

Bradford Level 2 Strategic Flood Risk Assessment Main Report

Final Draft

July 2026

Prepared for:

City of Bradford Metropolitan District Council



City of
BRADFORD
METROPOLITAN DISTRICT COUNCIL

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This report describes work commissioned by City of Bradford Metropolitan District Council (CBMDC) by an instruction dated 19 July 2024. The Client's representative for the contract was Jonathan Dicken of CBMDC. Laura Thompson and Freya Nation of JBA Consulting carried out this work.

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Contents

1	Introduction	1
1.1	SFRA future proofing	2
2	Level 2 SFRA requirements	4
2.1	Objectives	5
3	Available data and information	6
3.1	EA models	6
3.2	EA Open Data (2024 and 2026)	6
3.3	Other datasets	7
4	Methodology	8
4.1	Assessing fluvial flood risk	8
4.2	Surface water	9
4.3	Residual risk	10
4.4	Assessing flood risk from reservoirs	12
4.5	Assessing flood risk from canals	13
4.6	Assessing risk from groundwater emergence	13
4.7	Assessing risk from sewers	13
4.8	Assessing historic flood risk	13
4.9	Access and escape routes and emergency planning	13
4.10	Cumulative impacts	14
4.11	Working with Natural Processes	14
5	Limitations	15

List of Figures

Figure 4-1: Indicative hazard resulting from a breach of defence infrastructure	12
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List of Tables

Table 4-1: Aire and Calder management catchment peak river flow allowances	9
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Abbreviations

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CBMDC	City of Bradford Metropolitan District Council
CC	Climate Change
CRT	Canal & River Trust
EA	Environment Agency
FAA	Flood Alert Area
FMfP	Flood Map for Planning
FRA	Flood Risk Assessment
FRCC-PPG	Flood Risk and Coastal Change Planning Practice Guidance
FWA	Flood Warning Area
GIS	Geographical Information System
LIDAR	Light Detection And Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	metres Above Ordnance Datum
NaFRA2	National Flood Risk Assessment 2
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PPG	Planning Practice Guidance
RBD	River Basin District
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage System
YW	Yorkshire Water

Definitions

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

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

Annual Exceedance Probability (AEP): 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 chance 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.

Dry island: Land which may not be at risk of flooding itself but is surrounded by flood risk and therefore may become cut off during a flood event.

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

Green infrastructure (GI): A network of natural environmental components and green spaces that intersperse and connect the urban centres, suburbs, and urban fringe.

Greenfield: An undeveloped parcel of land.

Lead Local Flood Authority (LLFA): The unitary authority for the area or if there is no unitary authority, the county council for the area.

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

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

Major development: Defined in the National Planning Policy Framework 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 provide 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 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: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

Risk Management Authority (RMA): The Environment Agency, Lead Local Flood Authorities, District and Borough Councils in an area where there is no unitary authority, Coast Protection Authorities in coastal areas, Water and sewerage companies, Internal Drainage Boards, and Highways authorities.

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

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 (SuDS): Sustainable Drainage Systems are 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 planning authority's local plan.

1 Introduction

A Level 2 Strategic Flood Risk Assessment (SFRA) is required by the City of Bradford Metropolitan District Council (CBMDC) as all identified potential development sites cannot be allocated outside the areas of medium and high flood risk, as identified through the Level 1 SFRA, published in November 2023.

The Level 1 SFRA entailed the flood risk screening of 1,397 potential development site allocations across the Bradford authority area. 260 of these sites were shown to be at medium or high flood risk yet considered important to the Bradford Local Plan.

A Level 2 SFRA Scoping Study was undertaken in November 2024. As part of the scoping study, a further sites screening exercise was carried out to identify the sites that were either at some level of fluvial risk and/or at high or medium risk from surface water. 170 sites were identified through this process. A Level 2 SFRA is therefore required to help determine whether these sites can be allocated in the Local Plan. The scoping study identified 72 sites where a detailed Level 2 assessment was required. Risk at the remaining 98 sites was identified to be nominal. As such, these sites have been briefly assessed.

