and the train lines from high levels.
River Tame	Newton	400492 293580	Wall/Embankment	50 years	252.33m	Fair (3) to Good (2)	Wall on the North bank of the river with embankments either side of the train line.
River Tame	Wednesbury	398094 29485	Wall/Embankment	50-100 years	1341.19m	Fair (3) to Good (2)	Embankments along the river from the Walsall boundary line along the river through Mesty Croft.
River Tame	Wednesbury (Balls Hill)	399868 294372	Wall/Embankment	50 years	416.84m	Poor (4) to Fair (3)	Runs along the north bank of the River and separates from a body of water.

Watercourse	Location	NGR	Type	Design SoP	Approximate length	Condition rating	Comments
River Tame	Wednesbury (Golds Green)	398306 294224	Wall/Embankment	50 Years	439.93	Poor (4) to Fair (3)	Ocker Hill storage lake embankment and inlet weir and walls to protect properties off smith road.
River Tame	Toll End	397878 292663	Wall	50 Years	452.33m	Poor (4) to Good (2)	Pairs of defences on both banks of the River Tame.
River Tame	Horsely Heath, Sheepwash Lake.	397380 291715	Embankment	50 Years	1078.4m	Fair (3) to Good (2)	Embankments protecting properties in Horsley heath and sheepwash storage lake from high levels.
River Tame	Oldbury	398359 290461	Wall/Embankment	50 Years	110.82m	Poor (4) to Fair (3)	Defences protecting Balaji Avenue and Union Road from high Levels.
River Tame	Oldbury	399359 290075	Wall	50 Years	310.92m	Fair (3) to Good (2)	Walls protecting properties surrounding the Sandwell and Dudley Train station.
Tributary of the River Tame	Land South of Yew Tree.	402391 294945	Embankment	50 Years	78.34m	Good (2)	Earth embankment
Unnamed watercourse, tributary of the river Tame.	Brandhall	399301 286534	Embankment	25 Years	206.02m	Good (2)	Brandhall embankment and a Dam / Embankment protecting properties around heron road and Causeway Green.

Watercourse	Location	NGR	Type	Design SoP	Approximate length	Condition rating	Comments
Unnamed watercourse, tributary of the river Tame.	Titford	398515 287480	Embankment	5 Years	209.57m	Poor (4) to Good (2)	Small embankments to prevent flooding from trash screen blockage to Ashes Road Screen.
Unnamed watercourse, tributary of the river Tame.	Langley	398316 287781	Wall	50 Years	80.22m	Fair (3)	Pre-cast concrete flood wall
Unnamed watercourse, tributary of the river Tame.	Langley, off Joseph Street	398492 288700	Wall	Unknown	101.75m	Good (2)	Private floodwall
River Stour	Briery Coppice, Hawne	395931 284945	Wall	25 Years	43.64m	Fair (3)	Protecting properties around Hayseech.

Table 6-2: Flood management assets in Sandwell

Asset	Location	Information
Culvert inlet screen	Alexandra Road, Tipton	Utl
Culvert inlet screen	Wendover Road, Cradley Heath	Utl
Culvert inlet screen	Cotterills Road, Tipton	Tipton Brook
Culvert inlet screen	Hyett Way, Tipton	Utle
Culvert inlet screen	Hyett Way, Tipton	Utle
Culvert inlet screen	Great Bridge Road, Tipton	Utl

Asset	Location	Information
Culvert inlet screen	Hyett Way, Tipton	Utle
Culvert inlet screen	Hanover Road, Oldbury	Utl
Culvert inlet screen	Lansdown Road, Dudley	Utl
Culvert inlet screen	Birchfield Lane, Oldbury	Utl
Culvert inlet screen	Dudley Road, Tividale	Utl
Culvert inlet screen	Churchbridge, Oldbury	Whiteheath Brook
Culvert inlet screen	Old Park Road, Wednesbury	Utl
Culvert inlet screen	Brook Road, Oldbury	Utl
Culvert inlet screen	Brook Road Oldbury	Utl
Culvert inlet screen	Oldbury Ringway Oldbury	Utl
Culvert inlet screen	Oldbury Ringway Oldbury	Utl
Culvert inlet screen	Oldbury Ringway Oldbury	Utl
Culvert inlet screen	Oldbury Ringway Oldbury	Utl
Culvert inlet screen	Kelvin Way Industrial Estate, West Bromwich	Utl
Culvert inlet screen	Kelvin Way Industrial Estate, West Bromwich	Utl
Culvert inlet screen	Denbigh Drive, West Bromwich	Inlet of canal overflow
Culvert inlet screen	Birmingham Road, West Bromwich	Utl
Culvert inlet screen	Norman Road, Smethwick	Utl
Culvert inlet screen	Manor Road, Smethwick	Utl
Culvert inlet screen	Hadley Stadium, Smethwick	Utl

Asset	Location	Information
Culvert inlet screen	Shireland Road, Smethwick	Utl
Culvert inlet screen	Cheshire Road, Smethwick	Utl
Culvert inlet screen	Cheshire Road, Smethwick	Utl
Culvert inlet screen	Newton Road	Utl
Culvert inlet screen	Tame Valley Canal	Utl
Culvert inlet screen	Monksfield Avenue	Utl
Culvert inlet screen	M6 Motorway	Utl
Culvert inlet screen	M6 Motorway	Utl
Culvert outlet screen	Forge Lane	
Culvert outlet screen	Westgate	Utl
Culvert outlet screen	Forge Lane	Utl
Culvert outlet screen	New Pool Road	
Culvert outlet screen	Greenfield Avenue	Utl
Culvert outlet screen	Macarthur Road	Utl
Culvert outlet screen	Cradley Road	
Culvert outlet screen	Cradley Road	Pipe from MH 2455 abandoned
Culvert outlet screen	Cradley Road	
Culvert outlet screen	Saint Annes Road	Utl
Culvert outlet screen	Woodall Street	Utl
Culvert outlet screen	Foxoak Street	Utl
Culvert outlet screen	New Town Lane	Utl

Asset	Location	Information
Culvert outlet screen	New Town Lane	Utl
Culvert outlet screen	Bannister Street	Utl
Culvert outlet screen	Corngreaves Road	
Culvert outlet screen	Corngreaves Road	Utl
Culvert outlet screen	Haden Hill Park	
Culvert outlet screen	Hayseech	Utl
Culvert outlet screen	Park Street	Utl
Culvert outlet screen	Brook Lane	
Culvert outlet screen	Hickmans Avenue	
Culvert outlet screen	Hickmans Avenue	
Culvert outlet screen	Mildred Road	Utl
Culvert outlet screen	Highland Road (Playing Field)	Utl
Culvert outlet screen	Mildred Road	Utl
Culvert outlet screen	Halesowen Road	Utl
Culvert outlet screen	Halesowen Road	Utl
Culvert outlet screen	Bluebell Road	Utl
Culvert outlet screen	Gawne Lane	Utl
Culvert outlet screen	Gawne Lane	Utl
Culvert outlet screen	Mousesweet Close	Utl
Culvert outlet screen	Mousesweet Close	Utl
Culvert outlet screen	Gawne Lane	Utl

Asset	Location	Information
Culvert outlet screen	Doulton Road	Utl
Culvert outlet screen	Doulton Industrial Estate	Utl
Culvert outlet screen	Dudley Road	Utl
Culvert outlet screen	Dudley Road	Utl
Culvert outlet screen	Watery Lane	Utl
Culvert outlet screen	Watery Lane	Utl
Culvert outlet screen	Locarno Road	Utl
Culvert outlet screen	Haden Hill Road	Utl
Culvert outlet screen	High Haden Road	
Culvert outlet screen	Granville Road	
Culvert outlet screen	Crendon Road	Utl
Culvert outlet screen	Oakham Road	Utl
Culvert outlet screen	Laburnum Croft	Utl
Culvert outlet screen	Coneygree Road	Utl
Culvert outlet screen	Dudley Port	Utl
Culvert outlet screen	Oakley Avenue	Utl
Culvert outlet screen	Oakley Avenue	Utl
Culvert outlet screen	Alexandra Road (Playing Field)	
Culvert outlet screen	Brookfield Way	
Culvert outlet screen	Alexandra Road (Playing Field)	
Culvert outlet screen	Lower Church Lane	Utl

Asset	Location	Information
Culvert outlet screen	Great Bridge Road	Utl
Culvert outlet screen	Hyett Way	Utle
Culvert outlet screen	Great Bridge Road	Utl
Culvert outlet screen	Hyett Way	Utle
Culvert outlet screen	Hyett Way	Utle
Culvert outlet screen	Beverston Road	Utl
Culvert outlet screen	Glyn Avenue	Utl
Culvert outlet screen	New Birmingham Road	Utl
Culvert outlet screen	Britannia Street	Utl
Culvert outlet screen	New Birmingham Road	Utl
Culvert outlet screen	Shelbourne Close	Utl
Culvert outlet screen	Johns Lane	Utl
Culvert outlet screen	Johns Lane	Utl
Culvert outlet screen	Morrison Road	Utl
Culvert outlet screen	Arnhem Way	
Culvert outlet screen	Open Land Rear Macdonald Close	Utl
Culvert outlet screen	Open Land Rear Macdonald Close	
Culvert outlet screen	Open Land Rear Macdonald Close	Utl
Culvert outlet screen	Arnhem Way	
Culvert outlet screen	Tame Road	Utl
Culvert outlet screen	Beddoe Close	Utl

