Shropshire Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables

<table>
<tr><td rowspan="5">Site details</td><td>Site Code</td><td colspan="5">WEM033</td></tr>
<tr><td>Address</td><td colspan="5">Hill House Farm, Wem</td></tr>
<tr><td>Area</td><td colspan="5">2.99 hectares</td></tr>
<tr><td>Current land use</td><td colspan="5">Greenfield</td></tr>
<tr><td>Proposed land use</td><td colspan="5">Residential</td></tr>
<tr><td rowspan="11">Sources of flood risk</td><td>Location of site within catchment</td><td colspan="5">The site is located on an unnamed ordinary watercourse in the upper catchment of the River Roden approximately 3.5km upstream of the confluence of the River Roden and the Soulton Brook. The site lies on sloping topography with higher ground to the south, west and north sloping downwards to the east.</td></tr>
<tr><td>Existing drainage features</td><td colspan="5">An unnamed watercourse flows from high ground to the north of the site, turning to flow east following the northern and eastern boundary of the site and diverting away from the site in the southeast corner. This watercourse is unmodelled.</td></tr>
<tr><td rowspan="6">Fluvial</td><td colspan="5">Proportion of site at risk</td></tr>
<tr><td>FZ3b</td><td colspan="2">FZ3a</td><td>FZ2</td><td>FZ1</td></tr>
<tr><td>0%</td><td colspan="2">0%</td><td>0%</td><td>100%</td></tr>
<tr><td colspan="5">Highest zone of risk (Risk of Flooding from Rivers and Sea)</td></tr>
<tr><td colspan="5">N/A</td></tr>
<tr><td colspan="5">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="5">Available data:
There is no Flood Zone generalised mapping at the site as the catchment is smaller than 3km^2.
Flood characteristics:
The site is not situated within the Environment Agency’s fluvial Flood Zones 2 or 3. Similarly, the site is not covered by the Risk of Flooding from Rivers and Sea dataset. However, this does not mean there is no fluvial risk, as the watercourse along the site’s northern and eastern boundary remains unmodelled due to its small catchment size so fluvial risk from this watercourse is largely unknown. Runoff is likely to be rapid given the site’s location in the foothills of a watershed. The surface water mapping will therefore provide an indication at this strategic scale.</td></tr>
<tr><td rowspan="7">Surface Water</td><td colspan="4">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td>30-year</td><td colspan="2">100-year</td><td>1,000-year</td></tr>
<tr><td><1%</td><td colspan="2">4%</td><td>17%</td></tr>
<tr><td colspan="4">Max depths (m)</td></tr>
<tr><td><0.3</td><td colspan="2"><0.3</td><td>0.3-0.9</td></tr>
<tr><td colspan="4">Max velocity (m/s)</td></tr>
<tr><td><0.25</td><td colspan="2">>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>
</table>

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	Address	Hill House Farm, Wem		
	Area	2.99 hectares		
	Current land use	Greenfield		
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		Description of surface water flow paths: This site is impacted by surface water flooding in the 100-year and 1,000-year events. The Environment Agency's Risk of Flooding from Surface Water mapping shows the presence of a surface water flow path in the 100-year and 1,000-year events which crosses the centre of the site, flowing southeast from the northern boundary to the eastern boundary. This flow route follows an area of low-lying topography through the site and originates from the unnamed watercourse as it meets the northern site boundary. This flow path spreads laterally southward along the watercourse at the eastern boundary in the 1,000-year event.		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	The site is not covered by the Environment Agency's historic flood map.		
Flood risk management infrastructure	**Defences**	**Defence Type**	**Standard of Protection**	**Condition**
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	Approximately 350m downstream of the site, the unnamed watercourse passes through a culvert underneath the railway embankment. If this structure were to become blocked water could potentially back up along existing surface water flood routes, reaching the site and increasing the risk of surface water flooding in its low-lying eastern area. This is deemed low risk given the distance from the site and lower-lying topography to the east of the site which would fill first.		
Emergency planning	**Flood warning**	The site is not covered by the Environment Agency's Flood Warning or Flood Alert Service.		
	Access and egress	Safe access and egress to the site can be gained during all surface water flooding events at the western boundary of the site via Whitchurch Road. Although there are parts of this road that are inundated by surface water ponding during all surface water events, the maximum depth estimated in the 1,000-year event is 0.3m so it is likely that emergency vehicles will be able to gain access. Consideration should be given to the north-eastern portion of the site where surface water extents bisect the site. There is minimal information regarding the hazard of fluvial flooding for access and egress to this site. 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.		

