

Level 2 Strategic Flood Risk Assessment – Site AS615 B

Final Report

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Prepared for:
Hinckley and Bosworth Borough Council

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for AS615 B. 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 Church Farm, in the north of Barlestone.
- Site area: 0.43ha
- Existing site use: Brownfield
- 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. The site has higher ground concentrated across the north and northeast of the site, sloping downhill towards the southwest. The maximum elevation in the site is 136.9mAOD in the northwest of the site. The minimum elevation in the site is 134.6mAOD found in the southwest of the site.

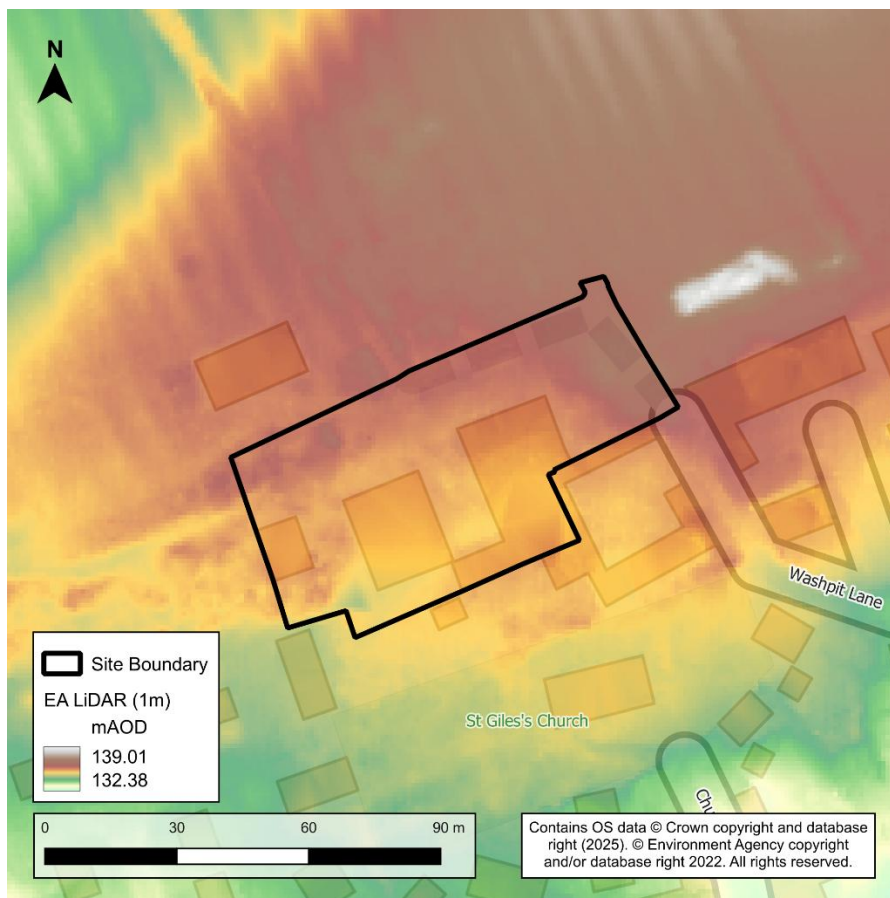


Figure 1-1: Topography of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock - Gunthorpe Member comprising of mudstone.
- Superficial - Oadby Till Member comprising diamicton in the northern half of the site. The southern half of the site is underlain by glaciofluvial deposits, mid Pleistocene, comprising sand and gravel.

Soils at the site consist of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream end of the Carlton Brook (from Source to River Sence) catchment. Carlton Brook flows west until it meets the River Sence south of Congerstone, just north of Sibson Wolds. Carlton Brook flows around 470m southeast of the site. The catchment upstream of the site is predominantly rural with a number of isolated rural properties and the settlement of Bagworth.

