South Staffordshire Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables	

Site details

Site Code	**SA-0284-WOL**
Address	Land off Gilbert Lane, Wombourne Y / 387917, 293192
Area	2.13ha
Current land use	Greenfield
Proposed land use	Residential

Sources of flood risk

Location of the site within the catchment	The site is located in the east of Wombourne, adjacent to site 463 to the north. The Wom Brook it flows in a north-eastern direction, before joining Lyde Brook Coppice, and subsequently Penn Brook 1.1km downstream. The site is bounded to highways along 3 sides; High Street to the north-west; Gilbert Lane to the north; and Battlefield Hill to the north-east. Moises Hall Road residential properties form the southern boundary, and the Wom Brook bounds the south-east of the site.
Existing drainage features	Wom Brook flows along the site's south-eastern boundary. Wom Brook is small watercourse, originating from a confluence point along the larger Smestow Brook located approximately 2.5km west of the site. As the watercourse passes the site, it discharges into the Lyde Brook Coppice 1.1km downstream, forming Penn Brook. It flows south-west, draining the upper, semi-rural catchment from Sedgley and Penn. It then passes beneath the A449, bounding the site along its south-eastern edge, and flowing west through Wombourne to join the Smestow Brook.
Fluvial	**The proportion of site at risk (EA Flood Zones):** **FZ3 – 8.5%** **FZ2 – 20.2%** **FZ1 – 71.3%** **The proportion of site at risk (modelled outlines):** **3.3% AEP – 4.44%** **1% AEP – 5.11%** **0.1% AEP – 6.33%** *The % Flood Zones quoted show the % of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at flood risk at a higher risk zone, e.g. FZ2 includes the FZ3 %. FZ1 is the remaining area outside FZ2 (FZ2 + FZ1 = 100%). As there are no Flood Risk Management features or defences the flood risk defined by the zones is also the actual flood risk.* **Available data:** The Environment Agency's (EA) Flood Maps for Planning have been used within this assessment, which are believed to be based on broadscale modelling at this location. Generalised 2D modelling has also been undertaken for the Wash Brook to the north of the site. Percentages quoted above relate to Environment Agency Flood Zones. **Flood characteristics:** Modelling undertaken as part of this assessment indicates that the north-eastern portion of the site is at risk in the 3.3%, 1% and, 0.1% AEP events. In all modelled events, flooding occurs along the south-eastern boundary of the site. In the 3.3% AEP event, flooding is constrained to the south-eastern corner, with maximum depths of ~0.1m out of bank, and 1m in-channel.

	In the 1% AEP event, the area of flooding in the south-east corner increases slightly, and depths encroaching into the site increase to approximately 0.2m, with a maximum hazard of 'caution'. There is a slight increase again in flood extent during the 0.1% AEP event, with in-channel maximum depth of 1.4m.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 3.3% Max depth: 0.9-1.2m Max velocity: 1-2m/s **1% AEP** – 5.0% Max depth: 0.9-1.2m Max velocity: 1-2m/s **0.1% AEP** – 8.2% Max depth: 0.9-1.2m Max velocity: 1-2m/s *The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)* **Description of surface water flow paths:** This site is predicted to be at low risk from surface water flooding, although areas of risk are present along the eastern boundary in all events. The 3.3% AEP extent is minor and only predicted to impact the area along the length of the Wom Brook, where maximum depth and velocity is 0.9-1.2m and 1-2m/2. Maximum hazard is classified as 'Danger to Most'. A small ponding is also shown on Gilbert Lane, between this site and site 463, with a maximum depth of 0.3-0.6m and maximum hazard categorised as 'Danger for Most'. The 1% AEP increases the predicted surface water extent into areas of lower topography in the south-eastern corner but remains largely within channel through the rest of the site. This has a maximum depth of >1.2m in the eastern corner, where the brook enters the site, though 0.9-1.2m is shown as the most common. Predicted maximum velocity is shown as >2m/s though 1-2m/s is again more common, and the Maximum hazard through the brook has increased to 'Danger for All'. The Ponding along Gilbert Road has increased in depth and hazard to 0.6-0.9m and 'Danger for Most'; and now connects to the Wom Brook via a surface water flow path along Battlefield Hill. This has a maximum depth and velocity of 0.15m and 1-2m/s, with a hazard classification of 'Caution'. In the 0.1% AEP event predicted flood extents increase further into east of the site from the watercourse and connect with the increased flow path along Battlefield Hill. Maximum depths and velocities along Battlefield Hill have increased to 0.15-0.3m and >2m/s, with a maximum hazard designation of 'Danger to Most'. Surface water risk along the Wom Brook in the east of the site have also increased, with maximum depth and velocity of >1.2m and >2m/s, and a hazard classification of 'Danger to All'.
Reservoir	The Environment Agency reservoir flood risk extent online dataset provides insight into the extent of water inundation originating from reservoirs. The data shows that the site is not at risk of flooding from reservoir sources.
Canals	The site is not impacted by risks from Canals.
Groundwater	The Environment Agency's "Areas Susceptible to Groundwater Flooding 2010 dataset, displayed as a 1km grid resolution, provides insight into the susceptibly of a flood event at the site, as well as the surrounding region. All but the north-eastern corner of the site is shown to be at a relatively low level of flood risk, with a likelihood of <25% in any given year.
Sewers	There are no records of areas of critical drainage problems.
Flood history	The Environment Agency's Historic Flood Map shows there are no records of historic flooding events on or in the vicinity of the site.
Flood risk management infrastructure	
Defences	The site is not protected by any formal flood defences. The banks of the river are classified as 'natural high ground' in the Environment Agency's AIMS dataset.

