Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**8247: Proposed Allocation K1**
Address	**Land west of Warwick Road, Kibworth**
Area	76.4 hectares
Current land use	Greenfield, agricultural
Proposed land use	Residential
Flood Risk Vulnerability	More vulnerable

Sources of flood risk

Location of the site	The site is located along Warwick Road, west of Kibworth, within the centre of the Harborough District. The site is located approximately 500m east of the Grand Union Canal and 800m east of an unnamed tributary of the River Sence. Another, smaller unnamed ordinary watercourse also flows in a northerly direction from the north of the site and under Wistow Road before joining the Burton Brook.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that the topography of the site declines from approximately 124m AOD at the south to approximately 103m AOD at the north.
Existing drainage features	The site is located near to the Grand Union Canal and two unnamed ordinary watercourses. Mapping suggests that a drainage ditch is culverted under Wistow Road at the northern corner of the site joining Burton Brook approximately 530m northwest of the site. It is also likely drainage ditches are located within the fields and an investigation should be undertaken prior to development.

Fluvial	**Available data and mapping:** EA Flood Map for Planning for Rivers and Sea. **Data analysis:** Details of the sites location within each Flood Zone are provided within the SFRA Site Screening Appendix. **Flood characteristics:** The site is entirely located within Flood Zone 1. Flood Zone 1 represents areas which have less than 1 in 1000 (0.1%) chance of river flooding in a given year.
Fluvial plus climate change	The site is at very low risk of fluvial flooding and there are no significant watercourses within the vicinity of the site that could cause a risk of flooding.
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 3% Max Depth is 0.51m Max Velocity is 1.62m/s Max Hazard is 1.38, Danger to Most Mean Depth is 0.12m Mean Velocity is 0.72m/s Mean Hazard is 0.66, Caution **1% AEP (1 in 100 year event):** Proportion is 6% Max Depth is 0.58m Max Velocity is 1.97m/s

	Max Hazard is 1.59, Danger to Most Mean Depth is 0.13m Mean Velocity is 0.84m/s Mean Hazard is 0.7, Caution **0.1% AEP (1 in 1000 year) event:** Proportion is 15% Max Depth is 0.81m Max Velocity is 2.81m/s Max Hazard is 2.24, Danger to Most Mean Depth is 0.17m Mean Velocity is 1.13m/s Mean Hazard is 0.9, Danger to Some **Flood characteristics:** The site is shown to be at risk of flooding from all three surface water events across the north and centre of the site, ranging from 3% of the site affected within the 3.3% AEP event to 15% within the 0.1% AEP event. During the 3.3% AEP event flooding occurs along the northern site boundary, with localised flooding towards the centre and south of the site. This increases slightly within the 1% AEP event across the centre and south of the site connecting the majority of localised flooding areas. During the 0.1% AEP event a flow path connects all localised flooding, crossing from the north of the site to the southwest. It should be noted that this flow path bisects the site across the centre and has potential to cause access and egress issues. The most significant flood depths during the 0.1% AEP event are located within the northeast of the site. Across the site, there is an average depth and velocity of 0.17m and 1.13m/s respectively. The mean hazard rating is shown to be a 'Danger to Some'.

Surface water plus climate change	**Available data and mapping:** 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 8% Max Depth is 0.69m Max Velocity is 2.48m/s Max Hazard is 1.89, Danger to Most Mean Depth is 0.15m Mean Velocity is 0.99m/s Mean Hazard is 0.79, Danger to Some **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 9% Max Depth is 0.72m Max Velocity is 2.63m/s Max Hazard is 1.99, Danger to Most Mean Depth is 0.16m Mean Velocity is 1.03m/s

	Mean Hazard is 0.82, Danger to Some **1% AEP (1 in 100 year) central climate change event:** Proportion is 13% Max Depth is 0.81m Max Velocity is 2.85m/s Max Hazard is 2.33, Danger to All Mean Depth is 0.17m Mean Velocity is 1.13m/s Mean Hazard is 0.91, Danger to Some **1% AEP (1 in 100 year) upper climate change event:** Proportion is 15% Max Depth is 0.86m Max Velocity is 3.04m/s Max Hazard is 2.52, Danger to All Mean Depth is 0.17m Mean Velocity is 1.16m/s Mean Hazard is 0.92, Danger to some **Flood characteristics:** The site is shown to be at risk of flooding in all four scenarios with a flow path from the north across to the southwest of the site, with depths averaging less than 0.17m. The maximum flood depth in the 1% AEP plus upper climate change event is shown to be 0.86m within the north of the site. The average velocity is shown to be no more than 1.16m/s, with an average hazard rating of 'Danger to Some'.
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 site is located within a zone where there is negligible risk of groundwater flooding due to the nature of local geological deposits.
Sewers	Sewer flood records from Anglian Water were unavailable and therefore cannot be assessed as part of this assessment. It should be noted that this site is located near the boundary of the two water company service areas and developers should contact both to confirm which would provide sewerage / water services to the site. The risk of sewer flooding should be considered within a site-specific flood risk assessment prior to development. The site is located within Anglian Water's Kibworth sewer catchment. Detailed information on the risk of sewer flooding is not available from Anglian Water's Drainage and Wastewater Management Plan.
Flood history	The site is not shown to be located within the EA's Recorded Flood Outlines extent.

