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Level 2 Strategic Flood Risk Assessment - HA14

Beaufort Business Centre, Monmouth Street, Derby, DE21 6AX

Final

Prepared for
Derby City Council

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July 2026

Derby City Council

Contents

1 Background

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

1.1 Site details

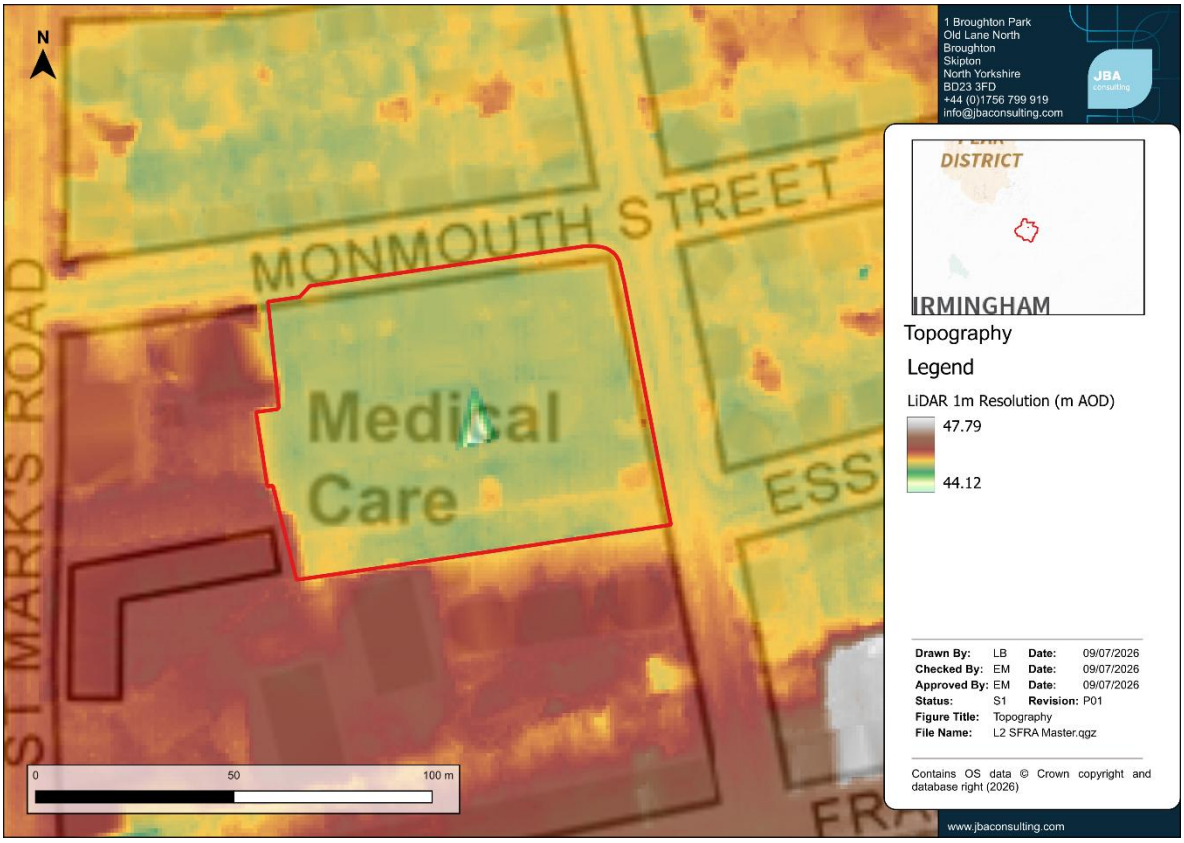
The site is located within the Chaddesden area, to the north-east of Derby, and is 0.68 hectares in size. The site is currently undeveloped greenfield land and is proposed for residential development.

The site is bordered by Monmouth Street to the north, Beaufort Street to the east, and a mixture of residential and commercial properties to the south and west.

1.2 Topography

Figure 1-1 shows the topography of the site represented by the Environment Agency (EA) 1m resolution LiDAR. The topography is relatively flat, ranging between approximately 44.30mAOD in the centre of the site to approximately 46.26mAOD in the south-western area. The wider topography demonstrates that land levels are generally higher to the east of the site and gradually fall towards the west, in the direction of the River Derwent.

