Level 2 Strategic Flood Risk Assessment - Site BL8

A1-C01

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Prepared for:

Newcastle-under-Lyme Borough Council

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Contents

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for BL8. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Newcastle-under-Lyme Level 1 SFRA' and read the 'Newcastle-under-Lyme Level 2 SFRA Main Report' and is therefore familiar with the terminology used in this report.

1.1 Site details

- **Location:** Land adjacent to roundabout at West Avenue. The site is situated in an urban area, west of Kidsgrove, which is located within 200m of the northern borough boundary.
- **Site area:** 1.42 ha.
- **Existing site use:** Brownfield.
- **Proposed site use:** Residential.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR shows that there is lower-lying ground along the northwest border of the site, with areas of higher elevation located centrally and to the southeast of the site. The maximum elevation is 144.9mAOD at the southeastern boundary, and the minimum elevation is 136.6mAOD on the northwestern boundary of the site.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of mudstone, siltstone, and sandstone that form the Pennine Middle Coal Measures Formation.
- Superficial deposits comprising till.

Soils at the site consist of:

- Slowly permeable seasonally wet acid loamy and clayey soils.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream end of the 'Kidsgrove Stream (including Day Green Stream)' catchment, which drains an area of 23.85km^2. The Kidsgrove Stream flows northwest in two parallel channels which converge just before passing underneath the M6. The site is situated between the sources of these two channels, approximately 640m from the western part of the stream and 920m from the eastern channel. The catchment is predominantly urban upstream of the site, encompassing the settlement of Kidsgrove, but is more rural in nature downstream of the site.

2.2 Existing drainage features

There are no existing drainage features within the site.

2.3 Fluvial

2.3.1 Available data

The EA's Flood Map for Planning (FMfP) has been used within this assessment.

2.3.2 Description of risk to the site

The EA FMfP does not show the site to be at fluvial flood risk. As shown in Table 2-1, the entire site is located within Flood Zone 1.

Table 2-1: Existing fluvial flood risk*.

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
100	0	0	0

**The percentage flood zones quoted show the percentage of the site at flood risk from that particular flood zone or event, including the percentage of the site at flood risk at a higher risk zone, e.g. Flood Zone 2 includes the Flood Zone 3 percentage. Flood Zone 1 is the remaining area outside Flood Zone 2 (Flood Zone 2 + Flood Zone 1 = 100%).*

2.4 Surface water

2.4.1 Available data

The EA's Risk of Flooding from Surface Water (RoFSW) map has been used within this assessment.

2.4.2 Description of risk to the site

Table 2-2 shows the extent of the site at risk in the 3.3%, 1%, and 0.1% AEP events, and the maximum depths, velocities, and hazards within the site boundary.

In the 3.3% AEP event, most of the site is not shown to be at risk. There is an area of surface water pooling that crosses into the western part of the site from West Avenue. As shown in Table 2-2, this pooling has a 'Very Low' maximum hazard classification, the maximum velocity reaches up to 0.25m/s, and the maximum depth is between 0.15m and 0.30m.

In the 1% AEP event, the surface water pooling in the west expands to cover a greater extent, and a new area of ponding emerges in the northeast of the site. A flow path starts to form along West Avenue, running adjacent to the western border of the site. Compared to the 3.3% AEP event, the maximum depth increases to between 0.30m and 0.60m, and the maximum hazard classification increases to 'Danger For Most'. The velocity remains up to 0.25m/s for most of the site, with only a few localised spots increasing to between 0.25m/s and 0.5m/s. These areas with increased velocity are located by the western boundary, and in the new area of ponding in the northeast.