Since the scoping exercise, 12 potential allocations were withdrawn from the list of potential allocations by CBMDC. One site requiring L2 assessment was added to the list.

This Level 2 SFRA consists of the following documents:

- This main report summarising the Level 2 processes and methodologies;
- 61 detailed site assessment reports;
- Brief site assessment reports covering 98 sites with nominal flood risk (Appendices A to D);
- A note detailing how the functional floodplain has been delineated and outlining how the functional floodplain challenge process works (Appendix E); and
- A Level 2 SFRA addendum report summarising any changes to onsite flood risk following the release of NaFRA2 in March 2025 (Appendix F).

This Level 2 SFRA has been prepared with full consideration of the latest government and Environment Agency (EA) guidance on flood risk and planning policy, namely:

- National Planning Policy Framework¹ (NPPF) 2024,
- Flood Risk and Coastal Change Planning Practice Guidance² (FRCC-PPG) 2025,
- How to Prepare a Strategic Flood Risk Assessment³ guidance 2025,
- Strategic Flood Risk Assessment Good Practice Guide⁴ 2021,

¹ [National Planning Policy Framework | UK Government | 2024](#)

² [Flood Risk and Coastal Change Planning Practice Guidance | UK Government | 2025](#)

³ [How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2025](#)

⁴ [Strategic Flood Risk Assessment Good Practice Guide | Association of Directors of](#)

- Flood Risk Assessments: Climate Change Allowances⁵ 2022.

1.1 SFRA future proofing

At the time of writing, this Level 2 SFRA has assessed and considered flood risk in the Bradford authority area at a specific point in time. This Level 2 SFRA has been developed over two years. As such, various datasets have been used. The Level 2 SFRA Addendum (Appendix F) gives an overview of how flood risk to the sites differs between different datasets. The Level 2 SFRA has been future proofed as far as possible though the reader should always confirm with the source organisation (CBMDC) that the latest information is being used when decisions concerning development and flood risk are being considered.

A detailed hydraulic model of Bradford Beck was developed between 2024 and 2026.

19 of CBMDC's potential allocations are located within the vicinity of Bradford Beck. These sites have been assessed using the 2026 Bradford Beck model and 2026 versions of the EA's Flood Map for Planning (FMfP) and Risk of Flooding from Surface Water (RoFSW) datasets.

Whilst the Bradford Beck model was being developed, this SFRA used the November 2024 versions of the EA's Flood Map for Planning (FMfP) and Risk of Flooding from Surface Water (RoFSW) datasets to assess fluvial and surface water flood risk to the 42 sites which are not located within the vicinity of Bradford Beck.

An addendum to this Level 2 SFRA (Appendix F) has been produced to document any changes (within the 42 non-Bradford Beck sites) to onsite fluvial and surface water flood risk following the latest updates to the FMfP and RoFSW datasets, based on the National Flood Risk Assessment 2 (NaFRA2). NaFRA2 provides a single picture of both current and future flood risk from rivers and surface water, using both existing detailed local information and improved national data. Surface water risk has now been incorporated into the FMfP.

At the time of writing, the NPPF has most recently been updated in December 2024, following a reform with the advent of the Labour Government, which has introduced minor revisions relevant to flood risk.

The FRCC-PPG (September 2025), alongside the NPPF, is referred to throughout this SFRA, being the current primary development and flood risk policy and guidance available at the time of finalisation of this SFRA.

The EA's SFRA guidance states a review of an SFRA should be carried out when there are changes to:

- The predicted impacts of climate change on flood risk,
- Detailed flood modelling - such as from the EA or LLFA,
- The spatial development strategy or relevant local development documents,
- Local flood management schemes,

[Environment, Economy, Planning & Transport | 2021](#)

⁵ [Flood Risk Assessments: Climate Change Allowances | Environment Agency | 2022](#)

- Local flood risk management strategies, and
- National planning policy or guidance.

