Harborough District Council

Level 2 Strategic Flood Risk Assessment

Detailed Site Summary Table

Site details

Site Code	**8155: Proposed Allocation B1**
Address	**Land at Gaulby Lane, Billesdon**
Area	7.9 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 located to the south of Billesdon, within the north of Harborough District. The site is comprised of greenfield land, split by Gaulby Road across the centre. Two watercourses have been identified to the northwest and southwest of the proposed development. The Billesdon Brook flows in a south-westerly direction approximately 155m northwest of the site, before joining the Coplow Brook. The watercourse to the southwest of the site is unnamed and flows within the site's boundary, before flowing in a south-westerly direction joining the Burton Brook.
Topography	The Environment Agency's (EA) 1m resolution 2022 Composite LiDAR shows that Gaulby Road acts as a topographical ridge across the centre of the site. The topography of the site therefore declines from the centre of the site along Gaulby Road at approximately 185mAOD down to 169mAOD to the south of the site, and 171mAOD to the north of the site.
Existing drainage features	The site is located between two watercourses located to the northwest and southwest. Furthermore, it is likely drainage ditches are located within the fields and an investigation should be undertaken prior to development. It

	should also be noted that a small pond is located approximately 50m south of the site.
Fluvial	**Available data and mapping:** The 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. EA Flood Zones are not available for the small watercourses near the site, however the Risk of Flooding from Surface Water dataset can be used to gain an understanding of likely risk from these watercourses. The watercourse to the north is unlikely to pose a risk to the site due to topography. Developers will need to confirm the risk to the site posed by the watercourse to the south in a site-specific Flood Risk Assessment, including detailed modelling.
Fluvial plus climate change	The site is at risk of fluvial flooding from the watercourse in the south of the site, and is likely to be at increased risk in future. Developers should confirm the risk to the site in the future using detailed modelling 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 6% Max Depth is 0.36m Max Velocity is 1.52m/s

	Max Hazard is 1.31, Danger to Most Mean Depth is 0.12m Mean Velocity is 0.71m/s Mean Hazard is 0.65, Caution **1% AEP (1 in 100 year event):** Proportion is 9% Max Depth is 0.44m Max Velocity is 1.82m/s Max Hazard is 1.47, Danger to Most Mean Depth is 0.14m Mean Velocity is 0.85m/s Mean Hazard is 0.71, Caution **0.1% AEP (1 in 1000 year) event:** Proportion is 20% Max Depth is 0.65m Max Velocity is 2.45m/s Max Hazard is 2.02, Danger to Most Mean Depth is 0.18m Mean Velocity is 1.13m/s Mean Hazard is 0.94, Danger to Some **Flood characteristics:** The site is shown to flood during all surface water flooding events across the southern portion of the site. A flow path crosses in a south-westerly direction from the east and southeast of the site, associated with the unnamed watercourse, increasing in extent from 6% during the 3.3% AEP event up to 20% during the 0.1% AEP event. During the 1% and 0.1% AEP events the flood extent also extends in a northerly direction creating a new flow path from Vicarage Close.

	The average depth, velocity and hazard during the 0.1% AEP event is shown to be 0.18m, 1.13m/s and 'Danger to Some') respectively.
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 12% Max Depth is 0.5m Max Velocity is 1.98m/s Max Hazard is 1.61, Danger to Most Mean Depth is 0.15m Mean Velocity is 0.97m/s Mean Hazard is 0.79, Danger to Some **3.3% AEP (1 in 30 year) upper climate change event:** Proportion is 13% Max Depth is 0.52m Max Velocity is 2.04m/s Max Hazard is 1.67, Danger to Most

	Mean Depth is 0.16m Mean Velocity is 0.99m/s Mean Hazard is 0.81, Danger to Some **1% AEP (1 in 100 year) central climate change event:** Proportion is 18% Max Depth is 0.6m Max Velocity is 2.28m/s Max Hazard is 1.87, Danger to Most Mean Depth is 0.17m Mean Velocity is 1.07m/s Mean Hazard is 0.88, Danger to Some **1% AEP (1 in 100 year) upper climate change event:** Proportion is 20% Max Depth is 0.65m Max Velocity is 2.42m/s Max Hazard is 1.99, Danger to Most Mean Depth is 0.18m Mean Velocity is 1.12m/s Mean Hazard is 0.93, Danger to Some **Flood characteristics:** During the surface water climate change events up to 20% of the site is shown to flood along the southern half of the site during the 1% AEP upper climate change event. The flow path crosses the south of the site in south-westerly direction from the east and southeast of the site in association with the unnamed watercourse during all climate change events. Maximum flood depths are located in a localised area to the south. The average depth, velocity and hazard during the 1% AEP upper climate change event are 0.18m, 1.12m/s and a 'Danger to Some' respectively.

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 predominantly shown to be 'low risk' during a 1% AEP groundwater flood event, with small, localised areas to the north and east of the site with levels between 0.5m and 5m below the grounds surface.
Sewers	Sewer flood records from Severn Trent Water were unavailable and therefore cannot be assessed as part of this assessment. However, Billesdon is located within the Severn Trent Water DWMP as part of the Billesdon catchment. The catchment has been identified as a medium-short term priority with internal sewer flooding, blockages and pollution incident concerns. It is therefore recommended that the risk of sewer flooding should be assessed within a site-specific assessment prior to development.
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 no formal flood defences within the vicinity of the site.
Potential defences	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 has not been identified to be located within an EA Flood Warning or Flood Alert Area.
Access and egress	Access and egress are available during the 1% AEP plus central and upper climate change surface water events along Gaulby Road, as flood depths remain less than 300mm.

	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. • There are no superficial deposits identified within the BGS mapping across the majority of the proposed development site, however there is a small area of diamicton to the south of the site. The soils on site are shown to be slightly acid loamy and clayey soils with impeded drainage across the majority of the site, with a small area to the south comprising of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. This suggests that infiltration may be a viable means of surface water disposal to the south of the site. **SuDS** • JBA Groundwater mapping suggests the site is predominantly shown to be 'low risk' during a 1% AEP groundwater flood event, with small localised areas to the north and east of the site with levels between 0.5m and 5m below the grounds surface. As a result, 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 south 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 usage as "More Vulnerable", this type is taken into consideration for the Exception Test. The site, although entirely located within Flood Zone 1, is located within the 0.1% AEP surface water flooding extent. Providing the development is proposed outside of the areas at risk, the Exception Test is not required for this site. Whilst the Exception Test only specifically applies to sites within fluvial/coastal Flood Zones, should development be proposed within areas at risk, 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.
Requirements and guidance for site-specific Flood Risk Assessment	**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.

(Developer considerations)	• 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, 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. • The risk from groundwater flooding and the ordinary watercourse to the south of the site should also be quantified as part of a site-

	specific FRA to understand the risk to the proposed development site. • 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

Most of the site is at low risk, however there are areas at risk of groundwater flooding, and an unmodelled ordinary watercourse which flows across the southeast of the site.

Development is likely to be able progress if:

- A site-specific FRA, supported by detailed fluvial/surface water modelling, is undertaken to assess the risk of surface water flooding and risk from the unnamed watercourse in relation to the proposed development, and the access and egress arrangements. 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.
- 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.