Residual risk	Risks are associated with the culverted channel of the Wom Brook where is passes beneath the A449 highway near the north-eastern corner of the site, posing a risk of an impoundment upstream bursting into the site.
Emergency planning	
Flood warning	The Wom Brook is situated within the 'River Stour and Smestow Brook in the Black Country and South Staffordshire' Flood Alert Area, which begins at the culvert under Battlefield Hill within the site. No Environment Agency Flood Warning Areas are present along the brook.
Access and egress	The site can be accessed through a field gate along High Street/Gilbert Lane, opposite Smallbrook Lane, along the north-west boundary of the site. Fluvial flooding is unlikely to impede access to the site. Similarly, surface water is unlikely to affect immediate access to the site in any AEP event, however surrounding highways and access routes may be impacted in the 1% AEP and 0.1% AEP events. This includes Smallbrook Lane, Gilbert Lane, Battlefield Hill, and the A449 Stourbridge Road.
Climate change	
Implications for the site	• Central and Higher climate change allowances for the 3.3%, 1%, and 0.1% AEP fluvial events have been modelled as part of this assessment. As the site is a significant new development, the Upper End was also considered. The modelled outputs show predicted risk extents similar to the 0.1% AEP fluvial event. The Higher and Upper End climate change scenarios for this however do not extend significantly further into the site. • Surface water climate change uplifts have been modelled for the 3.3% AEP and 1% AEP surface water events in the Central and Higher climate change scenarios. Surface water risk is not predicted to be significantly greater to the site in any modelled scenario. No new surface water flows occur and maximum depths on site reach up to approximately 1.6m in the 1% AEP Higher Climate change scenario. • The preservation of existing and predicted future surface water flow routes and storage volumes should be considered when preparing the layout and site scheme. • Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA. • A site-specific FRA, with the most up-do-date climate change allowances, should be undertaken to investigate the implications of climate change on the site.
Requirements for drainage control and impact mitigation	

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock- Wildmoor Sandstone
	  ○ Superficial- N/A
	• Soils at the site consist of:
	  ○ Freely draining slightly acid sandy soils
	SuDS
	• The site is considered to have very low susceptibility to groundwater flooding, this should be confirmed through additional site investigation work. Below ground development such as basements may still be susceptible to groundwater flooding.
	• BGS data indicates that the underlying geology is sandstone which is likely to be free draining. This should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
	• The site is not located within a historic landfill site.
	• The entire site is located within Groundwater Source Protection Zone 1 (SPZ) and infiltration techniques may not appropriate for anything other than clean roof drainage. If infiltration is proposed for anything other than clean roof drainage a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible opportunities and constraints.
	• Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising

	the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques. • The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during the 0.1% AEP event. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space. • 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.
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. 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. • Development at this site should not increase flood risk either on or off site. 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 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 clean improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site. • 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. Where slopes are >5%, features should follow contours or utilise check dams to slow flows. • Surface water discharge rates should not exceed the existing greenfield runoff rates for the site. Opportunities to further reduce discharge rates should be considered and agreed with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.
NPPF and planning implications	
Exception Test requirements	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. Since the east of site lies within Flood Zone 2 and 3 and is affected by surface water flood risk the Exception Test is required.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • As the site lies partially within Flood Zones 2 and 3 and is affected by surface water flood risk a site-specific Flood Risk Assessment will be required. • The site-specific FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; the South Staffordshire Local Development Scheme; and the Staffordshire County Council Lead Local Flood Authority's Statutory Consultee for Planning Guidance Document. • Consultation with the Local Authority and the Lead Local Flood Authority should be undertaken at an early stage. **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). • As a large new development any proposal should be accompanied by an overall Surface Water Management Masterplan and Strategy. This should cover:

