



EVB03.4

Bolton Level 2 Strategic Flood Risk Assessment Site Summaries 337-379

Site 337

Final Report

Prepared for
Bolton Council

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Contract

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JBA Project Code	2025s1871

This report describes work commissioned by Bolton Council by an instruction dated 18 June 2026. The Client's representative for the contract was Sara Dilmamode of Bolton Council. Laura Thompson-Jones of JBA Consulting carried out this work.

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Acknowledgements

We would like to thank the Environment Agency for their assistance with this work.

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Local Plan Site 337. The content of this report assumes the reader has already consulted the 'Bolton Level 1 SFRA' (2026) and read the 'Bolton Level 2 SFRA Main Report' (2026) and is therefore familiar with the terminology used in this report.

1.1 Site 337

- Location: Brightmet Street
- Existing site use: Disused car park
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area (ha): 1.61
- Watercourse: N/A
- Environment Agency (EA) model: N/A
- Summary of requirements from Level 2 SFRA scoping stage:
 - Assessment of surface water flood extent, depths and hazards
 - Assessment of all other sources of flood risk
 - Assessment of flood risk management measures and natural flood management

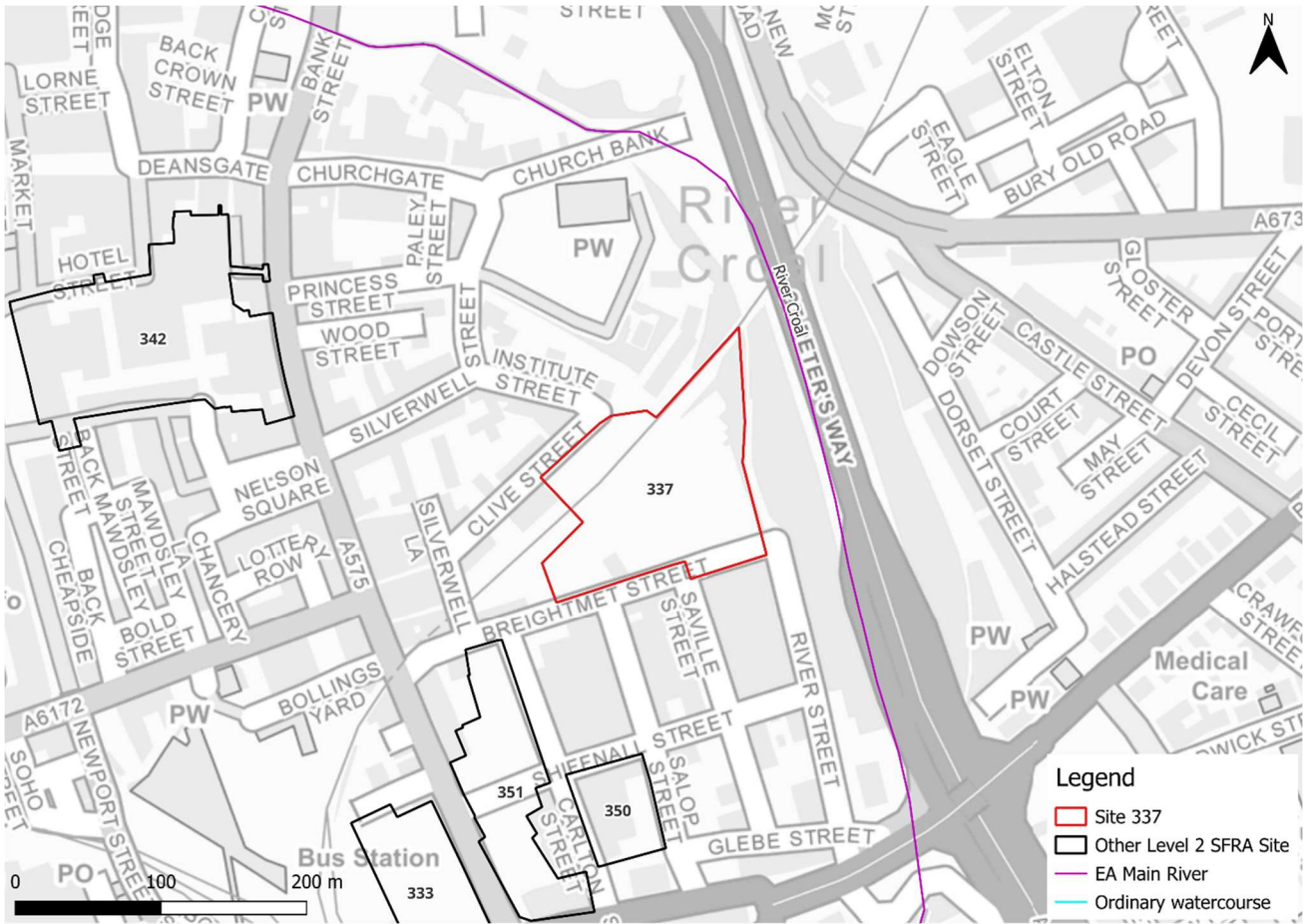


Figure 1-1: Existing site location boundary

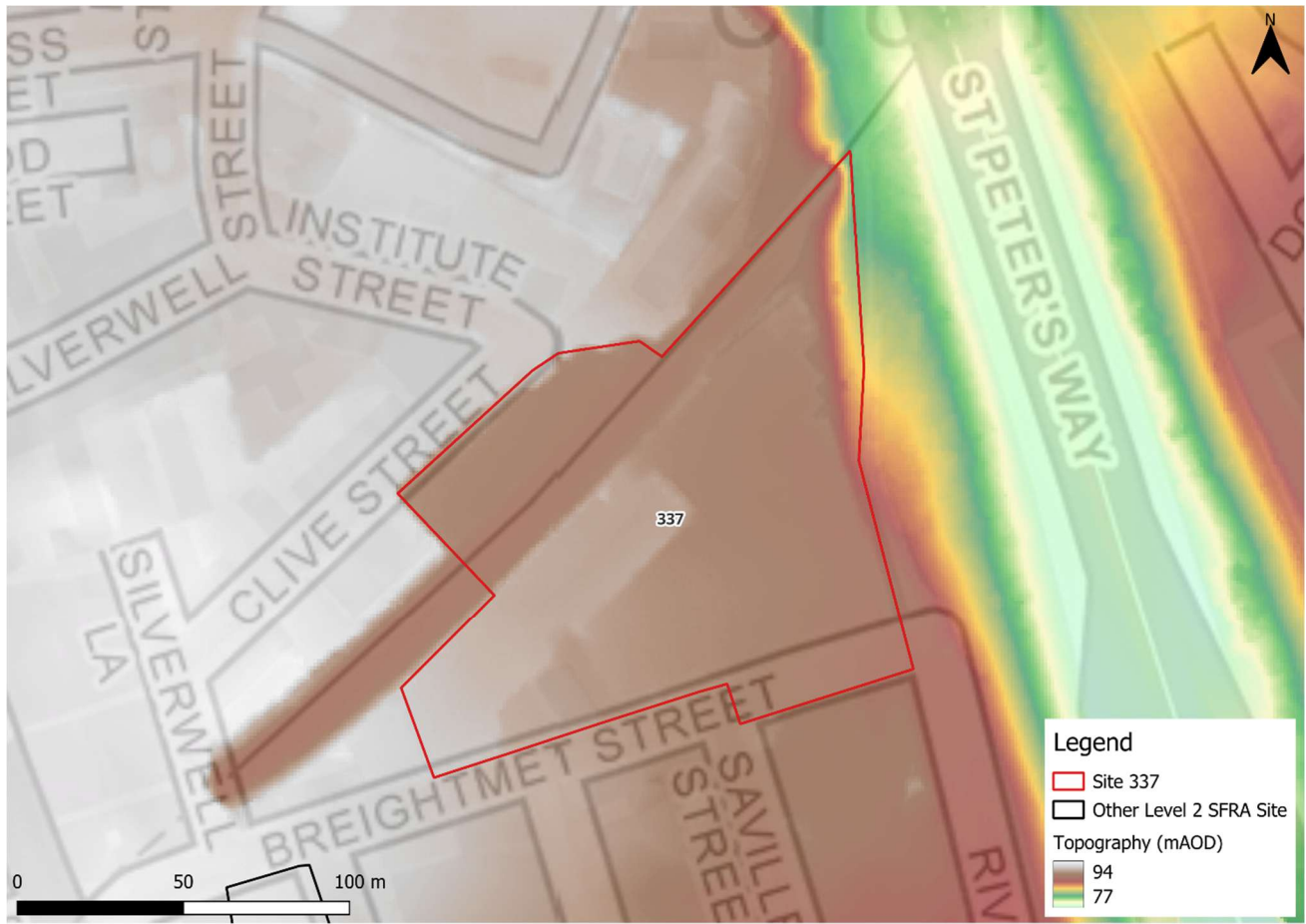


Figure 1-2: Topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the Environment Agency's (EA) Flood Map for Planning (June 2026) and Flood Zone 3b (functional floodplain), as updated through the Bolton Level 1 SFRA, the percentage areas of the site within the flood zones are stated in Table 2-1 and can be viewed on Figure 2-1. This version of the Flood Map for Planning does not consider flood defence infrastructure (Section 2.4).

The site is located at a much higher elevation than the River Croal floodplain therefore is within Flood Zone 1 and at low risk of flooding from rivers.

Table 2-1: Existing flood risk based on percentage area of site at risk

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



Figure 2-1: Existing risk

2.2 Impacts from climate change

2.2.1 Flood Map for Planning - climate change

The site is not likely to be at fluvial risk when considering climate change, based on the EA's Flood Map for Planning - Flood Zones plus Climate Change dataset.

2.3 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site, according to these datasets.

The LLFA provided its historic floods register. There have been no recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

2.4 Flood risk management

2.4.1 Flood defences

The site does not benefit from any formal engineered flood defences, according to the EA's spatial flood defences dataset.

2.4.2 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the site and surrounding areas. There are no opportunities that could benefit the site.

2.5 Emergency planning

2.5.1 Flood warning

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. The site is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is not located within a FAA.

2.5.2 Access and escape routes

Based on available information on fluvial flooding, safe access and escape routes would likely be achievable via Clive Street for development to the north of the railway line, or Brightmet Street for development to the south of the railway line (Figure 2-2).

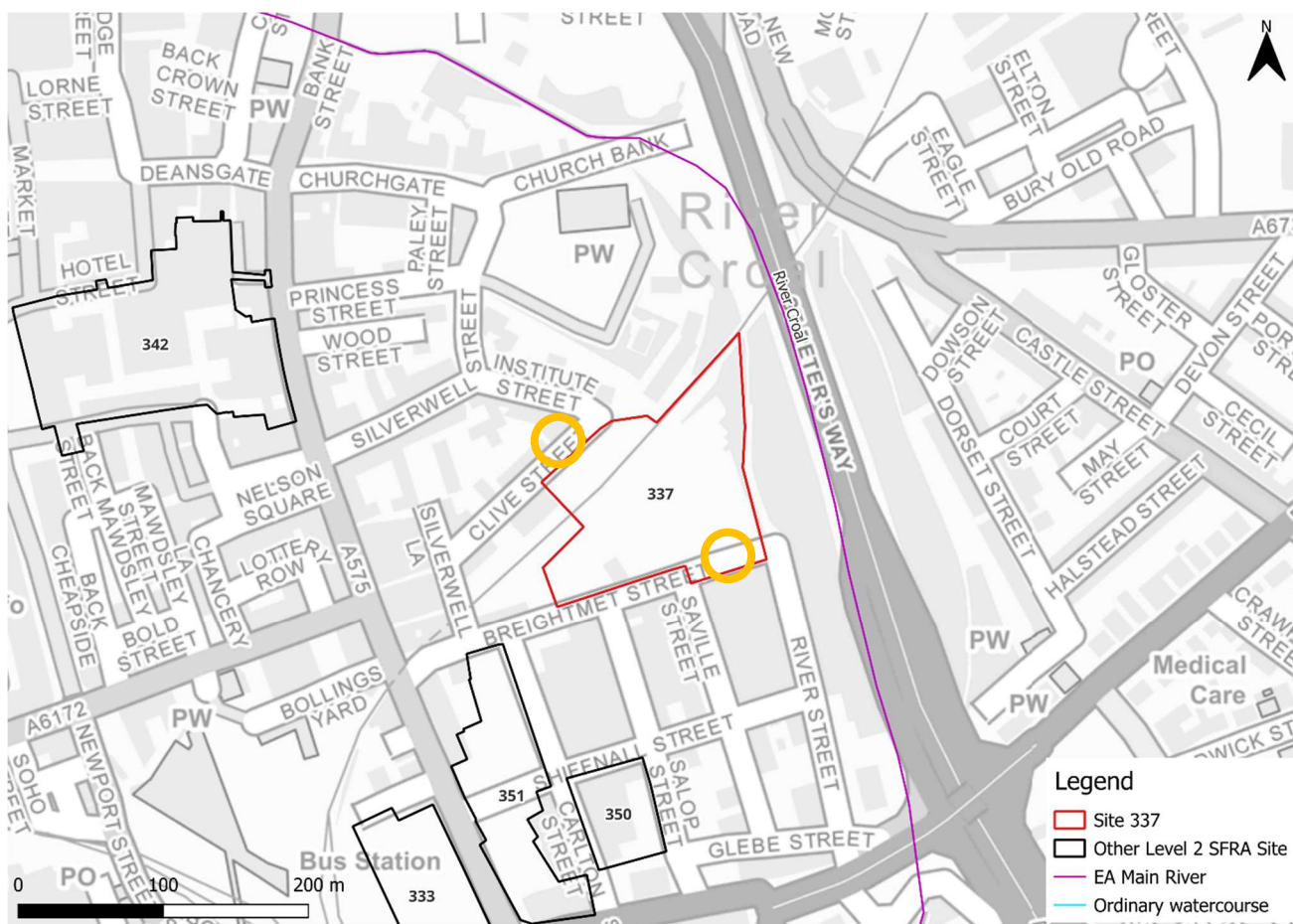


Figure 2-2: Potential access and escape routes

2.6 Observations, mitigation options, site suitability, sequential approach to development management - fluvial

- Observations:
 - The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
 - Given the change in use and therefore vulnerability of the site, the LPA must consider whether the change of use is acceptable and whether the development can be designed to be safe, including for adequate emergency planning provision, accounting for the information provided in this Level 2 SFRA (para 014 FRCC-PPG).
 - The site is wholly located within Flood Zone 1 and therefore at low risk from rivers.
 - The site is not shown to be at additional risk from climate change.
- Access and escape:
 - Safe access and escape routes would likely be achievable via Clive Street for development to the north of the railway line, or Breightmet Street for development to the south of the railway line.

3 Flood risk from surface water

3.1 Existing risk

3.1.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Present Day

Based on the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Extents Present Day map (June 2026), the majority of the site is situated outside of the 0.1% AEP surface water flood extent (Table 3-1) and therefore at nominal flood risk. Modelled surface water risk to the site is confined to the railway line present through the north of the site (Figure 3-1). It is assumed that the railway line will remain in situ.

Greatest flood depths along the railway line in the 1% AEP event are shown to be shallow, between 0.15 and 0.3 m (Figure 3-2). Safe access and escape routes would likely be achievable via both Clive Street and Brightmet Street in all events.

