Level 2 Strategic Flood Risk Assessment – Site LPR131

Final Report

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Prepared for:
Hinckley and Bosworth Borough Council

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Hinckley & Bosworth Borough Council

Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for LPR131. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the Hinckley and Bosworth Level 1 SFRA and read the Hinckley and Bosworth Level 2 SFRA Main Report and is therefore familiar with the terminology used in this report.

1.1 Site details

- Location: Land at Burbage Fields Farm north of the M69, situated in Burbage in the south of Hinckley.
- Site area: 26.39ha
- Existing site use: Predominantly greenfield, with a number of existing buildings in the southwest.
- Proposed site use: Residential

1.2 Topography

Figure 1-1 shows the topography of the site represented by the Environment Agency (EA) 1m resolution LiDAR. Higher ground is concentrated in the north and the west of the site, with a maximum elevation of 127.0mAOD found at the northern boundary near Coventry Road. The elevation slopes downhill towards the southeast, following an unnamed watercourse that flows from the north to the southeast of the site. The minimum elevation is found in the southeast of the site, at 104.2mAOD.

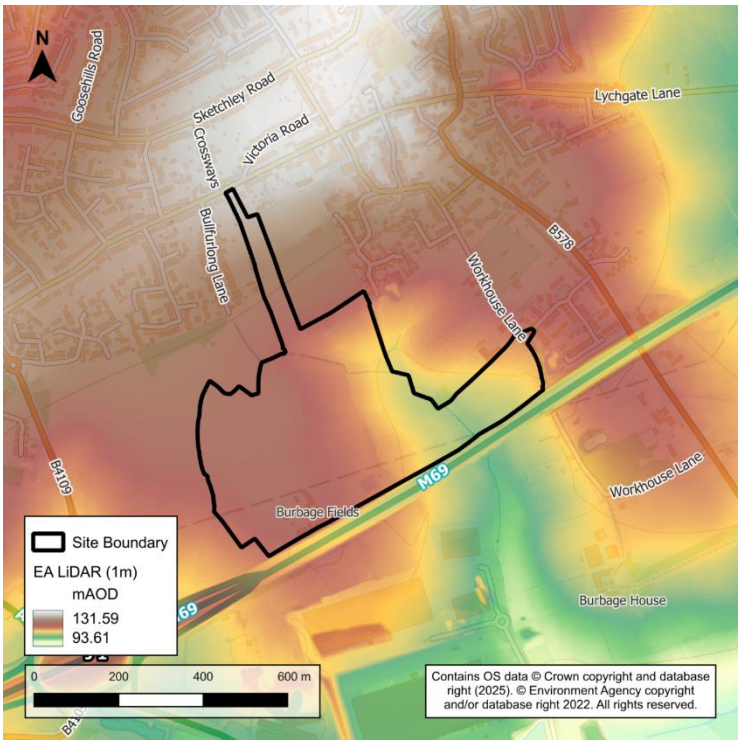

Figure 1-1: Topography of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock - Mercia Mudstone Group comprising mudstone.
- Superficial deposits – The site is predominantly underlain by Oadby Till Member, consisting of diamicton. Dunsmore Gravel Member, comprising sand and gravel, is found in the northernmost section of the site. Wolston sand and gravel underlay the southeastern corner and the central-northern part of the site. Alluvium, comprising clay, silt, sand and gravel, is found in the southeast along the watercourse.

Soils at the site consist of slightly acid loamy and clayey soils with impeded drainage.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream end of the Soar Brook (from Source to Soar) catchment. The Soar Brook flows southeast until it meets the River Soar east of Sharnford. The site is situated approximately 1.5km west of the Soar Brook. The catchment is predominantly rural, but includes parts of the settlement of Burbage, as well as the settlements of Aston Flamville and Sharnford in the north, and Copston Magna in the south.

