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

Site details

Site Code	**SA-0119a**
Address	Land off Saredon Road, Cheslyn Hay / 397027, 307425
Area	2.88ha
Current land use	Greenfield
Proposed land use	Residential

Sources of flood risk

Location of the site within the catchment	The site is situated 6.5km east of the River Penk. The Staffordshire and Worcestershire Canal is located 5.6km to the west of the site, with the Hatherton Reservoir based 0.9km to the north-east.
Existing drainage features	Two ordinary watercourses drain the site- one flowing along the northwest boundary of the site and on flowing northwards across the site from the southern boundary to the northern corner. Additionally, there are a number of lakes and smaller waterbodies in the immediate area of the site.
Fluvial	**The proportion of site at risk (EA Flood Zones):** **FZ3 –** 0% **FZ2 –** 0% **FZ1 –** 100% **The proportion of site at risk (modelled outlines):** **3.3% –** 23.8% **1% –** 31.25% **0.1% –** 33.05% *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. The Flood Zones do not take account of the two unnamed watercourse flowing through the site and so to support the assessment generalised 2D modelling has been undertaken for the 2 unnamed ordinary watercourses flowing through the site. The percentages quoted above relate to Environment Agency Flood Zones and not the generalised modelling. **Flood characteristics:** From the generalised modelling data results, flooding is predicted to potentially affect a portion of the site in the 3.3%, 1% and 0.1% AEP events. For purposes of this assessment, the watercourses are referred to as Watercourse "A" (flowing along the northern boundary) and Watercourse "B" (crossing the site from southern boundary to northern corner). In the 3.3% AEP event, the generalised modelling suggests that a substantial part of the northern half of the site is affected by flooding from from Watercourse A, along with floodwater flows affecting the area west of Watercourse B, with approximately 24% of the site affected. However, predicted flood depths are generally very low (<0.2m) with the exception of a topographic depression where depths reach up to 1m. Hazard across the flooded area is generally very low, with the only areas of greater hazard classification 'caution' being the channel and the topographic depression.

	The predicted extent of flooding is not substantially greater in the 1% AEP event compared to the 3.3% AEP event. Predicted depths remain very low (up to 0.2m) across the flooded area (except the topographic depression), with velocities reaching up to 0.5m/s and hazard remaining 'caution' across the flooded area. In the 0.1% AEP event, again the predicted results using the generalised modelling suggest there is only minor increase in flood extent compared to the 1% AEP event. Depths remain low across most of the flooded area but reach up to 0.6m in areas of pooling along the northern boundary. Velocities reach up to 1.5m/s. Hazard remains very low across most of the flooded area, however, reaches up to 'danger for most' in the areas of deeper pooling. Given the significant extent of predicted flooding at the site by the generalised modelling (and referring to the flood extents described by the surface water mapping it is recommended that detailed modelling including channel survey will be essential to preparing appropriate development scheme proposals at the site. The generalised modelling results do not suggest that the predicted extents or depths of flooding that would suggest that the principle of development is not supported.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 3.6% Max depth: 0.6-0.9m Max velocity: 0.5-1m/s **1% AEP** – 7.0% Max depth: 0.9-1.2m Max velocity: 1-2m/s **0.1% AEP** – 18.8% 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:** The site is predicted to be affected by surface water flooding in all modelled events. In the 3.3% AEP event, risk to the site is generally low, with surface water pooling in two topographic depressions on the north and eastern borders. Maximum depths are between 0.6-0.9m, maximum velocities between 0.25-0.5m and maximum hazard 'danger for most'. In the 1% AEP event, surface water is predicted to form flow paths along the channels of the ordinary watercourse flowing through the site. A surface water flow also flows across the eastern corner of the site from Saredon Road towards the quarry north of the site. Depths are greatest in the topographic depressions, 0.6-0.9m, with velocities greatest in the flow path, up to 1.0-2.0m/s. Maximum hazard is 'danger for most' across the majority of the flooded area. In the 0.1% AEP event, the predicted extent of flooding expands significantly, with flow paths widening. Depths across the flooded area are generally low, but exceed 1.2m in the areas of pooling. Hazard is danger for most across much of the flooded area, with isolated areas where hazard is classified as 'danger for all'.
Reservoir	The Environment Agency reservoir flood risk extent online dataset provides insight into the extent of water inundation originating from reservoirs. The site is not shown to be at risk of flooding from reservoir sources.
Canals	There are no canals within the vicinity of the site that could pose a risk to the site in the event of a breach or overtopping event.
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. The site is shown to have a likelihood <25% of experiencing groundwater flooding in any given year.
Flood history	The site is not situated within the boundaries or in the immediate vicinity of historical flooding events
Flood risk management infrastructure	
Defences	The site is not protected by any formal flood defences.
Residual risk	There are no formal flood defences in the vicinity of the site that could pose a risk to the site in event of failure. There is a culvert underneath Saredon Road, which may pose a risk to the site if it were to become blocked. This should be investigated as part of a site-specific FRA.
Emergency planning	