Figure 1-1: Topography of the site.



1.3 Geology and soils

Geology at the site consists of:

- Bedrock - Tarporley Siltstone Formation consisting of mudstone and siltstone
- Superficial - Alluvium consisting of clay, silt, sand and gravel

Soils at the site consist of:

- Loamy and clayey floodplain soils with naturally high groundwater

2 Sources of Flood Risk

2.1 Location of site within the catchment

The site is located in the Derwent from Bottle Brook to Trent Water Body which is part of the Derwent Lower - Derbyshire Operational Catchment. The Derwent from Bottle Brook Water Body has a catchment area of 7512.84ha and is described as heavily modified.

2.2 Existing drainage features

There are no existing drainage features within the site. The River Derwent (classified as an EA Main River) flows in a south-easterly direction approximately 850m south-west of the site.

2.3 Fluvial

2.3.1 Available data

The EA's Derby Our City Our River (OCOR) detailed hydraulic model (2023) for the River Derwent was used in this assessment.

2.3.2 Description of risk to the site

illustrates the fluvial flood risk to the site based on outputs from the Derby OCOR hydraulic model. The site is not predicted to experience fluvial flooding during either the 3.3% AEP defended or 1% AEP undefended events. However, during the 0.1% AEP undefended event, extensive flooding is predicted across both the site and the surrounding area. Flood depths exceeding 1m are predicted across the entirety of the site, with a maximum depth of 1.43m in the western part of the site. The highest velocities are predicted within the south-western corner, reaching up to 0.91m/s. Hazard outputs are not available for the 0.1% AEP event; however, given the significant flood depths predicted across the site, flood hazard is expected to be high with risk to life likely.

It should be noted that the site also lies entirely within Flood Zone 2 of the EA's Flood Map for Planning (FMfP).

Table 2-1 illustrates the fluvial flood risk to the site based on outputs from the Derby OCOR hydraulic model. The site is not predicted to experience fluvial flooding during either the 3.3% AEP defended or 1% AEP undefended events. However, during the 0.1% AEP undefended event, extensive flooding is predicted across both the site and the surrounding area. Flood depths exceeding 1m are predicted across the entirety of the site, with a maximum depth of 1.43m in the western part of the site. The highest velocities are predicted within the south-western corner, reaching up to 0.91m/s. Hazard outputs are not available for the 0.1% AEP event; however, given the significant flood depths predicted across the site, flood hazard is expected to be high with risk to life likely.

It should be noted that the site also lies entirely within Flood Zone 2 of the EA's Flood Map for Planning (FMfP).

Table 2-1: Existing fluvial flood risk based on the Derby OCOR hydraulic model*

Flood Zone	3.3% AEP (%) (FZ3)	1% AEP (%) (FZ3)	0.1% AEP (%) (FZ2)
Percentage of site at risk* (%)	0.00	0.00	100
Maximum depth (m)	N/A	N/A	1.43
Maximum velocity (m/s)	N/A	N/A	0.91
Maximum hazard classification	N/A	N/A	No information available

** The percentage fluvial flood extents quoted show the percentage of the site at fluvial flood risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g., 1% AEP includes the 3.3% AEP percentage).*

2.3.3 Climate Change

2.3.3.1 Available data

The EA's Derby Our City Our River (OCOR) hydraulic model (2023) has been used to assess the impact of climate change on fluvial flood risk to the site. The assessment is based on the 1% AEP event with a 29% climate change allowance, representing the 'Central' allowance for the 2080s epoch.

2.3.3.2 Description of risk to the site

As shown in Table 2-2, there is a substantial increase in the extent of fluvial flooding between the present-day 1% AEP event and the 1% AEP event including a 29% climate change allowance. The site is not predicted to be affected by flooding during the present-day 1% AEP event; however, under the climate change scenario, 98.86% of the site is predicted to be inundated. Flood waters are predicted to encroach onto the site from the north, affecting a significant proportion of the site area, with only a minor area in the south-western corner remaining unaffected. Maximum flood depths of up to 0.71m are predicted within the western part of the site, whilst peak velocities of 0.82m/s are anticipated in the north-western corner. Overall, flood hazard mapping indicates a maximum hazard classification of 'Significant – Danger for Most People' across the site

Table 2-2: Comparison of fluvial flood risk to the site between the 1% AEP and 1% AEP plus 29% climate change extents.

