

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH69</b>			
	<b>Address</b>	Land south east of Syston			
	<b>Area</b>	64.35 ha			
	<b>Current land use</b>	Greenfield			
	<b>Proposed land use</b>	Residential			
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site varies in topography with a high elevation area located to the north west corner of the site and the north east corners of the site. Two topographic depressions are located in the south west corner of the site and the central north part of the site.</p> <ul style="list-style-type: none"> <li>• There are no existing buildings located within the site.</li> <li>• The site generally has a slope of less than 5%.</li> </ul>			
	<b>Existing drainage features</b>	Barkby Brook runs along the south eastern border of the site, where it meets an unnamed ordinary watercourse as it tracks north. This then cuts through the site northwards and leaves the site at the north site boundary by St Hildas Close. This then flows into the River Wreake 2.5km north west of the site.			
	<b>Fluvial</b>	<b>Proportion of site at risk</b>			
		<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>
	<1%	<1%	40%	60%	
	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				
	Medium				

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	<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> <p><b>Available data:</b> The site is covered by the Environment Agency's Lower Wreake (2015) hydraulic model from the northern site boundary and 2D generalised modelling through the site and upstream (south).</p> <p><b>Flood characteristics:</b>                      The Flood Map for Planning presents the site to be located within Flood Zone 3 as the watercourse flows through the site, with water remaining in bank through the site. Almost the entire southern half of the site is shown to be located within Flood Zone 2. This is a very wide area of floodplain where the Barkby Brook meets an unnamed drain at the site's southern boundary, and water spreads out to the west and ponds against the railway embankment along the western boundary.                      The defended 100-year model extent from the Lower Wreake model has been used to assess the actual risk to the site. Model outputs show the site to be at negligible risk from fluvial flooding. However, the extent of this model starts at the site's northern boundary, so there is no depth, velocity or hazard data available. The deepest area of the site would be to the west adjacent to the railway line.                      It is recommended that this model is extended further upstream to provide a better understanding of the fluvial risk associated with the site, which may see a reduction in the severity of Flood Zone 2 shown in the Flood Zone mapping.</p>			
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		1%	2%	10%
		Max depths (m)		
		0.9-1.2	0.9-1.2	0.9-1.2
		Max velocity (m/s)		
		>2	>2	>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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	<b>Proposed land use</b>	Residential
		<p><b>Description of surface water flow paths:</b>            For the 30-year event, surface water accumulation occurs predominantly in small, localised patches across the site due to lower ground elevations along Barkby Lane and parallel to the railway line. Surface water accumulation is also observed along the Barkby Brook watercourse. An increase in 2% for the 100-year displays greater accumulation of surface water at the same locations for the 30-year event. There is over double the area predicted to be impacted by surface water for the 1,000-year event, where there is significant expansion and development of flow routes through the site. Most notably in the south-west corner by Barkby Lane and along the Barkby Brook watercourse where a significant flow route from Pembroke Avenue intersects with the northern boundary of the site. Overall, however, only 10% of the site is shown to be at risk. Depths are high in all events due to these topographic depressions where water ponds.            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 50\%</math> to <math>&lt; 75\%</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 at the site should be used to confirm groundwater levels to support the design of SUDS features.</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 450m 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>

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<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High Ground	Unknown	Unknown
	High ground is located to the north of the site and follows the banks of the Barkby Brook. This includes 80m of the site boundary. It is unknown what the standard of protection or condition of the high ground is.			
<b>Residual risk</b>	The Barkby Brook is culverted under Pembroke Avenue to the north of the site. If this structure were to become blocked during a flood event, it is possible that water could back up and increase flood risk on the site. This residual risk should be investigated in a site-specific FRA.			
<b>Emergency planning</b>	<b>Flood warning</b>	The site is partially within the Environment Agency's River Wreake in Leicestershire Flood Alert area (034WAF404). The site is not situated within an Environment Agency Flood Warning area.		
	<b>Access and egress</b>	Access and egress to the site can be gained in the north east corner of the site via Barkby Road for all fluvial and surface water events. Surface water and fluvial flood risk bisects the site and therefore consideration is needed regarding access to the western portion of the site, as to whether provision can be made from the housing estate to the north, so as not to cross flood waters. With detailed modelling, the Flood Zone 2 extent may reduce; this needs to be confirmed at detailed FRA stage.		

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	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. The site is partially clipped by detailed model extents for the Lower Wreake model which covers fluvial risk downstream of the site. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances will need to be considered in a detailed hydraulic model of the watercourse which runs through the site, to confirm the impact in the site. Using the 1,000-year as a proxy for climate change, an increase in flood risk is predicted to occur as a result of climate change.</li> <li>Only the 100-year flood extent is available for the site to assess potential future Flood Zone 3b. The 100-year extent (Flood Zone 3) when compared to the 20-year (Flood Zone 3b) suggests that only a marginal area could become Flood Zone 3b in the future. Two areas to the north of the site where out of bank flow routes occur could become the functional floodplain the future.</li> <li>Due to the number of dwellings proposed at the site, the H++ climate change uplift should be considered for the site as part of a site-specific Flood Risk Assessment.</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</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 with River Terrace Deposits (undifferentiated) consisting of sand and gravel.

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<b>impact mitigation</b>	<b>Soils</b>	The north of the site has slightly acid loamy and clayey soils with impeded drainage whilst the south has loamy and clayey floodplain soils with naturally high groundwater.
	<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. 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 due to the site potential groundwater flooding.</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 recommended 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.</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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 (or extension upstream to the existing Lower Wreake model) may be required at Flood Risk Assessment stage, to confirm flood risk and flow paths, FZ3b and climate change extents from the Barkby Brook, 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.
- 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).

		<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <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 Flood Zones 2 and 3 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> <li>• The Environment Agency has currently a project looking at the feasibility of multi-benefit interventions in the Barkby brook which runs through Syston. The Brook suffers from reduced water quality and biodiversity. Although the new development is not adjacent to the Brook, the development could increase flood risk and reduce water quality. The EA would like development to contribute to improvement in the quality of the river, biodiversity and reduce flood risk. High quality and high functioning SuDS schemes could benefit the river downstream.</li> </ul>
<p><b>Key messages</b></p>		<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 60% of the site located within Flood Zone 1 and therefore should be steered towards the north-western and north-eastern side of the site.</li> <li>• It should be noted that the Flood Zones and surface water flood risk bisects the site and therefore consideration is needed regarding access from both sides to local roads.</li> </ul>

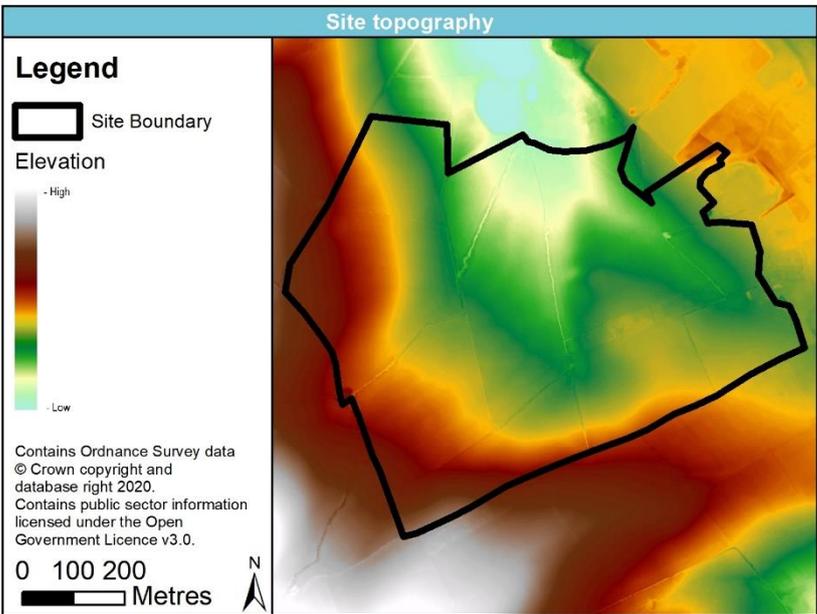
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		<ul style="list-style-type: none"> <li>Detailed hydraulic modelling will need to be conducted for the watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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>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>		
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.		
<b>Flood Zones</b>	The Flood Zone data is based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model and the EA's Flood Map for Planning.	
<b>Climate change</b>	Climate change was based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model and Flood Zone 2 given the modelled extents are further downstream of the site.	
<b>Fluvial depth, velocity and hazard mapping</b>	The 100-year modelled outputs used to assess depth, velocity and hazard are from the detailed Environment Agency Lower Wreake and tributaries (2015) hydraulic model. However, model coverage is further downstream of the site.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



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	<b>Address</b>	Extend Park Grange Farm, LE11 2UA																						
	<b>Area</b>	50.48 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	 <p>The site slopes generally from south west to the north.</p> <ul style="list-style-type: none"> <li>• Several ordinary watercourses and field drains are visible within the LIDAR which drain through the site from the south to north into the topographic depression.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> <li>• There are no existing buildings present on the site.</li> </ul>																						
	<b>Existing drainage features</b>	There is a drain running from the middle of the site directly north where it leaves the site parallel to Bramcote Road. Where this drain leaves the site, it is joined by an unnamed ordinary watercourse which enters from the western boundary before tracking east, reaching a point and then flowing north east to the point of meeting the drain.																						
	<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>&lt;1%</td> <td>&lt;1%</td> <td>&lt;1%</td> <td>99%</td> </tr> <tr> <td colspan="4"><b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b></td> </tr> <tr> <td colspan="4">Medium</td> </tr> </tbody> </table>				<b>Proportion of site at risk</b>				<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>	<1%	<1%	<1%	99%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				Medium		
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	<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> <p><b>Available data:</b> The site is covered by the Environment Agency's Flood Map for Planning, which uses 2D generalised modelling methods. The Flood Zones are shown only from the site's northern boundary onwards, because the catchment upstream (i.e. including the site area) is less than 3km<sup>2</sup> and so is not represented. There will still be flood risk associated with the drains through the site.</p> <p><b>Flood characteristics:</b> The Flood Map for Planning indicates that the majority of the site is within Flood Zone 1 with a small area located on the north site boundary identified to be within Flood Zone 3 and 2. This dataset is based on 2D generalised modelling data which starts at the northern site boundary. It is likely though, that the Flood Zones would be present through the central portion of the site where topography is widening and the two drains start to converge. It is 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. The surface water mapping can be used to help infer flood risk at the strategic level.</p>				
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>			
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
		4%	8%	20%	
		Max depths (m)			
		0.9-1.2	0.9-1.2	0.9-1.2	
		Max velocity (m/s)			
		>2	>2	>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>  A surface water flow path crosses the site along the drain and watercourse for all events. There is a further flow for 100-year and 1,000-year events extending from the entrance of the Halfway House to the surface water flows resulting from the drain. Another flow also extends from the south from where the ordinary watercourse begins tracking north for 100-year and 1,000-year events. The 1,000-year extent is much wider and encompasses both drains in the centre of the site.  The depths are fairly high and consistent in all events, likely due to it picking up the lower topography of the watercourses.  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 &lt; 25% 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 at the site should be used to confirm groundwater levels to support the design of SUDS features.</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 1km 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>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH21</b>		
	<b>Address</b>	Extend Park Grange Farm, LE11 2UA		
	<b>Area</b>	50.48 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Flood risk management infrastructure</b>		N/A	N/A	N/A
		This site is not protected by any formal flood defences.		
	<b>Residual risk</b>	The site is considered to not be at a residual risk from flood risk management infrastructure.		
<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>	Access and egress is available for the site for all fluvial and surface water events along the east site boundary via Laburnum Way or Spindle Road. The only access roads present are from the back of this housing estate. Surface water flood risk bisects the site and therefore consideration is needed regarding access to the western portion of the site, or the provision of new access roads.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH21</b>
	<b>Address</b>	Extend Park Grange Farm, LE11 2UA
	<b>Area</b>	50.48 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. 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.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is only a small increase in flood extent. Therefore, the site is predicted to be at an increase in flood risk in the future.</li> <li>Due to the number of dwellings proposed at the site, the H++ climate change uplift (100-year +65%) should be considered for the site as part of a site-specific Flood Risk Assessment. This would likely resemble Flood Zone 2.</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>	There are no superficial deposits in the eastern half of the site. The other half is underlain by River Terrace Deposits (undifferentiated), consisting of sand and gravel.
	<b>Soils</b>	Half of the site has slightly acid loamy and clayey soils with impeded drainage and the other half has slowly permeable seasonally wet acid loamy and clayey soils.
	<b>Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH21</b>
	<b>Address</b>	Extend Park Grange Farm, LE11 2UA
	<b>Area</b>	50.48 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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>• All forms of source control are likely to be suitable.</li> <li>• Infiltration methods are 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.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention methods.</li> <li>• All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required.</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. If the site has contamination issues; a liner will be required.</li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH21</b>
	<b>Address</b>	Extend Park Grange Farm, LE11 2UA
	<b>Area</b>	50.48 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 using 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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 watercourses, 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.
- 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,

		<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>		<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 parts of the site outside of the Risk of Flooding from Surface Water zones and within Flood Zone 1. Development should therefore be steered towards the western and eastern sides of the site.</li> <li>• Surface water flood risk bisects the site and therefore consideration is needed regarding access to the western portion of the site, or the provision of new access roads.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourses that intersect the site to assess the present and future fluvial risk to the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH21</b>
	<b>Address</b>	Extend Park Grange Farm, LE11 2UA
	<b>Area</b>	50.48 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <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>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.</p>	
<b>Climate change</b>	<p>Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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 available corresponding fluvial modelling data from the generalised 2D model; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.</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>	
<b>Surface water depth, velocity and hazard mapping</b>	<p>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.</p>	

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>			
	<b>Address</b>	Former Limehurst Depot			
	<b>Area</b>	0.75 ha			
	<b>Current land use</b>	Brownfield			
	<b>Proposed land use</b>	Residential			
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from south to north into an area of topographic depression which runs parallel to the east and west site boundary. There is an area of higher ground beyond this immediately north. There is also an area of depression in the far west corner of the site which is part of the Wood Brook.</p> <ul style="list-style-type: none"> <li>• There are some existing buildings located on the site in the south west corner and east of the site which have resulted in poor LIDAR filtering issues.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>			
	<b>Existing drainage features</b>	The Wood Brook partially intersects the site along the south west site boundary. The Grand Union Canal is also located 13m from this boundary.			
	<b>Fluvial</b>	<b>Proportion of site at risk</b>			
		<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>
3%		3%	28%	72%	
<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High	

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



Site details	Site Code	SH48
	Address	Former Limehurst Depot
	Area	0.75 ha
	Current land use	Brownfield
	Proposed land use	Residential
		<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> <p><b>Available data:</b> The site is covered by the latest 2021 Environment Agency Wood Brook hydraulic model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p> <p>The current EA online Flood Map for Planning shows a different picture of flood risk, as this is based on older outdated modelling, which is due to be updated in 2021 using latest Wood Brook results. This dataset has therefore not been used in this assessment.</p> <p><b>Flood characteristics:</b></p> <p>This site is at low fluvial risk in the 100-year undefended Wood Brook (Flood Zone 3a) scenario, where the water is shown to remain in-channel, and the overland flow path from further upstream does not reach the site. Flood Zone 2 affects mostly the north-eastern portion of the site and abuts the southern boundary.</p> <p>The defended 20-year (Flood Zone 3b) and defended 100-year extents are also still in-bank in these scenarios upstream and downstream, with the main culvert running adjacent to the site's western boundary, showing the 'actual' flood risk when flood risk management features are in place. The site boundary does capture this stretch of open channel and therefore there is FZ3 and 3b in the site, even though it is not out of bank flooding.</p> <p>As the defended 100-year extent does not affect the site, the maximum depth for the 100-year plus 30% (higher central) climate change event was considered, but this also does not affect the site – only the +50% climate change scenario marginally encroaches into the far north-eastern boundary and is the end of an outer flood extent, and the maximum depth here is shallow at 0.06m.</p> <p>Velocity and hazard outputs were provided for the 100-year event, but there is no risk to the site in this event, therefore these should be interrogated in the +50% climate change event at site-specific level. It is likely that velocities and hazard will be low given the shallow depths and sparse area of flooding.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>		
	<b>Address</b>	Former Limehurst Depot		
	<b>Area</b>	0.75 ha		
	<b>Current land use</b>	Brownfield		
	<b>Proposed land use</b>	Residential		
<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	2%	22%	77%	
	Max depths (m)			
	0.6-0.9	0.6-0.9	0.6-0.9	
	Max velocity (m/s)			
	0.25-0.5	1-2	>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>			
	<p><b>Description of surface water flow paths:</b>            Surface water flows occur over most of the site area for the 1,000-year event, with isolated pockets not at risk where topography is higher. The 100-year event covers approximately a third of the north-western edge. The 30-year is confined to the Wood Brook channel along the western boundary.            Considering the risk away from the channel of the Wood Brook, depths in the 100-year in the site are generally &lt;0.3m and velocities a mix of &lt;0.25m/s and &gt;0.25m/s. In the 1,000-year event, most of the site is &lt;0.3m, but the area covered by the 100-year extent increases to 0.3-0.9m. Higher velocities in this area denote a flow path in a north-easterly direction towards Limehurst Avenue.            Loughborough sees a very large overland flow route from surface water in all events, along the course and topography of the Wood Brook, though the Wood Brook itself is largely in culvert through Loughborough.            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. The surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.            Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.</p>			

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>		
	<b>Address</b>	Former Limehurst Depot		
	<b>Area</b>	0.75 ha		
	<b>Current land use</b>	Brownfield		
	<b>Proposed land use</b>	Residential		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the southern half of the site is located within a 1 km grid square where <math>\geq 50\%</math> to <math>&lt; 75\%</math> of the area is predicted to be at risk of groundwater flooding. The remainder of the site is located within the grid square where <math>\geq 75\%</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 at the site should be used to confirm groundwater levels to support the design of SUDS features.</p>		
	<b>Reservoir</b>	<p>The available <a href="#">online</a> maps shows that the maximum extent of flooding from reservoirs reaches through the entire site. Reservoir risk is considered low, but this risk should be confirmed in a site-specific Flood Risk Assessment.</p>		
	<b>Flood history</b>	<p>Between 2018-2020, there have been 87 LLFA reports of internal flooding; 32 of which were in Loughborough. There are no records of historic flooding at this site from the Environment Agency. No recorded historical flood incidents occurred within 350m of the proposed development site.</p> <p>Records from Leicestershire County Council detail historical flood incidents from all sources, whereas the Environment Agency dataset only records incidents of fluvial, tidal or coastal flooding.</p> <p>Loughborough is also one of the 40 highlighted priority settlements for the purpose of the Local Flood Risk Management Strategy, coming in the top 5 settlements at risk from surface water, with most properties at risk.</p> <p>The Lead Local Flood Authority should be contacted to obtain further details.</p>		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High ground	Unknown	Unknown
		High ground is located to the south east of the site and follows the banks of the Wood Brook. This includes part of the site boundary. It is unknown what the standard of protection or condition of the high ground is.		

