www.jbaconsulting.com

Bury Council Level 1 Strategic Flood Risk Assessment

Final Report

Prepared for
Bury Council

Date
June 2026

Bury Council

Document Status

Issue date	June 2026
Issued to	Bury Council
BIM reference	QWH-JBA-XX-XX-RP-EN-0001
Revision	P06
Prepared by	Kira Khangura Technical Assistant Laura Thompson-Jones BSc FRGS Senior Analyst
Reviewed by	Mike Williamson BSc MSc CGeog FRGS EADA Principal Analyst
Authorised by	Mike Williamson BSc MSc CGeog FRGS EADA Principal Analyst

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.

Accessibility

JBA aims to align with governmental guidelines on accessible documents and WCAG 2.2 AA standards, so that most people can read this document without having to employ special adaptation measures. This document is also optimised for use with assistive technology, such as screen reading software.

Contract

JBA Project Manager	Laura Thompson-Jones BSc FRGS
Address	Phoenix House, Lakeside Drive, Centre Park, Warrington, WA1 1RX
JBA Project Code	2025s1446

This report describes work commissioned by Bury Council by an instruction dated 12 September 2025. Kira Khangura and Laura Thompson-Jones of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of Bury 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 Bury 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.

Acknowledgements

We would like to acknowledge the contributions of the Environment Agency, Manchester City Council, Rochdale Borough Council, Rossendale Borough Council and Salford City Council.

Contents

List of Figures

List of Tables

Abbreviations

ADEPT	Association of Directors of Environment, Economy, Planning & Transport
AEP	Annual Exceedance Probability
AIMS	Asset Information Management System
BNG	Biodiversity Net Gain
CaBA	Catchment Based Approach
CC	Climate Change
CDA	Critical Drainage Area
CIA	Cumulative Impact Assessment
CIL	Community Infrastructure Levy
CIRIA	Construction Industry Research and Information Association
DCG	Design and Construction Guidance
Defra	Department for Environment, Food and Rural Affairs
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
FAA	Flood Alert Area
FCERM	Flood and Coastal Erosion Risk Management
FFL	Finished Floor Level
FMfP	Flood Map for Planning
FRA	Flood Risk Assessment
FWA	Flood Warning Area
FWMA	Flood and Water Management Act
FWS	Flood Warning System
GI	Green Infrastructure
GMCA	Greater Manchester Combined Authority
GSPZ	Groundwater Source Protection Zone
HFM	Historic Flood Map
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
NaFRA2	National Flood Risk Assessment 2
NCERM	National Coastal Erosion Risk Mapping

NFM	Natural Flood Management
NPPF	National Planning Policy Framework
NVZ	Nitrate Vulnerable Zone
PPG	Planning Practice Guidance
RFM	Reservoir Flood Mapping
RFO	Recorded Flood Outlines
RMA	Risk Management Authorities
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SHELAA	Strategic Housing and Economic Land Availability Assessments
SAB	SuDS Approving Body
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WwNP	Working with Natural Processes

Definitions

1D model: One-dimensional hydraulic model.

2D model: Two-dimensional hydraulic model.

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

Brownfield: A previously developed parcel of land.

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

Design flood: A flood event of a given annual flood probability, which is generally taken as: fluvial (river) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or surface water flooding likely to occur with a 1% annual probability (a 1 in 100 change each year), plus an appropriate allowance for climate change, against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

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

Green and blue infrastructure: A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity.

Greenfield: An undeveloped parcel of land.

Lead Local Flood Authority: The unitary authority for the area or if there is no unitary authority, the County Council for the area.

Main river: A watercourse shown as such on the statutory main river map held by the Environment Agency (EA). They are usually the larger rivers and streams. The EA has permissive powers (not duties) to carry out maintenance and improvement works on main rivers).

Major development: Defined in the National Planning Policy Framework (NPPF) as a housing development where 10 or more homes will be provided, or the site has an area of 0.5 hectares or more, or as a non-residential development with additional floorspace of 1,000m² or more, or a site of 1 hectare or more, or as otherwise provided in the Town and Country Planning (Development Management Procedure) (England) Order 2015 (gov.uk).

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

Ordinary watercourse: Any river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows but which does not form part of a

main river. The local authority or internal drainage board (IDB) has permissive powers (not duties) on ordinary watercourses.

Permissive powers: Authorities have the power to undertake flood risk management activities, but not a duty to do so. This will depend on priorities in flood risk management.

Return period: An estimate of the interval of time between events of a certain intensity or size, in this instance it refers to flood events. It is a statistical measurement denoting the average recurrence interval over an extended period of time.

Riparian owner: A riparian landowner, in a water context, owns land or property, next to a river, stream or ditch.

Risk Management Authority: The Environment Agency; Lead Local Flood Authority; a District Council in an area where there is no unitary authority; an internal drainage board; a water company and a highway authority.

Risk: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

Stakeholder: A person or organisation affected by the problem or solution or interested in the problem or solution. They can be individuals or organisations, includes the public and communities.

Sustainable Drainage Systems: Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques, such as grates, gullies, and channels.

Windfall site: A site which becomes available for development unexpectedly and therefore not included as allocated land in a local planning authority's local plan.

Executive Summary

This report provides a comprehensive and robust evidence base on flood risk issues to support the production of the new Local Plan for Bury Council. This Level 1 Strategic Flood Risk Assessment (SFRA) uses the best available information, including input from key stakeholders, and latest national planning policy and guidance, including:

- National Planning Policy Framework (NPPF) (gov.uk), last major revision in December 2024.
- Planning Practice Guidance (PPG): Flood risk and coastal change (gov.uk) updated in September 2025.
- The latest Environment Agency climate change guidance (gov.uk) (updated in July 2021 and May 2022).
- The Environment Agency 'How to prepare a strategic flood risk assessment' (gov.uk) guidance, updated in August 2025.
- The Association of Directors of Environment, Economy, Planning & Transport (ADEPT) 'Strategic flood risk assessment good practice guidance' (adeptnet.org.uk), published December 2021.

Table 1-1 sets out the contents of the Level 1 SFRA and how users should use the information provided through the document and appendices.

Introduction

To support the new Local Plan for Bury Council (the Council), the key objectives of the assessment are:

- To consider, identify and assess all possible sources of flood risk.
- To produce a robust SFRA meeting the requirements of the National Planning Policy Framework and national guidance contained in the Planning Practice Guidance (PPG).
- To provide the required information to inform decisions on the location of future development and the preparation of sustainable policies for the long-term management of flood risk.
- To fully consider flood risk across Bury forming an integral part of the evidence base underpinning the local plan prior to examination.

Summary of the Borough and flood risk

Over 193,900 people live within the Bury Council Borough, according to the 2021 census. Bury's population increased by an estimated 8,800 people between 2011 and 2021. The Borough covers an area of approximately 100 km^2. The urban Borough covers the six towns of Bury, Prestwich, Radcliffe, Ramsbottom, Tottington and Whitefield.

Flood risk from all sources has been assessed in this SFRA. Parts of the Borough are shown to be at risk of flooding from the following sources: fluvial watercourses, surface water, sewers, groundwater, canals and reservoirs. This study has shown that the most

significant sources of flood risk across the Borough are surface water and fluvial flooding. The points below summarise the findings:

Fluvial: The majority of fluvial flood risk comes from the River Irwell and the River Roch, covering residential areas to the south of Bury in Radcliffe and Redvales. There is also significant fluvial risk in the north of the Borough in Ramsbottom, along the River Irwell. Fluvial flood risk is discussed in Section 4.4 and the flood extents are shown on the interactive GeoPDF mapping in Appendix H.

Surface Water: Surface water flood risk is widespread within the urban areas of the Borough. Surface water flood risk is discussed in Section 4.5 and the flood extents are shown on the interactive GeoPDF mapping in Appendix H.

Climate Change: Areas at risk of flooding today are likely to become at increased risk in the future and the frequency of flooding will also increase in such areas, due to climate change. Flood extents will increase; in some locations this may be minimal, but flood depth, velocity and hazard may have more of an impact due to climate change. This SFRA provides an assessment of the impacts of climate change on fluvial and surface water flood risk. The approach to climate change is discussed in Section 5 and the flood extents are also shown on the interactive GeoPDF mapping in Appendix H.

Sewer: United Utilities provides water and sewerage services across the Borough. Sewer flood risk is discussed in Section 4.6.

Groundwater: Areas with the greatest risk of groundwater emergence generally follow watercourses, most notably the River Irwell.
There is no national groundwater flood dataset to inform the areas at risk from groundwater flooding; however, emergence mapping when considered in conjunction with topography and surface water flow paths can indicate areas where groundwater is likely to emerge, and the flow paths it may take once above the ground. Groundwater flood risk is discussed in Section 4.7, and the JBA emergence map are shown on the interactive GeoPDF mapping in Appendix H.

Reservoirs: There are 12 reservoirs within the Borough and 56 reservoirs located outside the Borough, which present a potential risk of reservoir flooding. The level and standard of inspection and maintenance required under the Reservoirs Act means that the risk of flooding from reservoirs is relatively low. However, there is a residual risk of a reservoir breach, and this risk should be considered in any site-specific FRAs (where relevant) in accordance with the updated PPG: Flood risk and coastal change. Reservoir flood risk is discussed in Section 4.8.2. The 'Dry Day', 'Wet Day', and 'Fluvial Contribution' flood extents are shown on the interactive GeoPDF mapping in Appendix H.

Defences: The EA Asset Information Management System (AIMS) dataset provides information on flood defence assets across the Borough. Flood defences are present as areas of engineered high ground and flood walls along the River Irwell.
Further information on defences across the Borough is available in Section 6.4 and shown on the interactive GeoPDF mapping in Appendix H.

How to use this report

The SFRA provides recommendations regarding all sources of flood risk across the Borough, which can be used to inform policy on flood risk within the Council's new Local Plan. This includes how the cumulative impact of new development should be considered. It provides the latest flood risk data and guidance to inform the sequential test, for both allocations and individual planning applications (Appendix B) and provides guidance on how to apply the exception test.

This Level 1 SFRA is a strategic assessment of flood risk and does not replace the need for site-specific FRAs, where required. This Level 1 SFRA provides guidance for the development industry and development management officers to establish when a site-specific FRA is required and to assess whether it meets the required quality standard (Section 7). This should be used alongside the EA's FRA Guidance (gov.uk). This Level 1 SFRA can be used to help identify which locations and development may require emergency planning provision.

The Level 1 SFRA will also be helpful for developing community level flood risk policies in high flood risk areas. Similarly, all known available recorded historical flood events across the Borough are listed in Section 4.3. This can be used to supplement local knowledge regarding areas worst hit by flooding. Ongoing and proposed flood alleviation schemes planned within the Borough are outlined in Section 6.5, and Section 8 discusses mitigation measures, and resistance and resilience techniques which can be applied to alleviate flood risk to an area.

Site screening assessment

The current land supply is shown to be at varying risk from fluvial and surface water flooding. Development consideration assessments for all sites are summarised through four strategic recommendations within the development sites assessment spreadsheet in Appendix E, summarised in the accompanying technical note in Appendix F. The strategic recommendations broadly entail the following:

- Strategic Recommendation A - recommend for withdrawal if built development cannot avoid Flood Zone 3b. A Level 2 SFRA would be required to inform this;
- Strategic Recommendation B - Level 2 SFRA required due to medium or high flood risk. Exception test required if a site is proposed for uses that are more vulnerable in Flood Zone 3a;
- Strategic Recommendation C - progress to developer-led FRA; and
- Strategic Recommendation D - development could be allocated on flood risk grounds based on the evidence of this Level 1 SFRA.

The strategic recommendations have been refined since the Greater Manchester Combined Authority (GMCA) Level 1 SFRA, in line with changes to relevant planning policy. Strategic recommendations B and C have been combined into one overarching recommendation for sites at high and medium risk of flooding.

1 Introduction

1.1 Purpose of a Strategic Flood Risk Assessment (SFRA)

Bury Council (referred to hereafter as the Council) is a unitary authority and therefore acts as the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA). In its role as LPA, the Council is responsible for producing a Local Plan, determining planning applications, enforcement in response to breaches of planning control, and supporting neighbourhood planning.

As set out in the National Planning Policy Framework (NPPF) (Paragraph 171) "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."

This SFRA will form a key part of the evidence base for the Council's new Local Plan and will inform future planning decisions. It will be used to assist in the formulation of land allocations for development and specific policies in relation to water management and adapting to climate change

1.2 Relevance of the SFRA

The 'How to prepare a Strategic Flood Risk Assessment guidance', 2025 (gov.uk), sets out the requirements that the LPA must address within their SFRA and has been used to inform this Level 1 SFRA.

This Level 1 SFRA has been developed using the best available information, supplied at the time of preparation. Appendix A details the information supplied. Over time, new and updated information will become available to inform planning decisions:

- The Environment Agency (EA) regularly reviews its hydrology, hydraulic modelling, and flood risk mapping.
- The EA published the national flood risk assessment 2 mapping (NaFRA2) and national coastal erosion risk mapping (NCERM). Regular updates to flood risk information datasets are ongoing.
- Other datasets used to inform this SFRA may also be updated periodically and following the publication of this SFRA, new information on flood risk may be provided by other Risk Management Authorities (RMAs).

Web links have been provided for relevant guidance documents and policies published by RMAs such as Bury Council in its role as the Lead Local Flood Authority (LLFA) and the EA. When considering this Level 1 SFRA to help prepare site-specific flood risk assessments (FRA), it is important to check with the source organisation that the most up to date information is used.

As the data available for SFRAs and the relevant legislation is frequently changing, the SFRA should be updated to reflect changes where applicable and reasonably practicable. Under any changes in guidance or legislation, the implications on the SFRA should be considered and a review undertaken where this is deemed necessary.

1.3 Levels of SFRA

The PPG: Flood risk and coastal change (gov.uk) identifies two levels of SFRA.

Level 1 SFRAs are high-level strategic documents and do not go into detail on an individual site-specific basis. Where potential site allocations are not at major flood risk and where development pressures are low, a Level 1 assessment may be sufficient, without the LPA needing to progress to a more detailed Level 2 assessment. The Level 1 assessment should be of sufficient detail to enable application of the Sequential Test, to inform the allocation of development to areas of lower flood risk.

A Level 2 assessment is required where land outside flood risk areas cannot appropriately accommodate all necessary development, creating the need to apply the NPPF's Exception Test if relevant, or if the LPA believe they may receive high numbers of applications in flood risk areas on sites not identified in the Local Plan. In these circumstances the assessment should consider the detailed nature of the flood characteristics from all sources, both now and in the future.

This report and associated appendices fulfil the requirements of a Level 1 SFRA.

1.4 Local Plan Area

Bury lies in the north of Greater Manchester on the edge of the Western Pennines. The town has a mix of beautiful rural villages and open countryside with breathtaking views in the north, to urban living close to Manchester City Centre to the south. The town has a proud military history and has always had a military connection with the Lancashire Fusiliers Regiment. The world famous and award winning Bury Market has been in operation for over 500 years and attracts visitors from across the UK. The town has a rich cultural offering, with museums and arts venues to explore. Bury was the Greater Manchester Town of Culture in 2021.

The Borough consists of six towns, namely Bury, Ramsbottom, Tottington, Radcliffe, Whitefield, and Prestwich, and is one of ten councils that make up the Greater Manchester Combined Authority (GMCA).

The Council has ambitious plans to transform the borough as outlined in the Bury 2030 Strategy, which aims to achieve 'Faster economic growth than the national average, with lower than national average levels of deprivation'. The Let's Do It Strategy sets out four clear principles which will guide our work – Local, Enterprise, Together and Strength. The Council has introduced a number of measures to further these aims; we have recently been accredited as a Real Living Wage Employer; we have been awarded Member status of the Greater Manchester Good Employment Charter and have received Government funding through Levelling Up programme to help transform the borough.

Over 193,900 people live within the Borough, according to the 2021 census. The Borough's population increased by an estimated 8,800 people between 2011 and 2021 and covers an area of approximately 100 km^2.Borough.

The River Irwell, designated as main river, flows through much of the centre of the Borough. Tributaries of the River Irwell include the River Roch, Holcombe Brook and Kirklees Brook, also designated as main rivers. Main rivers are usually larger rivers and streams. The EA has permissive powers to carry out maintenance, improvement or construction work on main rivers to manage flood risk.

There are several ordinary watercourses located within the Borough, including Pigs Lee Brook as well as a number of unnamed drainage ditches. Watercourses are any watercourses that are not designated main river. These watercourses can vary in size considerably and can include rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

Bury Council are the LLFA for the Borough which is neighboured by six local authorities as shown in Figure 1-1. United Utilities are the main water and sewerage service provider.

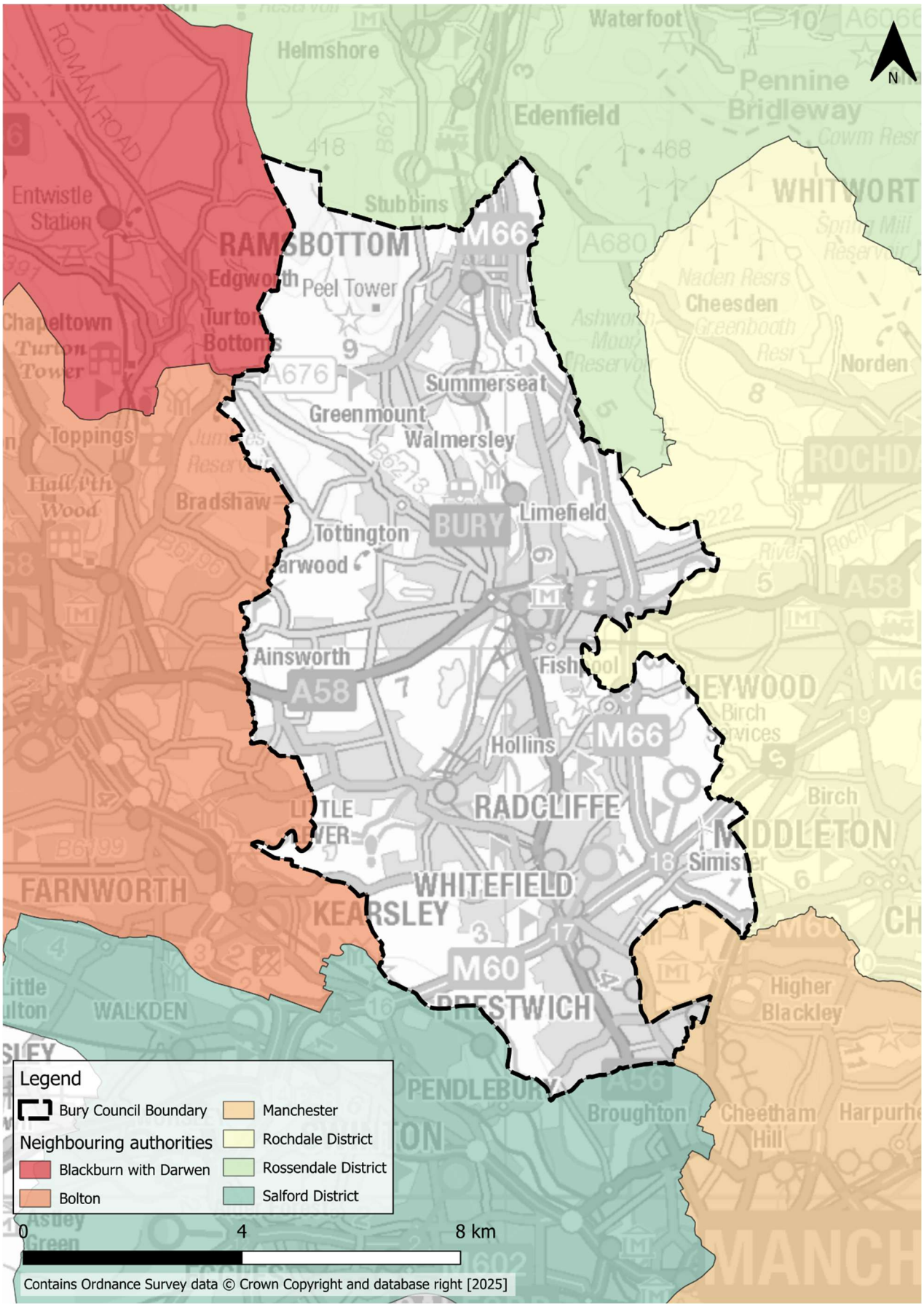


Figure 1-1: Bury Council and its neighbouring authorities

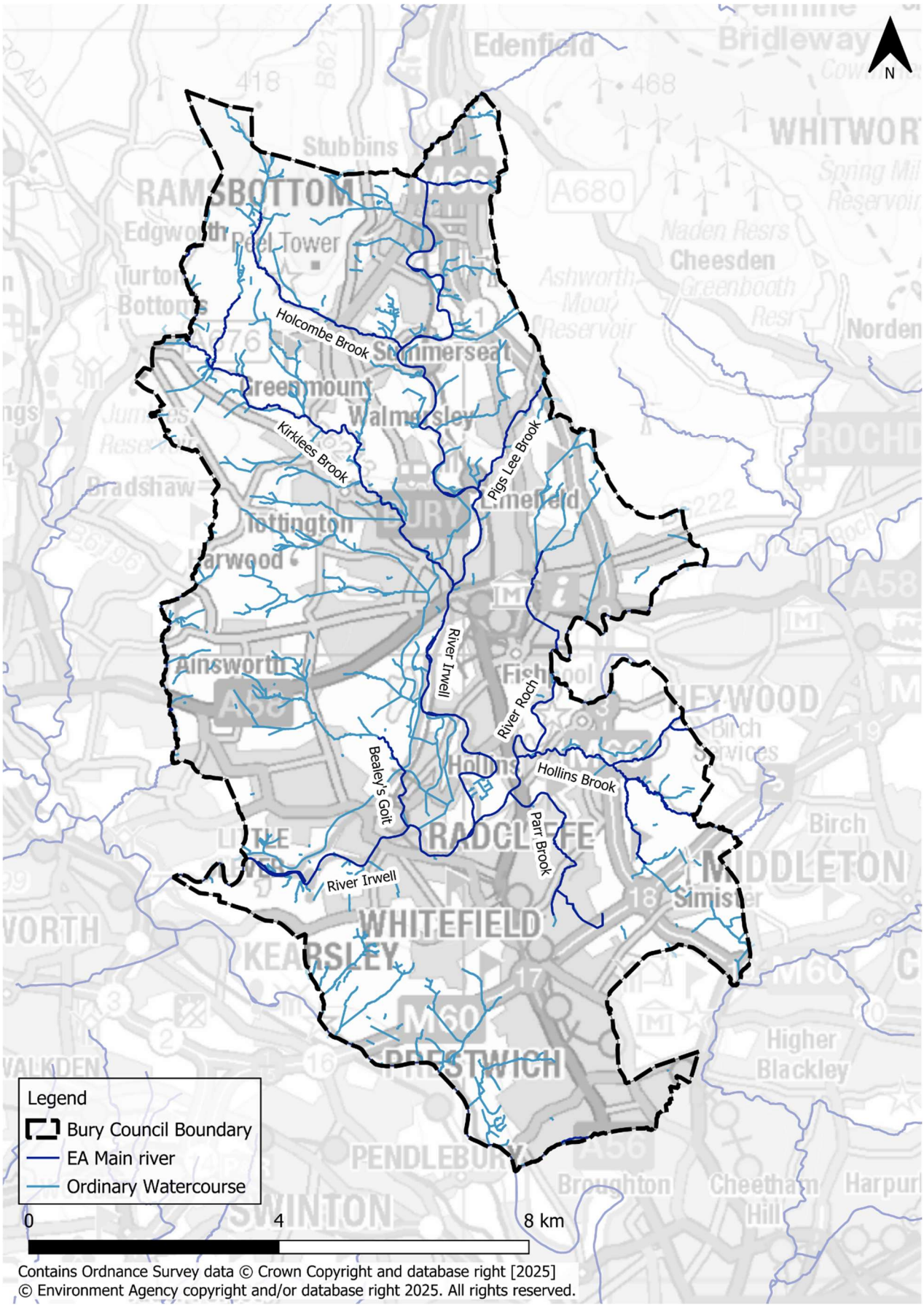


Figure 1-2: Main rivers and other watercourses across the Borough

1.5 Consultation

SFRAs should be prepared in consultation with other RMAs. The following parties have been consulted during the preparation of this version of the Level 1 SFRA through requests for information and through invitations to review and comment on draft outputs:

