Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**12231: Proposed Allocation MH8**
Address	**Commons Car Park, Market Harborough**
Area	1.1 hectares
Current land use	Brownfield site – car park
Proposed land use	Retail
Flood Risk Vulnerability	Less vulnerable

Sources of flood risk

Location of the site	The site is currently a car park, located off the A4304 in the centre of Market Harborough, in the south of Harborough District. The River Welland flows along the southern site boundary.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that the topography of the site is almost flat at approximately 77.5mAOD, with a slight decline from the northwest (78.4mAOD) to the southeast (76.5mAOD).
Existing drainage features	With the exception of the River Welland to the south of the site, no other existing drainage features were identified on site; however, it is likely drainage is located across the car park for surface water interception and an investigation should be undertaken prior to development. A storage tank, operated by Anglian Water is located beneath part of the commons car park.

Fluvial	**Available data and mapping:** The EA Flood Map for Planning for Rivers and Sea. **Fluvial Modelling:** There is modelling of the River Welland (2016), however as the model is in 1d only, depth, velocity, and hazard outputs are unavailable Flooding is present within the site in all AEP events. Flood Map for Planning represents undefended outputs from the River Welland Model. The site is however defended by an embankment and wall along the southern boundary. **Flood characteristics:** The site is predominantly located within Flood Zone 2, with a small area to the north in Flood Zone 1 and to the south in Flood Zone 3. • Flood Zone 3 representing an area greater than 1 in 100 (1%) chance of river flooding in a given year. Flood Zone 3 covers 2.4% of the site. • Flood Zone 2 represents areas which have less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of river flooding in a given year. Flood Zone 2 covers 70.9% of the site. • Flood Zone 1 represents areas which have less than 1 in 1000 (0.1%) chance of river flooding in a given year. Flood Zone 1 covers 26.85 of the site. In the defended 3.3% and 1% AEP defended and undefended events, flood extent is minimal and affecting only the southern border of the site. In the 0.1% AEP event, flooding extends across the majority of the site, with only the central eastern area near Northbank unaffected. As the modelling is only 1D, depth velocity, and hazard outputs are not available. Developers will need to undertake detailed modelling including these outputs to assess the risk to the site as part of a site-specific FRA. Given the proximity to defences, this should also include an assessment of the risk from a breach scenario.

Fluvial plus climate change	The River Welland Model (2016) has had an allowance of 20% added to the 1% and 0.1% AEP events. The latest climate change allowances for the River Welland are +17% for the central and +28% for the Higher Central scenario in the 2080s epoch. In the 1% AEP +CC scenario, the site remains largely unaffected with flows confined to the river channel as in the present day. In the 0.1% AEP plus climate change, the extent of flooding extends considerably into the area of the site that was dry previously. 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. Consideration should still be given to the Flood Zones and detailed modelling may be required within a site specific 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 51% Max Depth is 1.05m Max Velocity is 2.4m/s Max Hazard is 2.3, Danger to All Mean Depth is 0.33m Mean Velocity is 0.42m/s Mean Hazard is 1.11, Danger to Some **1% AEP (1 in 100 year event):** Proportion is 80% Max Depth is 1.44m Max Velocity is 2.55m/s Max Hazard is 2.83, Danger to All

	Mean Depth is 0.55m Mean Velocity is 0.56m/s Mean Hazard is 1.49, Danger to Most **0.1% AEP (1 in 1000 year) event:** Proportion is 100% Max Depth is 2.18m Max Velocity is 3.11m/s Max Hazard is 4.74, Danger to All Mean Depth is 1.16m Mean Velocity is 0.87m/s Mean Hazard is 2.41, Danger to All **Flood characteristics:** The site is at significant risk of flooding during all modelled scenarios, associated with the River Welland and significant surface water flows which run through Market Harborough along Roman Way and Leicester Way towards the River. During the 3.3% AEP event the southern portion of the site is shown to flood to 51% adjacent to the watercourse, with the entire site flooding during the 0.1% AEP event, including the entrance road. Max depths to the south of the site are shown to be fairly significant during the 3.3% AEP event at 1.06m, with a velocity of 2.4m/s and a maximum hazard of danger for some. The average depth, velocity and hazard during the 0.1% AEP event is shown to be 1.16m, 0.87m/s and a 'Danger to All' respectively. Given the significant risk to the site in all scenarios, careful consideration will need to be given to how surface water is managed on site through a site specific flood risk assessment and drainage strategy, informed by detailed surface water modelling.