Table 3-1: Existing surface water flood risk based on percentage area at risk using the Flood Map for Planning - Surface Water Spatial Planning Extent Present Day map

Less than 0.1% AEP event (% area)	0.1% AEP event (% area)	1% AEP event (% area)	3.3% AEP event (% area)
93	3	1	3

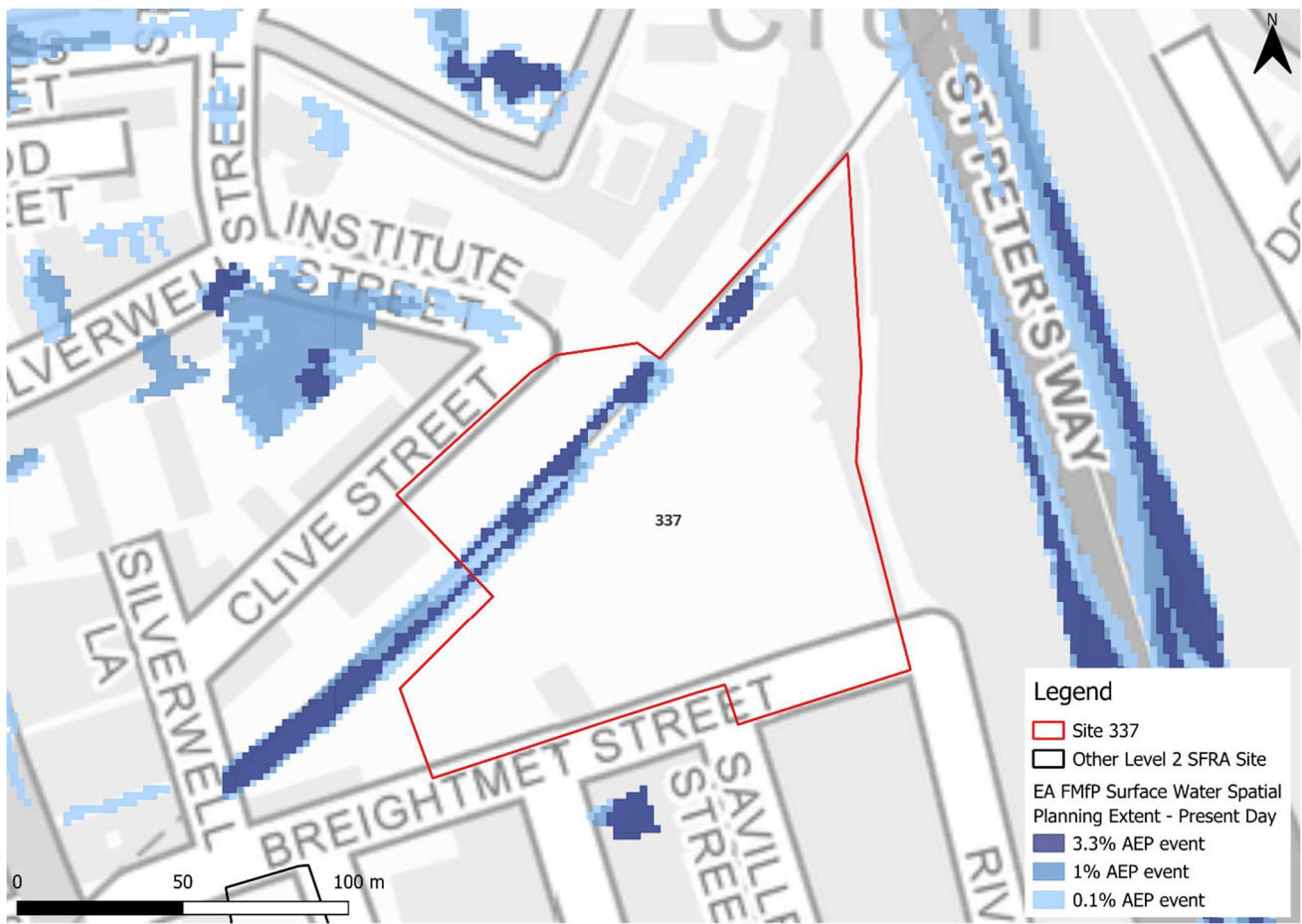


Figure 3-1: Flood Map for Planning - Surface Water Spatial Planning Extents Present Day

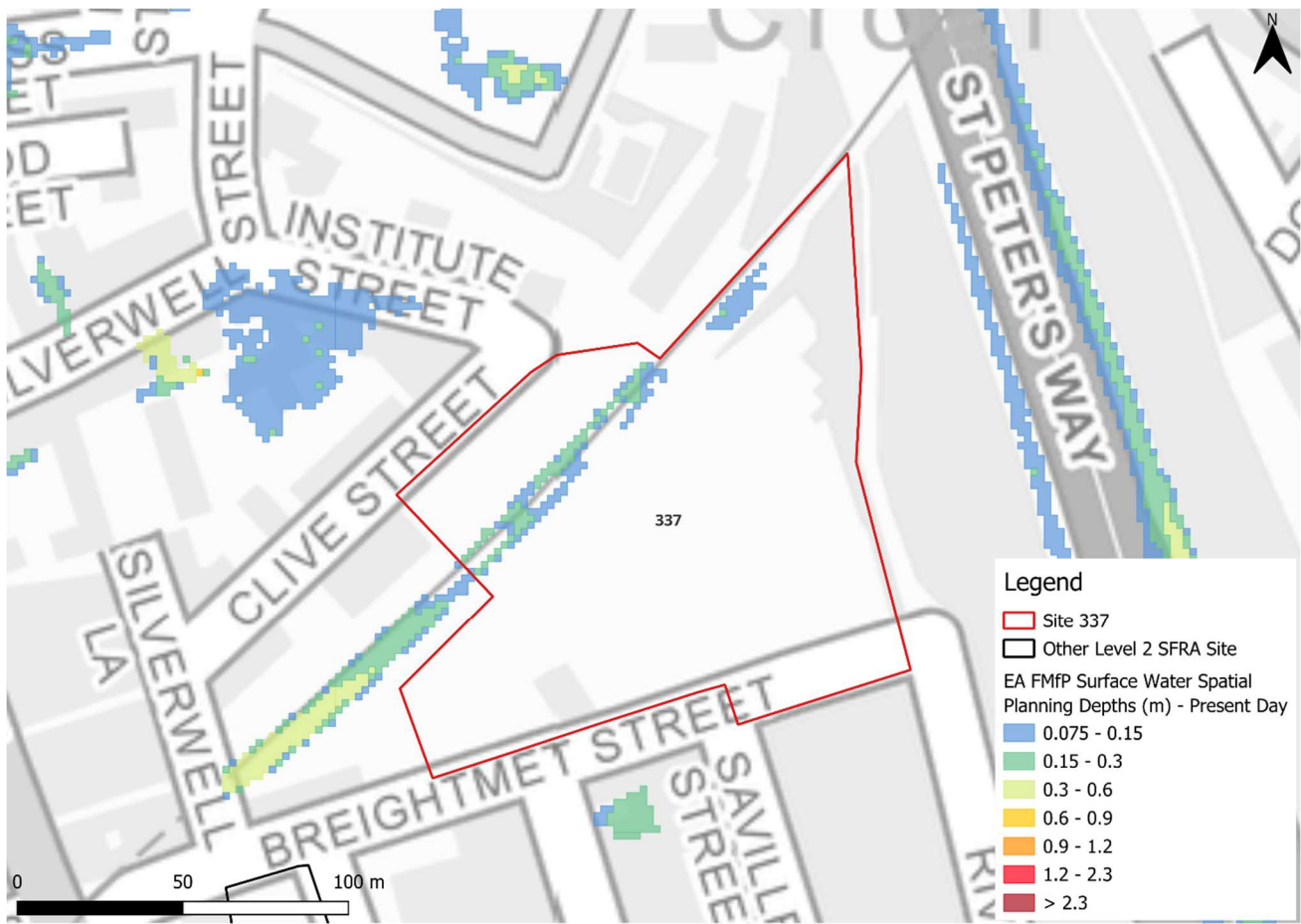


Figure 3-2: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Present Day for the 1% AEP event

3.1.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning data does not include hazard information suitable for planning purposes.

Therefore, this Level 2 SFRA considers the third generation Risk of Flooding from Surface Water (RoFSW) hazard mapping in addition to the Flood Map for Planning - Surface Water Spatial Planning extents and depths, as the best available information. Updated surface water hazard information would need to be confirmed at the site-specific FRA stage.

Based on the EA's national scale third generation RoFSW map, the greatest flood hazard along the railway line in the 1% AEP surface water event is categorised as 'moderate' (Figure 3-3).

There are some differences between the Flood Map for Planning - Surface Water Spatial Planning map and the third generation RoFSW hazard mapping. The Flood Map for Planning - Surface Water Spatial Planning data does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. In contrast, the third generation RoFSW does not map flooding with a hazard rating of less than 0.575. This could explain the differences observed between the Flood Map for Planning and third generation RoFSW maps.

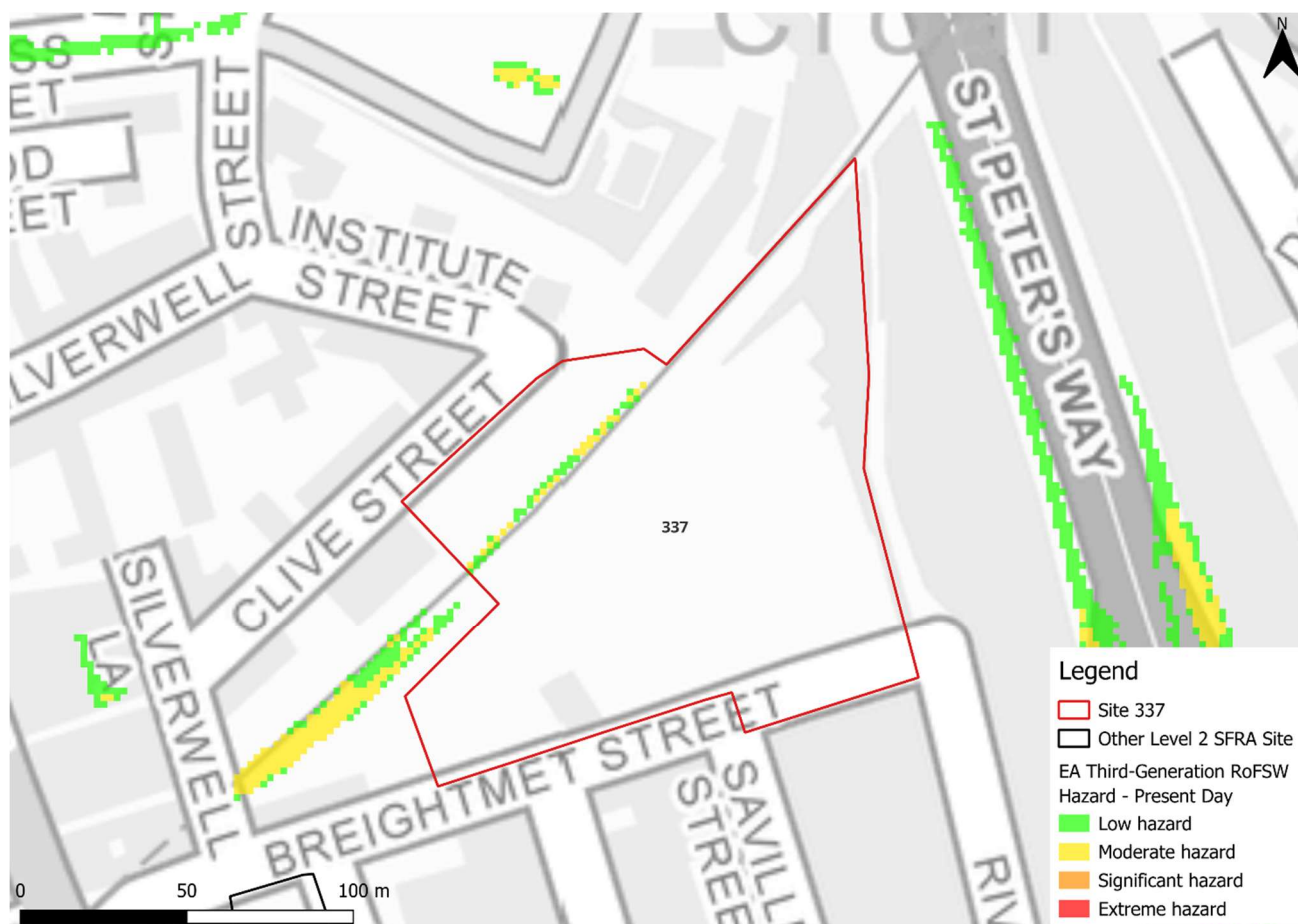


Figure 3-3: Third generation - Risk of Flooding from Surface Water map present day 1% AEP event surface water flood hazard¹

3.2 Impacts from climate change

3.2.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Climate Change

The EA's [climate change allowance guidance](#) states that SFRA's should assess the upper end peak rainfall allowance for the 2070s epoch. This dataset is included in the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Climate Change dataset (June 2026). The peak rainfall intensity allowances for the Irwell management catchment are shown in Table 3-2. The allowance for the 0.1% AEP event is not stated in the EA guidance.

¹ Based on Section 7.5 Hazard rating. What is the Risk of Flooding from Surface Water map? Report version 2.0. April 2019. Environment Agency

Table 3-2: Peak rainfall intensity allowances for the Irwell management catchment

Return period	Central allowance 2070s (% increase)	Upper end allowance 2070s (% increase)
3.3% AEP	30	40
1% AEP	30	45

Figure 3-4 shows the surface water flood extents for the 2070s upper end climate change scenario. Surface water risk remains largely confined to the railway line within the north of the site. There is a small additional area of ponding within the 0.1% AEP event in the southeast of the site.

The greatest flood depths onsite in the 1% AEP event are shown to increase to between 0.3 and 0.6 m (Figure 3-5), however this remains confined to the railway line onsite. Safe access and escape routes would likely remain achievable via both Clive Street and Brightmet Street in all events.

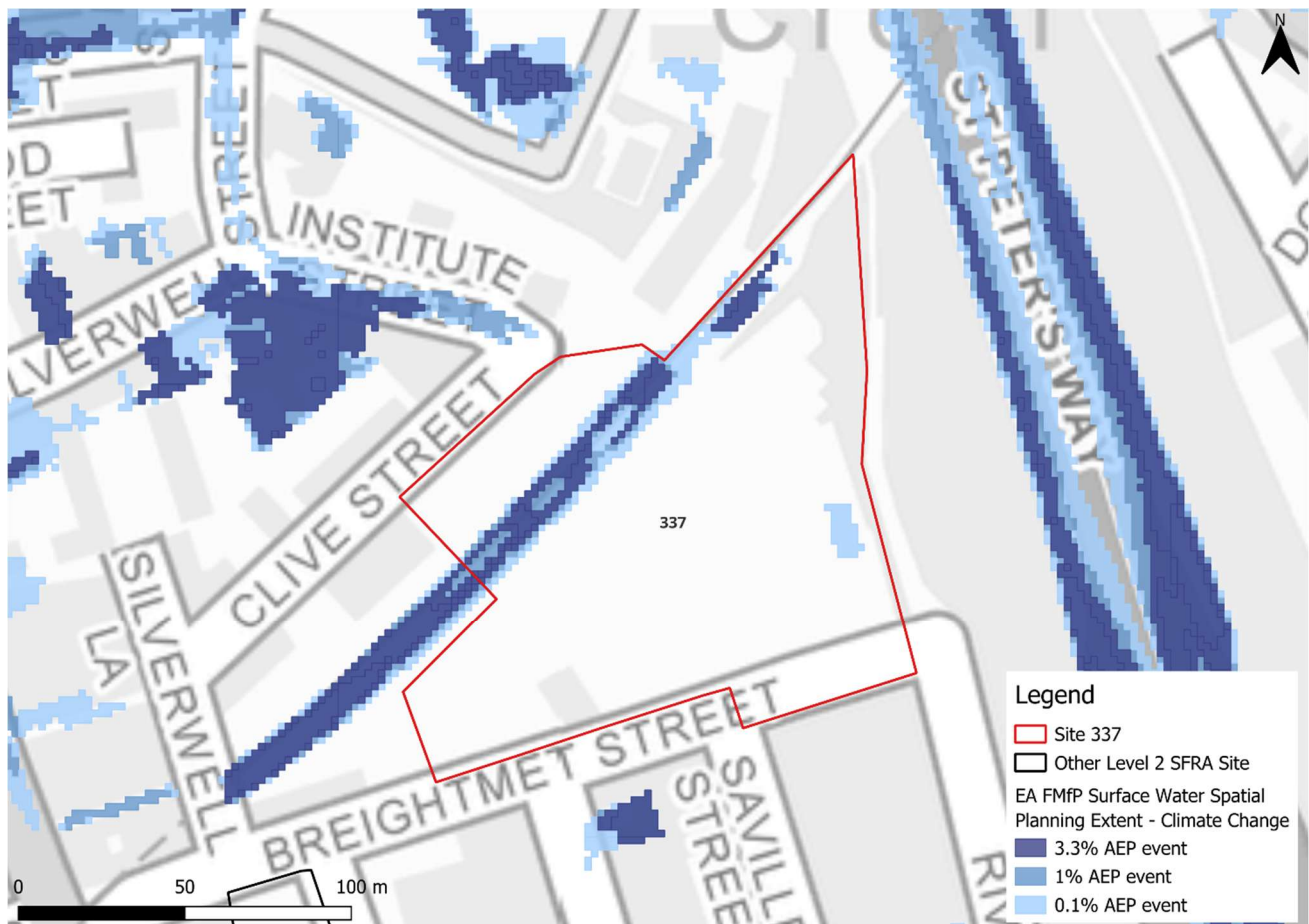


Figure 3-4: Flood Map for Planning - Surface Water Spatial Planning Extents Climate Change (2070s Upper End)