The SFRA should also be reviewed after a significant flood event. It is in any unitary authority's interest to keep the SFRA as up to date as possible.

Ideally, the SFRA should be kept as a 'live' entity and continually updated when new information becomes available, as documented in the Level 1 SFRA and Appendix E of this Level 2 SFRA. The EA requests for reports and maps to be published online and be easily updatable, when required. The Level 1 SFRA mapping can be viewed on the [Council's interactive SFRA map](#).

2 Level 2 SFRA requirements

The aim of a Level 2 SFRA is to build on the findings of a Level 1 SFRA, focussing on identified sites or communities at high and medium flood risk that are considered important to Local Plan development. This allows the SFRA process to be time efficient using detailed modelling techniques only where they are required in the Level 2 assessment. These locations usually include significant development and / or regeneration areas that are at medium or high risk of flooding from main rivers, ordinary watercourses or surface water whilst also accounting for the impacts of climate change. Flood risk data such as modelled flood extents, depths, velocities and hazards are used to assess the suitability of these areas for development. Appropriate mitigation techniques and achievable site layouts can then be informed.

This detailed information should support further application of the sequential test, the sequential approach to development management, inform on whether sites can pass the exception test, where applicable, and allow for flood risk indicators to be produced for use in the Sustainability Appraisal of the Local Plan.

EA guidance³ states a Level 2 SFRA should:

- *"Be detailed enough for you to identify which development allocation sites have the least risk of flooding,*
- *Contain the information needed to apply the exception test, if relevant,*
- *Enable you to decide if development can be made safe without increasing flood risk elsewhere."*

It should allow the LPA to:

- *"Apply the sequential test by identifying the severity and variation in risk within medium and high flood risk areas,*
- *Establish whether proposed allocations or windfall sites, on which your local plan will rely, are capable of being made safe throughout their lifetime without increasing flood risk elsewhere,*
- *Apply the exception test, where relevant."*

A site-specific FRA will be required at the planning application stage which will assess risk to each site in greater detail than this Level 2 SFRA. The Level 2 SFRA is a strategic assessment that is not intended to replace the requirement of a site-specific FRA.

2.1 Objectives

In accordance with the latest national planning policy and flood risk guidance, the requirements of CBMDC, and with consideration of the limitations stated in Chapter 5, the key objectives of this Level 2 SFRA are to:

- Assess present day flood risk from all sources (fluvial, surface water, groundwater, sewers, canals, and reservoirs),
- Assess the impacts of climate change on fluvial and surface water flood risk,
- Document residual risk, including modelling of potential defence breaches and culvert blockages, where applicable,
- Assess detailed modelled outputs including flood depths, velocities, and hazards, where information is available,
- Assess existing flood warnings and alerts and advise on required emergency planning procedures and safety of site access and escape routes in times of flood,
- Account for the potential cumulative impacts of development,
- Provide site-specific advice on mitigation options i.e. developable / non-developable areas; blue / green infrastructure and open spaces; maintenance of fluvial and / or surface water flow routes and topographic depressions; land raising and compensatory storage; advice on minimum finished floor levels; and appropriate SuDS techniques,
- Assess any catchment-wide or strategic solutions, e.g. upstream opportunity areas for flood management (storage solutions) to mitigate against the risk of flooding downstream and elsewhere using Natural Flood Management (NFM) and Working with Natural Processes (WwNP) datasets,
- Demonstrate whether the second part of the exception test (part b) can be passed for the potential development site allocations, where applicable,
- Provide recommendations for additional and future work requirements following on from or to supplement the Level 2 SFRA i.e. further fluvial or surface water modelling including for climate change, modelling of site layout / design options including provisions for safe access and escape routes, development optioneering (land raising, compensatory storage, flow routes / rates), drainage strategies, site-specific FRA requirements.