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>
	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
	<b>Residual risk</b>	Residual risk is present at the site due to the presence of flood risk management features to the west, which in the event of a breach, could flood the site. There is a potential blockage risk from a culverted Wood Brook, therefore, it is recommended that this is explored further in an FRA.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's Loughborough Urban Watercourses Flood Alert area (034WAF426) and the East Midlands Flood Warning area (034FWFWOLUFSOUTH).
	<b>Access and egress</b>	Access and egress is available to the site for modelled fluvial events and the 30-year and 100-year surface water events via Bridge Street to the east corner of the site. Wet access and egress could be available for the site for the 1,000-year surface water event in the same location. This is due to a hazard rating of 0.50 - 0.75 which is considered safe and suitable for emergency services vehicles. East of the site there is land clear of flood risk, and routes north or west should be avoided. 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 using the latest Wood Brook model results, to confirm whether access for emergency vehicles could still be obtained in the climate change events.

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>
	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
<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>Detailed modelled outputs from the latest 2021 Wood Brook modelling have been used to assess the impact of climate change on fluvial risk. The 100-year 20%, 30% and 50% defended uplifts show a significant increase in flood risk in comparison to the 100-year defended event, as the defended 100-year extent does not affect the site. The extents are slightly larger than the 100-year undefended extent, but do not reach that of the 1,000-year defended flood event. They do however cover the majority of the site and beyond the boundary, so implications of this for flood mitigation and access need to be considered.</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, and account for integrated modelling given the national surface water does not represent hydraulic structures.</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 with Alluvium deposits consisting of clay, silt and sand.
	<b>Soils</b>	Loamy soils with naturally high groundwater.
	<b>Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>
	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>
	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
<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>The site is affected by all Flood Zones, though Flood Zone 3b and 3a are due to the Wood Brook channel being in the site; these remain in-bank. Flood Zone 2 affects the north-eastern portion of the site. The Exception Test will need to be applied if the site is residential and in Flood Zone 3. However, the Exception Test is based on 'defended'/'actual' flood risk, and when using the defended 100-year extents, this shows no risk to the site outside of the channel; only the +50% climate change extent affects the site, matching more closely with Flood Zone 2.</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> <p>Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.</p>

**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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- All 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.
- Flood risk needs to be considered for the lifetime of the development, accounting for climate change.
- Latest modelled outputs from the Wood Brook Environment Agency study show the site is located in the Flood Zones, but not the 100-year defended/ actual risk. Risk to the site is not significant away from the channel.
- Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.
- The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, the culvert runs along the western boundary, so a 8-10m easement area will be required from the channel. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
- 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. 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 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 or existing ground levels may be needed. With the flood risk from surface water being a flow path, residential development may need to be placed on higher levels and any flow paths should not be obstructed so as to displace the risk elsewhere. Design should account for surface water with an element of climate change.
- 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.
- New development must seek opportunities to reduce overall level of flood risk at the site, for example by:
  - Reducing volume and rate of runoff
- Example features include green roofs, rainwater capture and reuse and permeable paving.
- 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.
- Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk.
- The opportunity should be taken to store additional water on development sites in the Wood Brook to alleviate flooding in the wider area, in addition to long term storage requirements. Opportunities to complement and enhance the existing NFM scheme within the catchment should also be investigated. Such schemes may also improve the surface water risk in the catchment, by slowing the fluvial

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



<b>Site details</b>	<b>Site Code</b>	<b>SH48</b>
	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
		<p>flows in the system allowing the surface water drainage to outfall to the channel.</p> <ul style="list-style-type: none"> <li>• Developers should enter into conversations with the Borough Council/ EA at pre-application stage to understand the latest position with regards to the Environment Agency led Wood Brook scheme. Betterment may be required: <ul style="list-style-type: none"> <li>○ In the form of additional storage for surface water runoff from development sites on site,</li> <li>○ In the form of 'in kind' works, such as additional floodplain storage on site, and/ or</li> <li>○ In the form of a contribution towards wider community flood alleviation works within the catchment.</li> </ul> </li> </ul>
<b>Key messages</b>		<ul style="list-style-type: none"> <li>• The modelled defended 100-year shows the site to be developable, with no risk shown to the site and low-level flood risk in the climate change and Flood Zone 2 events.</li> <li>• Surface water is a risk to the site, though access to/ from the site looks possible in the 30-year and 100-year events. The site is part of a flow path, so this needs to be maintained and not obstructed in future development design.</li> <li>• Site-specific assessments should investigate surface water risk in more detail using integrated modelling to fully understand the interaction between fluvial and surface water risk and hydraulic structures.</li> <li>• The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, the culvert runs along the western boundary, so a 8-10m easement area will be required from the channel. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.</li> <li>• If flood mitigation measures and flood resilient design are implemented, then they are tested to ensure that they will not displace water elsewhere.</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>

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



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	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
<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>The EA Flood Map for Planning does not currently represent the latest Environment Agency's 2021 Wood Brook modelling, which was in progress at the time of the SFRA, and hence the current EA Flood Zones 3a and 2 largely overestimate flood risk along this watercourse, with them being based on the Lower Soar modelling. Due to the significant difference between the EA's current Flood Map for Planning in this area and new Wood Brook model results, the new model results have been used to derive the Flood Zones for the purpose of the L2 SFRA at the four Loughborough sites. The draft defended and undefended 100-year extents have been merged to form a composite Flood Zone 3a extent, and the defended and undefended 1,000-year flood extents have been merged with the Historic Flood Map to form a composite Flood Zone 2 extent. Flood Zone 3b has been derived from the 20-year defended modelled flood extent.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Climate change</b>	<p>Climate change was based on the latest Environment Agency 2021 Wood Brook model and the 1,000-year surface water flood extent.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 100-year defended modelled outputs were used to assess depth, velocity and hazard are from the detailed 2021 Wood Brook hydraulic model. These do not affect the site, but the other modelled event outputs were not provided at the time of the study.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	

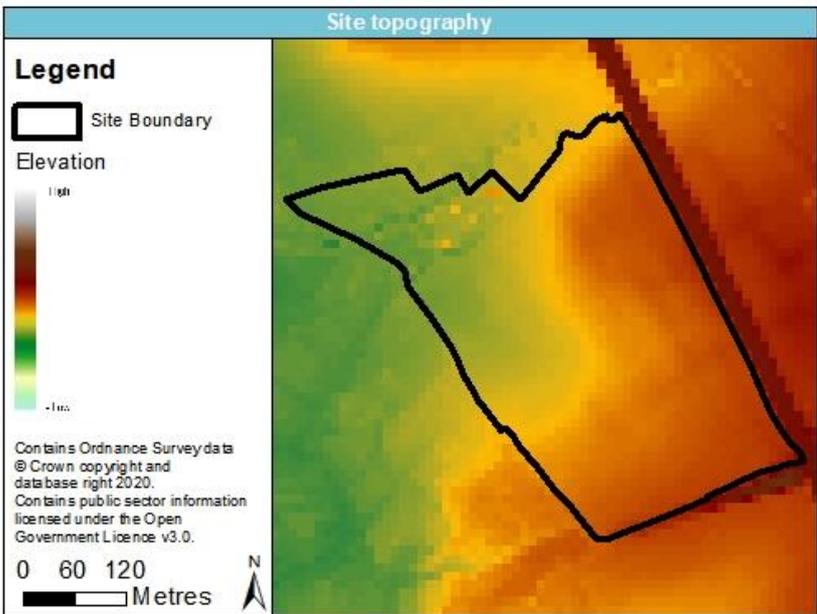
## Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



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	<b>Address</b>	Former Limehurst Depot
	<b>Area</b>	0.75 ha
	<b>Current land use</b>	Brownfield
	<b>Proposed land use</b>	Residential
<b>Surface Water</b>		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH260</b>																						
	<b>Address</b>	Land to rear of Derry's Garden Centre																						
	<b>Area</b>	13.84 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	 <p>The site generally slopes from south east to the north west of the site where a topographic depression is located.</p> <ul style="list-style-type: none"> <li>• There are some existing buildings located in the north west corner of the site.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	An unnamed ordinary watercourse flows parallel with the site at the northern boundary and flows towards the north-western corner of the site.																						
	<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>15%</td> <td>15%</td> <td>16%</td> <td>84%</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" style="text-align: center;">High</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>	15%	15%	16%	84%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
<b>Proportion of site at risk</b>																								
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH260</b>		
	<b>Address</b>	Land to rear of Derry's Garden Centre		
	<b>Area</b>	13.84 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Available data:</b> The site is covered by the Environment Agency's Flood Map for Planning, which is based on 2D generalised modelling data. Shortly downstream of the site/ Cossington Road, the drain enters the River Soar, where there is detailed EA modelling available (Upper Lower Soar, 2012).</p> <p><b>Flood characteristics:</b>                      The Flood Map for Planning Flood Zones along this drain are represented by 2D generalised modelling. The River Soar defended modelled 100-year remains west of Cossington Road, whereas the undefended Flood Zones include the most downstream end of this drain, commencing from just east of the railway line.                      There is little difference shown between the Flood Map for Planning Flood Zone 2 and 3a, and in the absence of detailed modelling along the drain, Flood Zone 3b has been assumed to be Flood Zone 3a. There is however a detailed 20-year Upper Lower Soar model output along the main Soar itself, which does not include this tributary as modelled.                      As 2D generalised modelling methods have been used to assess the fluvial risk for the site, it is 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>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		3%	3%	6%
		Max depths (m)		
		>1.2	>1.2	>1.2
		Max velocity (m/s)		
		>2	>2	>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>		

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p><b>Description of surface water flow paths:</b></p> <p>Surface water flows follow the ordinary watercourse alignment for all events. There is a further flow path that flows south along the eastern boundary, with surface water flooding just south of the watercourse for all events and further south of this, only occurring for 100-year and 1,000-year events. This area of ponding in all events is located in the north-western corner of the site.</p> <p>There is significant surface water ponding on the eastern side of the rail embankment, not affecting the site, but which acts as an impoundment at various locations for surface water accumulating from the east.</p> <p>The depths are shown to be high as this is picking up the main channel.</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 north of the site is located within a 1 km grid square where <math>\geq 25\%</math> to <math>&lt; 50\%</math> of the area is predicted to be at risk of groundwater flooding. The rest of the site is located within a grid square where <math>\geq 75\%</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 at the site should be used to confirm groundwater levels to support the design of SUDS features.</p>
	<b>Reservoir</b>	The site is not shown to be at risk of reservoir flooding from the available <a href="#">online</a> maps.

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



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	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 150m 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 infrastructure</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.			
	<b>Residual risk</b>	The unnamed watercourse which flows through the north western part of the site is culverted under the railway (not posing a risk to the site) and under Cossington Road. If the entrance to this culvert was to become blocked, flood water could back up and result in further flooding within the site. The site is therefore considered to be at a residual risk of flooding, which should be investigated further in a site-specific FRA.		
<b>Emergency planning</b>	<b>Flood warning</b>	<p>The northern section of this site is partially situated within the Environment Agency's Leicester River Soar Flood Alert area (034WAF428).</p> <p>The site is not situated within an Environment Agency Flood Warning area.</p>		
	<b>Access and egress</b>	Safe access and egress is available to the site via Back Lane to the south of the site for all fluvial and surface water flood events. Access should be avoided in the north-western corner where fluvial and surface water risk is present.		

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. The Upper Lower Soar climate change extents remain west of Cossington Road. 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.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is only a small increase in flood extent. Risk remains to the north of the site. The site is therefore predicted to be at an increase in flood risk in the future.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The site is underlain with River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	<b>Soils</b>	Slightly acid loamy and clayey soils with impeded drainage
	<b>Groundwater Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.

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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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. 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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>Proposed land use</b>	Residential
<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.</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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 watercourse drains, using channel topographic survey.
- 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.
- 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 flow routes.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH260</b>
	<b>Address</b>	Land to rear of Derry's Garden Centre
	<b>Area</b>	13.84 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>Consideration should be given to the siting of access points with respect to areas of surface water flood risk.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH260</b>
	<b>Address</b>	Land to rear of Derry's Garden Centre
	<b>Area</b>	13.84 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 84% of the site located within Flood Zone 1 and therefore should be steered away from the north of the site.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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>• 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>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.</p>	
<b>Climate change</b>	<p>Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH260</b>
	<b>Address</b>	Land to rear of Derry's Garden Centre
	<b>Area</b>	13.84 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Fluvial depth, velocity and hazard mapping</b>		There is no available corresponding fluvial modelling data from the generalised 2D model; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.
<b>Surface Water</b>		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH24</b>																						
	<b>Address</b>	Land off Fairway Road																						
	<b>Area</b>	24.88 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from the south east corner of the site towards the north site boundary.</p> <ul style="list-style-type: none"> <li>• There are few buildings located to the of the site.</li> <li>• The ground slope across the site generally has a gradient of less than 5%</li> </ul>																						
	<b>Existing drainage features</b>	The Oxley Gutter flows directly through the centre of the site, flowing north before continuing north east along the site boundary under the M1 and towards the Grace Dieu Brook.																						
	<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		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH24</b>		
	<b>Address</b>	Land off Fairway Road		
	<b>Area</b>	24.88 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<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 being &lt;3km<sup>2</sup>. There will however be flood risk associated with the Oxley Gutter.</p> <p><b>Flood characteristics:</b> The Flood Map for Planning shows the site to be within Flood Zone 1. However, this is because the catchment area is smaller than those represented in the national mapping. It is likely the risk would closely follow the topography of the channel, widening at the northern boundary where the topography is lower. It is 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. The surface water mapping dataset can be used instead to infer risk at a strategic scale.</p>		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		4%	7%	17%
		Max depths (m)		
		>1.2	>1.2	>1.2
		Max velocity (m/s)		
		>2	>2	>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>		

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



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	<b>Proposed land use</b>	Residential		
		<p><b>Description of surface water flow paths:</b>                      The surface water flows follow Oxley Gutter for all events. The flow path enters the site from the south-western corner, originating in site PSH405 on higher ground to the south. It then flows across the site's southern boundary and follows the line of the channel. The extent is confined for the 30-year and 100-year events, with the 1,000-year event spreading slightly further into the floodplain, with the northern boundary tip at most risk where it ponds in a depression against the M1 embankment.                      Depths are shown to be high as this is picking up the topography of the channel.                      RoFSW 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 &lt;25% of the area is predicted to be at risk of groundwater flooding.                      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>	<p>The site is not shown to be at risk of reservoir flooding from the available <a href="#">online</a> maps.</p>		
	<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 1km of the proposed development site.                      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.		

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



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	<b>Proposed land use</b>	Residential
<b>infrastructure</b>	<b>Residual risk</b>	The Oxley Gutter flows under the M1 to the north of the site. This structure is likely to be large and flood water already ponds here, but if a blockage were to occur, it could increase depths and push the extent slightly further into the northern portion of the site. Also, 350m south of the site is Ingleberry Lodge Farm where there is a sizeable pond. This looks to be topographically constrained around its perimeter and therefore unlikely to pose a risk, but if water was to overtop from here, it would flow downhill towards the site's southern boundary. The site is therefore considered to be at a residual risk of flooding and this should be investigated further in a site-specific FRA.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is not situated within a Environment Agency Flood Warning or Flood Alert area.
	<b>Access and egress</b>	Wet access and egress is only available to the site via Pennine Close and Fairway Road South located along the west site boundary. Access needs to be considered for the eastern half of the site, as the watercourse would need to be crossed to access this housing estate, unless provision can be made from the south. To the east and north is the M1, so this will not be viable. The hazard for all surface water events in this located is between 0.50 and 0.75 and is considered safe for evacuation.

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. 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.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is only a small increase in flood extent to the north of the site and towards the east site boundary. Therefore, the site is predicted to be at an increase in flood risk in the future.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The site does not have any superficial deposits.
	<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.

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>• All forms of source control are likely to be suitable.</li> <li>• 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.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention.</li> <li>• All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required.</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. If the site has contamination issues; a liner will be required.</li> </ul>

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended 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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- 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 watercourse drains, using channel topographic survey.
- 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.
- 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.
- 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.
- The site is within 250m of the boundary of three sites permitted by the Environment Agency and therefore any development at this location may be adversely affected by amenity issues associated with those sites. The sites are: Shepshed Feed Mill, Newhurst Recovery Facility and Morris Recycling Limited.

