

TECHNICAL NOTE

JBA Project Code	2022s0402
Contract	Liverpool City Region Combined Authority SFRA
Client	Liverpool City Region Combined Authority
Date	12 October 2023
Author	Laura Thompson
Reviewer	Mike Williamson
Subject	Functional Floodplain update



1 Introduction

The Flood Risk and Coastal Change Planning Practice Guidance¹ (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 Liverpool City Region Combined Authority (LCRCA) functional floodplain (Flood Zone 3b) extent has therefore been delineated as part of this SFRA using the most up-to-date data available from the EA. This methodology note explains the delineation process.

Note that Flood Zone 3b is not included in the Flood Map for Planning. 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 LPAs 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.

LCRCA, 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 LCRCA and the EA is therefore crucial in defining the functional floodplain as robustly and realistically as possible.

2 Functional floodplain definition

The EA's SFRA guidance² says 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 technical note provides this definition and the SFRA GeoPDF maps include the functional floodplain.

The EA's SFRA guidance states:

- *In any modelling used to identify the functional floodplain, include defences and other flood risk management features and structures,*
- *Functional floodplain may not be required in locations where evidence shows flooding would be prevented by existing:*
 - *flood defences*
 - *flood risk management features or structures*
 - *solid buildings*
- *Water storage areas are shown on the Flood Map for Planning. The EA should confirm whether these areas are suitable to include in the functional floodplain extent.*

The FRCC-PPG states the functional floodplain:

- *Comprises land where water from rivers or the sea has to flow or be stored in times of flood,*
- *Should comprise of land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively, or*

¹ Flood Risk and Coastal Change Planning Practice Guidance | UK Government | 2022

² How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2022

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- *Should comprise of land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding),*
- *Should take account of local circumstances and not be defined solely on rigid probability parameters.*

If there is not enough detailed information to identify the functional floodplain, this should be made clear on the 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. If sites are proposed for development in such areas in the local plan, a Level 2 SFRA will be required to map the functional floodplain extent.

3 Functional floodplain delineation

Based on the above guidance, the modelled flood outlines (MFO) listed in **Table 3-1** below were provided by the EA to assist in the update of the functional floodplain outline. The functional floodplain takes into account flood defences where possible, although not all of the models contained a defended scenario. In these cases the undefended model outputs were used.

Note:

- Only nine of the models contained 1 in 30-year (3.3% AEP) event MFOs. The 4% and 5% AEP event MFOs were used in place.
- See Section 6.2 of the main report for a list of the models that have not been remodelled for climate change at draft stage.

Table 3-1: EA modelled flood outlines

Model	Year	Annual Exceedance Probability (AEP)	Defended?
Birket, Fender and Arrowe Brook	2011	4%	Yes
Clipsley Brook	2009	4%	Yes
Crossens	2012	5%	Yes
Upper Dibbinsdale	2016	3.33%	Yes
Greasby Brook	2017	3.33%	No
Keckwick Brook	2014	3.33%	Yes
Kirkby – Upper Alt Tribs	2017	3.33%	No
Knowsley – Upper Alt Tribs	2017	3.33%	No
Logwood Mill	2012	4%	No
Lower Alt	2010	4%	Yes
Lower Dibbinsdale	2017	3.33%	Yes
Maghull	2011	4%	Yes
Mersey Estuary	2016	4%	Yes
Murdishaw Brook	2011	5%	No
Netherley	2012	4%	Yes
Ormskirk Road	2015	3.33%	Yes

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Model	Year	Annual Exceedance Probability (AEP)	Defended?
Pendlebury	2012	4%	Yes
Randle and Rainford	2011	4%	No
Stewards Brook	2017	3.33%	No
Tidal Lancs Alt	2014	3.33%	Yes
Tidal Lancs Ribble	2014	3.33%	Yes
Tidal Lancs Wirral	2015	3.33%	Yes
Upper Alt	2013	3.33%	Yes

Along with the above MFOs, the datasets in the table below were also interrogated to assist with the delineation.