3 Available data and information

The data and information described in this chapter has been used in the Level 2 SFRA to assess the risk to each site.

3.1 EA models

The following EA river models have been used within this assessment:

- Bradford Beck (2026)
- River Aire - Leeds FAS Kildwick to Esholt (2022)
- River Worth (2024)
- River Wharfe (2024)

3.2 EA Open Data (2024 and 2026)

Additional to the EA modelling information, the following datasets available from the EA's Open Data have been considered in the Level 2 SFRA:

- Most recent LIDAR digital terrain model (DTM) data
- NaFRA2 FMfP Flood Zones 2 and 3
- NaFRA2 FMfP Water Storage Areas
- NaFRA2 RoFSW extents for 3.3%, 1% and 0.1% AEP Annual Exceedance Probability (AEP) events
- Third generation RoFSW depths and hazards for 3.3%, 1% and 0.1% AEP events
- Spatial Flood Defences
- Historic Flood Map
- Recorded Flood Outlines
- Flood Warning Areas
- Flood Alert Areas
- Reservoir Flood Map
- Working with Natural Processes:
 - Riparian Woodland Potential
 - Wider Catchment Woodland Potential
 - Floodplain Woodland Potential
 - Floodplain Reconnection Potential
 - Runoff Attenuation Features 3.3% AEP
 - Runoff Attenuation Features 1% AEP.

As explained in Section 1.1, 19 of CBMDC's potential allocations have been assessed using the 2026 versions of the EA's Flood Map for Planning (FMfP) and Risk of Flooding from Surface Water (RoFSW) datasets. Whilst the Bradford Beck model was being developed, November 2024 versions of the FMfP and RoFSW datasets were used to assess flood risk to the 42 sites which are not located within the vicinity of Bradford Beck.

An addendum to this Level 2 SFRA (Appendix F) has been produced to document any changes (within the 42 non-Bradford Beck sites) to onsite fluvial and surface water flood risk following the latest updates to the FMfP and RoFSW datasets.

3.3 Other datasets

Other datasets and information used include:

- JBA 5m Groundwater Emergence Map,
- Functional floodplain dataset - the functional floodplain has been updated through this Level 2 SFRA (Section 4.1),
- OS Open Watercourse dataset,
- OS Open Data Zoomstack base mapping,
- Yorkshire Water sewer flood records,
- CRT breach and overtopping archive data,
- LLFA infrastructure and flood incident records,
- BGS Geology 625k dataset,
- LandIS Soilscales dataset

4 Methodology

This chapter presents the methodology used in each stage of the Level 2 SFRA. The site-specific reports contain further information.

4.1 Assessing fluvial flood risk

4.1.1 Sites not within the vicinity of Bradford Beck

For the sites not within the vicinity of Bradford Beck (and therefore assessed whilst the Bradford Beck model was being developed, prior to NaFRA2 datasets being published), flood risk from fluvial sources is assessed using the EA's Flood Map for Planning available at the time of commission (November 2024) and detailed hydraulic modelling, where available. Note that the NaFRA2 Flood Map for Planning was published on 25 March 2025, which provides an update to the flood zones and includes for the central climate change allowance on peak river flows. An addendum to this Level 2 SFRA (Appendix F) has been produced which considers the impact of the new Flood Map for Planning to onsite flood risk.

4.1.2 Sites within the vicinity of Bradford Beck

Flood risk from fluvial sources is assessed using the most recent version of the EA's Flood Map for Planning and the detailed Bradford Beck 2026 model.

4.1.3 Functional floodplain

Bradford functional floodplain has been updated as part of this SFRA. Appendix E details how functional floodplain has been delineated and outlines how the functional floodplain challenge process works.

4.1.4 Climate change

EA SFRA guidance³ states that the SFRA should assess the effects of climate change on all sources of flooding, including the functional floodplain, to help inform the sequential approach to development.

