Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**8234: Includes Proposed Allocations MH3**
Address	**Land south of Gallow Field Road, Market Harborough**
Area	76.4 hectares
Current land use	Greenfield
Proposed land use	Mixed use, residential and employment
Flood Risk Vulnerability	More Vulnerable

Sources of flood risk

Location of the site	The site is bounded by private access roads along the western and upper eastern boundary, with private access roads within the southern area of the site. At the northern boundary, the site is bounded by Gallow Field Road. The Grand Union Canal is approximately 230m north of the site, and there is an unnamed ordinary watercourse approximately 15m from the eastern site boundary, which flows into the River Welland approximately 920m south of the site. The site is within the River Welland catchment, which flows to the south of the site then northeast from Market Harborough out to The Wash. It rises approximately 8.1km south of the site, drains approximately 48.6km2 at the site and falls under the Welland Management Catchment.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that the site is on a south-westerly slope, with a maximum elevation of 116.2m AOD at the northern boundary, and a minimum elevation of 99.4m AOD at the southernmost corner.

Existing drainage features	Within the site, there are four ponds within the central area of the site, close to the western boundary. It is likely that the site drains into the ordinary watercourse at the south-western boundary, and another ordinary watercourse approximately 250m south of the site. Both watercourses form tributaries to the River Welland.
Fluvial	**Available data and mapping:** EA Flood Map for Planning for Rivers and Sea. **Fluvial Modelling:** The site is not modelled to be within the modelled flood outlines of the 2016 River Welland model. **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:** The site is entirely located within Flood Zone 1 of the EA's Flood Map for Planning. Flood Zone 1 represents areas which have less than 1 in 1000 (0.1%) chance of river flooding in a given year. The Flood Map for Planning does not account for fluvial flooding from ordinary watercourses with smaller catchments such as the one near the south-eastern boundary. Fluvial extents from this watercourse would likely be captured within the surface water mapping, developers should consider modelling this watercourse as part of a site-specific flood risk assessment.
Fluvial plus climate change	In the absence of existing detailed modelling for the unnamed watercourse east of the site, it is recommended developers undertake detailed modelling that includes climate change allowances within a site-specific flood risk assessment to determine the future fluvial risk this watercourse poses to the site.

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 1% Max Depth is 0.71m Max Velocity is 1.17m/s Max Hazard is 1.38, Danger to Most Mean Depth is 0.14m Mean Velocity is 0.47m/s Mean Hazard is 0.66, Caution **1% AEP (1 in 100 year event):** Proportion is 2% Max Depth is 0.73m Max Velocity is 1.62m/s Max Hazard is 1.52, Danger to Most Mean Depth is 0.15m Mean Velocity is 0.57m/s Mean Hazard is 0.69, Caution **0.1% AEP (1 in 1000 year) event:** Proportion is 13% Max Depth is 0.85m Max Velocity is 2.07m/s Max Hazard is 2.09, Danger to All Mean Depth is 0.13m Mean Velocity is 0.71m/s Mean Hazard is 0.69, Caution

	Flood characteristics: The site is most significantly affected by the 0.1% AEP event. In the 3.3% AEP event, there is a flow path along the private access road in the southern area of the site that flows into the unnamed watercourse at the south-eastern boundary. There is a flow path that forms in the southernmost corner where there is a topographic low point and ponding along the lower north-western boundary. The maximum depth is 0.73m, the maximum velocity is 1.17m/s and a maximum hazard rating of 'Danger to Most'. Across the site, the average depth is 0.14m, the average velocity is 0.47m/s, and the average hazard rating is 'Caution'. In the 1% AEP event, flow paths present in the 3.3% AEP event increase in scale, and there is ponding and a flow path present along the north-western boundary. The maximum depth is 0.73m, the maximum velocity is 1.62m/s, and the maximum hazard rating id 'Danger to Most'. Across the site, the average depth is 0.15m, the average velocity is 0.57m/s and the average hazard rating is 'Caution'. In the 0.1% AEP event, small areas of ponding/flow paths are present across the site. Several significant flow paths form: along the north-western boundary through to the southernmost area of the site; along the private access road and towards the ordinary watercourse; two flow paths in the north eastern area; and a flow path at the southern corner. The majority of the flooded area has depths below 0.15m, with velocity between 0.5 to 1.0m/s, and a predominant hazard rating of 'Caution'. The maximum depth on the site is 0.85m, the maximum velocity is 2.07 m/s, with a maximum hazard rating of 'Danger for Most'. Across the site, the average depth is 0.13m, the average velocity is 0.71 m/s, with an average 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 Wellend 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 4% Max Depth is 0.77m Max Velocity is 1.83m/s Max Hazard is 1.72, Danger for Most Mean Depth is 0.12m Mean Velocity is 0.62m/s Mean Hazard is 0.68, Caution **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 5% Max Depth is 0.78m Max Velocity is 1.85m/s Max Hazard is 1.77, Danger for Most Mean Depth is 0.13m Mean Velocity is 0.64m/s Mean Hazard is 0.68, Caution **1% AEP (1 in 100 year) central climate change event:** Proportion is 10% Max Depth is 0.83m