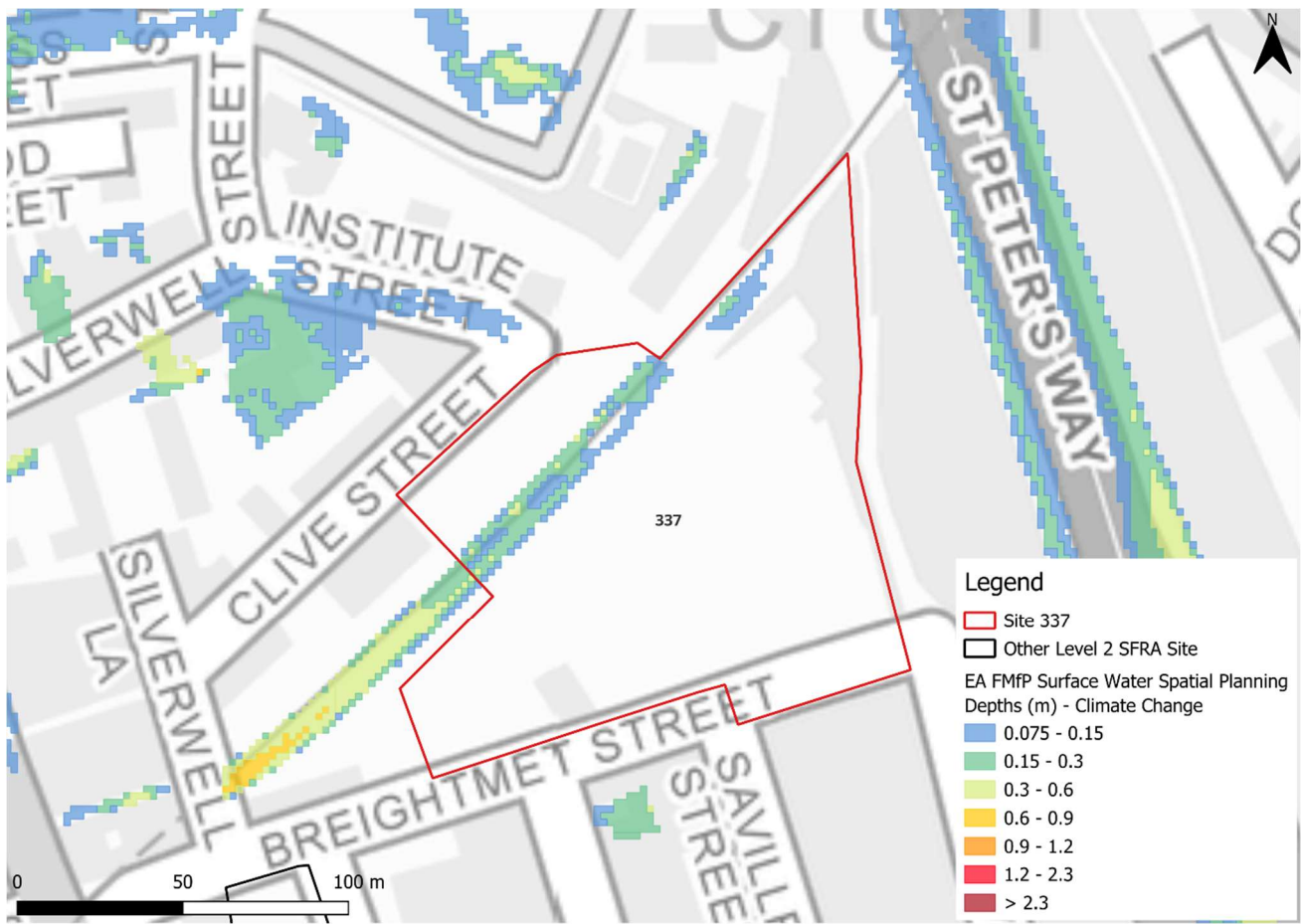


Figure 3-5: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Climate Change for the 1% AEP event (2070s Upper End)

3.2.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning climate change data does not include hazard information suitable for planning purposes. This Level 2 SFRA therefore considers the 0.1% AEP surface water event as a conservative proxy for the 1% AEP event plus climate change, as the best available information to assess surface water flood hazards. The impact of climate change on surface water flood hazards should be considered at the site-specific FRA stage.

Using the RoFSW 0.1% AEP event as a proxy, future surface water flood hazard in the RoFSW 1% AEP event is categorised as 'significant' within a small area along the railway line (Figure 3-6).



Figure 3-6: 0.1% AEP event surface water flood hazard¹, as a proxy for the 1% AEP event plus climate change (Third generation - Risk of Flooding from Surface Water map)

3.3 Sewer flood risk

United Utilities provided their historic risk registers which were aggregated by ward. There are no recorded sewer flooding incidents within the immediate vicinity of the site. There have been three recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

3.4 Observations, mitigation options, site suitability, sequential approach to development management - surface water

- Current risk to the site is predominantly very low, with 93% of the site being outside of the 0.1% AEP surface water flood extent. Present day surface water risk in all events is confined to the railway line through the north of the site.
- The railway line is secured by fencing and is assumed that this area is not being proposed for development.
- Risk to the site is shown to largely remain confined to the railway line when considering the impact of climate change, with an additional area of ponding within the 0.1% AEP event in the southeast of the site.

- Any drainage strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. Brownfield runoff rates or betterment should apply. The developer should consult the LLFA and follow local and National SuDS guidance.
- Safe access and escape routes would likely be achievable via both Clive Street and Breightmet Street.

4 Groundwater, geology and SuDS suitability

Risk of groundwater emergence is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. Figure 4-1 shows the map covering the site and the surrounding areas. Table 5-1 explains the risk classifications.

The majority of the site is within an area where there is a risk of emergence to subsurface assets, but surface manifestation of groundwater is unlikely. There are some small areas where there is a risk of groundwater emergence to both surface and subsurface assets. Infiltration SuDS would unlikely be suitable at this site. Were development to be considered, the site-specific FRA should further investigate groundwater levels through percolation testing in both wet and dry weather conditions.

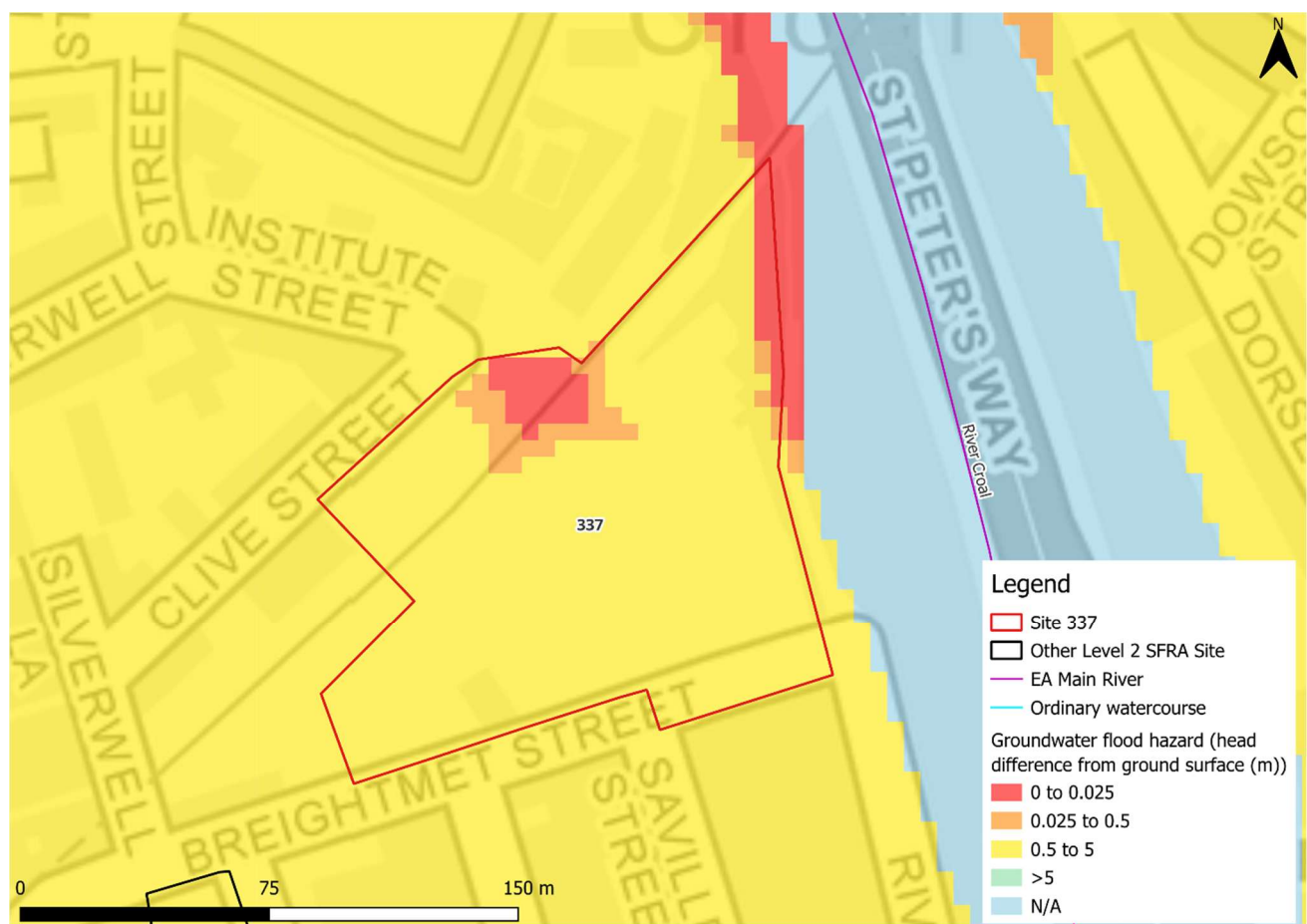


Figure 4-1: JBA 5m Groundwater Emergence Map

Table 4-1: Groundwater Hazard Classification

Groundwater head difference (m)*	Class label
0 to 0.025	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025 to 0.5	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event. There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
*Difference is defined as ground surface in mAOD minus modelled groundwater table in mAOD.	

The underlying bedrock within the site is a combination of mudstone, siltstone, sandstone, coal, ironstone and ferricrete (Figure 4-2). Mudstone, siltstone, coal, ironstone and ferricrete typically have low permeability, whereas sandstone has a higher permeability. Therefore, it is likely that the bedrock beneath the site will contribute to lower levels of infiltration and lower water tables. However, this is not reflected in the groundwater emergence mapping at the site (Figure 4-1).



Figure 4-2: BGS Geology - Bedrock and superficial deposits

5 Residual risk

Although a site may be afforded some protection from defences and / or drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. defence breaches, or blockages of culverts or drainage assets.

There does not appear to be any residual risk to the site from asset blockage or defence breach.

5.1 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. Figure 5-1 shows the RFM in a 'dry day' and 'wet day' scenario. A 'dry day' scenario assumes that the water level in the reservoir is the same as the spillway level or the underside of the roof for a service reservoir and the watercourses upstream and downstream of the reservoir are at a normal level. A 'wet day' scenario assumes a worst-case scenario where a reservoir releases water held on a 'wet day' when local rivers have already overflowed their banks.

The site is potentially at risk from two reservoirs, namely High Rid and Rumworth. These are both located within Bolton authority area and operated by United Utilities. In the 'dry day' scenario, only High Rid impacts the site, with the flood extent confined to the railway line within the north of the site.

The EA's SFRA guidance states that where a proposed development site is at flood risk from a reservoir, then an assessment into whether the reservoir design or maintenance schedule needs improving should be carried out. Expert advice may be required from an all-reservoirs panel engineer. The Council should consult the relevant reservoir undertaker to ascertain whether the proposed development could affect the reservoir's risk designation, it's design category or how it is operated. The Council, as category 1 responders, can access more detailed information about reservoir risk and reservoir owners using the [Resilience Direct](#) system.

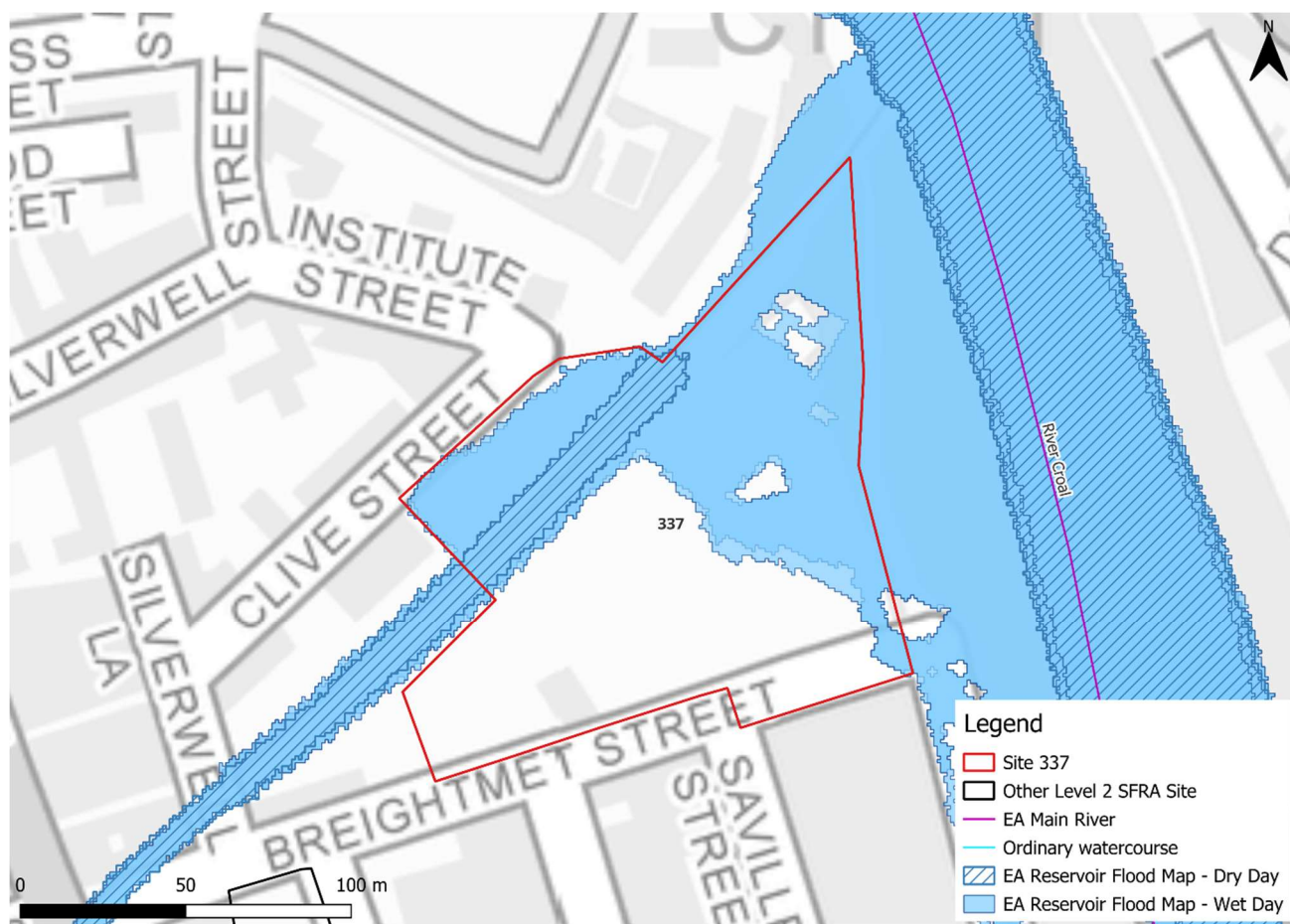


Figure 5-1: EA Reservoir Flood Map

5.2 Observations, mitigation options and site suitability - residual risk

- The site is at potential residual risk from a breach of two reservoirs, namely High Rid and Rumworth. However, only High Rid impacts the site in the 'dry day' flood extent. Both reservoirs are modelled to impact the site based on the 'wet day' flood extent, which represents a prediction of the credible worst case scenario, therefore the likelihood that such an extreme flood event would occur is remote.
- Given the potential reservoir risk to the site, developers should consider²:
 - Consulting with the local resilience forum for advice on emergency planning,
 - Consulting with relevant reservoir owners to understand the impact development may have on their reservoirs, and
 - Using this Level 2 SFRA to understand whether any proposed development will be safe throughout its lifetime.

² [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

6 Overall site assessment

6.1 Can part b) of the exception test be passed?

This site is not required to pass part b) of the exception test, as it is not located within Flood Zone 3a, however it must still be proven that the development can be safe for its lifetime, which is generally considered to be 100 years for residential development and 75 years for non-residential development.

6.2 Recommendations and site-specific FRA requirements

Based on the evidence presented in the Level 1 SFRA (2026) and this Level 2 SFRA:

- The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
- It should be appropriate to develop this site for more vulnerable purposes given its location largely within Flood Zone 1 and nominal surface water flood risk.
- Groundwater conditions should be considered further at the site-specific FRA stage.
- Consultation should be undertaken with Network Rail through the site-specific FRA given the railway line present through the site. United Utilities should also be consulted to understand the impact development may have on their reservoir.
- FRA should be carried out in line with the latest versions of the NPPF; FRCC-PPG; EA online guidance; the Bolton Local Plan, and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with, where applicable, the local planning authority; the lead local flood authority; emergency planning officers; the Environment Agency; United Utilities; the highways authorities; and the emergency services.