Asset	Location	Information
Culvert outlet screen	Fisher Street	Utle
Culvert outlet screen	Brickhouse Lane South	
Culvert outlet screen	Market Place	Abandoned
Culvert outlet screen	Market Place	
Culvert outlet screen	Greta Western Way	
Culvert outlet screen	Toll End Road	Utl
Culvert outlet screen	Toll End Road	Utl
Culvert outlet screen	Bankfield Road	Utl
Culvert outlet screen	Toll End Road	Utl
Culvert outlet screen	Toll End Road	Utl
Culvert outlet screen	Black Country New Road	
Culvert outlet screen	Bagnall Street	Utl
Culvert outlet screen	Black Country Spine Road	Utl
Culvert outlet screen	Bagnall Street	Utl
Culvert outlet screen	Eagle Industrial Estate	Utl
Culvert outlet screen	Farmer Way	
Culvert outlet screen	Lansdown Road	Utl
Culvert outlet screen	York Road	
Culvert outlet screen	York Road	Utl
Culvert outlet screen	Titford Road	Utl
Culvert outlet screen	Ashes Road	Utl

Asset	Location	Information
Culvert outlet screen	Ashes Road	Utl
Culvert outlet screen	Cakemore Road	
Culvert outlet screen	Titford Road	Utl
Culvert outlet screen	Titford Road	Utl
Culvert outlet screen	Lion Farm Playing Fields	
Culvert outlet screen	Texas Store Birchley Island	
Culvert outlet screen	Lion Farm Playing Fields	Utl
Culvert outlet screen	Birchfield Lane	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Wolverhampton Road	Utl
Culvert outlet screen	Churchbridge	Utl
Culvert outlet screen	Pearsall Drive	Utl
Culvert outlet screen	Dudley Road	Utl
Culvert outlet screen	Portway Road	Utl
Culvert outlet screen	Theodore Close	
Culvert outlet screen	Open Land Rear Theodore Close	Utl
Culvert outlet screen	Roway Lane	

Asset	Location	Information
Culvert outlet screen	Roway Lane	Utl
Culvert outlet screen	Union Road	
Culvert outlet screen	Oldbury Road	Utl
Culvert outlet screen	Brandon Way Industrial Estate	Utl
Culvert outlet screen	West Bromwich Street	
Culvert outlet screen	West Bromwich Street	
Culvert outlet screen	Albion Road	Utl
Culvert outlet screen	Union Road	Utl
Culvert outlet screen	Ryders Green Road	Utl
Culvert outlet screen	Phoenix Street	
Culvert outlet screen	Great Bridge	
Culvert outlet screen	Great Bridge	
Culvert outlet screen	Great Bridge	
Culvert outlet screen	Richmond Street	Utl
Culvert outlet screen	Siddons Industrial Estate	Utl
Culvert outlet screen	Smith Road	Utle
Culvert outlet screen	Smith Road (Off)	Utl
Culvert outlet screen	Holloway Bank	Utl
Culvert outlet screen	Holloway Bank	Utl
Culvert outlet screen	Holloway Bank	Utl
Culvert outlet screen	Old Park Road	Utl

Asset	Location	Information
Culvert outlet screen	Old Park Road	Utl
Culvert outlet screen	Old Park Road	Utl
Culvert outlet screen	Saint Matthews Road	Utl
Culvert outlet screen	Saint Matthews Road	Utl
Culvert outlet screen	Heron Road	Utl
Culvert outlet screen	Heron Road	Utl
Culvert outlet screen	Saint Matthews Road	Utl
Culvert outlet screen	Saint Matthews Road	Utl
Culvert outlet screen	Brandhall Golf Course	Utl
Culvert outlet screen	Brandhall Lane	Utl
Culvert outlet screen	Queensway	Utl
Culvert outlet screen	Old Park Lane	Utl
Culvert outlet screen	Park Street	Utl
Culvert outlet screen	Park Lane	Utl
Culvert outlet screen	Park Lane	Utl
Culvert outlet screen	Park Lane	Utl
Culvert outlet screen	Park Lane	Utl
Culvert outlet screen	Tat Bank Road	Utl
Culvert outlet screen	Seven Stars Road	Utl
Culvert outlet screen	Flash Road	Utl
Culvert outlet screen	Mckean Road	

Asset	Location	Information
Culvert outlet screen	Broadwell Road	Utl
Culvert outlet screen	Parsonage Street	Utl
Culvert outlet screen	Kelvin Way Industrial Estate	Utl
Culvert outlet screen	Crystal Drive	Utl
Culvert outlet screen	Cornwallis Road	Utl
Culvert outlet screen	Cornwallis Road	Utl
Culvert outlet screen	Credenda Road	Utl
Culvert outlet screen	Blakemore Road	Utl
Culvert outlet screen	Bromford Road	Utl
Culvert outlet screen	Bromford Lane	Utl
Culvert outlet screen	New Gas Street	
Culvert outlet screen	Swan Lane	
Culvert outlet screen	Meyrick Road	
Culvert outlet screen	Francis Ward Close	Utl
Culvert outlet screen	Woden Road South	Utl
Culvert outlet screen	Woden Road South	Utl
Culvert outlet screen	Hampshire Road	Utl
Culvert outlet screen	Woden Road South	
Culvert outlet screen	Hydes Road	Utl
Culvert outlet screen	Woden Road South	Utl
Culvert outlet screen	Hydes Road	Utle

Asset	Location	Information
Culvert outlet screen	Hydes Road	Utl
Culvert outlet screen	Axletree Way	Abandoned
Culvert outlet screen	Axletree Way	Abandoned
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	Utl
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	Abandoned
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	
Culvert outlet screen	Axletree Way	Utl
Culvert outlet screen	Wood Green Road	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Valentine Road	
Culvert outlet screen	Salop Road	Utl

Asset	Location	Information
Culvert outlet screen	Broadmoor Avenue	Utl
Culvert outlet screen	Norman Road	
Culvert outlet screen	Norman Road	
Culvert outlet screen	Cemetery Road	Utl
Culvert outlet screen	Victoria Road	Utl
Culvert outlet screen	Victoria Road	Utl
Culvert outlet screen	Manor Road	Utl
Culvert outlet screen	Manor Road	Utl
Culvert outlet screen	Kelvin Way Industrial Estate	Utl
Culvert outlet screen	Beresford Road	Utl
Culvert outlet screen	Spon Lane South	Utl
Culvert outlet screen	Spring Road	
Culvert outlet screen	Spon Lane South	Utl
Culvert outlet screen	Spon Lane South	Utl
Culvert outlet screen	Houghton Street	Utl
Culvert outlet screen	Union Street	Utl
Culvert outlet screen	Gordon Avenue	Utl
Culvert outlet screen	Johnson Road (Playing Fields)	
Culvert outlet screen	Kilvert Road	Utl
Culvert outlet screen	Price Street	Utl
Culvert outlet screen	Friar Park Road	Utl

Asset	Location	Information
Culvert outlet screen	William Green Road (Adj To)	Utl
Culvert outlet screen	William Green Road (Adj To)	Utl
Culvert outlet screen	Collins Road	Utl
Culvert outlet screen	Crankhall Lane	Utl
Culvert outlet screen	Crankhall Lane	Utl
Culvert outlet screen	Harewood Avenue (Rear Of)	Utl
Culvert outlet screen	Collins Road	Utl
Culvert outlet screen	Bloomfield Crescent	Utl
Culvert outlet screen	Collins Road	Utl
Culvert outlet screen	Park Hill	Utl
Culvert outlet screen	Tame Avenue	Utl
Culvert outlet screen	Tame Avenue	Utl
Culvert outlet screen	Devon Road	Utl
Culvert outlet screen	Shelton Close	Utl
Culvert outlet screen	Shelton Close	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Broadmoor Avenue	Utl
Culvert outlet screen	Norman Road	Utl
Culvert outlet screen	Stanhope Road	Utl
Culvert outlet screen	Stanhope Road	Utl
Culvert outlet screen	Dale Close	Utl

Asset	Location	Information
Culvert outlet screen	Manor Road	Utl
Culvert outlet screen	Margaret Gardens	Utr
Culvert outlet screen	Londonderry Lane	Utl
Culvert outlet screen	High Street	Utl
Culvert outlet screen	Saint Albans Road	Utl
Culvert outlet screen	Brasshouse Lane	Utl
Culvert outlet screen	North Western Road	Utl
Culvert outlet screen	Saint Albans Road	Utl
Culvert outlet screen	Kenrick Way	
Culvert outlet screen	Oldbury Road	Utl
Culvert outlet screen	Everest Close	Utl
Culvert outlet screen	Great Arthur Street	Utl
Culvert outlet screen	Saint Cuthberts Close	
Culvert outlet screen	Offini Close	Utl
Culvert outlet screen	Europa Avenue	
Culvert outlet screen	Saint Martins Close	Utl
Culvert outlet screen	Saint Valentines Close	Utl
Culvert outlet screen	Saint Caroline Close	
Culvert outlet screen	Saint Eleanor Close	
Culvert outlet screen	Europa Avenue	
Culvert outlet screen	Saint Johns Close	Utl