Through the Level 1 SFRA, completed in 2023, the EA river models covering the study area, available at the time of completion, were updated with the latest EA climate change allowances for peak river flows. This included the Leeds FAS Kildwick to Esholt 2022 model. Since completion of the Level 1 SFRA, new models covering Bradford Beck, the River Worth and the River Wharfe have been made available. The central and higher central allowances have therefore been modelled for this SFRA for the 1% AEP event and the 0.1% AEP event, where required. Table 4-1 lists the peak river flow allowances for the Aire and Calder management catchment, within in which the Bradford authority area is located.

The potential impacts of climate change on the functional floodplain have also been assessed to produce a 'future functional floodplain' flood extent, as updated through this Level 2 SFRA.

The modelled fluvial climate change outputs have been assessed against each potential site allocation, where applicable.

Table 4-1: Aire and Calder management catchment peak river flow allowances

Allowance category	Total potential change anticipated for peak river flows (based on a 1981 to 2000 baseline)		
	2020s (2015-2039)	2050s (2040-2069)	2080s (2070-2125)
Upper end	24%	31%	51%
Higher central	15%	18%	31%
Central	11%	13%	23%

4.2 Surface water

4.2.1 Sites not within the vicinity of Bradford Beck

For the sites not within the vicinity of Bradford Beck (and therefore assessed whilst the Bradford Beck model was being developed, prior to NaFRA2 datasets being published), flood risk from surface water is assessed using the EA's third generation Risk of Flooding from Surface Water dataset, accessed at the time of commission (November 2024). Note that the NaFRA2 Risk of Flooding from Surface Water dataset was published on 28 January 2025, which provides an update to the surface water flood map. An addendum to this Level 2 SFRA (Appendix F) has been produced which considers the impact of the new Risk of Flooding from Surface Water dataset to onsite flood risk.

4.2.2 Sites within the vicinity of Bradford Beck

Flood risk from surface water is assessed using the most recent (January 2026) version of the EA's Risk of Flooding from Surface Water dataset.

4.2.3 Climate change

EA climate change guidance states that for SFRAs, the upper end allowance on peak rainfall for the 2070s should be modelled for the 3.3% and 1% AEP events. For Bradford, this entails:

- 3.3% AEP rainfall event plus 40%
- 1% AEP rainfall event plus 45%

4.2.3.1 Sites not within the vicinity of Bradford Beck

The above scenarios were modelled for this SFRA and were assessed appropriately against the potential site allocations which are not within the vicinity of Bradford Beck (and

therefore assessed whilst the Bradford Beck model was being developed, prior to NaFRA2 datasets being published), where applicable.

4.2.3.2 Sites within the vicinity of Bradford Beck

The national Risk of Flooding from Surface Water dataset NaFRA2 update now includes for the central climate change allowance on peak rainfall. However, this allowance does not meet the requirements for planning, as set out above. Therefore, for these sites, the extent of flooding during the low risk event has been used as a proxy for the medium risk event plus the upper end allowance for peak rainfall (1% AEP plus 45% climate change allowance).

The EA are adding a new surface water climate change dataset to the FMfP on the 28th of May 2026. This new dataset will show the upper end climate change allowance for peak rainfall. Given the timescale of CBMDC's Local Plan, there is not sufficient time to update the SFRA based on the new dataset. Site-specific FRAs should always include for the latest information available.

4.3 Residual risk

Paragraph 004 of the FRCC-PPG states the requirement in plan making to account for residual flood risks from flood risk management infrastructure. For this Level 2 SFRA, this involves the consideration of defence breach scenarios and blockage of drainage assets, such as culverts, using available EA models where applicable.