- How the cumulative effects of potential peak rates and volumes of water from development sites would impact on peak flows, duration of flooding and timing of flood peaks on receiving watercourses. This should be used to develop and implement appropriate drainage sub catchments and specific runoff rate and volume requirements for each phase of the development.
- The risk of flooding from all sources, including for rainfall events greater than the design standard of the surface water drainage system should be taken into account to ensure there is no flood risk to new properties and that exceedance flows in extreme events are safely routed around those properties.
- The consideration of how SuDS, natural flood management techniques, green infrastructure and green-blue corridors can be designed into the development master plan to facilitate drainage flood risk management and ensure wider benefits such as biodiversity, amenity, water quality and recreation are realised.
- Based on the above, a Drainage Phasing Plan should be developed, based on the SuDS train method (considering firstly how water can be infiltrated/stored at a plot level, then conveyed through the site and any regional storage needs at a settlement level).
- The provision of drainage during the building phase shall be based on the Drainage Phasing Plan to ensure adequate drainage is provided and implemented throughout the development life.
- The LLFA, Environment Agency and LPA should be consulted during the development of the Surface Water Management Masterplan and Strategy.

- The development should be designed using a sequential approach. Development should be steered away from areas of flood risk in the north and central portions of the site, preserving these spaces as green infrastructure. This is likely to significantly limit the area available for development which should be restricted to land of higher elevation. In particular, low-lying land near the Wom Brook to the east of the site should be left undeveloped and surface water flow routes should be preserved and integrated into blue-green infrastructure.
- Safe access and egress will need to be demonstrated in the 1% AEP event plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Ideally, the access route should be situated 300mm above the designed flood level and waterproofing techniques should be used where necessary. Raising of access routes must not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.
- On site attenuation schemes would need to be tested to ensure flows are not exacerbated downstream within the catchment.
- Surface water should be discharged at the pre-development (greenfield) runoff rate which presents wider opportunities to improve biodiversity and amenity as well as climate change adaptation. An integrated flood risk management and sustainable drainage scheme for the site is advised.
- Developers should refer to Staffordshire County Council's SUDS Handbook and the Level 1 SFRA for information on SuDS for guidance on the information required by the LLFA from applicants to enable it to provide responses to planning applications.

Key messages

Despite areas of flood risk within the site, the majority of the site itself is at low risk of flooding and the principle of development can be supported by implementing practical schemes based on an appropriate understanding of the flood hazards. This will involve:

- The areas of greatest risk (namely the eastern area of the site adjacent the Wom Brook and known areas of surface water risk) are left undeveloped.
- Any proposal is accompanied by an overall Surface Water Management Masterplan and Strategy
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, with development to be steered away from the east of the site.
- Space for surface water to be stored on the site is provided and rainwater harvesting should be considered.

- A site-specific Flood Risk Assessment demonstrates that the site is not at an increased risk of flooding in the future as a result of climate change, and that the development of the site does not increase the risk of flooding both on the site and downstream.

Mapping Information

The key datasets used to make planning recommendations regarding this site were the broadscale 2D modelling outputs from the Environment Agency's Flood Map for Planning and the 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 Environment Agency's Flood Map for Planning mapping.
Climate change	Climate change uplifts have been applied to the Environment Agency's Risk of Flooding from Surface Water dataset for the 3.3% and 1% AEP scenarios. Climate change allowances have also been applied to the site-specific modelling undertaken as part of this assessment.
Fluvial depth, velocity and hazard mapping	Generalised 2D TUFLOW hydraulic models were built by JBA in May 2022 to inform the risk to sites as part of the Level 2 SFRA. Each model is comprised of a 2m DTM, material layers created from OS Vector mapping, upstream and downstream boundary conditions and a 2d_zsh line and elevation points representing the Wom Brook near the study area.
Surface Water	The Risk of Flooding from Surface Water map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The surface water depth, hazard and velocity mapping are taken from the Environment Agency's Risk of Flooding from Surface Water mapping.