Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**10248: Part of Proposed Allocation MH6**
Address	**Land east of Northampton Road, north of Harborough Enterprise Centre**
Area	1.2 hectares
Current land use	Greenfield
Proposed land use	Employment
Flood Risk Vulnerability	Less Vulnerable

Sources of flood risk

Location of the site	The site is bounded by Northampton Road along the western boundary, Moseley Avenue at the eastern boundary, and a car park along the southern boundary. It is located within the Compass Point Business Park area. An unnamed watercourse is present approximately 20m west of the site. The site falls in the catchment for an unnamed watercourse which rises 1.7km south-west of the site and drains approximately 1.8km2 at the site. The unnamed watercourse joins the River Jordon approximately 780m north of the site and falls under the Welland Management Catchment.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that the topography is flat across the site. The maximum elevation is 88.7m AOD and a minimum elevation of 88.5m AOD.
Existing drainage features	There are no drainage features within the site, but the site is likely to drain into the unnamed watercourse approximately 20m from the site, as well as into the surface water sewer network system which is likely to drain into the River Welland.

Fluvial	**Available data and mapping:** EA Flood Map for Planning for Rivers and Sea. **Flood Map for Planning** **Data analysis:** Details of the sites 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 is in its entirety (100%) in Flood Zone 1. While the site is in Flood Zone 1, the unnamed watercourse 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 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. Consideration from developers should still be given during detailed modelling that 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 10% Max Depth is 0.56m Max Velocity is 0.55m/s Max Hazard is 1.29, Danger for Most Mean Depth is 0.22m

	Mean Velocity is 0.17m/s Mean Hazard is 0.83, Danger for Some **1% AEP (1 in 100 year event):** Proportion is 19% Max Depth is 0.63m Max Velocity is 0.95m/s Max Hazard is 1.34, Danger for Most Mean Depth is 0.21m Mean Velocity is 0.28m/s Mean Hazard 0.82, Danger for Some **0.1% AEP (1 in 1000 year) event:** Proportion is 42% Max Depth is 0.84m/s Max Velocity is 1.46m/s Max Hazard is 1.54, Danger for Most Mean Depth is 0.27m Mean Velocity is 0.43m/s Mean Hazard is 0.96, Danger for Some **Flood characteristics:** In the 3.3% AEP event, there is ponding within the south-eastern area of the site with encroachment from a flow path into the northern area of the site from the northern boundary. The maximum depth of 0.56m, maximum velocity of 0.55m/s, and maximum hazard ration of 'Danger for Most' is present int the northern flow path. Across the site, average depths are 0.22m, average velocity is 0.17m/s, and average hazard rating of 'Danger for Some'.

	In the 1% AEP event, a flow path flows along the eastern boundary which connects to a flow path along Moseley Avenue and a flow path at the northern boundary. There is an additional flow path at the upper western boundary. The maximum depth is 0.63m in the northern flow path, a maximum velocity of 0.95m/s in the southern flow path, and a maximum hazard rating of 'Danger for Most' in the northern flow path. Across the site, the average depth is 0.21m, the average velocity is 0.28m/s, and average hazard rating is 'Danger for Some. In the 0.1% AEP event, there is an instance of ponding in the central area of the site, there are two significant flow paths within the site, the first from the central area of the site that flows to and along the western boundary. The second flow path is present along the eastern boundary up to the northern boundary, part of a larger flow path from fields south of Market Harborough flowing towards the town centre. The maximum depth is 0.84m in the northern area, the maximum velocity is 1.46m/s in the southern area, and a maximum hazard rating of 'Danger for Most' along the eastern boundary and northern area. Across the site, the average depth is 0.27m, the average velocity is 0.43m/s, and the average hazard rating is 'Danger for Some'. In all scenarios, surface water modelling suggests that the risk to the site from the unnamed ordinary watercourse is low, however this should be confirmed through a detailed site-specific risk assessment including surface water and fluvial modelling.
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 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 29% Max Depth is 0.7m Max Velocity is 1.14m/s Max Hazard is 1.41, Danger for Most Mean Depth is 0.22m Mean Velocity is 0.33m/s Mean Hazard is 0.82, Danger for Some **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 32% Max Depth is 0.73m Max Velocity is 1.25m/s Max Hazard is 1.43, Danger for Most Mean Depth is 0.23m Mean Velocity is 0.34m/s Mean Hazard is 0.83, Danger for Some **1% AEP (1 in 100 year) central climate change event:** Proportion is 39% Max Depth is 0.81m Max Velocity is 1.41m/s Max Hazard is 1.51, Danger for Most