In the 0.1 AEP event, the percentage of the site at risk increases by 4% from the 1% AEP event. The extent of surface water flood risk in the west of the site expands slightly further, and the ponding in the southeast covers a larger area. A new zone of surface water pooling also emerges from Bowling Alley Street, encroaching on the eastern boundary. Additionally, a flow path forms along nearly the entire length of West Avenue, from Linley Road to the roundabout. Compared to the 1% AEP event, the maximum hazard classification remains 'Danger For Most' but covers a larger area in the west of the site. The maximum depth increases in the area of pooling in the west, up to between 0.60m and 0.90m. Most of the surface water flood risk remains at velocities between 0.00m/s and 0.25m/s, but the areas that are between 0.25m/s and 0.50m/s increases. The velocity reaches between 0.50m/s and 1.0m/s in the southwest of the site, in the new encroachment on the eastern boundary, and in an area close to the north of the boundary.

Table 2-2: Existing surface water flood risk based on the RoFSW map.

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	4	17	21
Maximum depth (m)	0.15 to 0.30	0.30 to 0.60	0.60 to 0.90
Maximum velocity (m/s)	0.00 to 0.25	0.25 to 0.50	0.50 to 1.00
Maximum hazard classification	Very Low Hazard	Danger For Most	Danger For Most

** The percentage surface water extents quoted show the percentage 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 includes the 3.3% AEP percentage).*

2.5 Reservoir

The site is not shown to be at risk of reservoir flooding during the 'dry day' or 'wet day' scenario from the EA reservoir flood maps.

2.6 Groundwater

The EA Areas Susceptible to Groundwater Flooding (AStGWF) dataset (1km resolution) suggests that the entire site has less than 25% susceptibility to groundwater flooding. The JBA Groundwater Emergence Map (5m resolution) aligns with this, showing that the site has negligible risk. This means that the site is not considered to be susceptible to groundwater emergence due to the nature of the local geological deposits.

This assessment does not negate the requirement that an appropriate assessment of the groundwater regime should be carried out at the site-specific Flood Risk Assessment (FRA) stage.

2.7 Sewers

The site is located in a postcode area (ST7), where there were 10 internal and 31 external recorded sewer flooding incidents within Newcastle-under-Lyme borough, according to historic flood records provided by United Utilities (for the period from September 2010 to May 2024). No records are noted on the roads within the immediate vicinity of the site.

2.8 Flood history

The EA's historic flooding and recorded flood outline datasets do not have a record of any flooding on or surrounding the site.

3 Climate change

Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding. Please see Section 3.5 of the main Level 2 SFRA report for information on fluvial models and climate change allowances.

Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and escape routes must also address the potential increase in severity and frequency of flooding.

3.1 Fluvial

3.1.1 Available data

In the absence of detailed hydraulic modelling with climate change uplifts, the FMfP Zone 2 extent (0.1% AEP) has been used as an indicative 1% AEP event plus climate change flood extent. This can be compared within Flood Zone 3a (1% AEP) to give an indication of areas most sensitive to the impacts of climate change.

3.1.2 Description of risk to the site

The site is not shown to be at fluvial risk in the 0.1% AEP event, suggesting that the site is not sensitive to increased fluvial flood risk associated with climate change.

3.2 Surface water

3.2.1 Available data

The latest climate change allowances have been applied to the RoFSW map to indicate the impact on pluvial flood risk.

The design event for rainfall intensities is the 1% AEP event with the upper end climate allowance for the 2070s epoch, which is the 1% AEP plus 45% climate change for the Weaver Gowy Management Catchment which this site falls within.

3.2.2 Description of risk to the site

The extent of the design event is slightly greater than the present day 1% AEP event, with 5% more of the site at risk, as seen in Table 3-1. There is little change in extent in the west of the site, however the depths increase from between 0.30 and 0.60m in the 1% AEP event up to a maximum of 0.74m in the 1% AEP plus climate change event. The main increase in extent is through the centre of the site.

The 1% AEP plus climate change event largely shows the same extent as the 0.1% AEP event (Section 2.4.2).

Table 3-1: Comparison of surface water flood risk to the site between the 1% AEP and 1% AEP 2070s Upper End climate change extents.