Event	1% AEP	1% AEP plus 29% CC
Percentage of site at risk (%)	0.00	98.86

Event	1% AEP	1% AEP plus 29% CC
Maximum depth (m)	N/A	0.71
Maximum velocity (m/s)	N/A	0.82
Maximum hazard classification	N/A	1.35 - Significant - Danger for most: Flood Zone with deep fast flowing water

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used to assess surface water flood risk within this assessment.

2.4.2 Description of risk to the site

indicates that the site is at significant surface water flood risk during all AEP events. During the 3.3% AEP event (high-risk event), surface water ponding is predicted across the majority of the site, affecting 79% of the total site area. Flood depths are generally shallow, remaining below 0.20m, and the maximum flood hazard classification across the site is Low (Caution).

During the 1% AEP event (medium-risk event), the extent of flooding increases, with an additional 8.50% of the site affected, particularly along the southern and western site boundaries. Maximum depths across the site are 0.20m and the maximum hazard classification increases to Moderate (Danger for Some) within central areas of the site.

During the 0.1% AEP event (low-risk event), a further 11.70% of the site is affected, resulting in flooding across almost the entire site. Flood depths increase to a maximum of approximately 0.30m, and the severity of flooding also escalates, with a maximum hazard classification of Significant (Danger for Most People) predicted across the site.

Table 2-3 indicates that the site is at significant surface water flood risk during all AEP events. During the 3.3% AEP event (high-risk event), surface water ponding is predicted across the majority of the site, affecting 79% of the total site area. Flood depths are generally shallow, remaining below 0.20m, and the maximum flood hazard classification across the site is Low (Caution).

During the 1% AEP event (medium-risk event), the extent of flooding increases, with an additional 8.50% of the site affected, particularly along the southern and western site boundaries. Maximum depths across the site are 0.20m and the maximum hazard classification increases to Moderate (Danger for Some) within central areas of the site.

During the 0.1% AEP event (low-risk event), a further 11.70% of the site is affected, resulting in flooding across almost the entire site. Flood depths increase to a maximum of approximately 0.30m, and the severity of flooding also escalates, with a maximum hazard classification of Significant (Danger for Most People) predicted across the site.

Table 2-3: Existing surface water flood risk based on the RoFSW map

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	79.00	8.50	11.70
Maximum depth (m)	0.20	0.20	0.30
Maximum hazard classification	0.50 - Low Hazard - Caution (i.e. children): Flood zone with shallow flowing water or deep standing water	0.75 - Moderate Hazard - Dangerous for some (i.e. children): Flood zone with deep or fast flowing water	1.25 - Significant Hazard - Dangerous for most people: Flood zone with deep fast flowing water

**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.*

2.4.3 Climate Change

2.4.4 Available data

The EA's FMfP Surface Water Spatial Planning mapping has been used to assess the extent and depth of surface water flooding impact of climate change on flood risk to the site in the 1% AEP plus 40% climate change event. The impact of climate change on surface water flood risk should be assessed as part of a site-specific Flood Risk Assessment, in line with the latest available climate change allowances and guidance.

2.4.5 Description of risk to the site

Surface water flood mapping indicates an increase in flood extent between the present-day 1% AEP event and the 1% AEP event including a 40% climate change allowance. Table 2-4 shows that an additional 8.50% of the site is affected during the present-day 1% AEP event compared to the 3.3% AEP event. However, this figure excludes the 79% of the site already shown to be at risk during the 3.3% AEP event. When these extents are considered cumulatively, 87.50% of the site is affected by surface water flooding during the present-day 1% AEP event.

During the 1% AEP plus 40% climate change allowance scenario, the extent of flooding increases further, resulting in a greater proportion of the site being affected by surface water flooding, notably along the western and southern site boundaries. This increase in flood extent is accompanied by greater flood depths, with the majority of the site predicted to experience depths of up to 0.60m.

