Level 2 Strategic Flood Risk Assessment - Site SP22

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 SP22. 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:** Former playground off Ash Grove, Silverdale. Within residential urban area, around St Luke's Close.
- **Site area:** 0.70 ha.
- **Existing site use:** Brownfield - existing buildings onsite.
- **Proposed site use:** Residential.

1.2 Topography

The Environment Agency (EA) 1m resolution LiDAR indicates higher ground is located in the southwest of the site and along the northern boundary. The southeast of the site is at a lower elevation, as is St Luke's Close road, which lies at a slightly lower level than the surrounding area. The site has a maximum elevation of 143.37mAOD in the southwestern corner of the site. The minimum elevation is in the southeastern corner of the site, at 139.50mAOD.

1.3 Geology and soils

Geology at the site consists of:

- Bedrock made up of mudstone, sandstone, and conglomerate that form the Etruria Formation.
- Superficial deposits comprising till.

Soils at the site consist of:

- Restored soils mostly from quarry and opencast spoil.

2 Sources of flood risk

2.1 Location of site within the catchment

The site is in the upstream end of Lyme Brook Catchment (trib of Trent), which drains an area of 29.59 km^2. Lyme Brook flows south, converging with the River Trent near Hanford. The site is situated approximately 2.3km northwest of Lyme Brook. The majority of the catchment is urban, encompassing a number of built-up areas and settlements, the largest being Newcastle-under-Lyme. The are more rural areas in the northwest of the catchment, located north of Silverdale. There are also green spaces along the watercourse, particularly to the south of Newcastle-under-Lyme.

2.2 Existing drainage features

There are no existing drainage features within the site.

Available hydraulic modelling for Lyme Brook shows there is an ordinary watercourse which flows approximately 140m north of the site, before entering a culvert which runs through the urban area of Silverdale. There is a second ordinary watercourse which emerges from a culvert approximately 80m southeast of the site, flows for a short distance as an open channel, before re-entering a culvert approximately 45m east of the site. The culverts are shown to converge within the urban area of Silverdale.

2.3 Fluvial

2.3.1 Available data

The EA's Flood Map for Planning (FMfP) and EA's 2015 Estry-TuFLOW detailed hydraulic model of Lyme Brook have been used within this assessment.

2.3.2 Description of risk to the site

The EA's FMfP and Lyme Brook model do not show any fluvial flood risk to this site.

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 2-1 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, there are two areas of isolated surface water ponding within the site. One is along the northern border, and the other is in the southeast of the site. The

maximum depth is between 0.15m and 0.30m, and the velocity is between 0.50m/s and 1.00m/s. The maximum hazard classification is 'Very Low Hazard'.

In the 1% AEP event, the extent of surface water flood risk increases considerably to cover 21% of the site. This extent falls mostly in the northeast and is part of a greater flow path which flows east towards Newcastle-under-Lyme. The maximum depths remain the same from the 3.3% AEP event, between 0.15m and 0.30m. However, the velocity increases to between 1.00m/s and 2.00m/s, and the maximum hazard classification increases to 'Danger for Most'.

In the 0.1% AEP event, over half of the site is at risk of surface water flooding. This risk is located in the eastern portion of the site, extending partially into the northwest but not into the southwest. The entirety of Saint Luke's Close is covered by the prominent flow path, which flows east. From the 3.3% and 1% AEP events, the maximum depth increases to between 0.30m and 0.60m. As in the 1% AEP event, the maximum hazard classification increases to 'Danger for Most'. However, the velocity increases to greater than 2.00m/s.

Table 2-1: Existing surface water flood risk based on the RoFSW map.

Event	3.3% AEP	1% AEP	0.1% AEP
Percentage of site at risk* (%)	7	21	51
Maximum depth (m)	0.15 to 0.30	0.15 to 0.30	0.30 to 0.60
Maximum velocity (m/s)	0.50 to 1.00	1.00 to 2.00	Greater than 2.00
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 a susceptibility to groundwater flooding between 25% and 50%.

The JBA Groundwater Emergence Map (5m resolution) aligns with this, showing areas within 150m north and south of the site where groundwater levels range from 0.025m to 0.5m below the ground surface, reaching or coming very near (within 0.025m) to the ground surface in some locations. However, the site itself is shown to have 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 (ST5 6), where there were 9 recorded historic sewer flooding incidents within Newcastle-under-Lyme borough, according to information provided by Severn Trent Water Severn Trent Water provided historical flooding data for reports of external and internal sewer flooding between 1 January 2004 and 19 March 2024, including locations with repeat incidents.

There are no incidents of sewer flooding within the site or its immediate vicinity.

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

As part of the 2024 Level 1 SFRA for Newcastle-under-Lyme borough, the existing EA's 2015 Estry-TuFLOW detailed hydraulic model of Lyme Brook was uplifted with the latest central, higher central, and upper end climate change allowances for the 3.3%, 1%, and 0.1% AEP events.