Event	1% AEP	1% AEP plus 45% climate change
Percentage of site at risk (%)	17	22
Maximum depth (m)	0.30 to 0.60	0.74
Maximum velocity (m/s)	0.25 to 0.50	0.93
Maximum hazard classification	Danger For Most	Danger For Most

4 Flood risk management infrastructure

4.1 Defences

The EA AIMS dataset shows that the site is not protected by any formal flood defences.

4.2 Residual risk

There is no residual risk to the site from flood risk management structures.

5 Emergency planning

5.1 Flood warnings and alerts

The site is not located in an EA Flood Warning or Flood Alert Area.

5.2 Access and escape routes

Safe access and escape routes will need to be demonstrated in the 1% AEP plus climate change fluvial and surface water events. Site drainage proposals should address the requirements for access routes, avoid impeding surface water flows and preserve the storage of surface water to avoid exacerbation of flood risk elsewhere on the site and in the wider catchment.

5.2.1 Existing access

The site can be accessed from West Avenue, either by approaching from Linley Road (A5011) in the south or from Old Butt Lane in the north. Old Butt Lane connects to Congleton Road (A34), either directly or via Church Street and Chapel Street. By foot the site can be accessed from the east by Bowling Alley Street, joining Ryder Grove where there is a footpath to Bambury Drive.

5.2.2 Fluvial

Safe access and escape routes are shown to be maintained at this location in all available fluvial events.

5.2.3 Surface water

In the 3.3% AEP event, all routes are likely to be accessible. There are a few isolated areas of surface water ponding on West Avenue, but the depths are between 0.15 and 0.30m. There are a few areas of pooling along Old Butt Lane, but the extents do not cover the entire road. There is surface water flood risk at the entrance to Church Street from Old Butt Lane, but the depths are between 0.15 and 0.30m and access remains clear via Chapel Street.

In the 1% AEP event, access via West Avenue may be impacted. The surface water flow path along West Avenue increases in extent from the 3.3% AEP event, with depths between 0.30 and 0.60m adjacent to the west of the site. However, access should remain clear from Old Butt Lane; as in the 3.3% AEP event the areas of ponding remain between 0.15 and 0.30m and access to Old Butt Lane via Chapel Street remains clear.

In the 1% AEP event plus 45% uplift for climate change, there is a flow path along most of West Avenue potentially restricting access, and the depths are highest directly northwest of the site, with a maximum of 0.75m. Further south along West Avenue, depths are shown to remain around 0.40m or below. Access may still be possible along the eastern routes. There is a flow path along much of Old Butt Lane, but the depths remain mostly below

0.3m. There is a flow path along the entirety of Church Street, however, most of Chapel Street remains clear of surface water risk. There is surface water risk at the junction with Old Butt Lane, but depths are shown to remain below 0.30m so access and escape may still be possible. The footpath between Ryder Grove and Bellringer Place also remains completely clear, and the site can be exited on foot on this route from Bowling Alley Street.

In the 0.1% AEP event, access and escape via West Avenue is impeded, with a flow path forming along most of the road. Velocity is between 1.00 and 2.00m/s in the south, and while depths are between 0.00 and 0.15m along the road to the south of the site, the depth increases when approaching the site. Directly adjacent to the site along West Avenue, there are depths of up to between 0.60 and 0.90m, with a maximum hazard rating of 'Danger For Most'. This implies safe access and escape routes may not be possible in this direction. Access may still be maintained via the eastern routes; however, a flow path is formed along large parts of Old Butt Lane with a hazard rating of 'Danger For Some', with depths between 0.15 to 0.30m. Access and escape via Church Street is impeded, with depths between 0.30m and 0.60m. However, Chapel Street remains mostly clear from surface water flood risk.

5.3 Dry islands

The site is not located on a dry island.

