

Bradford Level 2 SFRA - Appendix E

Functional floodplain update
methodology

Final Draft

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Prepared for:

City of Bradford Metropolitan District Council



City of
BRADFORD
METROPOLITAN DISTRICT COUNCIL

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1 Introduction

The [Flood Risk and Coastal Change Planning Practice Guidance \(FRCC-PPG\)](#) states that local planning authorities (LPA) should identify in their Strategic Flood Risk Assessments (SFRA) areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency (EA).

The functional floodplain (Flood Zone 3b) extent covering the Bradford authority area was updated as part of the Level 1 SFRA, finalised in 2023, using the most up-to-date data available at the time. Since the delineation of the previous functional floodplain, three additional models have been finalised and the outputs are therefore required to be included within the functional floodplain extent. The future functional floodplain extent has also been updated to include the most recently available models as part of this Level 2 SFRA.

Note that Flood Zone 3b is not included in the Flood Map for Planning. Although the EA now publishes the Rivers and Sea 3.3% defended extent, the functional floodplain should also account for other available data indicating land where water has to flow, or which stores water, in times of flooding. EA guidance states that the Level 1 SFRA should define the functional floodplain. This SFRA therefore sub-divides Flood Zone 3 into Flood Zone 3a and Flood Zone 3b. This distinction is for the use of the LPA and developers in development planning. Flood Zone 3a can be considered to be Flood Zone 3 of the Flood Map for Planning that is not functional floodplain.

The LPA, Lead Local Flood Authority (LLFA) and the EA must all agree on the extent of the functional floodplain outline and the methodology used. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. The local knowledge of the LPA, LLFA and the EA is therefore crucial in defining the functional floodplain as robustly and realistically as possible.

The functional floodplain delineation methodology in Appendix B of the Level 1 SFRA provides detail of the methodology used to produce the 2023 functional floodplain, which remains consistent with the latest update. This methodology document will present the model outputs and methods used in the Level 2 SFRA update of the functional floodplain only. This methodology also documents the City of Bradford Metropolitan District Council's (CBMDC) Flood Zone 3b challenge process (Section 5).

2 Functional floodplain definition

The EA's [SFRA guidance](#) states that the Level 1 SFRA should include the functional floodplain extent on maps with a detailed explanation of how the functional floodplain was defined. This methodology note provides this definition.

The EA's SFRA guidance (2026) states that functional floodplain should show land that:

"Would flood from rivers or the sea with an annual probability of 1 in 30 (3.3%), with flood risk management features and structures operating effectively

Would normally form the river channel

Is designed to flood (such as flood attenuation schemes), even if it would only flood in more extreme events (such as 0.1% annual probability)"

How to Prepare an SFRA, Environment Agency, 2026

Regarding the impact of defences on the functional floodplain:

"In any modelling used to identify the functional floodplain, include existing defences and other flood risk management features and structures.

You may not need to designate the functional floodplain in locations where evidence shows flooding would be prevented by existing flood defences, flood risk management features or structures, or buildings"

How to Prepare an SFRA, Environment Agency, 2026

Regarding the impact of existing buildings on the functional floodplain:

"The footprints of existing buildings may be removed from functional floodplain extents. However, it may be simpler to include existing buildings and use local policies to control the redevelopment or changes of use that may be acceptable.

Use local policies or guidance to explain the approach you will take when buildings are demolished in functional floodplain. It may be reasonable to assume that sites revert to functional floodplain when buildings have been demolished for more than a year."

How to Prepare an SFRA, Environment Agency, 2026

If there is not enough detailed modelled information available to identify the functional floodplain, this should be made clear on the Level 1 SFRA maps to ensure risk isn't underestimated. In these areas, site-specific flood risk assessments should determine whether a site is affected by functional floodplain through additional modelling. If sites are proposed for development in such areas in the local plan, a Level 2 SFRA will be required to robustly map the functional floodplain extent.

3 Level 2 SFRA functional floodplain update

3.1 Datasets

3.1.1 Detailed flood modelling

The modelled flood outlines (MFO) listed in Table 3-1 were provided by the EA to assist in the update of the functional floodplain extent, following the recent finalisation of the models. Direct modelling of the 3.3% AEP defended event has been used to delineate the functional floodplain for these models. The additional datasets outlined in Table 3-2 of Appendix B (Level 1 SFRA) remain included within the latest update to the functional floodplain, where applicable.

