Bassetlaw Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site details

Site Code	**HS13**
Address	Former Knitwear Factory, Retford Road, Worksop, S80 2FR
Area	1.86ha
Current land use	Brownfield
Proposed land use	Residential

Sources of flood risk

Location of the site within the catchment	The site is within the catchment of the River Ryton. The River Ryton is an Environment Agency designated main river and flows in an easterly direction through Worksop towards its confluence with the River Idle.
Existing drainage features	The site is bounded to the north by a canal feeder which transports water into the Chesterfield Canal. The canal feeder is fed from an unnamed tributary of the River Ryton which splits into two distributaries 100m upstream of the site, the first flowing back into the main River Ryton channel and the second feeding the Chesterfield Canal. The Chesterfield Canal is located 82m east of the site and the River Ryton is located 25m north of the site.
Fluvial	**The proportion of site at risk:** **FZ3b –** 0% **FZ3a –** 0% **FZ2 –** 11% **FZ1 –** 89% *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 Environment Agency's Flood Zone mapping and detailed modelling undertaken in 2009 has been used in this assessment. The River Ryton Flood Zones through Worksop are based on a 1D only model undertaken in 2008 so depths are not available. We understand that the Environment Agency is currently updating this modelling. Modelling of the 1% AEP and 1% plus climate change scenarios was undertaken as part of the Level 1 SFRA in 2009. These outputs have been used to understand the risk of flooding during this scenario. **Flood characteristics:** The site is not at risk of flooding from Flood Zones 3b or Flood Zone 3 (1% AEP). A small area in the north of the site is shown to be in Flood Zone 2 (0.1% AEP).
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** – 3% Max depth 0.3-0.6m Max velocity 1-2m/s **1% AEP** – 5% Max depth 0.3-0.6m Max velocity 1-2m/s **0.1% AEP** – 34% Max depth 0.3-0.6m Max velocity >2m/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:** In the 3% AEP flood event, an area of surface water ponding is present in the site's north eastern corner. Flood depths are between 0.15m-0.6m and have a flood hazard rating of 'caution' to 'dangerous for most'. In the 1% AEP flood event, the extent of surface water flooding is marginally increased from the 30-year flood event. Flood depths are up to 0.6m in a small part area . and this area has a flood hazard rating of 'caution' to 'dangerous for some'. In the 0.1% AEP event, three flow paths are present on the site. The first flow path is located along the west edge of the site and flows north through the site before flowing into the canal feeder watercourse. The second flow path is located in the east of the site and flows in a northerly direction before ponding along the northern site boundary. The third flow path is ialong the south edge of the site and flows east before joining the flow path located along the east of the site. The flood depths of these surface water flow paths are predominantly shallow (less than 0.3m), with small localised areas of deeper flood water present around the site. These areas have a flood hazard rating of 'caution' to 'dangerous for some'.
Reservoir	A small area in the north of the site is at risk of flooding from reservoirs, as shown in 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 further investigation is taken as part of a site-specific flood risk assessment. If the site is found to be at risk, proposals should be accompanied by a Flood Warning and Evacuation plan in the event of a breach.
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%- <50% 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 six incidences of sewer flooding have occurred in the S80 2 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 in the Environment Agency's 'Ryton Oldcotes catchment' flood alert area. The site is not located in an Environment Agency flood warning area.
Access and egress	The site will be accessed from B6040 Retford Road. The north of the site is at risk of flooding from fluvial sources. However, flood water would not affect access to and from the rest of the site. In the 3.3, 1 and 0.1% AEP flood events, access and egress may be affected by surface water along the B6040 Retford Road. Flood depths are predominantly shallow and are below 300mm. The B6040 Retford Road has a flood hazard rating of 'dangerous for some' and 'dangerous for most', affecting access.
Climate change	

Implications for the site	Detailed modelling from the 2009 Level 1 SFRA was available for the River Ryton for the 1% plus 30% climate change scenario. The site is not at risk of flooding during this scenario. As noted above, the extent of Flood Zone 2 on the site is small and only affects 11% of the site. The significant increase in risk between 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, with some small areas up to 0.6m in depth. 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- Alluvium- Clay, Silt, Sand and Gravel
	• Soils at the site consist of:
	  ○ Freely draining slightly acid sandy soils
	
	SuDS
	
	• The site is considered to have a low susceptibility to groundwater. Detention and attenuation features should be designed to prevent groundwater ingress from impacting hydraulic capacity and structural integrity. Groundwater monitoring is recommended to determine the seasonal variability of groundwater levels, as this may affect the surface water drainage system's design. Below ground development such as basements may not be appropriate at this site.
	• 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 the presence of surface water flow paths during the 3.3, 1 and 0.1% AEP event. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space where possible. 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 projected lifetime of the development.
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. Residential development is classified as 'More Vulnerable'. As the site is partially located in Flood Zone 2 and predominantly located in Flood Zone 1, the Exception Test is not required. However, there is a significant risk of surface water flooding that is likely to increase with climate change. This must be considered as part of a site specific FRA s to ensure the development can be made safe from flooding and 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 and is partially within Flood Zone 2. • All flooding sources, particularly the risk of fluvial flooding, surface water and the Chesterfield Canal, should be considered 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 Council's Local Plan policies, and the Nottinghamshire County Council Lead Local Flood Authority's Statutory Consultee for Planning Guidance Document. • The development should be designed using a sequential approach. Development should be steered away from fluvial flood risk areas, 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. • 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:** • Through an FRA, the developer will need to show that 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, the operation of any mitigation measures can be safeguarded and maintained effectively through the development's lifetime. (Para 048 Flood Risk and Coastal Change PPG) • Safe access and egress will need to be demonstrated in the 1% AEP event plus climate change, (upper-end scenario), using depth, velocity and hazard outputs. The raising of access routes must not impact 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. • The risk of flooding should be quantified as part of the site-specific FRA, including a detailed model of surface water flooding and the existing drainage system using topographical and asset survey datato further determine the risk to the site 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 include a Flood Warning and Evacuation plan for this eventuality. • Areas at risk from surface water flooding should ideally be integrated into green infrastructure, which presents wider opportunities to improve biodiversity and 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 determine the risk from surface water flooding further and ensure that overland flows do not overwhelm future sustainable drainage features. It may be possible to reprofile the site to direct overland flows into open space, any such work should ensure that flood risk off site is not increased. • 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 for guidance on the information required by the LLFA from applicants to enable it to respond to planning applications.

Key messages

The site is predominantly located within Flood Zone 1, with a small area located in Flood Zone 2, 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. Surface water mitigation measures should be designed for the 1% plus climate change event. 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 and the Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

Flood Zones	The Environment Agency's Flood Zone mapping has been used in this assessment. The River Ryton Flood Zones through Worksop are based on a 1D only model so depths are not available.
Climate change	Climate change modelling outputs were not available for this site. Climate change has been assessed using Flood Zone 2 as a proxy for Fluvial flooding and the 0.1% AEP event as a proxy for surface water flooding.
Fluvial depth, velocity and hazard mapping	Results from this assessment are based on 1D modelling undertaken by the Environment Agency in 2008. Flood depth, velocity and hazard outputs were not available for this model.
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.