3.1.2 Description of risk to the site

The site is not shown to be at fluvial risk in any of the modelled fluvial climate change events.

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 40% climate change for the Trent Valley Staffordshire Management Catchment which this site falls within.

3.2.2 Description of risk to the site

The extent of the 1% AEP plus 40% climate change event is much greater than the present day 1% AEP event, with 39% more of the site at risk, as seen in Table 3-1. The 1% AEP plus 40% climate change event also has a higher maximum depth and maximum velocity. Over half of the site is at risk in the climate change event, except from the southwest, a potion of the northwest, and three gaps in the extent. Two of the gaps are located by the northern boundary, and the largest one by the southern boundary.

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 40% climate change
Percentage of site at risk* (%)	21	60
Maximum depth (m)	0.15 to 0.30	0.62
Maximum velocity (m/s)	1.00 to 2.00	2.77
Maximum hazard classification	Danger For Most	Danger for All

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 surface water event. 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

Currently the site's only access point is via Station Road, which runs along the east boundary of the site. This road intersects with Sneyd Terrace (B5044), which heads east towards Newcastle-under-Lyme and west to meet High Street, approximately 150m south of its junction with Station Road.

On foot it is possible to access the site from the north, where Station Road joins a cycle path (the Former Stoke-Market Drayton Line). This cycle path runs west to meet the High Street after approximately 270m and runs east directly to the north of Newcastle-under-Lyme. Leaving the site by following Station Road north, there is also a footpath that goes to the residential area around Sutton Avenue.

5.2.2 Fluvial

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

5.2.3 Surface water

In the 3.3% AEP event, safe access and escape routes are likely maintained. There is surface water pooling on Station Road close to and on the junction to Sneyd Terrace (B5044). There is also a stretch, approximately 60m, of surface water flood risk directly east of this junction. However, the maximum depth is between 0.15m and 0.30m, and access remains mostly clear travelling west of the site.

In the 1% AEP event, there is a flow path that covers the entire stretch of Station Road between Saint Luke's Close and Sneyd Terrace (B5044). However, just as in the 3.3% AEP event, the maximum depth is between 0.15m and 0.30m. The stretch of surface water flood risk directly east of the Station Road and Sneyd Terrace (B5044) junction expands further in the 1% AEP event and has a maximum depth of between 0.30m and 0.60m. However, access and escape routes leaving the junction west remains clear.

In the 1% AEP event plus 40% uplift for climate change, access and escape routes are impacted, particularly when directly entering and leaving the site on Station Road from

Sneyd Terrace (B5044). There is a surface water flow path that covers the entirety of Station Road, as well as along Sneyd Terrace (B5044) travelling west from the site and along Church Street (B5044) travelling east. The maximum depth on Station Road is around 0.50m, and the maximum depth is 0.73m on Sneyd terrace (B5044) just outside of the site. Continuing east from the site on Church Street (B5044) access and escape routes become restricted with maximum depths above 1.50m. However, the depth reduces to below 0.30m along Sneyd Terrace (B5044) west of the site.

In the 0.1% AEP event, the extent of risk from surface water flooding is similar to that of in the 1% AEP event plus 40% climate change event. Access and escape routes are impacted leaving the site from Station Road, with maximum depths between 0.60m and 0.90m on Sneyd Terrace (B5044) just east of the junction with Station Road. Access and escape routes become restricted leaving the site eastwards on Church Street (B5044), with maximum depths above 1.50m. Access may still be maintained along Sneyd Terrace (B5044) west of the site, as the depth reduces to below 0.30m. However, the issue remains of surface water flood risk on the junction leaving the site.

Developers will need to demonstrate safe access and egress in the 1% AEP plus climate change surface water event.

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 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 design of the surface water drainage system. Below ground development such as basements may not be appropriate at this site.
- BGS data indicates that the underlying geology is mudstone, sandstone, and conglomerate which is likely to have variable permeability. The local soils are identified to be restored soils mostly from quarry and opencast spoil, which may suffer from compaction and, as a consequence, run off and erosion. 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.
- The site is a brownfield site, and soils are identified to be restored soils mostly from quarry and opencast spoil. Soil contamination testing may need to be undertaken to determine whether infiltration is appropriate at the 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%, 1% AEP plus 40% climate change, 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 the 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.
- The use of multistage SuDS treatment will improve water quality of surface water runoff discharged from the site and reduce the impact on receiving water bodies.
- 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 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

The site is at significant surface water risk. Development should be steered away from the main areas of surface water risk in the east of the site and these areas should be considered as potential locations for SuDS. Where this is not possible, Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance.

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.

