Central Lancashire Level 2 Strategic Flood Risk Assessment Main Report

Final

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Prepared for:

Preston
South Ribble
Chorley
Central Lancashire

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This report describes work commissioned by Preston City Council, on behalf of the Central Lancashire Local Plan Team, by an instruction dated 19 August 2024. The Client's representative for the contract was Carolyn Williams of Preston City Council. Laura Thompson of JBA Consulting carried out this work.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between 19 August 2024 and 20 June 2025 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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

Acknowledgements

We would like to thank the Environment Agency for their assistance with this work.

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Abbreviations

AEP	Annual Exceedance Probability
DTM	Digital Terrain Model
EA	Environment Agency
FMfP	Flood Map for Planning
FRA	Flood Risk Assessment
HFM	Historic Flood Map
LIDAR	Light detection and ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NaFRA2	National Flood Risk Assessment 2
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PPG	Planning Practice Guidance
RBD	River Basin District
RFM	Reservoir Flood Mapping
RFO	Recorded Flood Outline
RoFSW	Risk of Flooding from Surface Water
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
WwNP	Working with Natural Processes

1 Introduction

A Level 2 Strategic Flood Risk Assessment (SFRA) is required by the Central Lancashire Authorities (Chorley Council, Preston City Council and South Ribble Borough Council) 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, finalised in 2024.

The Level 1 SFRA entailed the flood risk screening of 403 potential development site allocations across the Chorley, Preston and South Ribble authority areas. 77 of these sites were shown to be at medium or high flood risk yet considered important to the Central Lancashire Local Plan. A Level 2 SFRA is therefore required to help determine whether these sites can be allocated within the Local Plan.

Using the outputs from the Level 1 SFRA, the Central Lancashire Authorities have performed the sequential test on all available sites using the administrative area of the three constituent Local Planning Authorities (LPA) as the search area. The outcomes of the sequential test found that there were no reasonably alternative sites within the search area at lower risk of flooding. Hence the necessity for a more detailed assessment of flood risk through this Level 2 SFRA.

This Level 2 SFRA consists of the following documents:

- This main report summarising the Level 2 process and methodologies;
- 77 detailed site assessment reports (Appendix A); and
- A summary of the recommendations for each site (Appendix B).

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 Framework[1] (NPPF) 2024,
- Flood Risk and Coastal Change Planning Practice Guidance[2] (FRCC-PPG) 2022,
- How to Prepare a Strategic Flood Risk Assessment[3] guidance 2025,
- Strategic Flood Risk Assessment Good Practice Guide[4] 2021,
- Flood Risk Assessments: Climate Change Allowances[5] 2022.

1.1 SFRA future proofing

At the time of writing, this Level 2 SFRA has assessed and considered flood risk in the Central Lancashire authority area at a specific point in time. This Level 2 SFRA has been

[1] National Planning Policy Framework | UK Government | 2024
[2] Flood Risk and Coastal Change Planning Practice Guidance | UK Government | 2022
[3] How to Prepare a Strategic Flood Risk Assessment | Environment Agency | 2025
[4] Strategic Flood Risk Assessment Good Practice Guide | Association of Directors of Environment, Economy, Planning & Transport | 2021
[5] Flood Risk Assessments: Climate Change Allowances | Environment Agency | 2022

developed using the most up-to-date data and information available at the time of publication. The Level 2 SFRA has been future proofed as far as possible though the reader should always confirm with the source organisation (Central Lancashire Local Plan Team) that the latest information is being used when decisions concerning development and flood risk are being considered.

This SFRA uses the EA's Flood Map for Planning (FMfP) version accessed in August 2024 to assess fluvial risk and tidal risk, and the Risk of Flooding from Surface Water (RoFSW) dataset to assess surface water flood risk, also accessed in August 2024.

