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

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| **Site Code** | **SA-0646** |
| **Address** | Land to the West of ROF Featherstone, Coven Heath/ROF Featherstone / 391839, 305435 |
| **Area** | 54.3ha |
| **Current land use** | Greenfield |
| **Proposed land use** | Residential |

## Sources of flood risk

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| **Location of the site within the catchment** | The site is located on the west boundary of the Staffordshire and Worcestershire Union Canal, in the catchment of the River Penk, in the Greater Penk Rivers and Lakes catchment area. The site is approximately 6km to the North of Wolverhampton, in the town of Featherstone. The A460 passes by, 2.5km from the Eastern border of the site, with the town of Codsall located 5km to the South-West. The site is divided into two sections, a northern and a southern section, divided by an unnamed watercourse. |
| **Existing drainage features** | Topographical analysis of the site shows that water is drained via an unnamed watercourse, flowing westwards, between the two sections of the site, before joining with Watershead Brook 1km downstream. Mapping suggests that a watercourse exists in the northern portion of the site, near the existing industrial buildings, however a site visit found no evidence of this watercourse and is likely to represent a surface water flow route. |
| **Fluvial** | **The proportion of site at risk (EA Flood Zones):**<br>**FZ3 – 0.02%**<br>**FZ2 – 0.10%**<br>**FZ1 – 99.9 %**<br><br>**The proportion of site at risk (modelled outlines):**<br>**3.3% AEP – 0.24%**<br>**1% AEP – 0.33%**<br>**0.1% AEP – 0.43%**<br><br>*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.*<br><br>**Available data:**<br>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 unnamed watercourse to the south of the site. Percentages quoted above relate to Environment Agency Flood Zones.<br><br>**Flood characteristics:**<br>Flood zones in the proximity of the site are associated with the unnamed watercourse which flows westward between the northern and southern portions of the site. Flood zones border the site boundaries but do not cross into the site.<br>Generalised Modelling undertaken as part of this assessment indicates that the northern portion of the site is not at risk in the 0.1% AEP event. |

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| | In all modelled events, flooding occurs in the area of lower topography in the northern edge of the southern half of the site. In the 3.3% AEP event, flooding is constrained to the area in proximity to the two drainage ditches, with depths below 0.2m and velocities below 0.25m/s.<br>In the 1% AEP event, the area of flooding increases slightly, with depths reaching up to 0.2m away from the drainage ditches and up to 0.4 m in the ditches, with a maximum hazard of 'caution'. There is no significant increase in flood extent during the 0.1% AEP event, with depths and velocities remaining low and a maximum hazard classification of 'caution'. |
| **Surface Water** | **Proportion of site at risk (RoFfSW):**<br>**3.3% AEP** – 1.2%<br>Max depth: 0.6-0.9m<br>Max velocity: 0-0.25m/s<br>**1% AEP** – 1.8%<br>Max depth; 0.6-0.9m<br>Max velocity: – 0.5-1.00m/s<br>**0.1% AEP** – 5.8%<br>Max depth: 0.6-0.9m<br>Max velocity: 1-2m/s<br><br>*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 %)*<br><br>**Description of surface water flow paths:**<br>The site is predicted to generally be at low risk from surface water flooding, although areas of risk are present in all events. In the 3.3% AEP event, there are several isolated areas of shallow ponding (>0.6m) ponding present on the western boundary of the site, and an area of deeper ponding (0.6-0.9m) in the centre of the northern part of the site.<br>In the 1% AEP event, the predicted areas of ponding expand slightly and surface water flow forms travelling from the ponding in the centre of the northern site towards the western boundary. Predicted maximum depths remain 0.6-0.9m, with velocities up to 0.25-0.5m. Maximum hazard is categorised as 'danger for some' in the areas of deepest ponding.<br>In the 0.1% AEP event, the predicted extent of flooding increases, with a new surface water flow forming in the south of the site, although the majority of the site remains unaffected. Predicted maximum depths remain 0.6-0.9m, with a maximum hazard of 'danger for most' in the areas of deepest ponding. |
| **Reservoir** | The Environment Agency reservoir flood risk extent online dataset provides insight into the extent of water inundation originating from reservoirs.<br><br>The data shows that the site is not at risk of flooding from reservoirs. |
| **Canals** | The site is situated directly adjacent to the Staffordshire and Worcestershire Union Canal. However, the site is significantly elevated above the canal and is unlikely to be affected in the event of a breach or overtopping incident. |
| **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.<br><br>The site straddles several 1km grid squares. The north of the northern half and the south of the southern half are deemed to be at relatively low risk, with a likelihood of flooding at <25% in any given year. The central region between these two sections has greater risk with a likelihood to flood of between 50%-75% in any given year. |
| **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 banks of the river are classified as 'natural high ground' in the Environment Agency's AIMS dataset. |
| **Residual risk** | There are no defences in the vicinity of the site that could pose a risk to the site in event of a breach. There is the potential for the low lying area to the west of the site to be affected in the event of a breach from the canal, however the majority of the site is significantly elevated and would remain unaffected. |
| **Emergency planning** | |

