Welwyn Hatfield 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="4">Cuf15</td></tr>
<tr><td>Address</td><td colspan="4">King George V</td></tr>
<tr><td>Area</td><td colspan="4">10.57ha</td></tr>
<tr><td>Current land use</td><td colspan="4">Greenfield</td></tr>
<tr><td>Proposed land use</td><td colspan="4">Residential</td></tr>
<tr><td rowspan="13">Sources of flood risk</td><td>Existing drainage features</td><td colspan="4">The Hempshill Brook flows along the southern boundary of the site until its confluence with the Northaw Brook, which continues along the southern boundary. An unnamed drain flowing towards the Northaw Brook cuts through the east of the site in a southerly direction.</td></tr>
<tr><td rowspan="12">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>7%</td><td>8%</td><td>10%</td><td>90%</td></tr>
<tr><td colspan="4">Max depths (m) (out of bank)</td></tr>
<tr><td>0.20</td><td>0.34</td><td>0.44</td><td>n/a</td></tr>
<tr><td colspan="4">Max velocity (m/s) (out of bank)</td></tr>
<tr><td>0.68</td><td>0.82</td><td>1.07</td><td>n/a</td></tr>
<tr><td colspan="4">Max hazard rating (out of bank)</td></tr>
<tr><td>Very low</td><td>Danger for some</td><td>Danger for some</td><td>n/a</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:
2D generalised modelling has been undertaken for the SFRA for the Hempshill Brook in 2015, and this has been used to assess flood risk. The Northaw Brook has not been modelled but is represented by the EA's Flood Zones. A more detailed model of the channel using survey would need to be undertaken at site-specific stage.
Flood characteristics:
The southern boundary of the site is within FZ3 and FZ2 of the Hempshill and Northaw Brooks, with FZ2 extending a little further into the site than FZ3. The south-west of the site is most impacted by the Flood Zones, parallel to the watercourse. The Northaw Brook joins the Hempshill Brook at the site boundary.
Outside of the river channel on the interactive mapping, the maximum hazard rating in the 100-year event is predominantly 'Very low hazard'; there are isolated cells of 'Danger for some/ most' but this is where the channel is captured along the site's boundary, which has been excluded from the analysis as it would be expected that the channel is deep/ high hazard. Velocities are high near the channel and where the flood extent follows low topography at the very north-western corner. Flood depths are highest at the southern boundary of the site, and in the middle of the flood extents where topography is lowest (0.5-1.0m). Developers should steer development away from the southern edge of the site where it is bounded by the watercourse, where the risk is highest.</td></tr>
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<tr><td rowspan="11"></td><td rowspan="11">Surface Water</td><td colspan="3">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td>30-year</td><td>100-year</td><td>1,000-year</td></tr>
<tr><td>10%</td><td>14%</td><td>28%</td></tr>
<tr><td colspan="3">Max depths (m) (out of bank)</td></tr>
<tr><td>0.3-0.6</td><td>0.6-0.9</td><td>>1.2</td></tr>
<tr><td colspan="3">Max velocity (m/s) (out of bank)</td></tr>
<tr><td>1.0-2.0</td><td>1.0-2.0</td><td>>2.0</td></tr>
<tr><td colspan="3">Max hazard rating (out of bank)</td></tr>
<tr><td>Danger for most</td><td>Danger for most</td><td>Danger for all</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 %). The % given are indicative only and more detailed work to refine this at a site-specific scale may be required.</td></tr>
<tr><td colspan="3">Description of surface water flow paths:
The surface water flooding that affects the site is shown to follow the topographic flow paths of the Hempshill and Northaw Brooks. The 1,000-year event does intersect the site in the west, to the south of Wells Farm. The 30-year event encroaches the south-western edge of the site more than in the south-east. Two topographic flow paths route surface water in a southerly direction through the site towards the watercourses, following small drains or topographic depressions.
Outside of the river channel, looking at the 100-year surface water event in the interactive mapping, velocities are quite high at 1.0-2.0m/s, largely in the vicinity of the channel floodplain along the southern edge of the site. water follows a topographic flow path in a south-easterly direction. The deepest area of the surface water extent is in the far south-eastern corner of the site (0.6-0.9m), as well as in the middle of the surface water extents where topography levels are lowest.
Hazard is ‘Danger for most’ in the south-eastern corner of the site, and in small pockets of the larger flood extent in the north-west of the site. There is ‘Danger to all’ along the channel edge. Developers should steer development away from the southern edge of the site where risk is greatest.</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>Flood history</td><td colspan="3">The Environment Agency’s historic flood map shows no history of flooding at the site.</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Defences</td><td>Defence Type</td><td>Standard of Protection</td><td>Condition</td></tr>
<tr><td>-</td><td>-</td><td>-</td></tr>
</table>