For sites modelled to be at residual risk, the FRCC-PPG includes the following information:

- Areas of residual risk should be included in the sequential approach to risk avoidance when sequential testing or through development management,
- Where avoidance is not shown to be feasible through appropriate sequential testing, flood resistance and resilience measures should be in place, including for finished floor levels to be placed above the design flood level plus a minimum of 300mm,
- Adequate flood warning and emergency plans should be available to site users. Residual risks will need to be safely managed to ensure people are not exposed to hazardous flooding. This includes the ability of residents and site users to safely access and escape a building during the design flood and to evacuate before an extreme flood event which is defined as the 0.1% AEP event with an allowance for climate change (note it was not possible to model this event for this SFRA due to limitations with the EA models),
- The likelihood of defences keeping pace with climate change should be considered e.g. is funding available and what are the funding options (e.g. Community Infrastructure Levy, planning obligations / S106 agreements, or Partnership Funding). This should inform the nature of residual risk to be considered and whether new development can remain safe for its lifetime,

- Local planning authorities should use information on identified residual risk to state in strategic policies their preferred mitigation strategy for ensuring development will be safe throughout its lifetime in relation to urban form, risk management and where flood mitigation measures are likely to have wider sustainable design implications,
- A site-specific FRA will be required for all sites modelled to be at residual risk. The FRAs would need to show that appropriate evacuation procedures and flood response infrastructure are in place to manage the residual risk associated with an extreme flood event.

4.3.1 Defence breaches

EA SFRA guidance³ states that Level 2 SFRA's should '*assess what would happen if flood risk management features and structures failed or were breached*'. All sites were assessed against the EA's Spatial Flood Defences dataset and LiDAR data to understand whether they were protected by any raised flood defence infrastructure (embankments / flood walls). None of the potential development sites were identified through this process.

To understand the potential impacts of a breach of flood defence infrastructure on windfall sites, a proxy approach has been developed in consultation with the EA to provide indicative hazard associated with a defence breach. Table 4.4 within the Defra/Environment Agency Flood Risk to People (FD2321/TR2) guidance document⁶ has been used to assess the hazard behind defence breaches, utilising existing defended scenario modelling.

The water level behind each raised defence considered was taken from the 1% AEP plus 38% climate change defended event for the relevant watercourse. The level of the floodplain was subtracted from this value to provide the relevant 'head above floodplain' measurement. This informed the hazard rating with distance from the point of defence breach. The outputs from this high-level assessment have been supplied in GIS format and an example defence breach hazard map is shown in Figure 4-1.

It should be noted that this is a high-level approximation of the hazard associated with a defence breach. Breach modelling should be considered for any windfall sites that are situated behind a defence embankment as part of a site-specific FRA.

6 [Flood Risk to People \(FD2321/TR2\) | Defra/Environment Agency | March 2006](#)