**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,

		<p>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).</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>	<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 83% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered towards the eastern side or the south-western side of the site. Development should also be steered away from the watercourse in the centre of the site, and the northern tip where risk is highest.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> </ul>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH24</b>
	<b>Address</b>	Land off Fairway Road
	<b>Area</b>	24.88 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>Detailed hydraulic modelling will need to be conducted for the watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>Safe access and egress in association with surface water risk will need to be considered as part of a site-specific flood risk assessment, as the site is bisected by risk.</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>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>		
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.		
<b>Flood Zones</b>	<p>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.</p>	
<b>Climate change</b>	Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no available corresponding fluvial modelling data from the generalised 2D model; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	

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



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	<b>Address</b>	Land off Fairway Road
	<b>Area</b>	24.88 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>																						
	<b>Address</b>	Land east of Leicester Road																						
	<b>Area</b>	38.70 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from south east to north west.</p> <ul style="list-style-type: none"> <li>• The site is bound to the north by a railway embankment.</li> <li>• There are no existing buildings present within the site.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	An unnamed ordinary watercourse flows from the south east of the site towards the northwest where it enters the Rothley Brook. A second unnamed ordinary watercourse flows from the south and joins the other unnamed watercourse in the centre of the site.																						
	<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>15%</td> <td>15%</td> <td>17%</td> <td>83%</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">High</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>	15%	15%	17%	83%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>		
	<b>Address</b>	Land east of Leicester Road		
	<b>Area</b>	38.70 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Available data:</b> The site is covered by the Environment Agency's Flood Map for Planning, which uses 2D generalised modelling data. The Flood Zones are only present in the downstream extent of the drain near the Rothley Brook, because upstream the catchment is less than 3km<sup>2</sup> and not represented.</p> <p><b>Flood characteristics:</b>                      The Flood Map for Planning presents the site to be located within Flood Zone 2 and 3 with out of bank flooding largely occurring the northern boundary of the site, at the confluence with the Rothley Brook and along this watercourse where the floodplain topography is lowest. There would also be flood risk along the remaining reach of the drain, but this is not represented in the Flood Zones. The floodplain looks fairly confined though so it is likely out of bank flooding would be within the vicinity of the channel.                      The unnamed ordinary watercourse which enters the site from the west near Leicester Road is also not covered by any modelling.                      As 2D generalised modelling methods have been used to assess the fluvial risk for the site, it is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage which also includes the west unnamed ordinary watercourse, to confirm fluvial flood risk to the site.</p>		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		6%	11%	25%
		Max depths (m)		
		>1.2	>1.2	>1.2
		Max velocity (m/s)		
		>2	>2	>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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>
	<b>Address</b>	Land east of Leicester Road
	<b>Area</b>	38.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p><b>Description of surface water flow paths:</b>            Surface water flows follow the drains through the centre of the site from the south-eastern corner, north-west to the Rothley Brook, for all events. Further flooding extends from these watercourses into the site, particularly in the north eastern corner for the 1,000-year event, in the lower topography of the Rothley Brook floodplain. West of the ordinary watercourse, there is a surface water flow path following the other small drain from the south, meeting the main drain in the centre of the site.            The depths are high in all events, because this is picking up the watercourse channel through the centre of the site. Depths are shallower moving away from the watercourse.</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 south of the site is located within a 1 km grid square where <math>\geq 50\%</math> <math>&lt; 75\%</math> of the area is predicted to be at risk of groundwater flooding. The remainder of the site is located within a 1km grid square where</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 available <a href="#">online</a> maps show a significant reach from maximum extent of flooding from reservoirs into the top half of the site.
	<b>Flood history</b>	<p>The Rothley Brook flooded in 1977 resulting in flooding up to 150m from the brook/boundary into the proposed site. The site itself was not flooded during this event.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>		
	<b>Address</b>	Land east of Leicester Road		
	<b>Area</b>	38.70 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High Ground	N/A	N/A
	High ground is located on the north west boundary for 570m, following the banks of the Rothley Brook. It is unknown what the standard of protection or condition of the high ground is.			
<b>Residual risk</b>	The watercourse which runs through the site is culverted under Leicester Road, Thurcaston Lane (Rothley Brook) and the A46. If the entrances to the culverts were to become blocked, water could back up and spill overland into the site and result in further flooding. Given the confined topography and A46, it is unlikely there would be significant risk from the A46 structures. This should be investigated further in a FRA.			
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's Leicester Rothley Brook Flood Alert area (034WAF403) and East Midlands Flood Warning area (034FWFROGLENFLD).		
	<b>Access and egress</b>	Safe access and egress is available for the site via Leicester Road for all fluvial and surface water events. Thurcaston Lane should be avoided as the Rothley Brook is shown to flood this. However, the ordinary watercourses bisect the site, so consideration regarding access is required for the portion of the site north of the watercourse.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>
	<b>Address</b>	Land east of Leicester Road
	<b>Area</b>	38.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. 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.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is only a small increase in flood extent in the centre of the site. Therefore, the site is predicted to be at an increase in flood risk in the future.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The eastern half of the site is underlain with Till deposits consisting of diamicton and the western half is underlain by Alluvium deposits, consisting of clay, silt and sand.
	<b>Soils</b>	The NW half of the site has slightly acid loamy and clayey soils with impeded drainage and the other half has lime-rich 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>
	<b>Address</b>	Land east of Leicester Road
	<b>Area</b>	38.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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 due to the site potential groundwater flooding.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>
	<b>Address</b>	Land east of Leicester Road
	<b>Area</b>	38.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended 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 more 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>

	<p style="text-align: center;"><b>Requirements and guidance for site-specific Flood Risk Assessment</b></p>	<p><b>Flood Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>• At the planning application stage, a site-specific Flood Risk Assessment will be required for this site as development is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites: <ul style="list-style-type: none"> <li>○ are 1 hectare or more in size;</li> <li>○ contain land which has been identified by the Environment Agency as having critical drainage problems; or</li> <li>○ contain land identified in the strategic flood risk assessment as being at increased flood risk in future.</li> </ul> </li> <li>• Other sources of flooding must be considered as part of any site-specific Flood Risk Assessment, including surface water and groundwater.</li> <li>• 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.</li> <li>• 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 watercourse, using channel topographic survey.</li> <li>• Climate change modelling should be undertaken using the relevant allowances for the type of development and level of risk.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Development in FZ3b should be avoided unless appropriate use can be demonstrated in line with NPPF.</li> <li>• Development in FZ3 may require floodplain compensation and this should be confirmed with the EA at FRA stage.</li> </ul> <p><b>Guidance for site design and making development safe:</b></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events,</li> </ul>
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		<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>		<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 75% of the site outside of the Risk of Flooding from Surface Water zones and within Flood Zone 1. Development should therefore be steered away from the watercourses, preferable near safe access routes.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourse that intersects the site to assess the present and future fluvial risk to 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>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH120</b>
	<b>Address</b>	Land east of Leicester Road
	<b>Area</b>	38.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>The ordinary watercourses bisect the site, so consideration regarding access is required for the portion of the site north of the watercourse, which is also bound by a railway line. Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.</li> </ul>
<b>Mapping Information</b>		
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.		
<b>Flood Zones</b>	<p>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.</p>	
<b>Climate change</b>	Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no available corresponding fluvial modelling data from the generalised 2D model; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>																						
	<b>Address</b>	Ratcliffe Road																						
	<b>Area</b>	45.15 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from the north east towards the west of the site.</p> <ul style="list-style-type: none"> <li>• There are no existing buildings located within the site.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	There is an unnamed ordinary watercourse which enters the site from the south east, following a boundary line before it meets a second ordinary watercourse flowing from the east. Both watercourses drain to the west site boundary where it is culverted under the railway line. The watercourse eventually drains 1400m west and into the River Soar.																						
	<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>3%</td> <td>3%</td> <td>4%</td> <td>96%</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">High</td> </tr> </tbody> </table>				<b>Proportion of site at risk</b>				<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>	3%	3%	4%	96%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>			
	<b>Address</b>	Ratcliffe Road			
	<b>Area</b>	45.15 ha			
	<b>Current land use</b>	Greenfield			
	<b>Proposed land use</b>	Residential			
	<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> <p><b>Available data:</b> The site is covered by the Environment Agency's Flood Map for Planning, which uses 2D generalised modelling data. This only commences halfway down the ordinary watercourse, partway through the site, because further upstream, the catchment is less than 3km<sup>2</sup>, which is not represented in the EA's Flood Zones.</p> <p><b>Flood characteristics:</b> The Environment Agency's Flood Map for Planning displays a very minor difference between Flood Zone 3 and 2, but the site is bisected by the channel and flood risk. As mentioned above, the Flood Zones only commence part-way through the site due to catchment size, so the entire length of the watercourse through the site and along its north-eastern boundary is not represented. The surface water mapping can be used to infer flood risk along the remaining reach in the absence of detailed data. As this is 2D generalised modelling in the Flood Zones, there is no backing up shown at the rail embankment, which in reality in a detailed model, there would be some representation of this structure.</p> <p>It is 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 for the entire channel extent.</p>				
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>			
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
		3%	5%	19%	
		Max depths (m)			
		>1.2	>1.2	>1.2	
		Max velocity (m/s)			
		1-2	1-2	>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>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>		
	<b>Address</b>	Ratcliffe Road		
	<b>Area</b>	45.15 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Description of surface water flow paths:</b>            Surface water flow follows the watercourse tracking south-west (following the point where the watercourses merge) for all events. There is surface water flooding at this eastern boundary, with a wider extent for the lower probability events.            There is evidence of surface water ponding and backing up against the railway embankment in all events, extending more significantly in the 1,000-year event.            The site is bisected by surface water risk in the middle of the site. Depths are significant due to it picking up the maximum depth along the watercourse topography.</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 550km 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 manageme</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		N/A	N/A	N/A

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>
	<b>Address</b>	Ratcliffe Road
	<b>Area</b>	45.15 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>nt infrastructure</b>		This site is not protected by any formal flood defences.
	<b>Residual risk</b>	The unnamed watercourse which flows through the centre of the site is culverted under the railway close to the west site boundary. If the entrance to this culvert were to become blocked, water could back up and cause flooding within the site. It is likely this embankment will cause an impoundment. The site is therefore considered to be at a residual risk from this culvert and should be investigated further in an FRA.
<b>Emergency planning</b>	<b>Flood warning</b>	A small area of the site is situated within the Environment Agency's Leicester River Soar Flood Alert area (034WAF428). The site is not situated within an Environment Agency Flood Warning area.
	<b>Access and egress</b>	Safe access and egress is available for the site via Blackberry Lane to the south for all fluvial and surface water events. Due to the ordinary watercourses present, consideration is required regarding access from both the eastern and western boundaries of the site. Ratcliffe Road is accessible in a south-easterly direction except for in the 1,000-year surface water event, where a large flow path crosses the road to meet the watercourse. Access considerations are needed for the north-western portion of the site, north of the watercourse where there are no roads present (unless extending from an existing housing estate) and a railway embankment.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>
	<b>Address</b>	Ratcliffe Road
	<b>Area</b>	45.15 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. 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.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is only a small increase in flood extent. Therefore, the site is predicted to be at an increase in flood risk in the future.</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 south-east half of the site is underlain by River Terrace Deposits (undifferentiated) consisting of sand and gravel whilst the other half is underlain by Till deposits, consisting of diamicton.
	<b>Soils</b>	Slightly acid loamy and clayey soils with impeded drainage and the NE edge has lime-rich 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>
	<b>Address</b>	Ratcliffe Road
	<b>Area</b>	45.15 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>
	<b>Address</b>	Ratcliffe Road
	<b>Area</b>	45.15 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended 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 using 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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 watercourse, 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, and 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.
- 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).

		<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>	<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 81% of the site outside of the Risk of Flooding from Surface Water zones and within Flood Zone 1. Development should therefore be steered towards the western and eastern sides of the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourse that intersects the site to assess the present and future fluvial risk to 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> </ul>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH493</b>
	<b>Address</b>	Ratcliffe Road
	<b>Area</b>	45.15 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>Due to the ordinary watercourses present, access considerations are needed for the north-western portion of the site, north of the watercourse where there are no roads present (unless extending from an existing housing estate) and a railway embankment.</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>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk.</p>	
<b>Climate change</b>	<p>Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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 available corresponding fluvial modelling data from the generalised 2D model; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.</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>	
<b>Surface water depth, velocity and hazard mapping</b>	<p>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.</p>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>																						
	<b>Address</b>	Land at Tickow Lane																						
	<b>Area</b>	11.87 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>Site topography</p> <p><b>Legend</b></p> <p>Site Boundary</p> <p>Elevation</p> <p>- High</p> <p>- Low</p> <p>Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> <p>0 45 90 Metres</p> <p>N</p> <ul style="list-style-type: none"> <li>The site is generally sloping from the east and the west into the centre of the site.</li> <li>There are no existing buildings located within the site.</li> <li>The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	There is an unnamed ordinary watercourse which flows from the south to the north through the centre of the site. This watercourse is culverted under the A512, 30m south of the site. The watercourse continues north west where it enters the Black Brook 790m north of the site.																						
	<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		
<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																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>				
	<b>Address</b>	Land at Tickow Lane				
	<b>Area</b>	11.87 ha				
	<b>Current land use</b>	Greenfield				
	<b>Proposed land use</b>	Residential				
<b>Surface Water</b>	<p><b>Available data:</b> The Environment Agency's Flood Map for Planning does not cover the site, as the drainage catchment is smaller than 3km<sup>2</sup>.</p> <p><b>Flood characteristics:</b> The Environment Agency's Flood Map for Planning displays the site to be located within Flood Zone 1. It is likely, looking at the topography, that flood extents would be relatively confined at the south of the site, widening at the north end of the site and backing up against the raised embankment where it goes into culvert. It is 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%		8%	
	Max depths (m)					
	>1.2		>1.2		>1.2	
	Max velocity (m/s)					
	1-2		1-2		>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>					
	<p><b>Description of surface water flow paths:</b> Surface water flows follow the path of the existing drain for all events with some more noticeable flooding at the northern boundary for the 1,000-year event, where the topography is lower and there is a topographic impoundment. There is also surface water flooding, for all events, in the north east corner of the site due to ponding. The 30-year extent is narrow and flows to the right of the channel along a topographic flow route. The 100-year and 1,000-year events are slightly wider and pond more at the northern embankment. Depths are high in all events as this is picking up the lower topography of the channel. 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>					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>		
	<b>Address</b>	Land at Tickow Lane		
	<b>Area</b>	11.87 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the site is located within a 1 km grid square where &lt;25% 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 300m 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 infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		-	-	-
		This site is not protected by any formal flood defences.		
	<b>Residual risk</b>	<p>The site is not protected by any formal flood defences. The unnamed watercourse is culverted under the A512 to the south of the site; the impoundment of water here in the event of a blockage would back up south of the embankment as the road appears raised and therefore will unlikely affect the site. If the entrance to the culvert at the northern boundary was to become blocked, this has the potential to increase flood risk in the lower topographic depression, causing increased risk to the site. This should be investigated further in a site-specific assessment.</p>		
	<b>Flood warning</b>	The site is not situated within an Environment Agency Flood Warning or Flood Alert area.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>
	<b>Address</b>	Land at Tickow Lane
	<b>Area</b>	11.87 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Emergency planning</b>	<b>Access and egress</b>	Access and egress to the site can be gained via Tickow Lane to the west from the western half of the site and Ashby Road West (A512) from both sides of the site, for all surface water events. The watercourse does bisect the site, so consideration is needed either side of this. 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 be obtained.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>
	<b>Address</b>	Land at Tickow Lane
	<b>Area</b>	11.87 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial risk at the site due to climate change. Flood Zone 2 is usually used a proxy, but there are no Flood Zones either. 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.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	There are no superficial deposits at the site.
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>
	<b>Address</b>	Land at Tickow Lane
	<b>Area</b>	11.87 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>• All forms of source control are likely to be suitable.</li> <li>• 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.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention.</li> <li>• All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required.</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. If the site has contamination issues; a liner will be required.</li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>
	<b>Address</b>	Land at Tickow Lane
	<b>Area</b>	11.87 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 watercourse, 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.
- 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.
- The Environment Agency may need access to the nearby Main River for maintenance and emergency purposes.

**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).

		<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>	<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 92% of the site outside of the Risk of Flooding from Surface Water zones and within Flood Zone 1. Development should therefore be steered away from the centre of the site where the watercourse bisects the site.</li> <li>• It should be noted that the surface water flood risk bisects the site and therefore consideration is needed regarding access.</li> <li>• Detailed hydraulic modelling will need to be conducted for the watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> <li>• If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere</li> </ul>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH62</b>
	<b>Address</b>	Land at Tickow Lane
	<b>Area</b>	11.87 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>(for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).</p> <ul style="list-style-type: none"> <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>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk, as no Flood Zones are available.</p>	
<b>Climate change</b>	<p>Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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 as no Flood Zone 2 is available.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>There is no available corresponding fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.</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>	
<b>Surface water depth, velocity and hazard mapping</b>	<p>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.</p>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>		
	<b>Address</b>	Land off Cotes Road		
	<b>Area</b>	21.35 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Sources of flood risk</b>	<b>Topography</b>	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;"><b>Site topography</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p><b>Legend</b></p> <p><span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Site Boundary</p> <p>Elevation</p> <p style="text-align: center;">- High</p> <p style="text-align: center;">- Low</p> <p style="font-size: small;">Contains Ordnance Survey data © Crown copyright and database right 2020. Contains public sector information licensed under the Open Government Licence v3.0.</p> <p>0 75 150 Metres</p> </div> <div style="width: 65%;"> </div> </div> <p style="font-size: small; margin-top: 10px;">The site is generally flat, with a slope from east to west into a topographic depression adjacent to the River Soar where a small pond is located.</p> <ul style="list-style-type: none"> <li>There are few small buildings located along the east site boundary.</li> <li>The ground slope across the site generally has a gradient of less than 5%.</li> </ul> </div>		
	<b>Existing drainage features</b>	<p>There are no existing drainage features in the proposed site, although there is a small pond by the western boundary by the railway embankment. The Grand Union Canal and River Soar flow along the west site boundary up to the northern corner, then the River Soar is culverted under the railway embankment adjacent to the north west corner of the site, flowing on the other side of the railway.</p>		
	<b>Fluvial</b>	<b>Proportion of site at risk</b>		
	<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>
	1%	1%	1%	99%
	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>			
	High			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>		
	<b>Address</b>	Land off Cotes Road		
	<b>Area</b>	21.35 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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> <p><b>Available data:</b> The site is covered by the Environment Agency Loughborough Tributaries Scheme (2017) hydraulic model, which includes the River Soar in this location.</p> <p><b>Flood characteristics:</b>                      The Environment Agency's Flood Map for Planning Flood Zones show only a small proportion of the north-west corner of the site is located within Flood Zone 3a and Flood Zone 2. There is also a small ditch along the embankment which is not part of the modelling but is picked up in the surface water dataset.                      The maximum 100-year depth in this small encroachment in the north-western corner is however high, at 1.12m, likely where there is a topographic low point or vegetation against the railway embankment. There is no velocity or hazard data provided for this event.</p>			
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		3%	6%	9%
		Max depths (m)		
		0.6-0.9	0.6-0.9	0.9-1.2
		Max velocity (m/s)		
		0.25-0.5	1-2	>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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>		
	<b>Address</b>	Land off Cotes Road		
	<b>Area</b>	21.35 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Description of surface water flow paths:</b></p> <p>There is surface water flooding from a flow path across the lower half of the site for the 100-year and 1,000-year events, originating from Catsick Hill, flowing linearly to the railway line. Ponding also accumulates along the western boundary, due to raised ground for the railway and a topographic low stretch parallel with the railway, causing surface water flooding for all events here.</p> <p>Depths are fairly high due to the topography and nature of ponding parallel with the railway.</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 majority of the site is located within a 1 km grid square where <math>\geq 75\%</math> of the area is predicted to be at risk of groundwater flooding. The remainder of the site falls within a grid square where <math>&lt; 25\%</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>	<p>The available <a href="#">online</a> maps show that the maximum extent from reservoir flooding reaches the site, alongside the railway track.</p>		
	<b>Flood history</b>	<p>The eastern boundary, where surface water accumulates due to the raised ground for the railway, experienced flooding due to the River Soar's channel capacity being exceeded in 1998.</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 manageme</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High ground	N/A	N/A

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>nt infrastructure</b>		This site is protected by high ground which runs along the Grand Union Canal to the west of the site. The standard of protection and condition of the defence is unknown.
	<b>Residual risk</b>	The Grand Union Canal is culverted under the railway embankment close to the north west corner of the site. If this structure were to become blocked, flood risk to the site could increase. The potential for blockage may need to be considered in a site-specific assessment.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is partially situated within the Environment Agency's Lower River Soar in Leicestershire (034WAF428) Flood Alert area and the East Midlands Flood Warning area (034FWFSOCOTES).
	<b>Access and egress</b>	Access and egress to the site can be gained via Cotes Road located along the eastern boundary of the site for all fluvial and surface water events. It should be noted that the surface water flood risk bisects the site with a flow path travelling from east to west in the 100-year and 1,000-year events. Development should seek to avoid this flow route. 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>Detailed fluvial modelling showing the implications of climate change has been carried out at this site. Results show very little difference between the Flood Zone and climate change extents.</li> <li>Using the 50-year and 75-year defended outputs from the Loughborough Tributaries (2017) hydraulic model, there is a minor increase in extent. This means that Flood Zone 3b has the potential to increase in the future. However, the increase is only estimated to be small and remains confined to the north west corner of the site.</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>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 surface water extent provides an indication of the likely increase in extent of the more frequent events. A flow route originating from Cotes Road is predicted to increase in magnitude during this event and therefore could occur in the future as a result of climate change. 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 has no superficial deposits.
	<b>Soils</b>	Half of the site has lime-rich loamy and clayey soils with impeded drainage and the other half has slightly acid loamy and clayey soils with impeded drainage. However, directly adjacent the railway there is perhaps loamy and clayey floodplain soils with naturally high groundwater

