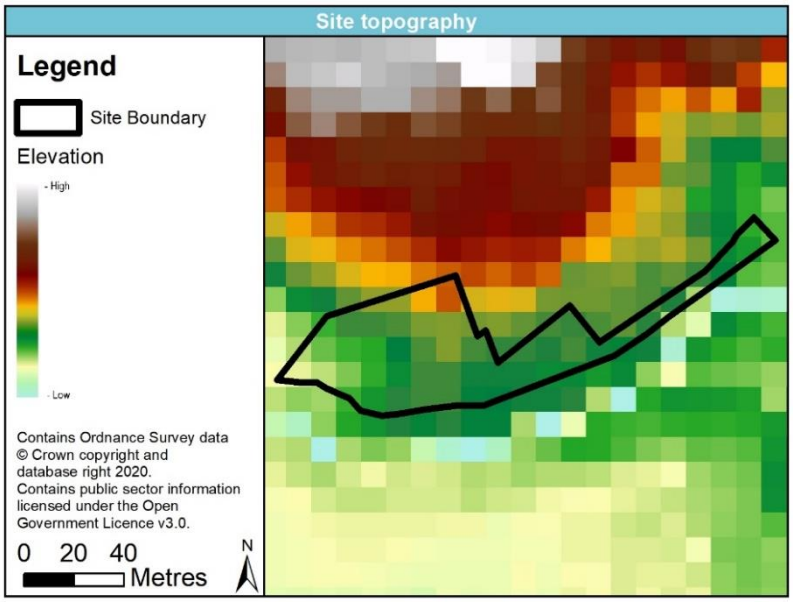
Charnwood Borough Council Strategic Flood Risk Assessment Level 2 Detailed Site Summary Tables

Site details	**Site Code**	**PSH353**
	Address	Land rear of The Maltings site High Street
	Area	0.46 ha
	Current land use	Greenfield
	Proposed land use	Residential
Sources of flood risk	**Topography**	 • There is no high-resolution LIDAR available for the site, therefore coarse 10m resolution has been used. • The site is generally flat with a slope from east to west. • 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; however, the Sileby 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.
	Fluvial	**Proportion of site at risk**

FZ3b	FZ3a	FZ2	FZ1
<1%	<1%	2%	98%

Highest zone of risk (Risk of Flooding from Rivers and Sea)
Medium
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%)

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<table>
<tr><td rowspan="5">Site details</td><td>Site Code</td><td colspan="3">PSH353</td></tr>
<tr><td>Address</td><td colspan="3">Land rear of The Maltings site High Street</td></tr>
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<tr><td>Proposed land use</td><td colspan="3">Residential</td></tr>
<tr><td rowspan="11"></td><td rowspan="2"></td><td colspan="3">Available data: 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.

Flood characteristics:
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</td></tr>
<tr><td rowspan="9">Surface Water</td><td colspan="3">Proportion of site at risk (RoFfSW)</td></tr>
<tr><td>30-year</td><td>100-year</td><td>1,000-year</td></tr>
<tr><td>1%</td><td>2%</td><td>6%</td></tr>
<tr><td colspan="3">Max depths (m)</td></tr>
<tr><td>0-0.15</td><td>0.15-0.3</td><td>0.15-0.3</td></tr>
<tr><td colspan="3">Max velocity (m/s)</td></tr>
<tr><td>0-0.25</td><td>0.25-0.5</td><td>0.5-1</td></tr>
<tr><td colspan="3">The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %)</td></tr>
<tr><td colspan="3">Description of surface water flow paths:
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.</td></tr>
</table>

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	Groundwater	The Areas Susceptible to Groundwater Flooding dataset shows the west of the site is located within a 1 km grid square where >=75% of the area is predicted to be at risk of groundwater flooding. The remainder of the site is located within a 1km square where >=25%<50% 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.
	Reservoir	The available online 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.
	Flood history	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.
Flood risk management infrastructure	**Defences**	**Defence Type** / **Standard of Protection** / **Condition** High Ground / N/A / N/A 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.

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	Residual risk	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. The potential for this should be assessed in a site-specific FRA.
Emergency planning	**Flood warning**	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).
	Access and egress	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.

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Climate Change	**Implications for the site**	• Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard and frequency of both fluvial and surface water flooding. • 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. • 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 by River Terrace Deposits (undifferentiated) consisting of sand and gravel.
	Soils	Slightly acid loamy and clayey soils with impeded drainage.
	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.

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	Broad scale assessment of possible SuDS	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. 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. The following techniques are considered suitable for the site: • 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. • 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 <1m. • Mapping suggests that the site slopes are suitable for all forms of detention. A liner maybe required to prevent the egress of groundwater. • All filtration techniques are likely to be suitable. 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**	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'. 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. The Exception test will need to be applied if: • More Vulnerable and Essential Infrastructure development is located in FZ3a and for Highly Vulnerable development located in FZ2. • Highly Vulnerable infrastructure should not be permitted within FZ3a and FZ3b. • More Vulnerable and Less Vulnerable Infrastructure should not be permitted within FZ3b. Development will not be permitted for the following scenario: • 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 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).

		• Safe access and egress will need to be demonstrated in the 1 in 100-year plus climate change fluvial and rainfall events, using the depth, velocity and hazard outputs. Raising of access routes must not impact on surface water flow routes. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.
		• Resilience measures will be required if buildings are situated in the flood risk area. Raising Finished Floor Levels above the design event may remove the need for resilience measures.
		• The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, to ensure that runoff from the development is not increased by placing development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure there is no increase in runoff beyond the current greenfield rates.
		• On site attenuation schemes would need to be tested against the watercourse to ensure flows are not exacerbated downstream within the catchment.
		• New or re-development should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. Assessment for runoff should include allowance for climate change effects.
		• 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.
		• This site *may* benefit from future works upstream on the Sileby Brook. Please contact the Environment Agency's East Midlands team for further information.

Key messages		The flood risk element of the Exception Test is likely to be passed if: • 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. • 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).

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		• 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. • Space for green infrastructure should be considered in the areas of highest flood risk. 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.

Flood Zones	The Flood Zone data is based on the Environment Agency's Upper Lower Soar (2012) hydraulic model and the EA's Flood Map.
Climate change	Climate change was based the Environment Agency's Upper Lower Soar (2012) hydraulic model which was re-run for latest climate change allowances.
Fluvial depth, velocity and hazard mapping	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.
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.