Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**8241: Proposed Allocation TB1**
Address	**Land north of A47 and east of Zouche Way, Thurnby and Bushby**
Area	8.6 hectares
Current land use	Greenfield
Proposed land use	Residential
Flood Risk Vulnerability	More Vulnerable

Sources of flood risk

Location of the site	The site is bounded by Uppingham Road (A47) along the southern boundary, and Zouche Way along the western boundary. Along the north-western boundary there is an unnamed ordinary watercourse that flows approximately 5m from the site at its closest point, and is a tributary to the Thurnby Brook. The site is in the Thurnby Brook catchment. The Thurnby Brook rises approximately 950m to the east of the site, and then flows approximately 2.0km west where it shares a confluence with the Bushby Brook. The catchment drains approximately 2.2km2 at the site and falls under the Soar Management Catchment.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that the topography of the site is a north facing slope, leading to the Thurnby Brook. The maximum elevation is 131.5m AOD at the south-eastern corner of the site with the lowest point of elevation being 97.5m AOD at the northernmost corner of the site.

Existing drainage features	There are no drainage features within the site. However, the site is likely to drain into unnamed watercourse along the upper north-western boundary and into the Thurnby Brook to the north of the site.
Fluvial	**Available data and mapping:** EA Flood Map for Planning for Rivers and Sea. **Flood Map for Planning** **Data analysis:** Details of the site's location within each Flood Zone are provided within the SFRA Site Screening Appendix. **Flood characteristics:** • Flood Zone 1 represents areas which have less than 1 in 1000 (0.1%) chance of river flooding in a given year. The site in its entirety (100%) is within Flood Zone 1. While the site is within Flood Zone 1, the Thurnby Brook has a small catchment that is not included within the broadscale modelling. Fluvial extents are likely to be captured within the surface water extents. Developers should seek or conduct modelling of the Thurnby Brook and the unnamed watercourse as part of a site-specific flood risk assessment.
Fluvial plus climate change	In the absence of detailed modelling, the Risk of Flooding from Surface Water dataset with a climate change allowance has been used to assess the depth, hazard and velocity flood risk to the site. Climate change allowances should be included as part of detailed modelling developers should undertake at the site as part of a site-specific flood risk assessment.
Surface water	**Available data and mapping:** The EA's Risk of Flooding from Surface Water dataset for the 3.3%, 1% and 0.1% AEP events. **Data analysis:** **3.3% AEP (1 in 30 year) event:** Proportion is 0.2% Max Depth is 0.24m

	Max Velocity is 0.97m/s Max Hazard is 0.75, Danger for Some Mean Depth is 0.13m Mean Velocity is 0.58m/s Mean Hazard is 0.64, Caution **1% AEP (1 in 100 year event):** Proportion is 2% Max Depth is 0.31m Max Velocity is 1.34m/s Max Hazard is 1.32, Danger for Most Mean Depth is 0.1m Mean Velocity is 0.74m/s Mean Hazard is 0.63, Caution **0.1% AEP (1 in 1000 year) event:** Proportion is 14% Max Depth is 0.53m Max Velocity is 2.15m/s Max Hazard is 1.94, Danger for Most Mean Depth is 0.11m Mean Velocity is 1.08m/s Mean Hazard is 0.69, Caution **Flood characteristics:** In the 3.3% AEP a flow path encroaches the site in the northern most corner of the site, with a maximum depth of 0.24m, a maximum velocity of 0.97m/s and a hazard rating of caution.

	In the 1% AEP event, there is a flow path that encroaches the site along the northern boundary, and a flow path that flows northwards through the area connecting the northern and southern parts of the site. The maximum depth of 0.31m and maximum velocity of 1.34m/s are found at the northern boundary, associated with Thurnby Brook, and has a maximum hazard rating of 'Danger for Most'. Average depths across the site are 0.13m, the average velocity is 0.74m/s with an average hazard of 'Caution'. In the 0.1% AEP event, a flow path flows along the western boundary of the southern area to the northern area, connecting to the encroachment from Thurnby Brook. The maximum depth of 0.53m, maximum velocity of 2.15m/s, and maximum hazard rating of 'Danger for Most' are found in the encroachment extent in the northernmost corner of the site. Throughout the site, the average depth of 0.11m, an average velocity of 1.08m/s, and average hazard rating of 'Caution'.
Surface water plus climate change	**Available data and mapping:** The EA's Risk of Flooding from Surface Water dataset for the 3.3% and 1% AEP events with both upper and central climate change scenarios. **Management Catchment:** The site is located within the Soar Management Catchment. The EA guidance recommends that the Upper End allowance is considered for both the 3.3% and 1% AEPs for the 2070's epoch, unless the allowance for the 2050's epoch is higher, in which case this should be used. This is appropriate for development with a lifetime beyond 2100. The recommended uplift on peak rainfall intensity for the 3.3% AEP central and upper estimates are 25% and 35%, and 25% and 40% for the 1% AEP event. **Data analysis:** **3.3% AEP (1 in 30 year) central climate change event:** Proportion is 5% Max Depth is 0.39m