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

As shown in Table 2-1, in the 3.3% AEP event less than 1% of the site is at risk, with an area of ponding that encroaches onto the southwestern boundary. Maximum depths here do not exceed 0.2m, the maximum velocity does not exceed 0.25m/s, and the maximum hazard classification is 'Very Low Hazard/Caution'. In the 1% AEP event, there is a new area of ponding that encroaches onto the southeastern boundary, but the area of risk remains below 1% of the site. Velocity and hazard are similar to the 3.3% AEP event, but depths exceed 0.2m but remain below 0.3m. In the 0.1% AEP event, the extents increase significantly by 25.3% of the site. There is a large area of ponding that covers much of the central and southern area of the site. Maximum depths are between 0.3m and 0.6m; however, the depths mostly remain below 0.2m. Maximum velocities are between 0.25m/s

and 0.5m/s. The maximum hazard classification increases to 'Danger to Some' but mostly remains as 'Very Low Hazard/Caution'.

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	25.3
Maximum depth (m)	Does not exceed 0.2m	Exceeds 0.2m but does not exceed 0.3m	Exceed 0.3m but does not exceed 0.6m
Maximum velocity (m/s)	Does not exceed 0.25m/s	Does not exceed 0.25m/s	Exceeds 0.25m/s but does not exceed 0.5m/s
Maximum hazard classification	Very Low Hazard/Caution	Very Low Hazard/Caution	Danger to Some

* 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 in the southern half of the site groundwater levels are between 0.5m and 5m below the ground surface. This means that there is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely. The northern half of the site is deemed as having 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. The site is considered to have a low potential impact on sewerage infrastructure due to the small number of houses proposed, and no known issues with sewer flooding of the network at 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 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 risk increases by 25.3% between the 1% AEP and the 0.1% AEP events, with development of a large area of ponding covering much of the central and southern area of the site. Flood depths exceed 0.3m to the south of the site, particularly to the southwest corner. In the 0.1% AEP event, the maximum flood velocities within the area of ponding exceed 0.25 m/s across the south, although the majority of the area experiences velocities below this level. Between the two events, the maximum hazard classification increases from 'Very Low Hazard' to 'Danger to Some', although this is only in a small area in the southwest.

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 only has one access point from the east via Washpit Lane. Washpit Lane continues eastward until it meets Bagworth Road, which then links north towards Garland Lane and south into Barlestone.

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 to and from the site via Washpit Lane is likely to be possible in all modelled AEP events. Washpit Lane remains clear from surface water risk in the 3.3% and 1% AEP events. In the 0.1% AEP event there a flow path which develops along the road towards the junction with Bagworth Road. However, depths are shown to remain below 0.2m, with a hazard classification of 'Very Low Hazard/Caution'.

Access and escape to Washpit Lane via Bagworth Road from the north is likely to be possible in all modelled AEP events as although small areas of ponding develop in all AEP events, depths are shown to remain below 0.3m. However, there is an area of ponding on Bagworth Road in all modelled AEP events to the south of the site where the road becomes Main Street. In all AEP events, this depths within this area of ponding exceed 0.6m and reach a hazard classification of 'Danger for most'. Therefore, access to Washpit Lane via Bagworth Road from the south is likely to be impeded in all events.

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 \(gov.uk\)](https://www.gov.uk/national-standards-for-suds). 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 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, as this may affect the design of the surface water drainage system.
- 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. 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. It may be possible to re-use aspects of the existing surface water drainage system, subject to surveys of its condition and capacity (see Section 2.7).

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 pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation 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 Flood Map for Planning.

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:

- 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

Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere. The site layout must adopt a sequential approach by steering more vulnerable aspects of the development away from the areas of highest surface water risk.

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. This initial assessment has shown that access and escape is likely to be possible when the site is accessed along Bagworth Road from the north. 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, predominantly in the 0.1% AEP event where there is a large area of ponding that covers much of the central and southern area of the site. 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 Flood Map for Planning. However, a site-specific FRA will be required because the proposed development site is 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:

- Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance and any raising of ground levels should ensure that flood risk is not increased elsewhere. The site must adopt layout a sequential approach by steering more vulnerable aspects of the development away from the areas of highest surface water risk.
- 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 is likely to be possible when the site is accessed along Bagworth Road from the north.
- 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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