2.2 Existing drainage features

An unnamed watercourse crosses the site, originating just south of Bullfurlong Lane before running along part of the northern boundary and continuing southwest toward the eastern boundary. At this point, it is joined by a second unnamed watercourse 100m in length. The combined flow travels south and leaves the site by a culvert beneath the M69. Downstream, the watercourse joins another channel and then discharges into the Soar Brook, around 1.8km southwest of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Flood Map for Planning (FMfP) has been used within this assessment to inform Flood Zones 2 and 3a. Flood Zone 3b has been defined using the EA's Rivers and Sea 3.3% AEP defended flood risk extent.

2.3.2 Description of risk to the site

The site is not shown to be at fluvial flood risk based on the EA's FMfP.

The unnamed watercourse flowing southeast across the site is not represented within the EA's FMfP. The risk from this watercourse has been assessed using the EA's Risk of Flooding from Surface Water Map (see Section 2.4).

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment.

2.4.2 Description of risk to the site

In the 3.3% AEP event, there is a surface water flow path in the east of the site associated with the unnamed watercourse. There is also an area of ponding in the north, as well as by the existing buildings in the southwest. However, in this event only 0.8% of the site is at

risk. Maximum depths, velocities, and hazard are associated with the ordinary watercourse (Table 2-1) with flood depths across the wider site remaining below 0.2m.

In the 1% and 0.1 AEP events, the percentage of the site at risk increases by 1.4% and 4% respectively. The largest increase in risk is associated with the ordinary watercourse with the extent increasing considerably in the southeast of the site and bisecting the centre of the site. In the 0.1% AEP event there is a considerable increase in flood depths associated with the ordinary watercourse upstream of the culvert under the M69.

Table 2-1: Existing surface water flood risk based on the RoFSW map.

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	<1	1.4	4.0
Maximum depth (m)	Exceeds 0.9m but does not exceed 1.2m	Exceeds 0.9m but does not exceed 1.2m	Exceeds 1.2m
Maximum velocity (m/s)	Exceeds 0.5m/s but does not exceed 1.0m/s	Exceeds 0.5m/s but does not exceed 1.0m/s	Exceeds 1.0m/s but does not exceed 2.0m/s
Maximum hazard classification	'Danger for Some'	'Danger for Most'	'Danger for All'

** The percentage surface water extents quoted show the percentage of the site at surface water risk from that particular event, excluding the percentage of the site at flood risk at a higher risk zone (e.g. the 1% AEP does not include the 3.3% AEP percentage).*

2.5 Reservoir

The site is not shown to be at risk of reservoir flooding during the 'dry day' or 'wet day' scenario from the EA reservoir flood maps.

2.6 Groundwater

The JBA Groundwater Emergence Map shows that groundwater levels are between 0.5m and 5m below the ground surface in the northeast and part of the northernmost section of the site. There is a risk of flooding to subsurface assets here, but surface manifestation of groundwater is unlikely. The northernmost section of the site has groundwater levels are at least 5m below the ground surface. Flooding from groundwater is not likely here.

Based on the EA RoFSW mapping and topography of the sites, if any groundwater does emerge it is likely to flow towards the southeast of the site.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

2.7 Sewers

Severn Trent Water were consulted as part of the Regulation 18 process and each of the Strategic Housing and Employment Land Availability Assessment reports to provide comments on known issues of sewer flooding within or surrounding the site. The site is considered to have a high potential impact on sewerage infrastructure. Modelling of the network shows some predicted flooding downstream of the site.

This assessment does not negate the requirement that drainage at the site should be in line with the drainage hierarchy (see Section 6.1).

2.8 Flood history

The EA's Historic Flood Map shows no records of flooding at the site.

Information provided by Leicestershire County Council shows that on Lutterworth Road, east of the site, groundwater was encountered while construction was taking place in January 2018. Temporary de-watering works were carried out. North of the site on Coventry Road there was external property flooding from highway in 2013.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 4.6 of the Hinckley and Bosworth Level 2 SFRA report for information on climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

The EA's FMfP Flood Zones plus Climate Change layer has been used to indicate areas of the site likely to be at increased flood risk in future.

