Bassetlaw Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables	

Site details

Site Code	**HS9**
Address	Former Elizabethan School, West Furlong, Hallcroft, DN22 7LN. Grid reference: SK 69733 81818
Area	1.31ha
Current land use	Unoccupied brownfield land
Proposed land use	Residential

Sources of flood risk

Location of the site within the catchment	The site is within the River Idle catchment. The River Idle is an Environment Agency designated main river and flows in a northerly direction to the east of Retford towards its confluence with the River Trent.
Existing drainage features	The site is located 650m south of the nearest tributary of the River Idle. The Chesterfield Canal is located 280m south of the site.
Fluvial	**The proportion of site at risk:** **FZ3b –** 0% **FZ3a –** 0% **FZ2 –** 0% **FZ1 –** 100% *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%).* **Available data:** The assessment of flood risk is based on detailed 1D-2D Flood Modeller Tuflow modelling of the River Idle. Modelling was completed by the Environment Agency in 2020. Climate change uplifts were provided by the Environment Agency in line with latest guidance these are based on UKCP18 projections. **Flood characteristics:** The site is not at risk of fluvial flooding from the River Idle.
Coastal and Tidal	The site is not at risk of coastal or tidal flooding.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3%AEP** – 0% Max depth 0m, Max velocity 0m/s **1% AEP** – 2% Max depth 0.15m-0.3m Max velocity <0.25m/s **0.1% AEP** – 31% Max depth 0.15m-0.3m Max velocity 0.5m/s- 1m/s *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. 1% AEP extent includes the 3.3 % AEP extent)*

	Description of surface water flow paths: The site is not shown to flood during the 3.3% AEP flood event, In the 1% AEP, surface water ponding affects a small area in the west of the site. Flood depths are below 0.3m and have a flood hazard rating of 'caution'. In the 0.1% AEP event, the extent of surface water flooding significantly increases. Two surface water flow paths are present on the site. The most significant surface water flow path flows north into the site from A638 North Road before flowing through the weste of the site and out towards Leafield. Flood depths from this flow path are less than 0.3m and have a flood hazard rating of 'caution'. The flow path velocities are between 0.25m/s and 1m/s. The second path flows westward from the site's eastern boundary to join the first surface water flow path. Flood depths are shallow and are less than 0.3m. The flow path velocities are 0.25m/s-0.5m/s and have a flood hazard rating of 'caution'. As well as the surface water flow paths, surface water ponding is present in the north of the site, along the edge of the existing field. However, flood depths are shallow and are less than 0.3m.
Reservoir	The site is not shown to be at risk of reservoir flooding from the available online maps.
Canals	The site is in proximity to the Chesterfield Canal. If a breach in the Chesterfield canal occurred, flood water could flow towards the site. It is recommended that overtopping and breach modelling is carried out to identify the residual risk of flooding.
Groundwater	The Environment Agency's Areas Susceptible to Groundwater Flooding dataset, provided as 1km grid squares, shows an area's susceptibility to groundwater flood emergence. The following comments can be made about groundwater flood risk: • The entire site has a <25% susceptibility to groundwater flood emergence from superficial deposits. This assessment does not negate the requirement that an appropriate groundwater regime assessment should be carried out at the site-specific FRA stage.
Sewers	The Level 1 SFRA indicates that 36 incidences of sewer flooding have occurred in the DN22 7 postcode area.
Flood history	The Environment Agency's historic flooding map does not hold a record of flooding at the site. NCC does not have any records of flooding within 100m of the site.
Flood risk management infrastructure	
Defences	This site is not protected by any formal flood defences.
Residual risk	There is no residual risk to the site from flood risk management structures.
Emergency planning	
Flood warning	The site is not located in an Environment Agency flood warning or flood alert area.
Access and egress	Access to the site is currently available from West Furlong, where two small access tracks are present. An access road is also located on Leafield. In terms of surface water flood risk, surface water flooding impacts the site and some of the surrounding road network in the 0.1% AEP modelled event. Flood depths during all events are shallow, and access will not be affected.
Climate change	
Implications for the site	The site is not at risk of flooding from the climate change extents of the River Idle. The significant increase in risk between the 1% and 0.1% AEP surface water flood event suggests that the site is sensitive to climate change. Flood depths on the site are predominantly between 0.15m-0.3m. The flow path velocities are between 0.25m/s and 1m/s across the site. The flow path has a flood hazard rating of 'caution' to 'dangerous for most people.
Requirements for drainage control and impact mitigation	

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• Geology at the site consists of:
	  ○ Bedrock- Chester Formation- Sandstone, Pebbly (Gravelly).
	  ○ Superficial- River terrace deposits, 1- Sand and Gravel.
	• Soils at the site consist of:
	  ○ Naturally wet, very acid sandy and loamy soils.
	SuDS
	• The site is considered to have very low susceptibility to groundwater flooding; this should be confirmed through additional site investigation work. Below ground development such as basements may still be susceptible to groundwater flooding.
	• BGS data indicates that the underlying geology is Sandstone which is likely to be free draining. This should be confirmed through infiltration testing, with the use of infiltration maximised as much as possible in accordance with the SuDS hierarchy.
	• The entire site is mainly located within Groundwater Source Protection Zone 1 (SPZ), and infiltration techniques may not appropriate for anything other than clean roof drainage. If infiltration is proposed for anything other than clean roof drainage, a hydrogeological risk assessment should be undertaken to ensure that the system does not pose an unacceptable risk to the supply source. Proposed SuDS should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible opportunities and constraints.
	• The site is not located within a historic landfill site.
	• Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on-site using a combination of permeable surfacing and soft landscaping techniques.
	• The Risk of Flooding from Surface Water (RoFSW) mapping indicates surface water flow paths during the 3.3 and 1% AEP event. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space. Care should be taken to ensure that SuDS is not at risk of being overwhelmed during a surface water flood event.
	• If it is proposed to discharge runoff to a watercourse or sewer system, the receiving watercourse or asset's condition and capacity should be confirmed through surveys, and the discharge rate agreed with the asset owner.

Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits, including volume control, water quality, amenity and biodiversity. This could provide more comprehensive 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. • Site masterplans should be designed to ensure space is made for above-ground SuDS features. • Drainage strategies should demonstrate that an appropriate number of treatment stages have been delivered. This depends on the factors such as the type of development, the primary source of runoff and the likelihood of contamination. Guidance should be sought from LLFA and other guidance documents such as the CIRIA SuDS Manual (C753). • Development at this site should not increase flood risk either on or off-site. The design of the surface water management proposals should consider the impacts of future climate change over the development's projected lifetime. • It is recommended that hard paving areas be designed to ensure that flood water can be stored during a flood event alongside green features such as rain gardens and tree pits.
NPPF and planning implications	
Exception Test requirements	The Local Authority will need to confirm that the sequential test has been carried out. The Sequential Test will need to be passed before the Exception Test is applied. The site is located entirely within Flood Zone 1 therefore the Exception test need not be applied. Residential development is classified as 'More Vulnerable'. No part of the site is within the national Flood Zones that show river flooding in the borough. However, there is a significant risk of surface water flooding that is likely to increase with climate change. It must be considered further to ensure the development can be made safe from flooding and that it will not increase flood risk elsewhere.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** • A site-specific Flood Risk Assessment will be required at the planning application stage as the development is more than 1ha in size.

	• All flooding sources, particularly the risk of surface water and the Chesterfield Canal should be considered as part of a site-specific flood risk assessment. • The site-specific FRA should be carried out according to the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance, Bassetlaw Borough Council's Local Plan policies, and the Nottinghamshire County Council Lead Local Flood Authority's Statutory Consultee for Planning Guidance Document. • It is recommended that overtopping and breach modelling of the Chesterfield Canal is considered as part of a site-specific FRA to establish the residual risk of canal flooding to the development. **Guidance for site design and making development safe:** • The risk of flooding should be quantified as part of the site-specific FRA, including a detailed surface water flooding model and the existing drainage system using topographical and asset survey data. To further determine the site's risk and ensure that runoff from the development is not increased by development across any surface water flow routes. A drainage strategy should help inform site layout and design to ensure no increase in runoff beyond current rates. Surface water mitigation measures should be designed for the 1% plus climate change event. • Should the site-specific FRA identify that the site is at risk from a breach of the Chesterfield Canal, proposals should demonstrate that the site can be safely evacuated through a Flood Warning and Evacuation or otherwise provide a safe area for residents to shelter in situ above the maximum predicted water level with an allowance for freeboard. • Areas at risk from surface water flooding should ideally be integrated into green infrastructure, presenting wider opportunities to improve biodiversity, amenity, and climate change adaptation. An integrated flood risk management and sustainable drainage scheme for the site is advised. A detailed surface water flooding model using the existing drainage system, topographical and asset survey must be constructed at the FRA stage. This will further determine the risk from surface water flooding and ensure that overland flows do not overwhelm future sustainable drainage features. • New developments should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. This should include allowance for climate change. • Betterment on the existing site runoff rate should be sought to ensure that there is no increase in surface water flood risk elsewhere. Ideally, surface water runoff should be fully attenuated to the greenfield rate. Developers should refer to Nottinghamshire County Council's 'Nottinghamshire County Council's Guidance Note on the Validation Requirements for Planning Applications and the Level 1 SFRA for information on SuDS guidance on the information required by the LLFA from applicants to enable it to respond to planning applications.

Key messages

The site is located entirely within Flood Zone 1 and therefore the Exception test need not be applied. However, there is a significant risk of surface water flooding, particularly when considering climate change, that must be considered further to ensure the development can be made safe from flooding and that it will not increase flood risk elsewhere.

The development is likely to be able to proceed if:

- Development is located outside of areas at risk of flooding.
- A site specific FRA, including a detailed model of surface water flooding and the existing drainage system using topographical and asset survey, is undertaken to further determine the risk from surface water to the site and ensure surface water flows do not overwhelm any planned SuDS features.
- Space for surface water to be stored on the site is provided, and rainwater harvesting should be considered. Given the degree of surface water flood risk and the location of the surface water flow path crossing the site, the density of the development may need to be lowered to make space for water.
- New developments should adopt exemplar source control SuDS techniques to reduce the risk of frequent low impact flooding due to post-development runoff. This should include allowance for climate change.

Mapping Information

The key datasets used to make planning recommendations regarding this site were the Environment Agency's Flood Map for Planning, flood modelling of the River Idle and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

Flood Zones	The extent of flooding from the River Idle is based on detailed 1D-2D Flood Modeller Tuflow modelling. Modelling was completed by the Environment Agency in 2020.
Climate change	Climate change uplifts were provided by the Environment Agency in line with latest guidance- these are based on UKCP18 projections.

Fluvial depth, velocity and hazard mapping	Flood depths, velocity and hazards were not available for the River Idle.
Surface Water	The Risk of Flooding from Surface Water map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The surface water depth and hazard mapping for the 1 in 0.1% AEP event is taken from the Environment Agency's Risk of Flooding from Surface Water mapping.