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| **Flood warning** | The site is not located within an Environment Agency Flood Warning area. The 'River Sow and River Penk' Flood Alert area covers the region between the two halves of the site. |
| **Access and egress** | Access to the site is possible via two roads. Dark Lane and Brinsford Lane, which pass through the north and south halves respectively, in addition to the A449 passing along both site's west boundaries. Fluvial flooding is unlikely to impede access/egress to the site via the A449 during the 0.1% AEP event, although access to the east is likely to be impeded by flooding under the railway bridge ion all modelled scenarios. Similarly, access and egress via the A449 is unlikely to be affected in the 1% AEP surface water event, although flooding is likely to impede access via the railway bridge to the east. In the 0.1% AEP surface water event, Access via Dark Lane is likely to be affected by a surface water flow crossing the north half of the site. Access via the A449 may also be affected by flooding. |
| **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 as part of this assessment. As the site is a significant new development, the Upper End was also considered. The site is not shown to be at significant risk in the 0.1% AEP fluvial event in the Upper End climate change scenario.<br>• 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.<br>• The preservation of existing and predicted future surface water flow routes and storage volumes should be considered when preparing the layout and site scheme.<br>• Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.<br>• 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**<br>• Geology at the site consists of:<br>  ○ Bedrock- Helsby Sandstone formation in the south – sandstone, pebbles and gravels. In the north, Wildmoor sandstone.<br>  ○ Superficial- In the south glaciofluvial deposits of sand and gravel. In the north deposits are till and diamicton.<br>• Soils at the site consist of:<br>  ○ Slowly permeable seasonally wet, slightly acid but base-rich loamy and clayey soils.<br>**SuDS**<br>• The site is considered to have a moderate susceptibility to groundwater. 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.<br>• BGS data indicates that the underlying geology is sandstone and till which is likely to be with highly variable permeability. 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.<br>• The site is not located within a historic landfill site.<br>• 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.<br>• 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. |

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| | 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.<br>• 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.<br>• 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.<br>• 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.<br>• 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.<br>• Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.<br>• 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.<br>• 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.<br>Since the entire site lies outside of Flood Zone 2 and 3 the Exception Test is not required for fluvial flood risk, however, since the site is potentially affected by surface water flood risk an FRA should be prepared to address part “b” of the Exception Test. |
| **Requirements and guidance for site-specific Flood Risk Assessment** | **Flood Risk Assessment:**<br>• Whilst the site lies entirely outside of Flood Zones 2 and 3, a site-specific Flood Risk Assessment will be required as the site is greater than 1ha and the site is affected by surface water flood risk.<br>• 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.<br>• Consultation with the Local Authority and the Lead Local Flood Authority should be undertaken at an early stage.<br>**Guidance for site design and making development safe:**<br>• 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).<br>• As a large new development any proposal should be accompanied by an overall Surface Water Management Masterplan and Strategy. This should cover:<br>○ 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 |

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| | implement appropriate drainage sub catchments and specific runoff rate and volume requirements for each phase of the development.<br>○ 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.<br>○ 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.<br>○ 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).<br>○ 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.<br>○ The LLFA, Environment Agency and LPA should be consulted during the development of the Surface Water Management Masterplan and Strategy.<br><br>• 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 southern site portion should be left undeveloped and surface water flow routes should be preserved and integrated into blue-green infrastructure.<br>• 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.<br>• On site attenuation schemes would need to be tested to ensure flows are not exacerbated downstream within the catchment.<br>• 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.<br>• 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 close proximity to areas of flood risk, 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 northern area of the southern half of the suite adjacent the watercourse 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 north 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.

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| **Flood Zones** | Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning mapping. |

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| **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. |