

# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH352</b>																						
	<b>Address</b>	21 Garendon Road, LE12 9NU																						
	<b>Area</b>	0.30 ha																						
	<b>Current land use</b>	Residential																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> <ul style="list-style-type: none"> <li>The site is generally flat, with a slope from west to east.</li> <li>There are a number of existing buildings across the site and which have affected localised filtering of the LIDAR data.</li> <li>The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	There are no existing drainage features within the site boundaries; however, an ordinary watercourse flows adjacent to the site's eastern boundary.																						
	<b>Fluvial</b>	<table border="1"> <thead> <tr> <th colspan="4"><b>Proportion of site at risk</b></th> </tr> <tr> <th><b>FZ3b</b></th> <th><b>FZ3a</b></th> <th><b>FZ2</b></th> <th><b>FZ1</b></th> </tr> </thead> <tbody> <tr> <td>0%</td> <td>0%</td> <td>0%</td> <td>100%</td> </tr> <tr> <th colspan="4"><b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b></th> </tr> <tr> <td colspan="4">N/A</td> </tr> </tbody> </table> <p><i>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%)</i></p>				<b>Proportion of site at risk</b>				<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>	0%	0%	0%	100%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				N/A		
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<b>Surface Water</b>	<p><b>Available data:</b> The site is covered by the Environment Agency's Flood Map for Planning which uses 2D generalised modelling data. At the site, there is no Flood Zone extent present due to the catchment area of the unmodelled watercourse to the east being &lt;3km<sup>2</sup>.</p> <p><b>Flood characteristics:</b> The Environment Agency's Flood Map for Planning shows the site to be located within Flood Zone 1. This does not mean there is no fluvial risk present at the site as there is an ordinary watercourse which flows along the east site boundary, which is culverted several times along its reach. Fluvial risk at the site is therefore unknown and needs to be confirmed at a detailed site-specific stage.</p> <p>Using surface water extents, the location of the watercourse is shown to convey surface water flow routes and suggests out of bank flooding can occur when this happens. It is therefore recommended that a more detailed hydraulic model is constructed at the site-specific flood risk assessment stage, to confirm fluvial flood risk to the site.</p>			
	<b>Proportion of site at risk (RoFfSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	2%	4%	32%	
	Max depths (m)			
	0.9-1.2	0.9-1.2	>1.2	
	Max velocity (m/s)			
	0.25-0.5	0.5-1	1-2	
<p><i>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 %)</i></p>				

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		<p><b>Description of surface water flow paths:</b>                      There are surface water flow paths in the eastern section of the site, for all events, due to water converging towards the watercourse that flows next to/forms the boundary for the site here. The extent of these flows reaches further west into the site for the 1,000-year event. Further surface water flow paths cause accumulation in the northern section of the site adjacent to Garendon road. Depths are shown to be high as it is catching the channel to the east.</p> <p>RoFFSW takes account of building footprints so the flood risk may be affected by existing buildings on the site. It also only considers flood risk where the hazard rating is greater than 0.575.</p>		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the site is located within a 1 km grid square where <math>\geq 25\%</math> <math>&lt; 50\%</math> of the area is predicted to be at risk of groundwater flooding.</p> <p>The AStGWF data should be used only in combination with other information, for example local data or historical data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist. Ground investigations may be required at the site.</p>		
	<b>Reservoir</b>	The site is not shown to be at risk of reservoir flooding from the available <a href="#">online</a> maps.		
	<b>Flood history</b>	<p>There are no records of historic flooding at this site from the Environment Agency. No recorded historical flood incidents occurred within 900m of the proposed development site.</p> <p>Leicestershire County Council may hold additional records which are not available at this time. These records detail historical flood incidents from all sources, whereas the Environment Agency dataset only records incidents of fluvial, tidal or coastal flooding. The Lead Local Flood Authority should be contacted to obtain further details.</p>		
<b>Flood risk management</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		N/A	N/A	N/A
		This site is not protected by any formal flood defences.		

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<b>infrastructure</b>	<b>Residual risk</b>	The unmodelled watercourse along the eastern boundary is culverted shortly downstream (north) of the site. If this were to become blocked, it could pose a risk to the site and this needs to be investigated further at FRA stage.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is not situated within an Environment Agency Flood Warning or Flood Alert area.
	<b>Access and egress</b>	<p>Dry safe access and egress could be available for the site during all fluvial events and the 30-year surface water event via Garendon Road. Wet safe access and egress could also be available for the same route for the surface water 100-year and 1,000-year events. This is due to the hazard rating of flood waters in this location being between 0.50 and 0.75 which is considered safe for evacuation purposes and emergency services vehicles.</p> <p>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.</p>

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<b>Climate Change</b>	<b>Implications for the site</b>	<ul style="list-style-type: none"> <li>Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding.</li> <li>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.</li> <li>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.</li> <li>Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.</li> </ul>
<b>Requirements for drainage control and impact mitigation</b>	<b>Bedrock Geology</b>	The entire site's bedrock geology consists of mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The site is underlain by River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	<b>Soils</b>	Slightly acid loamy and clayey soils with impeded drainage.
	<b>Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.