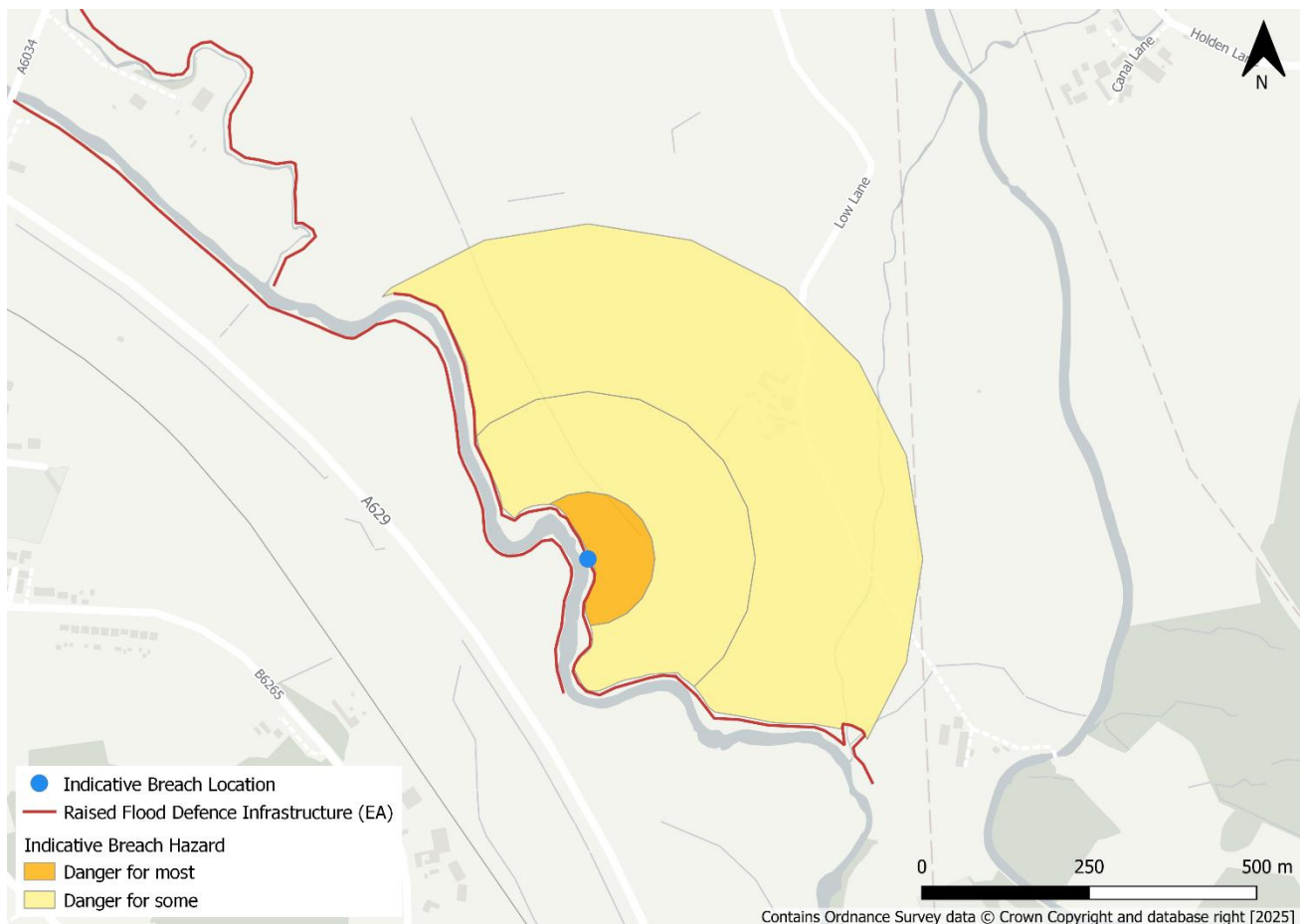


Figure 4-1: Indicative hazard resulting from a breach of defence infrastructure

4.3.2 Structural blockages

The 2026 Bradford Beck model has included for a modelled blockage scenario where every culvert was blocked by 50%. The model outputs have been used to assess the risk of culvert blockage for the sites within the vicinity of Bradford Beck.

4.4 Assessing flood risk from reservoirs

The EA's SFRA guidance³ requests for the assessment of risk from reservoir dam failure using the EA's Reservoir Flood Map (RFM). The RFM shows the credible worst-case scenarios from dam failure. If a site is shown to be at risk, the SFRA should assess if the design or maintenance of the reservoir would need improving. This will require contacting the reservoir owner(s) to ascertain the flood risk in more detail and whether the proposed development could affect the reservoir's risk designation, its design category or how it is operated.

CBMDC may be required, as category 1 responders, to access more detailed information about reservoir risk and reservoir owners using the online Resilience Direct System.