Table 2-4: Comparison of surface water flood risk to the site between the 1% AEP and 1% AEP plus 40% climate change extents.

Event	1% AEP	1% AEP plus 40% CC
Percentage of site at risk (%)	8.50	99.9
Maximum depth (m)	0.20	0.60

2.5 Reservoir

The EA's Reservoir flood mapping shows the entirety of the site to be affected by the Dry Day flood extent from the Ladybower reservoir. The site is also entirely within the Wet Day reservoir flood extent from the Ladybower reservoir, as well as the Derwent, Howden, Kedleston Park Lake No.1, Kedleston Park Lake No.2, Markeaton (Mill pond) and Ogston reservoirs.

The 'Wet Day' event seeks to estimate the effect of a breach at the same time as a 0.1% AEP river flood is occurring and suggests that the consequences of such a breach are similar to the modelled 0.1% AEP event river flood event, but are likely associated with a much lower probability.

2.6 Groundwater

The JBA Groundwater Emergence Map shows that there is negligible risk of groundwater flooding during a 1% AEP groundwater flood event.

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

The sewer flooding risk register provided by Derby City Council shows that there has been one instance of external sewer flooding within the postcode area of the site. This occurred along Beaufort Street, which runs along the eastern site boundary.

2.8 Flood history

The EA's Recorded Flood Outlines shows that the site is not located within a historic flood extent, nor is it named within a Section 19 report held by Derby City Council.

3 Flood risk management infrastructure

3.1 Defences

The EA AIMS dataset shows that there are numerous flood defences along the River Derwent which comprise of walls, bridge abutments, embankments, and engineered high ground. Defence structures have a design standard of protection (SoP) ranging from the 10% AEP event to the 1% AEP event, however not all SoPs are detailed within the dataset. Named structures are the St Alkmund's Way Right Bank, Meadow Lane Flood Wall, Meadow Road Flood Wall, Stuart Street Left Bank Integrated Wall, Pheonix St Bank, and OCOR Defences.

3.2 Residual risk

The site is at a residual risk of flooding resulting from the breach or overtopping of flood defence structures associated with the River Derwent. However, given that the site is located approximately 850m from the river and occupies relatively higher ground, the likelihood of flooding from such an event is considered to be low. As part of a site-specific flood risk assessment, developer should assess the risk posed to the site if defences were to fail, and demonstrate that users of the site will be safe for the lifetime of the development. This is likely to require a flood warning and evacuation plan, although this may be provided through integration into risk management authorities existing emergency plans for flooding to Derby from the River Derwent.

In addition, the site is shown to be at residual risk of flooding associated with reservoir failure under both the Dry Day and Wet Day scenarios. Further details are provided in Section 2.5.

4 Emergency planning

4.1 Flood warnings and alerts

The site is located in the River Derwent at Racecourse Park at Chaddesden Flood Warning Area (034FWFDERACEPARK) and the Lower Derwent in Derbyshire (034WAF409) Flood Alert Area.

4.2 Access and escape

Safe access and escape will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Given the significant flood risk to the site, a flood warning and evacuation plan is likely to be neccesary. 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.

4.2.1 Potential access

Potential access to the site is provided via Monmouth Street to the north or Beaufort Street to the east.

4.2.2 Fluvial

During the present-day 0.1% AEP event, fluvial flooding is predicted to inundate the site and surrounding access roads, with significant depths of over 1m predicted along both Monmouth Street and Beaufort Street. Extensive flooding is also predicted along these access roads during the 1% AEP including a 29% climate change allowance event, with depths of over 0.50m. As a result, access and escape is impeded both within the site and from the wider area during these fluvial events.

4.2.3 Surface water

During the 3.3% AEP and 1% AEP surface water flood events, vehicular access to and from the site is likely to remain available, with flood depths along Monmouth Street and Beaufort Street generally remaining below 0.20m. However, during the 0.1% AEP event, flood depths of up to 0.30m are predicted both within the site and along the surrounding access routes, which may adversely affect safe access and escape.