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended that proposed development will be sequentially located within Flood Zone 1 areas of the site.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- 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.
- 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 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

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>the design event may remove the need for resilience measures.</p> <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 Flood Zones 2 and 3 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 91% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered away from the west site boundary of the site.</li> <li>• It should be noted that the surface water flood risk bisects the site with a flow path travelling from east to west. Development should also avoid this flow route.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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>• 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>		
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.		
<b>Flood Zones</b>	The Flood Zone data is based on the EA's Flood Map for Planning Flood Zones 2 and 3a and the Loughborough Tributaries Scheme (2017) hydraulic model for FZ3b (defended 20-year).	
<b>Climate change</b>	Climate change was based on the Environment Agency's Loughborough Tributaries Scheme (2017) hydraulic model, with the latest uplifts modelled on the 100-year event.	
<b>Fluvial depth, velocity and hazard mapping</b>	The modelled outputs used to assess depth, velocity and hazard are from the detailed Environment Agency Loughborough Tributaries Scheme (2017) hydraulic model.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH484</b>
	<b>Address</b>	Land off Cotes Road
	<b>Area</b>	21.35 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>																						
	<b>Address</b>	Queniborough Lodge																						
	<b>Area</b>	7.51 ha																						
	<b>Current land use</b>	Commercial																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site is generally flat, with a slope from south east to north west.</p> <ul style="list-style-type: none"> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> <li>• There are a number of existing buildings located in the centre and north of the site which have affected localised filtering of the LIDAR data.</li> </ul>																						
	<b>Existing drainage features</b>	There are no existing drainage features identified within the drainage river network dataset. However, a depression in the topography which runs along the east site boundary and leads into a pond may indicate a drainage feature. The River Wreake is located the other side of the railway line to the north-west and the Queniborough Brook to the north.																						
	<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>1%</td> <td>19%</td> <td>81%</td> </tr> <tr> <td colspan="4"><b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b></td> </tr> <tr> <td colspan="4">Medium</td> </tr> </tbody> </table>				<b>Proportion of site at risk</b>				<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>	0%	1%	19%	81%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				Medium		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
0%	1%	19%	81%																					
<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>																								
Medium																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>		
	<b>Address</b>	Queniborough Lodge		
	<b>Area</b>	7.51 ha		
	<b>Current land use</b>	Commercial		
	<b>Proposed land use</b>	Residential		
		<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> <p><b>Available data:</b> The site is covered by the Environment Agency's Lower Wreake (2015) hydraulic model and the EA's Flood Map for Planning.</p> <p><b>Flood characteristics:</b>                      Flood Zone 3a encroaches only marginally onto the site's north-western boundary, whereas Flood Zone 2 spreads further into the site's northern quarter. Flood Zone 3b does not reach this side of the railway embankment from the Wreake.                      There is depth, velocity and hazard data available from the River Wreake modelling, but the 100-year only marginally encroaches. The maximum 100-year depth is 0.22m, the maximum velocity is 0.03m/s, giving a hazard rating of 'very low', as this is the outer extremity of the large River Wreake floodplain.</p>		
		<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>	
	<b>30-year</b>		<b>100-year</b>	<b>1,000-year</b>
	<1%		2%	9%
	Max depths (m)			
	0.3-0.6		0.6-0.9	>1.2
	Max velocity (m/s)			
	0-0.25		0-0.25	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>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>		
	<b>Address</b>	Queniborough Lodge		
	<b>Area</b>	7.51 ha		
	<b>Current land use</b>	Commercial		
	<b>Proposed land use</b>	Residential		
		<p><b>Description of surface water flow paths:</b>            There are numerous small areas of ponding across the site, largely for the 1,000-year event, although in some areas this also occurs for 30-year and 100-year events. Ponding is focused around existing buildings in the site in small topographic low spots. Depths do become more significant in the higher return periods, due to the ponding nature of the risk topographic low spots. Overall, the risk is fairly low. 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 75\%</math> of the area is predicted to be at risk of groundwater flooding. 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>Only the very north western tip has experienced flooding in 1977 from the River Wreake according to records received. 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 infrastructure</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.			
<b>Residual risk</b>	There are no culverts or other flood risk management structures which pose a residual risk to the site.			
<b>Emergency planning</b>	<b>Flood warning</b>	The site is partially within the Environment Agency's River Wreake in Leicestershire Flood Alert area (034WAF404) and River Wreake at Syston Flood Warning area (034FWFWRYSTON).		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
	<b>Access and egress</b>	<p>Access and egress to the site is available via Melton Road for all modelled fluvial and surface water events, which is the area of site at least flood risk.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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>The EA River Wreake modelled climate change outputs and showed a small increase in flooding for all climate change events, extending from the north west boundary of the site compared to Flood Zone 3a. Therefore, the site is predicted to be at an increase in flood risk in the future. This is still smaller than the Flood Zone 2 extent.</li> <li>Using the 30-year and 50-year defended outputs from the Lower Wreake (2015) model as a proxy for climate change on the functional floodplain, Flood Zone 3b is not predicted to intersect the site in the future.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The site does not have superficial deposits.
	<b>Soils</b>	Freely draining slightly acid loamy soils
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
	<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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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 recommended 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.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage.
- 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. The site extents include the modelled 100-year + 50% climate change flood outline. Any development should consider the future flood risk impacts onsite and the impacts the development may have upon future flood flows. Proposals should consider the opportunity to include measures that provide for a reduction in the predicted surface water flood risk at existing development.
- 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.
- 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 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 flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH287</b>
	<b>Address</b>	Queniborough Lodge
	<b>Area</b>	7.51 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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 81% of the site within Flood Zone 1 and therefore should be steered away from the north of the site. Development should also avoid the 9% of the site which is located within an area of surface water risk.</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>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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>		
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.		
<b>Flood Zones</b>	The Flood Zone data is based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model and the EA's Flood Map for Planning.	
<b>Climate change</b>	Climate change was based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model.	
<b>Fluvial depth, velocity and hazard mapping</b>	The 100-year modelled outputs used to assess depth, velocity and hazard are from the detailed Environment Agency Lower Wreake and tributaries (2015) hydraulic model.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>			
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane			
	<b>Area</b>	20.43 ha			
	<b>Current land use</b>	Greenfield			
	<b>Proposed land use</b>	Residential			
<b>Sources of flood risk</b>	<b>Topography</b>	<ul style="list-style-type: none"> <li>• The site generally slopes from south to north.</li> <li>• There are two areas of topographic depression located along the north site boundary, one to west and the other to the east.</li> <li>• There are no existing buildings located within the site boundary.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>			
	<b>Existing drainage features</b>	A small unnamed ordinary watercourse flows along a depression, northwards, cutting through the site before joining the boundary and is culverted under the A5630 where it then flows east and merges with another unnamed ordinary watercourse. Eventually this watercourse drains into the Rothley Brook 180m north of the site.			
	<b>Fluvial</b>	<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					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>		
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane		
	<b>Area</b>	20.43 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<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> <p><b>Available data:</b> The site is Environment Agency's Flood Map for Planning, which uses 2D generalised modelling data. As the catchment of the small drain is less than 3km<sup>2</sup>, there are no Flood Zones represented at the site.</p> <p><b>Flood characteristics:</b> The Environment Agency's Flood Map for Planning displays the site to be located within Flood Zone 1. There is however a small unnamed drain which flows through the north-eastern corner of the site, under the A5630 and A46 towards the Rothley Brook. The topography is confined here so it is likely the drain will not cause significant flood risk to the site, but this should be confirmed at the site-specific Flood Risk Assessment stage.</p>		
		<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>	
	<b>30-year</b>		<b>100-year</b>	<b>1,000-year</b>
	3%		5%	13%
	Max depths (m)			
	>1.2		>1.2	>1.2
	Max velocity (m/s)			
	1-2		1-2	>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>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane
	<b>Area</b>	20.43 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p><b>Description of surface water flow paths:</b>            There are two significant surface water flows, present for all events. These flow northwards, along two depressions, and accumulate surface water along the northern boundary, an area of lower topography. The eastern flow route accumulates due to raised ground (A5630) and the western flow route accumulates at Gynsill Lane, also raised. The extents spread further out in each flood event. In the 100-year and 1,000-year events, this does act to bisect the site in these 2 locations.            Depths are high in all events, due to the ponding of surface water in the topographic depressions.            RoFSW 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 largely 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. The west of the site is located within a 1km grid square where <math>\geq 50\%</math> <math>&lt; 75\%</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 150m 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>		
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane		
	<b>Area</b>	20.43 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		N/A	N/A	N/A
	<b>Residual risk</b>	This site is not protected by any formal flood defences. The unnamed ordinary watercourse which intersects the site to the east is culverted under the A5630. If the entrance to the culvert becomes blocked, water is likely to back up and into the east of the site. The culvert entrance is in a topographic depression where it is unlikely water will escape from but the depth of water at this location will likely increase if the culvert is blocked.		
<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>	Access and egress to the site can be gained via Gynsill Lane for all modelled fluvial and surface water events. Even though in the 100-year and 1,000-year events the site is bisected, each portion of the site could gain access to Gynsill Lane or the A5630. 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.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane
	<b>Area</b>	20.43 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. As part of a site-specific Flood Risk Assessment, latest EA climate change allowances may need to be considered in a detailed hydraulic model, to confirm the impact in the site.</li> <li>Using Flood Zone 2 (1,000-year) as a proxy for climate change, there is a small increase in flood extent. Therefore, the site is predicted to be at an increase in flood risk in the future.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	Half of the site is underlain by Alluvium deposits consisting of clay, silt and sand, whilst the other half is underlain by Till deposits, consisting of diamicton.
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane
	<b>Area</b>	20.43 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane
	<b>Area</b>	20.43 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended 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 of the unnamed watercourse to the north-east.</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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 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.
- 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,

		<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>	<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 87% of the site outside of the Risk of Flooding from Surface Water zones. Development should also be steered away from the east of the site and into Flood Zone 1.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</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>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> </ul>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH144</b>
	<b>Address</b>	Land at Gynsill Lane & Anstey Lane
	<b>Area</b>	20.43 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.
<b>Mapping Information</b>		
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.		
<b>Flood Zones</b>	<p>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>This site is not covered by the EA Flood Zones; it is recommended that a more 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>	Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no available corresponding fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>																						
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane																						
	<b>Area</b>	9.29 ha																						
	<b>Current land use</b>	Greenfield																						
	<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 slop from south west to north east.</li> <li>There are no existing buildings located within the site boundary.</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 located at the proposed site.																						
	<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		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
0%	0%	0%	100%																					
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N/A																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>		
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane		
	<b>Area</b>	9.29 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Available data:</b> There is no Flood Zone mapping at the site as the site is not affected by fluvial flood risk.</p> <p><b>Flood characteristics:</b> The site is located within Flood Zone 1 and is therefore at a negligible risk of fluvial flooding. The site is at risk of surface water flooding.</p>		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		1%	3%	24%
		Max depths (m)		
		0-0.15	0.15-0.3	0.3-0.6
		Max velocity (m/s)		
		1-2	1-2	>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>			
	<p><b>Description of surface water flow paths:</b> Surface water flows in the 1,000-year event enter the site from the south eastern corner and the south western corner from higher ground, flowing north and converging in the north-east of the site. The flow path is largely parallel to the B591 and is present in all events from close to the northern boundary. The depths are generally low.</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 &lt;25% 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>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>		
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane		
	<b>Area</b>	9.29 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 1km 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 infrastructure</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.			
	<b>Residual risk</b>	There are no culverts or flood risk management features which pose a residual risk to the site.		
<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>	Safe access and egress is available for the site via the B591 to the east and the smaller road to the south for all surface water events, but consideration is needed in the 1,000-year event where there are two flow paths splitting the site and meeting in the north-west.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane
	<b>Area</b>	9.29 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	There are no superficial deposits at the site.
	<b>Soils</b>	Slowly permeable seasonally wet acid loamy and clayey soils
	<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 however, there is one located directly next to the NW corner of the site.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane
	<b>Area</b>	9.29 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>• All forms of source control are likely to be suitable.</li> <li>• 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.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention.</li> <li>• All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required.</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. If the site has contamination issues; a liner will be required.</li> </ul>
<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception Test is not required as the site is not within Flood Zone 2 or 3 but a Flood Risk Assessment is still required. See below for further details on requirements for a Flood Risk Assessment and surface water issues to be considered.</p>

	<p><b>Requirements and guidance for site-specific Flood Risk Assessment</b></p>	<p><b>Flood Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>• At the planning application stage, a site-specific Flood Risk Assessment will be required for this site as development is greater than 1ha in size and is subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites: <ul style="list-style-type: none"> <li>◦ contain land which has been identified by the Environment Agency as having critical drainage problems; or</li> <li>◦ contain land identified in the strategic flood risk assessment as being at increased flood risk in future.</li> </ul> </li> <li>• Other sources of flooding must be considered as part of any site-specific Flood Risk Assessment, including surface water and groundwater.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage.</li> <li>• The development should be designed using a sequential approach. Development should be steered away from areas of 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.</li> </ul> <p><b>Guidance for site design and making development safe:</b></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• 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.</li> <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</li> </ul>
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane
	<b>Area</b>	9.29 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>layout and design to ensure there is no increase in runoff beyond the current greenfield rates.</p> <ul style="list-style-type: none"> <li>• On site attenuation schemes would need to be tested 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 surface water 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> <li>• The site is in relatively close proximity to two sites permitted by the Environment Agency and therefore development at this location may be adversely affected by amenity issues associated with those sites. The sites are: Newhurst Recovery Facility and Morris Recycling Limited.</li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH405</b>
	<b>Address</b>	Land west of the B591/Ingleberry Road and north of Iveshead Lane
	<b>Area</b>	9.29 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 71% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered towards the north west and south west 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>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>• Consider access in the 1,000-year event which acts as a climate change indication, where the site is bisected.</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>	There is no Flood Zone data available at the site as there are no watercourses in proximity of the site.	
<b>Climate change</b>	Climate change was based on the 1,000-year surface water flood extent to serve as an indication of possible extents associated with the unmodelled watercourse which flows through the centre of the site.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no available fluvial data as there are no watercourses present. The Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>																						
	<b>Address</b>	Loughborough Road																						
	<b>Area</b>	5.70 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from a high elevation in the north west corner of the site into a topographic depression the centre of the site.</p> <ul style="list-style-type: none"> <li>• The south of the site also slopes towards this location.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> <li>• There are no existing buildings located within the site.</li> </ul>																						
	<b>Existing drainage features</b>	An unnamed drainage feature tracks north along the north eastern boundary and is culverted under the A6 just outside the north east corner of the site. This unnamed watercourse drains into the Grand Union Canal and River Soar 1.6km north east of the site. The Poultney Brook also flows shortly south of the site after turning 90 degrees from north to east, flowing into the Quorn Brook and River Soar. The site is located between these two floodplains.																						
	<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>33%</td> <td>33%</td> <td>47%</td> <td>53%</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">High</td> </tr> </tbody> </table>				<b>Proportion of site at risk</b>				<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>	33%	33%	47%	53%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<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> <p><b>Available data:</b> The site is in the vicinity of the Environment Agency’s Upper Lower Soar (2012) and Loughborough Tributaries (2017) hydraulic models and 2D generalised modelling along the unnamed watercourses and Poultney Brook. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p><b>Flood characteristics:</b></p> <p>The Environment Agency’s Flood Map for Planning shows the east of the site and across the centre towards the south west corner to be located within Flood Zone 3a. This is further increased for Flood Zone 2 with extents increasing towards the north west of the site. Fluvial risk to the site originates from a combination and interaction of the Poultney Brook and the outer River Soar floodplains. There is also a small drain which enters a culvert under Loughborough Road and reappears along the site’s north-eastern boundary.</p> <p>When flood risk management features are applied and the defended Upper Lower Soar and Loughborough Tributaries model results are inspected, fluvial risk associated with the River Soar becomes negligible for the defended 100-year extent; it does not reach the site. For the defended 1,000-year reaches up to the A6, bounding the north of the site.</p> <p>Regarding Flood Zone 3b, this has been assumed to be Flood Zone 3a in this assessment, due to the presence of generalised outputs at this location as the Poultney Brook modelled 20-year is not present until further downstream; however, the 20-year River Soar flood extents do not affect the site and in reality, there may not be the flow path interaction between the Soar and Poultney floodplains as shown in the EA’s Flood Map for Planning, as the Loughborough Road is embanked. Flood risk from the drain along the boundary should be investigated though, as this may help link local drains to these larger floodplains.</p> <p>It is recommended that a more detailed hydraulic model is constructed or extended along the Poultney Brook or to investigate the connections of these small, localised drains at the site-specific Flood Risk Assessment stage, to confirm fluvial flood risk and the functional floodplain at the site.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>		
	<b>Address</b>	Loughborough Road		
	<b>Area</b>	5.70 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		<1%	1%	21%
		Max depths (m)		
		0.3-.0.6	0.3-0.6	0.3-0.6
		Max velocity (m/s)		
		N/A	0-0.25	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>		
		<p><b>Description of surface water flow paths:</b>                      The site experiences small areas of surface water ponding, in areas of a topographic depression, for 100-year and 1,000-year events. Additionally, there is a significant surface water flow path expanding across the southern half of the site for the 1,000-year event.                      There is a significant build-up of surface water ponding shortly west of the site, up against the embanked Loughborough Road. Depths are shallow in all events, event the 1,000-year where the expanse is larger.                      RoFSW 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 75\%</math> of the area is predicted to be at risk of groundwater flooding.                      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 at the site.</p>	
<b>Reservoir</b>	<p>The available <a href="#">online</a> maps show that the maximum extent from reservoir flooding has a significant reach into the site.</p>			

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



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	<b>Address</b>	Loughborough Road		
	<b>Area</b>	5.70 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<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 550m of the proposed development site. 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 infrastructure</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.			
<b>Residual risk</b>	<p>There is an unnamed ordinary watercourse which flows along the north-east site boundary and is culverted under the A6 to the north of the site. If the entrance to this culvert becomes blocked water is likely to back up, causing increased surface water ponding in an area already susceptible to risk. The culvert entrance is in a topographic depression where it is unlikely water will escape from but the depth of water at this location will likely increase if the culvert is blocked. This should be investigated further in a site-specific FRA.</p>			
<b>Emergency planning</b>	<b>Flood warning</b>	<p>The site is situated within the Environment Agency's Lower River Soar in Leicestershire Flood Alert area (034WAF428) and River Soar at Quorn Flood Warning area (034FWFSOQUORN).</p>		
	<b>Access and egress</b>	<p>Access and egress to the site can be gained from the north west of the site via Loughborough Road and Terry Yardley Way (A6004) for all fluvial and surface water events. Access is also possible to the south-east onto Loughborough Road.</p> <p>It should be noted that the surface water and fluvial extents are shown to bisect the site and therefore consideration is needed regarding access to the north-eastern portion of the site.</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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There are detailed modelling outputs from the Upper Lower Soar and Loughborough Tributaries modelling studies, located to the east of the site. Outputs from these models predict an increase in flood risk compared to the 100-year (Flood Zone 3). The extents are shown to encroach into the central portion of the site. Risk associated with the unmodelled watercourses will need to be considered 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.</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 the Wealden Group (mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	The site is underlain with Alluvium deposits consisting of clay, silt and sand.
	<b>Soils</b>	Mostly loamy and clayey floodplain soils with naturally high groundwater however, the NW corner has 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 recommended 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. It should be noted that fluvial flood risk is high at this site, which may pose difficulties for the development, though more detailed investigations may show the site is at lower flood risk than the Flood Map for Planning shows.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 unmodelled parts of local watercourses. The EA may have some concerns about flood flow routes into this site.
- 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.
- 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.