	Max Velocity is 1.68m/s Max Hazard is 1.54, Danger for Most Mean Depth is 0.1m Mean Velocity is 0.84m/s Mean Hazard is 0.64, Caution **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 6% Max Depth is 0.41m Max Velocity is 1.74m/s Max Hazard is 1.6, Danger for Most Mean Depth is 0.1m Mean Velocity is 0.87m/s Mean Hazard is 0.65, Caution **1% AEP (1 in 100 year) central climate change event:** Proportion is 11% Max Depth is 0.5m Max Velocity is 1.98m/s Max Hazard is 1.84, Danger for Most Mean Depth is 0.11m Mean Velocity is 0.99m/s Mean Hazard is 0.68, Caution **1% AEP (1 in 100 year) upper climate change event:** Proportion is 13.7% Max Depth is 0.55m Max Velocity is 2.2m/s Max Hazard is 1.98, Danger for Most

	Mean Depth is 0.11m Mean Velocity is 1.08m/s Mean Hazard is 0.7, Caution **Flood characteristics:** The site is shown to be at risk of flooding from all four scenarios. The 3.3% plus climate change allowances are similar in extent to the present day 1% AEP event, and the 1% AEP plus climate change events are similar in extent to the present day 0.1% AEP event. The design event for the site is the 1% AEP plus 40% climate change allowance. The maximum depth is 0.55m in the northernmost corner, the maximum velocity is 2.2m/s and a maximum hazard rating of 'Danger for Most' along the northern boundary. Across the site, average depths are 0.11m, average velocities are 1.08m/s, and an average hazard rating of 'Caution'.
Reservoir	The site is not located in a Wet or Dry day reservoir flooding extent, according to the EA's reservoir flood mapping.
Groundwater	**Available data and mapping:** The JBA Groundwater Flood Data Map (GW5) is provided as a 5m resolution grid. **Flood characteristics:** The JBA Groundwater Flood Data Map shows that the majority of the site is at no risk of groundwater emergence. Within the central area of the site, groundwater is shown to be within 0.5m or more of the grounds surface, as such, subsurface development is unlikely to be suitable within this area.
Sewers	Sewer flood records from Severn Trent Water were unavailable and therefore cannot be assessed as part of this assessment. There are no issues identified within Severn Trent Water's DWMP. The risk of sewer flooding should be considered within a site-specific assessment prior to development.

Flood history	The EA's Recorded Flood Outlines dataset, there are no historic flood outlines at or in the vicinity of the site.

Flood risk management infrastructure

Existing defences	The EA's AIMS dataset shows that there are no formal defences at the site or in its vicinity.
Potential defences	There are no potential defences at the site or in its vicinity.
Residual risk	As the site is undefended, and there are no structures in the vicinity, there is no residual risk to the site.

Emergency planning

Flood warning	The site is not located in an EA Flood Alert or Flood Warning Area.
Access and egress	At present, access and egress are maintained through foot paths along the upper western boundary on Zouche Way, and the lower western boundary also on Zouche Way. Developers would also be able to include more entry points along the A47 as part of the site's design. Access and egress is very unlikely to be affected by any fluvial flood event from Thurnby Brook due to its location in relation to access points. For the surface water events, during the 3.3% AEP, 1% AEP, and 0.1% AEP events, access and egress are maintained to the site. During the design event (1% AEP plus 40% climate change allowance), extents are similar to the 0.1% AEP and have no access or egress issues to the site. Developers will need to demonstrate safe access and egress to/from all parts of the sites in the design surface water and fluvial flood events as part of a site-specific flood risk assessment.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology and Soils** The geology consists of: • Bedrock geology of mudstone forming the Blue Lias formation, the Charmouth Mudstone Formation,

- Superficial deposits of clay, silt, sand and gravel alluvium, sand and gravel glaciofluvial deposits, diamicton (Oadby Member), and clay, silt, sand and gravel colluvium.

The soils on site consist of slowly permeable, seasonally wet, slightly acidic but base-rich loamy and clayey soils, which is likely to have impeded drainage. The composition of geology and soils at the site suggests that infiltration is unlikely to be a viable means of surface water disposal.

