Solihull Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment Flood Risk Assessment Detailed Site Summary Table

<table>
<tr><td rowspan="5">Site details</td><td>Site Code</td><td colspan="4">Site 26</td></tr>
<tr><td>Address</td><td colspan="4">South of Shirley</td></tr>
<tr><td>Area</td><td colspan="4">13.7 Hectares</td></tr>
<tr><td>Current Land Use</td><td colspan="4">Greenfield/Agricultural, Industrial & Residential</td></tr>
<tr><td>Proposed Land Use</td><td colspan="4">Residential</td></tr>
<tr><td rowspan="6">Sources of flood risk</td><td>Location of site within catchment</td><td colspan="4">The western portion of the site is located in the River Cole catchment and eastern portion of the site is located in the River Blythe catchment. An unnamed tributary of the River Cole is located approximately 200m west of the site and in addition, the Stratford-Upon-Avon canal is located to the south-west.</td></tr>
<tr><td>Existing drainage features</td><td colspan="4">There is an informal watercourse in the north western corner of the site that flows northwards from a pond towards Bills Lane. There is no visible connection at the downstream extent of this channel, and it is assumed that this channel fills up and spills on to Bills Lane during a flood event.</td></tr>
<tr><td rowspan="5">Fluvial</td><td colspan="4">Proportion of Site at Risk</td></tr>
<tr><td>FZ3b</td><td>FZ3a</td><td>FZ2</td><td>FZ1</td></tr>
<tr><td>1.26%</td><td>1.29%</td><td>1.31%</td><td>98.7%</td></tr>
<tr><td colspan="4">Highest Zone of Risk (Risk of Flooding from Rivers and Sea)</td></tr>
<tr><td colspan="4">Majority of site - Very Low
Northern Western Corner – Medium to High</td></tr>
<tr><td colspan="4">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%)</td></tr>
<tr><td colspan="4">Available Data:
As part of the Level 2 SFRA, 2D strategic modelling has been completed for the watercourses associated with this site using TUFLOW. Limitations of the strategic modelling are discussed in the SFRA Strategic Modelling Report and summarised in the Mapping Information section at the end of this table.
Survey data was collected for the informal channel in the north western corner of the site, but no downstream connections could be found. It is recommended more detailed investigations are undertaken as part of a future detailed site-specific assessment.
Flood Characteristics:
The strategic 2D modelling shows that that there are two fluvial flows paths in the north western corner of the site. As no downstream connection could be identified, it is assumed that the informal watercourse spills in a westerly direction from the upstream pond and the downstream extent along Bills Lane when channel capacity is reached.
Flood extents and depths in the 20, 100 and 1000 year flood events vary only slightly. Flooding could reach approximately 0.3 – 0.6m in depth around the pond and along the southern extent of Bills Lane. Depths in the westerly flow paths could reach 0.1m in depth during this event.</td></tr>
<tr><td rowspan="7">Surface Water</td><td colspan="4">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td colspan="2">30-year
High Risk</td><td>100-year
Medium Risk</td><td>1,000-year
Low Risk</td></tr>
<tr><td colspan="2">0.1%</td><td>0.7%</td><td>1.0%</td></tr>
<tr><td colspan="4">Max depths (m)</td></tr>
<tr><td colspan="2"><0.3m</td><td>0.3 – 0.9m</td><td>0.3 – 0.9m</td></tr>
<tr><td colspan="4">Max velocity (m/s)</td></tr>
<tr><td colspan="2"><0.25</td><td><0.25</td><td><0.25</td></tr>
<tr><td colspan="4">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 %).</td></tr>
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		Description of surface water flow paths: Surface water flooding across the site is minimal in all events. In the 30 year event, a single isolated area of surface water ponding with a depth of less than 0.3m is shown in the west of the site. In the 100 and 1000 year events, some additional surface water ponding is seen in the centre of the site and in the north western corner around the pond and informal watercourse. Depths could reach 0.3 – 0.9 in some isolated areas. In the 1000 year event, surface water flooding is also shown along Bills Lane to the north west and along the access road which runs from Bills Lane along the eastern site boundary providing access to Whitlock's End Farm.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Groundwater	The Environment Agency Areas Susceptible to Groundwater Flooding dataset, provided as 1km grid squares, shows the susceptibility of an area to groundwater flood emergence. The following comments can be made about groundwater flood risk: • The entirety of the site has a >= 50% <75% susceptibility to groundwater flood emergence from superficial deposits. This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site specific FRA stage.		
	Flood History	There are no records of historic flooding from the Environment Agency within the recorded flood outlines dataset or historic flooding dataset. Flood history information provided by SMBC and Severn Trent Water also shows no record of historic flooding on or around the vicinity the site.		
Flood risk management infrastructure	**Defences**	**Defence Type**	**Standard of Protection**	**Condition**
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Survey data was collected for the informal channel in the north western corner of the site, but no downstream connections could be found. The connectivity of the informal watercourse and any residual flood risk will require further assessment based on site topographical and asset survey at a site specific FRA stage.		
Emergency planning	**Flood warning**	The site is not covered by an Environment Agency Flood Warning or Alert area.		
	Access and Egress	The site is accessible from Bills Lane, which runs along the northern site boundary. There are also two existing roads on the site, both accessed from Bills Lane. The western unnamed road provides access to Woods Farm and the eastern unnamed road, which runs along the eastern site boundary, provides access to Whitlock's End Farm. Fluvial flooding is shown to impact Bills Lane to the west of the site in all flood events. However, as flood depths are not shown to exceed 0.1m along this flow path, access and egress along Bills Lan to the west is unlikely to be affected. The rest of Bills Lane along the norther extent and two access road are unaffected by fluvial flooding. In terms of surface water flood risk, Bills Lane and the associated access roads are unaffected in the 30 year event. In the 100 year event, several small and isolated areas of surface water flooding are seen along Bills Lane to the west, but flood depths are shown to be less than 0.3m in depth.		

