Level 2 Strategic Flood Risk Assessment – Site AS705

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 site AS705. 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: The site is situated in the east of Groby on the outskirts of Leicester, directly south Leicester Road and west of Sacheverell Way.
- Site area: 1.80ha
- Existing site use: Greenfield
- 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 in the site is concentrated in the south. By the southern boundary is the site's maximum elevation, at 84.8mAOD. The site slopes downhill towards the north, where a central low-lying area is flanked by higher ground to the northeast and northwest. The site's minimum elevation, at 74.8mAOD, is in this central northern area.

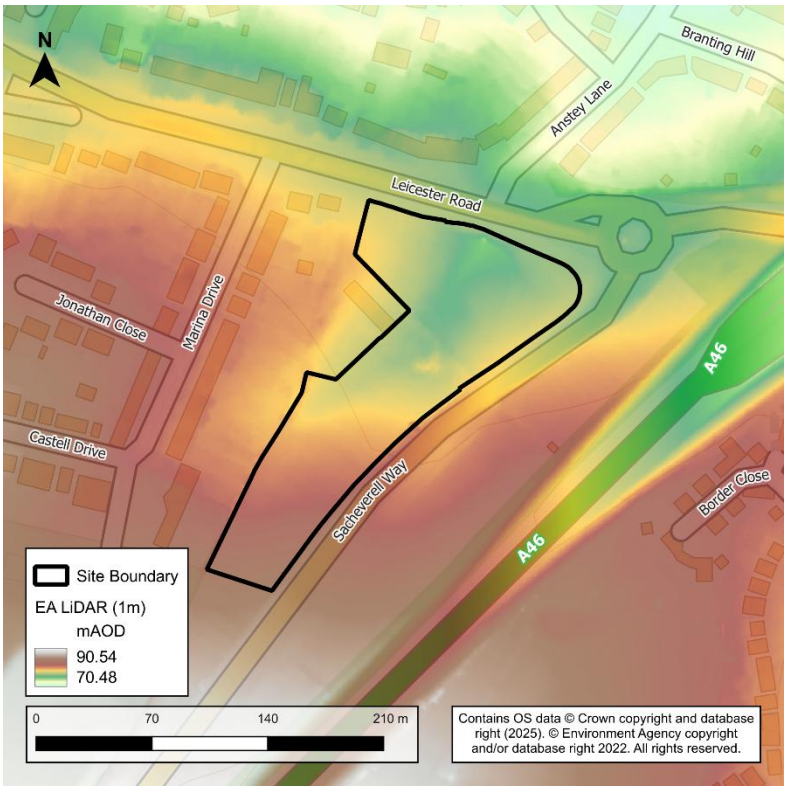


Figure 1-1: Topography of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock - Edwalton Member comprised of mudstone.
- Superficial deposits - Thrussington Till Member consisting of diamicton underlays the south of the site. There are no superficial deposits present in the north of the site.

Soils at the site consist of:

- Slightly acid loamy and clayey soils with impeded drainage in the northwest of the site.
- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils in the south and northeast of the site.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is located in the mid-reach of Rothley Brook (tributary of the River Soar) catchment. Rothley Brook flows in a northeasterly direction approximately 800m east of the site. Upstream of the site, the catchment contains several settlements, including Bagworth, Desford, and Ratby. A large portion of the upstream catchment is also rural farmland and woods. Woodland areas include Bagworth Heath Woods, Browns Wood upstream, and Crow Wood.

2.2 Existing drainage features

Based on online mapping, there are no existing drainage features within 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.

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

During the 3.3% AEP event, a large area of ponding develops in the central-northern part of the site, affecting 15.2% of the total area. Part of this ponding reaches depths greater than 1.2 m, while much of the remaining area is shallower but still exceeds 0.3m. The maximum velocity exceeds 0.5m/s, but the majority of the pooling exceeds 0.25m/s or has even lower velocities. A large part of the ponding has a maximum hazard classification of 'Danger for Most'.

In the 1% AEP event, the area of pooling expands and a flow path start to form, travelling from the western boundary towards the ponding in the north. The flood extent of the

ponding shows similar depths and hazard classification, but the new flow path mostly has depths below 0.2m and a 'Very Low' hazard rating. The maximum velocity remains exceeding 0.5m/s, including for the new flow path.