Asset	Location	Information
Culvert outlet screen	Europa Avenue	Utl
Culvert outlet screen	Dagger Lane	
Culvert outlet screen	Dartmouth Golf Course	Utle
Culvert outlet screen	Dartmouth Golf Course (Pond)	Utl
Culvert outlet screen	Newton Road	Utl
Culvert outlet screen	Wychnor Grove	Utl
Culvert outlet screen	Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	New Walsall Road	Utl
Culvert outlet screen	Collumbine Close	Utl
Culvert outlet screen	Stanhope Road	Utl
Culvert outlet screen	Edward Road	Utl
Culvert outlet screen	Dorset Road	Utl
Culvert outlet screen	Shireland Road	Utl
Culvert outlet screen	North Western Road	Utl
Culvert outlet screen	Victoria Avenue	Utl
Culvert outlet screen	Rolfe Street	Utl

Asset	Location	Information
Culvert outlet screen	Colliery Road	
Culvert outlet screen	Park Lane	Utl
Culvert outlet screen	Water Lane	
Culvert outlet screen	Wigmore Lane	Utl
Culvert outlet screen	Charlemont Road	
Culvert outlet screen	Wigmore Lane	Utl
Culvert outlet screen	Newton Road	Utl
Culvert outlet screen	Newton Road	Utl
Culvert outlet screen	Newton Road	Utl
Culvert outlet screen	Wigmore Lane	Utl
Culvert outlet screen	Ray Hall Lane	
Culvert outlet screen	Newton Road	
Culvert outlet screen	Newton Road	
Culvert outlet screen	Newton Road	Utl
Culvert outlet screen	Newton Road	
Culvert outlet screen	Ray Hall Lane	
Culvert outlet screen	Newton Gardens	
Culvert outlet screen	Newton Gardens	
Culvert outlet screen	Beacon View Road	Utl
Culvert outlet screen	River Tame (Adj)	Utl
Culvert outlet screen	River Tame (Adj)	Utl

Asset	Location	Information
Culvert outlet screen	Manorford Avenue	Utl
Culvert outlet screen	River Tame	Utl
Culvert outlet screen	Wolfsbane Drive	Utl
Culvert outlet screen	Pimpernel Drive	Utl
Culvert outlet screen	M5 Motorway (Beneath)	Utl
Culvert outlet screen	River Tame (Adj)	Utl
Culvert outlet screen	Ray Hall Lane	Utl
Culvert outlet screen	Orchard Road	Utl
Culvert outlet screen	Pear Tree Close (Rear Of 21)	Utl
Culvert outlet screen	Ray Hall Sewage Works	Utl
Culvert outlet screen	Brooklands (Rear Of)	
Culvert outlet screen	Brooklands (Rear Of)	
Culvert outlet screen	Cranford Street	Utl
Culvert outlet screen	Woodburn Road	Utl
Culvert outlet screen	Foundry Lane	
Culvert outlet screen	Wellington Street	Utl
Culvert outlet screen	Wellington Street	Hockley brook
Culvert outlet screen	Perrott Street	
Culvert outlet screen	Perrott Street	Utl
Culvert outlet screen	Perrott Street	Utl
Culvert outlet screen	Rabone Lane	Utl

Asset	Location	Information
Culvert outlet screen	Brookside(Adjacent Railway)	Utl
Culvert outlet screen	Tanhouse Avenue	Utl
Culvert outlet screen	Newton Close	Utl
Culvert outlet screen	Newton Close	Utl
Culvert outlet screen	Grove Vale Avenue	Utl
Culvert outlet screen	Grove Vale Avenue	Utl
Culvert outlet screen	Chatsworth Avenue	Utl
Culvert outlet screen	Chatsworth Avenue	Utl
Culvert outlet screen	Grove Vale Avenue (62)	Utl
Culvert outlet screen	Red House Park	
Culvert outlet screen	Fairyfield Avenue	Utl
Culvert outlet screen	Red House Park	Utl
Culvert outlet screen	Biddleston Grove	Utl
Culvert outlet screen	Walcot Drive (River Tame)	Utl
Culvert outlet screen	Hamstead Road (Rear Of 369)	
Culvert outlet screen	Old Walsall Road	Utl
Culvert outlet screen	Old Walsall Road (Rear of garage)	
Culvert outlet screen	Hamstead Road (School Field)	Utl
Culvert outlet screen	Brookside	Utl
Culvert outlet screen	Hamstead Road	
Culvert outlet screen	Spouthouse Lane (Open Space)	Utl

Asset	Location	Information
Culvert outlet screen	Spouthouse Lane (Open Space)	Utl
Culvert outlet screen	Greenhill Gardens	Utl
Culvert outlet screen	Anderson Crescent	Utl
Culvert outlet screen	Birmingham Road	

6.5 Flood Alleviation Schemes

Information and location of flood alleviation schemes within Sandwell MBC can be found on the EA's Programme of FCERM schemes.

6.5.1 Ashes Road Capital Maintenance Scheme - Sandwell MBC

Sandwell MBC Potential Scheme at appraisal stage for a capital maintenance scheme in Warley to provide better protection to 46 houses at flood risk with an envisaged completion date of 2021.

6.5.2 Thimblemill Brook, Smethwick, Flood Alleviation Scheme - Sandwell (Sandwell MBC)

A major potential scheme at appraisal stage to better protect 255 homes by a series of interventions in or adjacent the Thimblemill Brook in the Warley area, currently programmed in to be completed and delivered by 2027.

6.5.3 Collins Road Sheet Pile Refurbishment - Sandwell (EA)

EA scheme in construction to refurbish sheet piling at Collins Road adjacent to the River Tame at Wednesbury to improve the structural integrity of the hard-engineered banks benefitting 62 properties at risk.

6.5.4 Ockerhill Flood Storage Area Repairs - Sandwell (EA)

Repairs and amendments to be undertaken by the Environment Agency to an existing flood storage area to ensure a good standard of protection to 22 properties. Currently in early assessment stage, with capital repairs due by 2021.

6.5.5 Upper Tame - Titford Culvert (EA)

Scheme in construction upgrading the River Tame Titford culvert and benefitting 145 properties in Oldbury to be completed by 2019.

6.5.6 The Beck, Mousesweet Brook, Dudley Flood Alleviation Scheme (EA)

Completed scheme by the EA to better protect and offer benefit to 46 properties in Cradley and Cradley Heath, as the Mouseweet Brook forms the boundary between Sandwell and Dudley.

6.6 Actual and residual flood risk

A Level 2 SFRA (for strategic allocations) or developer site-specific FRA will need to consider the actual and residual flood risk due to the presence of flood and drainage assets in greater detail.

6.6.1 Actual flood risk

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

The assessment of the actual risk should take into account that:

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

6.6.2 Residual risk

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

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

Parts of Sandwell MBC rely on formal flood defences for protection against fluvial flooding. Consequently, there are areas vulnerable to rapid inundation in the event of a breach / failure. The assessment of the residual risk should take into account:

- The flood hazard, depth and velocity that would result from overtopping or breach of defences. Flood gate or pumping station failure and/ or culvert blockage (as appropriate). The EA can provide advice at site-specific development level for advice on breach/ overtopping parameters for flood models.
- The design of the development to take account of the highest risk parts of the site e.g. allowing for flood storage on parts of the site and considering the design of the development to keep people safe and / or ensuring all sleeping accommodation is above the flood level
- A system of warning and a safe means of access and egress from the site in the event of a flood for users of the site and emergency services.

7 Cumulative impact of development, schemes and strategic solutions

This chapter provides a summary of flood alleviation schemes, catchments with highest flood risk and makes recommendations for local planning policy based on these and summarises strategic solutions applicable to Sandwell MBC.

7.1 Introduction

Cumulative impacts are the combined effects of multiple impacts from individual sites and/or a number of smaller sites within a locality. Under the NPPF, strategic policies and their supporting SFRAs, are required to 'consider cumulative impacts in, or affecting, local areas susceptible to flooding' (para 166).

When allocating land for development, consideration should be given to the potential cumulative impact on flood risk within a catchment. Development has the potential to increase the impermeable area within a catchment, which if not properly managed, can cause loss of floodplain storage, increased volumes and velocities of surface water runoff, and result in heightened downstream flood risk. Whilst individual development with appropriate site mitigation measures should not result in measurable local effects with respect to hydrology and flood risk, the cumulative effect of multiple developments may be more severe at sensitive downstream locations in the catchment. Locations where there are existing flood risk issues with people, property or infrastructure will be particularly sensitive to cumulative effects.

The cumulative impact should be considered throughout the planning process, from the allocation of sites within the Local Plan, to the planning application and development design stages.