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 Welland 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 88% Max Depth is 1.64m Max Velocity is 2.78m/s Max Hazard is 3.28, Danger to All Mean Depth is 0.7m Mean Velocity is 0.65m/s Mean Hazard is 1.73, Danger to Most **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 98% Max Depth is 1.72m Max Velocity is 2.81m/s Max Hazard is 3.5, Danger to All Mean Depth is 0.72m Mean Velocity is 0.66m/s

	Mean Hazard is 1.75, Danger to Most **1% AEP (1 in 100 year) central climate change event:** Proportion is 100% Max Depth is 2.00m Max Velocity is 3.04m/s Max Hazard is 4.43, Danger to All Mean Depth is 0.99m Mean Velocity is 0.81m/s Mean Hazard is 2.21, Danger to All **1% AEP (1 in 100 year) upper climate change event:** Proportion is 100% Max Depth is 2.18m Max Velocity is 3.13m/s Max Hazard is 4.81, Danger to All Mean Depth is 1.16m Mean Velocity is 0.88m/s Mean Hazard is 2.43, Danger to All **Flood characteristics:** During the surface water climate change events up to 100% of the site is shown to flood during the 1% AEP central and upper climate change events. Flooding extends from the south of the site in a northerly direction, encompassing the entrance road, with maximum flood depth of 2.18m far south. The average depth, velocity and hazard during the 1% AEP upper climate change event are 1.16m, 0.88m/s and a 'Danger to All' respectively. The site is extremely sensitive to increased runoff as a result of climate change.

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:** Groundwater levels on site are shown to be 'low risk' during a 1% AEP groundwater flood event.
Sewers	Sewer flood records from Anglian Water were unavailable and therefore cannot be assessed as part of this assessment. The risk of sewer flooding should be considered within a site-specific assessment prior to development. There is no evidence to believe that the site is at risk of sewer flooding within Anglian Water's DWMP.
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 dataset shows there are defences present along the River Welland to the south of the site comprising of engineered high ground, embankments and a wall. This asset is maintained by the Local Authority. Given the proximity to the watercourse, and existing defences, consideration should be given as to whether any land needs to be safeguarded for defences in future. In June 2005, Anglian Water constructed a storage tank beneath Commons Car Park in Market Harborough which has helped to alleviate surface water and sewer flooding. Developers should consult with Anglian Water to understand the future plans for the tank and ensure that development of the site does not negatively impact this infrastructure, or impede any activities as may be necessary to maintain it in future.
Potential defences	There are no potential defences in or near the site.

Residual risk	The site is at residual risk of flooding form a breach or overtopping of defences along the southern border during an extreme event. This will need to be considered further in a site-specific flood risk assessment supported by detailed modelling.

Emergency planning

Flood warning	The majority of the site has been identified to be located within the Welland Valley (055WAF134TWV) Flood Alert Area and the River Welland in Market Harborough (055FWFUWEL01) Flood Warning Area.
Access and egress	Access and egress are unavailable during the 1% AEP plus central and upper climate change surface water events as flood depths exceed 300mm on the A4304. Flood depths are also noted to be significant within the site boundary. 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. Access and egress should therefore be assessed in a site-specific assessment with consideration to the development of a Flood Response Plan.

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. • There are no superficial deposits identified within the BGS mapping at the proposed development site. The soils on site are shown to be Loamy and clayey floodplain soils with naturally high groundwater. This 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 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 southeast 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 employment usage as 'Less Vulnerable', however there is significant surface water and fluvial risk to the site, alongside and

	access and egress issues. It is therefore recommended that the council carefully balances the benefits of development against the risks and satisfies themselves that users of the site will be safe throughout its lifetime to the site considering all sources of flood risk.
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 and fluvial 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. This should include an assessment of residual risk in the event of a breach/overtopping of defences. • 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, and the EA should be undertaken at an early stage. • Developers should consult with Anglian 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. • Arrangements for safe access and egress are unlikely to be possible and 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. A Flood Response Plan may also need to be produced following the site-specific assessment.

Key messages

The site is identified to be at significant risk of fluvial and surface water flooding with significant depths both within and alongside the site boundary, affecting safe access and egress.