6 Requirements for drainage control and impact mitigation

6.1 Broadscale assessment of possible 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 comprised of a combination of mudstone, siltstone, and sandstone which is likely to have variable permeability. The local soils are identified to be slowly permeable seasonally wet acid loamy and clayey soils which may limit infiltration potential within the winter months. Infiltration potential at the site should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff from the site.
- The site is not located within a Groundwater Source Protection Zone and there are no restrictions over the use of infiltration techniques with regard to groundwater quality.
- The site is located within a Nitrate Vulnerable Zone. Therefore, early engagement with the LLFA and the EA is recommended to determine requirements for the site to manage the impact to surrounding watercourses. Consideration of water quality is likely to be of high importance and demonstrated through the use of the Simple Index Approach.
- 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 RoFSW mapping indicates the presence of surface water flow paths during the 1% and 0.1% AEP events. Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
- If it is proposed to discharge runoff to a sewer system, the condition and capacity of the receiving asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

6.2 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, helping meet requirements for the Nitrate Vulnerable Zone. This could provide wider

sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (Local Planning Authority, Lead Local Flood Authority, 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.
- Opportunities to incorporate filtration techniques such as filter strips, filter drains and bioretention areas must be considered.
- Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
- The potential to utilise conveyance features such as swales to intercept and convey surface water runoff should be considered. Conveyance features should be located on common land or public open space to facilitate ease of access. Where slopes are >5%, features should follow contours or utilise check dams to slow flows.

7 NPPF and planning implications

7.1 Exception test requirements

The Local Planning Authority will need to confirm that the sequential test has been carried out in line with national guidelines. The sequential test will need to be passed before the exception test is applied.

The NPPF classifies residential development as 'More Vulnerable'.

The exception test is not required for this site because the entire site is located in fluvial Flood Zone 1.

7.2 Requirements and guidance for site-specific Flood Risk Assessment

At the planning application stage, a site-specific FRA will be required as the proposed development site:

- Is one hectare or greater in Flood Zone 1.
- Is subject to surface water flooding.
- Is identified as being at increased flood risk in the future, due to climate change.

All sources of flooding should be considered as part of a site-specific FRA.

Guidance on the requirements for site-specific FRAs can be found in the accompanying Level 2 SFRA report.

7.3 Guidance for site design and making development safe

Development should be steered away from the surface water flow paths in the west of the site. Developers should consider utilising this area as a green corridor or as a location for SuDS. The area of isolated surface water ponding in the central eastern portion of the site east needs to be considered and incorporated within the site design.

The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to pre-development greenfield rates, with areas of surface water ponding used as open space and SuDS or water compatible/essential infrastructure uses only.

Arrangements for safe access and escape routes will need to be provided for the 1% AEP surface event with an appropriate allowance for climate change, considering depth, velocity, and hazard. Design and access arrangements will need to incorporate measures, so development and occupants are safe.

Provisions for safe access and escape routes should not impact on surface water flow routes or contribute to loss of floodplain storage. Consideration should be given to the siting of access points with respect to areas of surface water flood risk.