- Environment Agency
- Lead Local Flood Authority (Bury Council)
- United Utilities
- Blackburn with Darwen Council
- Bolton Council
- Manchester Council
- Rochdale District Council
- Rossendale District Council
- Salford District Council

The 'How to prepare a Strategic Flood Risk Assessment guidance' (gov.uk) also recommends consultation with:

- Emergency planners
- Emergency services
- Reservoir owners or undertakers
- Highways authorities
- Catchment partnerships
- Regional flood and coastal committees

1.6 Structure of this report

Table 1-1: Report contents and how to use each section

Section	Contents	How to use
Executive summary	This section focuses on how the SFRA can be used by planners, developers, and neighbourhood planners.	Users should refer to this section for a summary of the Level 1 findings and recommendations.
1. Introduction	This section provides a background and context to the study, and the Local Plan Area. It also details the organisations involved in the SFRA.	Users should refer to this section for general information and context.
2. Policy and strategy for flood risk management	This section sets out the relevant legislation, policy, and strategy for flood risk management at a national, regional, and local level.	Users should refer to this section and Appendix C for any relevant policy which may underpin strategic or site-specific assessments.
3. Sequential and Exception Tests	This section provides an overview of national planning policy, application of the sequential approach, and the sequential/Exception Test process. It provides guidance for the Council and developers on the application of the sequential and Exception Test for both allocations and windfall sites, at allocation and planning application stages.	Users should use this section to understand and follow the steps required for the sequential and Exception Tests.
4. Understanding flood risk	This section introduces the concept of flood risk and provides an overview of the local characteristics of flooding affecting the Borough and key risks including historical flooding incidents and flood risk from all sources, as well as characteristics that influence flood risk including topography, geology and soils.	This section should be used to understand all sources of flood risk across the Borough including where has flooded historically.
5. Impact of climate change	This section outlines the latest climate change guidance published by the EA and how this was applied to the SFRA. It also sets out how developers should apply the guidance to inform site-specific FRAs.	This section should be used to understand the climate change allowances for a range of epochs and conditions, linked to the vulnerability of a development.
6. Flood risk	This section provides a summary of	This section should be

Section	Contents	How to use
infrastructure	current flood defences and asset management and future planned schemes.	used to understand if there are any defences or flood schemes in a particular area, for further detailed assessment at site specific stage.
7. Flood risk management requirements for developers	This section contains guidance for developers on FRAs, considering flood risk from all sources, and principles of managing flood risk in developments.	Developers should use this section to understand requirements for FRAs and what conditions/guidance documents should be followed.
8. Principles for site design and masterplanning	This section sets out the principles for site design through ground level modifications and consideration of the impact of defence infrastructure on planning.	Developers should use this section to understand mitigation options for FRAs.
9. Surface water management and SuDS	This section provides an overview of SuDS, including signposting to relevant guidance; guidance for developers on surface water drainage strategies and for considering any specific local standards and guidance for SuDS from the LLFA.	Developers should use this section to understand what national, regional, and local SuDS standards are applicable. Hyperlinks are provided.
10. Flood warning and emergency planning	This section provides an overview of the requirements for emergency plans, include any local emergency planning arrangements and an overview of the available flood alerts and warnings.	Developers should use this section to understand requirements for emergency planning.
11. Cumulative Impact Assessment	This section details the cumulative impact assessment, which identifies which catchments are most likely to be sensitive to increased flood risk as a result of future development.	Planners should use this section to help develop policy recommendations for the potential cumulative impacts of development.
12. Strategic flood risk solutions	This section sets out wider strategic solutions that may offer potential to reduce flood risk across the Borough, including natural flood management. It also details current partnership working opportunities within the Borough.	Planners should use this section to help develop policy recommendations for strategic flood risk solutions to reduce flood risk across the Borough, with a particular emphasis on natural flood management and nature-based solutions

Section	Contents	How to use
		Developers should use this section to consider options for strategic solutions and natural flood management techniques and nature-based solutions.
13. Recommendations	This section summarises sources of flood risk in the Borough and outlines planning policy recommendations. It also sets out the recommended next steps.	Developers and planners should consider the recommendations made in this section. Developers should refer to the Level 1 SFRA recommendations when considering site specific assessments.
Appendix A	Details the data used to inform the SFRA, including when the data was provided, any associated licensing, and where the data can be obtained from.	Planners and developers should use this appendix to understand what data has been used in the SFRA, whether it has since been updated, and where to access the latest data from.
Appendix B	Sets out guidance for the application of the Sequential Test, including how each source of flood risk should be considered.	Planners and developers should use this appendix to inform the application of the Sequential Test.
Appendix C	Provides a background to the flood risk policy documents that are relevant to the Borough.	Planners and developers should use this appendix, in conjunction with Section 2, to understand the relevant flood and water management policy and guidance for development.
Appendix D	Technical note explaining the methodology behind the delineation of the functional floodplain (Flood Zone 3b) for this Level 1 SFRA.	Planners and developers should use this appendix to understand the datasets used to inform the functional floodplain extent.
Appendix E	Excel spreadsheet containing an assessment of flood risk to the potential development allocations based on all available sources of flood risk including for climate change where available. Each potential allocation is assigned a strategic recommendation based on risk and vulnerability.	Planners should use this appendix to understand the level of risk to each potential allocation and associated recommendations for development. Planners should use this appendix to assist in the

Section	Contents	How to use
		application of the Sequential Test for Local Plan preparation.
Appendix F	Summarises the outcomes of the sites assessment process recorded in Appendix E.	Planners and developers should use this appendix to understand the level of risk to each potential allocation and associated recommendations for development. Planners should use this appendix to assist in the application of the Sequential Test for Local Plan preparation.
Appendix G	Details the methodology and results for the cumulative impact assessment.	Planners should use this appendix, in conjunction with Section 11, to help develop policy recommendations for the cumulative impacts of development.
Appendix H	Interactive GeoPDF mapping displaying all flood risk information used within the SFRA.	Planners and developers should use the flood risk data within the mapping to scope out the issues they need to consider in greater detail in a site-specific FRA to support a planning application.

2 Policy and strategy for flood risk management

This section, along with Appendix C which contains greater detail, sets out the flood risk management roles and responsibilities for different organisations and relevant legislation, policy, and strategy.

2.1 Roles and responsibilities

There are different organisations in and around the Borough that have responsibilities for flood risk management, known as RMAs. These are listed in Table 2-1 with a summary of their responsibilities.

Further information on the roles and responsibilities of the RMAs is available in Annex A of the National Flood and Coastal Erosion Risk Management Strategy (FCERM) (gov.uk) for England. The Local Government Association (gov.uk) also provides further information on the roles and responsibilities for managing flood risk.

The National flood risk standing advice for local planning authorities (gov.uk) provides advice on when to consult the EA.

Table 2-1: Roles and responsibilities for RMAs.

Risk Management Authority	Strategic Level	Operational level	Planning role
EA	Strategic overview for all sources of flooding, National Strategy, flood forecasts and warnings and general supervision	Main River (e.g. River Irwell, River Roch) and reservoirs (Flood Risk Activity Permits, enforcement, and works), flood waning	Statutory consultee for certain development in Flood Zones 2 and 3 and all works within 20 metres of a main river.
Bury Council as LLFA	Coordination of Local Flood Risk Management and maintaining a Local Flood Risk Management Strategy (LFRMS)	Surface water, groundwater, and ordinary watercourses (consenting, enforcement, and works)	Statutory consultee for major developments
United Utilities	Asset Management Plans, supported by Periodic Reviews (business cases), develop drainage and wastewater management plans	Public sewers and some reservoirs	Non-statutory consultee

Risk Management Authority	Strategic Level	Operational level	Planning role
	(DWMPs)		
Highways Authorities - National Highways for motorways and trunk roads and Bury Council for non-trunk roads	Highway drainage policy and planning	Highway drainage	Statutory consultee regarding highways design standards and adoptions

2.1.1 Riparian ownership

Land and property owners are responsible for the maintenance of watercourses either on or next to their properties, called riparian owners. Riparian 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 on the government website in the EA publication 'Owning a watercourse' (gov.uk).

When it comes to undertaking works to reduce flood risk, the EA, and the Council do have permissive powers, but limited resources must be prioritised and targeted to where they can have the greatest effect. Permissive powers mean that RMAs are permitted to undertake works but are not obliged.

3 Sequential and Exception Tests

This section summarises national planning policy for development and flood risk and the application of the Sequential and Exceptions Tests for both planners and developers.

3.1 National Planning Policy Framework and Guidance

The NPPF (December 2024) (gov.uk) sets out government's planning policies for England. It must be considered in the preparation of local plans and is a material consideration in planning decisions. The NPPF advises on how flood risk should be considered to guide the location of future development and FRA requirements. The NPPF states that:

“Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing of future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere” (paragraph 170).

The Sequential and Exception Tests help to guide this process.

The Flood Risk and Coastal Change PPG, 2025 (gov.uk), , sets out how the policy should be implemented. Diagram 1 in the PPG (Paragraph: 007 Reference ID: 7-007-20220825) sets out how flood risk should be considered in the preparation of local plans. The PPG states that:

"A strategic Flood Risk Assessment should be used to apply the Sequential Test and, where necessary, the Exception Test when determining land use allocations" (paragraph 009).

3.2 The Sequential Test

Firstly, land at the lowest risk of flooding 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 the potential inclusion in the local plan. For all other developments, evidence must be supplied to the LPA, with a planning application, that the development has passed the test if any proposed building, access and escape route, land-raising or other vulnerable element will be:

- In Flood Zone 2 or 3 of the Flood Map for Planning (FMfP), See Section 4.4 for information on the FMfP;
- In Flood Zone 3b and your development is not compatible;
- Within 'Flood Zones plus climate change' of the FMfP, showing it is at increased risk of flooding from rivers in the future;
- In Flood Zone 1 of the FMfP, and the FMfP shows it is at risk of flooding from surface water;

- In Flood Zone 1 and the SFRA shows it will be at increased risk of flooding during its lifetime; or
- Subject to sources of flooding other than from rivers.

The requirements for developers are set out in the FRA Standing Advice (gov.uk).

The LPA should define a suitable search area for the consideration of alternative sites in the Sequential Test. Based on the latest updates to the PPG, sites can be considered 'reasonably available' if their location is suitable for the type of development proposed, they are able to meet the same development needs and they have a reasonable prospect of being developed at the same time as the proposal (Paragraph: 027a Reference ID: 7-027a-20220825).

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/Employment Land Availability Assessments.

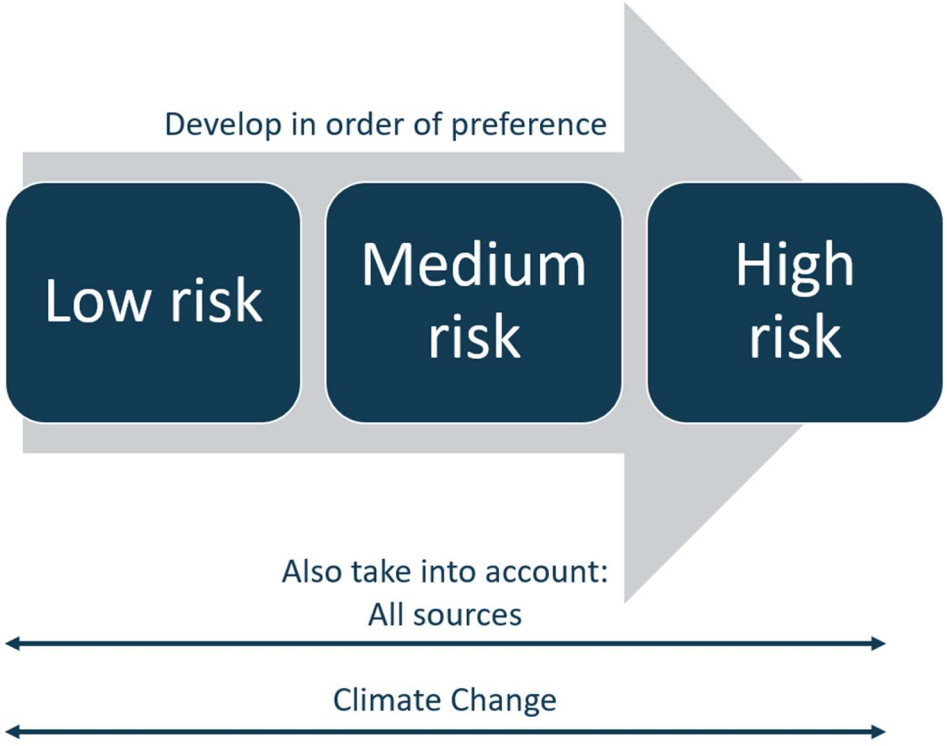


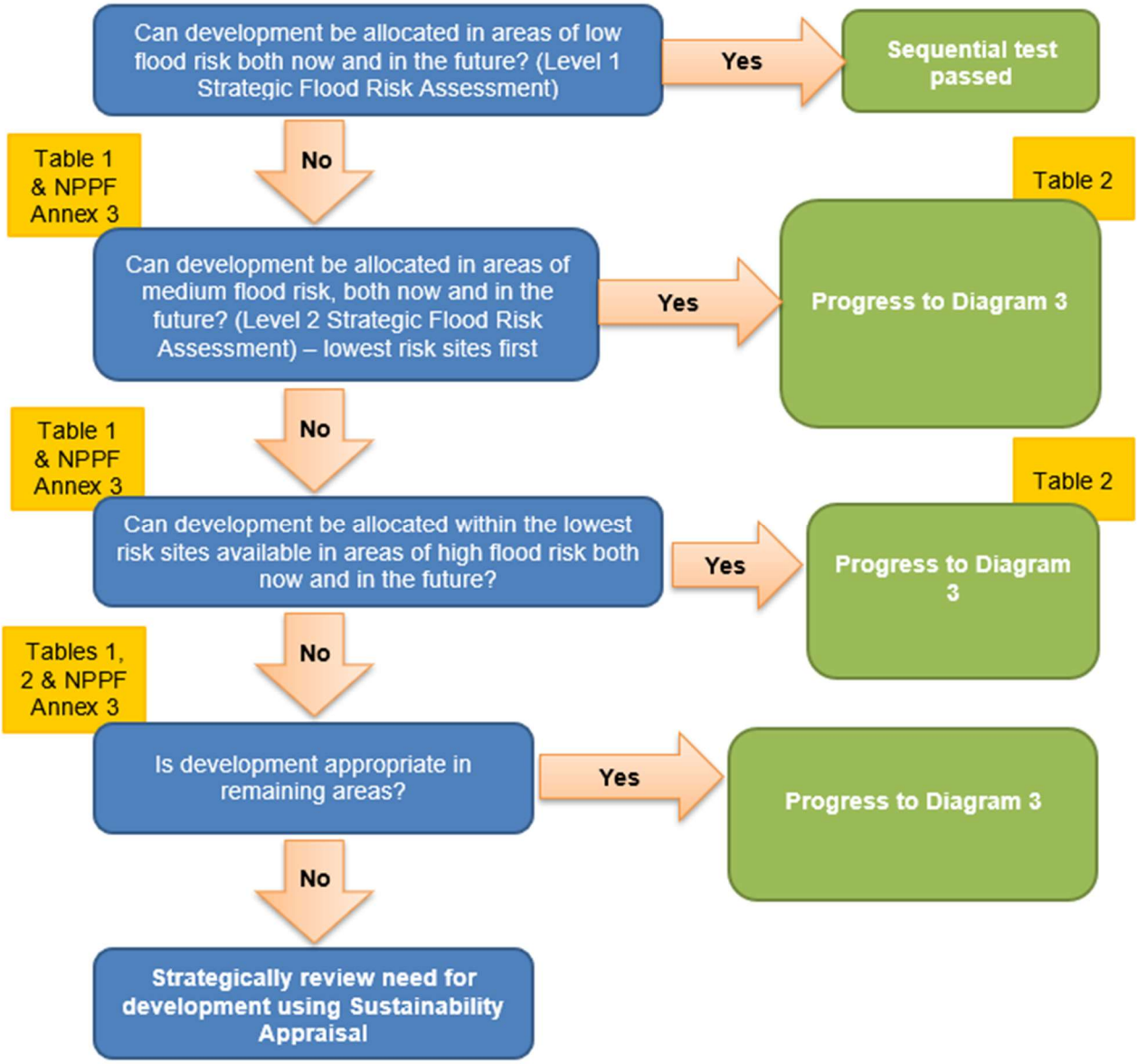
Figure 3-1: The Sequential Test

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 PPG (gov.uk) (Paragraph: 079 Reference ID: 7-079-20220825) shows whether, having applied the Sequential Test first, the vulnerability of development is not compatible with a particular Flood Zone and where the Exception Test is required to determine the suitability of that vulnerability of development to the Flood Zone.

Figure 3-2 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 complex

one, as several 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. Appendix B addresses the use of flood risk information in the application of the Sequential Test.



† Diagram 2 of PPG: Flood Risk and Coastal Change (paragraph 026, Reference ID 7-026-20220825) Revised September 2025.

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

3.2.1 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 Paragraph 172 of the NPPF) so that all sources of flood risk are to be included in the consideration.

The PPG further states:

"Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk" (paragraph 023).

The general implications of these approaches are summarised as follows:

- The Sequential Test must be based on mapping that enables decision making according to a prioritisation based on a risk-based sequence (for river flooding national mapping is available that describes low, medium and high-risk Flood Zones but comparable mapping of this specific type and quality is not available for other sources; for river flooding the risk zones are based on the assumption that no flood risk management features are present, with the exception of Flood Zone 3b (the functional floodplain)).
- The other sources of flood risk that can potentially be included in the Sequential Test are surface water, groundwater, sewer flooding and reservoir flooding (or other water impounding features such as canals).
- It follows that proposed new development placed in locations at high or medium risk from flooding from other sources now and in the future (note that the explicit requirement to include climate change in the test, as set out in the September 2025 PPG may require the preparation of additional modelling and mapping or use of proxies) should be accompanied by evidence that the site can remain safe for its lifetime and pass the Exception Test (if applicable) (in a Level 2 SFRA).

A basic requirement for the Sequential Test to be performed is that appropriate, competent mapping can be prepared to enable logical comparison of the flood risk from different sources at alternative locations, both now and in the future, as this is fundamental to establishing a logical “risk sequence”.

Appendix B describes the implications of including different sources of flooding both now and in the future in the Sequential Test. It also highlights matters to be considered and identifies a preferred approach.

3.3 The Exception Test

It will not always be possible for all new development to be located 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 (gov.uk)

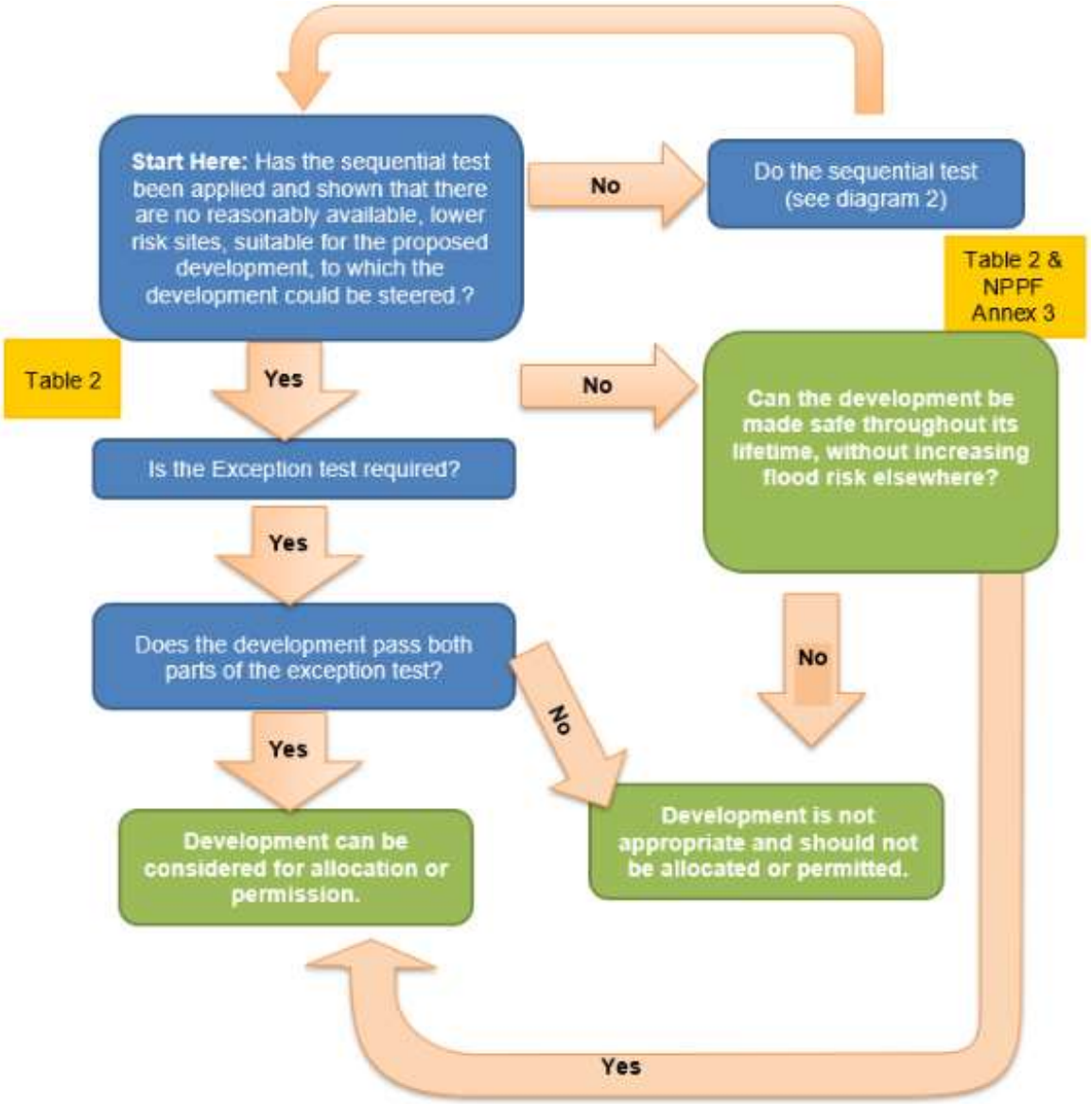
(Paragraph: 033 Reference ID: 7-033-20220825) summarises the Exception Test (Figure 3-3).

Table 2 of the PPG (gov.uk) sets out the requirements for the Exception Test but does not reflect the need to avoid flood risk from sources other than rivers and the sea. There is no guidance on how to consider other sources of flood risk. The Exception Test should only be applied, following the application of the Sequential Test, in the following instances:

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

While the Exception Test is not explicitly required for sites at risk from other sources of flooding, the LPA should follow a similar principle where sites are proposed that are at risk from other sources of flooding, carefully weighing up the wider benefits of development against the risk, ensuring that site users can be kept safe through the lifetime of the development and ensuring residual risk can be safely managed.

For sites proposed for allocation within the local plan that are at flood risk, the LPA should use information provided in a Level 2 SFRA to inform the Exception Test. At the planning application stage, the developer must design the site such that it is appropriately flood resistant and resilient in line with the recommendations in national and local planning policy and supporting guidance and those set out in the SFRA. This should demonstrate that the site will still pass the flood risk element of the Exception Test based on the detailed site level analysis.