Site-specific FRAs must consider the cumulative impact of the proposed development on flood risk within the wider catchment area if there are potentially material effects.

As part of the Level 1 SFRA, an assessment of the cumulative effects within catchments in Sandwell MBC boundary has been undertaken.

7.2 Cross-boundary issues

The topography of the district means that a number of major watercourses such as the River Tame and River Stour flow through the study area and into neighbouring authorities. As such, future development, both within and outside Sandwell MBC can have the potential to affect flood risk to existing development and surrounding areas, depending on the effectiveness of SuDS and drainage implementation. Sandwell MBC has boundaries with the following Local Authorities, which can be seen in Figure 1-1:

- Walsall MBC
- Wolverhampton City Council

- Dudley MBC
- Birmingham City Council

Development control should ensure that the impact on receiving watercourses from development in Sandwell has been sufficiently considered during the planning stage and appropriate development management decisions put in place to ensure there is no adverse impact on flood risk or water quality.

All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments near watercourses in neighbouring authorities comply with the latest guidance and legislation relating to flood risk and sustainable drainage, they should result in no increase in flood risk within Sandwell MBC.

The neighbouring authorities were contacted for information on their site allocations, to determine where development in neighbouring authorities may have an impact on flood risk within Sandwell MBC

7.3 Cumulative Impact Assessment

As agreed in the meeting on 10th June 2024, the cumulative impact assessment is being undertaken in conjunction with Wolverhampton and Dudley Councils and is due to be issued after this version of the report has been released. This section will be updated in a later version once the CIA has been completed.

Historic flood risk, surface water flood risk, potential development, predicted flood risk from increased runoff upstream and sewer flooding were all considered during the assessment, and each catchment was ranked within each of these categories. The individual rankings were combined to give and overall risk ranking for each catchment and these were then allocated a Red, Amber, Yellow or Green rating corresponding to high-risk, medium-risk, lower-risk and low-risk overall. More detailed information on the methodology, assumptions and considerations of the cumulative impact assessment can be found in Appendix M.

The results of the cumulative impact assessment are summarised below and in Figure 7-1. Policy recommendations for the below catchments can be found in section 10.3.

The catchments rated as high-risk (red) are:

- River Penk, including Perton, Tettenhall, Bilbrook and Oxley
- River Stour, Stourbridge and Brierley Hill
- Smestow Brook, including Kingswinford
- Smestow Brook and Black Brook, Wolverhampton and Seisdon
- Gains Brook and Wash Brook, including Norton Canes
- Crane Brook, Burntwood, draining towards Shenstone
- Tipton Brook

The catchments rated as medium risk (amber) are:

- Mousesweet Brook and Black Brook, including Rowley Regis, Blackheath and south Dudley
- River Tame source to Tipton Brook, including Oldbury and Dudley
- Tributaries of the Smestow Brook, draining towards Hinksford at risk
- Wom Brook and Penn Brook, draining towards Wombourne
- River Stour, including Kinver and Dunsley, draining towards Kidderminster
- Footherley Brook, draining towards Shenstone
- Watershead and Featherstone Brook, draining towards Cove
- River Tame Bilston and Darlaston

Figure 7-1: RAG rating of catchments in Sandwell MBC

7.4 Strategic solutions

The RMAs have a vision for the future management of flood risk and drainage across Sandwell MBC. This concerns flood risk management, alongside wider environmental and water quality enhancements. Strategic solutions may include upstream flood storage, integrated major infrastructure/ FRM schemes, new defences and watercourse improvements as part of regeneration and enhancing Green Infrastructure (GI), with opportunities for natural flood management and retrofitting sustainable drainage systems.

Chapter 2 sets out the strategic plans that exist for Sandwell MBC. The list below summarises the key outcomes these are seeking to achieve and strategic solutions that can be implemented within Sandwell MBC. This vision needs to be delivered by new development alongside retrofitting and enhancing Green Infrastructure and flood defence schemes in the existing developed area.

- RMAs working in partnership to manage all sources of flooding.
- Managing flood risk to existing communities, infrastructure and the environment in a sustainable manner.
- De-culverting and restoring watercourses and, where this is unfeasible, to take the opportunity to upsize culverted watercourses, including taking opportunities presented by new development to do so.
- Recognising that new development is one of the best ways to manage flood risk, by avoiding inappropriate development in flood risk areas, seeking opportunities to deliver flood risk benefits through development e.g. oversized SuDS, and ensuring that new development does not increase flood risk elsewhere.
- Encouraging the take up of multi-functional SuDS and retrofitting and enhancing Green Infrastructure.
- Promoting the use of NFM through multi-agency projects led by the Birmingham and Black Country Wildlife Trust.
- Ensuring communities are prepared for flood events (and that the residual risk to new developments has been considered and planned for).

- Reconnecting the floodplain with the River Tame, in areas around the Oldbury Arm near Wednesbury and Sandwell Valley and any flood betterment or ecological opportunities to improve water quality around the M5 corridor.
- Recognising the role of strategic solutions in reducing flood risk to enable regeneration as well as the protection of existing communities, infrastructure and the environment.
- Recognising the potential for developers to contribute towards flood risk management measures that reduce risk to their development sites, facilitate regeneration and benefit the wider community.

Land that is required for current and future flood management will be safeguarded from development. Where development lies adjacent to or benefits from an existing or future flood alleviation scheme, the developer will be expected to contribute to the cost of delivery and/or maintenance of that scheme. The EA also seek financial contributions towards their flood warning service (or related infrastructure) where a development is reliant upon such for safe development e.g. to inform flood evacuation management/safe access.

8 Guidance for developers

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

The report provides a strategic assessment of flood risk in Sandwell MBC. 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.

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

8.1 Principles for new developments

Apply the Sequential and Exception Tests

Developers must provide evidence that the Sequential Test has been passed for windfall developments. If the Exception Test is needed, they must also provide evidence that all parts of the Test can be met for all developments, based on the findings of a detailed FRA.

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

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

Consult with statutory consultees at an early stage to understand their requirements.

Developers should consult with the EA, Sandwell MBC as LLFA and Severn Trent Water, at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling and drainage assessment and design.

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

The SFRA can be used by developers to scope out what further detailed work is likely to be needed to inform a site-specific FRA. At a site level, Developers will need to check before

commencing on a more detailed FRA that they are using the latest available datasets. Developers should apply the 2019 EA climate change guidance and ensure the development has taken into account climate change adaptation measures.

Ensure that the development does not increase flood risk elsewhere

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

Ensure the development is safe for future users

Consideration should first be given to minimising risk by planning sequentially across a site. Once risk has been minimised as far as possible, only then should mitigation measures be considered. Developers should consider both the actual and residual risk of flooding to the site (Chapter 6.6).

Further flood mitigation measures may be needed for any developments in an area protected by flood defences, where the condition of those defences is 'fair' or 'poor', and where the standard of protection is not of the required standard.

Manage the surface water runoff rates of new development

On greenfield sites surface water runoff rates should not be increased and on brownfield sites surface water runoff should be reduced to the greenfield rate wherever practical. Approved development proposals will be expected to be supplemented by appropriate maintenance and management regimes for surface water drainage.

Enhance the natural river corridor and floodplain environment through new development

Developments should demonstrate opportunities to create, enhance and link green assets. This can provide multiple benefits across several disciplines including flood risk and biodiversity/ ecology and may provide opportunities to use the land for an amenity and recreational purposes. Development that may adversely affect Green Infrastructure assets should not be permitted. Where possible, developers should identify and work with partners to explore all avenues for improving the wider river corridor environment.

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

Wherever possible, developments should seek to help reduce flood risk in the wider area e.g. by contributing to a wider community scheme or strategy for strategic measures, such as defences or natural flood management or by contributing in kind by mitigating wider flood risk on a development site. More information on the contribution developers are expected to make towards achieving the wider vision for FRM and sustainable drainage in Sandwell MBC can be found in Chapter 7.3. Developers must demonstrate in an FRA how they are contributing towards this vision.

8.2 Requirements for site-specific Flood Risk Assessments

8.2.1 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.
- 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).
- Where evidence of historical or recent flood events have been passed to the LPA.
- In an area of significant risk from other sources e.g. surface water, groundwater (consult the LLFA for their latest requirements)

8.2.2 Objectives of a site-specific FRA

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

- whether a proposed development is likely to be affected by current or future flooding from any source;
- whether a proposed development will increase flood risk elsewhere;
- whether the measures proposed to deal with the effects and risks are appropriate;
- the evidence, if necessary, for the 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 EA and Sandwell MBC Guidance and advice for developers on the preparation of site-specific FRAs include:

- Standing Advice on Flood Risk (EA);
- FRA for Planning Applications (EA);
- Site-specific FRA: 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.

8.3 Local requirements for mitigation measures

8.3.1 Site layout and design

Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development.

The NPPF states that a Sequential, risk-based approach should be applied to try to locate more vulnerable land use away from flood zones, to higher ground, while more flood-compatible development (e.g. vehicular parking, recreational space) can be located in higher risk areas. Whether parking in floodplains is appropriate will be based on the likely flood depths and hazard, evacuation procedures and availability of flood warning.