The existing 2023 functional floodplain extent was used as a starting point, and the MFOs listed in Table 3-1 were appended to update the outline, superseding the previous modelled extents representing the relevant watercourse. The EA Rivers and Sea 3.3% defended flood risk extent (Section 3.1.2) has superseded all models developed in 2020 or earlier. The functional floodplain delineation methodology in Appendix B of the Level 1 SFRA remains applicable to the Level 2 SFRA update.

Table 3-1: EA modelled flood outlines used in the functional floodplain update

Model	Year	Model used to define the Level 1 functional floodplain	AEP used to define the Level 2 update functional floodplain	Defended / undefended?
River Wharfe	2024	Wharfe Catchment 2014	3.3%	Defended
River Worth	2024	River Worth 2007	3.3%	Defended
Bradford Beck	2026	Flood Zone 3 (EA)	3.3%	No defences exist
Where no defences exist, it indicates that there are no defences present along the watercourse. The defended event would be used in preference to the undefended event where available.				

3.1.2 EA Rivers and Sea 3.3% defended flood risk extent

The EA has published the Rivers and Sea 3.3% AEP defended event extent for both present day and accounting for climate change. The defended scenario considers the presence of flood defences and assumes that they operate in the way they were designed to function. This scenario does not include any asset failure or removal scenarios.

The Rivers and Sea 3.3% AEP defended event extent has been used to represent the functional floodplain in areas where no recently completed detailed modelling is available.

3.1.3 Local circumstances

3.1.3.1 Mill Hey, Haworth

As part of the functional floodplain delineated for the Bradford Level 1 SFRA, the River Worth 2007 model was used. This has since been superseded by the finalised River Worth 2022 model in the Level 2 SFRA update of the functional floodplain extent. The 30-year flood extent has been refined in the 2022 model along the River Worth, given the newer modelling software and higher resolution Digital Terrain Model (DTM) available since the 2007 model was built. This has removed an area modelled to be at risk in the 30-year event near Haworth train station, along Mill Hey. There are a number of recorded local historic and recent flood incidents in this area. Therefore, this area of modelled risk has been retained from the River Worth 2007 model in the Level 2 SFRA present day and future functional floodplain extents to reflect the observed flooding.

3.1.3.2 Walk Mills, Keighley

The area around Walk Mills, Keighley is not shown to be at risk from fluvial flooding in the River Worth 2024 3.3% AEP defended event. However, there have been a number of LLFA recorded flood events that have occurred within this area. Therefore, to represent this risk within the functional floodplain, a combination of the EA's Flood Map for Planning - Flood Zone 3 extent and the EA's Historic Flood Map have been used.

3.1.3.3 River Worth / River Aire confluence, Keighley

As part of the functional floodplain delineated for the Bradford Level 1 SFRA, the River Worth 2007 model was used. This has since been superseded by the finalised River Worth 2022 model in the Level 2 SFRA update of the functional floodplain extent. There is a significant difference in extent between the River Worth 2007 and 2022 models at the confluence between the River Worth and River Aire. Given the number of LLFA recorded flood events that have occurred in this area, the EA's Flood Map for Planning - Flood Zone 3 has been included to represent the functional floodplain in this location.

3.1.3.4 Coutances Way, Ilkley

As part of the functional floodplain delineated for the Bradford Level 1 SFRA, the Wharfe Catchment 2014 model was used to represent fluvial risk from the River Wharfe. This model has since been superseded by the River Wharfe 2024 model, which shows no fluvial flooding south of Coutances Way in the 3.3% AEP defended event. The EA's Flood Map for Planning - Flood Zone 3 has been included south of Coutances Way given the LLFA recorded historic flood incidents in this location.

3.1.3.5 Sandholme Drive, Burley-in-Wharfedale

Following consultation with the EA, a minor adjustment has been made to the functional floodplain extent at Sandholme Drive. This reflects the findings of a recent topographical survey for a minor development site, which demonstrates that the site is not located within the functional floodplain. The site has therefore been removed from the functional floodplain extent.

3.2 Dry islands

Areas of higher land shown as 'dry islands' within the functional floodplain should also be considered undevelopable, where safe access and escape routes are unachievable. The only exception to this is for water compatible or essential infrastructure uses. It has been assumed that any 'dry islands' within the functional floodplain extents should be considered as functional floodplain where these areas are located within Flood Zone 3 of the EA's Flood Map for Planning. Therefore, areas of 'dry islands' have been infilled within the extent where they align with Flood Zone 3.