Development may be able to progress if:

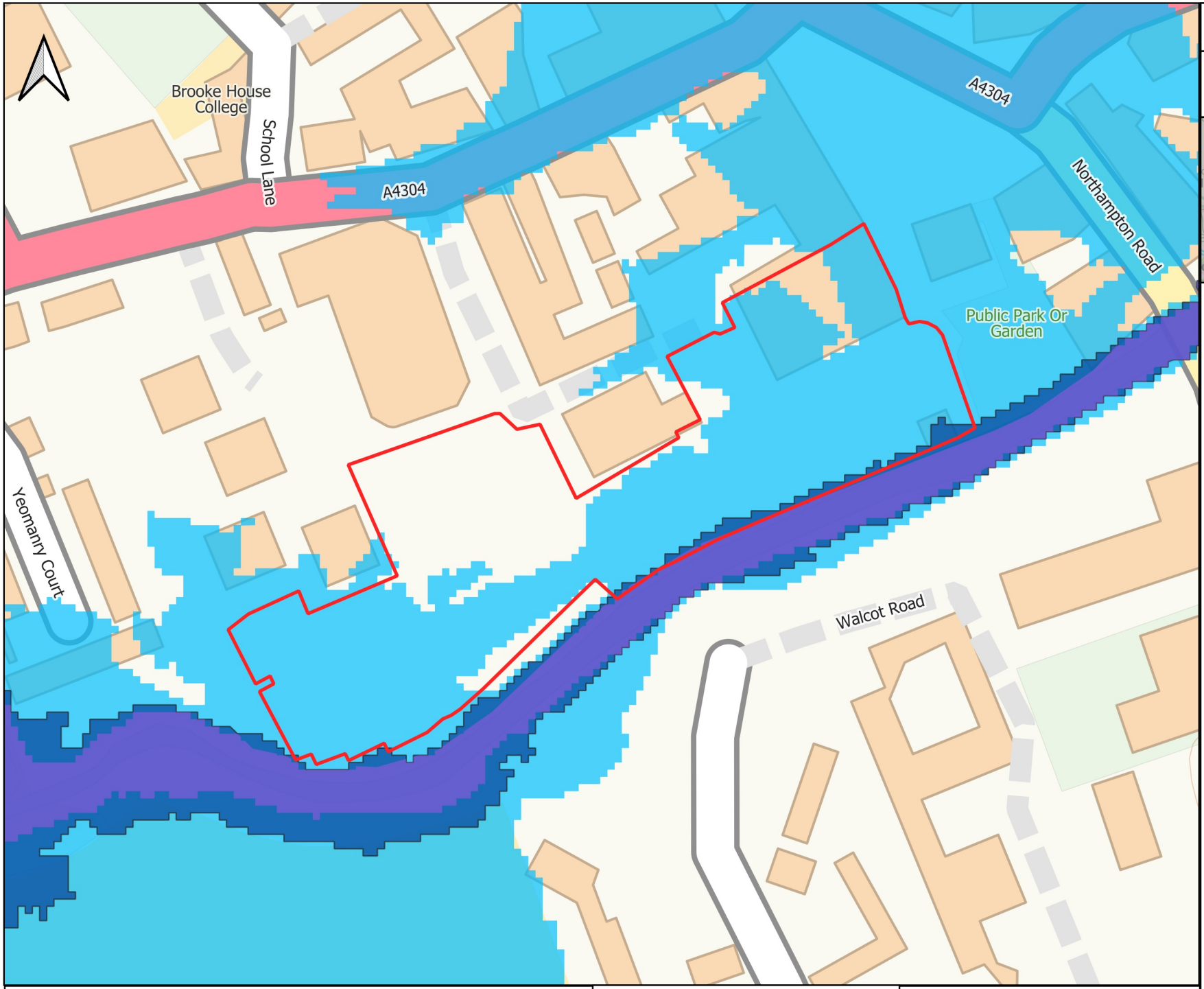
- A site-specific FRA, supported by detailed surface water modelling, is undertaken to assess the risk of surface water and fluvial flooding in relation to the proposed development, and the access and egress arrangements, including consideration of a breach scenario. Developers will need to demonstrate safe access and egress in the 1% AEP + climate change surface water event.
- Consideration is given as to whether any land on site needs to be safeguarded for defences in future.
- 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.