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

A minimum easement of 8 metres is required from top of bank of the watercourse. Wider easements may be necessary if the watercourse is heavily engineered and structurally weak, near the end of its design life or if tall buildings are being proposed to avoid overshadowing or instability from foundations. Opportunities should be sought to provide wider easements to incorporate green buffer strips with native planting to improve biodiversity and create green infrastructure networks. Easements are shown clearly in planning applications e.g. proposed site plans should show the watercourse channel and edges with top of bank clearly labelled and the proposed easement to edge of built development, clearly annotated and labelled.

8.3.2 Modification of ground levels

Any proposal for modification of ground levels will need to be assessed as part of a detailed flood risk assessment.

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

Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (in order for it to fill and drain). It should be in the vicinity of the site and within the red line of the planning application boundary (unless the site is strategically allocated).

Guidance on how to address floodplain compensation is provided in Appendix A3 of the CIRIA Publication C62430.

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 seek opportunities to provide floodplain betterment.

Raising levels can also create areas where surface water might pond during significant rainfall events. Any proposals to raise ground levels should be tested to ensure that it would not cause increased ponding or build-up of surface runoff on third party land.

8.3.3 Raised floor levels

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

The EA advises that minimum FFLs should be set 600mm above the 100-year plus climate change peak flood level, where the new climate change allowances have been used (see Chapter 4for the climate change allowances). An additional allowance may be required because of risks relating to blockages to the channel, culvert or bridge and should be considered as part of an FRA.

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

Similarly, the use of basements should be avoided. Habitable uses of basements within Flood Zone 3 should not be permitted, whilst basement dwellings in Flood Zone 2 will be required to pass the Exception Test. Access should be situated 300mm above the design flood level and waterproof construction techniques used.

8.3.4 Development and raised defences

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

Where development is located behind, or in an area benefitting from defences, the residual risk of flooding must be considered, as set out in Chapter 6.

8.3.5 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). Where possible, opportunities should be sought to work with other bodies and landowners to encourage and promote implementation of NFM measures which will contribute towards delivering a reduction in local and catchment-wide flood risk and the impacts of climate change as well as achieve other wider environmental benefits. Further information can be found about where strategic flood risk solutions are being planned in Chapter 7.4.

8.4 Resistance and resilience measures

The consideration of resistance and resilience measures should not be used to justify development in inappropriate locations.

Having applied planning policy, there will be instances where developments, such as those that are water compatible, and essential infrastructure are permitted in high flood risk areas. The above measures should be considered before resistance and resilience measures are relied upon. The effectiveness of these forms of measures are often dependent on the availability of a reliable forecasting and warning system and the use of back up pumping to evacuate water from a property as quickly as possible. The proposals must include details of how the temporary measures will be erected and decommissioned responsibility for maintenance and the cost of replacement when they deteriorate. The following measures are available:

- *Permanent barriers:* Permanent barriers can include built up doorsteps, rendered brick walls and toughened glass barriers.
- *Temporary barriers:* Temporary barriers consist of moveable flood defences which can be fitted into doorways and/or windows. The permanent fixings required to install these temporary defences should be discrete and keep architectural impact to a minimum. On a smaller scale, temporary snap on covers for airbricks and air vents can also be fitted to prevent the entrance of flood water.
- *Community resistance measures:* These include demountable defences that can be deployed by local communities to reduce the risk of water ingress to a number of properties. The methods require the deployment of inflatable (usually with water) or temporary quick assembly barriers in conjunction with pumps to collect water that seeps through the systems during a flood.
- *Flood resilience measures:* These measures aim to ensure no permanent damage is caused, the structural integrity of the building is not compromised and the clean up after the flood is easier. Interior design measures to reduce damage caused by flooding can include electrical circuitry installed at a higher level and water-resistant materials for floors, walls and fixtures.

8.5 Reducing flood risk from other sources

8.5.1 Groundwater

Groundwater flooding has a very different flood mechanism to any other and so many conventional flood mitigation methods are not suitable. The only way to fully reduce flood risk would be through building design (development form), ensuring floor levels are raised above the water levels caused by a 1 in 100-year plus climate change event. Site design would also need to preserve any flow routes followed by the groundwater overland to ensure flood risk is not increased downstream.

Infiltration SuDS can cause increased groundwater levels and subsequently may increase flood risk on or off a site. Developers should provide evidence and ensure that this will not be a significant risk.

8.5.2 Surface water and sewer flooding

Developers should discuss public sewerage capacity with the water utility company at the earliest possible stage. It is important that a drainage impact assessment shows that this will not increase flood risk elsewhere, and that the drainage requirements regarding runoff rates and SuDS for new development are met.

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

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

Consideration must also be given to attenuation and flow ensuring that flows during the 100-year plus climate change storm event are retained within the site if any flap valves shut. This should be demonstrated with suitable modelling techniques.

8.5.3 Culverted watercourses

Where a watercourse passes through a site (open or culverted) the developer should demonstrate that they have considered it when developing their proposals for development. They should do this by:

- Undertaking ground truthing to locate in detail the presence of any culverted watercourse e.g. through historic mapping and utility searches, site visits, CCTV and ground investigation work should there be any suspicion of a culvert running under the site.
- Undertaking a detailed CCTV assessment of the extent and condition of any culverts present on site

- Undertaking flood modelling to assess the capacity of any culverts on site

Developments should naturalise urban watercourses and open up underground culverts, to provide biodiversity net gain as well as amenity improvements. Culverts are only acceptable for essential infrastructure crossings e.g. a short length for site access crossings, where a culvert passes under a gas main, and the length of culvert should be limited to that which is essential.

In exceptional circumstances where it is not possible to open up a culvert (e.g. due to the significant depth of the feature) the structural loading of surrounding properties should be taken into account, with an appropriate easement of at least 8m on either side of the culvert. Access should be provided for future maintenance of the culvert and the condition of the culvert should be improved so that it is sufficiently safe against failure for the lifetime of the development. Trash screens should be provided on culvert headwalls that are designed in line with best practise and appropriate maintenance secured to ensure the structure is kept clear for the lifetime of the development.

According to the 2018 Black Country SFRA, where a site is shown on the SFRA mapping (or the outputs available from subsequent Council studies) to be potentially affected by flooding from a culvert blockage either on or off site, the developer should:

- Undertake more detailed modelling of the culverted watercourse network based on detailed survey of the culverts, watercourse structures and site topographical survey to ascertain in more detail the extent and flood hazards from potential blockage
- If the condition of the culvert is considered to be at least ‘Fair’: Design the development such that properties will not be flooded to account for a culvert blockage scenario during a 1 in 100year flood event, where the culvert would be at least 50% blocked. Ensure that safe access and egress from the site is available in such a scenario.
- If the condition of the culvert is considered to be ‘Poor’ or ‘Very Poor’ or is unknown: Design the development such that properties will not be flooded to account for a culvert blockage scenario during a 1 in 100 year flood event, where the culvert would be at least 90% blocked. Ensure that safe access and egress from the site is available in such a scenario.
- In all instances: Prepare a Flood Warning and Evacuation Plan to account for a culvert blockage scenario during a 1 in 100 year flood event, where the culvert would be at least 90% blocked.
- In all instances: Safe internal refuge should be available above the flood depths that might be expected should the culvert block by at least 90% in an extreme 1 in 1000 year flood event.
- Liaise with the Council about any potential to contribute towards on/ off site works to help to alleviate known flooding issues related to the culverts. If such works can be taken forward, the effect of such works should be modelled as above and planned for in the site design.

It should be noted that opening up watercourses significantly reduces the chance of blockage and developers should seek to open up watercourses off site working with third parties where this can be proven to be feasible.

8.5.4 Canals

The Canal and River Trust were consulted for data, however at the time of this version release, nothing has been received. If any data is received, this will be published in a later version of this report. Developers should consult with the Canal and Rivers Trust who have produced a checklist for developments close to canals.

8.5.5 Reservoirs

The risk of reservoir flooding is extremely low. However, there remains a residual risk to development from reservoirs which developers should consider during the planning stage. Developers should contact the reservoir owner for information on:

- the Reservoir Risk Designation
- reservoir characteristics: type, dam height at outlet, area/volume, overflow location;
- operation: discharge rates / maximum discharge;
- discharge during emergency drawdown; and
- inspection / maintenance regime.

The EA online Reservoir Flood Maps contain information on the extents, depths and velocities following a reservoir breach (note: only for those reservoirs with an impounded volume greater than 25,000 cubic metres are governed by the Reservoir Act 1975). Consideration should be given to the extent, depths and velocities shown in these online maps.

Developers should consult the West Midlands Conurbation Local Resilience Forum (LRF) about emergency plans for reservoir breach.

Developers should use the above information to:

- Apply the sequential approach to locating development within the site.
- Consider the impact of a breach and overtopping, particularly for sites proposed to be located immediately downstream of a reservoir. This should consider whether there is sufficient time to respond.
- Assess the potential hydraulic forces imposed by sudden reservoir failure event and check that that the proposed infrastructure fabric could withstand the structural loads.
- Develop site specific emergency plans if necessary and ensure the future users of the development are aware of these plans

8.6 Flood warning and emergency planning

Emergency planning covers three phases: before, during and after a flood. Measures involve developing and maintaining arrangements to reduce, control or mitigate the impact and consequences of flooding and to improve the ability of people and property to absorb, respond to and recover from flooding. National Planning Policy takes this into account by seeking to avoid inappropriate development in areas of flood risk and considering the vulnerability of new developments to flooding.