The Council consider that to achieve safe access and escape (on foot or in a wheelchair), the flood hazard rating (HR) of the relevant area of land would need to be 'very low' in accordance with FD2320/TR2 ([Flood risk assessment guidance for new development, Gov.uk](#)) and have a depth of standard kerb height of **125mm** or less.

4 Future functional floodplain dataset

In addition to the present day functional floodplain extent, the future functional floodplain extent has also been updated with the latest modelled outputs. As part of this Level 2 SFRA, the 2070s upper end climate change allowance for the Aire and Calder management catchment has been modelled for the 3.3% AEP defended event, as documented in Table 4-1. The same methodology has been applied as the present day extent update to supersede the previous models used to define the future functional floodplain. The EA Rivers and Sea 3.3% AEP defended event plus climate change extent has been included to define the future functional floodplain outline in areas not subject to detailed modelling. The climate change allowances used to produce this dataset are based on the latest UK Climate Projections (UKCP18) from the Met Office, using the Representative Concentration Pathway (RCP) 8.5.

No suitable 3.3% AEP defended event climate change modelling was available within the supplied Bradford Beck 2026 model. Therefore, a combination of the Bradford Beck 2026 1% AEP defended event, used as a proxy, and the EA's Rivers and Sea 3.3% AEP defended event plus climate change extent have been used to represent future flood risk within the vicinity of Bradford Beck.

The future functional floodplain indicates areas likely to be within the functional floodplain in the future, however should take into account local circumstances. The future functional floodplain extent should not be included in the functional floodplain designation and is not included in any policy for planning decisions.

Table 4-1: Modelled climate change allowances

Model	Year	Climate change allowance modelled
River Wharfe	2024	51%
River Worth	2024	51%

5 Flood Zone 3b (functional floodplain) spatial extent – challenge process

The Council published its Level 1 SFRA in April 2024 and this set out the new spatial (geographical) extent of Flood Zone 3b (the functional floodplain). The SFRA report provides details in Appendix B as to the process used to define Flood Zone 3b. It sets out the data sources used and the mapping methodology. The main report makes reference to the [Council's interactive SFRA map](#) and indicates that:

“Where possible, the SFRA should be kept as a ‘live’ entity and continually updated when new information becomes available. Mapped outputs from the SFRA are hosted online and can be accessed via the CBMDC portal via this link.

Going forward, the process for adopting the outputs generated from new hydraulic modelling studies is outlined below:

- *Finalised outputs should be reviewed and approved by the Environment Agency.*
- *Once approved, appropriate outputs will be incorporated into the FMfP. This dataset is updated quarterly.*
- *Approved outputs can be used to justify a local revision to the outputs hosted on the CBMDC portal, for example present or future Flood Zone 1, 2, 3, 3b datasets where they differ from the datasets shown on the portal.*
- *The datasets used on the portal will be periodically reviewed and updated to ensure that they remain current.”*

A Level 2 SFRA has also been prepared for a number of potential development sites as part of the evidence base for the new Local Plan. The Level 2 SFRA has also used new river modelling and the new National Flood Risk Assessment (NaFRA2) to update parts of Flood Zone 3b.

5.1 What is the purpose of this note?

This additional note provides details of how the Council will deal with any challenge to the spatial (geographical) extent of Flood Zone 3b (the functional floodplain) by third parties, and/or as highlighted through the planning application process. It is important to highlight that the Council anticipates that challenges made by third parties are likely to be infrequent and when they are made must be supported by appropriate evidence. Objections to the current Flood Zone 3b (the functional floodplain) designation will not be agreed until the submitted evidence is verified and approved by the LLFA and EA.

5.2 How does a challenge come about?

A challenge may be received by a third party looking to carry out development on land currently designated as Flood Zone 3b. In many cases this will be highlighted through the

submission of a planning application. However, any challenge to the extent of Flood Zone 3b should be made outside of the planning process.

5.3 What information is required for a challenge?

Any challenge will need to be supported by adequate and detailed hydrological evidence. This may be in the form of a detailed topographical survey for minor changes or may involve an update to an existing river model or the provision of a new river model for more major changes.

Applicants should provide relevant GIS (Geographical Information Systems) data showing the change in the extent of the flood zone, with a copy of the model and outputs, topographical data and associated report(s).

5.4 What happens once the challenge is made?

Once the information has been submitted to the Council, an assessment will be made to determine whether a change to the flood zone can be made. Consultation with the EA and the LLFA will be carried out to seek expert advice on whether the data provided is robust and credible, and that a change to the flood zone extent can be justified. Any river model would need to be reviewed and signed off by the EA. It should be noted that the assessment of the site/area in question will also consider the wider extent of the flood zone and whether the removal of an area would create a 'dry island' which would still raise concerns regarding the potential ability of the land to be developed.