SuDS

- JBA Groundwater mapping suggests the site is at 'low risk' of groundwater flooding during a 1% AEP flood event, however infiltration may not always be appropriate. Offsite discharge may therefore be required to discharge surface water runoff during flood events. The infiltration potential of the site should be confirmed through infiltration testing, in line with BRE 365.
- The site is not located within a Source Protection Zone, nor does it have historic landfill within the site.
- The site is located within the River Soar Nitrate Vulnerable Zone. Therefore, early engagement with the LLFA and the EA is recommended to determine requirements for the site to manage the impact to surrounding watercourses. Consideration of water quality is likely to be of high importance and demonstrated through the use of the Simple Index Approach.
- SuDS measures should follow the discharge hierarchy, and 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.
- Due to the topography, any surface water not intercepted via infiltration will drain via gravity to the north and northwest of the site. It is therefore recommended that the LLFA and the EA are consulted about viable discharge locations for surface water from the site and their attenuation potential.

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, helping meet requirements for the Nitrate Vulnerable Zone. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • 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 source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • SuDS are to be designed so that they are easy to maintain, and it should be set out who will maintain the system, how the maintenance will be funded and should be supported by an appropriately detailed maintenance and operation manual. • SuDS should be designed with a holistic approach, combining ecology, landscape and drainage requirements specific to the site, and incorporating Biodiversity Net Gain requirements. • 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 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. • 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. • SuDS should be designed in line with Leicestershire County Council's SuDS Guidance.

NPPF and planning implications

Exception Test requirements **(Local Authority Considerations)**	The Local 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 the residential usage of the site as 'More Vulnerable'. As the site is in Flood Zone 1 in its entirety, with some surface water flood risk, the Exception Test is not required for this site.
Requirements and guidance for site-specific Flood Risk Assessment **(Developer considerations)**	**Flood Risk Assessment:** The Level 1 SFRA has more guidance on this section and any relevant policies and information applicable to development within Harborough District Council. • The developers will need to demonstrate in a site-specific flood risk assessment that site users will be safe in the 1% AEP fluvial and surface water events including an allowance for climate change throughout the lifetime of the development. Developers should seek or conduct modelling of surface water at the site, and modelling of the unnamed ordinary watercourse and Thurnby Brook. As part of the flood risk assessment, developers will need to show that the site is not at increased flood risk in the future, and that development does not increase the flood risk off site. • There is significant risk from surface water at the site, as such flow routes should be quantified as part of the site-specific flood risk assessment, 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 do not exceed greenfield rates. Infiltration rates should be assessed as part of the drainage strategy. • Consultation with Harborough District Council, Leicestershire County Council, and the EA should be undertaken at an early stage. • Developers should consult with Severn Trent Water to ensure that the development aims to help achieve the targets of the Drainage and Wastewater Management Plan.

	• Development plans should use the Level 1 SFRA for Harborough District Council, as well as the Local Flood Risk Management Strategies to identify cumulative flood risk issues. It should also promote an integrated approach to water management. **Guidance for site design and making development safe:** • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • 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 do not exceed greenfield rates. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • Arrangements for safe access and egress are likely to be possible, however these will need to be considered further within a site-specific FRA for the surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.

Key messages

The site is at risk from surface water flooding from the 0.1% AEP and surface water design event (1% AEP plus 40% climate change allowance) and may be at risk of fluvial flooding from Thurnby Brook. Development is likely to progress if:

- New developments are located in areas of lowest risk, in line with the sequential approach, by steering sites, where possible, away from areas with a high risk of surface water flooding.
- A site-specific Flood Risk Assessment must demonstrate that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This will need to use detailed fluvial/surface water modelling and any interaction with the Thurnby Brook and unnamed watercourse. Developers 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 off site. Developers should seek or conduct fluvial modelling of the Thurnby Brook and unnamed watercourse at the site as part of the flood risk assessment.
- No development should be permitted within 8m of the top of bank of Thurnby Brook.
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling (as above), with development to be steered away from the areas identified to be at highest risk of surface water flooding within the site. This is to be in line with the sequential approach to site layout.
- There is early engagement with the LLFA and the EA on the proposed SuDS measures and infiltration rate to discuss requirements on the site meeting relevant conditions due to the sites location within a Nitrate Vulnerable Zone.

Mapping information

The key datasets used to make planning recommendations for this site were the EA's Flood Map for Planning and the EA's Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

Flood Zones	Flood Zones 2 and 3 have been taken from the EA's Flood Map for Planning mapping.
Climate change	The latest climate change allowances (updated May 2022) have been applied to the EA's RoFSW dataset.
Surface water	The EA's Risk of Flooding from Surface Water (RoFSW) map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The EA's Risk of Flooding from Surface Water (RoFSW) has been used to define areas at risk from surface water flooding.