Black Country Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables	

Site details

Site Code	**SA-0519**
Address	Land East of Bilbrook, Lane Green / 388490, 302946
Area	37.8ha
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 along the River Penk, in the Greater Penk Rivers and Lakes catchment area, which passes at its closest approximately 70m south-east of the site area. It is located east of the Lane Green residential area of Bilbrook, with highway boundaries of Lane Green Road to the west, and Pendeford Mill Lane to the North.
Existing drainage features	The topography of the site shows that water is drains to the southeast of the site into a drainage channel and the River Penk. The Moat Brook flows east approximately 280m north of the site. The Shropshire Union Canal is located near to the eastern boundary.
Fluvial	**The proportion of site at risk:** **FZ3a –** 0.01% **FZ2 –** 0.1% **FZ1 –** 99.9% *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. **Flood characteristics:** Flood zones in the proximity of the site are associated with the drainage channel and river Penk which flows eastward near the southern boundary of the site. Flood zones 2 and 3a encroach into the site along this boundary. Modelling has not been undertaken at this site as part of this assessment, however the Environment Agency's Fluvial Flood Zones indicate that only the south-western corner of the site is at risk in the 0.1%AEP event, however the drainage channel is not included within the Flood Zones' outputs.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 0.3% Max depth: 0.6-0.9m Max velocity: 0.5-1m/s **1% AEP** – 1.3% Max depth: 0.6-0.9m Max velocity: 0.5-1m/s **0.1% AEP** – 5.6% Max depth: 0.9-1.2m Max velocity: 0.5-1m/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 shown to generally predicted to be at low risk from surface water flooding, although some small areas of risk are present in all events. In the 3.3% AEP event, there are three isolated areas of shallow ponding (<0.1m) ponding present on the eastern boundary, the north-eastern corner and the central corner near Lane Green. A deeper flow path (0.6-0.9m/0.9-1.2m) is predicted along the drainage channel in the south-western corner of the site. This has a maximum velocity of 1-2m/s though 0.25-0.5m/s is modelled as the most prevalent, with a maximum hazard of 'Dangerous for Some'. In the 1% AEP event, the predicted areas of ponding expand slightly, with additional ponding predicted near the central Lane Green pond and the north-eastern corner. Surface water flow forms are also predicted to be increasing along the southern boundary near the drainage channel that flow into the River Penk. Maximum depths and velocities remain 0.9-1.2m 1-2m/s. Maximum hazard is categorised as 'danger for some' along the drainage channel, and also within surface water flows along Lane Green Road that bounds the west of the site. In the 0.1% AEP event, the predicted extent of flooding increases, with a new surface water flows forming in the west of the site, and existing flow paths in the south encroaching further into the site. Maximum depths and velocities remain 0.9-1.2m 1-2m/s. Maximum hazard is increased to 'danger for all' along the drainage channel, and also at a large impounding shown downstream on the River Penk to the south-east of the site where the river passes beneath the Shropshire Union Canal.
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 reservoirs, however the wet flood extent reaches the northern border of the site along Pendeford Mill Lane.
Canals	The eastern boundary of the site is situated directly adjacent to the Shropshire Union Canal. Therefore, in the event of a canal breach, much of the site would be at strong risk of flooding.
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 sits across 3 1km grid squares. The northern half is deemed to be at medium-low risk, with a likelihood of flooding at >=25%<50% . The southern section and the western corner of the site are at less risk of flooding, with a likelihood of <25% groundwater flooding.
Sewers	The site does not appear to display any signs of critical drainage issues to be addressed.
Flood history	There are no records of historic flooding on or in the vicinity of the site.
Flood risk management infrastructure	
Defences	The site is not protected by any formal flood defences. The River Banks of the Moat Brook are classified as 'natural high ground' in the Environment Agency's AIMS dataset.
Residual risk	Impounding is a risk to the south of the site where the River Penk passes beneath the Shropshire Union Canal. This is already shown in the Risk of Flooding from Surface Water model however the risk may increase with climate change increases. The Shropshire Union Canal poses the risk of overtopping into the east of the site.
Emergency planning	
Flood warning	The 'River Sow and River Penk' Flood Alert Area crosses the southern border of the site along the un-named tributary. The site is not located within an Environment Agency Flood Warning Area.
Access and egress	Access and egress are possible via the three roads that bound the site; Lane Green Road to the west; Pendeford Mill Lane to the North; and Barnhurst Lane to the east. Access may be possible on foot via the residential areas of Marshall Way and Downie Road in Lane Green. The site is comprised of ~6 fields which are accessible through gates between each boundary. Fluvial flooding is unlikely to impede access or egress to the site from the west or north, however Flood Zones 2 and 3 do extend across Barnhurst Lane to the east where the River Penk passes beneath the highway and the canal, which may cause the route to be impeded during flood events. Surface water also impedes Barnhurst Lane at this location, with significant flooding modelled in the 1% and 0.1% AEP extents, as well as along the full length of Lane Green Road, and the majority of

	Pendeford Mil Lane, though this extent is less impactful. Access points near the north east corner of the site may also be affected by surface water ponding.
Climate change	
Implications for 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 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. • Developers should consider fluvial flood risk in the south of the site and the future implications of climate change • 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- Helsby Sandstone formation – sandstone, pebbly and gravelly.
	  ○ Superficial- Till and diamicton
	• Soils at the site consist of:
	  ○ In the north there is freely draining slightly acid loamy soils, and to the south soils are slowly permeable, seasonally wet slightly acid but base-rich loamy and clayey soils.
	SuDS
	• The site is considered to have a low susceptibility to groundwater. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. 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 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 a portion at the south of site lies within Flood Zone 2 and 3 and is slightly affected by surface water 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 slightly 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 along the south of the site, preserving these spaces as green infrastructure. This is unlikely to significantly limit the area available for development which should be restricted to land of higher elevation. In particular, low-lying land near the un-named watercourse in the south 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 southern boundary area around the un-named watercourse and known areas of surface water risk along the south and east) 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 south and 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 model outputs were not available for this site.
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.