4.5 Assessing flood risk from canals

The Leeds and Liverpool Canal runs past several potential site allocations. There is no existing flood model of these canal systems therefore any residual risk from the canals is unknown. Given canals are controlled and managed features, the risk of flooding from a canal is considered low. The recommendation therefore is for any sites located near to a canal and situated at a lower elevation than a canal (identified in reports for sites assessed within the L2 SFRA), to be subject to a more detailed assessment at the FRA stage in consultation with the Canal & River Trust.

4.6 Assessing risk from groundwater emergence

Susceptibility of areas to groundwater emergence is appraised using JBA's national 5m Groundwater Flood Map which is much more refined than the British Geological Survey (BGS) datasets. In creating this map, our team of hydrogeologists and flood risk specialists modelled how and where groundwater levels would rise following prolonged periods of rainfall, considering factors such as topography, groundwater recharge volumes and spatial variations in aquifer storage and transmission properties. The model outputs were validated against recorded groundwater levels for past flood events and checked against areas historically affected by groundwater flooding. The high-resolution maps make it easier for users to pinpoint and report risks from groundwater flooding.

4.7 Assessing risk from sewers

Yorkshire Water provided its historic flood event register covering the 2023-24 period. Therefore, any incidents occurring prior to this date have not been reported within this Level 2 SFRA, with the assessment of historic sewer flood risk being limited to a two-year period. Given the sensitive nature of the data, this dataset has been used as a high-level flag to understand where a site may be located within an area with known issues of sewer flooding, rather than at the property-specific level. Developers should contact Yorkshire Water directly for more specific details at the FRA stage.

4.8 Assessing historic flood risk

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. CBMDC have also provided any information held internally on historic flooding. Details on historic flooding have been documented within the site-specific reports where applicable.

4.9 Access and escape routes and emergency planning

The EA's Flood Warning Areas and Flood Alert Areas have been reviewed and mapped against each potential site allocation. Potential access and escape routes have been documented for each site, identified where they are modelled to stay dry or experience non-hazardous to life flooding. Liaison with emergency planners and the local resilience forum may be required at the site-specific FRA stage.

4.10 Cumulative impacts

A joined-up approach should be adopted between developers at the FRA stage for any clusters of sites to ensure possible flood risk mitigation at one site does not increase risk to a neighbouring or downstream site as a result of loss of floodplain storage, the deflection or constriction of flood flow routes, or through inadequate management of surface water. Paragraph 049 of the FRCC-PPG states that site-specific flood risk assessments should assess cumulative impacts and demonstrate how mitigation measures have addressed them.

The LLFA states that any development plans proposing to discharge surface water offsite, should be limited to Qbar greenfield runoff rates for the developed area but not less than 0.5l/s as a practicable minimum. Any proposals to discharge at rates exceeding this would require LLFA approval based on technical assessment and justification.

The site-specific reports recommend for any clusters of sites at significant risk to be combined into a wider drainage strategy and masterplanning process.

4.11 Working with Natural Processes

The EA's national Working with Natural Processes mapping dataset has been assessed as to whether there is any potential for Natural Flood Management (NFM) measures that could benefit potential site allocations. This includes for tree planting, enhancing floodplain connectivity and attenuation of runoff through gully blocking and other runoff attenuation features.

5 Limitations

This Level 2 SFRA has been prepared under several limitations associated within the availability and quality of data. These limitations have been subject to consultation with Council officers and the EA whereby alternative approaches have been agreed to enable the Level 2 SFRA to be prepared using available existing information. The limitations include the following:

- NaFRA2 datasets were not available to use when assessing the sites not within the vicinity of Bradford Beck, e.g. sites assessed between 2024 and 2026 whilst the Bradford Beck model was being developed. The Level 2 SFRA addendum report (Appendix F) outlines any significant changes at each site.
- The EA released new surface water data to the FMfP on 28 May 2026. The new data now includes for suitable banded depth information and the upper end climate change allowance for peak rainfall. Given the timescale of CBMDC's Local Plan, there is not sufficient time to update the SFRA based on the new datasets. Site-specific FRAs should always include for the latest information available.

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