An update to this Level 2 SFRA was undertaken in June 2025 to re-assess sites where there has been a change to the level of fluvial or tidal flood risk following the publication of the new FMfP in March 2025, based on the National Flood Risk Assessment (NaFRA2). NaFRA2 provides a single picture of current and future flood risk from rivers, the sea and surface water, using both existing detailed local information and improved national data and surface water flood risk will be incorporated into the FMfP. In consultation with the EA, flood risk at the following sites was observed to have changed:

- 19C411
- 19C264x
- 19C243x
- 19C227x
- 19C100
- 19P089
- 19P012
- 19P031
- 19P178
- 19S250
- 19S110/165/169/SRB007
- 19S162
- 19S221/039/304

At the time of writing, the NPPF was significantly updated in December 2024, following a reform with the advent of the new Labour Government, which has introduced revisions relevant to flood risk and planning.

The FRCC-PPG (August 2022), 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 the finalisation of this SFRA.

The EA's SFRA guidance states a review of a 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,

- 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 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. The EA requests for reports and maps to be published online and be easily updateable, when required.

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, 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 guidance[3] states a Level 2 SFRA should:

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

It should enable the LPA to:

- *Apply the sequential approach 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 the constituent LPAs, 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, tidal, surface water, groundwater, sewers, canals, and reservoirs),

- Assess the impacts of climate change on fluvial, tidal and surface water flood risk,
- Document residual risk, including modelling of potential defence breaches and culvert blockages,
- 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 based on the cumulative impacts assessment carried out for the Level 1 SFRA,
- 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, tidal 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 and tidal models have been used within this assessment:

- Penwortham Lane 2006 (fluvial)
- Ribble-Douglas 2010 (fluvial)
- Black Brook 2011 (fluvial)
- River Chor 2011 (fluvial)
- Ribble Estuary 2014 (tidal)
- Lostock SOC 2020 (fluvial)

3.2 EA Open Data (August 2024)

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
- FMfP Flood Zones 2 and 3 (accessed August 2024)
- Updated FMfP Flood Zones 2 and 3 (accessed May 2025) - applicable to the 13 sites documented in Section 1.1
- FMfP rivers and sea undefended and defended climate change extents - applicable to the 13 sites documented in Section 1.1
- Flood Storage Areas
- Risk of Flooding from Surface Water extents, depths, and hazards for 3.3%, 1% and 0.1% Annual Exceedance Probability (AEP) events
- Reduction in Risk of Flooding from Rivers and Sea
- 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.

3.3 Other datasets

Other datasets and information used include:

- JBA 5m Groundwater Emergence Map (already available under licence from JBA Risk Management from the Level 1 SFRA)
- Modelled surface water climate change depths and hazards,
- Functional floodplain dataset - existing functional floodplain delineated through the Level 1 SFRA
- OS Open Watercourse dataset
- OS Open Data Zoomstack base mapping.

4 Methodology

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

4.1 Climate change allowance modelling

EA SFRA guidance[3] 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.

4.1.1 Fluvial

Through the Level 1 SFRA, the EA river models covering the study area were updated with the latest EA climate change allowances for peak river flows. The rivers within the Central Lancashire Authorities administrative area are located within the Wyre, Ribble and Douglas management catchments. Table 4-1 lists the peak river flow allowances for the Wyre, Ribble and Douglas management catchments.

The EA's climate change guidance[5] defines the return periods and allowances that should be modelled to assess the impacts of climate change in a SFRA. The central and higher central allowances have been modelled for this SFRA for the 1% AEP event (0.5% AEP event for tidal models) and the 0.1% AEP event.

The potential impacts of climate change on the functional floodplain have also been assessed to produce a 'future functional floodplain' flood extent, delineated through the Level 1 SFRA. The modelled fluvial climate change outputs have been assessed against each potential site allocation, where applicable.