5.5 What are the possible outcomes?

If the information submitted is not sufficient to make a determination, or lacks particular detail, applicants will be advised of this, and a recommendation will be given in relation to the additional requirements which will need to be provided before a full assessment can be made. If it is determined that a change to the extent cannot be justified by the information submitted, applicants will be informed that the challenge has been unsuccessful.

Where the information provided is sufficient to justify a change, the Council's GIS systems, interactive SFRA map and challenge log will be updated to reflect the change. The Assistant Director for Planning, Transport and Highways will use delegated powers to confirm the change to the flood zone extent. The applicant will then be informed that the challenge has been successful.

In cases where a planning application / proposed development is the driver for the challenge application, the case officer dealing with the planning application will be informed of the outcome of the challenge process and directed to take account of the information submitted to the council in the decision-making process.

The diagram in Figure 5-1 provides the step-by-step guide to the challenge process.

Flood Zone 3b (Functional Floodplain) spatial extent challenge process

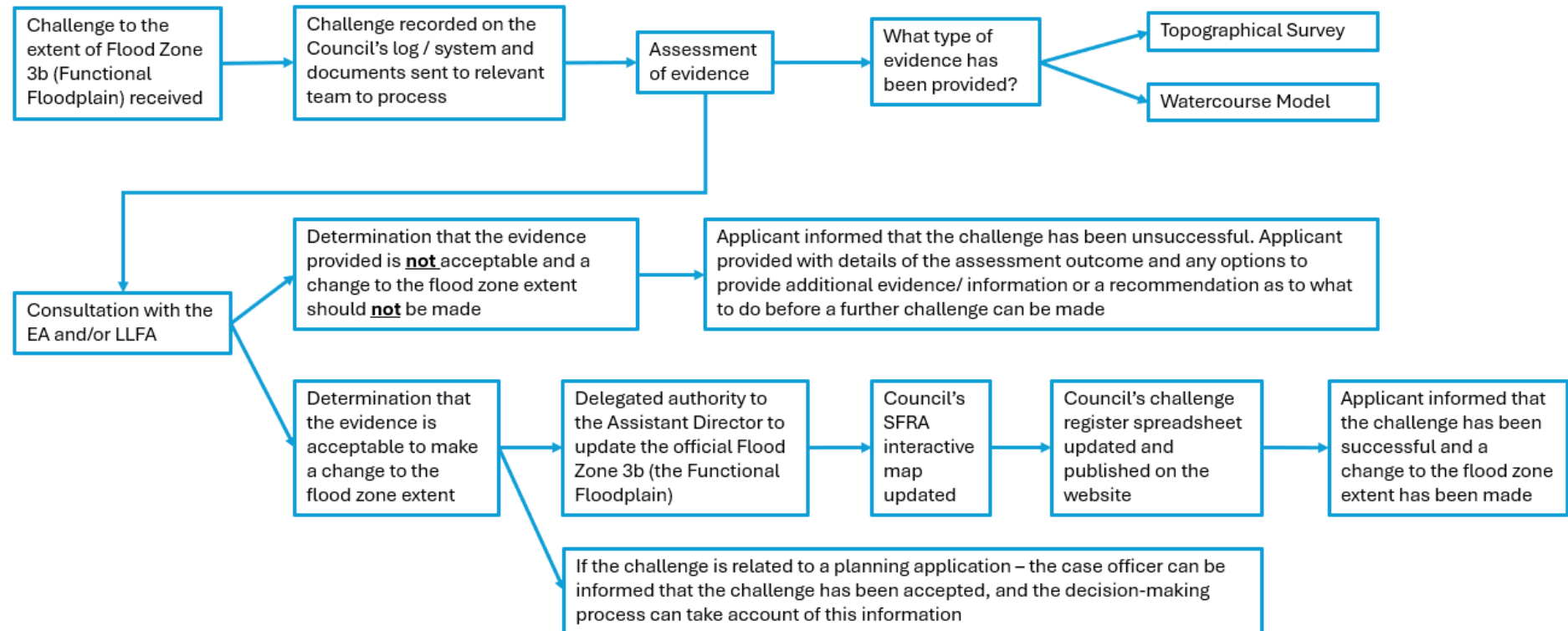


Figure 5-1: Flood Zone 3b (functional floodplain) challenge process

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North Yorkshire
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+44(0)1756 799919
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