7 Licencing

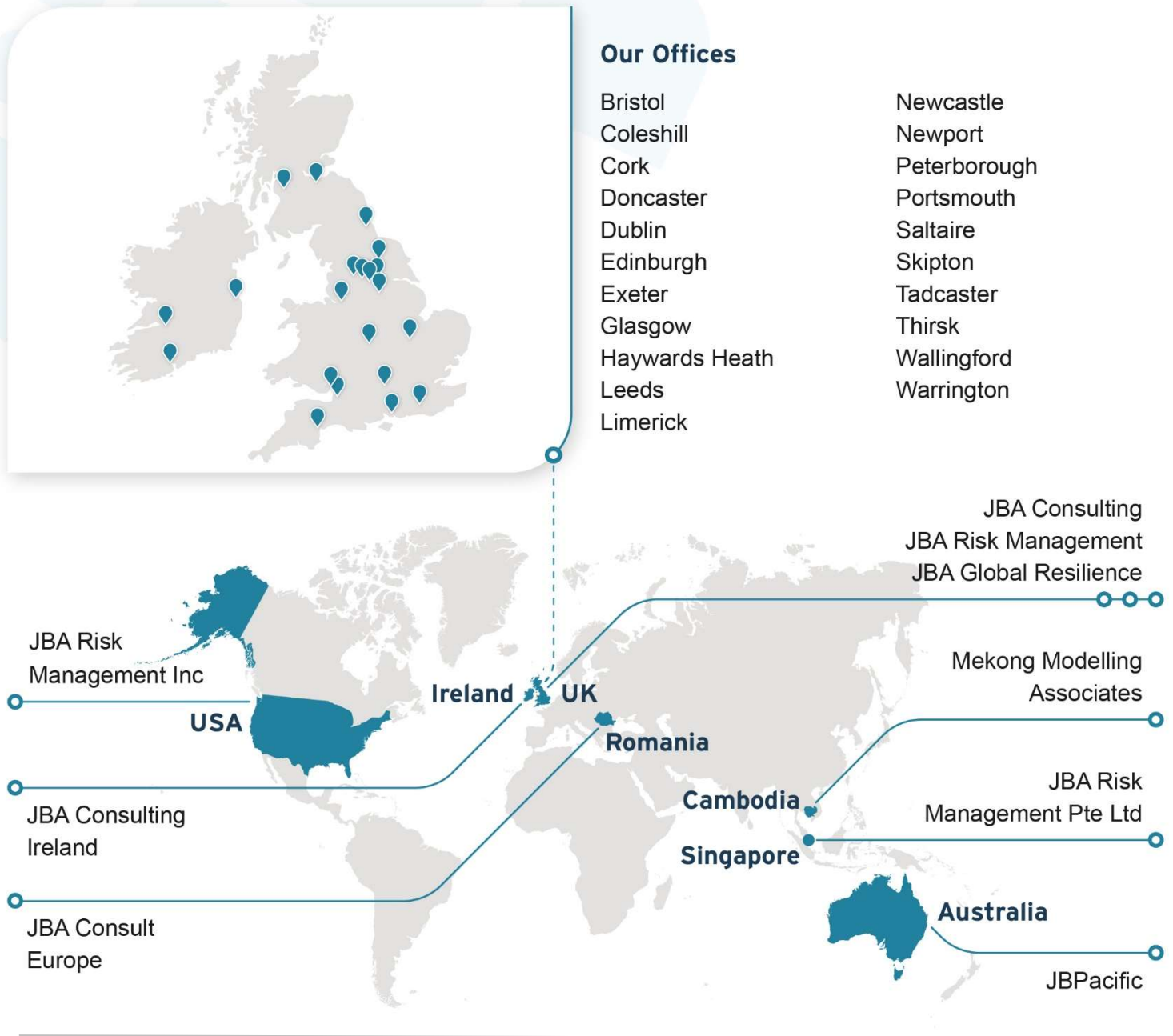
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Site 342

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Local Plan Site 342. The content of this report assumes the reader has already consulted the 'Bolton Level 1 SFRA' (2026) and read the 'Bolton Level 2 SFRA Main Report' (2026) and is therefore familiar with the terminology used in this report.

1.1 Site 342

- Location: Crompton Place
- Existing site use: Commercial
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area (ha): 1.77
- Watercourse: N/A
- Environment Agency (EA) model: N/A
- Summary of requirements from Level 2 SFRA scoping stage:
 - Assessment of surface water flood extent, depths and hazards
 - Assessment of all other sources of flood risk
 - Assessment of flood risk management measures and natural flood management

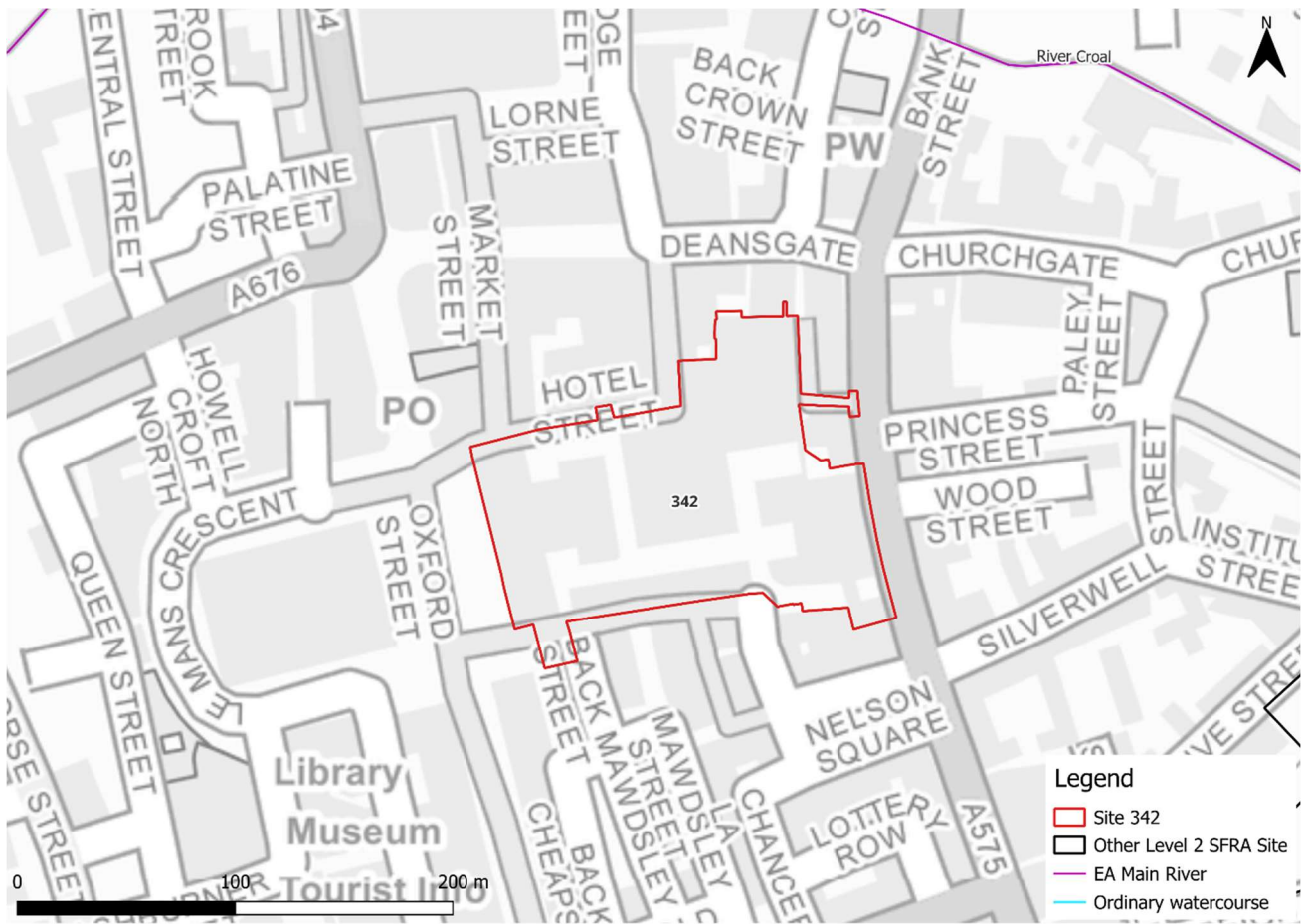


Figure 1-1: Existing site location boundary

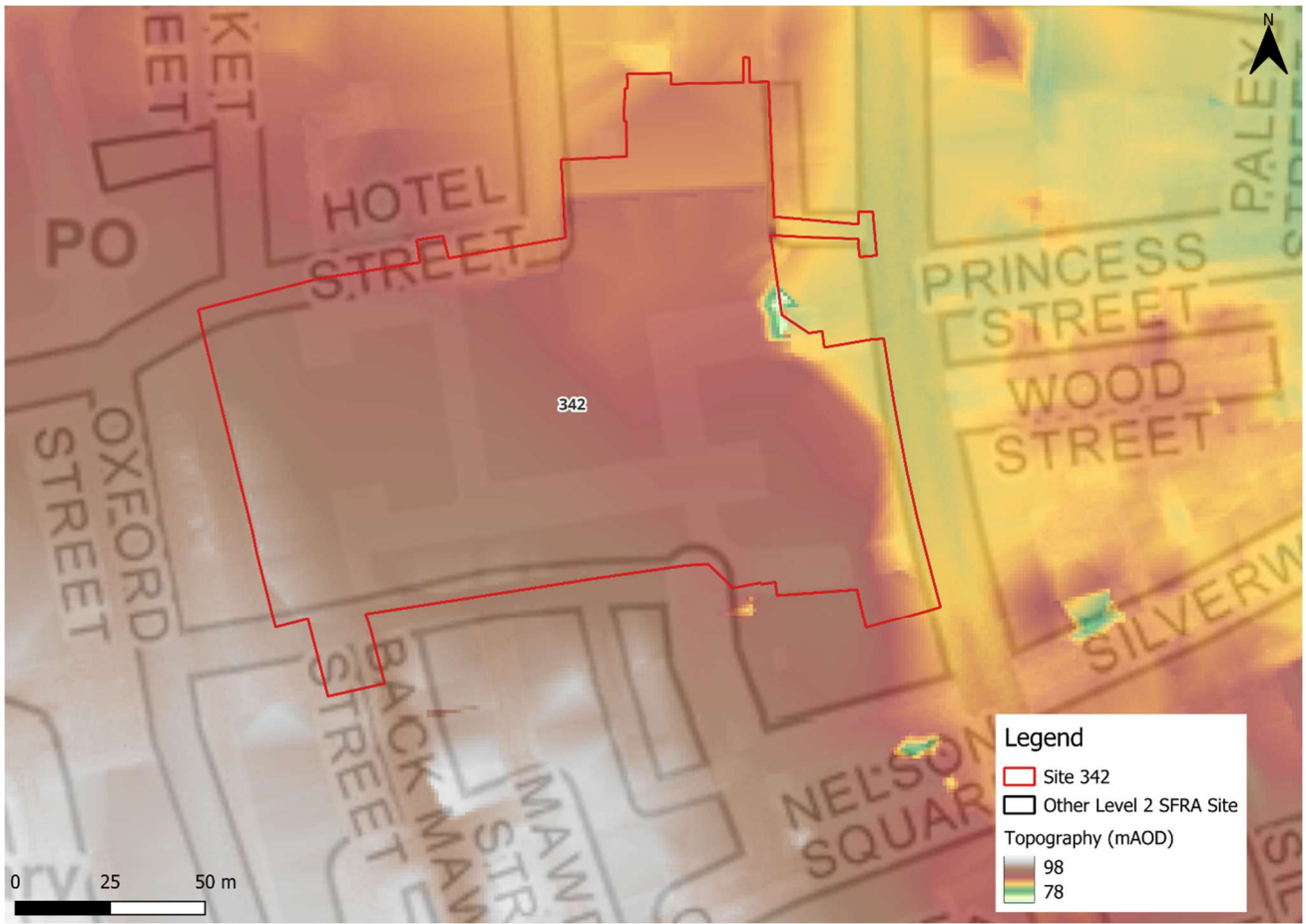


Figure 1-2: Topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the EA's Flood Map for Planning (June 2026) and Flood Zone 3b (functional floodplain), as updated through the Bolton Level 1 SFRA, the percentage areas of each site within the flood zones are stated in Table 2-1 and can be viewed on Figure 2-1. This version of the Flood Map for Planning does not consider flood defence infrastructure (Section 2.4).

The entire site is within Flood Zone 1 and therefore at low risk of flooding from rivers.

Table 2-1: Existing flood risk based on percentage area of site at risk

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

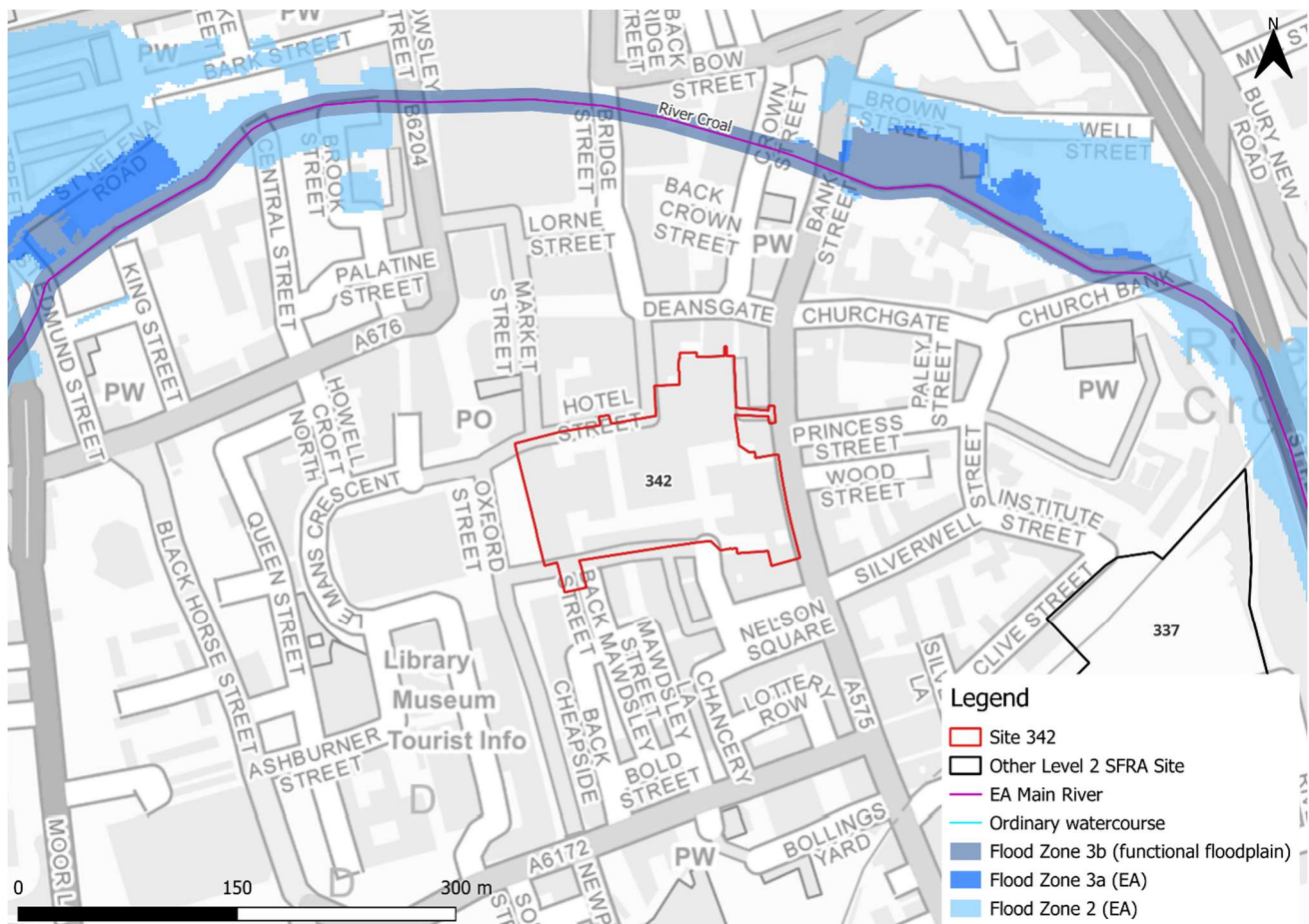


Figure 2-1: Existing risk

2.2 Impacts from climate change

2.2.1 Flood Map for Planning - climate change

The site is not likely to be at fluvial risk when considering climate change, based on the EA's Flood Map for Planning - Flood Zones plus Climate Change dataset.

2.3 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site, according to these datasets.

The LLFA provided its historic floods register. There have been no recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

2.4 Flood risk management

2.4.1 Flood defences

The site does not benefit from any formal engineered flood defences, according to the EA's spatial flood defences dataset.

2.4.2 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the site and surrounding areas. There are no opportunities that could benefit the site.

2.5 Emergency planning

2.5.1 Flood warning

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. The site is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is not located within a FAA.

2.5.2 Access and escape routes

Based on available information on fluvial flooding, safe access and escape routes would likely be achievable via multiple locations surrounding the site (Figure 2-2).



Figure 2-2: Potential access and escape routes

2.6 Observations, mitigation options, site suitability, sequential approach to development management - fluvial

- Observations:
 - The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
 - Given the change in use and therefore vulnerability of the site, the LPA must consider whether the change of use is acceptable and whether the development can be designed to be safe, including for adequate emergency planning provision, accounting for the information provided in this Level 2 SFRA (para 014 FRCC-PPG).
 - The site is wholly located within Flood Zone 1 and therefore at low risk from rivers.
 - The site is not shown to be at additional risk from climate change.
- Access and escape:
 - Safe access and escape routes would likely be achievable via multiple locations surrounding the site.

3 Flood risk from surface water

3.1 Existing risk

3.1.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Present Day

Based on the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Extents Present Day map (June 2026), the majority of the site is situated outside of the 0.1% AEP surface water flood extent (Table 3-1). However, 40% of the site is at risk, mainly in the east of the site. Surface water risk is constrained by the existing development present onsite.