Table 3-2: Additional datasets

Dataset	Purpose
Watercourse Link – OS Open Rivers	To create river channel areas within FZ3b as stated in EA SFRA guidance. A buffer of 8m either side of the channels was used to account for the EA’s recommended 8m non-development areas from the banks of a watercourse. Culverted and canalised sections have been excluded.
Buildings – OS OpenMapLocalRaster	To remove existing development from functional floodplain. A buffer of 1m was included around the building perimeters to roughly account for curtilages.
Road Link – OS Open Roads	To remove existing transport infrastructure from functional floodplain.
EA Flood Storage Areas (FSA)	To be considered as part of the functional floodplain.

3.1 GIS methodology

- The MFOs listed in **Table 3-1** were appended together to form one outline.
- All river channels were added to the outline using OS Open Data Rivers layer plus 8m buffer.
- The EA FSA dataset was reviewed, and it was found that there were three FSAs within the LCRCA administrative area. The EA must confirm this.
- Each polygon within the outline was attributed with the source MFO or flood risk dataset to easily identify the source of each polygon.

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- The OS Open Data Buildings layer plus 1m buffer for curtilages was used to identify existing buildings which were removed from the outline.
- Checks on the geometry of the outline were performed to ensure geometric correctness in GIS.

The draft functional floodplain outline should be assessed by LCRCA, LPAs, LLFAs and the EA and any comments or questions should be referred to JBA in order to agree on a finalised outline. The extent of the functional floodplain outline produced from this Level 1 SFRA and those areas where functional floodplain has not been delineated due to lack of data should always be assessed in greater detail where any more detailed study such as a Level 2 SFRA or site-specific FRA are undertaken, as directed by EA guidance.

3.2 Functional floodplain plus climate change

The above methodology for deriving the functional floodplain has also been applied to derive the Flood Zone 3b plus climate change outline.

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Table 3-3 indicates the fluvial models that have been used to define the functional floodplain plus climate change outline, and the respective uplift percentages applied to the peak flows for each model.

The climate change allowances are derived for the management catchments covering the LCRCA area; the Lower Mersey, the Alt and Crossens and the Weaver Gowy. The central uplift allowance is based on the 50th percentile and the higher central allowance is based on the 70th percentile. An allowance based on the 50th percentile is exceeded by 50% of the projections in the range. At the 70th percentile it is exceeded by 30%.

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Table 3-3: Fluvial models included in the Flood Zone 3b plus climate change outline

Model	Management catchment	Central uplift %	Higher central uplift %
Birket, Fender and Arrowe Brook	Lower Mersey	44	57
Clipsley Brook	Lower Mersey	44	57
Crossens	Alt and Crossens	44	58
Upper Dibbinsdale	Lower Mersey	44	57
Greasby Brook	Lower Mersey	44	57
Keckwick Brook	Lower Mersey	44	57
Kirkby – Upper Alt Tribs	Lower Mersey	44	57
Knowsley – Upper Alt Tribs	Lower Mersey	44	57
Logwood Mill	Lower Mersey	44	57
Lower Alt	Alt and Crossens	44	58
Lower Dibbinsdale	Lower Mersey	44	57
Maghull	Alt and Crossens	44	58
Murdishaw Brook	Lower Mersey	44	57
Netherley	Lower Mersey	44	57
Ormskirk Road	Lower Mersey	44	57
Pendlebury	Lower Mersey	44	57
Randle and Rainford	Lower Mersey	44	57
Stewards Brook	Lower Mersey	44	57
Upper Alt	Alt and Crossens	44	58

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Four additional models have been included within the functional floodplain plus climate change outline to account for sea level rise on coastal flood risk:

- Tidal Lancs Alt
- Tidal Lancs Ribble
- Tidal Lancs Wirral
- Mersey Estuary

For these models, the EA's sea level allowances for the North-west river basin district were applied to the tidal boundary of each model to simulate the potential effects of climate change on sea level rise. The higher central allowance is based on the 70th percentile and the upper end allowance is based on the 95th percentile. An allowance based on the 70th percentile is exceeded by 30% of the projections in the range. At the 95th percentile it is exceeded by 5% of the projections in the range.

Table 3-4 Sea level allowances for the North-West RBD (the total sea level rise for each epoch is in brackets)

Allowance category	2000-2035 (mm)	2036-2065 (mm)	2066-2095 (mm)	2096-2125 (mm)	Cumulative rise 2000-2125 (m)
Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41
Higher Central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01

For more detail on the levels applied please see the climate change modelling technical note in Appendix D.