3.1.2 Description of risk to the site

The EA's FMfP Flood Zones plus Climate Change layer shows the site is unlikely to be at increased fluvial flood risk in future.

The unnamed watercourse flowing southeast across the site is not represented within the EA's FMfP within the site. The future risk from this watercourse has been assessed using the EA's Risk of Flooding from Surface Water Map (see Section 3.2).

3.2 Surface water

3.2.1 Available data

In the absence of suitable climate change data, the 0.1% AEP extent from the EA's RoFSW mapping has been used as a proxy to indicate areas likely to be at risk during the 1% AEP plus climate change event.

3.2.2 Description of risk to the site

The southeast of the site surrounding the ordinary watercourse is shown to be susceptible to increased risk with climate change, with a considerable increase in extent between the 1% AEP and 0.1% AEP events. In this area there is also a considerable increase in depth and hazard where the water is shown to back up upstream of the M69 culvert.

There is also a new flow path that forms in the 0.1% AEP event through the centre of the site to join the watercourse.

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

The unnamed watercourse is culverted by the southeastern boundary of the site, beneath the M69. The EA RoFSW shows that the flow restriction at this culvert is likely to cause water to back up within the site, particularly within the 1% and 0.1% AEP events. In the event of a culvert blockage this risk on the site is likely to increase. This residual risk from the unnamed watercourse should be investigated further at the site-specific stage.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Access and escape

Safe access and escape routes will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Potential access

There is existing access into the site from the Bullfurlong Lane in the west, and the southeastern corner of the site can be accessed via Britannia Road and Workhouse Lane. There is also potential access from Flanders Close in the southeast, and Coventry Road in the north. The ordinary watercourse bisects the site and therefore access and escape need to be considered to the east and west parcels.

5.2.2 Fluvial

Access and escape are not shown to be impacted during any of the available fluvial flood events, including within the Flood Zones plus Climate Change dataset.

5.2.3 Surface water

In the 3.3% and 1% AEP event, there is ponding on Workhouse Lane and Britannia Road. However, depths are shown to remain below 0.3m and predominantly classified as 'Very Low Hazard' so unlikely to impede access and escape. Bullfurlong Lane, Flanders Close, and Coventry Road are shown to remain clear.

In the 0.1% AEP event, there is additional ponding on Bullfurlong Road and Coventry Road. The areas of ponding on Workhouse Lane and Britannia Road also increase in extent. Flanders Close leads to Lutterworth Road (B578) via Passchendaele Drive, and there is an area of ponding near the junction between Passchendaele Drive and Lutterworth Road (B578). Flood depths here exceed 0.9m, maximum velocity exceeds 0.5m/s and the maximum hazard classification is 'Danger for Most' which may impede access from the south along the B578, but access from the north remains clear. Areas of ponding across the other access routes is shown to remain below 0.3m in depth and is mostly classified as 'Very Low Hazard' so access and escape is unlikely to be impeded.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible SuDS

Surface water at the site should be discharged in accordance with the drainage hierarchy as set out in the National standards for SuDS (gov.uk). SuDS that provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity, should be prioritised. SuDS proposals should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints.

Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.

The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

The following factors should be considered when assessing whether infiltration is suitable at the site:

- Groundwater levels are indicated to be between 0.5 and 5m below ground level in the northeast and part of the northernmost section of the site and there is a risk of flooding to subsurface assets and below ground development such as basements. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels.
- BGS data indicates that the underlying geology is mudstone and is likely to be poorly draining. Any proposed use of infiltration should be supported by infiltration testing.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is not located within a historic landfill site.

If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

The unnamed watercourse flowing southeast across the site and surrounding areas of risk should be integrated into the site drainage strategy as blue-green infrastructure and public open space.