† Diagram 3 of PPG: Flood Risk and Coastal Change (paragraph 033, Reference ID 7-033-20220825) Revised September 2025.

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

There are two parts to demonstrating whether a development passes the Exception Test that should be considered by the LPA when allocating development sites, and developers when required (see Section 3.4 for Exception Test requirements for individual planning applications).

Part A: Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk.

The LPA will need to set out the criteria used to assess the Exception Test and provide clear advice to enable applicants to provide evidence to demonstrate that it has been passed. If the application fails to prove this, the LPA should consider whether the use of planning conditions and/or planning obligations could allow it to pass the Exception Test. If

this is not possible, this part of the Exception Test has failed, and development should not be considered for allocation or granting planning permission.

Wider sustainability objectives should be considered, such as those set out in local plan sustainability appraisals. These generally consider matters such as the local economy, biodiversity, green infrastructure, housing, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.

The sustainability issues the development will address and how far doing so will outweigh the flood risk concerns for the site should also be considered, e.g., by facilitating wider regeneration of an area, providing community facilities, infrastructure that benefits the wider area, etc.

Part B: 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.

In circumstances where the potential effects of proposed development are material, a Level 2 SFRA is likely to be needed to inform the Exception Test for strategic allocations to provide evidence that the principle of development can be supported. At the planning application stage, a site-specific FRA will be needed. Both will need to consider the undefended and residual risk and how this will be managed over the lifetime of the development.

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

3.4.1 Applying the Sequential Test

The LPA are responsible for considering the extent to which Sequential Test considerations have been satisfied.

Developers should consult with the LPA in the first instance before commencing on a site-specific FRA to determine the Sequential Test requirements for their site, including search area. Developers are required to apply the Sequential Test to all development sites, unless the site is:

- A strategic allocation and the test has already been carried out by the LPA as part of preparing the local plan, or
- A change of use (except to a caravan, camping or chalet site, or to a mobile home or park home site), or
- A minor development (householder development, small non-residential extensions with a footprint of less than 250m²), or
- A development in Flood Zone 1 unless there are other flood risk issues in the area of the development (i.e. surface water, groundwater, reservoir, sewer flooding).

The September 2025 update to the PPG sets out that the Sequential Test is also not required where "a site-specific flood risk assessment demonstrates clearly that the

proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development […], without increasing flood risk elsewhere" (PPG, Paragraph 027).

It should also be noted that residential sub-divisions are exempt from the definition of minor development and therefore, by default, should also be subject to the Sequential Test.

This SFRA contains information on all sources of flooding and considers the impact of climate change. This should be considered when a developer undertakes the Sequential Test, including the consideration of reasonably available sites at lower flood risk.

Local circumstances must be used to define geographical scope of the Sequential Test (within which it is appropriate to identify reasonably available alternatives). To determine the appropriate search area criteria, include the catchment area for the type of development being proposed. For some sites this may be clear, e.g. school catchments, urban extensions, 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.

As stated in the September 2025 update to the PPG "…where there are large areas in Flood Zones 2 and 3 (e.g. coastal towns and settlements on major rivers) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives" (PPG, Paragraph 027a).

The Sequential Test should be applied proportionately, with a focus on realistic alternatives in areas of lower flood risk that could satisfy the same development need.

The sources of information on reasonably available sites may include but is not restricted to:

- Site allocations in local plans.
- Sites with planning permission but not yet built out.
- Strategic Housing and Economic Land Availability Assessments (SHELAAs)/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 are not acceptable as reasons not to consider alternatives. Applying the Exception Test

Where a development proposal is in accordance with an allocation made in a local plan following the application of the Sequential and Exception Tests, the Exception Test will only be required to be repeated if:

- Elements of the development that were key to it satisfying the Exception Test at the plan-making stage (such as wider sustainability benefits to the community or measures to reduce flood risk overall) have changed or are not included in the proposed development; or
- The understanding of current or future flood risk has changed significantly.

For developments that have not been allocated in the local plan or where the Sequential Test was not applied at the development plan stage and new information becomes available that identifies a flood risk, developers must undertake the sequential and Exception Tests and present this information to the LPA for approval. The Level 1 SFRA can be used to scope the flooding issues that a site-specific FRA should investigate in more detail to inform the Exception Test for windfall sites.

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

4 Understanding flood risk

This section explores what flood risk is, key sources of flooding in the Borough, and the factors that affect flooding including topography, soils, and geology.

This is a strategic summary of risk in the Borough to inform the application of the Sequential and Exceptions Tests, if required. Developers should use this section of the SFRA together with the flood risk data included in the interactive GeoPDF maps (Appendix H) to scope out the flood risk issues they need to consider in greater detail in a site-specific FRA to support a planning application. Information in this section should not be used to inform flood risk at a property-level.

4.1 Defining flood risk

Section 3 (subsection 1) of the Flood and Water Management Act 2010 (FWMA) (gov.uk) defines the risk of a potentially harmful event (such as flooding) as "*a risk in respect of an occurrence is assessed and expressed (as for insurance and scientific purposes) as a combination of the probability of the occurrence with its potential consequences*."
Figure 4-1 sets out this definition of risk.

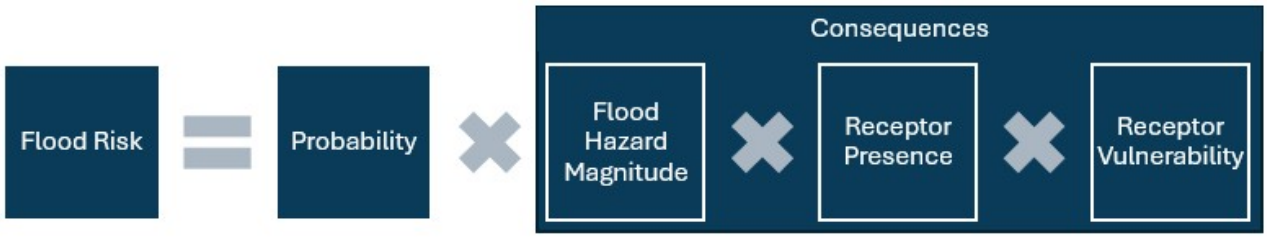


Figure 4-1: Conceptual model depicting how flood risk can be defined

4.1.1 Probability

The probability of flooding is expressed as a percentage based on the average frequency measured or extrapolated from records over many years. For example, a 1% AEP (annual exceedance probability) indicates the flood level that has a 1% chance of occurring in any one year, not that it will occur at least once every hundred years.

4.1.2 Consequences

The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g., financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), the receptors that are present and the vulnerability of these receptors (type of development, nature, e.g., age-structure, of the population, presence, and reliability of mitigation measures etc).

4.1.3 Source-Pathway-Receptor model

Flood risk can be assessed using the Source-Pathway-Receptor model (Figure 4-2) where:

- The source is the origin of the floodwater, principally rainfall.
- A pathway is a route or means by which a receptor can be affected by flooding, which includes rivers, drains, sewers, and overland flow.
- A receptor is something that can be adversely affected by flooding, which includes people, their property, and the environment.

Figure 4-2: Source-Pathway-Receptor model

This is a standard environmental risk model common to many hazards and should be the starting point of any assessment of flood risk. All these elements must be present for flood risk to arise. Having applied the Source-Pathway-Receptor model it is possible to mitigate the flood risk by addressing the source (often very difficult), blocking, or altering the pathway, or removing the receptor, e.g., steer development away.

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 to apply this guidance in a consistent manner.

4.2 Topography, geology, and soils

Topography, geology and soil 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 extent of overland flow and therefore the amount of runoff reaching the watercourse. Steep slopes or clay rich (low permeability) soils will promote rapid surface runoff, whereas more permeable rock such as limestone and sandstone may result in a more subdued response due to greater infiltration.

4.2.1 Topography

The National LIDAR Programme (gov.uk) provides elevation data at a 1m spatial resolution for all of England.

The topography of the Borough is steep, with the areas of highest elevation in the north of the Borough near Ramsbottom, as shown in Figure 4-3. The rest of the Borough is generally hilly, producing fast-flowing tributaries to the larger rivers within Bury. The centre of the Borough is characterised by flatter, low-lying floodplains.

4.2.2 Geology

Bedrock in the Borough primarily consists of mudstone, siltstone and sandstone, as shown in Figure 4-4. This type of bedrock generally has high permeability and porosity, allowing water to infiltrate into the rock. In some areas in the south of the Borough, bedrock geology consists of sandstone and conglomerate. Sandstone is generally porous and permeable.

Much of the bedrock is overlaid with till. The permeability of till is generally low. There are also significant superficial deposits of glacial sand and gravel within the south of the Borough. Additional superficial deposits include alluvium and river terrace deposits.

A map detailing the extents of this bedrock and further superficial geology across the Borough can be viewed online in the British Geology Society Geology Viewer (bgs.ac.uk).

The EA also provides mapping, on the Magic Map, of different types of aquifers, the underground layers of water-bearing permeable rock from which groundwater can be extracted. Aquifers are designated as either principal or secondary aquifers. Principal aquifers are designated by the EA as strategically important rock units that have high permeability and water storage capacity.

Much of the bedrock within the Borough is classified as Secondary A aquifer. There is a small area in the south classified as Principal Aquifer.

4.2.3 Soils

Soils across the Borough are varied. Soilscapes are a classification of soils in England and Wales, conveying a summary of the regional differences in the soil landscapes

Across much of the Borough Soilscape 17 (slowly permeable seasonally wet acid loamy and clayey soils) is present. Drainage of these soils to the stream network may be impeded.

Soils covering areas of Bury and Prestwich are categorised by Soilscape 6 (Freely draining slightly acid loamy soils). These soils are freely draining to local groundwater and rivers. In areas of Whitefield and Prestwich, soil cover is categorised as Soilscape 10 (Freely draining slightly acid sandy soils). These soils drain freely to Groundwater. Along the banks of the River Irwell, running through the centre of the Borough, Soilscape 20 (loamy and clayey floodplain soils with naturally high groundwater) is present. These soils are freely draining to local groundwater and rivers. Close proximity to the river results in risks of pollution from floodwater scouring and from drainage water after spreading of fertiliser and slurry.

The British Geological Survey website (bgs.ac.uk) provides data on soils across the Borough.

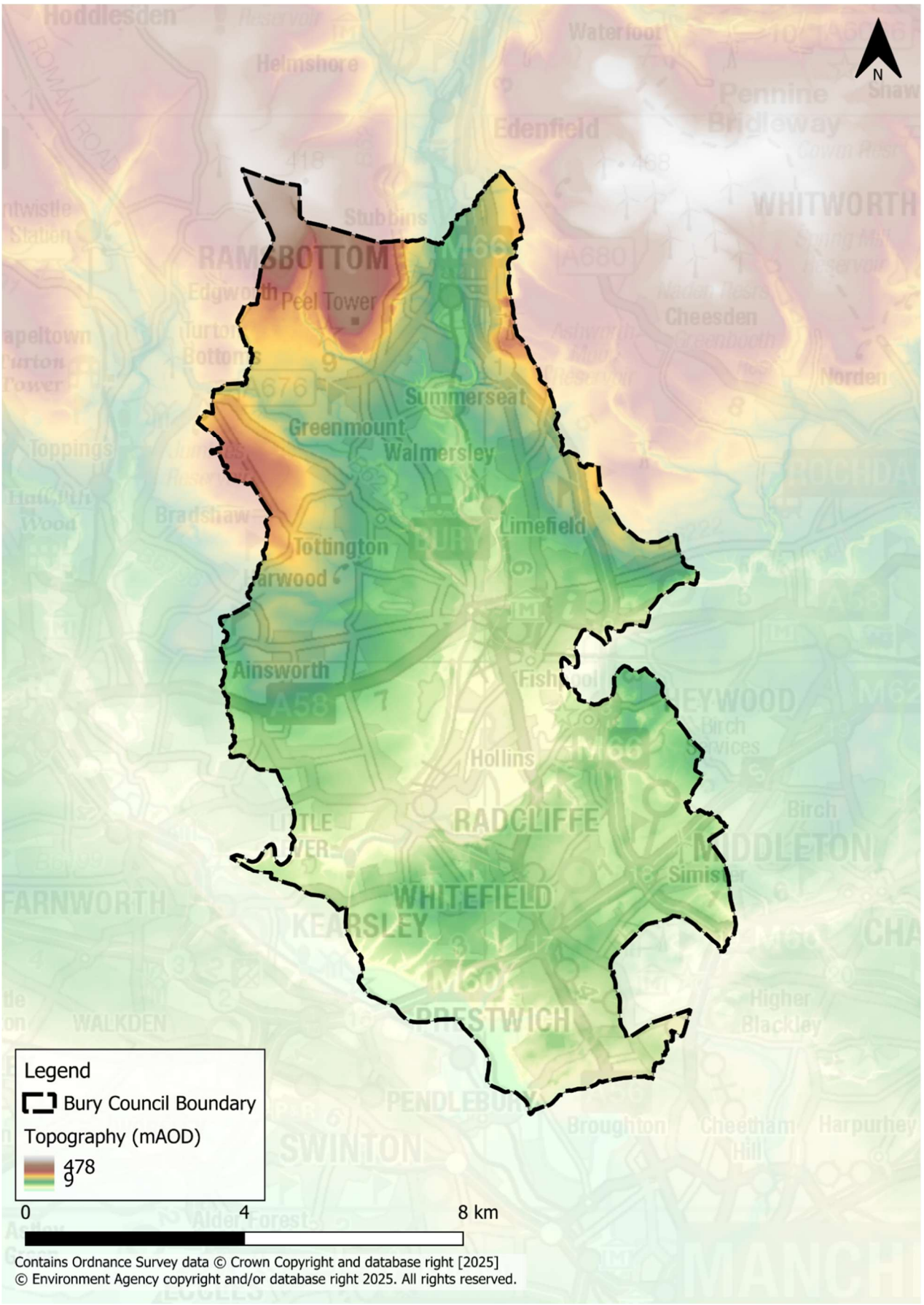


Figure 4-3: EA 1m LiDAR data showing the topography across the Borough

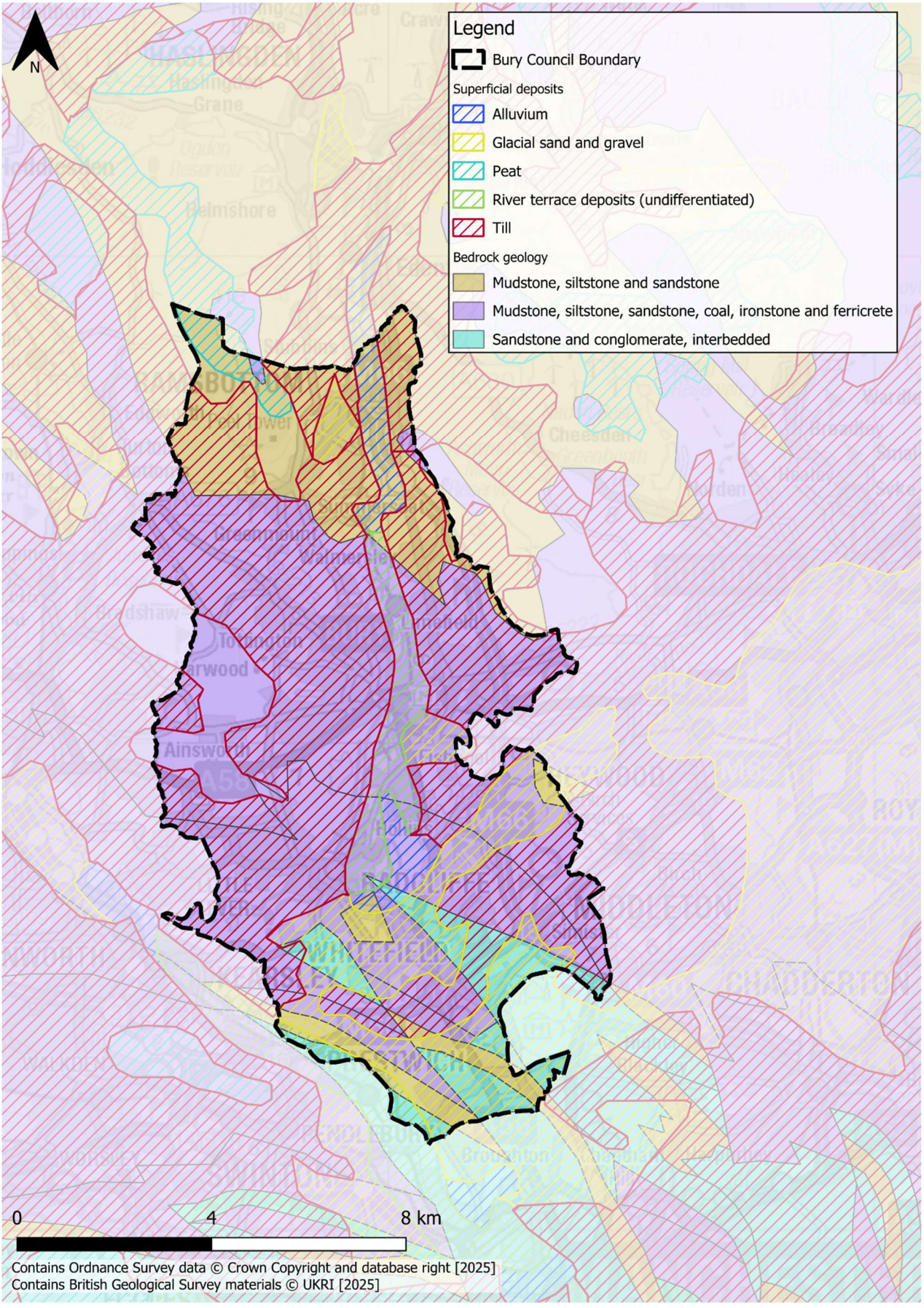


Figure 4-4: Bedrock geology and superficial deposits across the Borough

4.3 Historic flooding

Records of past flood events can help to build a picture of areas and locations that may be prone to flooding and to help confirm flood modelling outputs. Historic flood events can also help RMAs to target where flood risk management or resilience works may be required based on tangible evidence.

4.3.1 LLFA historic flood records

LLFAs are required, under the FWMA (2010), to maintain and update a historic flood incidents database as and when any locally significant flood incidents occur. The LLFA has a statutory responsibility to investigate and report upon any 'locally significant' flood events. Details of these events are usually recorded in a digital database and / or Section 19 reports.

4.3.1.1 Section 19 investigations: Boxing Day 2015 floods

A combined report from the LLFAs within Greater Manchester, working together and with the GMCA, was produced to investigate the flood event that took place across Greater Manchester on 26 December 2015.

The primary cause of flooding for this event came from heavy rainfall in the month preceding the event, and on the 25-26 December during Storm Eva. In the preceding days, soils in these areas had become saturated. Flooding in Bury during the event was a combination of surface water flooding, flooding from rivers and flooding from ordinary watercourses. As surface water drains to rivers, it is likely that the exceptionally high river levels prevented the drainage of surface water flows, contributing to flooding.

The Section 19 report details 808 locations of flooding. Of this number, 734 locations experienced flooding from main rivers, 15 locations from ordinary watercourses and 59 from surface water. The areas of Radcliffe and Redvales were most severely affected, with approximately 671 properties flooded from the River Irwell. Other affected areas included Tottington, Summerseat, Ramsbottom and industrial properties close to Bury town centre.

4.3.2 EA Historic Flood Map and Recorded Flood Outlines

The Historic Flood Map (HFM) is a spatial dataset showing the maximum extent of all recorded historic flood outlines from rivers, the sea and groundwater and shows areas of land that have previously been flooded across England. Records began in 1946 when predecessor bodies to the EA started collecting information about flooding incidents. The HFM accounts for the presence of defences, structures, and other infrastructure where such features existed at the time of flooding. It includes flood extents that may have been affected by residual flooding such as overtopping, breaches or blockages. It is also possible that historic flood extents may have changed and that some areas would not flood at present i.e., if a flood defence has been built.

The HFM does not contain any information regarding the specific flood source, return period or date of flooding, nor does the absence of the HFM in an area mean that an area has never flooded, only that records of historic flooding do not exist.

The Recorded Flood Outlines (RFO) dataset does include details of flood events. The difference between the two datasets is that the HFM only contains flood outlines that are ‘considered and accepted’ by the EA following adequate verification of the RFO dataset using certain criteria.

There have been 13 recorded historic flood incidents within the Bury Borough according to the HFM dataset, with the earliest of these occurring in November 1866. The largest flood event in the Borough occurred on Boxing Day 2015, affecting areas along the River Irwell in Ramsbottom and the south of Bury. The majority of recorded historic flood events have been caused by the channel capacity being exceeded (Figure 4-5). However, the source of many flood events is 'unknown' or recorded as 'other' causes.

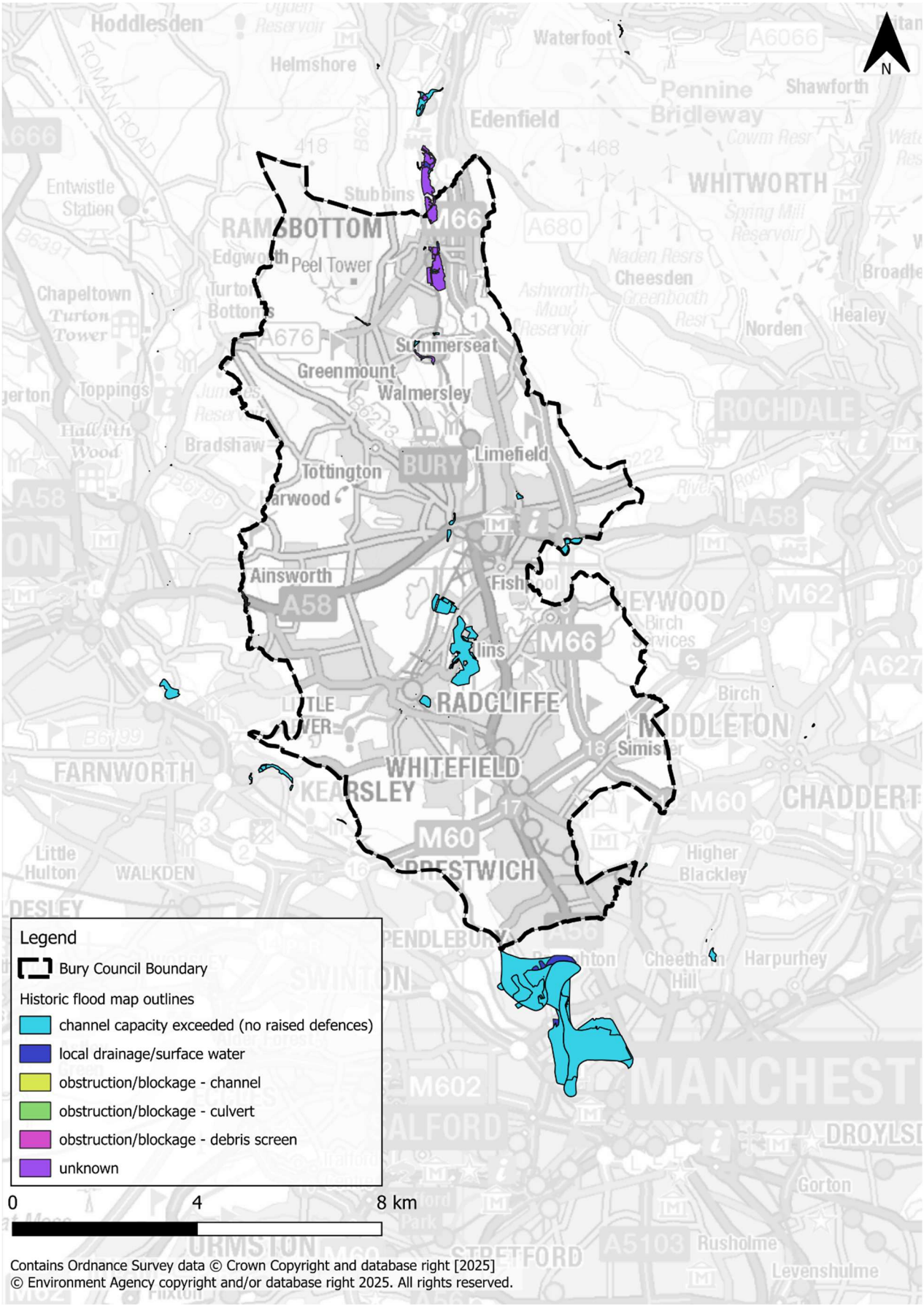


Figure 4-5: EA Historic Flood Map

4.3.3 Historic fluvial flooding

The most notable historic fluvial flood event within Bury was the Boxing Day 2015 flood event, as documented in Section 4.3.1.1. Other significant fluvial flood events within the Borough include the River Irwell flooding following Storm Ciara in 2020, which caused severe flooding in areas of Ramsbottom, Redvales and Radcliffe, and November 2024 flooding in Ramsbottom.