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		In the 1000 year event, flooding is seen along an extended portion of Bills Lane to the west of the site and on the access road that runs along the eastern site boundary. Again, depths are shown to be less than 0.3m along the majority of the road network affected. The portion of Bills Lane that runs along the north site boundary and extends northwards is unaffected by both fluvial and surface water flooding. It is recommended that access and egress to and from the site is achieved by travelling northwards along Bills Lane. The depths, velocities, hazards, durations and speeds of onset of surface water and fluvial flooding along access/ egress routes should be investigated further in a site-specific assessment, to confirm whether access for emergency vehicles could still be obtained.
Climate Change	**Implications for the site**	• Increased storm intensity and frequency as a result of climate change may increase the extent, depth, velocity, hazard and frequency of fluvial flooding from the surrounded unnamed watercourse and surface water flooding across the site and access road to the north. • As part of the Level 2 SFRA, 2D strategic modelling has been completed for the watercourses surrounding this site using TUFLOW, including allowances for climate change. For the 1 in 100 year event, the 2080s period was used, and all three allowance categories were modelled (20%, 30% & 50%). In the northern western corner of the site, there is very little change in the 100 year flood extent when climate change allowances are applied suggesting that there is low sensitivity to climate change. • As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model, to confirm the impact in the site. • Climate change also needs to be considered for surface water events; at the site-specific stage. The 100-year event with a 40% allowance for climate change should be considered as part of surface water drainage strategies, or surface water modelling. • The current day 1,000-year surface water extent provides an indication of the likely increase in extent of the more frequent events. Surface water flood extents are likely to increase in extent slightly within the site boundary and along Bills Lane. This would require a detailed FRA to assess the site layout and design. • Developers should consider SuDS strategies to help manage the impacts of climate change from surface water in a detailed site-specific FRA.
Requirements for drainage control and impact mitigation	**Broad scale assessment of possible SuDS**	Geology at the site consists of: • Bedrock: o Northern Extent: Sidmouth Mudstone Formation o Southern Extent: Mercia Mudstone Group • Superficial: Till Soils at the site consist of slowly permeable seasonally wet acid loamy and clayey soils. The site is not located within an EA designated Source Protection Zone. The site is also not designated by the EA as previously being a landfill site. • Most source control techniques are likely to be suitable. Mapping suggests that permeable paving may have to use non-infiltrating systems given the possible risk from groundwater. • Infiltration may be suitable. Mapping suggests a medium risk of groundwater flooding and underlying soils may be permeable. Further site investigation should be carried out to assess potential for drainage by infiltration. If infiltration is suitable it should be avoided in areas where the depth to the water table is <1m.