During the 1% AEP event including 40% climate change allowance, the extent and severity of flooding increase considerably. Significant inundation is predicted across both the site and the surrounding access roads, with flood depths reaching up to 0.60m in places. Consequently, safe access and escape is likely to be impeded both within the site and along the main access routes

4.3 Dry islands

The site is not located on a dry island.

5 Requirements for drainage control and impact mitigation

5.1 Broadscale assessment of possible SuDS

- Where possible, proposed attenuation features such as basins, ponds and tanks should be located outside of Flood Zone 2 to avoid the potential risks to the hydraulic capacity or structural integrity of these features. Surface water outfalls that discharge into the River Derwent may be susceptible to surcharging due to water levels in this watercourse. The impacts of flood flows will need to be considered in terms of the attenuation storage requirements of the site and placement of the outfalls.
- BGS data indicates that the underlying geology is mudstone and siltstone which is likely to be with highly variable permeability. This should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.
- The site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. This should be confirmed through additional site investigation work.
- 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.

5.2 Opportunities for wider sustainability benefits and integrated flood risk management

- Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, and the EA) at an early stage to understand possible constraints.
- 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.
- Development at this site should not increase flood risk either on or off site. 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.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.

- Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The site lies within the Derwent from Bottle Brook to Trent Water Body which is considered to have moderate ecological status. 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.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the 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.

6 NPPF and planning implications

6.1 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.

Whilst the Exception Test is not required, given the significant risk to the site from fluvial and surface water sources, and the increased risk to the site in the future it is recommended that the council applies a similar approach and satisfies themselves that users of the site will be safe for the lifetime of the development.

6.2 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 in Flood Zone 2
- is within 'Flood Zones plus Climate Change', showing it is at increased risk of flooding from rivers or sea in the future
- is at risk of surface water flooding, now and in the future
- is increasing its vulnerability classification to 'more vulnerable' use

All sources of flooding should be considered as part of a site-specific FRA. Developers should seek the latest modelling from the EA, particularly as at the time of writing the EA is updating its River Derwent modelling. As there is also significant surface water flood risk across the site, surface water modelling should also be undertaken.

Consultation with the Derby City Council as Local Planning Authority and Lead Local Flood Authority, Severn Trent Water, 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 any Derby City Council Local Plan Policies.

As part of a site-specific flood risk assessment, developer should assess the risk posed to the site if defences were to fail, and demonstrate that users of the site will be safe for the lifetime of the development. This is likely to require a flood warning and evacuation plan, although this may be provided through integration into risk management authorities existing emergency plans for flooding to Derby from the River Derwent.

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

6.3 Guidance for site design and making development safe

The site layout should adopt a sequential approach by steering the development outside of areas at risk of surface water flooding. It is not possible to steer development outside of the

Flood Zone 2 extent. However, it should be noted that 'More Vulnerable' development is acceptable in Flood Zone 2, as highlighted in Table 2 of the PPG.

Developers should utilise SuDS with multiple benefits throughout the site, particularly in areas at risk of surface water ponding.

Developers should seek a detailed hydraulic model for the River Derwent at the FRA stage to accurately represent the risk from this watercourse and set the height of any mitigation measures.

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.

Arrangements for safe access and escape will need to be provided for the 1% AEP fluvial and surface 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.

7 Conclusions

The site is located entirely within Flood Zone 2 as defined by the Environment Agency's Flood Map for Planning and is also encompassed by the modelled 0.1% AEP fluvial flood extent, associated with the River Derwent. In addition, 98.9% of the site is predicted to be affected during the 1% AEP event including a 29% climate change allowance, highlighting the site's sensitivity to future climate change impacts and the potential for an increase in flood risk over the development lifetime.

The Exception Test is not required for the site as it is more vulnerable development proposed in Flood Zone 2, however given the extent of surface water flood risk identified during the 3.3% AEP surface water event and the significant sensitivity to increased fluvial risk due to climate change, it is recommended the Council applies a similar approach and satisfies themselves that users of the site will be safe throughout the lifetime oof the development, and that the benefits of developing the site outweigh the risks. Flood risk is predicted to increase substantially under future climate change conditions, with almost the entire site affected during the 1% AEP event plus a 40% climate change allowance.