4.3.4 Historic sewer flooding

United Utilities have provided their record of historic sewer flood incidents within the Borough. The historic incident points have been aggregated by ward, as shown in Figure 4-6. The highest number of incidents were recorded in the ward of Tottington.

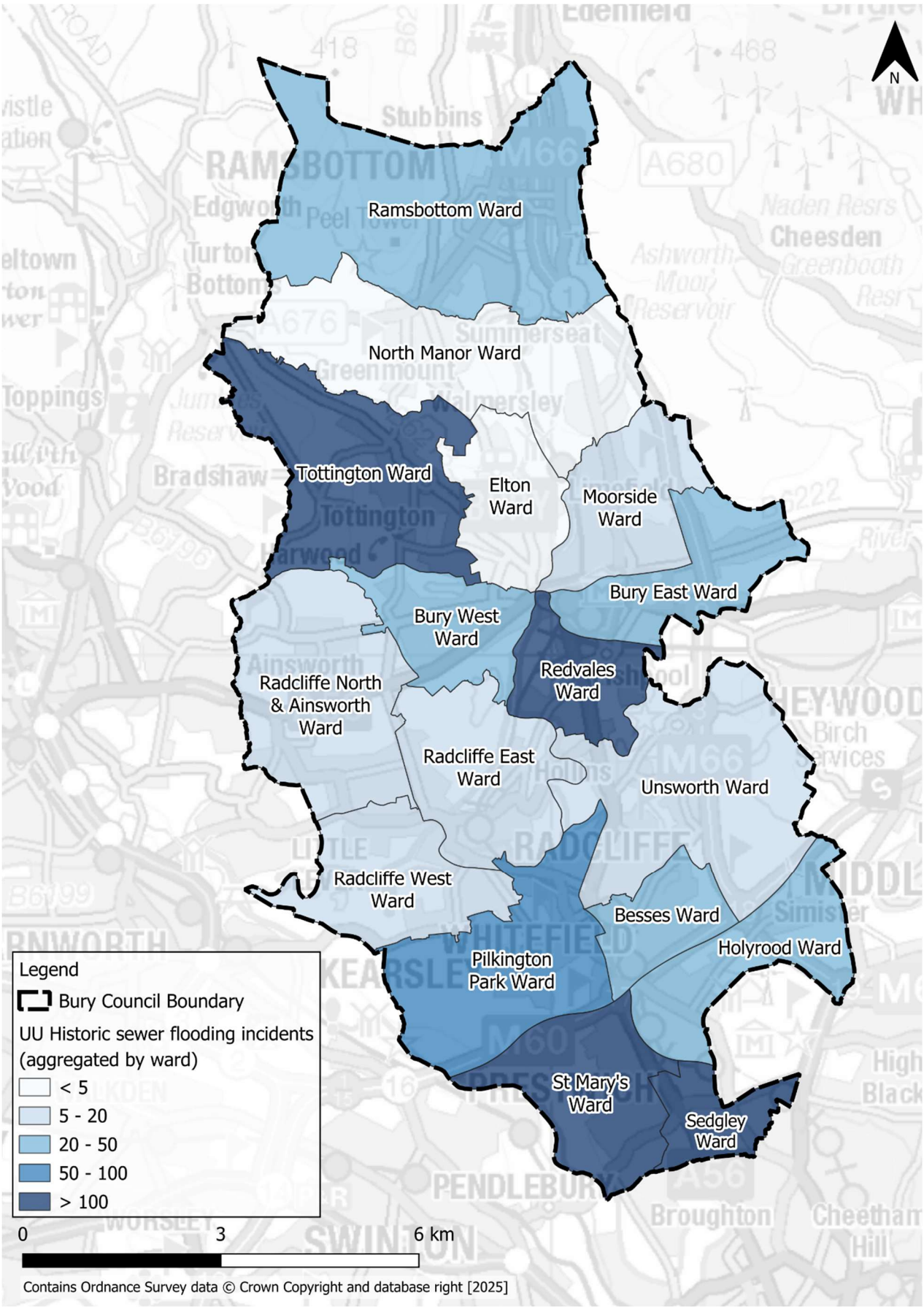


Figure 4-6: United Utilities recorded flood incidents, aggregated by ward

4.3.5 Historic groundwater flooding

Historic groundwater flooding is recorded in the EA's HFM. There are no records of historic flooding from groundwater sources.

4.4 Fluvial flood risk

4.4.1 Flood Zones

Fluvial flood risk across the borough is assessed based on Flood Zones. The definition of the Flood Zones is provided below. The Flood Zones do not consider defences, except when considering the functional floodplain. 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 are:

- Flood Map for Planning Flood Zone 1: Low risk: less than a 0.1% chance of river or sea flooding in any given year.
- Flood Map for Planning Flood Zone 2: Medium risk: between a 1% and 0.1% chance of river or sea flooding in any given year.
- Flood Map for Planning Flood Zone 3a: High risk: between a 3.3% and 1% chance of river flooding in any given year or between a 3.3% and 2% change of flooding from the sea. This Flood Zone includes all areas in Flood Zone 3 that are not in Flood Zone 3b.
- Flood Map for Planning Flood Zone 3b: Functional Floodplain: land where water has to flow or be stored in times of flood. 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. Annex 3 of the NPPF (gov.uk) provides information on flood risk vulnerability. See Appendix D for details on the functional floodplain and how it has been delineated through this SFRA.

Important note on Flood Zone information in this SFRA

The Flood Zone maps for the Borough are included in the interactive GeoPDF maps (Appendix H). These have been derived from the EA's Flood Map for Planning (FMfP) (gov.uk) (Section 4.4.1) and detailed hydraulic modelling received from the EA. Flood Zones 2 and 3a within this SFRA show the same extent as the online EA's FMfP.

The EA Flood Zones do not cover all catchments or ordinary watercourses with areas <3km². Where the EA have suitable data for smaller catchments, this will also be shown in the Flood Zones. As a result, whilst the EA Flood Zones may show an area is in Flood Zone 1, there may be a flood risk from a smaller watercourse(s) not shown in the Flood Zones.

Flood defences should be considered when delineating the functional floodplain. The methodology for functional floodplain delineation is described in Appendix D. Caution should also be applied where the conservative Flood Zone 3b extent encompasses existing

urban areas which would not otherwise be "designed to flood". Developers should consult the LPA on the derivation of the functional floodplain.

4.4.2 Summary of fluvial risk across the borough

According to the EA's FMfP (as shown in Figure 4-7), the majority of fluvial flood risk comes from the River Irwell and the River Roch, covering existing residential areas to the south of Bury in Radcliffe and Redvales. There is also significant fluvial risk in the north of the Borough in Ramsbottom, along the River Irwell. Additional areas of fluvial risk are identified along tributaries of the River Irwell, including Kirklees Brook.

The fluvial flood risk within the Borough is included in the interactive GeoPDF maps (Appendix H). The impacts of climate change on fluvial flooding are discussed in Section 5.2.

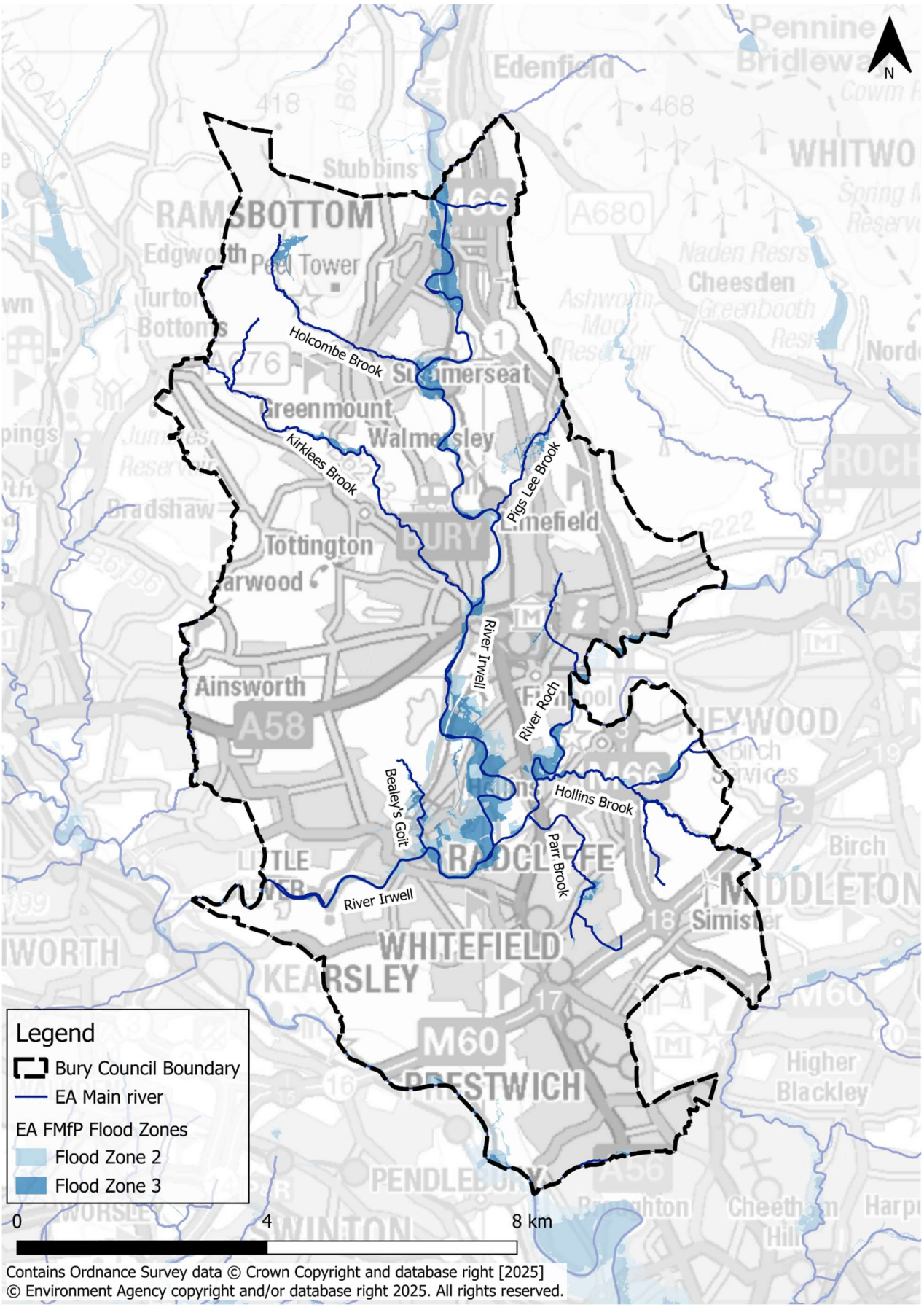


Figure 4-7: EA's Flood Map for Planning for Rivers and Sea - Flood Zones

4.5 Surface water flood risk

Surface water runoff is most likely to be caused by intense downpours e.g. thunderstorms. At times, the amount of water falling can completely overwhelm the drainage network, which is not designed to cope with extreme storms. The flooding can also be complicated by blockages to drainage networks, sewers being at capacity and/or high-water levels in watercourses that cause local drainage networks to back up.

The EA's Risk of Flooding from Surface Water mapping (RoFSW) (gov.uk) received a significant update through NaFRA2 and was published January 2025. The RoFSW has been used to assess surface water risk within this SFRA. These maps are intended to provide a consistent standard of assessment for surface water flood risk across England and Wales in order to help LLFAs, the EA, and any potential developers to focus their management of surface water flood risk.

The RoFSW map is an assessment of where surface water flooding may occur when rainwater does not drain away through the normal drainage systems or soak into the ground buy lies on or flows over the ground instead. It is produced using national scale modelling and enhanced with compatible, locally produced modelling from LLFAs. Risk is displayed as one of three likelihood bandings:

- High - greater than or equal to 3.3% (1 in 30) chance in any given year.
- Medium - less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year.
- Low - less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1000) chance in any given year.

The RoFSW map does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. Therefore, the RoFSW should not be used to understand flood risk for individual properties but can be considered suitable for high level assessments such as this SFRA.

4.5.1 Summary of surface water flood risk across the borough

The EA's RoFSW (as shown in Figure 4-8) highlights several communities in the Borough at risk from surface water flooding. Modelled high risk of surface water flooding is widespread across the Borough. Notably this includes areas of Radcliffe, Bury and Ramsbottom.

Surface water flow paths generally follow areas of topographic low spots with areas of isolated ponding across the Borough. Additionally, surface water flow routes are also established on roads in the more urban areas within the Borough highlighting risk to transport networks while posing a risk to buildings which water can be routed to.

The RoFSW mapping for the Borough is included in the interactive GeoPDF maps (Appendix H). The impacts of climate change on surface water flooding are discussed in Section 5.3.

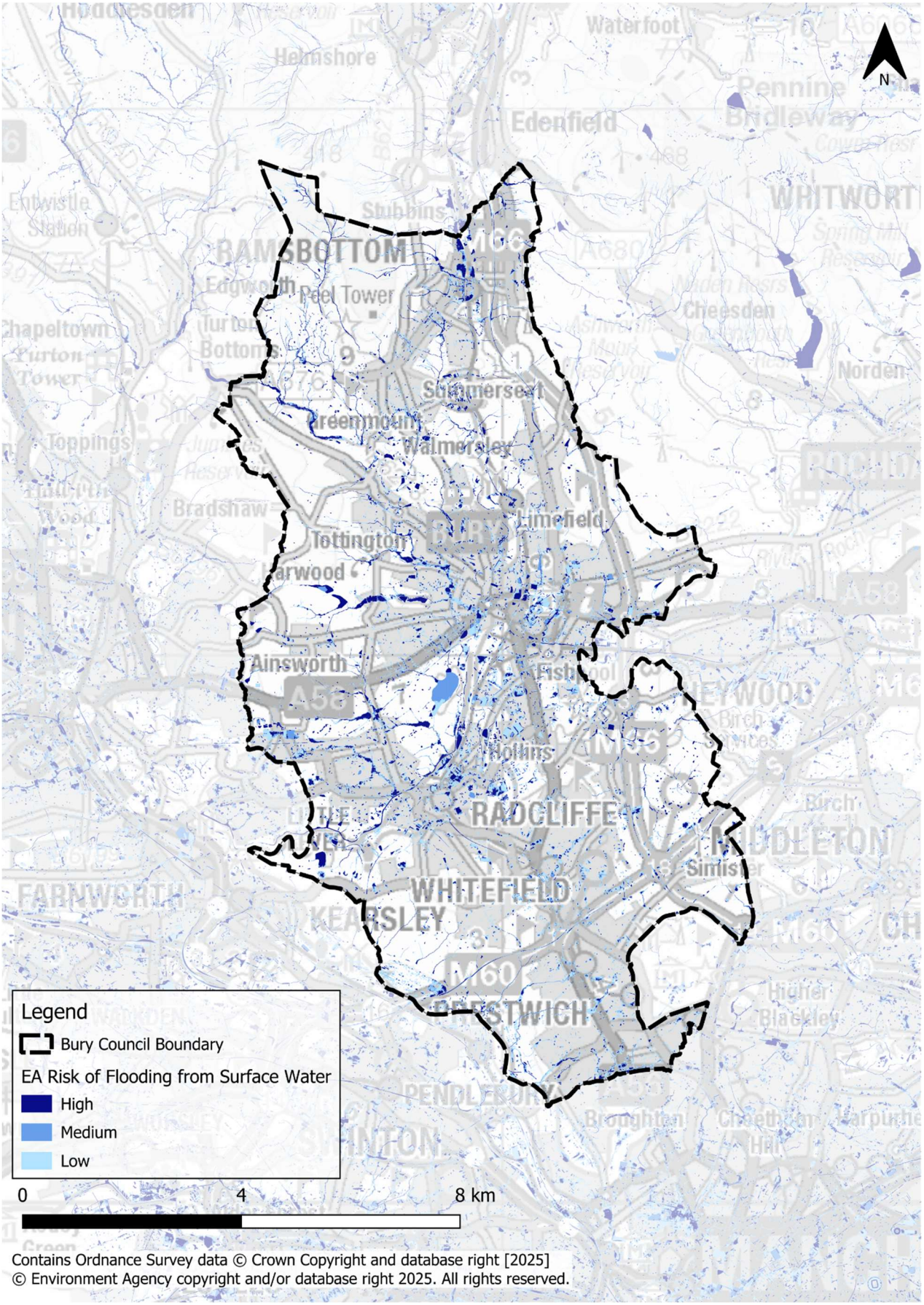


Figure 4-8: EA's Risk of Flooding from Surface Water mapping

4.6 Sewer flood risk

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 3.3% AEP rainfall event, although until recently this did not apply to smaller private systems. This means that sewers can be overwhelmed in larger rainfall and flood events.

New developments should not cause additional pressures on existing sewers due to the requirements to maintain greenfield runoff rates. However, increases in rainfall as a result of climate change can lead to existing sewers becoming overloaded, although this can be reduced through the use of well-designed SuDS to reduce surface water runoff. Water Cycle Studies can also assist LPA's in planning for new development and subsequent increased pressures on the sewerage and wastewater network.

United Utilities is the water company responsible for the management of the sewerage networks across the Borough.

4.6.1 Summer of sewer flood risk across the borough

Based on the United Utilities recorded historic incidents dataset, the areas with the highest number of recorded sewer flood events are Tottington, Redvales, St Mary's and Sedgley. It should be noted that historic incident records only indicate past susceptibility to sewer flooding and do not necessarily represent current risk. These locations may have since benefitted from network upgrades or targeted mitigation works.

4.7 Groundwater flood risk

In general, less is known about groundwater flooding and availability of data is limited. 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.
- Perched aquifers underlain by impermeable geology, particularly in low lying areas.

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, for example where there are major aquifers or in areas of historic mining.

The JBA Groundwater Emergence map shows the likelihood of groundwater emergence posing a risk to both surface and subsurface assets, based on predicted groundwater levels during a 1% AEP event. This divides groundwater emergence into five categories (Table 4-1).

Table 4-1: JBA Groundwater Emergence Map category descriptions

Category	Potential risk
0-0.025 - Groundwater levels are either at or very near (within 0.025m of) the ground surface.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025-0.5 - Groundwater levels are between 0.025m and 0.5m below the ground surface.	Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5-5 - Groundwater levels are between 0.5m and 5m below the ground surface.	There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5 - Groundwater levels are at least 5m below the ground surface.	Flooding from groundwater is not likely.
N/A - No risk.	This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.

It should be noted that this dataset only identifies areas likely to be at risk of groundwater emergence and does not allow for the prediction of the likelihood of groundwater flooding or quantification of the volumes of groundwater that might be expected to emerge in a given area.

4.7.1 Summary of groundwater emergence risk across the borough

Areas with the greatest risk of groundwater emergence generally follow watercourses, most notably the River Irwell. Communities potentially at risk include:

- Bury.
- Radcliffe.
- Walmersley.
- Whitefield.

A site-specific assessment for groundwater may be required to fully inform the likelihood of emergence to subsurface and surface areas. This may involve seasonal percolation testing and ground investigations.

The JBA Groundwater Emergence Map is shown in Figure 4-9 and included in the interactive GeoPDF maps (Appendix H)

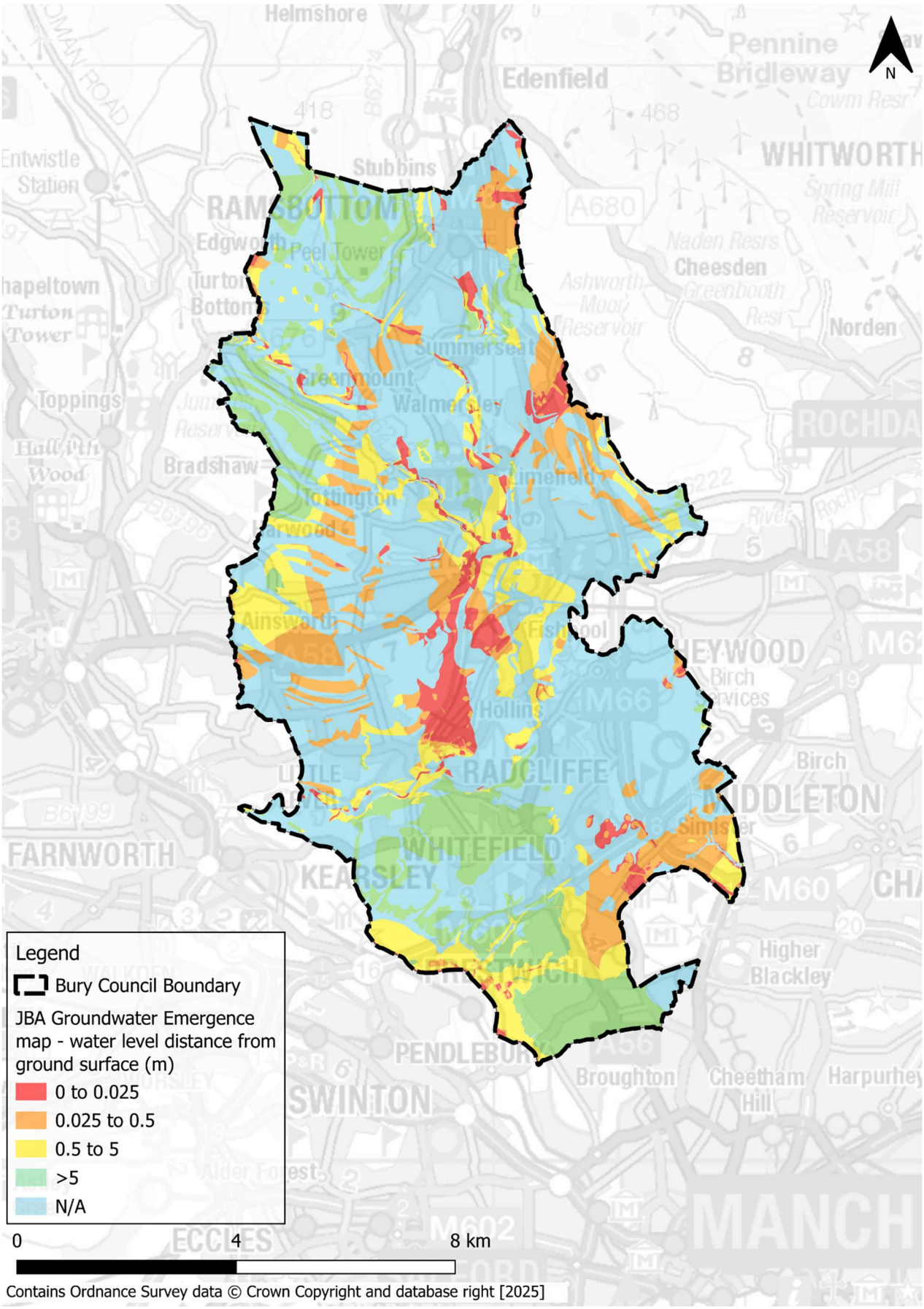


Figure 4-9: JBA Groundwater Emergence Map

4.8 Residual Risk

Residual risk comes in two main forms (PPG: Flood Risk and Coastal Change Paragraph: 041):

- Residual risk from flood risk management infrastructure.
- Residual risk to a development once any site-specific flood mitigation measures are taken into account.

