

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



Site details	Site Code	SH141			
	Address	Brook Street			
	Area	0.74 ha			
	Current land use	Commercial/Residential			
	Proposed land use	Residential			
Sources of flood risk	Topography	<ul style="list-style-type: none"> The site is generally flat, with a slope from the north to the south. Brook Street is visibly seen as a depression within the topography. There are a number of existing buildings across the site and which have affected localised filtering of the LIDAR data. The ground slope across the site generally has a gradient of less than 5%. 			
	Existing drainage features	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.			
	Fluvial	Proportion of site at risk			
		FZ3b	FZ3a	FZ2	FZ1
0%		1%	19%	81%	
Highest zone of risk (Risk of Flooding from Rivers and Sea)				Medium	

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	Surface Water	<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>Available data: The site is covered by the Environment Agency's Lower Wreake (2015) hydraulic model and the Flood Map for Planning.</p> <p>Flood characteristics: 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>		
		Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		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>		

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		<p>Description of surface water flow paths:</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>		
	Groundwater	<p>The Areas Susceptible to Groundwater Flooding dataset shows the site is located within a 1 km grid square where $\geq 75\%$ 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>		
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.		
	Flood history	<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>		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		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.		

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	Residual risk	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.
Emergency planning	Flood warning	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.
	Access and egress	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.

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Climate Change	Implications for the site	<ul style="list-style-type: none"> Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. 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. 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. This would require a detailed FRA to assess the site layout and design. Developers should consider SuDS strategies to reduce the impacts of climate change from surface water in a detailed site-specific FRA.
Requirements for drainage control and impact mitigation	Bedrock Geology	The entire site's bedrock geology consists of mudstone, siltstone and sandstone.
	Superficial Geology	The site is underlain with Alluvium deposits consisting of clay, silt and sand.
	Soils	Loamy and clayey floodplain soils with naturally high groundwater
	Source Protection Zone	The site is not located within any Environment Agency designated Source Protection Zone.
	Historic Landfill Site	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.

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	Broad scale assessment of possible SuDS	<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"> • 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. • 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. • This option may be feasible provided site slopes are < 5% at the location of the detention feature. A liner maybe required to prevent the egress of groundwater. • This feature is probably suitable provided site slopes are <5% and the depth to the water table is >1m. A liner maybe required to prevent the egress of groundwater. • All forms of conveyance are likely to be suitable. Where the slopes are >5% features should follow contours or utilise check dams to slow flows. A liner maybe required to prevent the egress of groundwater.

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NPPF and planning implications	Exception Test requirements	<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"> • More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. • Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. <p>Development will not be permitted for the following scenario:</p> <ul style="list-style-type: none"> • Highly vulnerable development within FZ3a. • Highly vulnerable, More vulnerable and / or Less vulnerable development within FZ3b.

Requirements and guidance for site-specific Flood Risk Assessment

Flood Risk Assessment:

- At the planning application stage, a site-specific Flood Risk Assessment will be required 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.

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		<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ○ 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.

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Key messages		<p>The flood risk element of the Exception Test is likely to be passed if:</p> <ul style="list-style-type: none"> • 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. • 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). • Space for green infrastructure should be considered in the areas of highest flood risk. • 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. <p>Refer to the 'detailed guidance for developers' section (above) for further information on the measures that are appropriate for this site.</p>
Mapping Information		
<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>		
Flood Zones	<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>	
Climate change	<p>Climate change was based on the Environment Agency's Lower Wreake and tributaries (2015) hydraulic model.</p>	
Fluvial depth, velocity and hazard mapping	<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>	
Surface Water	<p>The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.</p>	
Surface water depth, velocity and hazard mapping	<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>	