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 17</td></tr>
<tr><td>Address</td><td colspan="4">Moat Lane, Vulcan Road</td></tr>
<tr><td>Area</td><td colspan="4">3 Hectares</td></tr>
<tr><td>Current Land Use</td><td colspan="4">Industrial</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 site is currently used as a Solihull Metropolitan Borough Council Depot north of Moat Late in Lode Heath. The site is accessed from Moat Lane to the south. There are two existing access roads from Moat Lane.
The site is in the Hatchford Brook catchment but is not in close proximity to any watercourses. The nearest watercourse is the unnamed watercourse located approximately 500m to the north west. The unnamed watercourse joins the Hatchford Brook approximately 2km north of the site. The Hatchford Brook confluence with the River Cole is a further 4km north of the site.
The Grand Union Canal is located approximately 150m to the north east.</td></tr>
<tr><td>Existing drainage features</td><td colspan="4">The site is not in close proximity to any watercourses and there are no drainage features within the site boundary. The Grand Union Canal is located approximately 150m to the north east of the site.</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>0%</td><td>0%</td><td>0%</td><td>100%</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</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 1 SFRA, broadscale 2D modelling was completed for watercourses within the Borough using JFlow.
This broadscale modelling dataset has not been incorporated into the Environment Agency’s Flood for Planning and as a result, flood extents vary between the two datasets.
This site is located in Fluvial Flood Zone 1 in both the broadscale 2D modelling dataset and the Environment Agency’s Flood for Planning dataset and has a less than 1 in 1000 year annual probability of fluvial flooding.
Flood Characteristics:
The upstream extent of the broadscale 2D modelling on the unnamed watercourse does not extend to the portion of watercourse north west of the site. However, it is unlikely that fluvial flood risk from this watercourse would impact the site. The site is located entirely in Flood Zone 1 and has a less than 1 in 1,000 annual probability of fluvial flooding (<0.1% AEP).</td></tr>
<tr><td rowspan="7">Surface Water</td><td colspan="4">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td>30-year
High Risk</td><td colspan="2">100-year
Medium Risk</td><td>1,000-year
Low Risk</td></tr>
<tr><td>10.6%</td><td colspan="2">14.3%</td><td>28.4%</td></tr>
<tr><td colspan="4">Max depths (m)</td></tr>
<tr><td>>0.9m</td><td colspan="2">>0.9m</td><td>>0.9m</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>
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		Description of surface water flow paths: There is a significant surface water flow path that runs directly through the centre of the site. Surface water flooding is modelled on Lode Lane to the west and Moat Lane to the south. The flow path follows the existing access road network in the southern portion of the site and extends up into the northern portion of the site. Surface water flooding is also predicted on Wharf Lane to the east and along the Grand Union Canal. In the 30 year event, flooding affects the existing eastern access road from Moat Lane, the western site road and the existing building in the north of the site. Flood depths are greatest (0.3m – 0.9m) in the west of the site and shallower (<0.3m) across the eastern access road. In the 100 and 1000 year events, flooding is modelled on both the eastern and western access roads from Moat Lane. There is significant surface water pooling around the existing site road and the western portion of the site and flood extents are greater in the north of the site. In both the 100 year and the 1000 year, flood depths are still greatest in the western and northern portions of the site with lower depths seen on the access roads and Moat Lane. However, in the 1000 year event, flood depths could reach 0.3 to 0.9m on Moat Lane where the site is accessed from.		
	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 majority of the site has a >= 25% <50% susceptibility to groundwater flood emergence from superficial deposits. • The northern boundary 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 also shows no record of historic flooding on the site. Two flood incidents were recorded around the Moat Lane area to the south of the site. Both flood incidents were recorded in September 1998.		
Flood risk management infrastructure	**Defences**	**Defence Type**	**Standard of Protection**	**Condition**
		-	-	-
		This site is not protected by any formal flood defences.		
	Residual risk	There is no residual risk to the site from flood risk management structures.		

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Emergency planning	**Flood warning**	The site is not contained within an Environment Agency Flood Alert area.
