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 20</td></tr>
<tr><td>Address</td><td colspan="4">Land at Damson Parkway</td></tr>
<tr><td>Area</td><td colspan="4">95 Hectares</td></tr>
<tr><td>Current Land Use</td><td colspan="4">Greenfield/Agricultural, Commercial</td></tr>
<tr><td>Proposed Land Use</td><td colspan="4">Employment</td></tr>
<tr><td rowspan="11">Sources of flood risk</td><td>Location of site within catchment</td><td colspan="4">The site is contained within the River Cole catchment. The Low Brook, which is a tributary of the Kingshurst Brook and subsequently the River Cole, flows along the eastern site boundary.</td></tr>
<tr><td>Existing drainage features</td><td colspan="4">The Low Brook, which is a main river, flows in a northerly direction along the eastern boundary of the site and under the A45 Coventry Road which runs along the northern site boundary. The Low Brook flows into the Kinghurst Brook approximately 3km north of the site before joining the River Cole.
There is a small watercourse located to the north of Gables Close on the eastern boundary. This watercourse is around 120m in length and flows into Low Brook.
Between 2012 and 2014, the runway and Birmingham Airport was extended. During this process, Coventry Road (A45) which runs along the northern site boundary was diverted along with the Low Brook. The Low Brook downstream of the site now flows eastwards along the southern extent of Coventry Road and is culverted under the road approximately 300m east of the site.</td></tr>
<tr><td rowspan="9">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>3.2%</td><td>4.3%</td><td>6.1%</td><td>93.9%</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
Eastern boundary along the Low Brook – 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 Low 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.
Flood Characteristics:
The strategic 2D modelling shows that fluvial flooding could impact the eastern site boundary along the Low Brook. The majority of the site however is unaffected by fluvial flooding and access and egress is unimpeded.
In the 20 year event, the eastern site boundary to the north and south of Gables Close is modelled to be at flood risk. Modelling shows that flood depths could reach approximately 0.3 – 0.6m in depth at the northern end of the eastern site boundary and 0.6 - 0.9m in the southern corner around Hampton Coppice.
In the 100 year event, flood extents are greater to the north and south of Gables Close. Flood depths could reach 0.9 – 1.2m at the northern end of the eastern site boundary but remain around 0.6 - 0.9m in the southern corner.
In the 1000 year event, flood extents to the south are similar to the 100 year event. In the north, especially adjacent to Gables Close, flooding extends further westwards into the site. In this event, flood depths greater than 1.2m are more extensive at the northern end of the eastern site boundary.
There has been significant works relating to the Low Brook in the vicinity of the A45 as part of extension of the Birmingham City Airport. Unfortunately, these works have not been captured by the latest available LIDAR (collected in 2008) and as such there is uncertainty on the current floodplain levels. To improve confidence in the strategic modelling, invert levels for channel adjacent to the realigned A45 and the culvert passing under if have been extracted from the hydraulic model used for the FRA in 2007.</td></tr>
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<tr><td rowspan="11"></td><td></td><td colspan="3">Although the FRA for the works has been utilised to improve some of the modelling assumptions, it is recommended that this is reviewed in further detail as part of a future detailed site-specific assessment given the significant length of time since the FRA model was developed and also due to the inaccuracies in the datasets informing the floodplain ground levels.</td></tr>
<tr><td rowspan="9">Surface Water</td><td colspan="3">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td>30-year
High Risk</td><td>100-year
Medium Risk</td><td>1,000-year
Low Risk</td></tr>
<tr><td>1.1%</td><td>2.1%</td><td>7.0%</td></tr>
<tr><td colspan="3">Max depths (m)</td></tr>
<tr><td>0.3 - 0.9m</td><td>0.3 - 0.9m</td><td>>0.9m</td></tr>
<tr><td colspan="3">Max velocity (m/s)</td></tr>
<tr><td>>0.25m/s</td><td>>0.25m/s</td><td>>0.25m/s</td></tr>
<tr><td colspan="3">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>
<tr><td colspan="3">Description of surface water flow paths:
The main area at risk of surface water flooding is located around the Low Brook, which runs along the eastern boundary of the site. Surface water flooding is modelled all events, with the extents increasing in the 100 and 1000 year events. It is likely that the surface water mapping is picking up the flood plain of the Low Brook along the eastern site boundary.
In the 30 year event, small areas of isolated surface water pooling are seen along the Low Brook and at the central road junction between Old Damson Lane and Damson Parkway.
In the 100 year event and particularly the 1000 year event, surface water flooding is more extensive along the eastern Low Brook. In these events, flooding is also modelled along Damson Parkway and Old Damson Road within the site. Roads surrounding the site, such as Coventry Road to the north and Damson Parkway to the south are also affected by surface water flooding which may impact access and egress. Additional isolated areas of surface water pooling are seen in the larger events, scattered across the site.</td></tr>
<tr><td>Reservoir</td><td colspan="3">The site is not shown to be at risk of reservoir flooding from the available online maps.</td></tr>
<tr><td>Groundwater</td><td colspan="3">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 entire site has 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.</td></tr>
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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. Flood history information provided by SMBC also shows no record of historic flooding on the site, although there are several recorded flood events just to the south of the site in Kendal Grove and Waldeve Grove. No flood incidents were recorded in the vicinity of the site by Severn Trent Water.		
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 on the left and right banks of the Low Brook to the north east of the site. The identified raised on the Low Brook may act as an informal flood defence on the site. Survey and assessment of these banks would be required as part of a site specific FRA to determine the standard of protection they provide (if any).		
	Residual risk	Residual risk could occur when the Low Brook enters a culvert under Coventry Road approximately 300m downstream of the site to the east. The watercourse was diverted and culverted under the road between 2012 and 2014 as part of the runway extension at Birmingham Airport. Although the FRA for the works has been utilised to improve some of the modelling assumptions, it is recommended that this is reviewed in detail as part of a future detailed site-specific assessment.		
Emergency planning	**Flood warning**	The Environment Agency West Midlands River Cole Flood Alert area (033WAF301) extends around the Low Brook in a small portion of the north east of the site. This alert covers low-lying land and roads between Majors Green and Coleshill.		
	Access and Egress	The site is bounded by Coventry Road (A45) which runs along the northern boundary and Damson Parkway which runs along the southern boundary. Damson Parkway extends northwards through the centre of the site to Coventry Road. Old Damson Lane is also located in the northern portion of the site, providing access from Coventry Road. There is a junction between Damson Parkway and Old Damson Lane in the centre of the site. Access and egress to the site is unlikely to be affected by fluvial flooding. This is because flooding associated with the Low Brook is only located along the eastern site boundary where the site currently isn't accessible. In terms of surface water flood risk, Coventry Road, Damson Parkway and Old Damson Lane are all affected to different extents by surface water flooding. In the 30 year event, surface water flooding is seen on Coventry Road, outside the north western corner of the site. Flood depths could reach 0.3 to 0.9m here. In the centre of the site, there is a small area of surface water ponding on the junction between Damson Parkway and Old Damson Lane. Surface water flooding is also seen to extend southwards along Damson Parkway in the southern portion of the site. Flooding in both locations is modelled to reach depths of 0.3 to 0.9m. In the 100 year event, some surface water flooding is also seen along Damson Parkway and Old Damson Lane in the north of the site, but flood depths are modelled to be less than 0.3m. Flood extents and depths at the central road junction and along Damson Parkway along the southern boundary are not significantly greater than in the 30 year event.		