Greatest flood depths within the site in the 1% AEP event are shown to be between 0.3 and 0.6 m, located within the east of the site (Figure 3-2). Safe access and escape routes would likely be achievable via Hotel Street to the north of the site in all events.

Table 3-1: Existing surface water flood risk based on percentage area at risk using the Flood Map for Planning - Surface Water Spatial Planning Extent Present Day map

Less than 0.1% AEP event (% area)	0.1% AEP event (% area)	1% AEP event (% area)	3.3% AEP event (% area)
60	32	2	6

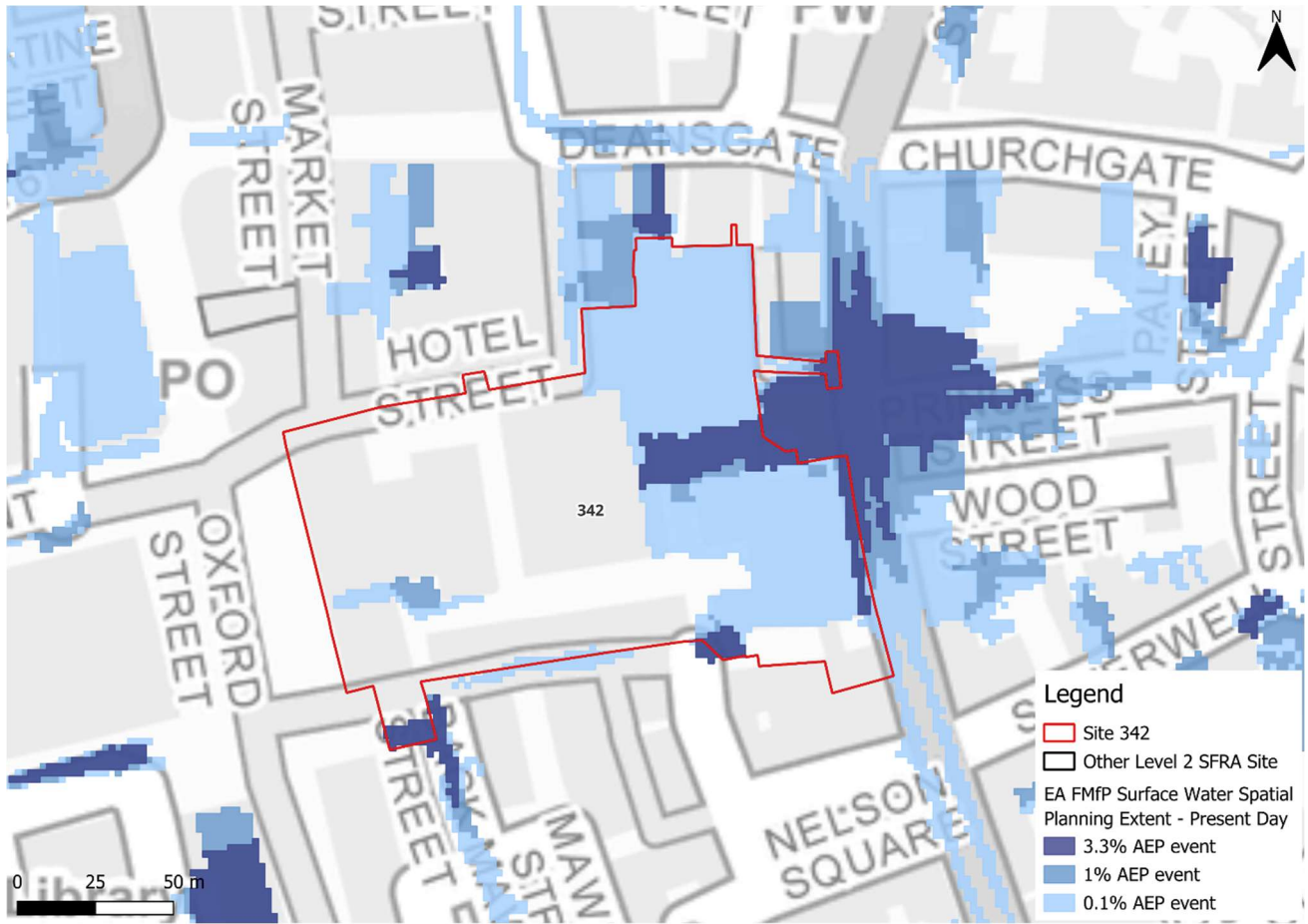


Figure 3-1: Flood Map for Planning - Surface Water Spatial Planning Extents Present Day



Figure 3-2: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Present Day for the 1% AEP event

3.1.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning data does not include hazard information suitable for planning purposes.

Therefore, this Level 2 SFRA considers the third generation Risk of Flooding from Surface Water (RoFSW) hazard mapping in addition to the Flood Map for Planning - Surface Water Spatial Planning extents and depths, as the best available information. Updated surface water hazard information would need to be confirmed at the site-specific FRA stage.

Based on the EA's national scale third generation RoFSW map, the greatest flood hazard within the site in the 1% AEP surface water event is categorised as 'moderate' (Figure 3-3). There are some differences between the Flood Map for Planning - Surface Water Spatial Planning Depths Present Day map and the third generation RoFSW hazard mapping. The Flood Map for Planning - Surface Water Spatial Planning Depths Present Day data does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. In contrast, the third generation RoFSW does not map flooding with a hazard rating of less than 0.575. This could explain the differences observed between the Flood Map for Planning and third generation RoFSW maps.



Figure 3-3: Third generation - Risk of Flooding from Surface Water map present day 1% AEP event surface water flood hazard¹

3.2 Impacts from climate change

3.2.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths

The EA's [climate change allowance guidance](#) states that SFRA's should assess the upper end peak rainfall allowance for the 2070s epoch. This dataset is now included in the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Climate Change dataset (May 2026). The peak rainfall intensity allowances for the Irwell management catchment are shown in Table 3-2. The allowance for the 0.1% AEP event is not stated in the EA guidance.

¹ Based on Section 7.5 Hazard rating. What is the Risk of Flooding from Surface Water map? Report version 2.0. April 2019. Environment Agency

Table 3-2: Peak rainfall intensity allowances for the Irwell management catchment

Return period	Central allowance 2070s (% increase)	Upper end allowance 2070s (% increase)
3.3% AEP	30	40
1% AEP	30	45

Figure 3-4 shows the surface water flood extents for the 2070s upper end climate change scenario. In the 1% AEP event, surface water risk increases significantly, showing a similar level of risk to the present day 0.1% AEP event. However, depths are largely shallow. There is also an additional area of ponding in the west of the site in the 3.3% AEP event.

The greatest flood depths onsite in the 1% AEP event are shown to remain at between 0.3 and 0.6 m (Figure 3-5). Safe access and escape routes would likely remain achievable via Hotel Street to the north of the site.

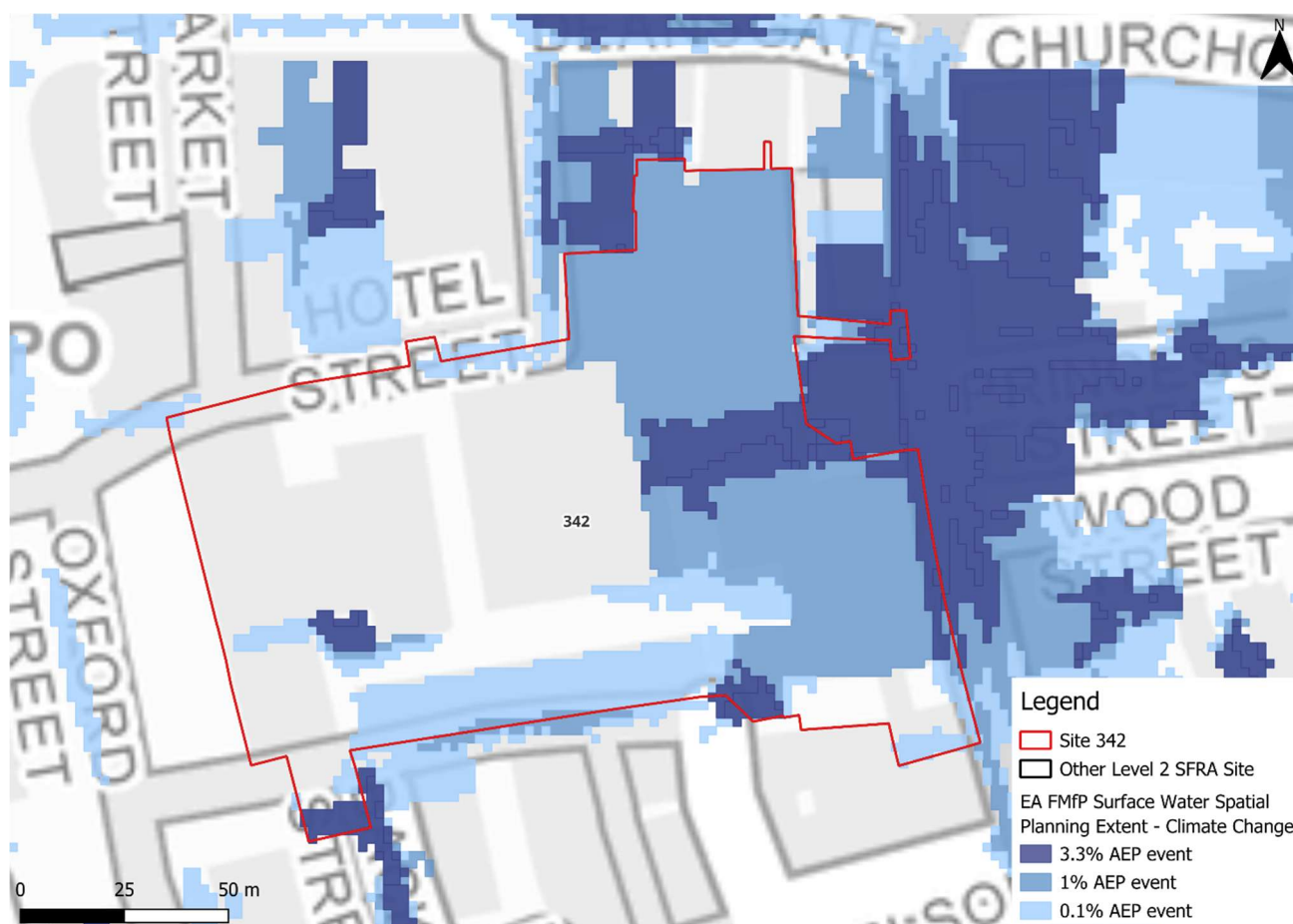


Figure 3-4: Flood Map for Planning - Surface Water Spatial Planning Extents Climate Change (2070s Upper End)



Figure 3-5: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Climate Change for the 1% AEP event (2070s Upper End)

3.2.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning Climate Change data does not include hazard information suitable for planning purposes. This Level 2 SFRA therefore considers the RoFSW low risk surface water event as a conservative proxy for the RoFSW medium risk event plus climate change, as the best available information to assess surface water flood hazards. The impact of climate change on surface water flood hazards should be considered at the site-specific FRA stage.

Using the RoFSW low risk event as a proxy, future surface water flood hazard in the RoFSW 1% AEP event is categorised as 'significant' (Figure 3-6)



Figure 3-6: Low risk event surface water flood hazard¹, as a proxy for the medium risk event plus climate change (Third generation - Risk of Flooding from Surface Water map)

3.3 Sewer flood risk

United Utilities provided their historic risk registers which were aggregated by ward. There are no recorded sewer flooding incidents within the immediate vicinity of the site. There have been three recorded flooding incidents in the Queens Park & Central Ward within which the site is located.

3.4 Observations, mitigation options, site suitability, sequential approach to development management - surface water

- 40% of the site is shown to be at present day surface water risk, mainly confined to the east of the site. When considering climate change, the 1% AEP event shows a similar level of risk to the site as the 0.1% AEP present day event,
- A detailed drainage strategy will be required which must consider potential demolition of several current buildings and making space for SuDS and containing surface water onsite. The strategy should consider the wider area, including the A575.
- The strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. Brownfield runoff rates or betterment

should apply. The developer should consult the LLFA and follow local and National SuDS guidance.

- Assessment of the current drainage system in place should be carried out to ascertain any current capacity issues and whether the current system could accommodate the proposed new development or whether further capacity will be required. A Water Cycle Study would help to inform this.
- Safe access and escape routes would likely be achievable via Hotel Street to the north of the site in a surface water flood event.

4 Groundwater, geology and SuDS suitability

Risk of groundwater emergence is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. Figure 4-1 shows the map covering the site and the surrounding areas. Table 5-1 explains the risk classifications.

The site is within an area where there is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.

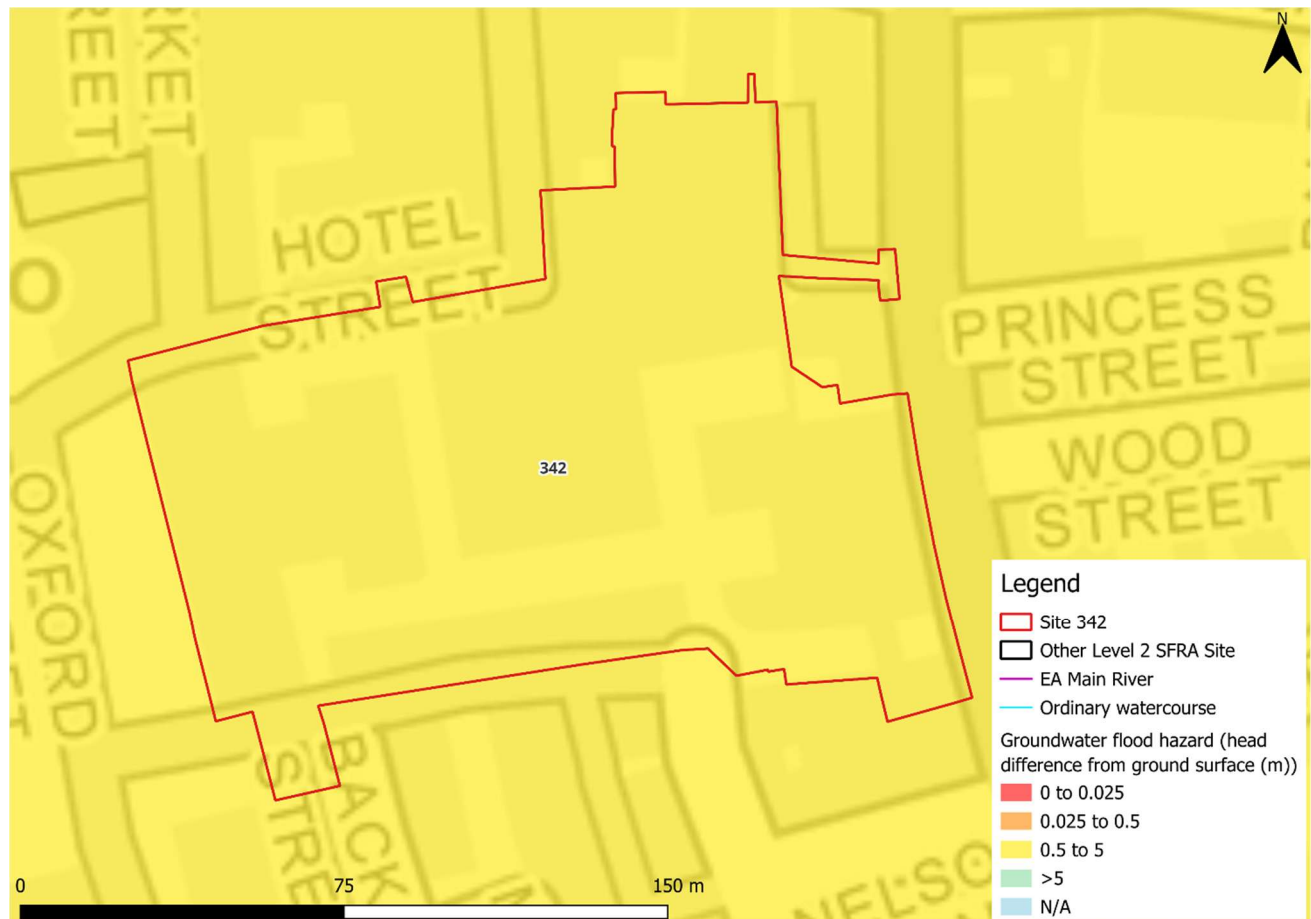


Figure 4-1: JBA 5m Groundwater Emergence Map

Table 4-1: Groundwater Hazard Classification

Groundwater head difference (m)*	Class label
0 to 0.025	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025 to 0.5	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
*Difference is defined as ground surface in mAOD minus modelled groundwater table in mAOD.	

The underlying bedrock within the site is a combination of mudstone, siltstone, sandstone, coal, ironstone and ferricrete (Figure 4-2). Mudstone, siltstone, coal, ironstone and ferricrete typically have low permeability, whereas sandstone has a higher permeability. Therefore, it is likely that the bedrock beneath the site will contribute to lower levels of infiltration and lower water tables.