The 2023 NPPF (para.173) requires site level FRAs to demonstrate that

"d) any residual risk can be safely managed; and

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

Certain sites will need emergency plans:

- Sites with vulnerable users, such as hospitals and care homes
- Camping and caravan sites
- Sites with transient occupants e.g., hostels and hotels
- Developments at a high residual risk of flooding from any source e.g., immediately downstream of a reservoir or behind raised flood defences
- Situations where occupants cannot be evacuated (e.g., prisons) or where it is safer to remain "in-situ" and / or move to a higher floor or safe refuge area (e.g., at risk of a breach).

Emergency Plans will need to consider:

- The characteristics of the flooding e.g., onset, depth, velocity, hazard, flood borne debris
- The vulnerability of site occupants.
- Structural safety
- The impact of the flooding on essential services e.g., electricity, drinking water
- Flood warning systems and how users will be encouraged to sign up for them.
- Safe access and egress for users and emergency services
- How to manage the consequences of events that are un-foreseen or for which no warnings can be provided e.g., managing the residual risk of a breach.
- A safe place of refuge where safe access and egress and advance warning may not be possible, having discussed and agreed this first with emergency planners. Proposed new development that places an additional burden on the existing response capacity of Wiltshire Council will not normally be appropriate.

It is advised that emergency plans should be provided to support developments ensuring that residual risk is covered. However, it will not be appropriate to rely solely on emergency plans to mitigate residual risk. Further information should be included to understand the approach where residual risk from flood risk management infrastructure affects large areas. This information should be covered in site-specific Flood Risk Assessments (FRAs) and the accepted approach in locating development in these areas to ensure that new development is not put at risk.

The West Midlands LRF provides emergency plan information about risks to the community, warn of hazardous conditions, such as flooding, snow, and drought, and provide information on preparing for emergency situations. Information is available from their website here.

Further information is available from the following documents / websites with hyperlinks provided:

- The National Planning Policy Guidance
- 2004 Civil Contingencies Act
- Defra (2014) National Flood Emergency Framework for England
- FloodRe
- The EA and Defra's Standing Advice for FRAs
- Sandwell flooding advice
- EA's 'How to plan ahead for flooding'
- Sign up for Flood Warnings with the EA
- The National Flood Forum
- GOV.UK 'Prepare for flooding' page
- ADEPT Flood Risk Plans for new development

9 Surface water management and SuDS

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

9.1 Role of the LLFA and LPA in surface water management

In April 2015, Sandwell MBC was made a statutory planning consultee on the management of surface water. They provide technical advice on surface water drainage strategies and designs put forward for major development proposals.

When considering planning applications, the LLFA will provide advice to the Planning Department on the management of surface water. As LPA, Sandwell MBC should satisfy themself that the development's proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the lifetime of the development.

It is essential that developers consider sustainable drainage at an early stage of the development process – ideally at the master-planning stage. This will assist with the delivery of well designed, appropriate and effective SuDS.

9.2 SuDS

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

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

It is a requirement for all new major development proposals to ensure that sustainable drainage systems for management of runoff are put in place. Likewise, minor developments should also ensure sustainable systems for runoff management are provided. The developer is responsible for ensuring the design, construction and future/ongoing maintenance of such a scheme is carefully and clearly defined, and a clear and comprehensive understanding of the existing catchment hydrological processes and current drainage arrangements is essential.

The runoff destination should always be the first consideration when considering design criteria for SuDS including the following possible destinations in order of preference:

- To ground;
- To surface water body;
- To surface water sewer;
- To combined sewer.

Effects on water quality should also be investigated when considering runoff destination in terms of the potential hazards arising from development and the sensitivity of the runoff destination. Developers should also establish that proposed outfalls are hydraulically capable of accepting the runoff from SuDS through consultation with the LLFA, EA, and Severn Trent Water.

The non-statutory technical standards for sustainable drainage systems (March 2015) set out appropriate design criteria based on the following:

- Flood risk outside the development;
- Peak flow control;
- Volume control;
- Flood risk within the development;
- Structural integrity;
- Designing for maintenance considerations;
- Construction.

In addition, the LPA may set local requirements for planning permission that include more rigorous obligations than these non-statutory technical standards. More stringent requirements should be considered where current Greenfield sites lie upstream of high-risk areas. This could include improvements on Greenfield runoff rates. CIRIA has also produced a number of guidance documents relating to SuDS that should be consulted by the LPA and developers.

The LLFA has a preferred discharge hierarchy of: Re-Use (Water Harvesting), infiltration, discharge to a watercourse, discharge to a surface water sewer or discharge to a combined sewer. To be supported, proposals are required to satisfactorily demonstrate all of the following:

- mitigation within storage calculations for future climate change must be included, designed to 100yr + Climate Change; currently 40% uplift;
- designs must accord with the Environment Agency's (EA) Guidance on Flood Risk and Coastal Change, Construction Industry Research and Information Association (CIRIA) guidance, Department for Environment Food & Rural Affairs (DEFRA) non-statutory technical standards and the Sandwell Metropolitan Borough Council Local Plan;
- surface run-off must be managed as close to the source as possible to reduce flood risk and improve water quality;
- discharge of surface run-off is as high up the SuDS hierarchy of drainage as possible. Daylight (open) SuDS will be preferred; and
- adequate arrangements have been made for the adoption, management and maintenance of any SuDS provided over the lifetime of the development.

Table 9-1 outlines the developer and SCC responsibilities during each stage of the design process.

Table 9-1: Developer and SCC responsibilities during SuDS design and construction

Stage	Developer Responsibilities	SCC Responsibilities
1: Pre-app advice	Where a site is deemed to be at risk of flooding or demonstrated risk a Pre-App is suggested and can be applied for on the Portal. For multi phased developments Pre-App advice application is deemed necessary	Review Pre-App application and comment on known risk
2a: Outline planning	Where a major or area of risk we would expect to see an outline application	Review and comment on outline in reference to Appendix A
2b: RM planning	As required	As Required
2c: Full Planning	Following LPA guidance and SuDS Handbook Appendix A – Major applications and Area of Risk.	Review and Comment
3: Technical approval	Discharge of Drainage Conditions Review ???	
4: Construction	Construction Environmental Management Plan is required before start of build	Review and Comment
5. Defects and Establishment	Require named person for Ownership, Management and Maintenance.	Review and Comment
6: Adoption	Require named person for Ownership, Management and Maintenance.	Review and Store within Database Management System

Many different SuDS techniques can be implemented. As a result, there is no one standard correct drainage solution for a site. In most cases, a combination of techniques, using the Management Train principle (see Figure 9-1), will be required, where source control is the primary aim.

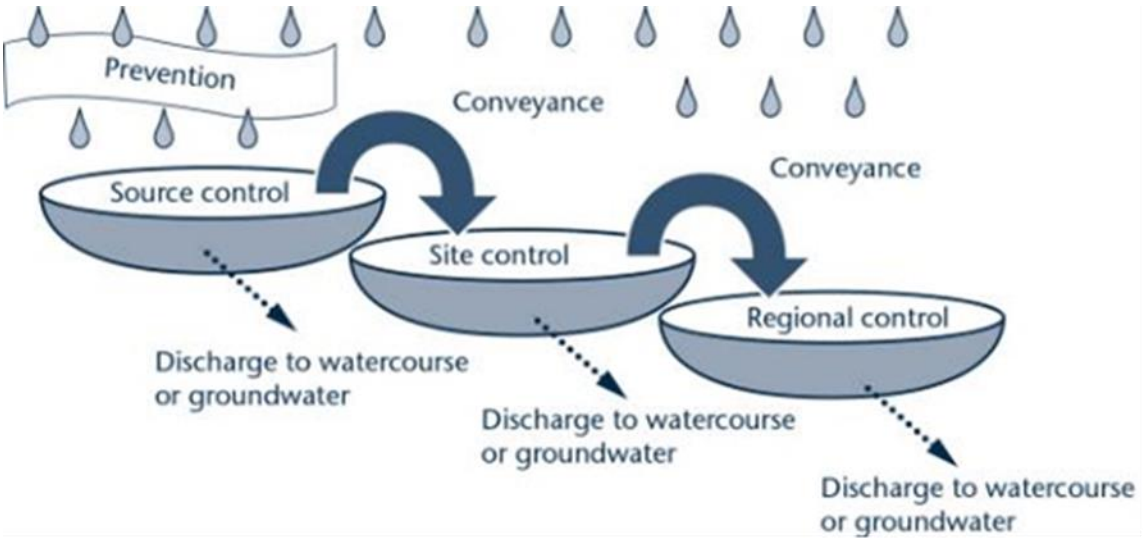


Figure 9-1: SuDS Management Train Principles

The effectiveness of a flow management scheme within a single site is heavily limited by land use and site characteristics including (but not limited to) topography; geology and soil (permeability); and available area. Potential ground contamination associated with urban and former industrial sites should be investigated with concern being placed on the depth of the local water table and potential contamination risks that will affect water quality. The design, construction and ongoing maintenance regime of any SuDS scheme must be carefully defined as part of a site-specific FRA. A clear and comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system) is essential for successful SuDS implementation.
Maintenance options must clearly identify who will be responsible for SuDS maintenance and funding for maintenance should be fair for householders and premises occupiers; and, set out a minimum standard to which the sustainable drainage systems must be maintained.