Table 4-1: Wyre, Ribble and Douglas management catchments peak river flow allowances

Management catchment	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)
Wyre	Upper end	29%	44%	67%
	Higher central	22%	29%	44%
	Central	18%	23%	35%
Ribble	Upper end	27%	44%	71%
	Higher central	19%	29%	46%
	Central	16%	23%	36%
Douglas	Upper end	24%	45%	79%
	Higher central	15%	26%	47%
	Central	12%	19%	35%

4.1.2 Tidal

Through the Level 1 SFRA, the EA tidal models covering the study area were updated with the latest EA climate change allowances for sea level rise. The Central Lancashire authority area is located within the North-West River Basin District (RBD). Table 4-2 lists the sea level allowances for the North-West RBD.

The EA's climate change guidance[5] defines the return periods and allowances that should be modelled to assess the impacts of climate change in a SFRA. The higher central and upper end allowances have been modelled for this SFRA. The modelled tidal climate change outputs have been assessed against each potential site allocation, where applicable.

Table 4-2: Sea level allowances for the North-West RBD

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

4.1.3 Surface water

EA climate change guidance[5] 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 Central Lancashire this entails:

- Wyre management catchment

- 3.3% AEP rainfall event + 45%
- 1% AEP rainfall event + 50%

- Ribble management catchment
  - 3.3% AEP rainfall event + 40%
  - 1% AEP rainfall event + 50%
- Douglas management catchment
  - 3.3% AEP rainfall event + 40%
  - 1% AEP rainfall event + 45%

The above scenarios have been modelled for this SFRA and assessed appropriately against the Central Lancashire Local Plan site allocations, where applicable.

The national Risk of Flooding from Surface Water map has undergone a significant update as part of the NaFRA2 project, released in January 2025. The EA have published the following caveats in relation to the updated RoFSW map[6]:

- *"Risk of Flooding from Surface Water extents are available to download from the Data Services Platform but the depth information is not structured in a way that is suitable for planning purposes, as it describes the chance of flooding to a given depth, rather than the depth of flooding expected in the flood events considered through planning.*
- *The climate change information currently available for surface water flood risk is also not sufficient for use in planning. This is because the time-horizons and climate change scenarios used are likely to fall short of what's needed to assess planned development. We plan to publish surface water climate change data relevant to planning time horizons in later updates".*

Given the uncertainty surrounding the suitability of the available climate change outputs for planning, climate change modelling for Level 2 SFRA is based on the third generation RoFSW map.

4.2 Residual risk

4.2.1 Defence breach and structural blockages

Para 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 involved targeted modelling of defence breach scenarios and blockages of drainage assets such as culverts using the available EA models. The residual risk modelling was targeted to where potential site allocations are located.

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,

6 Flood Zones and supporting datasets - Product Description | Environment Agency | 2025

- 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 place 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.

4.2.2 Canals

The Leeds and Liverpool Canal and Lancaster Canal run 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, to be subject to a more detailed assessment at the FRA stage in consultation with the Canal & River Trust.

Historic overtopping data from the Canal & River Trust indicates potential for canal overtopping adjacent to sites 19P031 and 19C245x. There have been no historic instances of canal breaching at any of the sites, based on the Canal & River Trust breach dataset.

4.2.3 Assessing flood risk from reservoirs

The EA's SFRA guidance[3] 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 in a dry day scenario. Para 046 of the FRCC-PPG states the following in relation to the risk of flooding from a reservoir:

The local planning authority will need to evaluate the potential damage to buildings or loss of life in the event of dam failure, compared to other risks, when considering development downstream of a reservoir. Local planning authorities are also advised to consult with the owners/operators of raised reservoirs, to establish constraints upon safe development.

Local planning authorities should also consider any implications for reservoir safety and reservoir owners and operators caused by new development located downstream of a reservoir, such as the cost of measures to improve the design of the dam to reduce flood risk, the operation of the reservoir, and general maintenance costs, by consulting with reservoir owners and operators on plan and development proposals. Local authorities, as category 1 responders, can access more information about reservoir risk and reservoir owners using the Resilience Direct system. Developers should be expected to cover any additional costs incurred, as required by the National Planning Policy Framework's 'agent of change' policy (paragraph 187). This could be through Community Infrastructure Levy or section 106 obligations for example.