	Max Velocity is 2.0m/s Max Hazard is 1.99, Danger for Most Mean Depth is 0.13m Mean Velocity is 0.69m/s Mean Hazard is 0.69, Caution **1% AEP (1 in 100 year) upper climate change event:** Proportion is 14% Max Depth is 0.85m Max Velocity is 2.09m/s Max Hazard is 2.11, Danger for All Mean Depth is 0.13m Mean Velocity is 0.72m/s Mean Hazard is 0.69, Caution **Flood characteristics:** The site is shown to be at risk of flooding from all four scenarios. The 3.3% plus climate change allowances show significantly greater risk to the site in comparison to the present day 3.3% AEP and 1% AEP events. Flow paths extend further across the site though maximum flood depths remain largely similar to the present day 3.3% and 1% AEP events. The 1% AEP plus climate change events are similar in extent to the present day 0.1% AEP event with multiple flow paths crossing the site. The design event for the site is the 1% AEP plus 40% climate change allowance. The maximum depth is 0.85m in the eastern boundary, the maximum velocity is 2.09m/s at the private access road and a maximum hazard rating of 'Danger for All' along the northern boundary. Across the site, average depths are 0.13m, average velocities are 0.72m/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 site is at no risk from groundwater emergence due the geological deposits in and around the site.
Sewers	Sewer flood records from Anglian Water were unavailable and therefore cannot be assessed as part of this assessment. The water recycling centre (WRC) for the site is identified to have compliance risk with risk from internal and external sewer flooding risk until 2050 within Anglian Water's DWMP. The risk of sewer flooding should be considered within a site-specific assessment prior to development.
Flood history	From the EA's Recorded Flood Outlines mapping, there are no recorded historic extents within 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	There are no residual risks to the site.

Emergency planning

Flood warning	The site is not located in an EA Flood Alert or Flood Warning Area.
Access and egress	Access and egress to the site is via Gallow Field Road and Air Field Road. Access may also be provided through private access roads and farmers entry points to the field.

	Fluvial model extents and Flood Zones are unavailable, however due to the topography of the site, it is highly unlikely that access and egress will be impeded during a fluvial event. In the surface water events, during the 3.3% AEP and 1% AEP events access and egress to the site should be achievable via Gallow Field Road and Air Field Road. In the 0.1% AEP event access and egress should be achievable for the majority of the site, however access from the private access road in the southern area of the site encounters a flow path that has a maximum depth between 0.3 to 0.6m, a maximum velocity between 0.5 to 1.0m/s, and a maximum hazard rating of 'Danger to Most'. The surface water design event is the 1% AEP plus 40% climate change, where the extents are similar to the present day 0.1% AEP event and faces the same access and egress issue. The maximum depth at the site is 0.8m, at the eastern boundary, a maximum velocity of 1.4m/s and a maximum hazard rating of 'Danger to Most' along the private access road. Safe access and egress will need to be demonstrated in the design (1% AEP +CC) fluvial and surface water events to all parts of the site. Given the significant surface water risk to the site, a site-specific flood risk assessment will be required, considering the duration and likely onset of flooding. If safe access and egress cannot be demonstrated, a flood warning and evacuation plan should be prepared.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology and Soils** The geology consists of: • Bedrock geology of interbedded siltstone and mudstone forming the Dyrham Formation • There are no superficial deposits at the site

	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. This suggests that infiltration may 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, the site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. However, infiltration may not always be appropriate, and 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 contain historical landfill. • The site is located within the River Welland 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 south and south-east 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	• 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

integrated flood risk management	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 proposed development of the site includes residential and employment spaces (mixed use). The NPPF classifies residential development as 'More Vulnerable' and the Exception Test is not required at the site as the site is entirely within Flood Zone 1.
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. 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 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 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 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. • 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).

Key messages

The site is predominantly affected by the 0.1% AEP surface water event and the surface water design event, however the site is at low risk from all other sources of flooding. Development is likely to progress if:

- New developments are located in areas of lowest risk, in line with the sequential approach, by steering sites away from areas with a high risk of surface water flooding. If a Sequential Test is undertaken and a site at flood risk is identified as the only appropriate site for the development, the Exception Test shall be undertaken. If development can't be avoided in a high-risk surface water Zone, then part "b" of the Exception Test should be satisfied.
- A site-specific Flood Risk Assessment demonstrates that site users will be safe in the 1% AEP surface water event, including an allowance for climate change. This will need to use detailed surface water modelling and explore any interaction with the ordinary 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.
- 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.

Fluvial depth, velocity and hazard mapping	Fluvial extents were from the River Welland hydraulic model (2016).
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.