		<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>	<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 79% of the site outside of the Risk of Flooding from Surface Water zones and within Flood Zone 1. Therefore, development should be steered towards the north west and towards the southern site boundary.</li> <li>• It should be noted that the surface and fluvial flood water is shown to bisect the site and therefore consideration is needed regarding access from either side, avoiding areas of highest risk.</li> <li>• Detailed hydraulic modelling may need to be conducted for the unnamed watercourse that intersects the site to assess the present and future fluvial risk to the site.</li> <li>• Areas in Flood Zone 2 are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 and no development at all is permitted in Flood Zone 3b.</li> </ul>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential

	<ul style="list-style-type: none"> <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>• 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>
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## Mapping Information

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.

<b>Flood Zones</b>	The Flood Zone data is based on the Environment Agency's Flood Map for Planning. The site is in the vicinity of the Environment Agency's Upper Lower Soar (2012) and Loughborough Tributaries (2017) hydraulic models and 2D generalised modelling along the unnamed watercourses and Poultney Brook. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.
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<b>Climate change</b>	Climate change was based the Environment Agency's Upper Lower Soar (2012) and Loughborough Tributaries (2017) hydraulic models, which extend to the site. Where there is no modelling, Flood Zone 2 can be used as a proxy. Investigation of climate change impacts specifically from the Poultney Brook/ unmodelled drains in this area may be required at site-specific stage.
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<b>Fluvial depth, velocity and hazard mapping</b>	The modelled outputs used to assess depth, velocity and hazard are from the detailed Environment Agency Upper Lower Soar (2012) and Loughborough Tributaries (2017) hydraulic models, though these do not impact the site. Depth, velocity and hazard outputs of fluvial risk associated with the unnamed watercourse which flows through the site are not available, therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.
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## Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH343</b>
	<b>Address</b>	Loughborough Road
	<b>Area</b>	5.70 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Surface Water</b>		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>																						
	<b>Address</b>	East Road/Narrow Lane																						
	<b>Area</b>	5.50 ha																						
	<b>Current land use</b>	Greenfield																						
	<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>• There is no high-resolution LIDAR available for the site, therefore coarse 10m resolution data has been used.</li> <li>• The site is generally flat, with a slope from east to west.</li> <li>• There are no existing buildings located within the site.</li> <li>• The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	An unnamed watercourse runs along the north site boundary adjacent to East Road/A6006. This then joins the River Mantle 115m south west of the site.																						
	<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		
<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																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>		
	<b>Address</b>	East Road/Narrow Lane		
	<b>Area</b>	5.50 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Available data:</b> The site is not covered by any modelling data or Environment Agency flood maps, though the site is bounded by an unnamed watercourse. This is because the Flood Zones represent catchments greater than 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 unnamed ordinary watercourse which flows along the north and western site boundaries and joins the River Mantle, which is represented in the EA's Flood Zones. Fluvial risk at the site is therefore unknown; it is recommended a more detailed assessment is carried out at detailed Flood Risk Assessment stage.</p> <p>Using surface water extents as an indication, the location of the unnamed 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>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		7%	15%	29%
		Max depths (m)		
		0.3-0.6	0.3-0.6	0.6-0.9
		Max velocity (m/s)		
		1-2	1-2	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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p><b>Description of surface water flow paths:</b>            Surface water flows occur along the unnamed watercourse, which bounds the north/ west of the site. There is also a depression crossing the A-road, where a 1,000-year surface water flow path from the north joins the watercourse. Flow accumulation is greater closer to where the watercourse merges with the River Mantle as the topography is lower. This flow occurs for all events though is more pronounced in the 100-year and 1,000-year events. Depths are relatively shallow in most events, though will be capturing some of the watercourse channel.</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 largely 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. A small area to the east is located within a grid square where <math>&lt; 25\%</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 1km 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>		
	<b>Address</b>	East Road/Narrow Lane		
	<b>Area</b>	5.50 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Flood risk management infrastructure</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.			
	<b>Residual risk</b>	The unnamed ordinary watercourse located to the south west of the site is culverted adjacent to Manor Court Road, leading to the River Mantle under Brook Street. If the entrance to the culvert becomes blocked water is likely to back up, causing increased surface water ponding in an area already susceptible to this risk. The culvert entrance is in a topographic depression where it is unlikely water will escape from but the depth of water at this location will likely increase if the culvert is blocked.		
<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>Access and egress to the site is compromised from the north along East Road, as the watercourse bounds the site and this is where all the surface water flow paths occur. It may be possible is the 30-year event to access, but this would require provision for crossing the channel. Alternatively, there is Brook Street, if accessed from the south-eastern site corner, away from the high surface water risk flowing all down Brook Street to the west. Access will need to be carefully considered at this site.</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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. Risk from the bounding drain should be investigated in a detailed assessment.</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 limestone, mudstone, siltstone and sandstone.
	<b>Superficial Geology</b>	There are no superficial deposits at the site.
	<b>Soils</b>	The site has a combination of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and lime-rich 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>Consideration still needs to be given to the watercourses not represented by the EA's Flood Zones as there will still be fluvial risk here, which needs to be confirmed in a FRA.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 from the drain along the northern boundary.
- 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.
- 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

		<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 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>
<p><b>Key messages</b></p>		<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 71% 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. It should be noted that the surface water flood risk bisects the site and therefore consideration is needed regarding access to the north-eastern portion of the site.</li> <li>• Detailed hydraulic modelling will need to be conducted for the unnamed watercourse along the northern boundary to assess the present and future fluvial risk to the site. This may show some risk which will then need to be considered and development steered away from.</li> <li>• Once the fluvial risk associated with the site is confirmed, areas in Flood Zone 2 (1,000-year extent) are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF. No residential development is permitted in Flood Zone 3 (100-year extent) and no development at all is permitted in Flood Zone 3b (20-year extent).</li> <li>• If flood mitigation measures are implemented then they are tested to ensure that they will not displace water elsewhere</li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>(for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).</p> <ul style="list-style-type: none"> <li>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>• Access and egress to the site is compromised from the north along East Road, as the watercourse bounds the site, and this is where all the surface water flow paths occur. Alternatively, there is Brook Street, if accessed from the south-eastern site corner, away from the high surface water risk flowing all down Brook Street to the west. Access will need to be carefully considered at this site.</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 fluvial modelling information for this site and the Environment Agency's Flood Map for Planning shows the site to be located within Flood Zone 1. A detailed hydraulic model may be required at the site-specific Flood Risk Assessment stage, to confirm flood risk along the northern boundary.</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 available fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping has been used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.</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>	

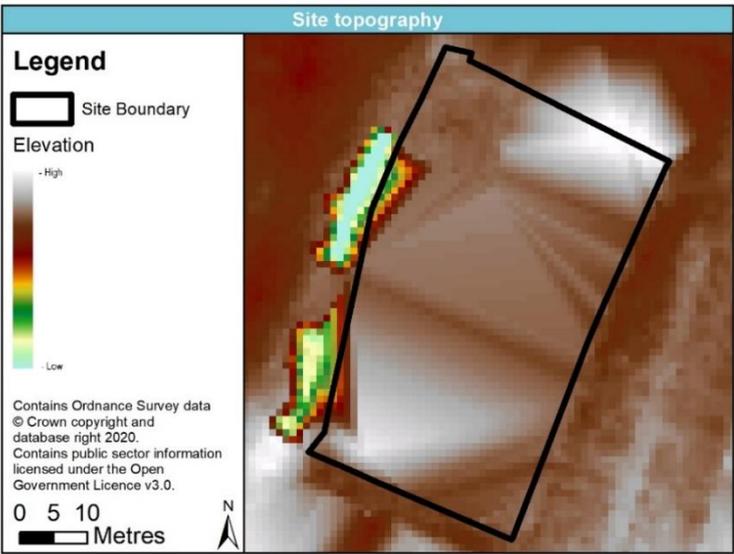
## Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH296</b>
	<b>Address</b>	East Road/Narrow Lane
	<b>Area</b>	5.50 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>																						
	<b>Address</b>	Devonshire Square																						
	<b>Area</b>	0.22 ha																						
	<b>Current land use</b>	Commercial																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	 <p>There is a slight downhill slope from east to west across the site. There is a topographic depression along the west site boundary where the Wood Brook is located.</p> <ul style="list-style-type: none"> <li>• There is an existing building which covers the majority of the site which has 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>	The Wood Brook watercourse flows directly next to the western site boundary, which is culverted several times with very short reaches of open channel.																						
	<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>&lt;1%</td> <td>&lt;1%</td> <td>77%</td> <td>23%</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">High</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>	<1%	<1%	77%	23%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
<1%	<1%	77%	23%																					
<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>																								
High																								

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



Site details	Site Code	PSH487
	Address	Devonshire Square
	Area	0.22 ha
	Current land use	Commercial
	Proposed land use	Residential
		<p><b>Available data:</b> The site is covered by the latest 2021 Environment Agency Wood Brook hydraulic model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p> <p>The current EA online Flood Map for Planning shows a different picture of flood risk, as this is based on older outdated modelling, which is due to be updated in 2021 using latest Wood Brook results. This dataset has therefore not been used in this assessment.</p> <p><b>Flood characteristics:</b></p> <p>This site is located adjacent to the Wood Brook on its right bank, where the channel has two open channel reaches and 2 culverted sections along the site's western boundary. The site is at low fluvial risk in the 100-year undefended Wood Brook (Flood Zone 3a) scenario, with only minor encroachment into the site along the northern and north-western boundary from the out of bank flow path. The site is shown to be approximately three-quarters covered by Flood Zone 2, with a large 'dry island' in the southern half of the site.</p> <p>The defended 20-year (Flood Zone 3b) and defended 100-year extents do not affect the site; the water is still in-bank in these scenarios along the site boundary, with the main culvert running alongside the site, showing the 'actual' flood risk when flood risk management features are in place.</p> <p>As the defended 100-year extent does not affect the site, the maximum depth for the 100-year plus 30% (higher central) climate change event has been inspected, which encroaches into the northern edge of the site and north-eastern boundary. The deepest area of the site is along the northern boundary (excluding the Wood Brook channel itself to the west), with the highest depth of 0.14m. Velocity and hazard outputs were provided for the 100-year event, but as there is no risk to the site in this event, these should be interrogated in the climate change events at site-specific level. If velocities are also high in the areas of deepest water, this would result in a high hazard rating.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>		
	<b>Address</b>	Devonshire Square		
	<b>Area</b>	0.22 ha		
	<b>Current land use</b>	Commercial		
	<b>Proposed land use</b>	Residential		
<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	<1%	1%	31%	
	Max depths (m)			
	>1.2	>1.2	>1.2	
	Max velocity (m/s)			
	1-2	>2	>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>			
	<p><b>Description of surface water flow paths:</b>                      The area surrounding the site is at risk of surface water flooding in all events. The site itself only experiences surface water flooding during a 1,000-year event, though this covers a third of the site and bisects the site. The 100-year and 1,000-year extents completely surround the site, though these depths are shallow. The 30-year extent is restricted to Granby Street to the north and isolated reaches along bordering roads.                      Surface water depths are very high in all events, but this is due to part of the Wood Brook channel being captured along the western site boundary. Depths on site in the 1,000-year event are &lt;0.3m in the middle of the site and 0.3-0.9m in the north-western corner. Velocities are similarly high due to capturing the open channel, but on site themselves are quite low.                      Loughborough sees a very large overland flow route from surface water in all events, along the course and topography of the Wood Brook, though the Wood Brook itself is largely in culvert through Loughborough. 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. The surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling. Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.</p>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>		
	<b>Address</b>	Devonshire Square		
	<b>Area</b>	0.22 ha		
	<b>Current land use</b>	Commercial		
	<b>Proposed land use</b>	Residential		
	<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 50\%</math> &lt;75% 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>	<p>The available <a href="#">online</a> maps show that the maximum extent from reservoir flooding reaches across the entire proposed site. Reservoir risk is considered low, but this risk should be confirmed in a site-specific Flood Risk Assessment.</p>		
	<b>Flood history</b>	<p>Between 2018-2020, there have been 87 LLFA reports of internal flooding; 32 of which were in Loughborough. There are no records of historic flooding at this site from the Environment Agency. No recorded historical flood incidents occurred within 450m of the proposed development site.</p> <p>Records from Leicestershire County Council detail historical flood incidents from all sources, whereas the Environment Agency dataset only records incidents of fluvial, tidal or coastal flooding.</p> <p>Loughborough is also one of the 40 highlighted priority settlements for the purpose of the Local Flood Risk Management Strategy, coming in the top 5 settlements at risk from surface water, with most properties at risk.</p> <p>The Lead Local Flood Authority should be contacted to obtain further details.</p>		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High ground	N/A	N/A
		This site is near high ground on either side of where Wood Brook enters and exits the site. The standard of protection and condition is unknown.		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
	<b>Residual risk</b>	The Wood Brook is culverted in several locations in close proximity of the site and also upstream where a significant overland flow path exists. If the entrance to any of the culverted sections were to become blocked, water could back up and flood the site further. The site is therefore considered to be at a residual risk from the Wood Brook culverts. This should be investigated further in a site-specific FRA and blockage assessments undertaken.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's Leicester Wood Brook Flood Alert area (034WAF426) and the East Midlands Flood Warning area (034FWFWOLUFSOUTH).
	<b>Access and egress</b>	Dry access and egress is available for the site for fluvial events via Cattle Market Road to the east and south of the site. Wet access and egress could be available to the site for the 30-year and 100-year surface water event in this location as well. This is due to the hazard rating being between 0.50 and 0.75 and is considered safe. Safe wet access and egress may not be available for the 1,000-year surface water event due to the hazard rating being between 1.25 and 2.00 around the entire site boundary. Access to the north and west should be avoided and consideration given in the 1,000-year of the site being bisected by surface water risk. 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 using the latest Wood Brook model results, to confirm whether access for emergency vehicles could still be obtained in the climate change events.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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>Detailed modelled outputs from the latest 2021 Wood Brook modelling have been used to assess the impact of climate change on fluvial risk. The 100-year 20%, 30% and 50% defended uplifts show an increase in flood risk in comparison to the 100-year defended event, as the defended 100-year extent does not affect the site. The +20% and +30% extents are similar to the undefended 100-year extent, around the northern periphery, with the +50% resembling more Flood Zone 2 covering over half the site.</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, and account for integrated modelling given the national surface water does not represent hydraulic structures.</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 the mudstone, siltstone and sandstone.
	<b>Superficial Geology</b>	The site is underlain with Alluvium deposits, consisting of clay, silt and sand.
	<b>Soils</b>	Loamy soils with naturally high groundwater
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
	<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 due to the site potential groundwater flooding.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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>The site is largely covered by Flood Zone 2 according to the EA's latest Wood Brook Flood Zones and undefended 100-year (FZ3a) risk encroaches slightly into the northern and north-western boundary. The Exception Test will need to be applied if the site is residential and in Flood Zone 3. However, the Exception Test is based on 'defended'/ 'actual' flood risk, and when using the defended 100-year extents, this shows no risk to the site; only the climate change extents and above affect the site, though these flood extents match more closely with the Flood Zones.</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> <p>Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.</p>

**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 is located within Flood Zone 3 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- Consultation with the Local Authority, Local Lead Flood Authority and the Environment Agency should be undertaken at an early stage.
- All 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.
- Flood risk needs to be considered for the lifetime of the development, accounting for climate change.
- Latest modelled outputs from the Wood Brook Environment Agency study show the site is located in the Flood Zones, but not the 100-year defended/ actual risk. Risk to the site is more significant in the climate change events and is largely covered by Flood Zone 2.
- Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.
- The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, the culvert runs along the western boundary, so a 8-10m easement area will be required from the channel. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
- 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.
- 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. 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 or existing ground levels may be needed. Residential development may need to be placed on higher levels. Any flow paths should not be obstructed so as to displace the risk elsewhere. Design should account for surface water with an element of climate change.
- 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.
- 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.
- All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff.
- 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.
- 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.
- Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk.
- The opportunity should be taken to store additional water on development sites in the Wood Brook to alleviate flooding in the wider area, in addition to long term storage requirements. Opportunities to complement and enhance

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
		<p>the existing NFM scheme within the catchment should also be investigated. Such schemes may also improve the surface water risk in the catchment, by slowing the fluvial flows in the system allowing the surface water drainage to outfall to the channel.</p> <ul style="list-style-type: none"> <li>• Developers should enter into conversations with the Borough Council/ EA at pre-application stage to understand the latest position with regards to the Environment Agency led Wood Brook scheme. Betterment may be required: <ul style="list-style-type: none"> <li>○ In the form of additional storage for surface water runoff from development sites on site,</li> <li>○ In the form of 'in kind' works, such as additional floodplain storage on site, and/ or</li> <li>○ In the form of a contribution towards wider community flood alleviation works within the catchment.</li> </ul> </li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential

## Key messages

- The modelled defended 100-year shows the site to be developable, with no risk shown to the site; however, the climate change extents increase in the +50% to nearer the extent of Flood Zone 2, so consideration is needed for flood risk mitigation and safe access for the lifetime of the development.
  - Surface water is a low risk generally to the site, but the site is surrounded by the 100-year flood extents and is bisected in the 1,000-year event. However, the depths are fairly low and so access for vehicles should be possible.
  - Site-specific assessments should investigate surface water risk in more detail using integrated modelling to fully understand the interaction between fluvial and surface water risk and hydraulic structures.
  - The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, the culvert runs along the western boundary, so a 8-10m easement area will be required from the channel. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
  - If flood mitigation measures and flood resilient design are implemented, then they are tested to ensure that they will not displace water elsewhere.
- Refer to the 'detailed guidance for developers' section (above) 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 was the Environment Agency's Risk of Flooding from Surface Water mapping. More details regarding data used for this assessment can be found below.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<b>Flood Zones</b>	<p>The EA Flood Map for Planning does not currently represent the latest Environment Agency's 2021 Wood Brook modelling, which was in progress at the time of the SFRA, and hence the current EA Flood Zones 3a and 2 largely overestimate flood risk along this watercourse, with them being based on the Lower Soar modelling. Due to the significant difference between the EA's current Flood Map for Planning in this area and new Wood Brook model results, the new model results have been used to derive the Flood Zones for the purpose of the L2 SFRA at the four Loughborough sites. The draft defended and undefended 100-year extents have been merged to form a composite Flood Zone 3a extent, and the defended and undefended 1,000-year flood extents have been merged with the Historic Flood Map to form a composite Flood Zone 2 extent. Flood Zone 3b has been derived from the 20-year defended modelled flood extent.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Climate change</b>	<p>Climate change was based on the latest Environment Agency 2021 Wood Brook model and the 1,000-year surface water flood extent. It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 100-year defended modelled outputs were used to assess depth, velocity and hazard are from the detailed 2021 Wood Brook hydraulic model. These do not affect the site, but the other modelled event outputs were not provided at the time of the study.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</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>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH487</b>
	<b>Address</b>	Devonshire Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Commercial
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>																						
	<b>Address</b>	Market Street																						
	<b>Area</b>	0.34 ha																						
	<b>Current land use</b>	Greenfield																						
	<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>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>	The Wood Brook is culverted directly under the current buildings that currently occupy the site and under Granby Street 40m south of the site.																						
	<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>18%</td> <td>82%</td> <td>18%</td> </tr> <tr> <td colspan="4"><b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b></td> </tr> <tr> <td colspan="4">High</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%	18%	82%	18%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				High		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
0%	18%	82%	18%																					
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High																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p><b>Available data:</b> The site is covered by the latest 2021 Environment Agency Wood Brook hydraulic model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p> <p>The current EA online Flood Map for Planning shows a different picture of flood risk, as this is based on older outdated modelling, which is due to be updated in 2021 using latest Wood Brook results. This dataset has therefore not been used in this assessment.</p> <p><b>Flood characteristics:</b></p> <p>This site is at fluvial risk in the 100-year undefended Wood Brook (Flood Zone 3a) scenario, in the south-western corner and southern boundary where the water out of bank forms an overland flow path. The site is shown to be largely covered by Flood Zone 2, with only a stretch along the northern boundary not at risk (though this area is surrounded by Flood Zone 2 still). The southern area of the site appears to be within the overland flow path, whereas the north-eastern portion is the outer flood extent of this flow path.</p> <p>The defended 20-year (Flood Zone 3b) and defended 100-year extents do not affect the site; the water is still in-bank in these scenarios upstream and downstream, with the main culvert running underneath the site, showing the 'actual' flood risk when flood risk management features are in place.</p> <p>As the defended 100-year extent does not affect the site, the maximum depth for the 100-year plus 30% (higher central) climate change event has been inspected, which covers the majority of the site. The deepest area of the site is a depression in the south-western area of the site, with maximum depths of 0.5m. Depths reach 0.09m in the far north-eastern corner. Velocity and hazard outputs were provided for the 100-year event, but as there is no risk to the site in this event, these should be interrogated in the climate change events at site-specific level. If velocities are also high in the areas of deepest water, this would result in a high hazard rating.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>		
	<b>Address</b>	Market Street		
	<b>Area</b>	0.34 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	7%	8%	100%	
	Max depths (m)			
	0.15-0.3	0.3-0.6	0.6-0.9	
	Max velocity (m/s)			
	0.-0.25	0-0.25	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>			
	<p><b>Description of surface water flow paths:</b>                      The entire site is at risk of surface water flooding in the 1,000-year event. In the 30-year and 100-year events, the site is narrowly bisected across the middle, so risk is lower.                      Surface water depths increase in all surface water events, from &lt;0.3m to up to 0.9m whereas velocity is shown to be generally low until the 1,000-year event.                      Loughborough sees a very large overland flow route from surface water in all events, along the course and topography of the Wood Brook, though the Wood Brook itself is largely in culvert through Loughborough.                      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. The surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.                      Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.</p>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>		
	<b>Address</b>	Market Street		
	<b>Area</b>	0.34 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 50\%</math> &lt;math&gt;&lt; 75\% of the area is predicted to be at risk of groundwater flooding. 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>	<p>The available <a href="#">online</a> maps show that the site is partially at risk from reservoir flooding (at its maximum extent). Reservoir risk is considered low, but this risk should be confirmed in a site-specific Flood Risk Assessment.</p>		
	<b>Flood history</b>	<p>Between 2018-2020, there have been 87 LLFA reports of internal flooding; 32 of which were in Loughborough. There are no records of historic flooding at this site from the Environment Agency. No recorded historical flood incidents occurred within 500m of the proposed development site. Records from Leicestershire County Council detail historical flood incidents from all sources, whereas the Environment Agency dataset only records incidents of fluvial, tidal or coastal flooding. Loughborough is also one of the 40 highlighted priority settlements for the purpose of the Local Flood Risk Management Strategy, coming in the top 5 settlements at risk from surface water, with most properties at risk. The Lead Local Flood Authority should be contacted to obtain further details.</p>		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High ground	N/A	N/A
	<b>Residual risk</b>	<p>This site is adjacent to higher ground along the western boundary of the site, following the banks of Wood Brook. The Wood Brook is culverted directly under the site. If the entrance to this culvert were to become blocked or if a manhole were to surcharge, this could result in further flooding at the site. The site is therefore considered to be at a residual risk. This should be investigated further in a site-specific FRA.</p>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's Leicester Wood Brook Flood Alert area (034WAF426) and the East Midlands Flood Warning area (034FWFWOLUFSOUTH).
	<b>Access and egress</b>	<p>Access and egress is available for the site for the 100-year and climate change fluvial events as well as the 30-year and 100-year surface water events along Market Place and Market Street. Wet access and egress could be available along the same route for both the fluvial and surface water 1,000-year events as the hazard rating is &lt;1.25 in this location and is considered suitable for emergency services vehicles. The site is almost completely covered in the 1,000-year event and access to the west should be avoided.</p> <p>Consideration should be given to how the southern portion of the site will gain safe access, which is more surrounded by 30-year and 100-year surface water risk south of where the site is bisected.</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 using the latest Wood Brook model results, to confirm whether access for emergency vehicles could still be obtained in the climate change events.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>Detailed modelled outputs from the latest 2021 Wood Brook modelling have been used to assess the impact of climate change on fluvial risk. The 100-year 20%, 30% and 50% defended uplifts show a significant increase in flood risk in comparison to the 100-year defended event, as the defended 100-year extent does not affect the site. The extents are larger than the 100-year undefended extent, but do not reach that of the 1,000-year defended flood event. They increase in size from the +20% affecting the southern portion of the site, to the +30% increasing to the middle of the site and north-eastern edge and the +50% further covering the middle of the site.</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, and account for integrated modelling given the national surface water does not represent hydraulic structures.</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 the mudstone, siltstone and sandstone.
	<b>Superficial Geology</b>	The site is underlain with Alluvium deposits, consisting of clay, silt and sand.
	<b>Soils</b>	Loamy soils with naturally high groundwater
	<b>Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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 due to the site potential groundwater flooding.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>The site is largely covered by Flood Zone 2 according to the EA's latest Wood Brook Flood Zones and affected by undefended 100-year (FZ3a) risk is the south-western corner. The Exception test will need to be applied if the site is residential and in Flood Zone 3. However, the Exception Test is based on 'defended'/ 'actual' flood risk, and when using the defended 100-year extents, this shows no risk to the site; only the climate change extents and above affect the site, though these flood extents match more closely with the Flood Zones.</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> <p>Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.</p>

**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 is located within Flood Zone 3 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- All 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.
- Flood risk needs to be considered for the lifetime of the development, accounting for climate change.
- Latest modelled outputs from the Wood Brook Environment Agency study show the site is located in the Flood Zones, but not the 100-year defended/ actual risk. Risk to the site is more significant in the climate change events and is wholly covered by Flood Zone 2.
- Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.
- The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, this is through the middle of the site, requiring 16-20m easement area, which will have implications for development. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
- 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. 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 or existing ground levels may be needed. Residential development may need to be placed on higher levels, allowing the ground floor to flood, e.g. through a void or siting car parking on ground levels. The flow path in the south-western corner should not be obstructed so as to displace the risk elsewhere. Design should account for surface water with an element of climate change.
- 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.
- 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.
- All development should adopt source control SuDS techniques to reduce the risk of frequent low impact flooding due to post development runoff.
- 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.
- 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.
- Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk.
- The opportunity should be taken to store additional water on development sites in the Wood Brook to alleviate

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
	<b>Address</b>	Market Street
	<b>Area</b>	0.34 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>flooding in the wider area, in addition to long term storage requirements. Opportunities to complement and enhance the existing NFM scheme within the catchment should also be investigated. Such schemes may also improve the surface water risk in the catchment, by slowing the fluvial flows in the system allowing the surface water drainage to outfall to the channel.</p> <ul style="list-style-type: none"> <li>• Developers should enter into conversations with the Borough Council/ EA at pre-application stage to understand the latest position with regards to the Environment Agency led Wood Brook scheme. Betterment may be required: <ul style="list-style-type: none"> <li>○ In the form of additional storage for surface water runoff from development sites on site,</li> <li>○ In the form of 'in kind' works, such as additional floodplain storage on site, and/ or</li> <li>○ In the form of a contribution towards wider community flood alleviation works within the catchment.</li> </ul> </li> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH488</b>
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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential

## Key messages

- The modelled defended 100-year shows the site to be developable, with no risk shown to the site; however, the climate change extents fully surround the site boundary and Flood Zone 2 largely covers the site, so consideration is needed for flood risk mitigation and safe access for the lifetime of the development.
  - Surface water access to/ from the site looks possible in the 30-year and 100-year events as the site is narrowly bisected, though consideration is needed for the portion of site south of this surface water risk. Any parts of the site in a flow path (south-western corner) needs to be maintained and not obstructed in future development design.
  - Site-specific assessments should investigate surface water risk in more detail using integrated modelling to fully understand the interaction between fluvial and surface water risk and hydraulic structures.
  - The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, this is through the middle of the site, requiring 16-20m easement area. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
  - If flood mitigation measures and flood resilient design are implemented, then they are tested to ensure that they will not displace water elsewhere.
- Refer to the 'detailed guidance for developers' section (above) 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 was the Environment Agency's Risk of Flooding from Surface Water mapping. More details regarding data used for this assessment can be found below.

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Flood Zones</b>	<p>The EA Flood Map for Planning does not currently represent the latest Environment Agency's 2021 Wood Brook modelling, which was in progress at the time of the SFRA, and hence the current EA Flood Zones 3a and 2 largely overestimate flood risk along this watercourse, with them being based on the Lower Soar modelling. Due to the significant difference between the EA's current Flood Map for Planning in this area and new Wood Brook model results, the new model results have been used to derive the Flood Zones for the purpose of the L2 SFRA at the four Loughborough sites. The draft defended and undefended 100-year extents have been merged to form a composite Flood Zone 3a extent, and the defended and undefended 1,000-year flood extents have been merged with the Historic Flood Map to form a composite Flood Zone 2 extent. Flood Zone 3b has been derived from the 20-year defended modelled flood extent.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Climate change</b>	<p>Climate change was based on the latest Environment Agency 2021 Wood Brook model and the 1,000-year surface water flood extent. It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 100-year defended modelled outputs were used to assess depth, velocity and hazard are from the detailed 2021 Wood Brook hydraulic model. These do not affect the site, but the other modelled event outputs were not provided at the time of the study.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</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>	

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>																						
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square																						
	<b>Area</b>	0.22 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<ul style="list-style-type: none"> <li>The site generally slopes from west to east.</li> <li>There is a road located within the site boundary which provides a low depression in the topography to the east of the site.</li> <li>The ground slope across the site generally has a gradient of less than 5%.</li> </ul>																						
	<b>Existing drainage features</b>	The Wood Brook watercourse is culverted directly under the site.																						
	<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>59%</td> <td>100%</td> <td>0%</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">Medium</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%	59%	100%	0%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				Medium		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
0%	59%	100%	0%																					
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Medium																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>		
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square		
	<b>Area</b>	0.22 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		<p><b>Available data:</b> The site is covered by the latest 2021 Environment Agency Wood Brook hydraulic model. The extent of the Flood Zones predicted by the flood model are different to the extent of the actual flood risk, as there are flood risk management features that change the risk.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p> <p>The current EA online Flood Map for Planning shows a different picture of flood risk, as this is based on older outdated modelling, which is due to be updated in 2021 using latest Wood Brook results. This dataset has therefore not been used in this assessment.</p> <p><b>Flood characteristics:</b></p> <p>This site is at high fluvial risk in the 100-year undefended Wood Brook (Flood Zone 3a) scenario, where the flow path forms a circle around the site's boundary, leaving a 'dry island' in the middle. The site is shown to be 100% covered by Flood Zone 2 and is situated in the middle of this overland flow path which flows south to north.</p> <p>The defended 20-year (Flood Zone 3b) and defended 100-year extents do not affect the site; the water is still in-bank in these scenarios upstream and downstream, with the main culvert running underneath the site, showing the 'actual' flood risk when flood risk management features are in place.</p> <p>As the defended 100-year extent does not affect the site, the maximum depth for the 100-year plus 30% (higher central) climate change event has been inspected, which covers the majority of the site. The deepest areas of the site are along the southern, eastern and north-eastern boundaries, with the highest depth of 0.41m in the far north-eastern corner. Depths reach 0.33m in the southern boundary. Velocity and hazard outputs were provided for the 100-year event, but as there is no risk to the site in this event, these should be interrogated in the climate change events at site-specific level. If velocities are also high in the areas of deepest water, this would result in a high hazard rating.</p>		
	<b>Surface Water</b>	<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		54%	91%	100%
		Max depths (m)		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>		
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square		
	<b>Area</b>	0.22 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
		0.6-0.9	0.6-0.9	>1.2
		Max velocity (m/s)		
		0.5-1	1-2	1-2
		<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>		
		<b>Description of surface water flow paths:</b>		
		The site is at risk of surface water flooding in all events due to it being in a highly urbanised area and an area of overland flow paths following the Wood Brook valley. The site is in the middle of a surface water flow path, though parts of the site are topographically lower, allowing ponding.		
		The risk is significant, with over 50% at risk in the 30-year and 100% at risk in the 1,000-year event. In the 30-year and 100-year events, the site looks to form a topographic low area where water ponds, as immediately beyond the western, southern and eastern boundaries, there is no risk and therefore access is possible.		
		Depths are fairly high in all events at 0.6-0.9m in the 30-year and 100-year events, as water ponds at the site, deepest in the south and east. Velocities are high in the 100-year and 1,000-year events as the flow path becomes more prominent.		
		Loughborough sees a very large overland flow route from surface water in all events, along the course and topography of the Wood Brook, though the Wood Brook itself is largely in culvert through Loughborough.		
		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. The surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.		
	Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>		
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square		
	<b>Area</b>	0.22 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 50\% &lt; 75\%</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>	<p>The available <a href="#">online</a> maps show that the maximum extent from reservoir flooding reaches across the entire proposed site. Reservoir risk is considered low, but this risk should be confirmed in a site-specific flood risk assessment.</p>		
	<b>Flood history</b>	<p>Between 2018-2020, there have been 87 LLFA reports of internal flooding; 32 of which were in Loughborough. There are no records of historic flooding at this site from the Environment Agency. No recorded historical flood incidents occurred within 550m of the proposed development site.</p> <p>Records from Leicestershire County Council detail historical flood incidents from all sources, whereas the Environment Agency dataset only records incidents of fluvial, tidal or coastal flooding.</p> <p>Loughborough is also one of the 40 highlighted priority settlements for the purpose of the Local Flood Risk Management Strategy, coming in the top 5 settlements at risk from surface water, with most properties at risk.</p> <p>The Lead Local Flood Authority should be contacted to obtain further details.</p>		
<b>Flood risk management infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High ground	N/A	N/A
	This site is near high ground 15m north and 50m south of the site, following the banks of Wood Brook. The standard of protection and condition is unknown.			
<b>Residual risk</b>	<p>The Wood Brook is culverted directly under the site. If the entrance to the culvert were to become blocked or if a manhole were to become surcharged, further flooding may occur within the site. The site is therefore at a residual risk. This should be investigated further in a site-specific FRA.</p>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's Leicester Wood Brook Flood Alert area (034WAF426) and the East Midlands Flood Warning area (034FWFWOLUFSOUTH).
	<b>Access and egress</b>	<p>Access and egress would be in all cases, to the south east from the site.</p> <p>In the 30-year and 100-year surface water events, the site looks to form a topographic low area where water ponds, as immediately beyond the western, southern and eastern boundaries, there is no risk and therefore access is possible. The entire surrounding area is at risk in the 1,000-year event. Access to the north from the site should be avoided.</p> <p>Safe access and egress is possible in the 100-year fluvial event, but when climate change is included, the risk to the site becomes more significant.</p> <p>Safe access and egress needs to be considered at this site, given the coverage of surface water risk, including in climate change events. 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 using the latest Wood Brook model results, to confirm whether access for emergency vehicles could still be obtained in the climate change events.</p>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>Detailed modelled outputs from the latest 2021 Wood Brook modelling have been used to assess the impact of climate change on fluvial risk. The 100-year 20%, 30% and 50% defended uplifts show a significant increase in flood risk in comparison to the 100-year defended event, as the defended 100-year extent does not affect the site. The extents are slightly larger than the 100-year undefended extent, but do not reach that of the 1,000-year defended flood event. They do however cover the majority of the site and beyond the boundary, so implications of this for flood mitigation and access need to be considered.</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, and account for integrated modelling given the national surface water does not represent hydraulic structures.</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 the mudstone, siltstone and sandstone.
	<b>Superficial Geology</b>	The site is underlain with Alluvium deposits, consisting of clay, silt and sand.
	<b>Soils</b>	Loamy soils with naturally high groundwater
	<b>Source Protection Zone</b>	The site is not located within any Environment Agency designated Source Protection Zone.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Historic Landfill Site</b>	The site is not designated by the Environment Agency as previously being a landfill site.
	<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 due to the site potential groundwater flooding.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>The site is wholly covered by Flood Zone 2 according to the EA's latest Wood Brook Flood Zones and surrounded by undefended 100-year (FZ3a) risk around the boundary, so there is nowhere to sequentially steer development to which is not at flood risk at all. The Exception test will need to be applied if the site is residential and in Flood Zone 3. However, the Exception Test is based on 'defended'/ 'actual' flood risk, and when using the defended 100-year extents, this shows no risk to the site; only the climate change extents and above affect the site, though these flood extents match more closely with the Flood Zones.</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> <p>Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.</p>

