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="5">Site 8</td></tr>
<tr><td>Address</td><td colspan="5">Hampton Road</td></tr>
<tr><td>Area</td><td colspan="5">Northern Site – 9.2 Ha Southern Site – 1.6 Ha</td></tr>
<tr><td>Current Land Use</td><td colspan="5">Greenfield/Agricultural & Recreational</td></tr>
<tr><td>Proposed Land Use</td><td colspan="5">Residential</td></tr>
<tr><td rowspan="4">Sources of flood risk</td><td>Location of site within catchment</td><td colspan="5">Site 8, which is made up of two individual portions of land, is located in the River Blythe catchment. The larger of the two sites is in close proximity to the Purnell’s Brook, a tributary of the River Blythe. Its confluence with the River Blythe is approximately 900m downstream of the site.</td></tr>
<tr><td>Existing drainage features</td><td colspan="5">The Purnell’s Brook flows in a north easterly direction along the north western extent of the larger site. This watercourse is then culverted under the Grand Union Canal approximately 250m downstream of the site before joining the River Blythe. Upstream, approximately 400m of the Purnell’s Brook is culverted between Warwick Road (A4141) and the western corner of the larger site.
The smaller of the two sites, located to the south of the larger site, is approximately 400m to the south east of the Purnell’s Brook and there is an unnamed tributary of the River Blythe approximately 200m to the east.</td></tr>
<tr><td rowspan="3">Fluvial</td><td colspan="5">Proportion of Site at Risk</td></tr>
<tr><td>Site</td><td>FZ3b</td><td>FZ3a</td><td>FZ2</td><td>FZ1</td></tr>
<tr><td>Northern</td><td>0.4%</td><td>0.5%</td><td>2.1%</td><td>97.4%</td></tr>
<tr><td>Southern</td><td>0%</td><td>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">Smaller Southern Site - Very Low
Larger Northern Site - Medium to High along the Purnell’s Brook</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:
As part of the Level 2 SFRA, 2D strategic modelling has been completed for the Purnell’s Brook 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, including upstream and downstream culvert dimensions and invert levels, were collected for the culvert upstream of the northern site. This data has been incorporated into the strategic model.
Flood Characteristics:
The strategic 2D modelling shows that the north western portion of the larger northern site is at fluvial flood risk from the Purnell’s Brook. Fluvial flooding associated with the Purnell’s Brook is narrow in extent and closely follows the watercourse along the north western site boundary.
The southern smaller site is not affected by fluvial flooding.
The 20, 100 and 1000 year flood extents are broadly similar within the site boundary, however the 1000 year extent is wider downstream towards the northern site corner.
In the 20 and 100 year event, flood depths are modelled to reach 0.1 – 0.5m around the watercourse with depths of 0.5 – 1.0m within the channel adjacent to the western site corner.
In the 1000 year event, flood depths increase as the watercourse travels north eastwards across the site and could reach up to 1.5m at the downstream extent, adjacent to the north eastern site boundary.
Although survey has been collected for the upstream face of culverts within the model domain, no information is available regarding the exact route of the culverts. It is recommended that this is reviewed as part of a future detailed site-specific assessment.</td></tr>
</table>

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	Surface Water	**Proportion of site at risk (RoFfSW)**

Site	30-year High Risk	100-year Medium Risk	1,000-year Low Risk
Northern	0.2%	0.8%	5.6%
Southern	<0.1%	<0.1%	<1.0%
Max depths (m)			
Northern	0.3 – 0.9m	0.3 – 0.9m	> 0.9
Southern	N/A	N/A	N/A
Max velocity (m/s)			
Northern	>0.25	>0.25	>0.25
Southern	N/A	N/A	N/A

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:

No surface water flooding is seen on the smaller southern site in the 30 and 100 year events, however flooding is seen on Hampton Road along the western boundary of the site. In the 1000 year event, a very small area of surface water flooding is seen in the western corner of the site, associated with flooding on Hampton Road to the west and Wooton Close to the south.

On the larger norther site, surface water flow paths follow the route of the Purnell's Brook along the north western site boundary and hence the mapping is likely to be picking up its natural floodplain.

In the 30 year event, disjointed surface water flooding is shown along the watercourse with depths largely below 0.3m. There are some isolated areas where depths are shown to be between 0.3 – 0.9m.