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Climate Change	**Implications for the site**	• Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. • The impacts of fluvial flood risk and the resulting impacts of climate change should be considered in a site-specific FRA using a detailed hydraulic model. The site is currently located outside the Flood Zones due to its small catchment size and hence the 1,000-year surface water extent will need to be used to infer climate change impacts at the strategic scale. • Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% climate change event is considered as part of surface water drainage strategies, or surface water modelling. • The current day 1,000-year surface water flooding extent provides an indication of the likely increase in extent of the more frequent events as a result of climate change. At this site, the surface water flow path steered by the local topography through the centre of the site will extend laterally, inundating larger areas of the site particularly as it spreads southwards at the eastern boundary. This would require a detailed FRA to assess the site layout and design. • Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.
Cumulative Impact of development within the catchment	**Level of risk**	**Catchment** / **Level of risk** Soulton Brook / Low The Soulton Brook catchment, a sub-catchment of the River Roden, has been identified as one with a low sensitivity to the cumulative impact of development within the catchment.
	Recommendations	N/A

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Requirements for drainage control and impact mitigation	**Broad scale assessment of possible SuDS**	• Geology at the site consists of:
		  ○ Bedrock: Lias Group - Mudstone.
		  ○ Superficial: Glaciofluvial Deposits – Sand and Gravel.
		• The site is not located within any Environment Agency designated Source Protection Zone.
		• 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.
		• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.
		• Detention features may be feasible provided site slopes are < 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.
		• Filtration systems are probably suitable provided site slopes are <5% and the depth to the water table is >1m. 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.
		• The site is not designated by the Environment Agency as previously being a landfill site.
		• Developers should refer to Shropshire Council's 'Surface Water Management: Interim Guidance for Developers' and 'SuDS requirements for new developments' webpage 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.

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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 recommended that proposed development will be sequentially located within Flood Zone 1 areas in the site away from the channel and surface water flow path. 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 should 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. • All sources of flooding, particularly the risk of surface water and groundwater flooding, should be considered as part of a site-specific flood risk assessment. • A more detailed hydraulic model will be required at Flood Risk Assessment stage, to confirm flood risk, FZ3b and climate change extents, using channel topographic survey. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Shropshire Council's Local Plan policies, and the LLFA's 'Surface Water Management: Interim Guidance for Developers' and 'SuDS requirements for new developments' webpage. • Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage. • 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 in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • 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 placing 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 the current greenfield rates. • On site attenuation schemes would need to be tested against the unnamed watercourse to ensure flows are not exacerbated downstream within the catchment. • New or re-development 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. Ideally, surface water runoff should be fully attenuated to the greenfield rate.

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		• Developers should refer to Shropshire Council's 'Surface Water Management: Interim Guidance for Developers' and 'SuDS requirements for new developments' webpage, and the Level 1 SFRA for information on SuDS.
		• New development must seek opportunities to reduce overall level of flood risk at the site, for example by:
		  ○ Reducing volume and rate of runoff
		  ○ Relocating development to zones with lower flood risk
		  ○ Creating space for flooding.
		• Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development.

Key messages		The flood risk element of the Exception Test is likely to be passed if: • Development is limited to the 83% of the site outside of the Risk of Flooding from Surface Water zones. It should be noted that surface water flood risk bisects the site and therefore consideration is needed regarding access to the north-eastern portion of the site. • 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). • Space for green infrastructure should be considered in the areas of highest flood risk. • Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.

Mapping Information

The key datasets used to make planning recommendations regarding this site was the Environment Agency's Risk of Flooding from Surface Water mapping. More details regarding data used for this assessment can be found below.

Flood Zones	There is no Flood Zone data available at the site. The 2D modelling that delineates Flood Zones 2 and 3 covers watercourse catchments that exceed 3km^2. It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.
Climate change	Climate change was based on the 1,000-year surface water event to serve as an indication of the potential increase in the extent of the 100-year surface water event as a result of climate change. 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	There is no available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. 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.

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Surface water depth, velocity and hazard mapping		The surface water depth, velocity and hazard mapping for the 1 in 30-year (high risk), 1 in 100-year (medium risk) and 1 in 1000-year (low risk) events is taken from the Environment Agency's Risk of Flooding from Surface Water mapping.