

Level 2 Strategic Flood Risk Assessment – Site LPR22

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 LPR22. 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 to the west of Dodwells Road, Hinckley, and between Watling Street (A5) and Hinckley Lane
- Site area: 47.83ha
- Existing site use: Greenfield
- Proposed site use: Employment

1.2 Topography

Figure 1-1 shows the topography of the site represented by the Environment Agency (EA) 1m resolution LiDAR. The LiDAR shows that the site is largely on lower ground, with elevated terrain being concentrated in the southeastern and southwestern boundaries of the site. Ground elevations slope downhill towards the watercourse in the centre of the site. The minimum elevation is 88.7mAOD in the south of the site, near the channel of the unnamed watercourse, and the maximum elevation is 95.2mAOD near the southwestern boundary of the site.

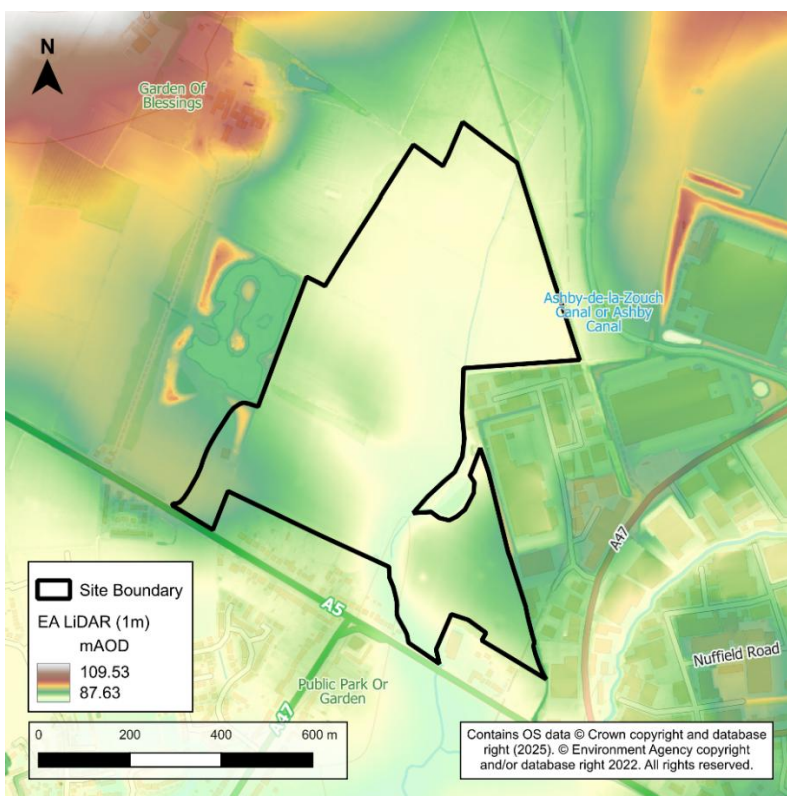


Figure 1-1: Topography of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock of the site is Mercia Mudstone Group comprised of mudstone
- Superficial deposits:
 - Bosworth Clay Member comprised of clay and silt covers most of the site.
 - Anker Sand and Gravel is found along the southern boundary of the site.
 - Alluvium comprised of clay, silt, sand and gravel located in the northeast corner of the site.

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 within the upstream end of the Sketchley Brook Catchment, located southeast of the site. There is an unnamed watercourse which flows in a southerly direction from the centre of the site to where it exits the site through the southern site boundary.

Existing drainage features

There is an unnamed ordinary watercourse that bisects the eastern side of the site and flows in a southerly direction. The unnamed watercourse enters the site through the northern boundary of the site and exits the site through the southern boundary of the site, where it is culverted beneath Watling Street (A5). It joins Harrow Brook (a Main River) approximately 180m south of the site.

There are two drainage channels located in the north of the site which drain in an easterly direction into the unnamed ordinary watercourse that bisects the eastern side of the site.