In the 0.1% AEP event, the portion of the site at risk increases by a further 5.7%, with both the northern area of pooling and associated flow paths expanding. The flow path in this event also travels along most of the southwestern boundary. The maximum depth stays above 1.2m in a small area of the ponding in the north. The flow path has depths that exceed 0.6m by the western boundary but are typically exceeding 0.2m. The maximum velocity increases to exceed 1m/s along the flow path. The maximum hazard classification is 'Danger for All' in a small area in the north but is generally 'Danger for Most' across the main area of ponding.

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* (%)	15.2	7.0	5.7
Maximum depth (m)	Exceeds 1.2m	Exceeds 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 Most'	'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 the site has a negligible risk from groundwater flooding due to the nature of the local geological deposits.

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. There is model predicted flooding on the western boundary of the site, but the site is generally considered to have a low potential impact on the sewerage infrastructure.

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 no recorded flood incidents on or surrounding the site.

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.

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 RoFSW mapping shows that the site is not very sensitive to increased risk with climate change. Compared the 1% AEP event, 0.1% AEP shows an increase in the flow path along the southwestern boundary. Maximum flood depths remain above 1.2m in both events. However, the velocity increases to exceed 1m/s in the 0.1% AEP event, and the maximum hazard classification increases to 'Danger for All' in a small area south of the flow path at the northern site boundary.

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

There is no residual risk to the site from flood risk management structures.

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 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

The site can either be accessed via Leicester Road that runs along the northern boundary, or via Sacheverell Way that travels along the eastern boundary.

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

Access and escape are likely possible in all events, either south on Sacheverell Way or east on Leicester Road. There are a number of areas of risk across the roads, but broadly the depths remain below 0.3m. In all events, there is also a large area of ponding on Leicester Road further west, approximately 350m from the site, that could impede access from that direction.

In the 3.3% and 1% AEP events, Leicester Road and Sacheverell Way remain mostly clear of surface water flood risk. However, in these events there is an area of ponding by the northeastern corner of the site on Sacheverell Way, as well as on the roundabout northeast of the site. In these events, maximum depths do not exceed 0.3m. In the 0.1% AEP event, several additional areas of risk appear, particularly to the northeast of the site and on the roundabout, as well as west along Leicester Road near its junction with Marston Drive. Maximum depths exceed 0.3m in a small area on the roundabout, but are otherwise below 0.3m on the surrounding access roads. On the roundabout the maximum hazard classification is ‘Danger for Most’, and the maximum velocity exceeds 1.0m/s, with this extending further south along Sacheverell Way.

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:

- 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.
- BGS data indicates that the underlying geology is mudstone and is likely to be poorly draining. Any proposed use of infiltration must be supported by infiltration testing. Off-site discharge in accordance with the SuDS hierarchy is required to discharge surface water runoff.
- 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 (see Section 2.7).

The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during the 1% and 0.1% AEP events. The flow path present in the 1% and 0.1% AEP events travelling from the west to the north of the site should be integrated into the site drainage strategy as blue-green infrastructure.

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 must 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 must be considered.

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 site is not shown to be at fluvial flood risk within the EA FMfP.

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 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 outside of the central-northern area of the site where there is significant pooling, as well as the area where a flow path travels from the west to the north in the 1% and 0.1% events.

Developers should consider utilising the area from west to north, where there is a flow path, as a green corridor, and the central-northern area as a location for SuDS.

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 surface water event 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.