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

- A site specific Flood Risk Assessment is required which demonstrates that site users will be safe during events up to and including the 1% and 0.1% AEP fluvial and rainfall events, with an appropriate allowance for climate change. This should be supported by detailed modelling of the River Derwent and any surface water modelling. The FRA will need to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of fluvial or surface water flooding either on or off the site.
- The site layout should adopt a sequential approach by steering development outside of areas at risk of surface water flooding. It is not possible to steer development outside of the Flood Zone 2 extent. However, it should be noted that 'More Vulnerable' development is acceptable in Flood Zone 2, as highlighted in Table 2 of the PPG.
- A site specific flood risk assessment will need to assess the risk to the site in the event of a breach/failure of defences and demonstrate that users of the site will be safe throughout its' lifetime. This is likely to require a Flood Warning and Evacuation Plan, although this could be integrated with risk management authorities existing emergency plans for a fluvial flood event.
- Arrangements for safe access and escape will need to be provided 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.
- Developers should utilise SuDS with multiple benefits throughout the site, particularly in areas at risk of surface water ponding.

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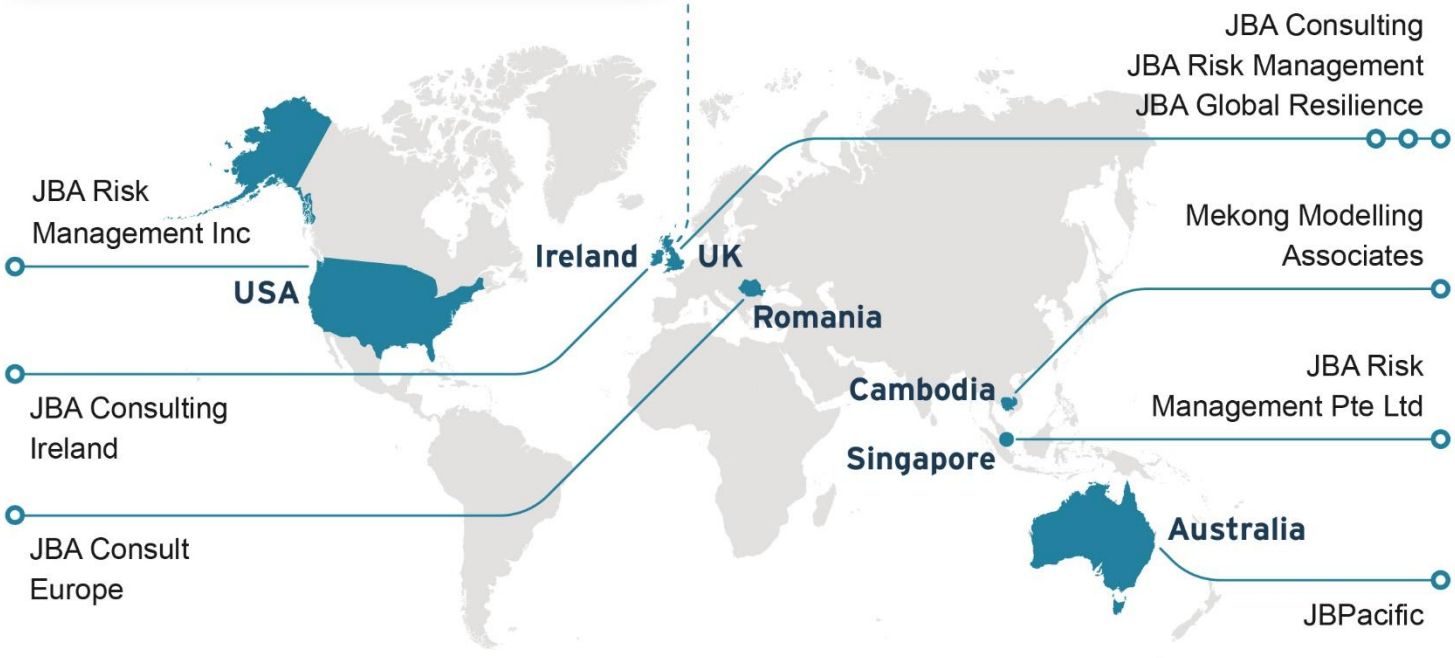

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