**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 is located within Flood Zone 3b and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- All 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.
- Flood risk needs to be considered for the lifetime of the development, accounting for climate change.
- Latest modelled outputs from the Wood Brook Environment Agency study show the site is located in the Flood Zones, but not the 100-year defended/ actual risk. Risk to the site is more significant in the climate change events and is wholly covered by Flood Zone 2.
- Consideration should be given to the surface water risk within Charnwood Borough, particularly within Loughborough with regards to the Exception Test. For example, a site may pass the test based on fluvial flood risk alone, but greater risk comes from surface water at the four Loughborough sites. However, the national surface water mapping does not account for culverts, structures, channel hydraulics or sewer capacity, and therefore this is deemed to overestimate risk in the Wood Brook valley, and therefore the confidence in this dataset is reduced. It is recommended that developers investigate surface water risk in more detail at the planning application stage and may need to consider undertaking integrated modelling.
- The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, this is in the middle of the site, requiring 16-20m easement area, which will have implications for development. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.
- 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. 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 or existing ground levels may be needed. With the flood risk from surface water being a flow path, residential development may need to be placed on higher levels, allowing the ground floor to flood, e.g. through a void or siting car parking on ground levels. The flow path should not be obstructed so as to displace the risk elsewhere. Design should account for surface water with an element of climate change.
- 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.
- 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.
- Efforts should be made to limit runoff to greenfield rates and discharge rates from the site should not increase downstream flood risk.
- The opportunity should be taken to store additional water on development sites in the Wood Brook to alleviate flooding in the wider area, in addition to long term storage requirements. Opportunities to complement and enhance the existing NFM scheme within the catchment should also be investigated. Such schemes may also improve the surface water risk in the catchment, by slowing the fluvial flows in the system allowing the surface water drainage to outfall to the channel.
- Developers should enter into conversations with the Borough Council/ EA at pre-application stage to understand

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>the latest position with regards to the Environment Agency led Wood Brook scheme. Betterment may be required:</p> <ul style="list-style-type: none"> <li>○ In the form of additional storage for surface water runoff from development sites on site,</li> <li>○ In the form of 'in kind' works, such as additional floodplain storage on site, and/ or</li> <li>○ In the form of a contribution towards wider community flood alleviation works within the catchment.</li> </ul>
<b>Key messages</b>		<ul style="list-style-type: none"> <li>• The modelled defended 100-year shows the site to be developable, with no risk shown to the site; however, the climate change extents fully surround the site boundary and Flood Zone 2 fully covers the site, so consideration is needed for flood risk mitigation and safe access for the lifetime of the development.</li> <li>• Surface water is a high risk to the site, though access to/ from the site looks possible in the 30-year and 100-year events as the site contains the surface water topographically. The site is part of a flow path, so this needs to be maintained and not obstructed in future development design.</li> <li>• Site-specific assessments should investigate surface water risk in more detail using integrated modelling to fully understand the interaction between fluvial and surface water risk and hydraulic structures.</li> <li>• The site extents include a Main River (in culvert), where an easement of 8m is required from either side of the bank. In this site, this is in the middle of the site, requiring 16-20m easement area. Developers will be required to apply for a permit and ensure the activity being carried out over this easement would not increase flood risk.</li> <li>• If flood mitigation measures and flood resilient design are implemented, then they are tested to ensure that they will not displace water elsewhere.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>The EA Flood Map for Planning does not currently represent the latest Environment Agency's 2021 Wood Brook modelling, which was in progress at the time of the SFRA, and hence the current EA Flood Zones 3a and 2 largely overestimate flood risk along this watercourse, with them being based on the Lower Soar modelling. Due to the significant difference between the EA's current Flood Map for Planning in this area and new Wood Brook model results, the new model results have been used to derive the Flood Zones for the purpose of the L2 SFRA at the four Loughborough sites. The draft defended and undefended 100-year extents have been merged to form a composite Flood Zone 3a extent, and the defended and undefended 1,000-year flood extents have been merged with the Historic Flood Map to form a composite Flood Zone 2 extent. Flood Zone 3b has been derived from the 20-year defended modelled flood extent.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA and updated online Flood Zone mapping will be available later in 2021. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Climate change</b>	<p>Climate change was based on the latest Environment Agency 2021 Wood Brook model and the 1,000-year surface water flood extent. It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH245</b>
	<b>Address</b>	Carillon Court Shopping Centre, Derby Square
	<b>Area</b>	0.22 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 100-year defended modelled outputs were used to assess depth, velocity and hazard are from the detailed 2021 Wood Brook hydraulic model. These do not affect the site, but the other modelled event outputs were not provided at the time of the study.</p> <p>It should be noted that these results are still draft format and that this same process (with additional EA quality assurance checks) will be undertaken by the EA. Developers should contact the EA for latest information on the Wood Brook.</p>	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>																						
	<b>Address</b>	Woodgate Nurseries, Barkby Lane																						
	<b>Area</b>	2.09 ha																						
	<b>Current land use</b>	Commercial/ Residential																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p> <ul style="list-style-type: none"> <li>The site is generally sloping downwards from the south to the north of the site.</li> <li>There are a number of small buildings located within the site boundary.</li> <li>The ground slope across the site generally has a gradient of less than 5%.</li> </ul> </p>																						
	<b>Existing drainage features</b>	There are no existing drainage features located within the site boundary. The Barkby Brook is located 470m east of the site.																						
	<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>23%</td> <td>77%</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">Low</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%	23%	77%	<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				Low		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
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<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>																								
Low																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>				
	<b>Address</b>	Woodgate Nurseries, Barkby Lane				
	<b>Area</b>	2.09 ha				
	<b>Current land use</b>	Commercial/ Residential				
	<b>Proposed land use</b>	Residential				
<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.</p> <p><b>Flood characteristics:</b> The Environment Agency's Flood Map for Planning shows areas along the northern portion of the site to be located within Flood Zone 2. This is from a wide spreading of Flood Zone 2 from the Barkby Brook to the east of the site, where the topography is lower, and it flows towards the rail embankment west of the site. The remainder of the site is located within Flood Zone 1.</p>					
	<b>Proportion of site at risk (RoFfSW)</b>					
	<b>30-year</b>		<b>100-year</b>		<b>1,000-year</b>	
	0%		1%		7%	
	Max depths (m)					
	N/A		0.15-0.3m		0.3-0.6m	
	Max velocity (m/s)					
	N/A		0-0.25		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>					
	<p><b>Description of surface water flow paths:</b> Surface water flooding at the site is very low. There is some surface water flow during the 1,000-year event and, at a lesser extent, during the 100-year event. This flow path creates ponding laterally across the site at the northern end, close to Barkby Lane. Depths are also low given the negligible nature of the risk. 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. Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.</p>					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>		
	<b>Address</b>	Woodgate Nurseries, Barkby Lane		
	<b>Area</b>	2.09 ha		
	<b>Current land use</b>	Commercial/ Residential		
	<b>Proposed land use</b>	Residential		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the south of the site is located within a 1 km grid square where &lt;25% of the area is predicted to be at risk of groundwater flooding. The remainder of the site is located within a grid square where <math>\geq 50\%</math> &lt;75% 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, potentially causing flooding in the entire site.		
	<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 1km 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 infrastructure</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.			
	<b>Residual risk</b>	There is no residual risk present at the site.		
<b>Emergency planning</b>	<b>Flood warning</b>	<p>The site is situated within the Environment Agency's River Wreake Flood Alert Area.</p> <p>The site is not situated within an Environment Agency Flood Warning area.</p>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
	<b>Access and egress</b>	<p>Access and egress to the site is available through Barkby Lane for all surface water and fluvial events up to the 1,000-year event (Flood Zone 2 and surface water). In these more extreme events, access is compromised to the north and should be sought from the south to Barkby Thorpe Lane. Alternatively, access may be possible on Barkby Lane if fluvial flood depths are shallow; this should be investigated and confirmed in a site-specific assessment.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
<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>There is no detailed fluvial modelling available at the site to indicate fluvial flood risk at the site due to climate change. Flood Zone 2 can be used as a proxy, which shows that almost a quarter of the site could be at risk. 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.</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 with largely Alluvium deposits consisting of clay, silt and sand however, the northern tip has River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	<b>Soils</b>	The southern half of the site has slightly acid loamy and clayey soils with impeded drainage whilst the northern half has loamy and clayey floodplain soils with naturally high groundwater.
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
	<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 due to the site potential groundwater flooding.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
<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'. Commercial development is classified as 'Less Vulnerable'.</p> <p>It is recommended 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.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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 Zone 2 and climate change flood risk from the Barkby Brook.
- 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>• 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.</li> <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 Flood Zones 2 and 3 as public open space.</li> <li>• Assessment of runoff should include allowances for climate change effects.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
<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 93% of the site outside of the Risk of Flooding from Surface Water zones and the 77% Flood Zone 1 and therefore should be steered away from the north of the site.</li> <li>• Safe access and egress to the north in association with the 1,000-year fluvial and surface water events will need to be considered as part of a site-specific flood risk assessment.</li> <li>• Areas in Flood Zone 2 (1,000-year extent) are used for the least vulnerable parts of the development in accordance with Table 2 in the NPPF.</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>• 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>Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Zones (2020) and detailed modelling where present for Flood Zone 3b. In the absence of modelling, Flood Zone 3a has been used as an indication of Flood Zone 3b.</p> <p>It is recommended that a more detailed hydraulic model is constructed at the site-specific Flood Risk Assessment stage, to confirm flood risk from Flood Zone 2 and climate change from the Barkby Brook.</p>	
<b>Climate change</b>	<p>Climate change was based on Flood Zone 2 to serve as an indication of possible extents. 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>	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH476</b>
	<b>Address</b>	Woodgate Nurseries, Barkby Lane
	<b>Area</b>	2.09 ha
	<b>Current land use</b>	Commercial/ Residential
	<b>Proposed land use</b>	Residential
<b>Fluvial depth, velocity and hazard mapping</b>		There is no available corresponding fluvial modelling data; therefore, the Risk of Flooding from Surface Water mapping can be used as this represents the floodplains of small watercourses. This should be explored further at the site-specific stage.
<b>Surface Water</b>		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>																						
	<b>Address</b>	Land south of Ashby Road Central																						
	<b>Area</b>	1.97 ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	<p>The site generally slopes from the south to the north of the site.</p> <ul style="list-style-type: none"> <li>There are no existing buildings present at the site.</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 boundary. There is an ordinary watercourse located 200m west of the site.																						
	<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		
<b>Proportion of site at risk</b>																								
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>																					
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# Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>		
	<b>Address</b>	Land south of Ashby Road Central		
	<b>Area</b>	1.97 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<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 or fluvial risk present.</p> <p><b>Flood characteristics:</b> The site is located within Flood Zone 1 and is therefore at a negligible risk of fluvial flooding. The site is at risk of surface water flooding and potential access considerations.</p>			
	<b>Proportion of site at risk (RoFfSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	6%	7%	14%	
	Max depths (m)			
	0.6-0.9	0.6-0.9	0.6-0.9	
	Max velocity (m/s)			
	0.5-1	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>			
	<p><b>Description of surface water flow paths:</b> There is an accumulation of surface water at the northern boundary, by the Ashby Road Central/ A512, for all events. There are further flow paths during the 1,000-year event, extending from the south to north across the site, to meet the area of ponding. Depths are fairly high but consistent across the surface water events.</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. Therefore, it is recommended that further assessment is undertaken at the site-specific FRA stage.</p>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>		
	<b>Address</b>	Land south of Ashby Road Central		
	<b>Area</b>	1.97 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the site is located within a 1 km grid square where &lt;25% 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 1km 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 infrastructure</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.			
	<b>Residual risk</b>	The site is considered to not be at a residual risk of flooding.		
<b>Emergency planning</b>	<b>Flood warning</b>	The site is not situated within a Environment Agency Flood Warning or Flood Alert area.		
	<b>Access and egress</b>	<p>Safe access and egress is available for the site along Ashby Road (A512) for all surface water events; however, there are potential access issues due to surface water ponding along the northern boundary, so access would need to be to the road from the north-eastern boundary.</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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>
	<b>Address</b>	Land south of Ashby Road Central
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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 the mudstone, siltstone and sandstone).
	<b>Superficial Geology</b>	There are no superficial deposits at the site.
	<b>Soils</b>	Largely, the site has slowly permeable seasonally wet acid loamy and clayey soils however, a small area in the eastern half has 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 however, there is one adjacent to the eastern boundary.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>
	<b>Address</b>	Land south of Ashby Road Central
	<b>Area</b>	1.97 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>• All forms of source control are likely to be suitable.</li> <li>• 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.</li> <li>• Mapping suggests that the site slopes are suitable for all forms of detention.</li> <li>• All filtration techniques are likely to be suitable. If the site has contamination issues; a liner will be required.</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. If the site has contamination issues; a liner will be required.</li> </ul>
<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception Test is not required as the site is not within Flood Zone 2 or 3 but a Flood Risk Assessment is still required and consideration of the area of ponding for access. See below for further details on requirements for a Flood Risk Assessment.</p>

**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 is greater than 1ha in size and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- 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 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

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>
	<b>Address</b>	Land south of Ashby Road Central
	<b>Area</b>	1.97 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<p>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.</p> <ul style="list-style-type: none"> <li>• On site attenuation schemes would need to be tested against the nearby 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 surface water 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>
	<b>Address</b>	Land south of Ashby Road Central
	<b>Area</b>	1.97 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 86% 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. It should be noted that the surface water flood risk bisects the site and therefore consideration is needed regarding access to the north-western portion 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>• Space for green infrastructure should be considered in the areas of highest flood risk. A particular area for consideration would be the north-western corner which is affected by surface water flows.</li> <li>• There are potential access issues due to surface water ponding along the northern boundary, so access would need to be to the road from the north-eastern boundary.</li> <li>• Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.</li> </ul>
<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 Environment Agency's Flood Map for Planning shows the site to be located within Flood Zone 1.</p>	
<b>Climate change</b>	<p>Climate change was based on the 1,000-year surface water event to serve as an indication of possible extents. It is recommended that the latest EA's climate change allowances are assessed as part of a site-specific FRA.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>There is no fluvial risk at the site although this should be explored further at site-specific stage.</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>	

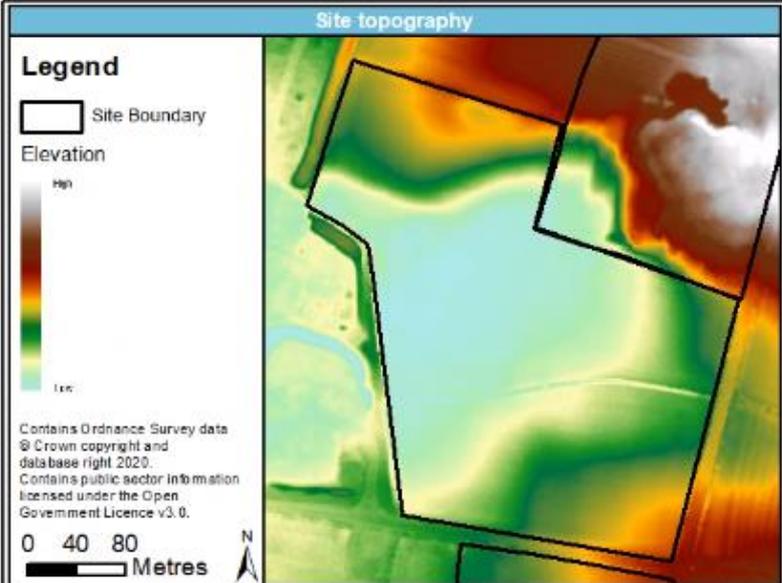
## Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<b>Site details</b>	<b>Site Code</b>	<b>PSH483</b>
	<b>Address</b>	Land south of Ashby Road Central
	<b>Area</b>	1.97 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>			
	<b>Address</b>	Land North of Barky Road			
	<b>Area</b>	8.33ha			
	<b>Current land use</b>	Greenfield			
	<b>Proposed land use</b>	Residential			
<b>Sources of flood risk</b>	<b>Topography</b>	 <p>The site generally slopes from northeast to south west with a large topographic depression in the centre of the site. The corners of the site boundary are on higher ground. There is an area of higher ground beyond the north east corner. The area of depression also extends south west from the centre of the site.</p>			
	<b>Existing drainage features</b>	There are no existing drainage features at the site; however, shortly downstream of the site a watercourse is shown, either to be here or is an outlet from a culvert to the south. This then feeds into the Barkby Brook.			
	<b>Fluvial</b>	<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					
<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>					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>				
	<b>Address</b>	Land North of Barky Road				
	<b>Area</b>	8.33ha				
	<b>Current land use</b>	Greenfield				
	<b>Proposed land use</b>	Residential				
<b>Surface Water</b>	<p><b>Available data:</b> The site is covered the Environment Agency's Flood Map for Planning, which uses 2D generalised modelling data. There are no Flood Zones located at this site.</p> <p><b>Flood characteristics:</b> The site is located within Flood Zone 1 and is therefore at a negligible risk of fluvial flooding. The site is at risk of surface water flooding.</p>					
	<b>Proportion of site at risk (RoFSW)</b>					
	<b>30-year</b>		<b>100-year</b>		<b>1,000-year</b>	
	13%		19%		31%	
	Max depths (m)					
	0.3-0.6		0.6-0.9		0.9-1.2	
	Max velocity (m/s)					
	1-2		1-2		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>					
	<p><b>Description of surface water flow paths:</b> There are significant surface water flows bisecting the centre of the site for all events. These extend from the eastern boundary to the western boundary. In all surface water events, surface water ponds in the large topographic depression in the middle of the site, against the higher ground along the western boundary, extending in size from the 30-year to the 1,000-year. This bisects the site's northern and south-eastern areas. Depths increase with return period and are quite high in the area of ponding.</p> <p>RoFSW 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>					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>		
	<b>Address</b>	Land North of Barky Road		
	<b>Area</b>	8.33ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 50\%</math> to <math>&lt; 75\%</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.</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 infrastructure</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.			
	<b>Residual risk</b>	The site is not at a residual risk of flooding.		
<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 surface water events via Barkby Road and Queniborough Road for the south-eastern portion of the site. Access and egress needs to be considered for the northern portion of the site, north of the surface water ponding. There may be access from the housing estate to the west, or via site PSH70 if this is possible.</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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barky Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 with River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	<b>Soils</b>	The north of the site has slightly acid loamy and clayey soils with impeded drainage whilst the south has loamy and clayey floodplain soils with naturally high groundwater.
	<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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barky Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barky Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception Test is not required as the site is not within Flood Zone 2 or 3 but a Flood Risk Assessment is still required, along with consideration of access and safety given the large amount of surface water ponding. See below for further details on requirements for a Flood Risk Assessment and surface water issues to be considered.</p>

**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.
- 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.
- 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barky Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <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>
<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 69% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered towards the northern and eastern 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>Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>Access and egress needs to be considered for the northern portion of the site, north of the surface water ponding. There may be access from the housing estate to the west, or via site PSH70 if this is possible.</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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barky Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>	There is no Flood Zone data available at the site as there are no watercourses in proximity of the site.	
<b>Climate change</b>	Climate change was based on the 1,000-year surface water flood extent to serve as an indication of possible extents associated with the unmodelled watercourse which flows through the centre of the site.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no risk at the site although this should be explored further at site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>														
	<b>Address</b>	Land rear of The Maltings site High Street														
	<b>Area</b>	0.46 ha														
	<b>Current land use</b>	Greenfield														
	<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>• There is no high-resolution LIDAR available for the site, therefore coarse 10m resolution has been used.</li> <li>• The site is generally flat with a slope from east to west.</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 drainage features located within the site; however, the Sibley Brook flows directly along the southern boundary of the site at its nearest point is less than 6.5m away from the boundary. This then joins the River Soar further west, but the Soar floodplain extends right up to the site's western 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>&lt;1%</td> <td>&lt;1%</td> <td>2%</td> <td>98%</td> </tr> </tbody> </table> <p><b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b> Medium</p> <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>	<1%	<1%	2%
<b>Proportion of site at risk</b>																
<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>													
<1%	<1%	2%	98%													