In the 100 year event, flood extents are similar to the 30 year event, but larger areas are shown to be between 0.3 – 0.9m in depth, especially in the northern site corner.

In the 1000 year event, surface water flood extents are wider, and a significant portion of the north western site boundary is shown to be affected by surface water flooding that is greater than 0.9m in depth.

In the 100 and 1000 year events, a surface water flow path is seen along Chantry Heath Crescent to the south west of the site. Flooding is also seen on Alveston Grove which runs parallel to the culverted watercourse upstream of the site.

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: • Both sites have a < 25% 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.

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	Flood History	There are no records of historic flooding from the Environment Agency within the recorded flood outlines dataset or historic flooding dataset. No historic flooding has been recorded by SMBC in the vicinity of the sites. The Severn Trent Water historic flood incidents dataset shows that flooding has been recorded on Hampton Road at the junction with Arden Valley Road to the west of the smaller southern site. Flooding on the road and curtilage was recorded in 1997, 1998 and 2014. The Canal and River Trust have identified no overtopping events on the Grand Union Canal in the vicinity of the site. However, in 1997, a breach event was recorded when a farmer excavated to toe of the embankment where the Purnell's Brook flows under the canal to the north of the site, inducing a 65m slope failure.		
Flood risk management infrastructure	**Defences**	**Defence Type**	**Standard of Protection**	**Condition**
		-	-	-
		This site is not protected by any formal flood defences. However, the Environment Agency spatial flood defences dataset (AIMS data) shows that there is raised ground located along the left and right banks of the Purnell's Brook through and downstream of the site to the River Blythe. The raised ground along the Purnell's Brook is likely to act as an informal flood defence. Survey and assessment of these banks is required as part of a site specific FRA to determine the standard of protection they provide, if any.		
	Residual risk	Upstream of the larger northern site there is culvert under Warwick Road (A4141) that extends approximately 400mm to the western site corner. There is also a culvert in the centre of the site and approximately 250m downstream of the site where the watercourse flows under the Grand Union Canal. JScreen, culvert blockage modelling software, was used in 2016 to look at the impact of culvert blockages on flood risk across the site. In the unblocked scenario, flood extents are smaller than in the updated strategic 2D modelling completed for this Level 2 SFRA. However, in the blocked scenario, flood extents are broadly similar to the updated strategic modelling. The risk of culvert blockage needs 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	Access and egress is unlikely to be affected by affected by fluvial flooding. The northern site can be accessed by Hampton Road which runs along the entirety of the eastern site boundary. The cul-de-sac Alveston Grove, located adjacent to the western site corner, could also provide access to the site. In terms of surface water flood risk, Hampton Road to the east of the northern site is unaffected by flooding. There is some flooding shown on this road to the south in all events. In the 30 year event this is shown to be less than 0.3m in depth and is therefore unlikely to affect access and egress. In the 100 and 1000 year events, flooding on this round could be 0.3 – 0.9m in depth which could affected southwards travel on Hampton Road from the site. The western corner of the site, adjacent to Alveston Grove, is shown to be affected by surface water flooding in all events. In the 30, 100 and 1000 year events, flood depths are shown to be between 0.3 – 0.9m. Alveston Road itself is only affected in the 100 and 100 year events, with flooding shown to be less than 0.3m in depth. As a result of this, it is recommended that the north site is accessed from Hampton Road, rather than Alveston Grove. The southern site can be accessed from Hampton Road, which runs along the western site boundary or from Wooton Close. There is a junction adjacent to the western site corner where Wooton Close can be accessed from Hampton Road.		