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		• Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required to prevent the egress of groundwater. • All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater. • All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater. • Surface water from the site needs to be discharged offsite into a system with known downstream connectivity and the capacity to accept the rate and volume of runoff expected. There are concerns that the channel in the northwest has no downstream connectivity and therefore (subject to further investigation for a site level assessment) would not be a suitable location to discharge surface water to. • Site masterplans should be designed to ensure space is made for above ground SuDS features. • Developers should refer to Solihull Metropolitan Borough Council's **Guide to SuDS and Drainage in Solihull** document as well as the Level 1 SFRA, for information on suitable types of SuDS, the management train and opportunities and constraints in site master-planning.
NPPF and Planning Implications	**Exception Test Requirements**	The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be passed before the Exception Test is applied. Residential development is classified as 'More Vulnerable'. It is anticipated that proposed development will be sequentially located outside Flood Zone 3. As the northern western portion of the site is contained within Flood Zone 3 and the site is proposed for residential development, the Exception test will need to be applied if: • More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. • Highly Vulnerable infrastructure is not be permitted within FZ3a and FZ3b. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.
	Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • At the planning application stage, a site-specific Flood Risk Assessment will be required if any development is located within Flood Zones 2 or 3 or is greater than one hectare. • The site-specific FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Solihull Council's Local Plan policies, and the LLFA's **Guide to SuDS and Drainage in Solihull**. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • All sources of flooding, particularly the risk from fluvial, surface water and groundwater flooding, should be considered as part of a site-specific flood risk assessment. • A detailed hydraulic model will be required to confirm both fluvial and surface water flood risk and flow paths, FZ3b and climate change extents, using channel, asset and topographic survey. The connectivity of the informal watercourse and any residual flood risk will require further assessment based on site topographical and asset survey at the site specific FRA stage.

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		• The development should be designed using a sequential approach. Development should be steered away from areas of fluvial flood risk and surface water flow routes, preserving these spaces as green infrastructure. Development must be in line with Table 3: flood risk vulnerability and flood zone compatibility of the NPPG. • Development in FZ3b should be avoided unless appropriate use can be demonstrated in line with NPPF. • Development in FZ3 may require floodplain compensation and this should be confirmed with the EA at FRA 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). • Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk. • Resilience measures will be required if buildings are situated at flood risk. Raising Finished Floor Levels above the 100 year event with allowance for climate change may remove the need for resilience measures. • The downstream connectivity of the informal watercourse needs to be fully assessed. • Culverting should be avoided where at all possible and limited to short lengths for essential infrastructure. The need to ensure both fluvial and surface water flows can pass through the site is essential. • Deculverting of any watercourse assets is also considered a priority. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond current greenfield rates. • **Areas at risk from fluvial and surface water flooding should ideally be integrated into green infrastructure, 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.** This needs to be modelled to inform the design to ensure that surface water overland flows or fluvial flooding do not overwhelm sustainable drainage features. • New developments should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Surface water runoff must be fully attenuated to the greenfield rate. • Developers should refer to **SMBC's Guide to SuDS and Drainage in Solihull** and the Level 1 SFRA for background information on SuDS.

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Key Messages		The flood risk element of the Exception Test is likely to be passed if: • New development is limited to the 98.7% of the site located within fluvial Flood Zone 1. • Areas in Flood Zone 1 and then 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. • If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another). • An integrated flood risk management and sustainable drainage solution is implemented. • The **Solihull Feasibility Study** (AECOM, December 2020) identifies the importance of increased flood storage for flood risk management in the River Cole Corridor. There is therefore an opportunity for betterment at this site in terms of increased flood storage, contributing towards the wider strategy for the River Cole catchment. Developers should take account of this and demonstrate to the Council how the development of their site contributes towards the wider flood storage needs in the River Cole catchment. • New developments should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Surface water runoff must be fully attenuated to the greenfield rate. • The site is accessed from Bills Lane. There are areas of both fluvial and surface water flood risk along this road to the west of the site but the area of road directly to the north of the site has a much lower risk. Travel northwards on Bills Lane to and from the site is preferable in terms of access and egress in flood conditions. • A suitable location to discharge surface water from the development can be found. If no watercourse can be found, then water should be discharged to the nearest surface water or combined (in order of preference) sewer if infiltration is not possible. The strategic data suggests that infiltration SuDS may be challenging for this site, but this needs to be confirmed by ground investigation to inform the site level assessment. Refer to the detailed 'guidance for developers' section for further information on the measures that are appropriate for this site.

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Mapping Information

The key datasets used to make planning recommendations regarding this site were the strategic 2D modelling outputs 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 strategic 2D modelling completed as part of the Level 2 SFRA. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk. Survey data was collected for the informal channel in the north western corner of the site, but no downstream connections could be found. It is recommended that this is reviewed as part of a future detailed site-specific assessment.
Climate change	Climate change was modelled as part of Level 2 SFRA strategic 2D modelling. However, it is recommended that the latest EA's climate change allowances are modelled in a detailed hydraulic model as part of a site-specific Flood Risk Assessment.
Fluvial depth, velocity and hazard mapping	Fluvial depth, velocity and hazard mapping has been taken from the strategic 2D modelling completed as part of the Level 2 SFRA. This should be explored further at site-specific stage.
Surface Water	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The surface water depth, velocity and hazard mapping for the 1 in 100-year event (considered to be medium risk) is taken Environment Agency's Risk of Flooding from Surface Water.