Examples of residual flood risk from flood risk management infrastructure include:

- A breach of a raised flood defence, blockage of a surface water conveyance system (culvert), or failure of a pumped drainage system;
- Failure of a reservoir / impounded waterbody; and
- A flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot accommodate.

This SFRA does not assess the probability of infrastructure failure. However, in accordance with the NPPF, all sources of flooding need to be considered. If a defence breach or overtopping event were to occur, then the consequences to people and property could be significant. It is the responsibility of the developer to fully assess flood risk, propose measures to mitigate it and demonstrate that any residual risks can be safely managed.

Examples of residual flood risk to a single development to consider include:

- The depth of internal flooding predicted after any raising of land or finished floor levels;
- The flood hazard to which people would be exposed on access or escape routes after they have been raised; and
- A failure of flood forecasting or flood warning and the risks associated with people not receiving warnings or not acting upon them.

4.8.1 Canal flood risk

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:

- Lack of or poor maintenance.
- 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 & River Trust monitor embankments at the highest risk of failure for canalised systems that they own.

The Manchester, Bolton and Bury Canal runs through the centre and west of the Borough. The canal is owned and maintained by the Canal & River Trust. This canal has the potential to interact with other watercourses in the Borough, including the River Irwell where the two watercourses run adjacent to each other at Redvales. In the event of a breach, these watercourses have the potential to convey water from the canal to elsewhere in our downstream of the Borough increasing floor risk elsewhere. Any development proposed adjacent to a canal should include a detailed assessment of how a canal breach may impact the site, as part of a site-specific FRA. Guidance on development near canals is available from the Canal and River Trust (canalrivertrust.org.uk).

4.8.2 Reservoir flood risk

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

Reservoirs have a designated "risk category" set by the potential damage and loss of life in circumstances where there is a breach or an extreme flood event. Reservoirs designated as high risk are subject to increased inspection and maintenance requirements. However, this designation does not mean they are at a high risk of flooding. Allocation of new development downstream of an existing reservoir could potentially change the risk category of the reservoir and result in a legal requirement to improve the structural and hydraulic capacity of the dam. As the cost of implementing such works can be substantial, consideration should be given to whether it would be more appropriate to place development in alternative locations not associated with such risk.

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's Reservoir Flood Map (RFM) shows the potential consequences of reservoir failure. Developers and planners should check the Long-Term Risk of Flooding (gov.uk) before using the reservoir data shown in this SFRA to make sure they are using the most up to date mapping.

4.8.2.1 Reservoir Flood Map

The EA provide two flooding scenarios for the RFM: a ‘dry-day’ and a ‘wet-day’. The ‘dry day’ scenario shows the predicted flooding which would occur if the dam or reservoir fails when rivers are at normal levels. The ‘wet day’ scenario shows the predicted worsening of the flooding which would be expected if a river is already experiencing an extreme natural flood. It should be noted that these datasets give no indication of the likelihood or probability of reservoir flooding. The EA maps represent a credible worst-case scenario. In these circumstances it is the time to inundation, the depth of inundation, the duration of flooding and the velocity of flood flows that will be most influential.

The EA also provides the 'fluvial contribution' extent which shows the extent of river flooding added to the reservoir model to determine the impacts of failure on a wet-day. This can be compared with the FMfP to gauge the impact a flood from a reservoir may have.

The current mapping shows that there are 12 reservoirs located within the Borough and a further 56 reservoirs located outside of the Borough which may pose a risk within the Borough (detailed in Table 4-2). The RFM is shown in Figure 4-10 and is also included in the interactive GeoPDF maps (Appendix H).

Table 4-2: Reservoirs with flood extents that may impact the Borough

Reservoir	Easting and Northing	Reservoir Owner	Risk Category	Local Authority	Does reservoir impact Bury in 'dry day' scenario?
Ashworth Moor	383000, 415500	United Utilities PLC	High-risk	Rochdale	Yes
Belmont	367297, 416798	United Utilities PLC	High-risk	Blackburn with Darwen	Yes
Birtle Upper	383313, 412286	Pinnacle Living 2 Ltd	High-risk	Rochdale	Yes
Blackstone Edge	397018, 418241	United Utilities PLC	High-risk	Rochdale	Yes
Bolton Lower Reservoir	373480, 407330	A & F Haulage Limited	High-risk	Bolton	No
Calf Hey	375400, 422400	United Utilities PLC	High-risk	Lancashire	Yes
Castle Irwell FSR	382000, 401200	Environment Agency	High-risk	Bolton	No
Chelburn Upper	395400, 418400	United Utilities PLC	High-risk	Rochdale	Yes
Clarkes Hill	378850, 405630	United Utilities PLC	High-risk	Bury	Yes
Cloughbottom	384600, 426700	United Utilities PLC	High-risk	Lancashire	Yes
Clowbridge	382749, 428104	United Utilities PLC	High-risk	Lancashire	Yes
Cowm	388000, 418800	United Utilities PLC	High-risk	Lancashire	Yes
Cowpe	384275, 420136	United Utilities PLC	High-risk	Lancashire	Yes
Delph	370200, 415400	United Utilities PLC	High-risk	Blackburn with Darwen	Yes
Dingle	369400, 414500	United Utilities PLC	High-risk	Blackburn with Darwen	Yes

Reservoir	Easting and Northing	Reservoir Owner	Risk Category	Local Authority	Does reservoir impact Bury in 'dry day' scenario?
Doe Hey Lower	372800, 406800	Doe Hey Reservoir Company Limited	High-risk	Bolton	No
Doe Hey Upper	372481, 406775	Doe Hey Reservoir Company Limited	High-risk	Bolton	No
Doffcocker Lodge	368500, 410300	Bolton Metropolitan Borough Council	High-risk	Bolton	Yes
Elton	379000, 409400	Canal & River Trust	High-risk	Bury	Yes
Elton Vale Lower	378400, 411000	Mr Keith Talbot	High-risk	Bury	Yes
Entwistle	372250, 417450	United Utilities PLC	High-risk	Blackburn with Darwen	Yes
Greenbooth	385590, 415460	United Utilities PLC	High-risk	Rochdale	Yes
Hanging Lees	396900, 412400	United Utilities PLC	High-risk	Rochdale	No
Heaton Park Open	382500, 404700	United Utilities PLC	High-risk	Manchester	Yes
High Rid	366900, 410200	United Utilities PLC	High-risk	Bolton	Yes
Holden Wood	377400, 422200	United Utilities PLC	High-risk	Lancashire	Yes
Hollingworth Lake	393659, 414967	United Utilities PLC	High-risk	Rochdale	Yes
Jumbles	373500, 413900	United Utilities PLC	High-risk	Bolton	Yes

Reservoir	Easting and Northing	Reservoir Owner	Risk Category	Local Authority	Does reservoir impact Bury in 'dry day' scenario?
Kitcliffe	396000, 412500	United Utilities PLC	High-risk	Rochdale	Yes
Lowercroft Lower	377400, 410900	Mr Mark Walsh	High-risk	Bury	Yes
Lowercroft Middle	377100, 410950	Mr Keith Talbot	High-risk	Bury	Yes
Lowercroft Upper	376800, 411200	Mr Keith Talbot	High-risk	Bury	Yes
Mortfield Lodge	370600, 410200	Bolton Metropolitan Borough Council	High-risk	Bolton	No
Naden Higher	385300, 417200	United Utilities PLC	High-risk	Rochdale	Yes
Naden Middle	385400, 416600	United Utilities PLC	High-risk	Rochdale	Yes
Norman Hill	396700, 413000	United Utilities PLC	High-risk	Rochdale	Yes
Ogden (Milnrow)	395260, 412440	United Utilities PLC	High-risk	Rochdale	Yes
Ogden Haslingden	376500, 422500	United Utilities PLC	High-risk	Lancashire	Yes
Piethorne	396461, 412582	United Utilities PLC	High-risk	Rochdale	Yes
Pilsworth Reservoir	382800, 408400	I V Patel and I V Patel Ltd	High-risk	Bury	Yes
Rhodes Lodge - Big Pond (ID256)	385956, 405322	Rochdale Borough Council	High-risk	Rochdale	Yes
Rooden	397101, 411809	United Utilities PLC	High-risk	Rochdale	Yes

Reservoir	Easting and Northing	Reservoir Owner	Risk Category	Local Authority	Does reservoir impact Bury in 'dry day' scenario?
Rumworth	367400, 408300	United Utilities PLC	High-risk	Bolton	Yes
Scout Moor	382650, 419600	United Utilities PLC	High-risk	Lancashire	Yes
Shore Top	376700, 406400	Mr Peter Lee	Not high-risk	Bury	Yes
Spring Mill	387500, 417000	United Utilities PLC	High-risk	Lancashire	Yes
Springs	368947, 414744	United Utilities PLC	High-risk	Blackburn with Darwen	Yes
Starmount Lodge	375569, 408766	Bury Council	High-risk	Bury	Yes
Walves	374700, 415100	Mr John Ramwell	High-risk	Blackburn with Darwen	No
Ward's (Blue Lagoon)	367000, 415800	Blue Lagoon Heritage Limited	High-risk	Blackburn with Darwen	No
Watergrove	391000, 417700	United Utilities PLC	High-risk	Rochdale	Yes
Wayoh	373700, 416400	United Utilities PLC	High-risk	Blackburn with Darwen	Yes
Withins	378500, 408700	Withins Reservoir Limited	High-risk	Bury	Yes
Woodgate Hill No.1	382000, 412200	United Utilities PLC	High-risk	Bury	Yes
Woodgate Hill No.2	382400, 412000	United Utilities PLC	High-risk	Bury	Yes
Heaton Park Boating Lake	383200, 403900	Manchester City Council	High-risk	Manchester	No

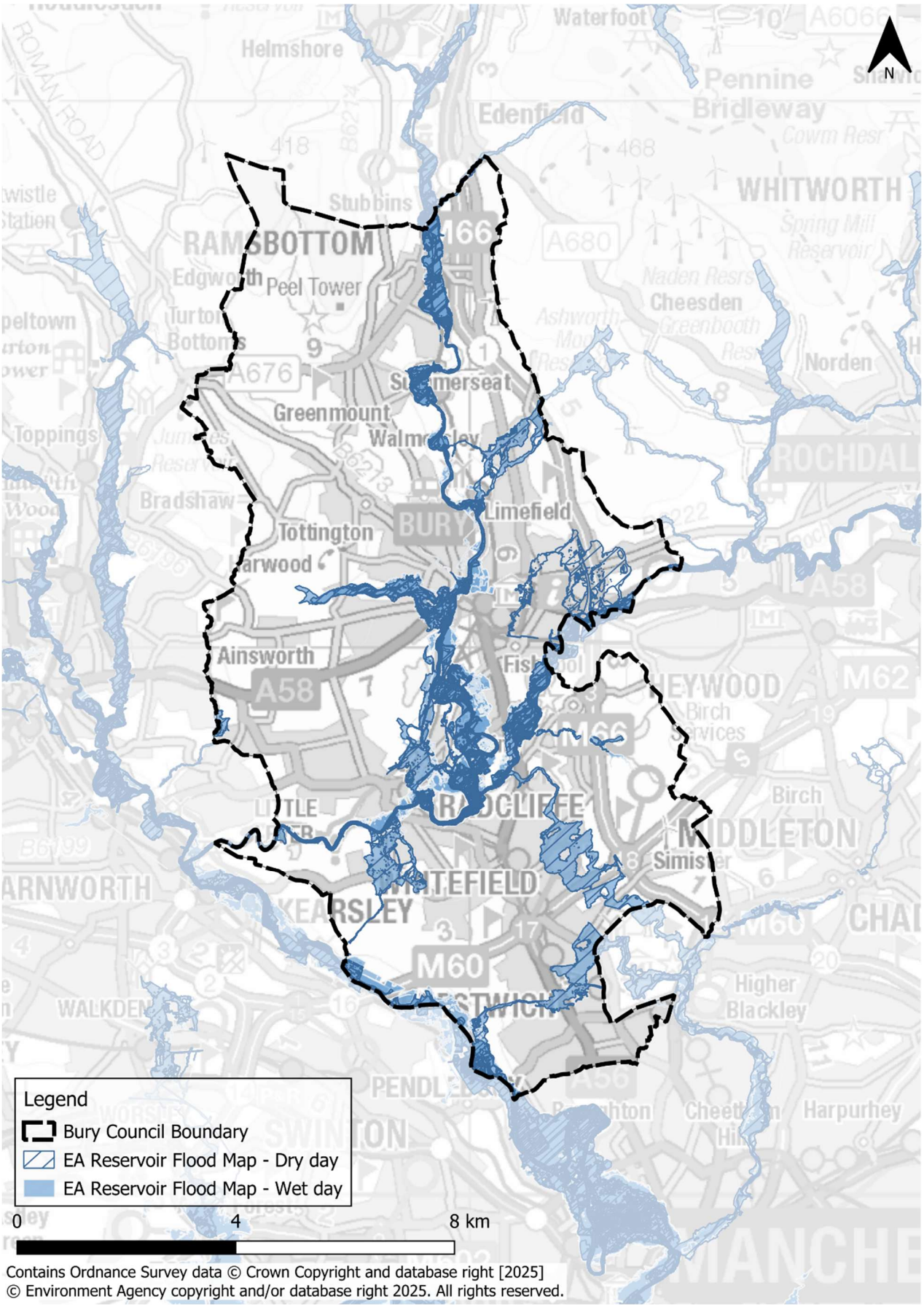


Figure 4-10: EA Reservoir Flood Map within the Borough

4.9 Combined sources of flood risk

In urban areas, surface water drainage networks and sewer systems are closely linked, with their interaction significantly influencing flood risk. Traditional urban drainage relies on impermeable surfaces directing rainwater into pipes and culverts, which often connect to combined sewers carrying both wastewater and stormwater. During heavy rainfall, these systems can become overwhelmed, leading to overflows that discharge untreated sewage into watercourses, exacerbating flooding and pollution.

4.10 Summary of flood risk in the Borough of Bury

The risk across the Borough is varied:

- Fluvial risk predominantly originates from the River Irwell and the River Roch. Areas at risk include south of Bury town, Redvales and Radcliffe, along with Ramsbottom in the north of the Borough. Additional areas of fluvial risk are identified along tributaries of the River Irwell, including Kirklees Brook. Communities at risk from fluvial flooding along Kirklees Brook include Woolfold and Woodhill.
- Surface water risk is scattered across the study area, largely compromised of areas of ponding within topographically low areas. Narrow flow paths are produced as a result of the steep topography of the Borough.
- Groundwater emergence risk is greatest in areas of Bury, Radcliffe, Walmersley, and Whitefield.
- Reservoir flood risk is, predominately along the River Irwell and the River Roch. Other areas of risk include Whitefield and areas to the east of Bury town.

5 Impact of climate change

The NPPF sets out that flood risk should be managed over the lifetime of a development, taking climate change into account. This section sets out how the impact of climate change on flood risk should be considered.

5.1 Climate change guidance

The Climate Change Act 2008 (legislation.gov.uk) 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. This was updated in June 2019 under the Climate Change Act 2008 (2050 Target Amendment) Order (legislation.gov.uk) to a 100% reduction (or net zero) by 2050.

In 2018, the Met Office published new UK Climate Projections (UKCP18) (gov.uk). The EA used these projections to update their guidance on climate change allowances for new developments for peak river flows (July 2021) and peak rainfall intensities (May 2022). 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 considers risk allowances on a management catchment level, rather than a river basin level. The Borough is wholly within the Irwell management catchment.

Developers should check Flood risk assessments: climate change allowances (gov.uk) for the most recent guidance before undertaking a detailed FRA.

5.2 Peak river flows

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 summers. Rising river levels may also increase flood risk.

The peak river flow allowances (gov.uk) provided in the guidance shows the anticipated changes to peak flows for the management catchment within which the subject watercourse is located. The range of allowances are based on percentiles which describe the proportion of possible scenarios that fall below an allowance level:

- The central allowance is based on the 50th percentile (exceeded by 50% of the projections in the range).
- The higher central allowance is based on the 70th percentile (exceeded by 30% of the projections in the range).
- The upper end allowance is based on the 95th percentile (exceeded by 5% of the projections in the range).

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

- 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 (gov.uk).

5.2.1 Peak river flow allowances

The Borough of Bury is located within the Irwell management catchment for peak river flow allowances, which are shown in Table 5-1.

Table 5-1: Peak river flow allowances for the Irwell Management Catchment

Allowance category	Total potential change (%) anticipated for '2020s' (2015 to 2039)	Total potential change (%) anticipated for ‘2050s' (2040 to 2069)	Total potential change (%) anticipated for ‘2080s’ (2070 to 2125)
Upper end	24	43	75
Higher Central	15	26	46
Central	12	19	35

5.2.2 Which peak river flow allowance to use?

The EA guidance (Flood risk assessments: climate change allowances (gov.uk)) states that both the central and higher central allowances should be assessed in SFRAs. However, the higher central allowance is only required to be assessed where there is planned 'essential infrastructure'.

The Flood Zone and flood risk vulnerability classification (gov.uk) should be considered when deciding which allowances apply to the development or the plan. Specific guidance for which climate change allowance estimates should be applied can be found in the EA climate change guidance (gov.uk).

5.2.3 Representation of fluvial climate change within the Level 1 SFRA

The Central allowance for the 2080s epoch has been used for risk of flooding from rivers, as per the EA's guidance on climate change. Eight of the available river models provided by the EA for use in this SFRA are up to date with the latest climate change allowances, namely:

- 2006 Pigs Lee Brook
- 2009 Kirklees Brook
- 2009 Gipsey Brook
- 2009 Holcombe Brook

- 2016 Crow Trees Farm Brook
- 2017 Lower Irwell
- 2017 Lower Roch
- 2017 Mid Irwell

These EA models have been used to inform the future fluvial risk across the Borough. The FMfP also now includes the Flood Zones plus Climate Change dataset. This dataset represents how the combined extent of Flood Zones 2 and 3 could increase with climate change, ignoring the benefits of any existing flood defences. This dataset has been used to represent fluvial climate change in areas not subject to detailed modelling. No additional modelling has been completed as part of this Level 1 SFRA.

The fluvial climate change mapping is included in the interactive GeoPDF maps (Appendix H).

5.2.4 Implications of climate change for fluvial risk across the borough

According to the available EA detailed model climate change outlines, as shown in Figure 5-1, there is a slight increase to flood risk when taking into account the impact of climate change for certain areas within the Borough, primarily along the River Irwell and River Roch. Areas with a predicted increase in flooding as a result of climate change include Bury town centre, Summerseat, Fletcher Fold and Ramsbottom, based on the available modelled climate change data.

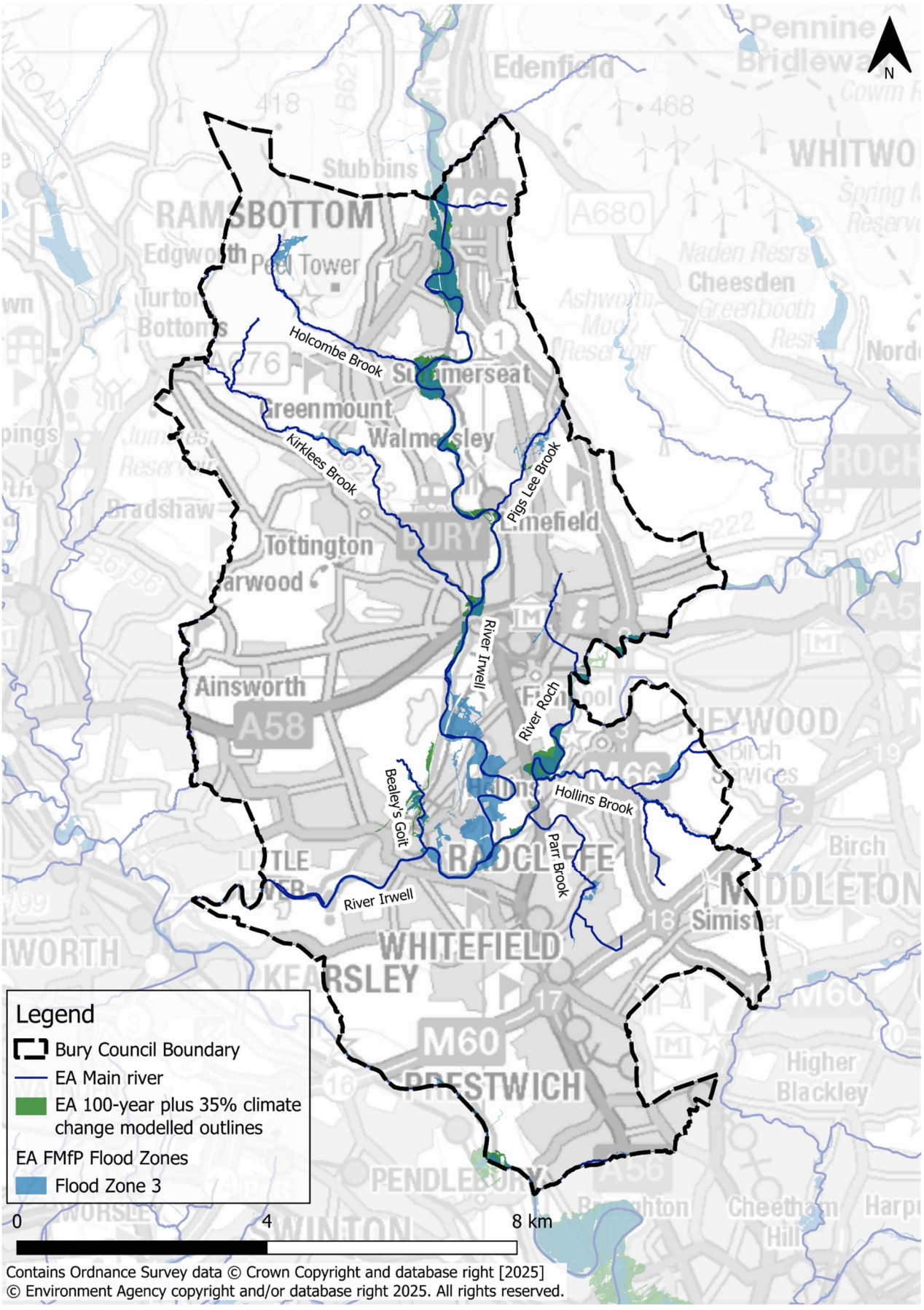


Figure 5-1: EA Detailed Flood Model Outlines - 100-year plus 35% climate change

5.3 Peak rainfall intensities

Climate change is predicted to result in wetter winters and increased summer storm intensities in the future. This increased rainfall intensity will likely negatively impact 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 (gov.uk) which shows anticipated changes in peak rainfall intensity which can be used for site-scale applications (like urban drainage design) and surface water flood mapping in small catchments (<5km^2).

The guidance suggests that direct rainfall modelling may not be suited to larger (>5km^2) catchments 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 5.2.1).

5.3.1 Peak rainfall intensities for the Borough

The Borough is located within the Irwell management catchment for peak river flow allowances, which are shown in Table 5-2.

Table 5-2: Peak rainfall intensity allowances for small and urban catchments for the Irwell Management Catchment

Allowance category	Total potential change (%) anticipated for '2050s' (2022 to 2060) 3.3% AEP	Total potential change (%) anticipated for '2050s' (2022 to 2060) 1% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 3.3% AEP	Total potential change (%) anticipated for '2070s' (2061 to 2125) 1% AEP
Upper end	35	40	40	45
Central	25	25	30	30

5.3.2 Which peak rainfall intensity allowance to use?

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 climate change guidance (gov.uk). For FRAs and SFRAs the upper end allowance should be used. The EA guidance recommends that the upper end allowance is considered for both the 3.3% and 1% AEPs for the 2070's epoch (2061 to 2125), unless the allowance for the 2050's epoch (2022 to 2060) is higher, in which case this should be used. This is appropriate for development with a lifetime beyond 2100. For development with an expected shorter lifetime, the central allowance can be used.