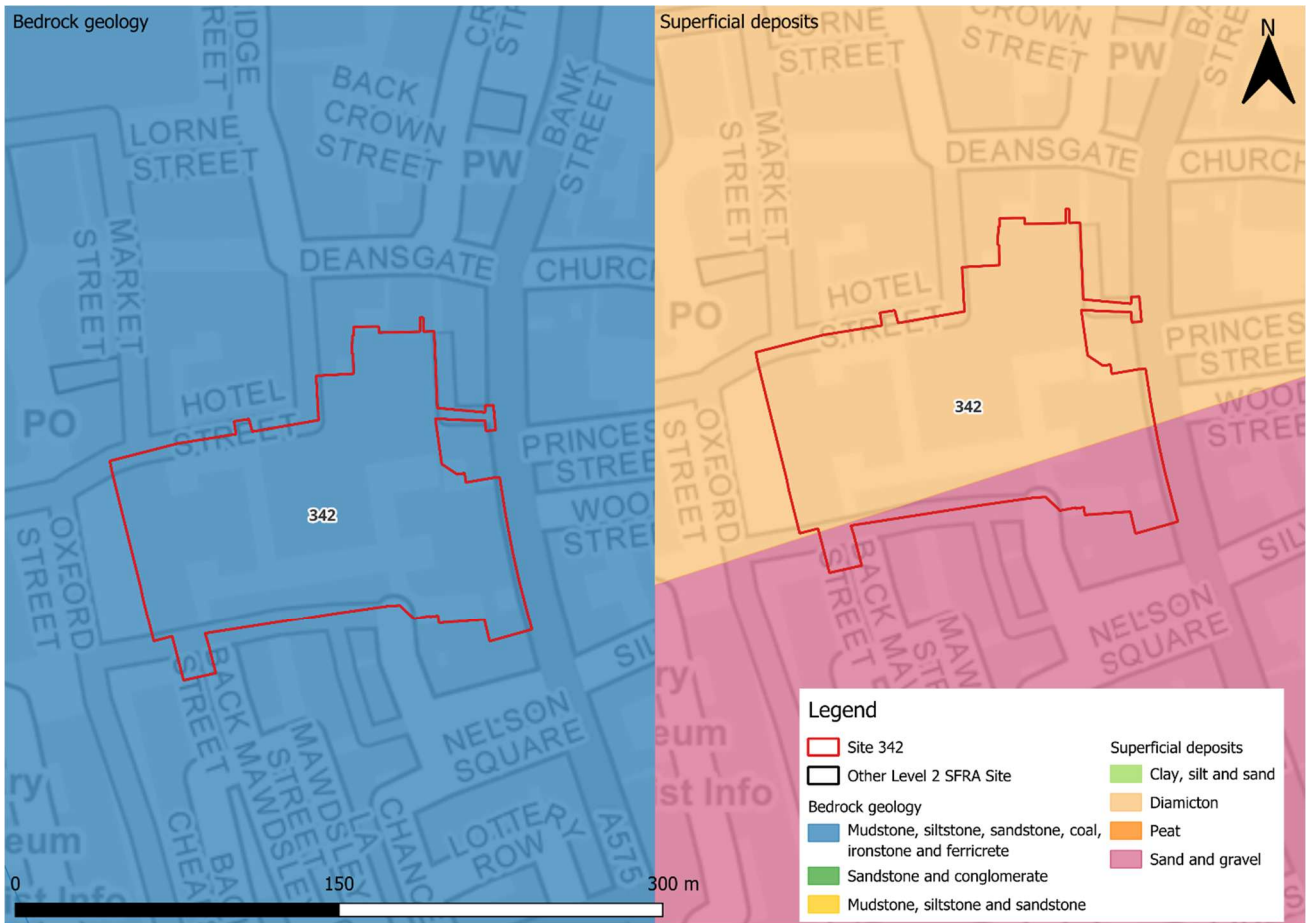


Figure 4-2: BGS Geology - Bedrock and superficial deposits

5 Residual risk

Although a site may be afforded some protection from defences and / or drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. defence breaches, or blockages of culverts or drainage assets.

There does not appear to be any residual risk to the site from asset blockage or defence breach.

5.1 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. The RFM shows that there is no modelled risk to the site as a result of a reservoir breach.

6 Overall site assessment

6.1 Can part b) of the exception test be passed?

The site is not required to pass part b) of the exception test, as it is not located within Flood Zone 3a. However, it must be proven that the development can be safe for their lifetime, which is generally considered to be 100 years for residential development and 75 years for non-residential development.

6.2 Recommendations and site-specific FRA requirements

Based on the evidence presented in the Level 1 SFRA (2026) and this Level 2 SFRA:

- The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
- It should be appropriate to develop this site for more vulnerable purposes given its location largely within Flood Zone 1. However, it may be challenging to develop this site and mitigate surface water flood risk within the east of the site.
- Were development to be considered, a detailed drainage strategy will be required for any new development to ensure there is no increase in surface water flood risk elsewhere as a result of new development.
- The strategy must consider potential demolition of several current buildings and making space for SuDS and containing surface water onsite. The strategy should consider the wider area, including the A575.
- FRA should be carried out in line with the latest versions of the NPPF; FRCC-PPG; EA online guidance; the Bolton Local Plan, and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with, where applicable, the local planning authority; the lead local flood authority; emergency planning officers; the Environment Agency; United Utilities; the highways authorities; and the emergency services.

7 Licencing

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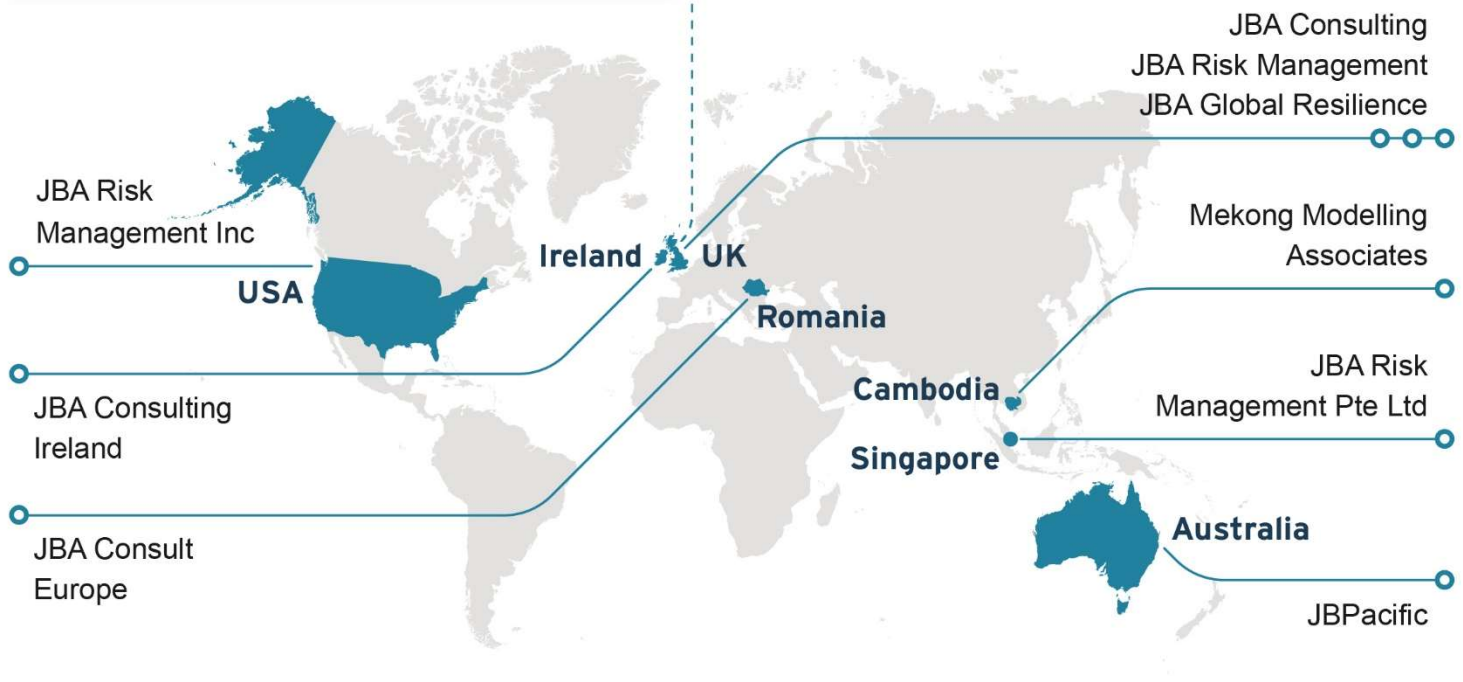
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Bolton Level 2 Strategic Flood Risk Assessment Site Summaries 337-379

Site 350

Final Report

Prepared for
Bolton Council

Date
September 2026

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Authorised by	Mike Williamson BSc MSc CGeog FRGS EADA Project Director

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Contract

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JBA Project Code	2025s1871

This report describes work commissioned by Bolton Council by an instruction dated 18 June 2026. The Client's representative for the contract was Sara Dilmamode of Bolton Council. Laura Thompson-Jones of JBA Consulting carried out this work.

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Acknowledgements

We would like to thank the Environment Agency for their assistance with this work.

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Local Plan Site 350. The content of this report assumes the reader has already consulted the 'Bolton Level 1 SFRA' (2026) and read the 'Bolton Level 2 SFRA Main Report' (2026) and is therefore familiar with the terminology used in this report.

1.1 Site 350

- Location: Bridgeman Place Works
- Existing site use: Car mechanics
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area (ha): 0.35
- Watercourse: N/A
- Environment Agency (EA) model: N/A
- Summary of requirements from Level 2 SFRA scoping stage:
 - Assessment of surface water flood extent, depths and hazards
 - Assessment of all other sources of flood risk
 - Assessment of flood risk management measures and natural flood management



Figure 1-1: Existing site location boundary

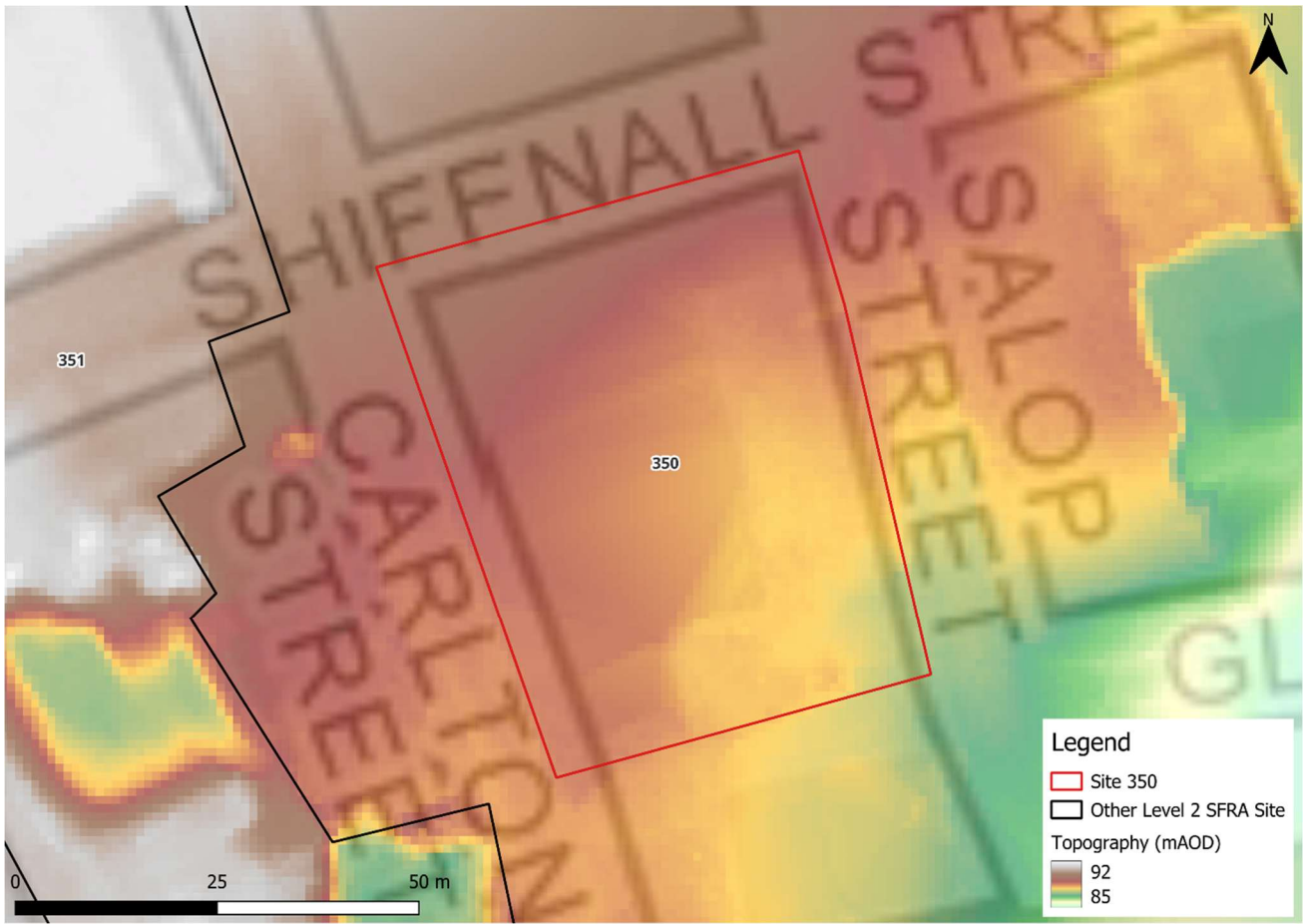


Figure 1-2: Topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the Environment Agency's (EA) Flood Map for Planning (June 2026) and Flood Zone 3b (functional floodplain), as updated through the Bolton Level 1 SFRA, the percentage areas of the site within the flood zones are stated in Table 2-1 and can be viewed on Figure 2-1. This version of the Flood Map for Planning does not consider flood defence infrastructure (Section 2.4).

The entire site is located within Flood Zone 1 and therefore at low risk of flooding from rivers.

Table 2-1: Existing flood risk based on percentage area of site at risk

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



Figure 2-1: Existing risk

2.2 Impacts from climate change

2.2.1 Flood Map for Planning - climate change

The site is not likely to be at fluvial risk when considering climate change, based on the EA's Flood Map for Planning - Flood Zones plus Climate Change dataset.

2.3 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site, according to these datasets.

The LLFA provided its historic floods register. There have been no recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

2.4 Flood risk management

2.4.1 Flood defences

The site does not benefit from any formal engineered flood defences, according to the EA's spatial flood defences dataset.

2.4.2 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the site and surrounding areas. There are no opportunities that could benefit the site.

2.5 Emergency planning

2.5.1 Flood warning

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. The site is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is not located within a FAA.

2.5.2 Access and escape routes

Based on available information on fluvial flooding, safe access and escape routes would likely be achievable via multiple locations surrounding the site (Figure 2-2).



Figure 2-2: Potential access and escape routes

2.6 Observations, mitigation options, site suitability, sequential approach to development management - fluvial

- Observations:
 - The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
 - Given the change in use and therefore vulnerability of the site, the LPA must consider whether the change of use is acceptable and whether the development can be designed to be safe, including for adequate emergency planning provision, accounting for the information provided in this Level 2 SFRA (para 014 FRCC-PPG).
 - The site is wholly located within Flood Zone 1 and therefore at low risk from rivers.
 - The site is not shown to be at additional risk from climate change.
- Access and escape:
 - Safe access and escape routes would likely be achievable via multiple locations surrounding the site.

3 Flood risk from surface water

3.1 Existing risk

3.1.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Present Day

Based on the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Extents Present Day map (June 2026), almost the entire site is situated outside of the 0.1% AEP surface water flood extent (Table 3-1). Present day surface water risk is confined to the boundaries of the site only (Figure 3-1).

Safe access and escape routes would likely be achievable via both Shiffnall Street and Salop Street in all events.