	Access and Egress	The site is bounded by Lode Lane to the west, Vulcan Road to the north, Wharf Lane to the east and Moat Lane to the South. Currently the site is accessed by two parallel access roads from Moat Lane, one for access and one for egress. Moat Lane joins Lode Lane (B425) to the west which provides access to Solihull Bypass (A41) to the south. Solihull Bypass can also be reached at the eastern end of Moat Lane to the south east of the site. In the 30 year surface water flood event, there is a small amount of surface water flooding modelled on the sites eastern access road and across Moat Lane. However, flood extents are limited, and flood depths are likely to be less than 0.3m so access and egress shouldn't be significantly affected. In the 100 year event, flood extents are marginally greater across both access roads and Moat Lane. However, flood depths are still likely to be less than 0.3m so access and egress are unlikely to be significantly affected. In the 1000 year event, flood depths of less than 0.3m can be expected on both access roads and Moat Lane. However, areas of Moat Lane, particularly directly south of the access location, could see flood depths of 0.3 to 0.9m which could affect site 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 intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of surface water flooding. • 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 is 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. This would require a detailed FRA to assess the site layout and design. In the 1000 year event, surface water flood extents are greater within the site and along Moat Lane, particularly to the west towards Lode Lane. Flood depths during this event are largely less than 0.3m but there are areas of Moat Lane where depths could more regularly reach 0.3 to 0.9m which could impact site access and egress. Preferential access to the site would be in the south-eastern corner of the site, to the east of the surface water flow path across Moat Lane. • Developers should consider SuDS strategies to reduce 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: • Bedrock - Sidmouth Mudstone Formation - Mudstone • Superficial – None Recorded. However, Glaciofluvial Deposits - Sand and Gravel are located to the east and south of the site. Soils at the site consist of: • Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils The site is not designated by the Environment Agency as previously being a landfill site. 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. • 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. If the site has contamination issues; a liner will be required. • Mapping suggests that the site slopes are suitable for all forms of detention in the southern portion of the site. A liner maybe required to prevent the egress of groundwater. Slopes are steeper in the northern portion of the site, which may make the use of detention unsuitable. Feasibility of such options should be assessed as part of a site specific assessment. • All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater. Slopes are steeper in the northern portion of the site, which may make the use of infiltration unsuitable. Feasibility of such options should be assessed as part of a site specific assessment. • 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 design of the SuDS system for this site needs to be carefully considered to ensure it is not overwhelmed by overland surface water runoff. • Drainage strategies should demonstrate that an appropriate number of treatment stages have been delivered. This depends on the factors such as the type of development, primary source of runoff and likelihood of contamination. Guidance should be sought from LLFA and other guidance documents such as the CIRIA SuDS Manual (C753). • 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'. 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. No part of the site is within the national Flood Zones that show river flooding in the Borough. However, there is a significant risk of surface water flooding that must be considered further to ensure the development can be made safe from flooding and that it will not increase flood risk elsewhere.
	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 for this site, should be considered as part of a site-specific flood risk assessment. • The site-specific FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance and 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. • The development should be designed using a sequential approach. Development should be steered away from 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. **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 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. • 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.

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		• 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 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.** It is essential that a detailed model of surface water flooding, using the existing drainage system, topographical and asset survey is constructed at the FRA stage. This will determine the risk from surface water flooding further and to ensure that overland flows do not overwhelm future 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. This should include allowance for climate change. • 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. • Developers should refer to SMBC's **Guide to SuDS and Drainage in Solihull** and the Level 1 SFRA for information on SuDS.
Key Messages		• As the site is entirely located within Flood Zone 1, the Exception Test does not need to be applied. However, there is a significant risk of surface water flooding that must be considered further to ensure the development can be made safe from flooding and that it will not increase flood risk elsewhere. • Given the degree of surface water flood risk and the location of the surface water flow path as it transects the site it is likely that the density of the development may need to be lower than other sites at lower flood risk to make space for water. • It is essential that a detailed model of surface water flooding and the existing drainage system using topographical and asset survey to constructed at the FRA stage to determine the risk from surface water flooding further and to ensure that surface water overland flows do not overwhelm proposed 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. • Safe access and egress needs to be outside of the areas of surface water flood risk to the west of the site. Preferential access to the site would be in the south-eastern corner of the site, to the east of the surface water flow path across Moat Lane. 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 was 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 broadscale 2D modelling completed as part of the Level 1 SFRA. However, the site is located entirely is Flood Zone 1 and is not in close proximity to any watercourses.
Climate change	Climate change was modelled as part of the Level 1 SFRA broadscale 2D modelling. However, the site is located entirely is Flood Zone 1 and is not in close proximity to any watercourses.
Fluvial depth, velocity and hazard mapping	Fluvial depth, velocity and hazard mapping has been taken from the broadscale 2D modelling completed as part of the Level 1 SFRA. However, the site is located entirely is Flood Zone 1 and is not in close proximity to any watercourses.
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.