- There is early engagement with the LLFA and Anglian Water to understand any constraints posed by the presence of the Commons Car Park attenuation tanks.

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 Flood Zone Mapping

Harborough District Council Level 1 Strategic Flood Risk Assessment

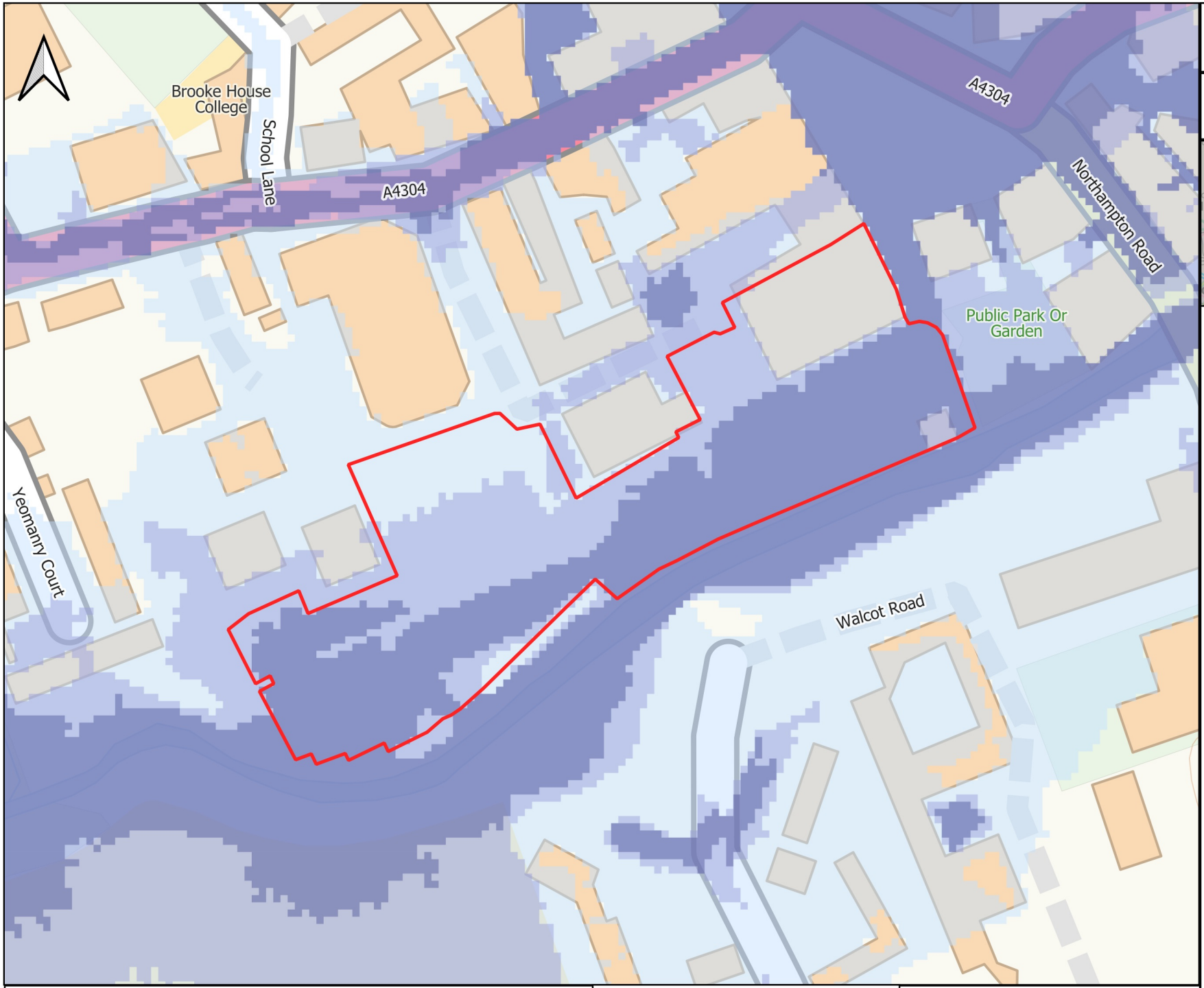
Legend

12231

Flood Zones

- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b

0 25 50 m



Level 2 Surface Water Flood Risk

Harborough District Council Level 1 Strategic Flood Risk Assessment

Legend

- 12231

Risk of Flooding from Surface Water

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

0 25 50 m