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		In the 1000 year event, flooding on Coventry Road is modelled to be more extensive and could reach depths of greater than 0.9m. In the north of the site, flooding along Damson Parkway is more extensive, but depths remain less than 0.3m. On Old Damson Road, depths could be between 0.3 to 0.9m in isolated areas. Surface water flooding extends further along Damson Parkway, south of the central road junction, where larger areas could see surface water pooling of 0.3 to 0.9m in depth. Flood extents with depths of 0.3 to 0.9m along the southern boundary of the site are also modelled to be more extensive. To the south, access and egress via Damson Lane is preferred over Damson Parkway as flooding is isolated and shallow in depth on this road. To the north, access and egress towards Coventry Road is preferred as surface water flooding is only of concern travelling westwards. This is most suitable via Damson Parkway rather than the smaller Old Damson Lane. The site cannot be accessed via Old Damson Parkway, only egress to Coventry Road can occur. 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 Low Brook and surface water flooding across the site. • As part of the Level 2 SFRA, 2D strategic modelling has been completed for the Low Brook 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 the Low Brook is not sensitive to climate change in this location. • 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. 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: Sidmouth Mudstone Formation - Mudstone • Superficial: There are no recorded superficial deposits on 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 located within an EA designated Source Protection Zone. Adjacent to the eastern boundary of the site, there is an area of land designated by the Environment Agency as being a landfill site, a small part of which just falls within the site boundary A thorough ground investigation will be required as part of a detailed FRA to determine contamination extent and the impact this may have on SuDS. As such proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and EA) at an early stage to understand constraints.

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		• All forms of source control are likely to be suitable. • Infiltration likely to be suitable. Mapping suggests a low risk of ground water flooding however, site investigations should be carried out to assess potential for drainage by infiltration. • Mapping suggests that the site slopes are suitable for all forms of detention. However, additional assessment may be required on the steeper slopes each site of the Low Brook. • All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required. • 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. If the site has contamination issues; a liner will be required. • 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. Commercial development is classified as 'Less Vulnerable'. Fluvial flooding is only modelled along the eastern site boundary. Therefore, the Exception Test will only 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 of 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.

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	Requirements and guidance for site-specific Flood Risk Assessment	**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. • 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. • As the Low Brook is classified as a Main River, an Environmental Permit will be required from the Environment Agency. • 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. • It is important that the capacity of the new downstream drainage network through the airport is understood

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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 93.9% of the site located outside of the Environment Agency's Flood Zone 2 and 3. This means that development along the eastern site boundary should be avoided. • Areas in Flood Zone 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. • 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. • Access and egress from the site is unaffected from Damson Parkway and Damson Lane to the south of the site and Coventry Road via Damson Parkway to the north during the 100 year design event (considering climate change). As a result of surface water flood risk on the access roads, it is preferential to either use Damson Lane to the south or travel eastwards on Coventry Road along the northern boundary. 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. In terms of the strategic fluvial modelling, there has been significant works relating to the Low Brook in the vicinity of the A45 as part of extension of the Birmingham City Airport. Unfortunately, these works have not been captured by the latest available LIDAR (collected in 2008) and as such there is uncertainty on the current floodplain levels. To improve confidence in the strategic modelling, invert levels for channel adjacent to the realigned A45 and the culvert passing under if have been extracted from the hydraulic model used for the FRA in 2007. Although the FRA for the works has been utilised to improve some of the modelling assumptions, it is recommended that this is reviewed in further detail as part of a future detailed site-specific assessment given the significant length of time since the FRA model was developed and also due to the inaccuracies in the datasets informing the floodplain ground levels.
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.