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		In terms of surface water flood risk, Hampton Road to the west of the site is affected by flooding in all events. In the 30 year event, a small and isolated area of surface water flooding is shown to the north of the junction, with depths of less than 0.3m. In the 100 year event, flood extents are greater on Hampton Road and are now shown across the junction between Wooton Close and Hampton Road. Flood depths could reach between 0.3 and 0.9m in depth north of the junction, but crucially depths are shown to be less than 0.3m across the junction itself which are unlikely to impact access and egress. In the 1000 year event, flooding along Hampton Road and Wooton Close is more extensive, but again flood depths are shown to be less than 0.3m across the road junction. It is recommended that the site is accessed from Wooton Close to the south, rather than further up the western boundary from Hampton Close where surface water flood risk is greater and may impact access and egress. 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 Purnell's Brook, and surface water flooding on the site. • As part of the Level 2 SFRA, 2D strategic modelling has been completed for the watercourses covering 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%). Within the site boundary, 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. Downstream of the site, flood extents are wider when the climate change allowances are applied. • 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. It is likely that surface water flooding along the Purnell's Brook will be more extensive as a result of climate change. Flooding along Hampton Road may also increase in extent and depth in some areas. The impact of climate change on surface water flood risk will require a detailed FRA to assess the site layout and design. • Developers should consider SuDS strategies to manage the impacts of climate change from surface water in a detailed site-specific FRA.

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Requirements for drainage control and impact mitigation	**Broad scale assessment of possible SuDS**	Geology at the site consists of:
		Northern Site
		• Bedrock:
		  o Southern Band: Sidmouth Mudstone Formation
		  o Central Band: Branscombe Mudstone Formation
		  o Northern Band: Saltford Shale Member – Mudstone
		• Superficial: Partial coverage of Glaciofluvial Deposits - Sand & Gravel
		Southern Site
		• Bedrock: Branscombe Mudstone Formation
		• Superficial: Glaciofluvial Deposits - Sand And Gravel
		Soils across the sites consist of loamy soils with naturally high groundwater. 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.
		• All forms of source control are likely to be suitable on the southern site. On the northern site, mapping suggests that slopes may be unsuitable for selective source control techniques.
		• Infiltration likely to be suitable. Mapping suggests a low risk of groundwater flooding. However, soil types suggest that infiltration may not be suitable. Site investigations should be carried out to assess potential for drainage by infiltration.
		• On the southern site, mapping suggests that the site slopes are suitable for all forms of detention. On the northern site, this option is unlikely to be feasible as mapping suggests mean site slopes are > 5%. Feasibility of such options should be assessed as part of a site specific assessment. If this feature is feasible a liner maybe required to prevent the egress of groundwater.
		• On the southern site, all filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required. On the northern site this option is unlikely to be feasible as mapping suggests mean site slopes are > 5%. Feasibility of such options should be assessed as part of a site specific assessment. If this feature is feasible it should be located where the depth to the water table is >1m.
		• All forms of conveyance are likely to be suitable. On the northern site where the slopes are >5%, features should follow contours or utilise check dams to slow flows.
		• 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.

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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 anticipated that proposed development will be sequentially located outside Flood Zone 3. As the northern site is located adjacent to the Purnell's Brook and is at risk form fluvial flooding and residential development is proposed, 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 it 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 of 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 residual risk from culvert blockage should be assessed and suitable mitigation proposed. • 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

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		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. • 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 impact of culvert blockage needs to be fully assessed. Any new culverts proposed as part of access improvements will need to be designed to ensure they do not increase flood risk up or downstream and will require a Land Drainage Consent outside of the planning process from the LLFA. • For any culverts (old or new), the developer must set out who is adopting and maintaining those culverts throughout the lifetime of the development. The design of the development must consider the residual risk of blockage e.g. properties should not be placed in the area that could flood if a culvert blocks and the exceedance flows from such an event should be built into the site masterplan. • 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 on the brownfield areas of the site 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: • Development is limited to the 97.4% of the northern site located outside of the Environment Agency's Flood Zone 2 and 3. • 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) • Space for green infrastructure should be considered in the areas of highest flood risk. • 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. • Safe access and egress routes must not be in the areas of high surface water risk or the 100-year fluvial design flood event (taking into account climate change). The northern site would be best accessed from Hampton Road to the east. The southern site would be best accessed from Wooton Close to the south, rather than further up the western boundary from Hampton Close where surface water flood risk is greater and may impact access and egress. Refer to the detailed 'guidance for developers' section 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 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. Although survey has been collected for the upstream face of culverts within the model domain, no information was available for their exact route. It is recommended that this is reviewed as part of a future detailed site-specific assessment. JScreen, culvert blockage modelling software, was used in 2016 to look at the impact of culvert blockages on flood risk across the site.
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.