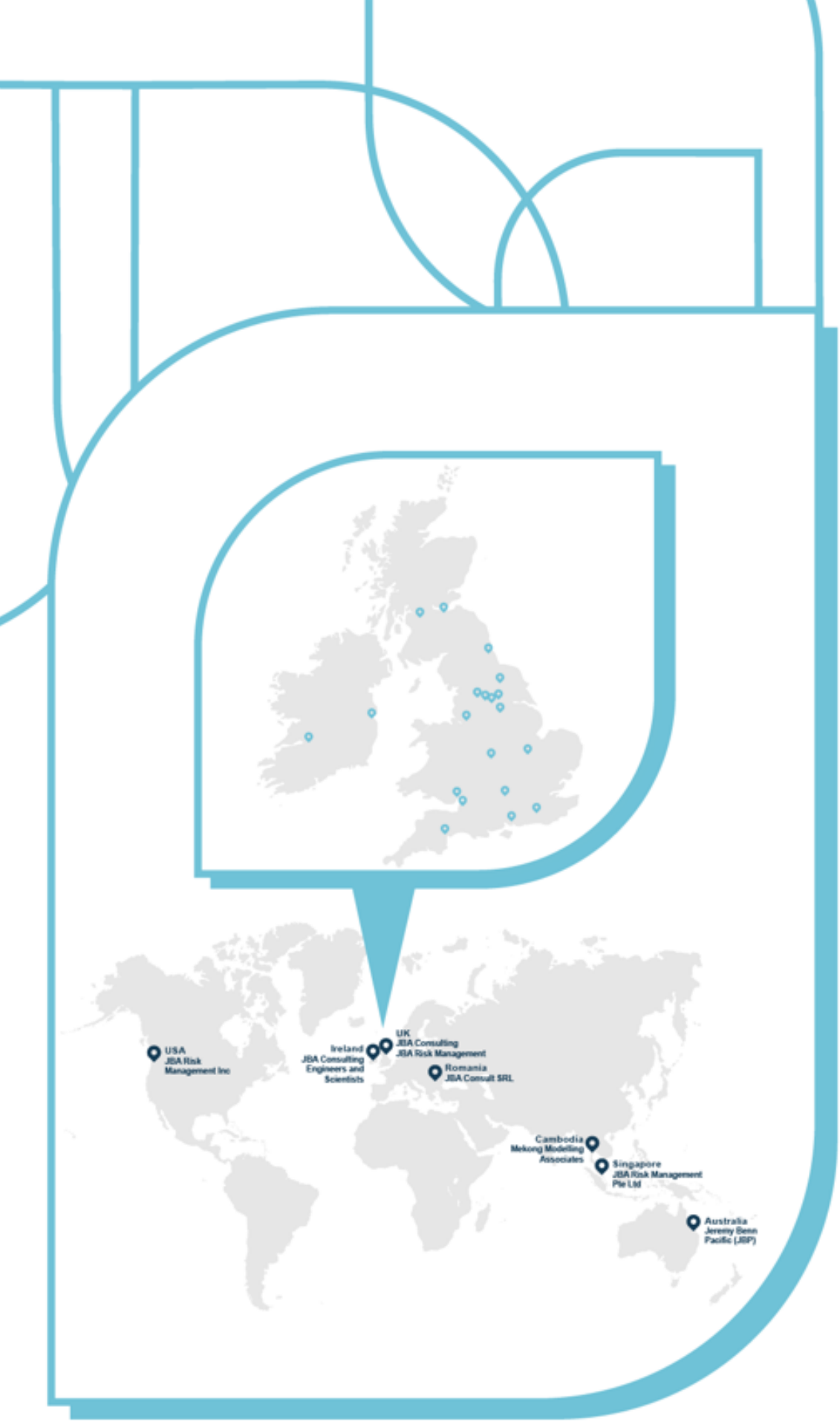
8 Conclusions

The site is at significant risk of surface water flooding. Surface water flood risk is present in the eastern areas across all events. A prominent surface water flow path, which flows through the centre of the urban area of Silverdale, results in 51% of the site being at risk of surface water flooding during the 1% AEP event, and 60% being at risk in the 1% AEP plus 40% climate change.

As the site is not at fluvial flood risk, the exception test is not required. However, the council should carefully weigh up the benefits of development against the risks and satisfy themselves that users of the site can be kept safe throughout its lifetime. Further assessment will be required as part of a site-specific FRA to determine whether development at this site can be safely allocated and the potential capacity of the site will have to be considered.

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

- Development should be steered away from the main areas of surface water risk in the east of the site. Where this is not possible, Finished Floor Levels should be raised above the expected height of flooding in line with the EA's guidance.
- Safe access and escape routes should be demonstrated in the 1% AEP plus climate change surface water event. Currently, this Level 2 SFRA cannot demonstrate that safe access and escape can be maintained within this event. If there are significant issues, a Flood Warning and Evacuation Plan should be prepared which considers the likely onset and duration of flooding and demonstrates how residents can safely be evacuated and/or shelter safely in situ during the surface water design 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).
- Severn Trent Water should be consulted at an early stage regarding the proposed site drainage due to the potential implications on the public sewerage as a result of the return period analysis identifying potential sewer flooding issues along the potential connecting network.



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