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	<b>Broad scale assessment of possible SuDS</b>	<p>Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.</p> <p>Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take into account the impacts of future climate change over the projected lifetime of the development.</p> <p>Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible opportunities and constraints.</p> <p>The following techniques are considered suitable for the site:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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 &lt;1m.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required to prevent the egress of groundwater.</li> <li>• All filtration techniques are likely to be suitable. A liner maybe required to prevent the egress of groundwater.</li> <li>• All forms of conveyance are likely to be suitable. Where the slopes are &gt;5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater.</li> </ul>

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<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>The Local Authority have carried out the Sequential Test in line with national guidance. The Sequential Test will need to be satisfied based on fluvial and other sources of flood risk before the Exception Test is applied. Residential development is classified as 'More Vulnerable'.</p> <p>It is recommendation that proposed development will be sequentially located within Flood Zone 1 areas of the site, which may need to be confirmed through a site-specific assessment and detailed modelling.</p> <p>The Exception test will need to be applied if:</p> <ul style="list-style-type: none"> <li>• More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2.</li> <li>• Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b.</li> <li>• More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b.</li> </ul> <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> <li>• Highly vulnerable development within FZ3a.</li> <li>• Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b.</li> </ul>

**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 for this site as development may be subject to sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - contain land which has been identified by the Environment Agency as having critical drainage problems; or
  - contain land identified in the strategic flood risk assessment as being at increased flood risk in future.
- Other sources of flooding must be considered as part of any site-specific Flood Risk Assessment, including surface water and groundwater.
- Consideration should be given to the potential effects of climate change, particularly with respect to surface water. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development.
- A more detailed hydraulic model may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the eastern drain, using channel topographic survey.
- Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk.
- Where there is a reasonable likelihood of multiple sources of flood risk having significant impact in combination it is recommended that consideration is given to assessing the combined risks of these.
- Any FRA should be carried out in line with the National Planning Policy Framework, Flood Risk and Coastal Change Planning Practice Guidance, Charnwood Council's Local Plan policies and the LLFA's SuDS guidance.
- 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.

**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.



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		<ul style="list-style-type: none"> <li>• 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.</li> <li>• On site attenuation schemes would need to be tested against the watercourse to ensure flows are not exacerbated downstream within the catchment.</li> <li>• 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.</li> <li>• New development must seek opportunities to reduce overall level of flood risk at the site, for example by: <ul style="list-style-type: none"> <li>○ Reducing volume and rate of runoff</li> <li>○ Relocating development to zones with lower flood risk</li> <li>○ Creating space for flooding.</li> </ul> </li> <li>• All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff.</li> <li>• SuDS should be designed to deliver multiple benefits including water quality, biodiversity, amenity, green infrastructure etc. Example features include swales, attenuation features, green roofs, rainwater capture and reuse and permeable paving.</li> <li>• Green infrastructure should be considered within the mitigation measures for surface water runoff from potential development and consider using areas of high fluvial or surface water flood risk as public open space.</li> <li>• Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk.</li> </ul>

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<b>Key messages</b>	<p>The flood risk element of the Exception Test is likely to be passed if:</p> <ul style="list-style-type: none"> <li>• Development is limited to the 88% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered towards the western side of the site.</li> <li>• 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).</li> <li>• Detailed hydraulic modelling may need to be conducted for the watercourse along the eastern boundary to assess the present and future fluvial risk to the site.</li> <li>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> </ul> <p>Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.</p>	
<b>Mapping Information</b>		
<p>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.</p>		
<b>Flood Zones</b>	<p>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<sup>2</sup>. The Environment Agency's Flood Map for Planning shows the site to be located within Flood Zone 1. It is recommended that a detailed hydraulic model is constructed at the site-specific flood risk assessment stage, to confirm flood risk from the drain to the east</p>	
<b>Climate change</b>	<p>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.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>There is no risk at the site although this should be explored further at site-specific stage with more detailed modelling.</p>	
<b>Surface Water</b>	<p>The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.</p>	

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<b>Surface water depth, velocity and hazard mapping</b>		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 1,000-year (low risk) events is taken from the Environment Agency's Risk of Flooding from Surface Water mapping.