Flood risk management infrastructure

Existing defences	The EA's AIMS spatial flood defences dataset shows there are no formal flood defences within the vicinity of the site.
Potential defences	The EA's AIMS spatial flood defences dataset shows that there are no potential defences in or near the site.
Residual risk	The site is at potential residual risk of flooding due to a blockage of the culvert under Wistow Road. The residual risk to the site posed by the culvert, must be considered in a site-specific flood risk assessment. Maintenance arrangements for the culvert will need to be demonstrated.

Emergency planning

Flood warning	The site has not been identified to be located within an EA Flood Warning or Flood Alert Area.
Access and egress	Access and egress from the eastern side of the site should be achievable via Warwick Road during all surface water events, including the 1% AEP plus central and upper end climate change allowance events. Flood depths on the road remain shallow, at less than 0.3m. It should be noted that a surface water flow path bisects the site diagonally and has potential to cause access and egress issues, preventing access and egress to the north/western portions of the site. Safe access and egress is unlikely to be achievable via Wistow Road during the 1% AEP plus upper end event given the depths of flooding to the road in both directions. Alternative access and egress or evacuation plans should therefore be considered within a site-specific flood risk assessment. Developers will need to demonstrate safe access and egress in the 1% AEP surface water event including an allowance for climate change (the design event). It should be noted that raising of access routes must not impede surface water flow paths or lead to an increased risk elsewhere.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology and Soils** The geology consists of: • Bedrock geology of mudstone, siltstone, limestone and sandstone. • Diamicton superficial deposits identified within the BGS mapping at the proposed development site. The soils on site are predominantly shown to be slightly acid loamy and clayey soils with impeded drainage, with a small area along the eastern boundary comprising of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. This suggests that infiltration may only be a viable means of surface water disposal along the eastern boundary.

	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 located within a 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. • The site has not been identified to be located within a historic landfill site or Source Protection Zone. • 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 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	• Existing flow paths should be retained within the site and incorporated into site design through the use of SuDS / green blue infrastructure. • 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. • 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 to utilise existing surface water flows where possible and 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 residential development as “More Vulnerable”, this vulnerability classification is taken into consideration for the Exception Test. The site, is entirely located within Flood Zone 1, therefore it is not required to pass the Exception Test. However, given the significant risk of surface water flooding to the site, Harborough District Council should carefully weigh the benefits of development against the risk and satisfy themselves that residents will be safe for the lifetime of the development. Detailed surface water flood modelling should be undertaken during a site-specific flood risk assessment.
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. • A site-specific flood risk assessment should be prepared for the site, supported by detailed surface water modelling, to demonstrate that site users will be safe for the lifetime of the development, development of the site will not increase risk elsewhere, and any residual risk can be safely managed. • Given the surface water risk to the site, a site drainage strategy should be prepared alongside the flood risk assessment. • Consultation with Harborough District Council, Leicestershire County Council, Canal Rivers Trust and the EA should be undertaken at an early stage. • Developers should consult with Severn Trent Water and Anglian Water to ensure that the development aims to help achieve the targets of their Drainage and Wastewater Management Plans. • 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 a site-specific flood risk assessment, 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 throughout 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 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. • Arrangements for safe access and egress to the west/northern side of the site are unlikely to be achievable during the 1% AEP event, plus an allowance for climate change. Therefore access and egress needs to be considered further within a site-specific flood risk assessment for the surface water events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs.