6.2 Opportunities for wider sustainability benefits and integrated flood risk management

The following are opportunities for wider sustainability benefits and integrated flood risk management at the site:

- Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas should be considered.
- Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The unnamed watercourse drains into the Soar Brook (from Source to Soar) (GB104028042590), which has a 'poor' ecological classification. The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.

7 NPPF and planning implications

7.1 Exception Test requirements

The Local Planning Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

The Exception Test is not required, because the development is not proposed within the EA Flood Zones.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site is:

- greater than 1 hectare
- at risk of flooding from ordinary watercourse and surface water
- identified as being at increased flood risk in the future.

All sources of flooding should be considered as part of a site-specific FRA.

Consultation with the Local Authority, Lead Local Flood Authority, Water Company, and the EA should be undertaken at an early stage.

Any FRA should be carried out in line with latest guidance including the National Planning Policy Framework (NPPF), Flood Risk and Coastal Change Planning Practice Guidance (PPG), and Hinckley and Bosworth Local Plan Policies.

The development should be designed with mitigation measures in place where required.

7.3 Guidance for site design and making development safe

The site layout must adopt a sequential approach by steering more vulnerable aspects of the development away from the areas of highest risk by the flow path associated with the unnamed watercourse across the central-north area and southeast of the site. Developers should consider utilising this area around the flow path as a green corridor.

A detailed hydraulic model of the unnamed watercourse may be required at FRA stage to accurately represent the risk from this watercourse and the interaction with the culvert downstream of the site. Blockage scenarios are likely to be required to understand the potential impacts for flood risk on the site. Consideration should be given to improving the current drainage under the road.

Development at this site should not increase flood risk either on or off site. The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should

help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development. This initial assessment has shown the area in the southeast of the site surrounding the ordinary watercourse is likely to be at increased risk in future.

Arrangements for safe access and escape will need to be demonstrated for the 1% AEP fluvial and surface water events with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

If proposed works affect an ordinary watercourse, Leicestershire County Council as the Lead Local Flood Authority should be contacted respectively to obtain prior written consent. Any watercourses should be accommodated within the site layout and should not be culverted except for where access is required. The site layout should allow for access to any watercourse for maintenance and they should generally be located within publicly accessible areas. A buffer of at least 8 metres should be maintained between the watercourses and any built development.

8 Conclusions

The site is not shown to be at flood risk within the EA FMfP, however there is an ordinary watercourse in the southeast of the site which provides a risk to the site, represented within the EA surface water mapping.

The Exception Test is not required, because the development is located within Flood Zone 1 of the EA FMfP. However, a site-specific FRA will be required, because the proposed development site is greater than one hectare, subject to ordinary watercourse and surface water flooding, and identified as being at increased flood risk in the future (based on the 0.1% AEP surface water event).

The following points should be considered in development of this site:

- A buffer of at least 8 metres should be maintained between the unnamed watercourse and any built development on the site.
- The site layout must adopt a sequential approach by steering more vulnerable aspects of the development away from the areas of highest risk by the flow path associated with the unnamed watercourse across the central-north area and southeast of the site. Developers should consider utilising this area around the flow path as a green corridor.
- A detailed hydraulic model of the unnamed watercourse may be required at FRA stage to accurately represent the risk from this watercourse and the interaction with the culvert downstream of the site. Blockage scenarios are likely to be required to understand the potential impacts for flood risk on the site. Consideration should be given to improving the current drainage under the road.
- Further assessment of the surface water risk to the sites should be undertaken as part of a site-specific FRA to quantify the volume of surface water risk at the sites and ensure that any modification of ground levels required as part of the site design will not displace surface water and increase flood risk off the sites.
- Safe access and escape routes should be demonstrated in the 1% AEP plus climate change surface water event. This initial assessment has shown safe access and escape are likely to be possible within the 0.1% AEP event (used as a proxy for the 1% AEP plus climate change event).
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development in one area, compensatory flood storage will be required in another).