5.3.3 Representation of surface water climate change within the Level 1 SFRA

The updated RoFSW now includes for one modelled climate change scenario, the 2050s central allowance for the 3.3%, 1% and 0.1% AEP events. However, as stated above, the upper end allowance on peak rainfall for the 2070s should be assessed in SFRAs. Therefore, at the time of writing, the national surface water climate change mapping available, is unsuitable for consideration in development planning.

Therefore, for this Level 1 SFRA, the 0.1% AEP event is considered as a conservative, worst case proxy for the 1% AEP plus climate change extent. The proxy surface water climate change mapping is included in the interactive GeoPDF maps (Appendix H)

5.4 Groundwater

The effect of climate change on groundwater flooding, and those watercourses where groundwater has a large influence on winter flood flows, is uncertain. Milder wetter winters may increase the frequency of groundwater flooding incidents in areas that are already susceptible, but warmer drier summers may counteract this effect by drawing down groundwater levels to a greater extent during the summer months. The effect of climate change on groundwater levels for sites in areas where groundwater may be an issue, as informed at a strategic level by the JBA Groundwater Emergence map (Section 4.7), should be considered at the planning application stage. There is currently no available dataset that assesses the impacts of climate change on groundwater.

5.5 Adapting to climate change

PPG: Climate Change (gov.uk) Paragraph 003 (Reference ID: 6-003-20140612) contains information and guidance for how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Paragraph 005 (Reference ID: 6-005-20140306) also provides considerations for the LPA on dealing with the uncertainty of climate risks and accounting for climate change in a realistic way within developments.

The Bury Council Climate Action Plan (2024) sets out how the Council aims to achieve carbon neutrality by 2038, following the declaration of a climate emergency in 2019. The plan outlines the actions being taken by Bury Council to achieve this and the progress being made against each action.

6 Flood risk infrastructure

This section provides a summary of existing flood alleviation schemes and assets in the Borough. Planners should note the areas that are protected by defences where further work to understand the undefended 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 according to their jurisdiction as follows:

- The EA holds a national asset database that is updated by local teams known as the Asset Information Management System (AIMS).
- The LLFA should hold a register of significant local flood risk assets, required under Section 21 of the FWMA (2010).
- Highways authorities (National Highways for major roads in England, Bury Council for local, minor roads) 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 the assets the 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 contains full information on the location, condition, and ownership of all the assets in their area. RMAs generally take a prioritised approach to collecting asset information, which will continue to refine the understanding of flood risk over time.

6.2 Standards of Protection

Flood defences are designed to give a specific Standard of Protection (SoP), reducing the risk of flooding to people and property in flood prone areas. For example, a flood defence with a 1% AEP SoP means that the flood risk in the defended area is reduced to at least 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, lack of maintenance, 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 ongoing hydraulic modelling programme may revise flood risk datasets and, therefore, the SoP offered by flood defences in the area may also be revised. The AIMS dataset contains information on SoP.

6.3 Maintenance

Different authorities have responsibilities relating to maintenance of flood risk assets, set out in Table 6-1. It is important that the authorities work in partnership to maintain flood risk assets and manage flood risk across the Borough.

Table 6-1: Flood risk asset maintenance responsibilities based on the FWMA (2010).

Authority	Asset maintenance responsibilities
EA	Permissive powers to maintain and improve main rivers, ultimate responsibility for maintaining watercourses rests with the landowner.
Local authorities	Permissive powers to maintain and improve ordinary watercourses, ultimate responsibility for maintaining watercourses rests with the landowner.
LLFA	Permissive powers, limited resources are prioritised and targeted to where they can have the greatest effect.
Highways authorities	Duty to maintain public roads, making sure they are safe, passable, and the impacts of severe weather have been considered. Responsible for maintaining sections of watercourses where they are crossed by highways.
Water companies	Duty to effectually drain their area. What this means in practise 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 sewer flooding.
Riparian owners	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.

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 defence has degraded over time. Drainage networks can frequently become blocked with debris which can lead to blockages of culverts and bridge openings.

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 make future users of the development aware of their obligations to maintain watercourses.

Formal structural defences are given a rating based on a grading system for their condition. A summary of the grading system used by the EA for condition is provided in Table 6-2.

Table 6-2: Grading system used by the EA to assess flood defence condition.

Grade	Rating	Description
1	Very good	Cosmetic defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce the performance of the asset.
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation required.
5	Very poor	Severe defects resulting in complete performance failure.

Source: Condition Assessment Manual – EA 2006

6.4 Major flood risk management assets in the Borough

The EA's AIMS dataset includes raised flood defences. Table 6-3 details the locations which benefit from formal flood defences within the AIMS dataset. Developers should refer to the AIMS Spatial Flood Defences dataset (gov.uk) for further information on specific flood defences. The AIMS dataset is shown on the interactive GeoPDF maps.

Table 6-3: Defence locations included in the EA 'AIMS' dataset

Watercourse	Location	Type	Design SoP (AEP)	Target Condition Rating (1-5)	Actual Condition Rating (1-5)	Ownership
Holcombe Brook	Summerseat	Engineered High Ground	Unknown	Unknown	Unknown	Unknown
River Irwell	Ramsbottom	Embankment	Unknown	Unknown	Unknown	Unknown
River Irwell	Ramsbottom	Wall	100	3	3	Unknown
River Irwell	Ramsbottom	Wall	100	3	4	Unknown
River Irwell (2 assets)	Ramsbottom	Wall	100	3	2	Unknown
River Irwell (2 assets)	Ramsbottom	Wall	100	3	3	Unknown
River Irwell (4 assets)	Ramsbottom	Engineered High Ground	100	3	3	Unknown
River Irwell (2 assets)	Ramsbottom	Engineered High Ground	100	Unknown	Unknown	Unknown
River Irwell	Summerseat	Embankment	Unknown	Unknown	Unknown	Unknown
Unknown	Tottington	Embankment	Unknown	Unknown	Unknown	Unknown
Unknown	Bury	Wall	Unknown	Unknown	Unknown	Unknown
Kirklees Brook (2 assets)	Bury	Wall	Unknown	Unknown	Unknown	Unknown
River Irwell (5 assets)	Bury	Embankment	100	3	2	Private individual, Company or Charity
River Irwell	Bury	Embankment	Unknown	Unknown	Unknown	Unknown
Bealey's Goit	Bury	Embankment	100	3	2	Private individual, Company or Charity
River Irwell (17 assets)	Bury	Wall	100	3	1	Private individual, Company or charity
River Irwell (8 assets)	Bury	Wall	100	3	2	Private individual, Company or charity

Watercourse	Location	Type	Design SoP (AEP)	Target Condition Rating (1-5)	Actual Condition Rating (1-5)	Ownership
River Irwell	Bury	Wall	100	3	3	Private individual, Company or charity
River Irwell (2 assets)	Bury	Wall	100	Unknown	Unknown	Private individual, Company or charity
Bealey's Goit (4 assets)	Bury	Wall	100	Unknown	Unknown	Private individual, Company or charity
Bealey's Goit	Bury	Wall	Unknown	Unknown	Unknown	Private individual, Company or charity
River Irwell	Bury	Flood Gate	Uknown	3	3	Private individual, Company or charity
River Irwell	Redvales	Embankment	100	Unknown	Unknown	Unknown
River Irwell (3 assets)	Redvales	Embankment	Unknown	Unknown	Unknown	Unknown
River Irwell	Redvales	Embankment	100	Unknown	Unknown	Private individual, Company or Charity
Bealey's Goit (2 assets)	Radcliffe	Embankment	100	Unknown	Unknown	Unknown
Bealey's Goit	Radcliffe	Embankment	100	Unknown	Unknown	Private individual, Company or Charity
River Irwell (3 assets)	Redvales	Wall	100	Unknown	Unknown	Private individual, Company or Charity
River Irwell	Redvales	Engineered High Ground	Unknown	Unknown	Unknown	Private individual, Company or

Watercourse	Location	Type	Design SoP (AEP)	Target Condition Rating (1-5)	Actual Condition Rating (1-5)	Ownership
						Charity
Bealey's Goit (3 assets)	Radcliffe	Wall	100	Unknown	Unknown	Private individual, Company or Charity
Unknown	Radcliffe	Engineered High Ground	5	Unknown	Unknown	Unknown
Crow Trees Farm Brook	Radcliffe	Engineered High Ground	5	Unknown	Unknown	Unknown
River Irwell (3 assets)	Radcliffe	Embankment	Unknown	Unknown	Unknown	Unknown
River Irwell	Radcliffe	Wall	Unknown	Unknown	Unknown	Unknown
Singleton Brook (2 assets)	Prestwich	Engineered High Ground	Unknown	Unknown	Unknown	Private individual, Company or Charity
Blackshaw Brook	Breightmet	Wall	Unknown	Unknown	Unknown	Unknown

6.5 Existing and future flood alleviation schemes

The EA manages government investment to reduce flood risk and coastal erosion in England. The LLFA works with the EA and other RMAs to deliver Local Flood Risk Management Strategies, focusing on surface water, groundwater, and ordinary watercourse flooding, and deliver specific flood risk management projects outlined in the local strategy and action plan.

6.5.1 Completed schemes in the Borough

6.5.1.1 Radcliffe and Redvales Flood Alleviation Scheme

The Radcliffe and Redvales Flood Defence scheme was developed following the 2015 Boxing Day flooding, led by the EA in partnership with the LLFA. The scheme includes over 2.5km of flood defences along the River Irwell along with other flood protection measures.

Both Phase 1 and Phase 2 of the scheme are now complete. Phase 3 will involve the installation of flood gates across Hardy's Gate Bridge and the implementation of NFM. NFM measures are planned along Stanney Brook, south-east of Rochdale, comprising of natural earthworks to increase flood storage along the Brook, prior to it joining the Roch. The scheme is expected to be completed by Summer 2027, at the time of writing.

6.5.2 Future schemes

There are no future flood alleviation schemes proposed within the Borough.

7 Flood risk management requirements for developers

This section provides guidance on site-specific FRAs and other principles for managing flood risk in new development.

7.1 Early consultation with statutory and non-statutory consultees

Developers should consult with the EA, the LLFA, Canal & River Trust and United Utilities at an early stage to discuss flood risk including requirements for site-specific FRAs, detailed hydraulic modelling and foul and surface water drainage assessment and design. It should be noted that some of these consultees may need to charge for data and/or advice requested by developers or landowners. However, developers should first consult the LPA when considering a site for development on whether the site has already been subject to the Sequential Test as part of the local plan making process.

7.2 Site-specific FRAs

7.2.1 What is a site-specific FRA?

A site-specific FRA is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site and should accompany a planning application where required (see Section 7.2.2). It is recommended that the assessment is undertaken by a suitably qualified person or company. The assessment should demonstrate how flood risk will be managed now and over the development's lifetime, taking both climate change and the vulnerability of users into account. The developer should check with the LPA whether they are required to apply the Sequential Test prior to commencing with a site-specific FRA.

The objectives of a site-specific FRA are to establish:

- Whether a proposed development is likely to be affected by current or future flooding from any source.
- Whether a proposed development will increase flood risk elsewhere.
- Whether the measures proposed to deal with these effects and risks are adequate and appropriate.
- The nature of residual risk and whether this can be safely managed.
- The evidence, if necessary, to apply the Sequential Test.
- The evidence, if applicable, to show whether the development will be safe for its lifetime and pass the Exception Test.

7.2.2 When is an FRA required?

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

- In Flood Zones 2, 3, or 3b.
- Within Flood Zone 1 with a site area of 1 hectare or more.
- Within the 'Flood Zones plus Climate Change' extent shown on the EA Flood Map for Planning.
- Within Flood Zone 1 and the Flood Map for Planning shows it is though shown to be at risk of flooding from surface water.
- In areas with critical drainage problems (as identified by the EA or LLFA).
- Within Flood Zone 1 where the LPA's SFRA shows it will be at increased risk of flooding during its lifetime.
- Where the vulnerability classification is increased and may be subject to sources of flooding other than rivers or sea.

7.2.3 What level of detail is needed in a site-specific FRA?

Site-specific FRAs should be proportionate to the degree of flood risk and the scale, nature, and location of the development. The SFRA can be used by developers as a starting point to identify the initial flood risk to a site however a pre-application consultation is key to define the scope of the FRA and identify data requirements, making sure that latest available datasets are used.

7.2.4 Guidance for FRAs

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

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

Guidance should be sought from the EA and the Council at the earliest possible stage, and opportunities should be taken to incorporate environmental enhancements and reduce flooding from all sources both to and from the site through development proposals. Developers should seek to go beyond managing the flood risk and support opportunities to reduce the causes and impacts of flooding, whilst enhancing and conserving the natural environment. PPG: Flood risk and coastal change (gov.uk) Paragraphs 062 - 067 provide further information. Potential strategic solutions to consider are detailed in Section 12 of this report.

7.2.4.1 LLFA surface water management guidance

The GMCA have developed guidance for the management of surface water to inform the development of planning applications. The Surface Water Management Plan (SWMP) for Greater Manchester was completed in 2012 and is comprised of five key aims and objectives:

- Using the communication and engagement strategy and through involvement with the technical work, the SWMP should support and be part of the delivery mechanism for the AGMA (now GMCA) and unitary level capacity building initiatives.
- Deliver output that can be used to satisfy the requirements of the Flood Risk Regulations as far as possible. Note the Flood Risk Regulations have now been revoked.
- Provide greater detailed understanding of flood risk at identified local hotspots.
- Consider interactions between surface water and other sources of flooding.
- Provide an evidence base that can be used cross-departmentally by all Greater Manchester authorities, such as ongoing spatial planning and Local Flood Risk Management Strategies.
- Provide an evidence base that can be used by external partners, such as the EA to feed into their strategy work and local asset systems management planning, and United Utilities to feed into future planning for the AMP6 period (Note AMP6 ended March 2020, currently in the AMP8 period) through the Period Review process.
- Provide a robust and widely supported SWMP, which can inform, align and deliver public and private investment over the next 10-20 years.

The key hotspots within Bury that were identified in the SWMP are:

- Water Street
- Gypsy Brook
- Ramsbottom

The LLFA should be contacted to access full and up to date guidance.

7.3 Emergency planning

Safe access and escape routes from the site should always be available from developments. The developer should seek to incorporate an emergency plan and ensure safe refuge points are available if the development site has been identified to be at risk of flooding. Emergency planners, emergency services, the local resilience forum, and all other flood incident responders should be consulted when designing an emergency plan. For further details on emergency planning, see Section 10 of this report.

8 Principles for site design and master planning

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. This section sets out the principles for site design through ground level modifications, consideration of the impact of defence infrastructure on planning, and property flood resilience.

The NPPF states that a sequential, risk-based approach should be applied to try to locate more vulnerable land uses away from high-risk areas to higher ground and lower flood risk areas, while more flood-compatible development (e.g., recreational spaces) can be located in higher risk areas. Higher risk areas can also be retained and enhanced as natural green space. Whether parking in floodplains is appropriate will be based on the likely flood depths and hazard, evacuation procedures and availability of flood warnings and alerts. The nature of risk to water quality also needs to be considered and mitigated to ensure that accumulated hydrocarbons and other vehicle related pollutants are not released to the aquatic environment.

Waterside areas, or areas along known flow routes, can be included in development layouts as blue green infrastructure, being used for recreation, amenity, and environmental purposes, allowing the preservation of flow routes and flood storage, whilst at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Appropriate landscaping should provide safe access to higher ground from these areas and avoid the creation of isolated 'dry islands' as water levels rise.

Bury Local Plan Policy LP-GI1 (Green Infrastructure)

The Council will seek to protect and enhance a network of multi-functional green and blue infrastructure and will support proposals to improve the connectivity and quality of the network where these accord with other Local Plan policies and proposals.

8.1 Modification of ground levels

Modifying ground levels to raise the land above the design 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 floodwaters. However, care must be taken as raising land above the flood level 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 analysis 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 (for it to fill and drain by gravity). 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). Appendix A3 of the CIRIA Publication C624 (ciria.org) provides guidance on how to address floodplain compensation.

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

Any proposal for modification of ground levels within areas of flood risk will need to be discussed at an early stage with the EA and its impacts assessed as part of a detailed FRA.

8.2 Raised floor levels

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

Developers should refer to the Preparing a flood risk assessment: standing advice (gov.uk) for the latest guidance on FFLs but generally the EA advises the minimum finished floor levels should be set 600mm above the 1% AEP fluvial plus climate change peak flood level (considered to be the standard design event), where the appropriate climate change allowances have been used. An additional allowance may be required because of residual risks relating to blockages to the channel, culvert or bridge and should be considered as part of an FRA. Lowering existing FFLs below the existing levels within the 1% AEP plus climate change floodplain would not be acceptable and should be discouraged. New development offers opportunities to improve the resilience of buildings to flooding.

Building design and raised floor levels are the only way to fully reduce groundwater flood risk, through ensuring FFLs are raised above predicted groundwater levels considering known groundwater issues.

Allocating the ground floor of a building for less vulnerable, non-residential, or non-habitable 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 of flood defences). This risk can be reduced by use of multiple storey construction and raised areas that provide a point of refuge. However, safe access and escape routes must still be available, particularly when flood duration covers many days.

Similarly, the use of basements should be avoided in areas of flood risk. Habitable uses of basements within Flood Zone 3 and areas at high or medium risk of surface water flooding should not be permitted, whilst basement dwellings (classed as 'highly vulnerable') in Flood Zone 2 will be required to pass the Exception Test.

Where the ground level of a site is below the ground level at the point where the drainage connects to the public sewer, care must be taken to ensure that the proposed development is not at an increased risk of sewer surcharge. It is good practice for the FFLs and manhole cover levels (including those that serve private drainage runs) to be higher than the manhole cover level at the point of connection to the receiving sewer. Alternatively, mitigation measures may need to be incorporated into the proposals to protect against sewer surcharge.

8.3 Development and raised defences

8.3.1 Undefended and residual risk

Construction of localised raised floodwalls or embankments to protect new development is not a preferred option, as a residual risk of flooding will remain. New defence works would normally be into in place to protect existing development. Compensatory storage must be provided where raised defences remove storage from the floodplain. This is because raised defences prevent floodwater from spreading naturally across the floodplain, which can increase flood levels elsewhere.

Where development is located behind, or in an area that benefits from defences, both the undefended risk and the residual risk of flooding from defence breaching or overtopping must be considered by the developer and it must be demonstrated that they can be safely managed. The assessment of the risk should consider:

- Improvements required to the level of protection afforded by existing defences for future development.
- The future commitment and funding to maintain the current SoP of any existing defences.
- Any disparities between the proposed level of commitment to maintain the current standard of protection and the level of protection required to support future development.
- The effects of climate change on the future SoP afforded by the defences and the associated maintenance and upgrade commitments required.
- Any land required to be safeguarded for affordable future flood risk management measures.

8.3.2 Breach assessment

The assessment of the residual risk from a breach event should consider an assessment of the hazards that might occur from subsequent flood flows, considering depth and flow velocities, so that the safety of people and structural stability of properties and infrastructure can be appropriately considered.

Considerations should include the location of a breach, when it would occur and for how long, the depth of the breach (toe level), the loadings on the defence, and the potential for multiple breaches.

There are various ways of assessing breaches using hydraulic modelling. EA LIT56413 Breach of Defences Guidance (2021) provides some guidance for breach assessment from the EA. It is recommended that the EA is consulted if a development site is located near to a flood defence, to understand the level of assessment required and to agree the location(s) and approach for the breach assessment.

8.3.3 Overtopping assessment

The assessment of the residual risk from overtopping of defences should consider the potential flood hazard to people, based on factors such as the height of floodwaters above the crest of the defence, the proximity and elevation of receptors relative to the defence and the likely depth and velocity of floodwaters in the event of overtopping. The Defra and EA Flood Risks to People guidance document (gov.uk) provides standard flood hazard ratings based on the distance from the defence and the level of overtopping. Overtopping modelling or assessments should be undertaken for any sites located near to defences or perched ponds/reservoirs, accounting for climate change.

8.3.4 Developer contributions

In some cases, and following 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 the 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). LPAs can choose to impose a community infrastructure levy (CIL) on development in their area.

8.4 Buffer strips

The provision of a buffer strip alongside a watercourse allows additional capacity to accommodate climate change and means access to the watercourse, and any structures or defences, is retained for future maintenance purposes. It also helps to avoid the disturbing of riverbanks which may adversely impact local ecology, and the need to have to construct engineered riverbank protection. A buffer strip of 8m is recommended for any non-tidal main river. Where flood defences are present, these distances should be taken from the landward toe of the defence.

Building adjacent to riverbanks may cause issues with the structural integrity of the riverbanks and subsequently the building itself, making future maintenance of the river much more difficult. Flood Risk Activity Permits (gov.uk) from the EA are likely to be required for development in these areas alongside any planning permission. There should be no built development within these distances from main rivers/flood defences (where present).

Bury Local Plan Policy LP-W3 (Water Resources)

Maintain an undeveloped and unobstructed buffer strip of at least ten metres from the top of the bank of any Main River and at least five metres from any ordinary watercourse and any new development. For main rivers, if it can be demonstrated that ten metres is not feasible or viable then eight metres should be achieved in line with Environment Agency regulations.

8.5 Property Flood Resilience

Property Flood Resilience (PFR) includes a range of measures that can be installed around the perimeter of a building to reduce the risk of internal flooding. PFR can also be used within a building, to minimise the damage done if internal flooding stills occurs. PFR aims to help households and businesses reduce the damage caused by flooding, helping to speed up recovery and reoccupation.

PFR encompasses two main elements:

- Resistance - Resistance measures are installed around the perimeter of a building. These measures aim to reduce or resist the amount of water entering the building, thus reducing the damage caused internally. Examples include flood doors/barriers, anti-flood airbricks, and non-return valves.
- Resilient adaptation (recoverability) - Adaptations made within a property, which aim to reduce the damage caused if internal flooding occurs.

The consideration of resistance measures and resilient adaptation should not be used to justify development in inappropriate locations. However, having applied planning policy there may be some instances where development is permitted in high or medium flood risk areas where application of resistance and resilience measures may be required.

There may also be opportunities for 'change of use' developments to be used to improve the flood resistance and resilience of existing development, which may not have been informed by a site-specific FRA when first constructed.

Further information and guidance on best practice can be found online in the following locations:

- Department for Communities and Local Government Improving the Flood Performance of New Buildings: Flood Resilient Construction (gov.uk)
- CIRIA Property Flood Resilience Code of Practice (ciria.org)
- EA Flood resilience construction of new buildings (gov.uk)

9 Surface water management and SuDS

This section provides an overview of SuDS, including signposting to relevant guidance, as well as guidance for developers on surface water drainage strategies

9.1 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) are management practices which enable surface water to be drained in a more sustainable manner and to mimic the local natural drainage. The inclusion of SuDS within developments is also an opportunity to enhance ecological and amenity value, and promote blue green infrastructure, incorporating above ground features into the development landscape strategy.

It is essential that developers consider sustainable drainage at an early stage of the development process – ideally at the pre-application or master planning stage. To further inform development proposals at the master planning stage, pre-application submissions are accepted by the Council. This assists with the delivery of well designed, appropriate, and effective SuDS. Applicants are also encouraged to engage with United Utilities to discuss their surface water proposals, especially where adoption is proposed.