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	Address	King George V
	Area	10.57ha
	Current land use	Greenfield
	Proposed land use	Residential
Flood risk management infrastructure		This site is not protected by any formal flood defences.
	Residual risk	-
Emergency planning	**Flood warning**	The site is covered by the EA's Flood Warning Service via a Flood Alert Area, but not a Flood Warning Area.
	Access and egress	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. There is approximately a 125m boundary along Northaw Road East and the most western edge of the site. Dry access and egress via Northaw Road East to the west of the site is available in all fluvial and surface water events along approximately 60m of this boundary (to the east of the watercourse where risk is higher). As a large area of the site is located away from existing roads, it is unknown at this stage whether further access routes would be made available, for example from the northern site boundary, given the railway line to the east and the watercourse to the south. Access/ egress should consider risk where surface water flow routes intersect the site. Consideration could be given to developing a community flood plan for sites Cuf14, Cuf15 and Cuf16.
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 fluvial extents from 2D climate change modelling (100-year +20%) did not increase significantly when compared with FZ2 and FZ3; FZ2 remains the largest extent. Climate change impacts should be investigated at the site as part of a site-specific assessment, using detailed hydraulic modelling. • Climate change also needs to be considered for surface water events; at the site-specific stage, the 100-year +40% event is considered as part of surface water drainage strategies, or surface water modelling. • The current day 1,000-year 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 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: Lambeth Group and Thames Group; Clay, Gravel, Sand and Silt.
		  ○ No superficial geology at the site.
		• The site is not located within a Groundwater Source Protection Zone.
		• Source control techniques are likely to be suitable for this site.
		• Infiltration is 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.
		• Detention features may be feasible providing site slopes are <5% at the location of the detention feature. If groundwater is a risk to the site, then a liner may be required to mitigate against potential contamination issues.
		• Filtration systems are probably suitable providing site slopes are <5% and the depth to the water table is >1m. If the site is at risk from groundwater, then a liner will be required.
		• All forms of conveyance features are likely to be suitable. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.
		• The site is not designated by the Environment Agency as previously being a landfill site.
		• Developers should refer to Hertfordshire County Council's SuDS Design Guidance and SuDS Policy Statement, 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 and Exception Test document (November 2019) provides the detail on how this has been undertaken and can be found on the Local Authority website. 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 within Flood Zone 1. 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.

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	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. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Welwyn Hatfield Council's Local Plan policies, and the LLFA's SUDS guidance and Policy Statement. • 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. Residential development is not acceptable in FZ3b; only water compatible and essential infrastructure, subject to the Sequential and Exception Test. • Development in FZ3 may require floodplain compensation and this should be confirmed with the EA at FRA stage. • Where flood risk is represented by 2D generalised models, this is a broadscale representation and risk should be confirmed at the site by the developer as part of a site-specific FRA; this may require detailed hydraulic modelling using channel and structure topographic survey, to confirm Flood Zones and climate change extents. **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 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.
		• Developers should refer to Hertfordshire County Council's SuDS Design Guidance, SuDS Policy Statement 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 and consider using Flood Zones 2 and 3 as public open space.

Mapping Information		
Flood Zones		Flood Zones 2 and 3 have been taken from the 2D generalised modelling undertaken for the SFRA (2015-2016). The extents may vary slightly from the original Environment Agency's Flood Map for Planning Flood Zones (shown in the L1 SFRA), due to more recent ground level data or hydrology being used.
Climate change		Climate change modelling was taken from modelled 2D generalised Jflow extents. The mapping provides a strategic assessment of climate change risk – developers should undertake detailed modelling of climate change allowances as part of a site-specific FRA.
Fluvial depth, velocity and hazard mapping		Depth, velocity and hazard mapping for the 1 in 100-year event have been taken from 2D generalised modelling techniques.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding. This dataset is not suitable for identifying whether an individual property will flood. It is based on the confidence in the modelling at that location; because of the way the mapping has been produced and is indicative, the maps are not appropriate to act as the 'sole evidence' for any specific planning or regulatory decision or assessment of risk in relation to flooding without further supporting studies or evidence. Please consult all layers and outputs provided on the RoFfSW mapping for further details.
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.