9.3 Sources of SuDS guidance

9.3.1 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.

9.3.2 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.

9.3.3 Black Country SuDS Handbook

The Black Country Authorities have worked in partnership with five other West Midlands LLFAs to produce the SuDS Handbook. The front end of the document is identical across LLFAs and each LLFA has a specific appendix in their version setting out local design considerations, constraints, case studies and arrangements for SuDS maintenance.

The SuDS Handbook presents design guidance alongside Local SuDS Standards that developers should meet when proposing SuDS systems on new developments. It also contains a proforma that a developer should submit with a FRA/ SWDS.

The Local SUDS Standards are identical in the Black Country SuDS Handbook that will be published later in 2020 to the Staffordshire SuDS Handbook, which was published in 2017. The Local Standards are that:

Design Principles

Local Standard A – Phased Development and Drainage Strategies

For phased developments, the LLFA will expect planning applications to be accompanied by a Drainage Strategy which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase.

Local Standard B – Pollution Prevention and Control

The LLFA will expect the SuDS to demonstrate how pollutants are prevented or controlled as part of the SuDS scheme. This should include consideration of the sensitivity of receiving waterbodies and particular attention should be given to the first 5mm of rainfall ('first flush' that mobilises the most pollutants).

Local Standard C – Conformity with the SuDS Management Train Principles

The LLFA will expect the SuDS design to demonstrate how the principles of the SuDS Management Train have been taken into account.

Local Standard D – Multiple Benefits

The LLFA will expect the SuDS design to demonstrate, where appropriate, how environmental site constraints have been considered and how the features design will provide multiple benefits e.g. landscape enhancement, biodiversity, recreation, amenity, leisure and the enhancement of historical features.

Volume Control

Local Standard E – Climate Change

The LLFA will expect SuDS design to include an allowance for a 30%* increase in rainfall for a 1% AEP rainfall event in order to accommodate climate change. (*note that guidance may be subject to change and therefore the most up to date information should be referenced).

Local Standard F – Urban Creep

The LLFA will expect the SuDS design to include an allowance for an increase in impermeable area to accommodate urban creep.

Local Standard G – Emergency Overflows

The LLFA will expect an emergency overflow to be provided for piped and storage features above the predicted water level in a 1% AEP rainfall event, with an allowance for climate change.

Local Standard H – Freeboard Levels

The LLFA will expect all surface water storage ponds to provide a 300mm freeboard above the predicted water level arising from a 1% AEP rainfall event inclusive of an allowance for climate change. Care must be taken to ensure that excavations do not take place below the ground water level.

Flood Risk Within the Development

Local Standard I – Exceedance Flows

The LLFA will expect exceedance flows, originating from both within and outside of the development site, must be directed through areas where the risks to both people and property are minimised.

When considering exceedance routes, particular attention should be paid to:

i. The position of walls, bunds and other obstructions that may direct water but must not cause ponding

ii. The location and form of buildings (e.g. terraces and linked detached properties) that must not impede flows or cause ponding

Submitted drawings and calculations must identify sources of water entering a site pre-development, how flows will be routed through a site, where flows leave the site pre-development and where they leave the site post development.

Local Standard J – Watercourse Floodplains

The LLFA will expect the floodplains of ordinary watercourses to be mapped to an appropriate level of detail considering the nature of the application (i.e. detailed flood modelling should be undertaken to support full planning applications). The layout of the development will then take a Sequential Approach, siting the least vulnerable parts of that development in the highest flood risk areas.

Local Standard K – Retention of Natural Drainage Features

The LLFA will expect natural drainage features on a site should be maintained and enhanced. Culverting of open watercourses will not normally be permitted except where essential to allow highways and / or other infrastructure to cross. In such cases culverts should be designed in accordance with CIRIA's Culvert Screen and Outfall manual (C786).

Where a culverted watercourse crosses a development site, it should be reverted back to open channel. In such a case the natural conditions deemed to have existed prior to the culverting taking place should be re-instated.

Local Standard L – Impact of Downstream Water Levels

If high water levels within a receiving watercourse into which a SuDS scheme discharges are anticipated, the LLFA will expect that they will not adversely affect the function of that SuDS system.

Designing for Maintenance Considerations

Local Standard M – Maintenance Requirements

The LLFA will expect SuDS to be designed so that they are easy to maintain. Proper use of the SuDS management train, including surface features, is one way to achieve this.

The developer must set out who will maintain the system, how the maintenance will be funded and provide a maintenance and operation manual.

Local Standard N – Minimising the Risk of Blockages

The LLFA will expect the SuDS design to minimise the risk of blockage as far as is reasonably possible e.g. by using suitable pipe sizes and making underground assets as visible and accessible as possible.

Local Standard O – Use of Pumped Systems

If it can be demonstrated that a partial or completely pumped drainage system is the only viable option, the LLFA will expect the residual risk of flooding due to the failure of the pumps to be assessed. The design flood level must be determined under the following conditions:

- If the pumps were to fail
- If the attenuation storage was full, and
- If a design storm occurred.

The finished floor levels of the affected properties should be raised above this level and all flooding should be safely stored onsite.

An emergency overflow must be provided for piped and storage features above the predicted water level arising from a 1% AEP rainfall event inclusive of allowances for climate change and urban creep.

9.4 Other surface water considerations

9.4.1 Groundwater Vulnerability Zones

The EA published 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 mapping.

9.4.2 Groundwater Source Protection Zones (GSPZ)

The EA also defines GSPZs near groundwater abstraction points. These protect areas of groundwater used for drinking water. The GSPZ requires attenuated storage of runoff to prevent infiltration and contamination. GSPZs can be viewed on the EA's website under the non-statutory land-based designations section.

Depending on the nature of the proposed development and the location of the development site with regards to SPZs, restrictions may be in place on the types of SuDS used within appropriate areas. For example, infiltration SuDS are generally accepted within Zone 3, whereas in Zones 1 (Inner Protection Zone) or 2 (Outer Protection Zone), the EA will need to be consulted and infiltration SuDS may only be accepted if the correct treatments and permits are put in place. Any restrictions imposed on the discharge of the site generated runoff by the EA will be determined on a site by site basis using risk-based approach.

Large areas of Sandwell are not within a groundwater source protection zone. There are some areas within Zone 3, for example areas covering Smethwick in Sandwell.

9.5 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. Sandwell MBC is entirely within an NVZ. The NVZ coverage can be viewed on the EA's online maps

10 Summary and Recommendations

This Level 1 SFRA delivers a strategic assessment of risk from all sources of flooding in Sandwell MBC. It also provides an overview of policy and provides guidance for planners and developers.

10.1 Sources of flood risk

Parts of Sandwell MBC are at risk from the following sources; fluvial, surface water, groundwater, sewers, reservoir inundation, canal overtopping/ breaches. This study has shown that the most significant sources of flood risk in Sandwell MBC are fluvial and surface water.

- *Fluvial flooding:* The primary fluvial flood risk is along the River Tame, Stour and Smestow Brook and the tributaries of these watercourses. . More recent significant flooding events across The Black Country occurred in July 2007 and 2008 and June 2016.
- *Surface water:* Surface water flooding is most likely caused by intense rainfall. There are many areas at high risk of surface water flooding in Sandwell MBC, with many urban areas within flow paths draining into the main rivers. These areas include Newton, Oldbury, Tipton, Wednesbury and Smethwick.
- *Sewer:* The sewers in Sandwell MBC are managed by Severn Trent Water. Severn Trent Water provided their Hydraulic Flood Risk Register on 03/01/2019. The data shows that there is one sewer flooding incident which occurred in Tipton in October 2004. This suggests that sewer flood risk across the Borough is low. Up-to-date sewer data from Severn Trent Water is due to be received and information will be updated in a later version of this report.
- *Groundwater:* The JBA Groundwater Emergence map shows that the majority of the borough is at low risk of groundwater flooding. Some areas have groundwater levels of between 0.5 and 0.025m below the ground surface or 0.5m below the ground surface. These include around the M6 in the north-east of the borough, around Smethwick and in Cradley Heath.
- *Canals:* There is a network of seven canals within Sandwell MBC; These have the potential to interact with other watercourses and become flow paths during flood events or in a breach scenario. According to the 2018 Black Country SFRA, there have been no incidents of canal overtopping or breach in Sandwell in recent years. The Canal and Rivers Trust were consulted for this report, however no information has been received.
- *Reservoirs:* There is a potential risk of flooding from reservoirs both within Sandwell MBC and those outside. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from the reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this should be considered in any site-specific FRAs (where relevant).

