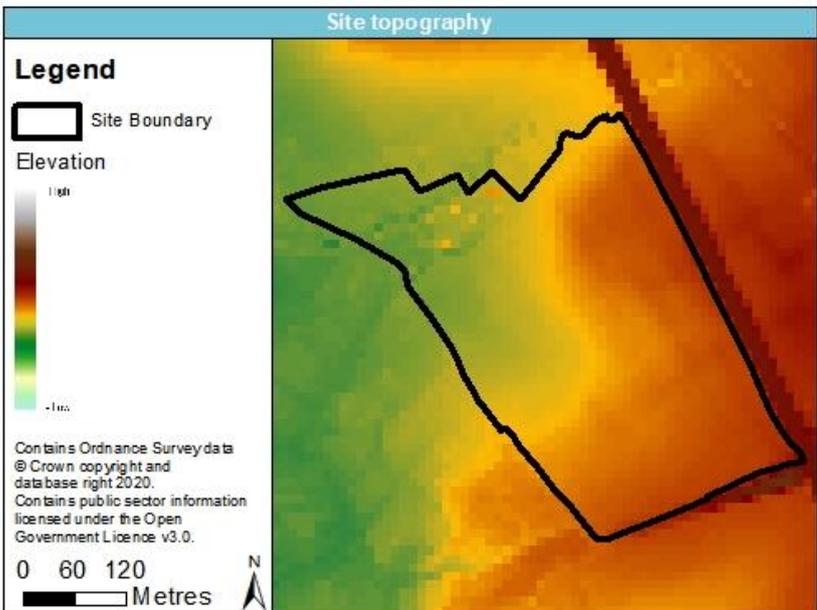


Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables



Site details	Site Code	PSH260																						
	Address	Land to rear of Derry's Garden Centre																						
	Area	13.84 ha																						
	Current land use	Greenfield																						
	Proposed land use	Residential																						
Sources of flood risk	Topography	 <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"> • There are some existing buildings located in the north west corner of the site. • The ground slope across the site generally has a gradient of less than 5%. 																						
	Existing drainage features	An unnamed ordinary watercourse flows parallel with the site at the northern boundary and flows towards the north-western corner of the site.																						
	Fluvial	<table border="1"> <thead> <tr> <th colspan="4">Proportion of site at risk</th> </tr> <tr> <th>FZ3b</th> <th>FZ3a</th> <th>FZ2</th> <th>FZ1</th> </tr> </thead> <tbody> <tr> <td>15%</td> <td>15%</td> <td>16%</td> <td>84%</td> </tr> <tr> <th colspan="4">Highest zone of risk (Risk of Flooding from Rivers and Sea)</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>				Proportion of site at risk				FZ3b	FZ3a	FZ2	FZ1	15%	15%	16%	84%	Highest zone of risk (Risk of Flooding from Rivers and Sea)				High		
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		<p>Available data: 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>Flood characteristics: 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>		
	Surface Water	Proportion of site at risk (RoFfSW)		
		30-year	100-year	1,000-year
		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>		

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		<p>Description of surface water flow paths:</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>
	Groundwater	<p>The Areas Susceptible to Groundwater Flooding dataset shows the north of the site is located within a 1 km grid square where $\geq 25\%$ to $< 50\%$ of the area is predicted to be at risk of groundwater flooding. The rest of the site is located within a 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 at the site should be used to confirm groundwater levels to support the design of SUDS features.</p>
	Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.

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	Flood history	<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>		
Flood risk management infrastructure	Defences	Defence Type	Standard of Protection	Condition
		N/A	N/A	N/A
	This site is not protected by any formal flood defences.			
	Residual risk	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.		
Emergency planning	Flood warning	<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>		
	Access and egress	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.		

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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. 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. 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. 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 the Wealden Group (mudstone, siltstone and sandstone).
	Superficial Geology	The site is underlain with River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	Soils	Slightly acid loamy and clayey soils with impeded drainage
	Groundwater Source Protection Zone	The site is not located within any Environment Agency designated Source Protection Zone.

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	Historic Landfill Site	The site is not designated by the Environment Agency as previously being a landfill site.
	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. 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'.</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"> • 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 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.

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		<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"> • Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates. • On site attenuation schemes would need to be tested against the watercourse to ensure flows are not exacerbated downstream within the catchment. • New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects. • 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 84% of the site located within Flood Zone 1 and therefore should be steered away from the north of the site. • 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. • 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. • 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. <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>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>	
Climate change	<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>	

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Fluvial depth, velocity and hazard mapping		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.
Surface Water		The Risk of Flooding from Surface Water has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping		The surface water depth, velocity and hazard mapping for the 1 in 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.