Applications will need to include any evidence local planning authorities need to understand the impact of individual developments on reservoirs. In doing so, they need to refer to relevant guidance in the Institution of Civil Engineers publication Floods and Reservoir Safety (4th edition) and the Environment Agency's Guide to risk assessment for reservoir safety management. It may be necessary to seek expert advice, such as from an All Reservoirs Panel Engineer, from the government accredited list under How to appoint a panel engineer.

Consideration should also be given to the potential impacts of development on the operation of reservoirs. This is particularly important where impacts could affect the management of flood risk or the supply of water.

The site reports in Appendix A show there to be 17 sites at risk from reservoir flooding according to the RFM. The LPAs may wish to follow the above guidance for these sites. However, this is for wider consideration within the local planning authority and emergency planning teams outside of the Level 2 SFRA.

4.3 Assessing risk from groundwater

Susceptibility of areas to groundwater emergence have been appraised using JBA's national 5m resolution Groundwater Emergence Map. See the site-specific reports in Appendix A for groundwater emergence risk to each potential site allocation.

4.4 Assessing flood risk from sewers

Recent historic sewer flooding incident data has not been provided for consideration within this Level 2 SFRA. Risk from nearby sewer and drainage networks must be assessed at the site-specific FRA stage through consultation with United Utilities.

4.5 Assessing historic flood risk

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered.

4.6 Access and escape routes and emergency planning

EA Flood Warning Areas and Flood Alert Areas have been mapped and reviewed against the potential site allocations along with access and escape routes for each site and any evacuation routes which 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. See Appendix A site reports.

4.7 Cumulative impacts

Cumulative impacts of development and land use change were assessed in the Level 1 SFRA. A joined-up approach should be adopted between developers at the site-specific 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. Para 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 site reports in Appendix A summarise the cumulative impact assessment policy recommendations as applicable from the Level 1 SFRA, and recommend for any clusters of sites at significant risk to be combined into a wider drainage strategy and masterplanning process

4.8 Working with Natural Processes

The national Working with Natural Processes (WwNP) mapping dataset has been assessed as to whether there is any potential for WwNP measures, such as flood storage, that could benefit potential site allocations. See Appendix A site reports for any potential areas.