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>				
	<b>Address</b>	Land rear of The Maltings site High Street				
	<b>Area</b>	0.46 ha				
	<b>Current land use</b>	Greenfield				
	<b>Proposed land use</b>	Residential				
<b>Surface Water</b>	<p><b>Available data:</b> The site is covered by the Environment Agency's Upper Lower Soar (2012) hydraulic model up to the western tip of the site and the EA's Flood Map for Planning along the Sileby Brook.</p> <p><b>Flood characteristics:</b> The extents from the Upper Lower Soar (2012) have been used within the Environment Agency's Flood Map for Planning. The very western corner and far eastern corner of the site is partially located within the Flood Zones, capturing the outer extremities of the River Soar floodplain to the west, and the Sileby Brook to the south and east. The remainder of the site is located within Flood Zone 1. The maximum 100-year depth is 0.09m in the western corner and the maximum velocity is 0.12 m/s, which are both low, meaning the hazard is also very low. This is because it is the very outer limit of the Soar extents</p>					
	<b>Proportion of site at risk (RoFfSW)</b>					
	<b>30-year</b>		<b>100-year</b>		<b>1,000-year</b>	
	1%		2%		6%	
	Max depths (m)					
	0-0.15		0.15-0.3		0.15-0.3	
	Max velocity (m/s)					
	0-0.25		0.25-0.5		0.5-1	
	<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>					
	<p><b>Description of surface water flow paths:</b> Surface water flows only accumulate in the very eastern section of the site, by the High Street and where Sileby Brook flows closest to the site. This is for all events, although the biggest accumulation occurs during the 1,000-year event. Remaining surface water flow paths follow the alignment of the Sileby Brook, not encroaching into the site. Depths are low in all events as the topography is fairly raised and only the 1,000-year encroaches slightly into the site. 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>					

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>		
	<b>Address</b>	Land rear of The Maltings site High Street		
	<b>Area</b>	0.46 ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<b>Groundwater</b>	<p>The Areas Susceptible to Groundwater Flooding dataset shows the west of the site is located within a 1 km grid square where <math>\geq 75\%</math> of the area is predicted to be at risk of groundwater flooding. The remainder of the site is located within a 1km square where <math>\geq 25\% &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>	<p>The available <a href="#">online</a> maps show that the site could be affected by the maximum extent of reservoir flooding in its southern half due Sileby Brook flowing directly south of the site. Reservoir risk is considered low, but this risk should be confirmed in a site-specific FRA.</p>		
	<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 1km 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 infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High Ground	N/A	N/A
		<p>This site is protected by high ground which runs along southern boundary of the site for 220m, following the banks of Sileby Brook. The standard of protection and condition of the defence is unknown.</p>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>
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	<b>Area</b>	0.46 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<b>Residual risk</b>	The Sileby Brook enters a culvert upstream of the railway embankment and reappears close to the site's eastern boundary. This embankment causes a throttle and impoundment upstream so in the event of a blockage, it is unlikely this would affect the site. <u>The potential for this should be assessed in a site-specific FRA.</u>
<b>Emergency planning</b>	<b>Flood warning</b>	A small area in the eastern tip of the site is situated within the Environment Agency's Lower River Soar Leicestershire Flood Alert area (034WAF428) and the River Soar at Sileby Flood Warning area (034FWFSOSILEBY).
	<b>Access and egress</b>	Wet access and egress is available for the site via the small access road which joins the High Street/ Cossington Road for the 30-year and 100-year surface water events. For these events, the hazard rating of flood water in this location is between 0.50 – 0.75 and is considered safe. For the 1,000-year, the hazard rating in the same location increases to between 0.75 – 1.25 which may be safe for evacuation and emergency vehicles. Consideration should be given to access and steered along the north, rather than south on Cossington Road, due to the large surface water ponding in all events immediately where the site entry is. 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>
	<b>Address</b>	Land rear of The Maltings site High Street
	<b>Area</b>	0.46 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>Detailed model extents for climate change are available for the site from the Upper Lower Soar (2012) hydraulic model. An increase in flood risk is predicted to occur in the south west corner of the site in comparison to the 100-year event, but only slightly.</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.

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



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	<b>Area</b>	0.46 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>
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	<b>Area</b>	0.46 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- 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.
- 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.
- The site extents either include or borders with a Main River, where an easement of 8m is required from the bank for maintenance and access purposes. Any future development will require a flood risk permit for any activity within 8m of a main river.

**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).

		<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <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 Flood Zones 2 and 3 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> <li>• This site <i>may</i> benefit from future works upstream on the Sileby Brook. Please contact the Environment Agency's East Midlands team for further information.</li> </ul>
<p><b>Key messages</b></p>		<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 94% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered away from the east of the site but avoiding the far west corner which is at risk from fluvial flooding.</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> </ul>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH353</b>
	<b>Address</b>	Land rear of The Maltings site High Street
	<b>Area</b>	0.46 ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <li>• Safe access and egress need to be considered due to the significant ponding in all surface water events at the road junction where site access would be gained from.</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>		
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.		
<b>Flood Zones</b>	The Flood Zone data is based on the Environment Agency's Upper Lower Soar (2012) hydraulic model and the EA's Flood Map.	
<b>Climate change</b>	Climate change was based the Environment Agency's Upper Lower Soar (2012) hydraulic model which was re-run for latest climate change allowances.	
<b>Fluvial depth, velocity and hazard mapping</b>	The 100-year modelled outputs were used to assess depth, velocity and hazard are from the detailed Environment Agency's Upper Lower Soar (2012) hydraulic model.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>			
	<b>Address</b>	Brook Street			
	<b>Area</b>	0.74 ha			
	<b>Current land use</b>	Commercial/Residential			
	<b>Proposed land use</b>	Residential			
<b>Sources of flood risk</b>	<b>Topography</b>	<ul style="list-style-type: none"> <li>The site is generally flat, with a slope from the north to the south.</li> <li>Brook Street is visibly seen as a depression within the topography.</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 drainage features located within the site boundary; however, Barkby Brook is located 56m south of the site and is partially culverted under Brook Street and Chapel Street. The River Wreake floodplain also extends close to the site from the north.			
	<b>Fluvial</b>	<b>Proportion of site at risk</b>			
		<b>FZ3b</b>	<b>FZ3a</b>	<b>FZ2</b>	<b>FZ1</b>
0%		1%	19%	81%	
<b>Highest zone of risk (Risk of Flooding from Rivers and Sea)</b>				Medium	

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>		
	<b>Address</b>	Brook Street		
	<b>Area</b>	0.74 ha		
	<b>Current land use</b>	Commercial/Residential		
	<b>Proposed land use</b>	Residential		
	<b>Surface Water</b>	<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> <p><b>Available data:</b> The site is covered by the Environment Agency's Lower Wreake (2015) hydraulic model and the Flood Map for Planning.</p> <p><b>Flood characteristics:</b>                      Flood Zone 3a marginally encroaches into the site from the south with Flood Zone 2 shown to encroach slightly further into a small area in the southern side of the site. Flood Zone 3b is still in-bank in the Barkby Brook in this location.                      The surrounding area along the Barkby Brook and Wreake floodplains is at flood risk, with several local impoundment features, such as a railway junctions, which causes water to back up just south-west of the site and compartmentalise parts of the Wreake flood extents between road and rail embankments.                      The defended modelled extents have been used to within the Environment Agency's Flood Map for Planning. However, there is a very small reduction for the 1,000-year in comparison to Flood Zone 2. This is due a historical flood outline south of the site being used in the composition of Flood Zone 2.                      The maximum 100-year defended depth is 0.17m and the maximum velocity is 0.007m/s. These are both low, therefore forming a hazard rating of 'very low'.</p>		
		<b>Proportion of site at risk (RoFfSW)</b>		
		<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>
		0%	0%	<1%
		Max depths (m)		
		N/A	N/A	0.15-0.3
		Max velocity (m/s)		
		N/A	N/A	0-0.25
		<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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>		
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	<b>Current land use</b>	Commercial/Residential		
	<b>Proposed land use</b>	Residential		
		<p><b>Description of surface water flow paths:</b></p> <p>The site is not affected by surface water flows during any event. A negligible 'cell' clips the site boundary only in the 1,000-year event, with negligible depths.</p> <p>In the vicinity, there is a surface water flow path down High Street towards the Barkby Brook and then the same pattern of ponding as fluvial in the areas of impoundment.</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 75\%</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>The Environment Agency's Recorded Flood Outline datasets displays in a corner along the south boundary of the site has previously flooded. This area was affected by flooding in 1992 caused by the Barkby Brook's channel being exceeded.</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 infrastructure</b>	<b>Defences</b>	<b>Defence Type</b>	<b>Standard of Protection</b>	<b>Condition</b>
		High Ground	N/A	N/A
		This site is protected by high ground in the southern half of the site, following the banks of Barkby Brook. The standard of protection and condition is unknown.		

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
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	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
	<b>Residual risk</b>	The site is considered to not be at a residual risk of flooding; however, the Barkby Brook is partially culverted in several locations south of the site. Due to higher ground, it is unlikely there would be any significant impacts at the site in higher return period events, but this should be considered at the site-specific FRA.
<b>Emergency planning</b>	<b>Flood warning</b>	The site is situated within the Environment Agency's River Wreake in Leicestershire Flood Alert area (034WAF404). The site is not situated within an Environment Agency Flood Warning area.
	<b>Access and egress</b>	Dry safe access and egress can be available to the site for all fluvial events and the 30-year and 100-year surface water events via Brook Street, leading away to the north-east. The same route can also be used for wet safe access and egress for the 1,000-year surface water event due to the hazard rating of flood extents along the High Street only being between 0.50 and 0.75. This is considered safe for evacuation and for emergency services vehicles. Caution is needed however along High Street, which acts as a surface waterflow path to the north-east of the site in the 100-year and 1,000-year events. Access should be avoided in a westerly and southerly direction due to high flood risk from the Wreake and Barkby Brook. 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
	<b>Address</b>	Brook Street
	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
<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>Detailed climate change modelling is available for the site from the Lower Wreake (2015) hydraulic model. A very small increase in flood extent is predicted to occur for the 20%, 30% and 50% climate change uplifts on the 100-year event. These are all still smaller than Flood Zone 2.</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 with Alluvium deposits consisting of clay, silt and sand.
	<b>Soils</b>	Loamy and clayey floodplain soils with naturally high groundwater
	<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. However, it is located within 250m of a permitted Household, Commercial and Industrial Waste site.

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
	<b>Address</b>	Brook Street
	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
	<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>• Mapping suggests that there is a high risk of groundwater flooding at this location, therefore it is likely infiltration techniques will not be suitable. This should be confirmed via site investigations to assess the potential for infiltration.</li> <li>• This option may be feasible provided site slopes are &lt; 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater.</li> <li>• This feature is probably suitable provided site slopes are &lt;5% and the depth to the water table is &gt;1m. 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
	<b>Address</b>	Brook Street
	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
<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'. Commercial development is classified as 'Less Vulnerable'.</p> <p>It is recommended 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.</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 is located within Flood Zone 2 and may be subject to other sources of flooding and the development may introduce a more vulnerable use. It will also be required where development sites:
  - are 1 hectare or more in size;
  - 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.
- 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.
- 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 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.

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
	<b>Address</b>	Brook Street
	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
		<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 Flood Zones 2 and 3 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>

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



<b>Site details</b>	<b>Site Code</b>	<b>SH141</b>
	<b>Address</b>	Brook Street
	<b>Area</b>	0.74 ha
	<b>Current land use</b>	Commercial/Residential
	<b>Proposed land use</b>	Residential
<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 81% of the site which is located within Flood Zone 1 and therefore should be steered towards the north, east and west 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>• Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>• Access needs to be considered via High Street due to surface water flow paths in the 1,000-year event, and all the surrounding extensive flood risk to the west and south from the fluvial flooding.</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>The Flood Zone data is based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model and the EA's Flood Map for Planning.</p>	
<b>Climate change</b>	<p>Climate change was based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model.</p>	
<b>Fluvial depth, velocity and hazard mapping</b>	<p>The 100-year modelled outputs used to assess depth, velocity and hazard are from the detailed Environment Agency Lower Wreake and tributaries (2015) hydraulic model.</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>	
<b>Surface water depth, velocity and hazard mapping</b>	<p>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.</p>	

# 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> <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> </p>																						
	<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		
<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																								

# 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		
	<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>Surface Water</b>	<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>		

# 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		
		<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.		

# 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>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>

# 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>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.

# 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>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>

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH352</b>
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	<b>Area</b>	0.30 ha
	<b>Current land use</b>	Residential
	<b>Proposed land use</b>	Residential
<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.

# 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
		<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>

# 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>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>	

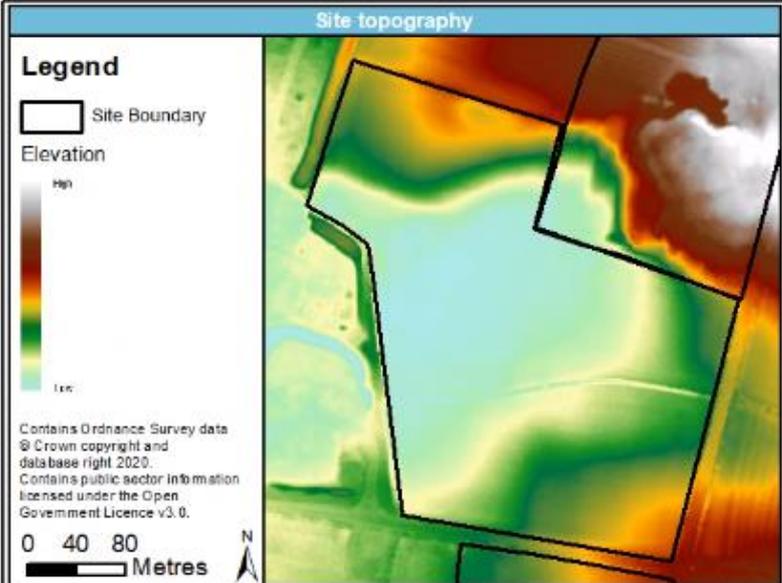
## Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



<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>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.

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>																						
	<b>Address</b>	Land North of Barkby Road																						
	<b>Area</b>	8.33ha																						
	<b>Current land use</b>	Greenfield																						
	<b>Proposed land use</b>	Residential																						
<b>Sources of flood risk</b>	<b>Topography</b>	 <p>The site generally slopes from northeast to south west with a large topographic depression in the centre of the site. The corners of the site boundary are on higher ground. There is an area of higher ground beyond the north east corner. The area of depression also extends south west from the centre of the site.</p>																						
	<b>Existing drainage features</b>	There are no existing drainage features at the site; however, shortly downstream of the site a watercourse is shown, either to be here or is an outlet from a culvert to the south. This then feeds into the Barkby Brook.																						
	<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		
<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																								

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>		
	<b>Address</b>	Land North of Barkby Road		
	<b>Area</b>	8.33ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
<b>Surface Water</b>	<p><b>Available data:</b> The site is covered the Environment Agency's Flood Map for Planning, which uses 2D generalised modelling data. There are no Flood Zones located at this site.</p> <p><b>Flood characteristics:</b> The site is located within Flood Zone 1 and is therefore at a negligible risk of fluvial flooding. The site is at risk of surface water flooding.</p>			
	<b>Proportion of site at risk (RoFSW)</b>			
	<b>30-year</b>	<b>100-year</b>	<b>1,000-year</b>	
	13%	19%	31%	
	Max depths (m)			
	0.3-0.6	0.6-0.9	0.9-1.2	
	Max velocity (m/s)			
	1-2	1-2	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>			
	<p><b>Description of surface water flow paths:</b> There are significant surface water flows bisecting the centre of the site for all events. These extend from the eastern boundary to the western boundary. In all surface water events, surface water ponds in the large topographic depression in the middle of the site, against the higher ground along the western boundary, extending in size from the 30-year to the 1,000-year. This bisects the site's northern and south-eastern areas. Depths increase with return period and are quite high in the area of ponding.</p> <p>RoFSW 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>			

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>		
	<b>Address</b>	Land North of Barkby Road		
	<b>Area</b>	8.33ha		
	<b>Current land use</b>	Greenfield		
	<b>Proposed land use</b>	Residential		
	<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 50\%</math> to <math>&lt; 75\%</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.</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 infrastructure</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.			
	<b>Residual risk</b>	The site is not at a residual risk of flooding.		
<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 surface water events via Barkby Road and Queniborough Road for the south-eastern portion of the site. Access and egress needs to be considered for the northern portion of the site, north of the surface water ponding. There may be access from the housing estate to the west, or via site PSH70 if this is possible.</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>		

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



<b>Site details</b>	<b>Site Code</b>	<b>PSH441</b>
	<b>Address</b>	Land North of Barkby Road
	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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 with River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	<b>Soils</b>	The north of the site has slightly acid loamy and clayey soils with impeded drainage whilst the south has loamy and clayey floodplain soils with naturally high groundwater.
	<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.

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



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	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
	<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>

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



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	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<b>NPPF and planning implications</b>	<b>Exception Test requirements</b>	<p>The Sequential Test must be satisfied based on fluvial and other sources of flood risk before the Exception test is applied.</p> <p>The Exception Test is not required as the site is not within Flood Zone 2 or 3 but a Flood Risk Assessment is still required, along with consideration of access and safety given the large amount of surface water ponding. See below for further details on requirements for a Flood Risk Assessment and surface water issues to be considered.</p>

**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.
- 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.
- 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.

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



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	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
		<ul style="list-style-type: none"> <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>
<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 69% of the site outside of the Risk of Flooding from Surface Water zones and therefore should be steered towards the northern and eastern 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>Space for green infrastructure should be considered in the areas of highest flood risk.</li> <li>Access and egress needs to be considered for the northern portion of the site, north of the surface water ponding. There may be access from the housing estate to the west, or via site PSH70 if this is possible.</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>

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



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	<b>Area</b>	8.33ha
	<b>Current land use</b>	Greenfield
	<b>Proposed land use</b>	Residential
<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>	There is no Flood Zone data available at the site as there are no watercourses in proximity of the site.	
<b>Climate change</b>	Climate change was based on the 1,000-year surface water flood extent to serve as an indication of possible extents associated with the unmodelled watercourse which flows through the centre of the site.	
<b>Fluvial depth, velocity and hazard mapping</b>	There is no risk at the site although this should be explored further at site-specific stage.	
<b>Surface Water</b>	The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.	
<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.	