Table 3-1: Existing surface water flood risk based on percentage area at risk using the Flood Map for Planning - Surface Water Spatial Planning Extent Present Day map

Less than 0.1% AEP event (% area)	0.1% AEP event (% area)	1% AEP event (% area)	3.3% AEP event (% area)
99	1	0	0

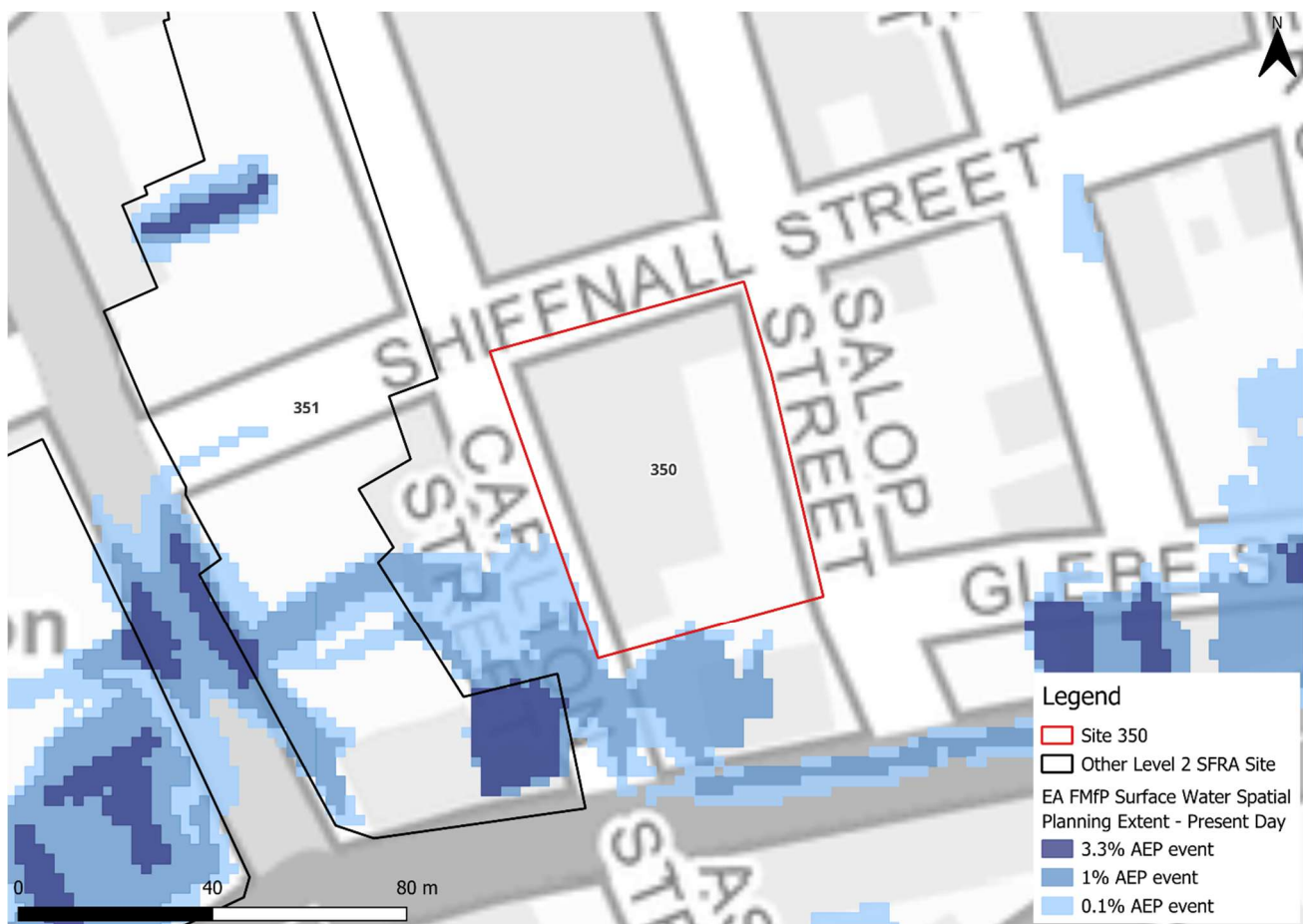


Figure 3-1: Flood Map for Planning - Surface Water Spatial Planning Extents Present Day

3.1.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning data does not include hazard information suitable for planning purposes.

Therefore, this Level 2 SFRA considers the third generation Risk of Flooding from Surface Water (RoFSW) hazard mapping in addition to the Flood Map for Planning - Surface Water Spatial Planning extents and depths, as the best available information. Updated surface water hazard information would need to be confirmed at the site-specific FRA stage.

Based on the EA's national scale third generation RoFSW map, there is no modelled flood risk to the site in the 1% AEP surface water event.

There are differences between the Flood Map for Planning - Surface Water Spatial Planning map and the third generation RoFSW hazard mapping. The Flood Map for Planning - Surface Water Spatial Planning data does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. In contrast, the third generation RoFSW does not map flooding with a hazard rating of less than 0.575. This could explain the differences observed between the Flood Map for Planning and third generation RoFSW maps.

3.2 Impacts from climate change

3.2.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Climate Change

The EA's [climate change allowance guidance](#) states that SFRA's should assess the upper end peak rainfall allowance for the 2070s epoch. This dataset is included in the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Climate Change dataset (June 2026). The peak rainfall intensity allowances for the Irwell management catchment are shown in Table 3-2. The allowance for the 0.1% AEP event is not stated in the EA guidance.

Table 3-2: Peak rainfall intensity allowances for the Irwell management catchment

Return period	Central allowance 2070s (% increase)	Upper end allowance 2070s (% increase)
3.3% AEP	30	40
1% AEP	30	45

Figure 3-2 shows the surface water flood extents for the 2070s upper end climate change scenario. Surface water risk increases significantly across the site in the 0.1% AEP event when considering climate change, however depths are shallow and rarely exceed 0.15 m (Figure 3-3). Risk appears to be constrained by the existing development present onsite.

Safe access and escape routes would likely remain achievable via both Shiffnall Street and Salop Street in all events.

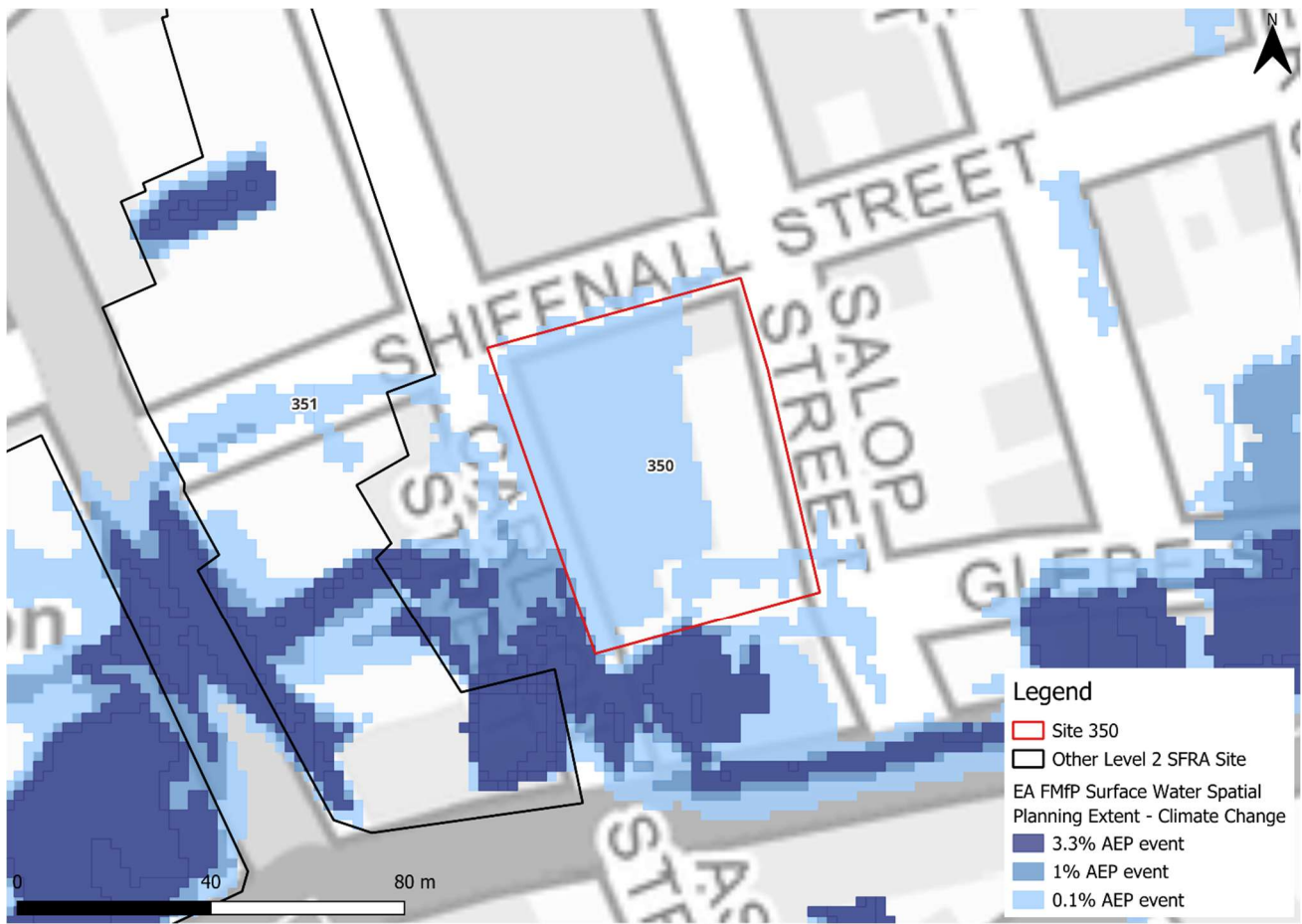


Figure 3-2: Flood Map for Planning - Surface Water Spatial Planning Extents Climate Change (2070s Upper End)

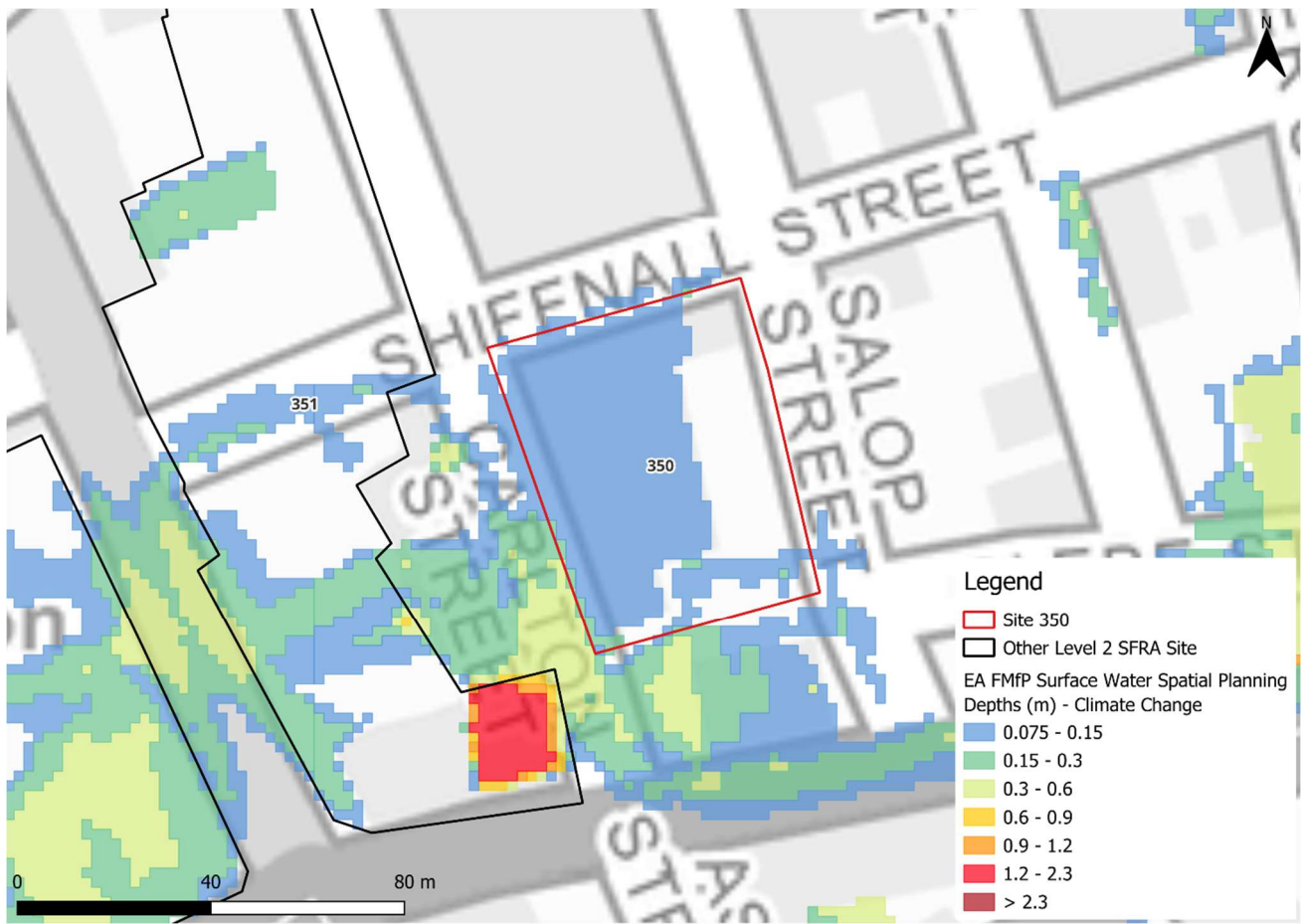


Figure 3-3: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Climate Change for the 0.1% AEP event (2070s Upper End)

3.2.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning climate change data does not include hazard information suitable for planning purposes. This Level 2 SFRA therefore considers the 0.1% AEP surface water event as a conservative proxy for the 1% AEP event plus climate change, as the best available information to assess surface water flood hazards. The impact of climate change on surface water flood hazards should be considered at the site-specific FRA stage.

Using the RoFSW 0.1% AEP event as a proxy, future surface water flood hazard in the RoFSW 1% AEP event is categorised as 'low' (Figure 3-4). However, as stated in Section 3.2.1, the 1% AEP event plus climate change is not shown to impact the site.



Figure 3-4: 0.1% AEP event surface water flood hazard¹, as a proxy for the 1% AEP event plus climate change (Third generation - Risk of Flooding from Surface Water map)

3.3 Sewer flood risk

United Utilities provided their historic risk registers which were aggregated by ward. There are no recorded sewer flooding incidents within the immediate vicinity of the site. There have been three recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

3.4 Observations, mitigation options, site suitability, sequential approach to development management - surface water

- Almost the entire site is situated outside of the 0.1% AEP surface water flood extent. Present day surface water risk is confined to the boundaries of the site only.
- Risk to the site is shown to increase in extent across the site in the 0.1% AEP event when considering the impact of climate change. There is a large area of shallow surface water ponding across the west of the site.

¹ Based on Section 7.5 Hazard rating. What is the Risk of Flooding from Surface Water map? Report version 2.0. April 2019. Environment Agency

- Any drainage strategy should demonstrate how surface water flood risk, currently constrained by the existing development present on site, will be retained onsite, or held upstream, to prevent any increase in flood risk to properties downstream.
- The drainage strategy must consider the potential demolition of the existing development and making space for SuDS and containing surface water onsite. Given depths are shown to be less than 0.15 m in the 1% AEP plus climate change event, it would likely be possible to retain onsite.
- Existing brownfield runoff rates or betterment should apply. The developer should consult the LLFA and follow local and National SuDS guidance.
- Assessment of the current drainage system in place should be carried out to ascertain any current capacity issues and whether the current system could accommodate the proposed residential development or whether further capacity will be required.
- Safe access and escape routes would likely be achievable via both Shiffnall Street and Salop Street in all events.

4 Groundwater, geology and SuDS suitability

Risk of groundwater emergence is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. Figure 4-1 shows the map covering the site and the surrounding areas. Table 5-1 explains the risk classifications.

The entire site is within an area where there is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.

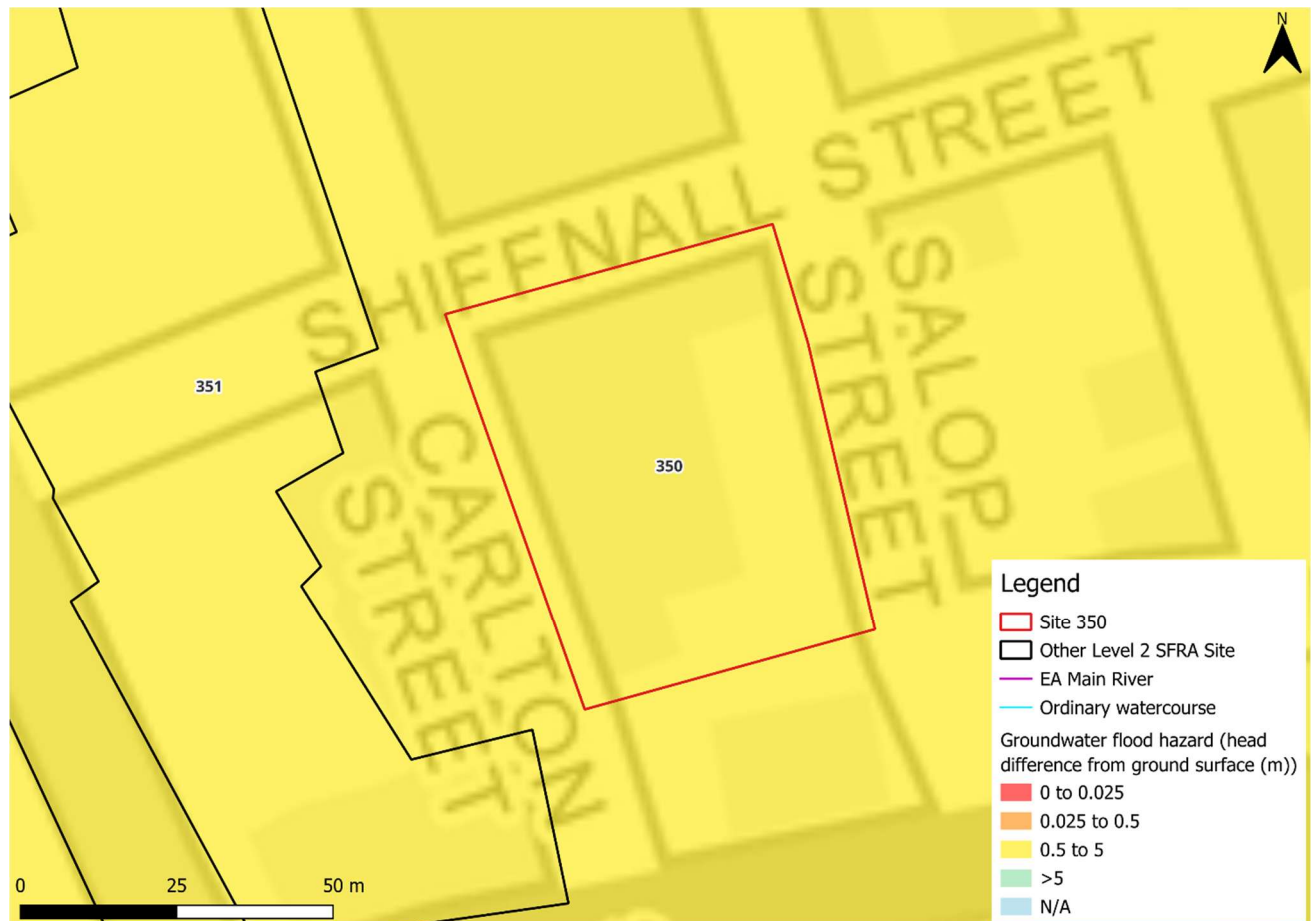


Figure 4-1: JBA 5m Groundwater Emergence Map

Table 4-1: Groundwater Hazard Classification

Groundwater head difference (m)*	Class label
0 to 0.025	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025 to 0.5	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event. There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
*Difference is defined as ground surface in mAOD minus modelled groundwater table in mAOD.	