The Ashby-de-la-Zouch Canal is located approximately 75m east of the northeastern boundary of the site.

Additionally, there is a water body/pond located approximately 15m west of the western boundary 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 which runs through the east of 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

The RoFSW mapping indicates that surface water flooding extents are primarily aligned with the existing watercourse and low-lying areas within the centre of the site.

In all modelled AEP events, a flow path forms which bisects the site from north to south.

In the 3.3% AEP event the risk remains confined to a relatively narrow channel in the north of the site, covering a larger extent in the south of the site where water is shown to back up upstream of the culvert under Watling Street (A5). There are also areas of surface water ponding which develop in the eastern side and in the northern end of the site. Water depths where the unnamed watercourse bisects the site in the southeast of the site exceed 0.9m but do not exceed 1.2m, velocities exceed 0.5m/s but do not exceed 1.0m/s and have a 'Danger for Most' classification.

During the 1% AEP event, all existing areas increase in extent, the largest increase in extent is near the southeastern boundary. Water depths where the unnamed watercourse bisects the site in the southeast of the site exceed 1.2m, velocities exceed 0.5m/s but do not exceed 1.0m/s and have a 'Danger for Most' classification.

During the 0.1% AEP event, there are considerable increases in extent in the north and centre of the site, particularly along the right bank of the unnamed watercourse. Water depths where the unnamed watercourse bisects the site in the southeast of the site exceed 1.2m, velocities exceed 0.5m/s but do not exceed 1.0m/s and have a 'Danger to All' classification.

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* (%)	9.9	6.0	15.6
Maximum depth (m)	Exceeds 0.9m but does not exceed 1.2m	Exceeds 1.2m	Exceeds 1.2m
Maximum velocity (m/s)	Exceeds 1.0m/s but does not exceed 2.0m/s	Exceeds 1.0m/s but does not exceed 2.0m/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 majority of the site is shown to not be at risk of groundwater emergence due to the nature of the local geological deposits.

There is a small area near the southern boundary of the site, where groundwater levels are between 0.025m and 0.5m below the ground surface. This area is where superficial geology of the site is Anker Sand and Gravel. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.

Based on the EA RoFSW mapping and topography of the site it is likely that any groundwater that emerges will flow in a southerly direction away from 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 potential high impact on the sewerage infrastructure with model predicted flooding downstream in the network. The development will also join at a junction which may have an impact on the flow.

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 the site but there is a record of internal property flooding located approximately 65m southeast of the site, in which the ground floor was covered in sewage believed to be from sewer flooding.

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 which runs through the east of 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 RoFSW mapping shows that the site is sensitive to increased risk with climate change. Between the 1% and 0.1% AEP events the surface water extents increase significantly, particularly along the right bank of the unnamed watercourse in the centre of the site, near the eastern border of the site and in the northern end of the site. Along the right bank of the unnamed watercourse the depths, velocities, and hazard are shown to increase indicating additional surface water hazard under future climate conditions.

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

Mapping shows that where the unnamed watercourse is culverted underneath Watling Street (A5) and exits the site water backs up into the southern end of the site. There is a potential residual risk that a blockage of the culvert would increase the risk on the site. The topography of the site means any water is likely to remain confined to the lower lying floodplain of the watercourse near the southeastern boundary of the site.

The base mapping shows there is a water body/pond located approximately 15m west of the western boundary of the site. There is a residual risk of this overtopping into the site.

The Ashby-de-la-Zouch Canal is located approximately 75m east of the northeastern boundary of the site, which present a residual flood risk in a breach or overtopping event.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area but is in close proximity of the River Anker and River Sence Flood Alert Area (033WAF307).

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

The site can be accessed from the south via Watling Street (A5). There is also a potential development proposal for the Hinckley Western Link Road which, if constructed, would provide a potential access option from the north of the site.

5.2.2 Fluvial

In the EA's FMfP Flood Zones 2, 3a, 3b and Flood Zone plus Climate Change layer show fluvial flood risk to the east of the site on Watling Street and Dodwells Road at the junctions of Dodwells Roundabout. However, there is no fluvial flood risk to the west, so access and escape is unimpeded.