9.2 Sources of SuDS guidance

9.2.1 National standards for SuDS

Previously, SuDS guidance was developed to sit alongside the PPG and provide non-statutory standards as to the expected design and performance for SuDS

As of June 2025, the Defra National standards for sustainable drainage systems (SuDS) (gov.uk) were brought in to comply with principles laid out in Section 9.4. Whilst remaining as a non-statutory specification, these now form a material consideration for LPAs when assessing planning applications. These standards aim to reflect and reinforce good practice and use of SuDS as detailed in Section 9.4, reflecting the four pillars of SuDS design.

The national standards contain two sets of standards. The first type (Standard 1) is known as the hierarchy standard and gives criteria for the prioritisation of final runoff destinations. The other standards (Standards 2-7) detail the minimum requirements of design criteria that surface water drainage systems should satisfy alongside how they are to be appropriately built, maintained, and operated.

9.2.2 C753 CIRIA SuDS Manual (2015)

The C753 CIRIA SuDS Manual (2015) (ciria.sharefile.com) 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.

9.2.3 Design and Construction Guidance (DCG)

The Design and Construction Guidance (DCG) (water.org.uk) contains Codes for Adoption, covering the adoption of new water and wastewater infrastructure by water companies, and contains details on the water sector's approach to the adoption of SuDS.

9.2.4 Local SuDS guidance

The North West SuDS Pro-forma contains design and technical guidance.

The Greater Manchester Sustainable Drainage Design Guide provides guidance on the design, delivery and maintenance of SuDS in Greater Manchester. The guide promotes holistic SuDS design through providing standards for common SuDS features and potential design and infrastructure options.

Bury Local Plan Policy LP-W2 (Sustainable Drainage)

Surface water must be discharged in the following order of priority, recognising that a combination of measures within the hierarchy may be required to satisfactorily deal with all surface water:

a. Collected for non-potable use.

b. Infiltrated to ground.

c. Discharged to an above ground surface water body.

d. Discharged to a surface water sewer, or another piped surface water drainage system.

e. Discharged to a combined sewer.

9.3 Roles of the LLFA and LPA

Bury Council as LLFA are a statutory planning consultee. They provide technical advice on surface water drainage strategies and designs put forward for major development proposals, to confirm that onsite drainage systems are designed in accordance with the current legislation and guidance.

When considering planning applications, the LLFA drainage/flood risk engineering team will provide advice to the LPA on the management of surface water. The LPA should satisfy themselves that the development's proposed minimum standards of operation are appropriate and, using planning conditions or planning obligations, to ensure there are clear arrangements for ongoing maintenance over the lifetime of the development.

In their role as LLFA and LPA, the Council should:

- Promote the use of SuDS for the management of runoff;
- Ensure their policies and decisions on applications support and compliment the building regulations on sustainable rainwater drainage, giving priority to infiltration over discharges into watercourses, and then sewer conveyance;
- Incorporate favourable policies within development plans;
- Adopt policies for incorporating SuDS requirements into the Local Plan; and

- Encourage developers to utilise SuDS whenever practical, if necessary, through the use of appropriate planning conditions.

9.3.1 Schedule 3 of the Flood and Water Management Act (2010)

At the time of writing, the implementation of SuDS is driven through planning policy. Schedule 3 of the FWMA 2010 aims to provide a framework for the approval and adoption of drainage systems, to designate SuDS Approving Bodies (SAB) within unitary and county councils, and to ensure national standards on the design, construction, operation, and maintenance of SuDS for the lifetime of the development are followed. Timescales for the enactment of Schedule 3 by government are unknown.

9.4 Considerations for SuDS design

9.4.1 Four pillars of SuDS design

SuDS are designed to maximise the opportunities and benefits that can be secured from surface water management practices. SuDS design should consider the four pillars of SuDS (Figure 9-1): water quantity, water quality, amenity, and biodiversity.

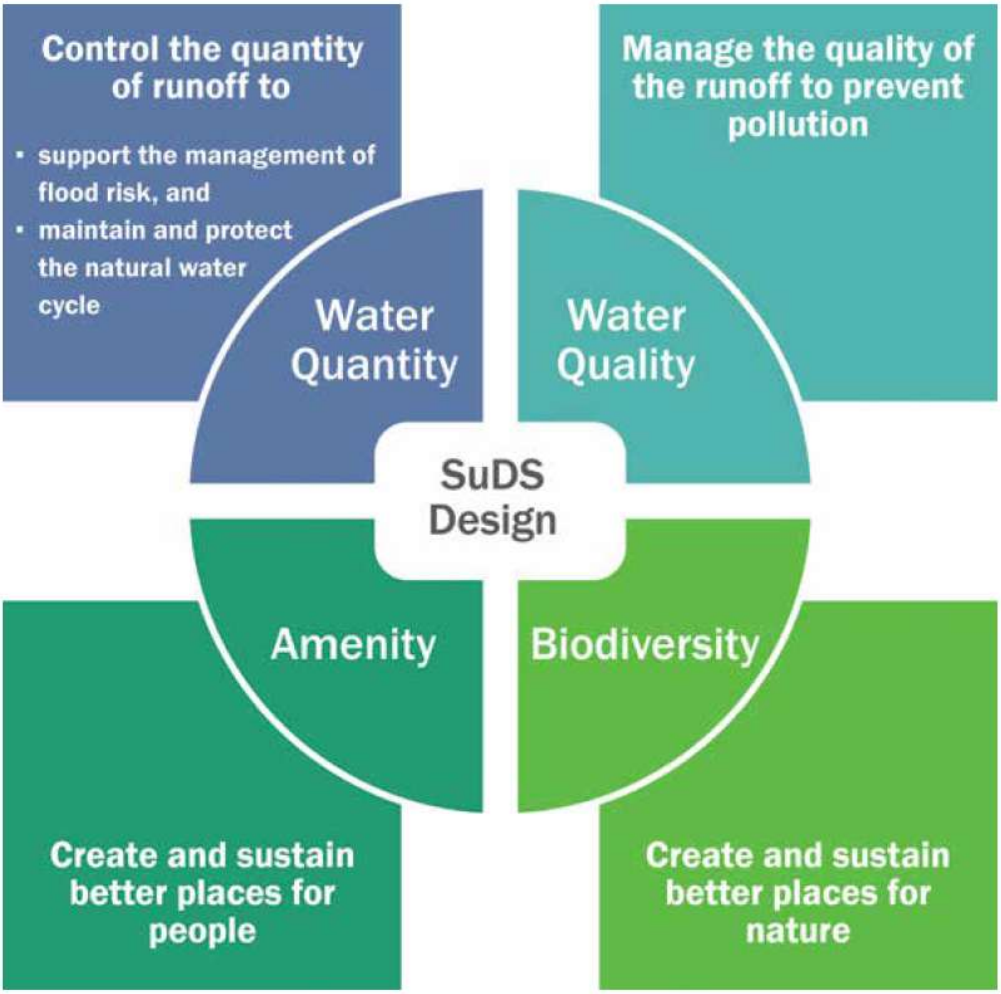


Figure 9-1: Four pillars of SuDS design (The SuDS Manual C753, 2015).

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 that 'applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity' (NPPF Paragraph 182).

It is important that SuDS are maintained for the lifetime for the development so that features can continue to function as designed. Consideration should be given to enhancing SuDS to achieve biodiversity net gain.

9.4.2 Types of SuDS

There are many different SuDS techniques that can be implemented in attempts to mimic pre-development drainage conditions. Techniques can include soakaways, infiltration trenches, permeable pavements, grassed swales, green roofs, ponds, and wetlands. Many of which do not necessarily need to take up a lot of space. The suitability of the techniques will be dictated in part by the development proposal and site conditions. Advice on best practice is available from the EA and the Construction Industry Research and Information Association (CIRIA) e.g. the CIRIA SuDS Manual C753 (2015).

9.4.3 SuDS management train

SuDS should not be used individually but as a series of features in an interconnected system designed to capture water at source and convey it to a discharge location. Collectively this concept is described as a SuDS Management Train (see Figure 9-2).

The number of treatment stages required within the Management Train depends primarily on the source of the runoff and the sensitivity of the receiving waterbody or groundwater.

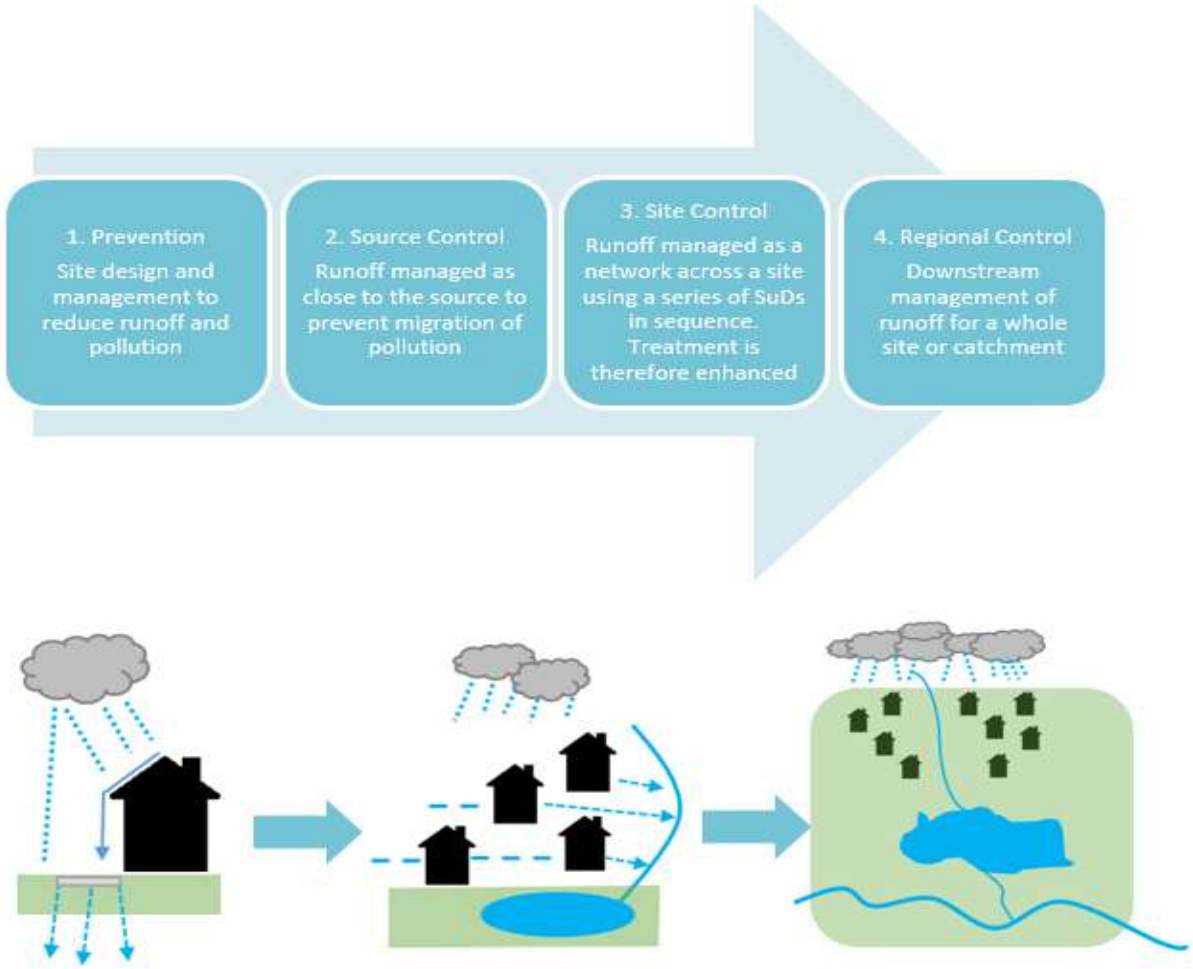


Figure 9-2: SuDS Management Train.

9.4.4 SuDS considerations

The design of appropriate SuDS will be influenced by a number of physical and policy constraints. These should be taken into account and reflected upon during the conceptual, outline, and detailed stages of SuDS design. Table 9-1 details some possible constraints and how they may be overcome.

Drainage from new development sites or redeveloped sites should be designed in line with the drainage hierarchy (PPG: Flood Risk and Coastal Change Paragraph: 056 Reference ID: 7-056-20220825) which initially promotes the use of infiltration prior to considering alternative drainage. For SuDS techniques that are designed to encourage infiltration, it is imperative that the water table is low enough to receive surface runoff waters. Most types of SuDS will be suitable in areas with permeable bedrock including features such as soakaways and infiltration basins. In areas with more impermeable geology, offsite discharge in accordance with the drainage hierarchy may be required to discharge surface water runoff from the site. In some cases, above-ground features such as attenuation ponds may be practical with a managed outlet or discharge point. Infiltration SuDS should be considered with caution within areas of possible subsidence or sinkholes.

Site-specific infiltration testing will need to be conducted early on as part of the design of the development in order to determine the impact of groundwater levels on the effectiveness of any drainage system. Groundwater monitoring is also encouraged and may be required in some locations.

Where sites lie within or close to Groundwater Source Protection Zones (GSPZs) (Section 9.5.2) or aquifers (Section 4.2.2), further restrictions may be applicable, and guidance should be sought from the LLFA and the EA.

Table 9-1: Example SuDS design constraints and possible solutions

Constraints	Solution
Land availability	SuDS can be designed to fit into small areas by utilising different systems. For example, features such as permeable paving and green roofs can be used in urban areas where space may be limited.
Contaminated soil or groundwater below site	SuDS can be placed and designed to overcome issues with contaminated groundwater or soil. Shallow surface SuDS can be used to minimise disturbance to the underlying soil. The use of infiltration SuDS should also be investigated as it may be possible in some locations within the site. If infiltration is not possible, impermeable linings can be used within features to prevent infiltration.
High groundwater levels	Non-infiltrating features can be used. Features can be lined with an impermeable lining or clay to prevent the egress of water into the feature. Additionally, shallow features can be utilised which are above the groundwater table.
Steep slopes	Check dams can be used to slow flows. Additionally, features can form a terraced system with additional SuDS components such as ponds used to slow flows.
Shallow slopes	Use of shallow surface features to allow a sufficient gradient. If the gradient is still too shallow, pumped systems can be considered as a last resort.
Ground instability	Geotechnical site investigation should be done to determine the extent of unstable soil and dictate whether infiltration would be suitable or not.
Sites with deep backfill	Infiltration should be avoided unless the soil can be demonstrated to be sufficiently compacted. Some features such as swales are more adaptable to potential surface settlement.

Constraints	Solution
Open space in floodplain zones	Design decisions should consider the likely high groundwater table and possible high flows and water levels. Features should also seek to not reduce the capacity of the floodplain and take into consideration the influence that a watercourse may have on a system. Instances such as siltation after a flood event should also be taken into account during the design phase.
Future adoption and maintenance	The LPA should ensure development proposals, through the use of planning conditions or planning obligations, have clear arrangements for ongoing maintenance over the development's lifetime.

9.5 Other surface water considerations

9.5.1 Groundwater Vulnerability Zones

The 2015 EA published groundwater vulnerability 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 properties within a one-kilometre grid square.

There are areas of high and medium-high groundwater vulnerability within Ramsbottom, to the northeast of Bury town centre and Whitefield.

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 (defra.gov.uk).

9.5.2 Groundwater Source Protection Zones

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 Defra's interactive mapping (defra.gov.uk). Three main zones are defined as follows:

- Inner protection zone (Zone 1) - areas from where pollution can travel to the groundwater source within 50 days or is at least a 50m radius.
- Outer protection zone (Zone 2) - areas from where pollution can travel to the groundwater source within 400 days or lies within the nearest 25% of the total catchment area (whichever is largest).
- Total catchment (Zone 3) - the total area needed to support removal/discharge of water from the groundwater source.

Online mapping shows there are no GSPZs in the Borough.

9.5.3 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. 2025 - 2028 NVZs can be viewed on the EA's interactive mapping (data.gov.uk).

A small area in the south of Bury, around Whitefield, is designated as a NVZ (2025 - 2028). If a site falls within a NVZ, these rules must be followed: Nitrate vulnerable zones (data.gov.uk). Landowners can appeal an NVZ designation once notified if their land (or part of it):

- Does not drain into water that has been identified as polluted.
- Drains into water that should not be identified as polluted.

9.5.4 Critical Drainage Areas

There are currently no EA Areas with Critical Drainage Problems (ACDP) within the Borough.

Local authorities can choose to designate Critical Drainage Areas (CDAs) within their Borough. GMCA updated the CDAs for the Greater Manchester authorities in 2022. The GM CDAs were based on the river catchments with the highest number of properties predicted to be at risk from surface water flooding, using the EA's Risk of Flooding from Surface Water mapping, and sewer flooding, based on UU modelled data. GM designated CDAs within Bury included Whitefield and Prestwich in the south and areas to the east of Bury town centre.

The GM CDAs were delineated prior to the release of the National Flood Risk Assessment 2 (NaFRA2) surface water mapping in March 2025. Whilst the GM CDAs continue to align well with the locations modelled to be at high risk in the NaFRA2 surface water mapping, there are also some areas within the north of the Borough, around Ramsbottom, that were identified as being at risk.

Therefore, the CDA's for Bury have been updated through the Bury SFRA, finalised in 2026, to include the catchment covering Ramsbottom in addition to the catchments covering Whitefield and Prestwich in the south, and areas to the east of Bury town centre. These areas would all benefit from having more stringent surface water management measures imposed for new development.

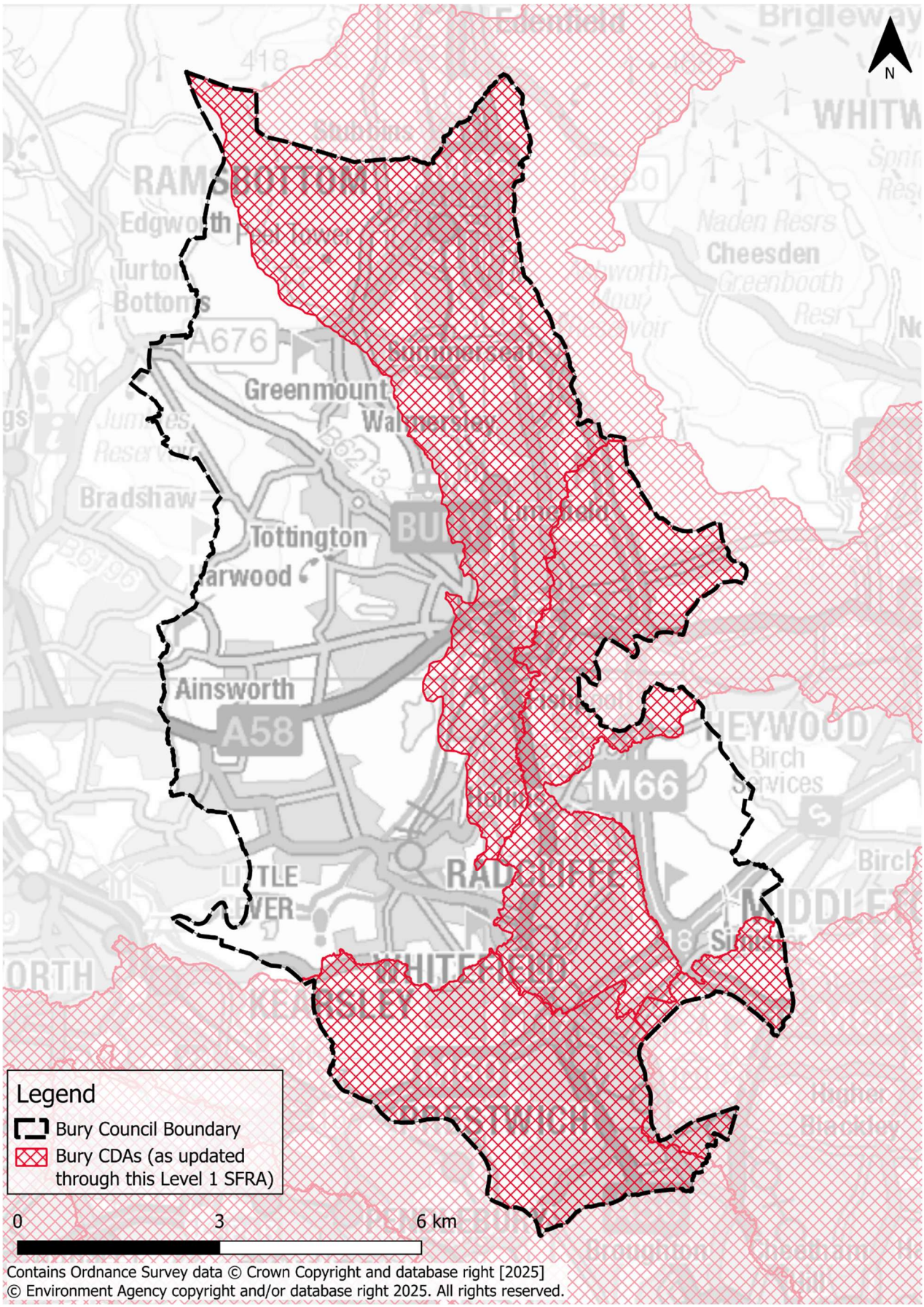


Figure 9-3: Critical Drainage Areas covering Bury

10 Flood warning and emergency planning

This section provides an overview of the requirements for emergency plans, include any local emergency planning arrangements, and an overview of the available flood alerts and warnings.

10.1 NPPF requirements

The NPPF Flood Risk Vulnerability and Flood Zone "incompatibility" table seeks to avoid inappropriate development in areas at risk from fluvial flooding. It is essential that any development which will be required to remain operational during a flood event is located in the lowest flood risk zones to ensure that, in an emergency, operations are not impacted upon by floodwater, or that such infrastructure is resistant to the effects of flooding such that it remains serviceable/operational during 'central' events for the majority of development types, and 'upper end' events for essential infrastructure, as defined in the Environment Agency's climate change allowances.

The outputs of this Level 1 SFRA should be compared and reviewed against any existing emergency plans and continuity arrangements. This includes any nominated rest and reception centres (and prospective ones), so that evacuees are outside of the high-risk Flood Zones and will be safe during a flood event.

10.2 Emergency Planning

The Civil Contingencies Act 2004 lists local authorities, the EA and emergency services as Category 1 responders, responsible for reducing, controlling, and mitigating the effects of emergencies in both response and recovery phases.

The NPPF (Paragraph 181) requires site-level FRAs to demonstrate that "any residual risk can be safely managed; and safe access and escape routes are included where appropriate, as part of an agreed emergency plan."

In accordance with the NPPF, this SFRA, the Council's LFRMS (2018), and an updated SWMP (currently GMCA-wide SWMP (2012)) can be used in the preparation and execution of a flood emergency plan as they can indicate areas that may be at risk of flooding. These can be provided as part of a FRA or as a separate document. Decisions regarding whether an emergency plan is required sits with the LPA, with advice from the Council's emergency planning teams, the EA, and the LLFA.

According to the PPG flood risk and coastal change guidance, an emergency plan is needed wherever emergency flood response is an important component of making a development safe; this includes the free movement of people during a 'design flood' and potential evacuation during an extreme flood.

Emergency plans are essential for any site with transient occupancy in areas at risk of flooding, such as holiday accommodation, hotels, caravan, and camping sites (PPG: Flood risk and coastal change paragraph 043).

Emergency plans should consider:

- The type of flood risk present, and the extent to which advance warning can be given in a flood event.
- The number of people that would require evacuation from the area potentially at risk.
- The vulnerability of site occupants.
- The impact of the flooding on essential services e.g., electricity, gas, telecommunications, water supply and sewerage.
- Safe access and escape routes for users and emergency services (Section 10.2.1).

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

- The National Planning Policy Guidance (gov.uk)
- 2004 Civil Contingencies Act (legislation.gov.uk)
- Defra (2014) National Flood Emergency Framework for England (gov.uk)
- FloodRe (floodre.co.uk)
- The EA and Defra's Standing Advice for FRAs (gov.uk)
- EA's 'How to plan ahead for flooding' (gov.uk)
- Sign up for Flood Warnings with the EA (gov.uk)
- The National Flood Forum (nationalfloodforum.org.uk)
- 'Prepare for flooding' (gov.uk)
- ADEPT Flood Risk Plans for new development (adeptnet.org.uk)
- Environment Agency (2012) Flooding – minimising the risk, flood plan guidance for communities and groups
- Environment Agency Personal flood plans (2017).