Flood warning	The site does not lie within an Environment Agency Flood Warning Area or Flood Alert Area.
Access and egress	The site borders only on one main road, Saredon Road, providing access to the entire site. Access and egress is unlikely to be affected in the 0.1% AEP fluvial event. Saredon Road is affected by surface water flooding in the 1% and 0.1% AEP surface water events, and access/egress may be impeded. During the 1% AEP event, flood depths are low, below 0.1mm, however in the 0.1% AEP event, depths reach up to 0.3-0.6m. 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.
Climate change	
Implications for the site	• Central and Higher climate change allowances for the 3.3%, 1%, and 0.1% AEP fluvial events were run using the generalised modelling techniques as part of this assessment. The site is not predicted to be particularly sensitive to increased fluvial flows as a result of climate change, with flood extents and depths in the 3.3%, 1% and 0.1% AEP Higher scenarios being only slightly larger than the equivalent AEP present day event. • 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 significantly greater to the site in any modelled scenario. No new surface water flows occur and maximum depths on site reach up to 1m in the 1% AEP Higher Climate change scenario. • Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA. • The preservation of existing and predicted future surface water flow routes and storage volumes should be considered when preparing the layout and site scheme. • 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- Etruria Formation – Sandstone, and the Halesowen Formation – interbedded mudstone and sandstone.
	  ○ Superficial- N/A
	• Soils at the site consist of:
	  ○ Slightly acid loamy and clayey soils with impeded drainage.
	SuDS
	• The site is considered to have a 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. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the design of the surface water drainage system. Below ground development such as basements may not be appropriate at this site.
	• BGS data indicates that the underlying geology is a mixture of sandstone and mudstone which is likely to be of highly variable permeability; sandstone being permeable and mudstone is poorly draining. This should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.
	• The site is not located within a historic landfill site.
	• The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
	• 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. Predictions that the entire site lies outside of Flood Zone 2 and 3 suggest that the Exception Test is not required, however, given the two watercourses on the site and large modelled flood extents predicted by the generalised modelling performed it is recommended a precautionary approach is taken and the Exception Test applied. This will inform the safe design of development and enable the flood hazards to be identified at the appropriate level of detail.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • Whilst the site lies entirely outside of Flood Zones 2 and 3, a site-specific Flood Risk Assessment will be required due to the presence of two watercourses on the. Detailed modelling of these watercourses, including channel survey, should be undertaken as part of the FRA. • 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). • The development should be designed using a sequential approach. Development should be steered away from areas of flood risk along the north and east of the site, preserving these spaces as green infrastructure. This is likely to significantly limit the area available for development. In particular, low-lying land in the north 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. • Where buildings are situated in areas of flood risk, finished floor levels should be raised at least 300mm above the design flood level, including an allowance for freeboard. • 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 the predicted generalised modelling flood extents on the site, flood depths are likely to be very low and the principle of development can be supported by implementing practical schemes based on an appropriate understanding of the flood hazards. This will involve:

- Detailed modelling of the two watercourses shows that the site is not at significant risk from fluvial flooding and users of the site will not be at risk in future as a result of climate change.
- Preparation of 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.
- Demonstration of safe access and egress in the 1% AEP fluvial and surface water events including allowance for climate change.
- Raising of finished floor levels at least 300mm above the design flood level, including an allowance for freeboard at locations where flood risk is predicted.

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 watercourse through 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.