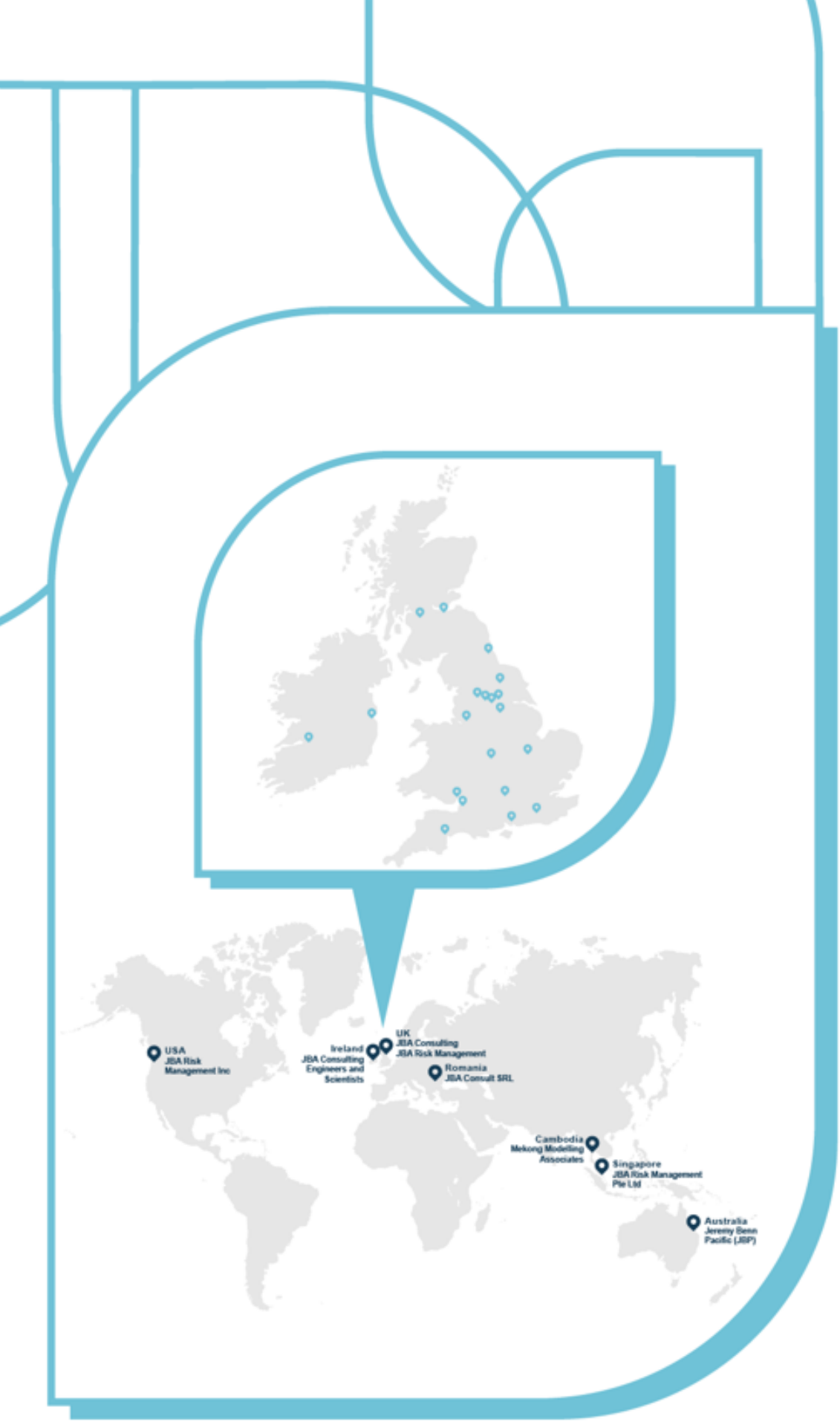
8 Conclusions

The site is at risk of surface water flooding, with surface water flood risk present in the western area across all events. Additionally, ponding emerges in the northeast of the site during the 1% and 0.1% AEP events, including the 1% AEP event plus 45% uplift for climate change.

The exception test is not required for this site because the entire site is located in fluvial Flood Zone 1. However, a site-specific FRA will be required, because the proposed development site is one hectare or greater in Flood Zone 1, subject to surface water flooding, and identified as being at increased flood risk in the future.

The following points should be considered in development of this site:

- Development should be steered away from the surface water flow paths in the west of the site, and the isolated ponding in the centre of the site needs to be considered and incorporated into the site design.
- Safe access and escape routes should be demonstrated in the 1% AEP plus climate change surface water event.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling.
- Flood mitigation measures should be implemented then tested to check that they will not displace water elsewhere (for example, if land is raised to permit development in one area, compensatory flood storage will be required in another).



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