5.2.3 Surface water

The risk associated with the unnamed watercourse and drainage channels in the north of the site bisects the site in all modelled AEP events, therefore access and escape to the northeastern, northwestern, southeastern and southwestern parcels of the site will need to be considered separately.

Access and escape along Watling Street (A5) within the vicinity of the site is likely to remain clear in all modelled AEP events. There is an area of risk shown on the road in the 3.3% and 1% AEP events where the unnamed watercourse is culverted under the road. However, this risk is associated with the watercourse channel and in this event is not shown to overtop onto the road.

During the 0.1% AEP event, the unnamed watercourse is shown to overtop onto Watling Street (A5) at the culvert. However, depths on the road are not shown to exceed 0.2m, with hazard classification of 'Very Low Hazard' so access and escape is unlikely to be impeded.

Both the southeastern and southwestern parcels can be accessed via Watling Street (A5) although access and escape to each side of the watercourse will need to be considered. Access and escape to each of the northern parcels will need to be considered from the

southwestern parcel and are likely to require a crossing of the drainage channel or watercourse. This will require ordinary watercourse consent and Leicestershire County Council should be consulted at an early stage. Alternatively, the proposed Hinckley Western Link Road, if constructed, may provide an additional option for access and escape to the northern parcels of the site.

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/government/uploads/system/uploads/attachment_data/file/612222/national_standards_for_suds.pdf). 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 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 (see Section 2.7).

The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during all modelled AEP events. The unnamed watercourse and drainage channels 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 must be considered.
- Consideration should be made to the existing condition of Sketchley Brook and their Water Framework Directive objectives for water quality. 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. Sketchley Brook is considered to be of moderate ecological status.

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 employment development as 'Less Vulnerable'.

The Exception Test is not required for this site because it 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 is:

- greater than 1 hectare.
- at risk of flooding from ordinary watercourse and surface water.
- identified as being at increased flood risk in 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 along the path of the watercourse and drainage channels and in the northern and eastern parts of the site.

A detailed hydraulic model of unnamed watercourse may be required at FRA stage to accurately represent the risk from this watercourse. This should include survey of the downstream culvert, which is shown to influence the risk on the site, and modelling of blockage scenarios to quantify the residual risk of the 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.

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.

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.

For development proposed in close proximity to a canal, the developer should consult with the Canal and River Trust at an early stage. Any development proposed adjacent to a canal should include a detailed assessment of how a canal breach would impact the site, as part of a site-specific Flood Risk Assessment. Guidance on development near canals is available from the [Canal and River Trust \(canalrivertrust.org.uk\)](https://canalrivertrust.org.uk).

8 Conclusions

The site is affected by ordinary watercourse and surface water flooding, with the most at risk areas being the northern end, eastern side and near the southeast boundary of the site. The culvert under Watling Street (A5), the pond and canal surrounding the site, all present a residual flood 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 ordinary watercourse and 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:

- A buffer of at least 8 metres should be maintained between the watercourses and any built development.
- The site layout must adopt a sequential approach by steering more vulnerable aspects of the development away from the areas of highest risk in the northern, southeastern and eastern parts of the site. Developers should consider utilising these areas as green corridors.
- A detailed hydraulic model of the unnamed watercourse that bisects the eastern side of the site may be required at FRA stage to accurately represent the risk from these watercourses. Detailed survey of the culvert beneath Watling Street (A5) is likely to be required to ensure this is properly represented within the modelling as the available flood risk mapping shows this is likely to significantly impact the flood extents within the site.
- Safe access and escape routes should be demonstrated in the 1% AEP plus climate change fluvial and surface water events. This will need to consider all areas of the site where it is bisected by the unnamed watercourse and drainage channels.
- 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 with development to be steered away from the areas identified to be at highest risk of surface water flooding within the site.

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