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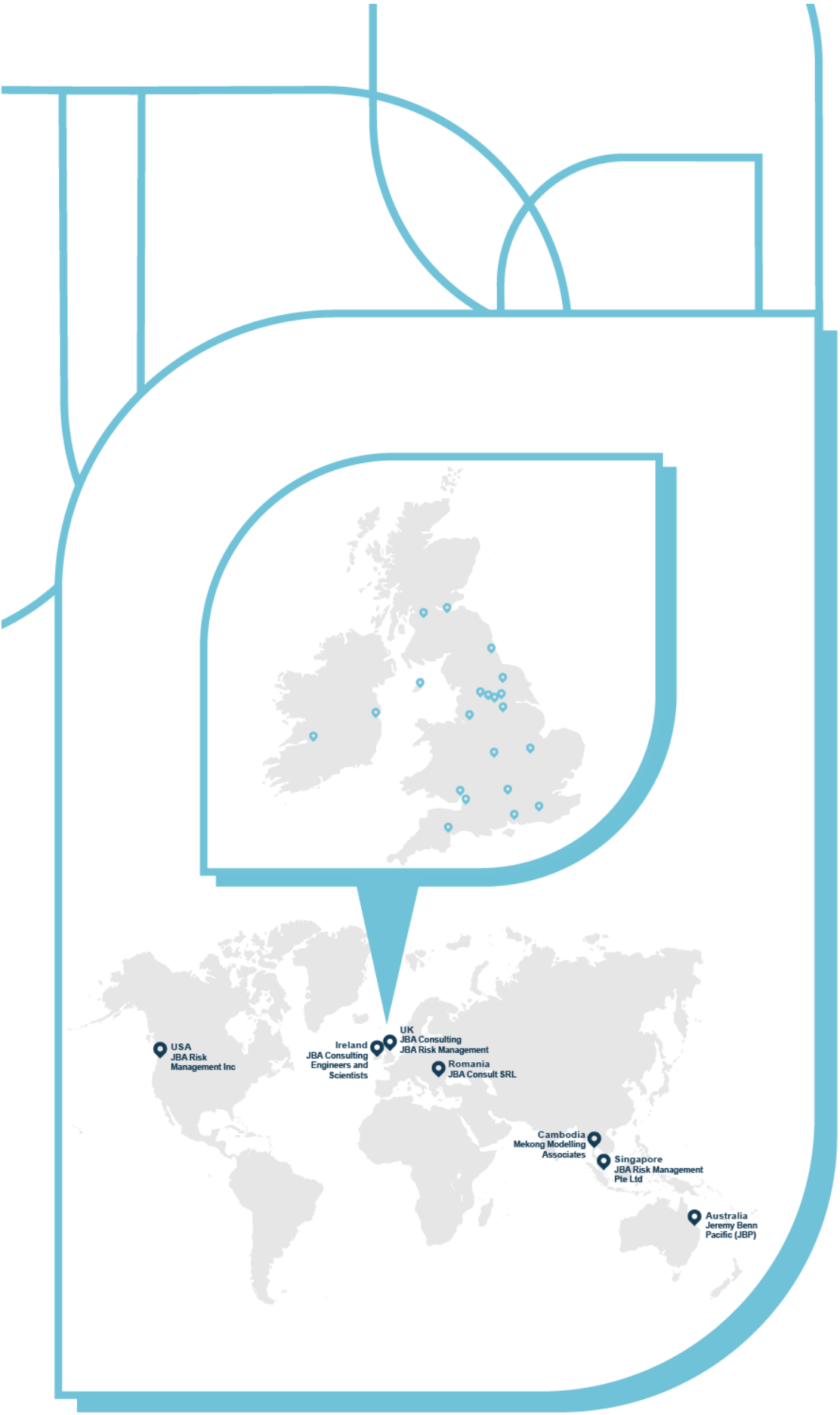

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