Key messages

The site is generally identified to be at low risk, however there are significant surface water flow paths present on the site. Development is likely to be able to progress if:

- A site-specific flood risk assessment, supported by detailed surface water modelling, is undertaken to assess the risk of surface water flooding in relation to the proposed development, and the provision of safe access and egress routes. Developers will need to demonstrate safe access and egress in the 1% AEP + climate change surface water event.
- 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

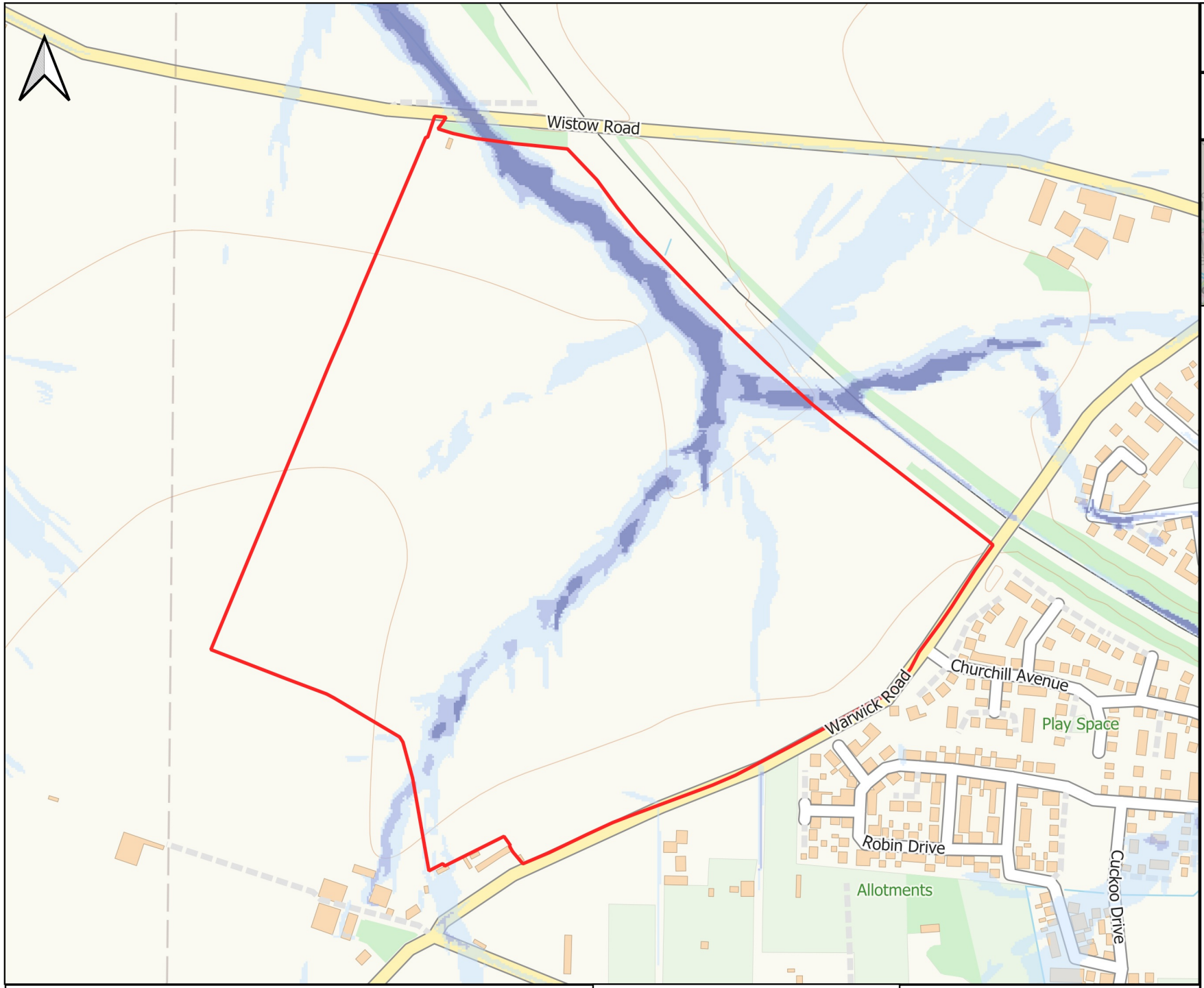
be steered away from the areas identified to be at highest risk of surface water flooding within the site. This is to be in line with the sequential approach to site layout.

- Infiltration rates are assessed on site as part of a drainage strategy.
- 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.



Level 2 Surface Water Flood Risk

Harborough District Council Level 1 Strategic Flood Risk Assessment

Legend

8247

Risk of Flooding from Surface Water

- 3.3% AEP
- 1% AEP
- 0.1% AEP

0 50 100 m