	Mean Depth is 0.26m Mean Velocity is 0.4m/s Mean Hazard is 0.91, Danger for Some **1% AEP (1 in 100 year) upper climate change event:** Proportion is 43% Max Depth is 0.85m Max Velocity is 1.47m/s Max Hazard is 1.55, Danger for Most Mean Depth is 0.27m Mean Velocity is 0.43m/s Mean Hazard is 0.96, Danger for Some **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 25% climate change allowance. The maximum depth is 0.81m, the maximum velocity is 1.41m/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 'Danger for 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 JBA Groundwater Flood Risk Map shows that the majority of the site has groundwater levels less than 0.025m from the grounds surface. As such and there is a risk of groundwater flooding at the surface during a 1% AEP event, which may flow to and pool within topographic low spots. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Additional site investigation work may be required to support the detailed design of the drainage system. This may include groundwater monitoring to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Below ground development such as basements are not appropriate at this site. Developers should confirm groundwater levels at the site through infiltration testing as part of a site-specific flood risk assessment.
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. The WRC for the site is identified to have compliance risk with risk from internal and external sewer flooding risk till 2050 within Anglian Water's DWMP.
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	The EA's AIMS dataset shows that there are no potential defences in or near the site.
Residual risk	There are no residual risks to the site.

Emergency planning

Flood warning	The site is not located within an EA Flood Alert or Flood Warning Area.

Access and egress	Access and egress to the site is currently through the use of Moseley Avenue, with access to the wider area through Northampton Road, with Market Harborough in a northern direction. In a fluvial event, the site is unlikely to be affected, and access and egress is maintained in all AEP events, although this will need to be confirmed through a site-specific FRA. In the 3.3% AEP, 1% AEP, and 0.1% AEP surface water events there is a flow path along Moseley Avenue, which encounters a maximum hazard rating of 'Danger to Most' at the site and along the road. In the 0.1% the flow path hazard ratings at the roundabout to Moseley Avenue on Northampton Road and in a northernly direction encounter a hazard rating of 'Danger to All'. In all events, maximum depths are between 0.6 to 0.9m, and maximum velocities are between 0.5 to 1.0m/s. As such, safe access and egress are not maintained to the site. The surface water design event is the 1% AEP plus 25% climate change allowance. The extents for the design event are similar to that of the present day 0.1% AEP event and is likely to face the same access and egress issues. For the surface water design event, the maximum velocity is 2.6m/s at the roundabout on Northampton Road, a maximum depth of 0.93m along Moseley Road north-east of the site. The hazard rating along Moseley Avenue is 'Danger for Most, with a maximum rating of 'Danger for All' along Northampton Road northbound. Developers will need to demonstrate safe access and egress to the site in the design surface water and fluvial events. Raising of access routes should not impede surface water flow paths.

Requirements for drainage control and impact mitigation

Broad-scale assessment of possible SuDS	**Geology and Soils** The geology consists of: • Bedrock of mudstone forming the Charmouth Mudstone formation • Superficial deposits of clay, silt, sand and gravel alluvium, and river terrace deposits of sand and gravel. 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 'high risk' of groundwater flooding during a 1% AEP flood event, and infiltration will not be appropriate. Offsite discharge may therefore be required to discharge surface water runoff during flood events. Infiltration and groundwater levels at the site should be confirmed through infiltration testing, in line with BRE 365. • The site is not located within a Source Protection Zone, nor is there any historic landfill within the site. • 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 north and west 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', therefore the Exception Test is not required. However, there is significant surface water at the site and access and egress issues, it is 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 applied to the site and considered 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. • 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 through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • Developers will need to 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 unnamed 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. Developers should conduct

	fluvial modelling of the unnamed ordinary watercourse at the site as part of the flood risk assessment. • Developers should confirm groundwater levels at the site through infiltration testing as part of a site-specific flood risk assessment. • There is significant risk from surface water at the site, as such 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. **Guidance for site design and making development safe:** • 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. • Developers should also seek a Flood Warning and Evacuation Plan as the site encounters significant surface water risk in addition to access and egress impeded at the site. • Raise commercial finished floor levels 600mm above the 1 in 100-year plus climate change flood level. • 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 generally identified to be predominantly at risk from the 0.1% AEP surface water event, and the surface water design event (1% AEP plus 25% climate change allowance) with access and egress issues in all surface water AEP events and the surface water design event. Additionally, there is significant risk of groundwater emergence at the site. Development could progress if:

- To locate new development 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 fluvial and surface water events, including an allowance for climate change. This will need to use detailed fluvial/surface water modelling 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 conduct surface water modelling and fluvial modelling of the unnamed ordinary watercourse with interactions to confirm risk to the site.
- Safe access and egress can be demonstrated in the 1% AEP plus upper climate change fluvial and surface water events. If this is not possible, an appropriate Flood Warning and Evacuation Plan is needed.
- 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.