10.2.1 Safe access and escape routes

Safe access and escape routes need to be available during the design flood event with consideration of climate change. Access requirements are set out in the PPG: Flood Risk and Coastal Change (gov.uk) Paragraph: 047 Reference ID: 7-047-20220825.

As part of an FRA, the developer should review the acceptability of the proposed access in consultation with the LLFA, the EA, and emergency planners. Site and plot specific velocity and depth of flows should be assessed against standard hazard criteria to ensure safe access and escape routes can be achieved.

10.3 Local arrangements for mapping flood risk

10.3.1 Greater Manchester Resilience Forum (GMPF)

Greater Manchester Resilience Forum works to prepare for, respond to and recover from any emergency incident, including flooding. The GMPF brings together local authorities, emergency services, utility companies, charities and volunteers.

The GMPF supports flood resilience by providing guidance on how to prepare homes and businesses for emergencies, promoting actions such as

The LRF supports flood resilience by providing guidance for residents and businesses on flood preparation, response and recovery, promoting actions such as creating flood plans and signing up to receive flood warnings. The LRF additionally provides information on what to do after flooding has taken place.

10.4 Flood alerts and flood warnings

The EA is 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. The EA Sign up for Flood Warnings (gov.uk) webpage provides information on how to sign up for these warnings.

There are currently two Flood Alert Areas (FAA) and eleven Flood Warning Areas (FWAs) covering the Borough.

Flood alerts are issued when there is water out of bank for the first time anywhere in the catchment, signalling that ‘flooding is possible’, and therefore FAAs usually cover the majority of main river reaches.

Flood warnings are issued to designated FWAs (i.e., properties within the extreme flood extent which are at risk of flooding), when the river level hits a certain threshold; this is correlated between the FWA and the gauge, with a lead time to warn that ‘flooding is expected’.

The FAAs and FWAs are included in the interactive GeoPDF maps (Appendix H)

11 Cumulative Impact Assessment

This section details the cumulative impact assessment, which identifies which catchments are most likely to be sensitive to increased flood risk as a result of future development.

11.1 Introduction

As required in para 171 of the NPPF, the cumulative impacts of development should be considered at both the local plan making stage and the planning application and development design stages.

When allocating land for development, consideration should be given to the potential cumulative impact of the loss of floodplain storage volume from any source, as well as the impact of increased flows on flood risk downstream. Whilst the loss of storage for individual developments may only have a minimal impact on flood risk, the cumulative effect of multiple developments may be more severe. Similarly, the effect of the loss of surface water flow paths/exceedance paths from sewers, surface water ponding and infiltration can also give rise to cumulative effects and potentially exacerbate flood risk. There are also risks of development causing modified flow regimes from sites creating an alignment in peak flows in downstream watercourses and resulting in greater flood risk as a result of the development.

All developments are required to comply with the NPPF and demonstrate they will not increase flood risk elsewhere. Therefore, providing developments comply with the latest guidance and legislation relating to flood risk and sustainable drainage, and appropriate consideration is given to flow paths and storage proposals should normally not increase flood risk downstream. Local planning policies can also be used to identify areas where the potential for development to increase flood risk is highest and identify opportunities for such new development to positively contribute to decreases in flood risk downstream.

Bury Local Plan Policy LP-W2 (Sustainable Drainage)

Proposals must be designed to maximise the retention of surface water on-site and minimise the volume. Developments on greenfield sites are expected to achieve greenfield run-off rates.

Proposals on previously development land should target a greenfield rate of surface water run-off. However, as a minimum, proposals on previously developed land must achieve a reduction in the rate of surface water discharge of 40% rising to a minimum of 55% in any critical drainage area identified by the Strategic Flood Risk Assessment. This rate will increase to 70% in Flood Zone 3.

There is currently no national guidance available for assessing the cumulative impacts of development. The CIA in this SFRA provides a relative assessment of the catchments within the Borough of Bury and are not comparable across other boroughs / districts.

11.2 Cumulative Impacts Assessment (CIA)

The CIA has identified the following catchments as being highly sensitive to the cumulative impacts of development:

- Irwell (Roch to Croal)
- Irwell (Croal to Irk)
- Irwell (Rossendale STW to Roch)

Specific recommendations for catchments identified as high risk, alongside broadscale recommendations applicable across the whole borough, are set out in Appendix G. The full CIA methodology can also be found in Appendix G.

12 Strategic flood risk solutions

This section sets out wider strategic solutions that may offer potential to reduce flood risk across the Borough, including natural flood management. It also details notable partnership working opportunities within the Borough.

Section 11 and Appendix G consider the cumulative impacts of development across the Borough and the catchments which are most sensitive to these impacts, and as such where strategic flood risk solutions may be most beneficial.

Where possible, developments should seek to help reduce flood risk in the wider area. The following sections outline different options which could be considered for strategic flood risk solutions. Any strategic solutions should ensure they are consistent with wider catchment policy and the local policies.

It is important that the ability to deliver strategic solutions in the future is not compromised by the location of proposed development. When assessing the extent and location of proposed development, consideration should be given to the requirement to secure land for flood risk management measures that provide wider benefits.

12.1 Partnership working

Flood risk to an area or development can often be attributed to multiple different sources, including fluvial, surface water and/or groundwater, which can become intertwined. Where complex flood risk issues are highlighted, it is important that all stakeholders are actively encouraged to work together to identify issues and provide suitable solutions.

12.1.1 Catchment Based Approach

The Catchment Based Approach (CaBA) (catchmentbasedapproach.org) was introduced by the Government to establish catchment partnerships throughout England to jointly deliver improved water quality and reduce flood risk, directly supporting achievement of many of the targets set out within the Government's 25-year Environment Plan. CaBA partnerships are actively working in all 100+ river catchments across England and cross-border with Wales.

The CaBA partnership working within the Borough of Bury is the Irwell Catchment Partnership.

12.2 Biodiversity Net Gain

Biodiversity Net Gain (BNG) is a strategy to develop land and contribute to the recovery of nature. It is making sure the habitat for wildlife is in a better state than it was before development. BNG has been applicable since November 2023 for developments in the Town and Country Planning Act 1990, unless exempt, and has been applicable to small sites since April 2024. Exempt developments include existing planning applications, below threshold development and small home extensions. Further information is available on the

Government BNG webpage (gov.uk). Strategic flood risk solutions can help developments achieve BNG requirements.

12.3 Natural Flood Management

12.3.1 Introduction

Development can provide opportunities to work with natural processes to help reduce flood and erosion risk, benefit the natural environment and reduce costs of schemes. This is known as Natural Flood Management (NFM) or nature-based solutions, a process whereby action is taken to mitigate flood risk by protecting, restoring and emulating natural processes. This approach aims to reduce flow volumes and delay the arrival of peak flood flow downstream.

Techniques and measures, which could be applied in the Borough include:

- Creation of offline storage areas.
- Re-meandering streams (creation of new meandering courses or reconnecting cut-off meanders to slow the flow of the river).
- Targeted woodland planting (as indicated in the EA's Working with Natural Processes dataset).
- Reconnection and restoration of functional floodplains (Section 12.4).
- Restoration of rivers and removal of redundant structures, i.e. weirs and sluices no longer used or needed (Section 12.5).
- Installation or retainment of large woody material in river channels.
- Improvements in management of soil and land use.
- Creation of rural and urban SuDS.

To maximise the benefits of NFM, it is important that land which is likely to be needed for NFM is protected by safeguarding land for future flood risk management infrastructure through local plan policy. This is particularly important for infrastructure that reduces the risk of flooding to large areas of existing development, or where options for managing risk in other ways are limited to achieve multiple benefits for flood risk and the environment.

It is important to recognise the value of maintenance or restoration of natural riparian zones, such as grasslands, which protect the soils from erosion and ‘natural’ meadows which can tolerate flood inundation. The use of blue green infrastructure throughout river corridors can also play a vital role in enhancing the river environment as well as safeguarding land from future development, protecting people and buildings from flooding and reducing flood risk downstream.

12.3.2 Working with natural processes

The EA published their updated evidence base in February 2025 for Working with Natural Processes to reduce flood risk 2024 (gov.uk) to support the implementation of NFM, with maps showing locations with the potential for NFM measures. These maps are intended to

be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them.

12.3.3 North West NFM Measures: A practical guide for farmers

The North West NFM Measures: A practical guide for farmers document has been developed to provide guidance for landowners and farmers within the North West on the range of NFM measures available and which would be appropriate for their land. Measures include soil management, buffer strips, leaky barriers and woodland creation. It also sets out the consents and approvals process prior to construction.

12.3.4 Ongoing NFM schemes

12.3.4.1 Radcliffe and Redvales Flood Alleviation Scheme

Phase 3 of the Radcliffe and Redvales Flood Alleviation Scheme incorporates a NFM programme. NFM measures are planned along Stanney Brook, south-east of Rochdale, comprising of natural earthworks to increase flood storage along the Brook, prior to it joining the Roch.

12.3.4.2 Natural Environment Investment Readiness Fund

The Natural Environment Investment Readiness Fund aims to develop an investment ready model to deliver environmental improvements on farmland across the Upper Irwell catchment. In consultation with farmers and landowners, NFM measures and habitat restoration will be implemented across the catchment with the aim to increase climate resilience and provide flood benefits to downstream communities.

12.3.5 Completed NFM schemes

12.3.5.1 Holcombe Moor Restoration

Work has been completed on Holcombe Moor to restore, conserve and manage the peat to reduce carbon in the atmosphere, improve habitats for wildlife and protect local communities from flooding. Works included sphagnum moss planting, creation of peat dams, creation of peat bunds and reprofiling gullies and peat hags.

12.4 Catchment and floodplain restoration

Floodplain restoration represents the most sustainable form of strategic flood risk solution, by allowing watercourses to return to a more naturalised state, and by creating space for naturally functioning floodplains working with natural processes.

Although the restoration of floodplain is difficult in previously developed areas where development cannot be rolled back, the following measures should be adopted:

- Promoting existing and future brownfield sites that are adjacent to watercourses to naturalise banks as much as possible. Buffering areas around watercourses to provide an opportunity to restore parts of the floodplain.
- Removing redundant structures to reconnect the river and the floodplain.
- Applying the sequential approach to avoid new development within the floodplain.

12.5 Structure removal and/or modification (e.g. weirs)

Structures, both within watercourses and adjacent to them can have significant impacts upon a river's regime, including alterations to the geomorphology and hydraulics of the channel through water impoundment and altering the sediment transfer regime, which over time can significantly impact the channel profile including bed and bank levels, alterations to flow regime and interruption of biological connectivity, including the passage of fish and invertebrates.

Many artificial in-channel structures (such as weirs and culverts) can sometimes be redundant and/or serve little purpose. Opportunities for the removal of such structures should be investigated where feasible. The need to do this is heightened by climate change, for which restoring natural river processes, habitats and connectivity are vital adaptation measures. However, it also must be recognised that some artificial structures may have important functions or historical/cultural associations, which need to be considered carefully when planning and designing restoration work.

In the case of weirs, whilst weir removal should be investigated in the first instance, in some cases it may be necessary to modify a weir rather than remove it. For example, by lowering the weir crest level or adding a fish pass. This will allow more natural water level variations upstream of the weir and remove a barrier to fish migration.

Developers should investigate the 'opening up' or 'daylighting' of existing culverts where possible and should not construct new culverts on site except for short lengths to allow essential infrastructure crossings for access.

12.6 Riverbank stabilisation

Any practice that may cause riverbank erosion should be avoided. Landowners should be encouraged to avoid using machinery and vehicles close to or within the watercourse unless in the circumstances where machinery and vehicles are required for watercourse maintenance such as desilting, grass cutting, or removal of vegetation. Care should be taken not to destabilise the banks.

There are several techniques that can be employed to restrict the erosion of riverbanks. In an area where bankside erosion is particularly bad and/or vegetation is unable to properly establish, ecologically sensitive bank stabilisation techniques, such as willow spiling, can be particularly effective. Live willow stakes thrive in the moist environment and protect the soils from further erosion allowing other vegetation to establish and protect the soils. Other approaches include the planting of brash or small trees, large wood, large trees and root wads.

12.7 Green infrastructure

Green infrastructure (GI) is a planned and managed network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs and rural fringe and consist of:

- Open spaces – parks, woodland, nature reserves, lakes.
- Linkages – river corridors and canals, and pathways, cycle routes and greenways.
- Networks of “urban green” – private gardens, street trees, verges and green roofs.

The identification and planning of GI are critical to achieving sustainable growth. It merits forward planning and investment as much as other socio-economic priorities such as health, transport, education and economic development. GI is also central to climate change action and is a recurring theme in planning policy. With regards to flood risk, green spaces can be used to manage storm flows and free up water storage capacity in existing infrastructure to reduce risk of damage to urban property, particularly in urban centres and vulnerable urban regeneration areas. GI can also improve accessibility to waterways, improve water quality, support regeneration, and improve opportunities for leisure, economic activity, and biodiversity.

13 Recommendations and next steps

13.1 Requirements for a Level 2 SFRA

Following the application of the Sequential Test, where sites cannot be appropriately accommodated in low-risk areas, the Council may need to show that sites proposed for allocation can be safe for their lifetime. Some sites may also require application of the Exception Test. In these circumstances, a Level 2 SFRA is required, to assess in more detail the nature and implications of the flood characteristics in order for the LPA to allocate such sites in the new local plan. However, a Level 2 SFRA does not negate the need for a site-specific FRA.

As part of this Level 1 SFRA, an initial site screening exercise using the Council's potential development site boundaries and the latest flood risk data has been undertaken to help inform the application of the Sequential Test and the subsequent potential requirement for a Level 2 SFRA.

Appendix G provides a strategic assessment of the suitability, relative to flood risk, of the sites to be considered for allocation in the Council's new Local Plan, summarising the outcomes of the screening assessment spreadsheet in Appendix F.

SFRA Strategic Recommendation B applies to sites where a Level 2 SFRA may be required in order to allocate. Of the 63 land supply sites screened as part of this Level 1 SFRA, Strategic Recommendation B applies to 46 sites. A Level 2 SFRA may not be required for all of these sites, depending on the proportion and location of risk across the site. The sites where Strategic Recommendation B applies should be reviewed by the Council to identify those where further assessment would be required.

13.2 Recommendations from SFRA findings

The following overarching SFRA recommendations have been developed to guide future development and inform planning decisions across the Borough in relation to flood risk. These recommendations should be read alongside national and local policies and are intended to support the allocation of sites and planning applications, ensuring that flood risk is appropriately considered at all stages of the planning process. These recommendations also align with, and should be read alongside, the relevant policies within the Bury Local Plan (policy LP-GI1 (Green infrastructure), policy LP-W1 (Flood Risk and Water Management), policy LP-W2 (Sustainable Drainage), and policy LP-W3 (Water Resources)).

- New development should be directed to areas with the lowest probability of flooding (Flood Zone 1). Development within Flood Zones 2 and 3 should only be considered if no reasonably alternative sites exist. Development should also be directed away from the climate change flood risk zones.
- There should be no residential development within Flood Zone 3a, the modelled climate change flood outlines and the Flood Zones plus climate change flood

zone. More vulnerable development is required to be subject to and to pass the Exception Test if it is proposed within Flood Zone 3a.

- Where development is proposed within Flood Zone 2, and whilst accounting for climate change, consideration should be given to locating dwellings above ground floor level. Ground floor areas should be limited to less vulnerable uses, such as retail, restaurants, office space, or car parking, where compatible with local policy.
- There should be no development within Flood Zone 3b (functional floodplain). Areas of functional floodplain would ideally remain as or be converted to open greenspace, providing multifunctional ecology, social and amenity benefits, as well as for flood attenuation and storage.
- A site-specific flood risk assessment should accompany planning applications where development is proposed within Flood Zones 2 and 3a, at risk from climate change, at risk from any other flood source, or within Flood Zone 1 and the site area is 1 hectare or greater.
- Built development within 8m of the bank top of a main river, culvert or flood defence should be discouraged. Focus should be for the preservation of the watercourse corridor, wildlife habitat, flood flow conveyance and future watercourse maintenance or improvement, with a focus on achieving BNG.
- For all new development situated within flood risk areas, planning applications should be accompanied by an emergency plan that is proportionate to the risk. This should set out clear procedures for safe evacuation, identify safe access and escape routes and account for the vulnerability of site users during a flood event.
- Space should be provided for the inclusion of SuDS on all allocated sites, outline proposals and full planning applications. SuDS design should 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.
- Where development is located behind a flood defence or within a defended area, consideration should be given to the potential safety of the development, FFLs and for safe access and escape routes in the event of rapid inundation of water due to a defence breach with little warning.

13.3 Recommendations for further work

The SFRA process has developed into more than just a planning tool. Sitting alongside the Sustainability Appraisal and Local Flood Risk Management Strategy, it can be used to provide a much broader and inclusive vehicle for integrated, strategic and local flood risk management and delivery.

There are several studies listed in

Table 13-1 that may be of benefit to the LPA, in developing the flood risk evidence base to support the delivery of the Local Plan, or to the LLFA to help fill critical gaps in flood risk information that have become apparent through the preparation of this Level 1 SFRA.

Table 13-1: Potential further works and assessments

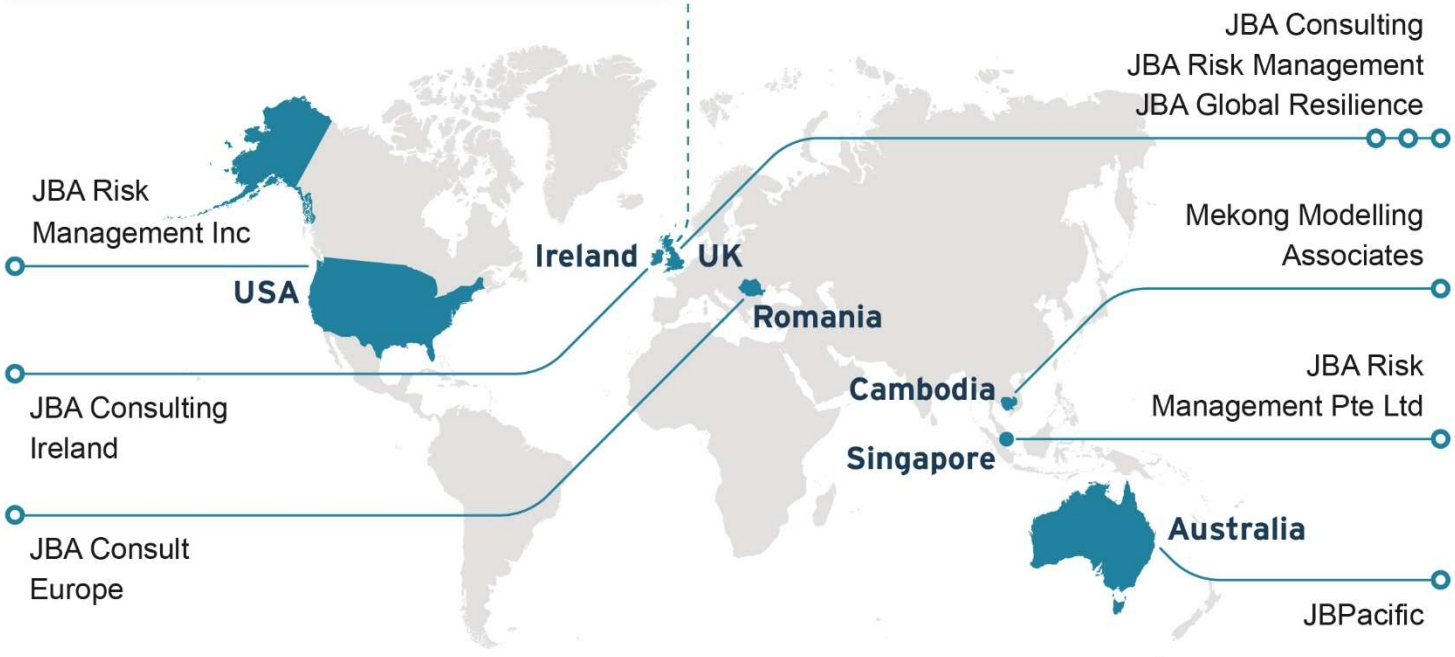
Type	Study	Reason	Timeframe
Understanding of local flood risk	Level 1 SFRA update	When there are changes to: the predicted impacts of climate change on flood risk; national flood modelling; detailed flood modelling - such as from the EA or LLFA; the local plan, spatial development strategy or relevant local development documents; local flood management schemes; flood risk management plans; local flood risk management strategies; national planning policy or guidance (2025 reforms of the PPG); or after a significant flood event.	As required
	Level 2 SFRA	Reviewing of EA flood zones in those areas not covered by existing detailed hydraulic models (i.e., the Flood Map for Planning does not cover every watercourse such as those <3km^2 in catchment area or ordinary watercourses). If a watercourse or drain is present on OS mapping but is not covered by the Flood Map for Planning, this does not mean there is no potential flood risk. A model or further investigation may therefore be required to ascertain the flood risk, if any, to any nearby sites.	Short term
	Level 2 SFRA	Further, more detailed assessment of flood risk to high and medium risk sites both now and in the future as notified by this Level 1 SFRA.	Short term
	SWMP/ detailed surface water modelling	The LLFA may wish to produce a SWMP for the Borough based on the most up to date surface water flood risk information and climate change allowances or consider targeted areas of high surface water flood risk. This would update the current GMCA-wide SWMP	Short term
Residual risk	Level 2 SFRA	Residual risk from flooding as a result of defence breaches and asset blockages should continue to be mitigated through sequential testing to steer development to lower risk areas and identifying opportunities for property flood resilience measures for properties at residual risk.	Short term

Type	Study	Reason	Timeframe
Flood storage and attenuation	Working with Natural Processes (WwNP)	Further assessment of WwNP options in the upland areas of the Irwell catchment to gauge possible areas for NFM. Promote creation of floodplain and riparian woodland, floodplain reconnection and runoff attenuation features where the research indicates that it would be beneficial to the Borough and beyond.	Short term
Water resources	Water Cycle Study	To ensure sufficient provision of infrastructure for water supply and wastewater for new development. Particularly relevant to intensification of urban development or the development of large strategic sites.	Short term
Data collection	Flood incident data	Bury Council should record flood events including such information as date, location, weather, flood source (if apparent without an investigation), impacts (properties flooded or number of people affected) and response by any RMA. This should be made available in GIS format.	Short term
	FRM Asset Register	The LLFA should continue to update and maintain its asset register as per FWMA requirements.	Ongoing
Risk assessment	Asset inspection	The LLFA should carry out condition inspections of critical flood risk management assets (see Section 6.1).	Short term
Capacity	SuDS review / guidance	The LLFA and LPA should clearly identify requirements of developers for inclusion of SuDS in new developments. Internal capacity, within Bury Council should be in place to deal with SuDS applications, set local specifications and set policy for adoption and future maintenance of SuDS.	Short term
Partnership	United Utilities	Bury Council should continue to collaborate with United Utilities on sewer and surface water projects to ensure their assets can remain operational and resilient at all times across the catchment and that capacity for new development is appropriate.	Ongoing
	EA	Bury Council should continue to work with the EA on fluvial flood risk management projects. Potential opportunities for joint schemes to tackle flooding from all sources should be identified.	Ongoing
	Community	Continued involvement with the community through existing flood risk partnerships.	Ongoing

www.jbaconsulting.com

Our Offices

Bristol
Coleshill
Cork
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle
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 on

Jeremy Benn Associates Limited
Registered in England
3246693

JBA Group Ltd is certified to
ISO 9001:2015
ISO 14001:2015
ISO 27001:2022
ISO 45001:2018