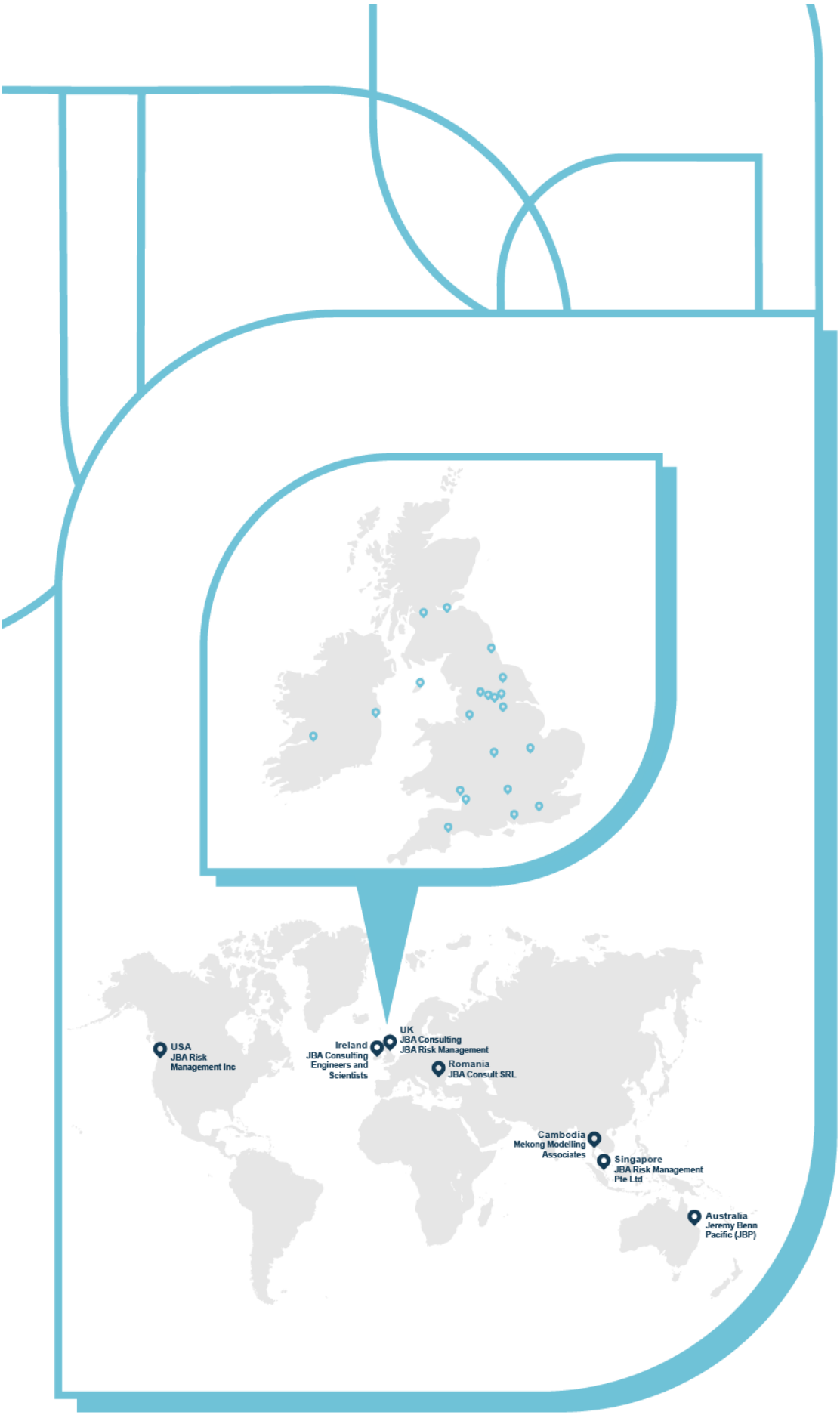
8 Conclusions

The site is shown to be at surface water flood risk, with a large area of ponding in the central-northern part of the site in all events. In the 1% and 0.1% AEP events there is a flow path travelling from the western boundary towards the ponding in the north. In the 0.1% AEP event, the flow path also travels along parts of the southwestern boundary. The site is not shown to be at fluvial risk.

The Exception Test is not required, because the site is not shown to be at fluvial flood risk within the EA FMfP. However, a site-specific FRA will be required, because the proposed development sites are one hectare or greater in Flood Zone 1, subject to surface water flooding, and identified as being at increased flood risk in the future.

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

- The site layout must adopt a sequential approach by steering more vulnerable aspects of the development away from the areas of highest risk outside of the central-northern area of the site where there is significant pooling, as well as the area where a flow path travels from the west to the north in the 1% and 0.1% events.
- Developers should consider utilising the area from west to north, where there is a flow path, as a green corridor, and the central-northern area as a location for SuDS.
- 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 that access and escape will likely be possible.
- 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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