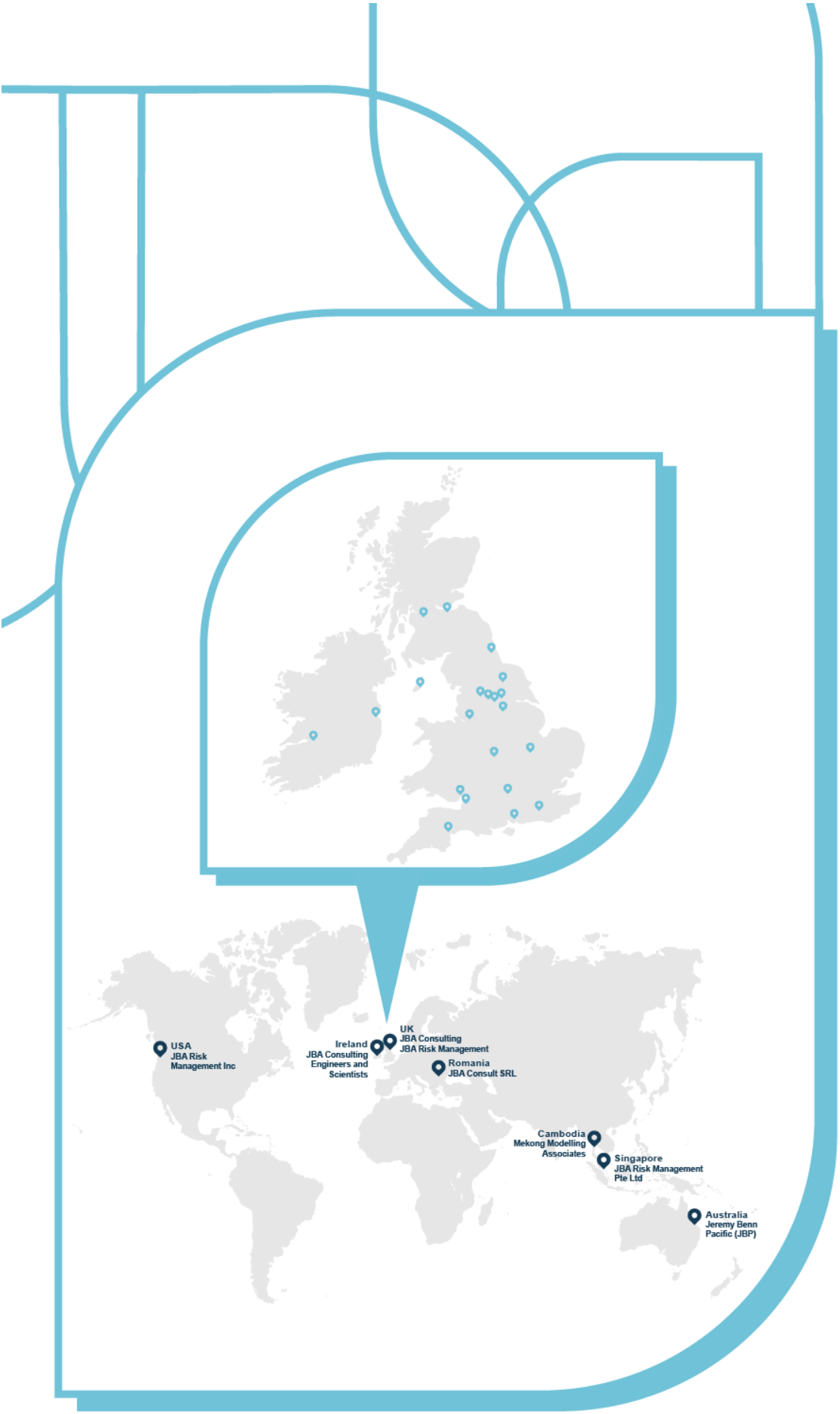
5 Limitations

This Level 2 SFRA has been prepared under several limitations associated with 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:

- The latest available EA flood models provided for use in the Level 2 SFRA are not up to date with the latest hydrology, therefore they may not be fully representative of current hydrological conditions. Model survey and digital terrain model data may also not be based on the latest information. The councils' Local Plan budget and programme would not allow for any updates to the EA models. The EA models used in the assessment are listed in Section 3.1.
- The third generation EA Risk of Flooding from Surface Water map has been used in this Level 2 SFRA. This has now been superseded by the new NaFRA2 Risk of Flooding from Surface Water map. As documented within this Level 2 SFRA, the updated data is not structured in a way suitable for planning purposes. Therefore, if any, more suitable, data is made available by the EA in the future, this Level 2 SFRA should be updated to account for the latest data, where there are significant differences to the third generation mapping.
- Several sites being assessed are at risk of flooding from rivers though an EA model is not available for a more detailed review of risk. Therefore, it cannot be proven that such sites can be safe for their lifetimes.
- OS Open Data watercourse information is high level and indicative in terms of culvert locations and routes. A number of culverted sections of watercourses included within the functional floodplain extent may be erroneous in terms of the route on which they have been digitised or are not accounted for in the dataset.

Any future SFRA update should look to include updates to the EA models with the latest information that is available at the time, including up to date hydrology inputs, channel and bank survey, LIDAR terrain data or topographic survey, and using the latest modelling software to update and run the models. The latest climate change allowances should be modelled and used to update the SFRA. Any SFRA update should also use any detailed culvert information available from the LLFA to more robustly define the functional floodplain and any residual risk modelling of culvert blockage scenarios.

In the absence of an update to the SFRA ahead of any planning application for allocated sites, the site-specific FRA should address all these limitations to the satisfaction of the LPA, the EA, and the LLFA, where required.



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