10.2 Recommendations for the Sandwell MBC

Reduction of flood risk through site allocations and appropriate site design

- To locate new development in areas of lowest risk, in line with the Sequential Test, by steering sites to Flood Zone 1. If a Sequential Test is undertaken and a site at flood risk is identified as the only appropriate site for the development, the Exception Test shall be undertaken.
- After application of Exception Test, a Sequential Approach to site design will be used to reduce risk. Any re-development within areas of flood risk which provide other wider sustainability benefits will provide flood risk betterment and made resilient to flooding.
- Identification of long-term opportunities to remove development from the floodplain and to make space for water.
- Ensure development is 'safe'. Dry pedestrian egress from the floodplain and emergency vehicular access should be possible for all residential development. If at risk, then as assessment should be made to detail the flood duration, depth, velocity and flood hazard rating in the 1 in 100-year plus climate change flood event, in line with FD2320.
- Raise residential and commercial finished floor levels 600mm above the 1 in 100 year plus climate change flood level. Protect and promote areas for future flood alleviation schemes.
- Safeguard functional floodplain from future development.
- Identify opportunities to help fund future flood risk management through developer contributions to reduce risk for surrounding areas.
- Seek opportunities to make space for water to accommodate climate change.

Promote SuDS to mimic the natural drainage routes to improve water quality

- SuDS design to demonstrate how constraints have been considered and how the design provides multiple benefits e.g. landscape enhancement, biodiversity, recreation, amenity, leisure and the enhancement of historical features.
- Planning applications for phased developments, should be accompanied by a Drainage Strategy which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase;
- Use of the SuDS management train to prevent and control pollutants to prevent the 'first flush' polluting the receiving waterbody
- SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual.

Reduce surface water runoff from new developments and agricultural land

- SuDS should be considered and implemented as part of all new development, in line with the Black Country SUDS Handbook.

- Space should be provided for the inclusion of SuDS on all allocated sites and outline proposals.
- Promote biodiversity, habitat improvements and Countryside Stewardship schemes to help prevent soil loss and to reduce runoff from agricultural land.

Enhance and restore river corridors and habitats

- Assess condition of existing assets and upgrade, if required, to ensure that the infrastructure can accommodate pressures / flows for the lifetime of the development.
- Opportunities should be sought to open up culverted watercourses wherever possible and reduce the residual risk from their blockage or failure.
- Natural drainage features should be maintained and enhanced.
- Identify opportunities for river restoration / enhancement to make space for water.
- A presumption against culverting of open watercourses except where essential to allow highways and / or other infrastructure to cross, in line with CIRIA's Culvert Screen and Outfall manual (C786) and the Black Country LFRM Strategy to restrict development over culverts and to daylight, where feasible.
- There should be no built development within 8m from top of bank of a watercourse or Main River, including culverted watercourses, for the preservation of the watercourse corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement.

Mitigate against risk, improved emergency planning and flood awareness

- Work with emergency planning colleagues and stakeholders to identify areas at highest risk and locate most vulnerable receptors.
- Exceedance flows, both within and outside of the site, should be appropriately designed to minimise risks to both people and property.
- For a partial or completely pumped drainage system, an assessment should be undertaken to assess the risk of flooding due to any failure of the pumps to be assessed. The design flood level should be determined if the pumps were to fail; if the attenuation storage was full, and if a design storm occurred.
- An emergency overflow should be provided for piped and storage features above the predicted water level arising from a 100-year rainfall event, inclusive of climate change and urban creep.
- Consideration and incorporation of flood resilience measures up to the 1 in 1000-year event.
- Ensure robust emergency (evacuation) plans are produced and implemented for major developments.
- Increase awareness and promote sign-up to the EA Flood Warnings Direct (FWD) within Sandwell MBC.

10.3 Recommendations from the cumulative impact analysis

Policy recommendations for Sandwell MBC

The cumulative impact assessment for the Black Country has highlighted that the potential for development to have a cumulative impact on flood risk is relatively high across the authorities. Many of the catchments are red and amber rated and those that are yellow still have levels of flood risk higher than many of the rural catchments in surrounding local authority areas in Southern Staffordshire.

This supports the need for incremental action and betterment in flood risk terms across all four Black Country Authority areas. The policy recommendations made here have been based on a review and recommended changes to policy ENV5 in the 2011 Black Country Core Strategy.

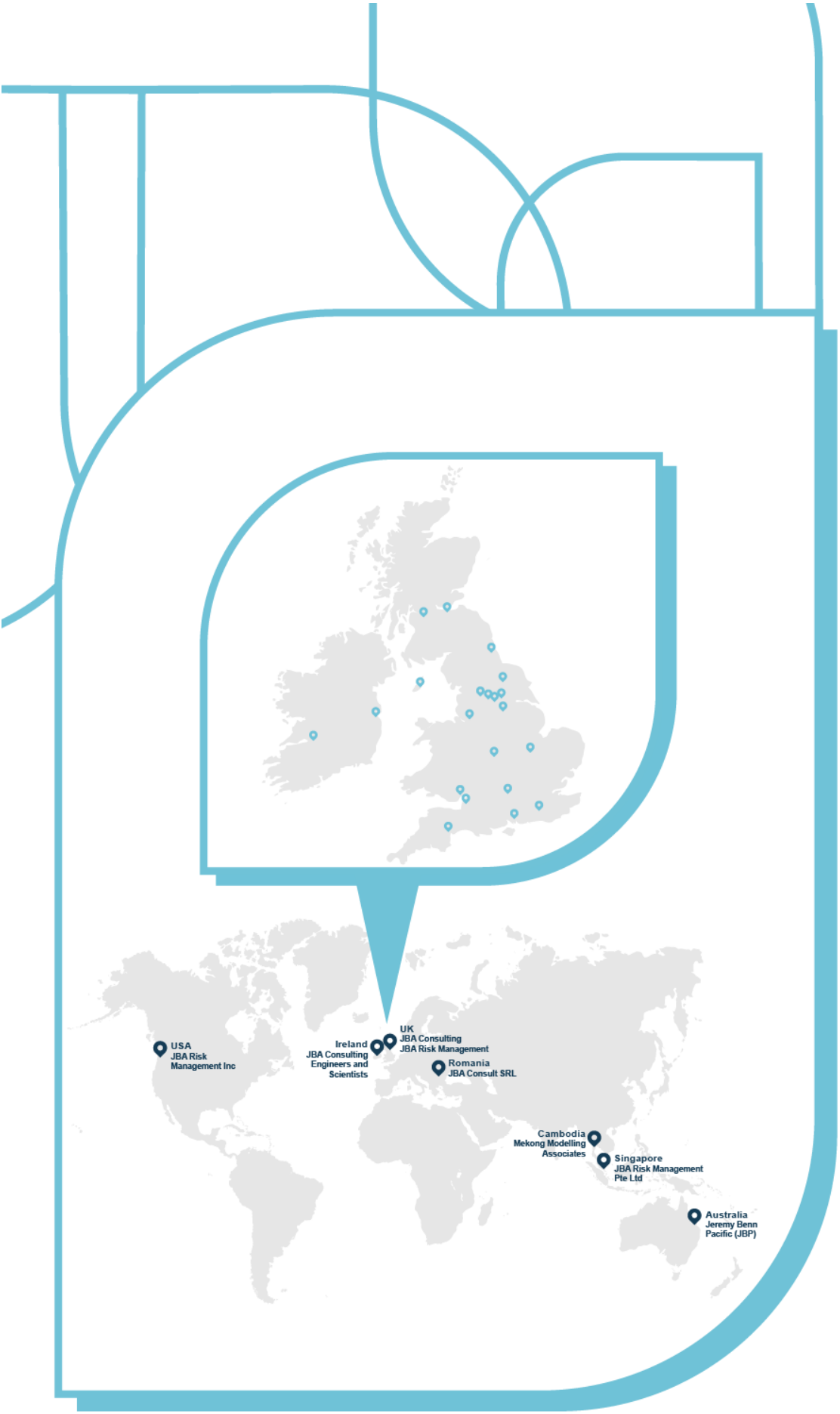
Please refer to the Black Country Core Strategy (2011) for further recommendations.

10.4 Recommendations for further work

10.4.1 Level 2 SFRA

To further inform the site allocations and development of local planning policies, a Level 2 SFRA should be undertaken to:

- Review flood risk issues further for all sites allocations significantly impacted by floodplain which is indicative or where there is uncertainty around its accuracy,
- Apply the flood risk elements of the Exception Test where this is required in high flood risk areas,
- Review the possibilities for surface water mitigation measures on sites at high risk of surface water flooding,
- Consider the actual and residual flood risk in greater detail on a site-specific basis,
- Explore flood hazard in greater detail should sites be allocated in high flood risk areas and the Exception Test required,
- Explore in greater detail the impact of climate change in relation to the Flood Zones, and
- Undertake more detailed drainage strategy work as part of a Level 2 SFRA when considering the cumulative impact of developments clustered in high flood risk catchments.



JBA consulting

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited
Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018