The underlying bedrock within the site is a combination of mudstone, siltstone, sandstone, coal, ironstone and ferricrete (Figure 4-2). Mudstone, siltstone, coal, ironstone and ferricrete typically have low permeability, whereas sandstone has a higher permeability. Therefore, it is likely that the bedrock beneath the site will contribute to lower levels of infiltration and lower water tables. However, this is not reflected in the groundwater emergence mapping at the site (Figure 4-1).

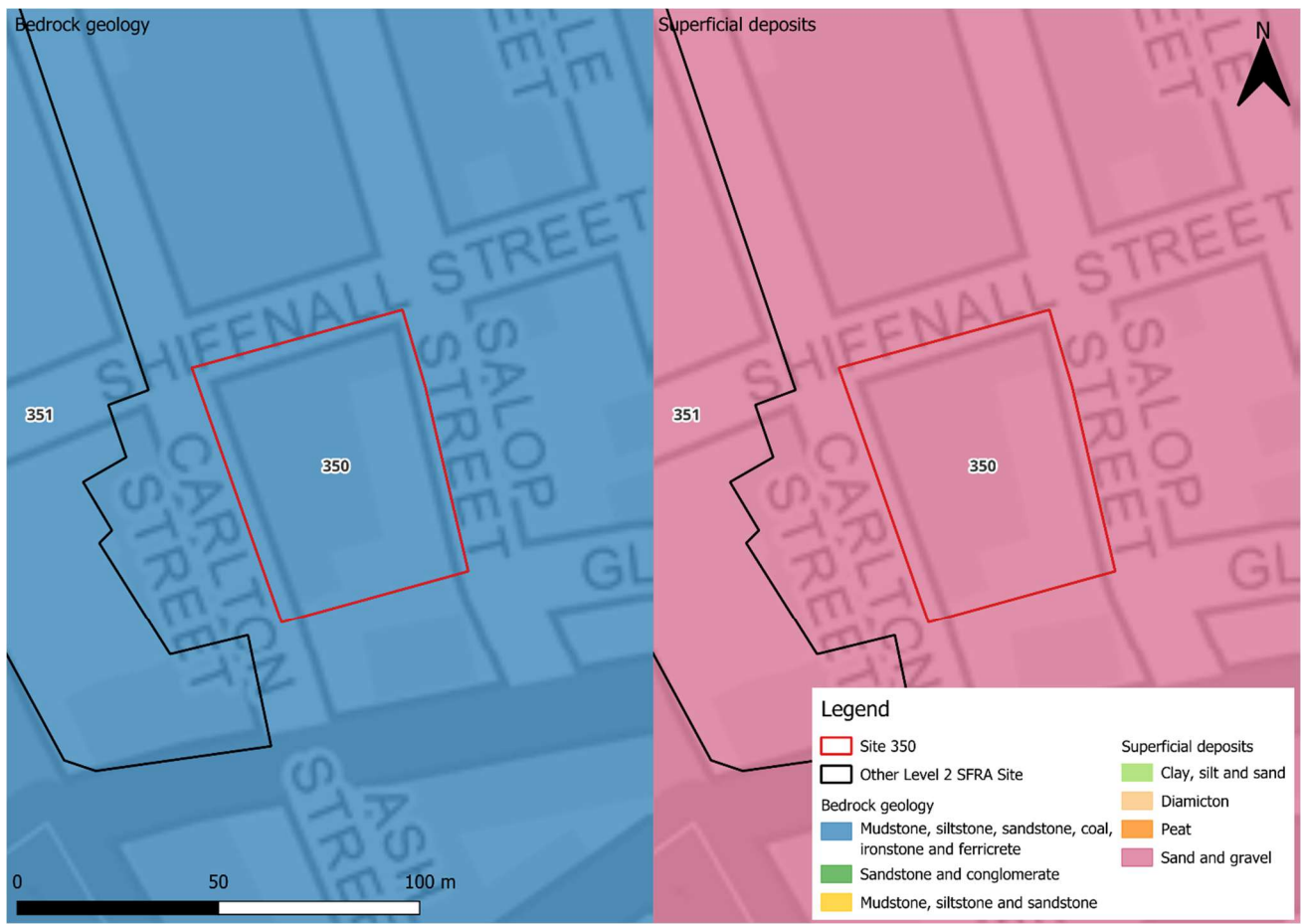


Figure 4-2: BGS Geology - Bedrock and superficial deposits

5 Residual risk

Although a site may be afforded some protection from defences and / or drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. defence breaches, or blockages of culverts or drainage assets.

There does not appear to be any residual risk to the site from asset blockage or defence breach.

5.1 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. Figure 5-1 shows the RFM in a 'dry day' and 'wet day' scenario. A 'dry day' scenario assumes that the water level in the reservoir is the same as the spillway level or the underside of the roof for a service reservoir and the watercourses upstream and downstream of the reservoir are at a normal level. A 'wet day' scenario assumes a worst-case scenario where a reservoir releases water held on a 'wet day' when local rivers have already overflowed their banks.

The site is marginally at risk from Rumworth reservoir in the 'wet day' scenario only. This is located within the Bolton authority area and operated by United Utilities.

The EA's SFRA guidance states that where a proposed development site is at flood risk from a reservoir, then an assessment into whether the reservoir design or maintenance schedule needs improving should be carried out. Expert advice may be required from an all-reservoirs panel engineer. The Council should consult the relevant reservoir undertaker to ascertain whether the proposed development could affect the reservoir's risk designation, it's design category or how it is operated. The Council, as category 1 responders, can access more detailed information about reservoir risk and reservoir owners using the [Resilience Direct](#) system.

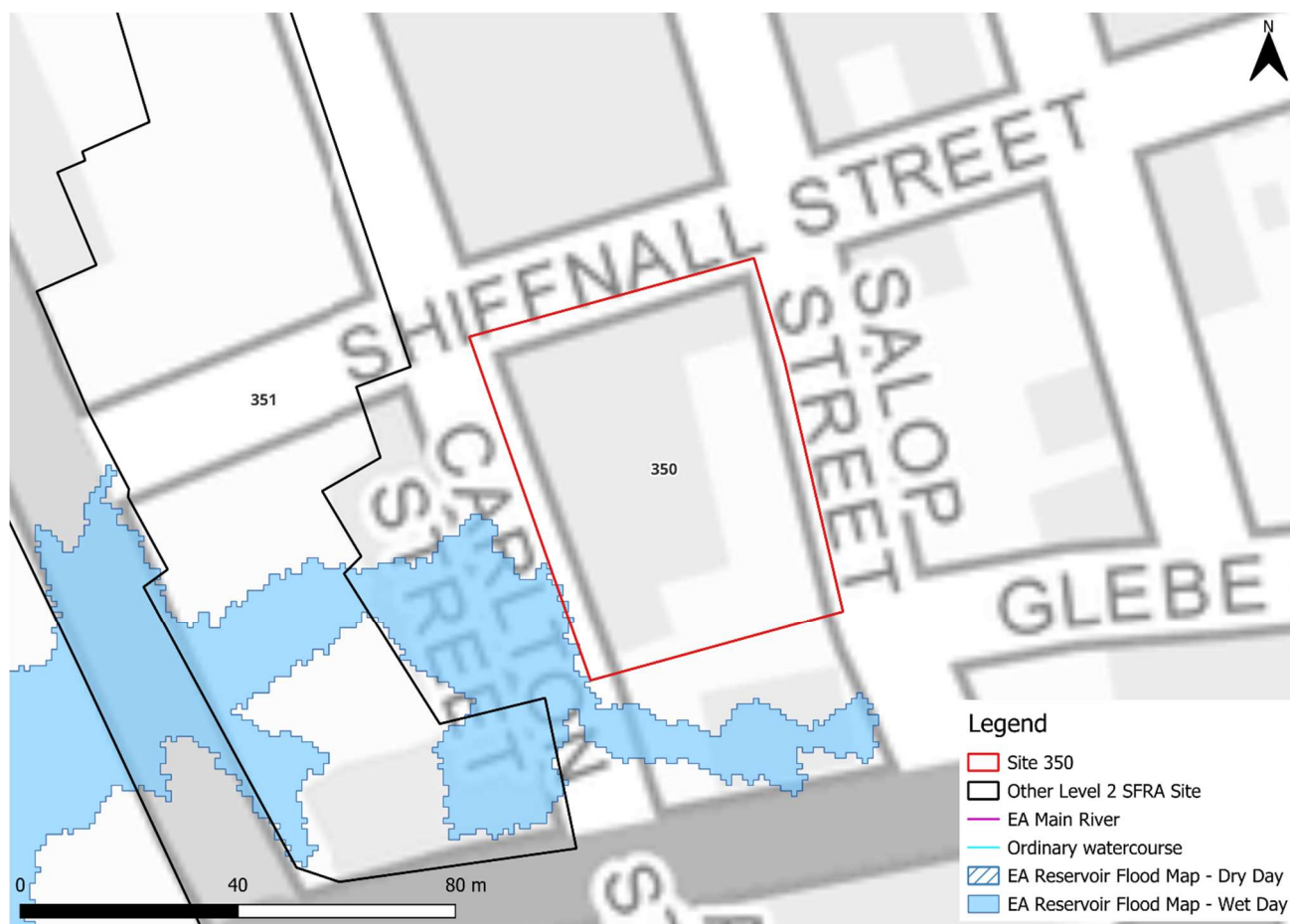


Figure 5-1: EA Reservoir Flood Map

5.2 Observations, mitigation options and site suitability - residual risk

- The site is at potential residual risk from a breach of one reservoir, namely Rumworth, based on the 'wet day' flood extent. This represents a prediction of the credible worst case scenario, therefore the likelihood that such an extreme flood event would occur is remote.
- Given the potential reservoir risk to the site, developers should consider²:
 - Consulting with the local resilience forum for advice on emergency planning,
 - Consulting with relevant reservoir owners to understand the impact development may have on their reservoirs, and
 - Using this Level 2 SFRA to understand whether any proposed development will be safe throughout its lifetime.

² [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

6 Overall site assessment

6.1 Can part b) of the exception test be passed?

This site is not required to pass part b) of the exception test, as it is not located within Flood Zone 3a, however it must still be proven that the development can be safe for its lifetime, which is generally considered to be 100 years for residential development and 75 years for non-residential development.

6.2 Recommendations and site-specific FRA requirements

Based on the evidence presented in the Level 1 SFRA (2026) and this Level 2 SFRA:

- The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
- It should be appropriate to develop this site for more vulnerable purposes given its location largely within Flood Zone 1 and nominal present day surface water flood risk.
- Were development to be considered, a detailed drainage strategy will be required at the planning application stage for any new development. The drainage strategy must consider the potential demolition of existing development, and subsequent regrading of land, and the impact this may have on surface water risk to the site and surrounding areas. Given the largely shallow depths within the site, surface water risk should be able to be attenuated onsite.
- FRA should be carried out in line with the latest versions of the NPPF; FRCC-PPG; EA online guidance; the Bolton Local Plan, and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with, where applicable, the local planning authority; the lead local flood authority; emergency planning officers; the Environment Agency; United Utilities; the highways authorities; and the emergency services.

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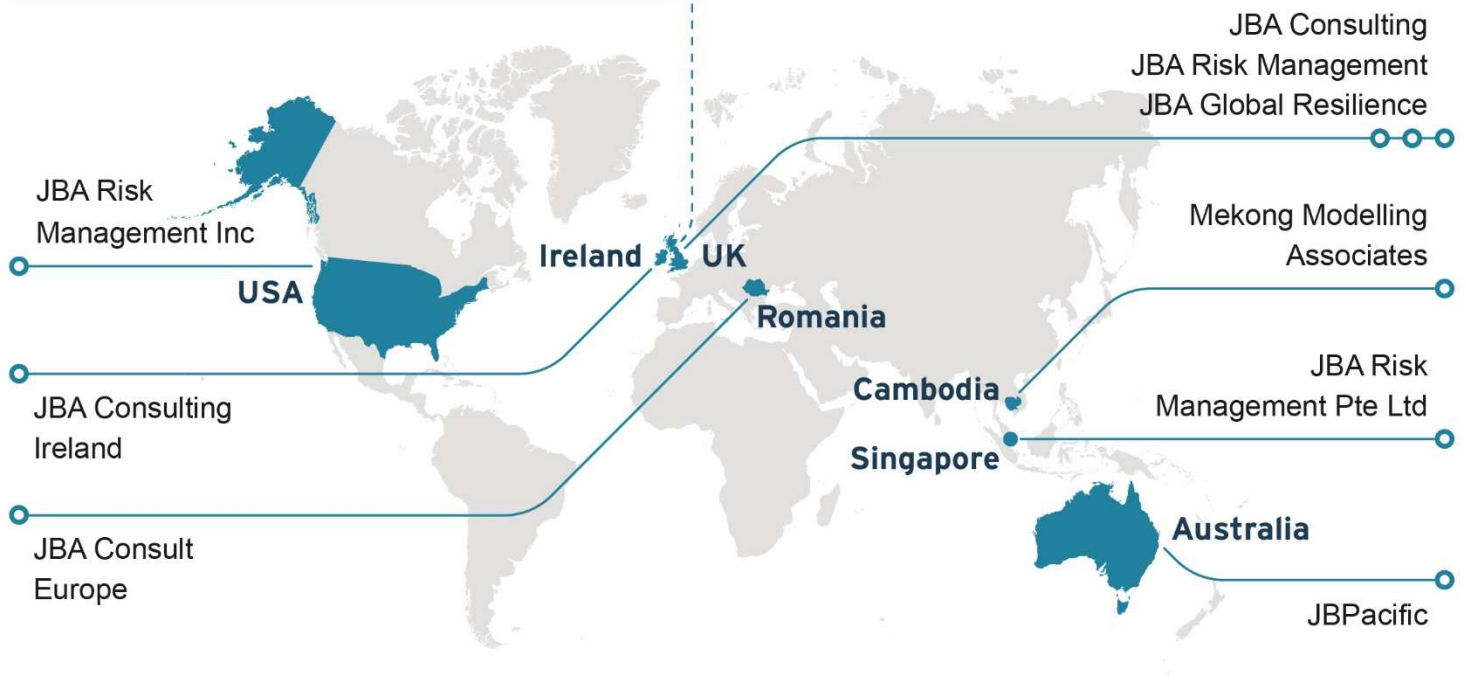
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Bolton Level 2 Strategic Flood Risk Assessment Site Summaries 337-379

Site 351

Final Report

Prepared for
Bolton Council

Date
September 2026

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Contract

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This report describes work commissioned by Bolton Council by an instruction dated 18 June 2026. The Client's representative for the contract was Sara Dilmamode of Bolton Council. Laura Thompson-Jones of JBA Consulting carried out this work.

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Acknowledgements

We would like to thank the Environment Agency for their assistance with this work.

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Local Plan Site 351. The content of this report assumes the reader has already consulted the 'Bolton Level 1 SFRA' (2026) and read the 'Bolton Level 2 SFRA Main Report' (2026) and is therefore familiar with the terminology used in this report.

1.1 Site 351

- Location: Bradshawgate
- Existing site use: Disused brownfield / car park
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area (ha): 0.83
- Watercourse: N/A
- Environment Agency (EA) model: N/A
- Summary of requirements from Level 2 SFRA scoping stage:
 - Assessment of surface water flood extent, depths and hazards
 - Assessment of all other sources of flood risk
 - Assessment of flood risk management measures and natural flood management

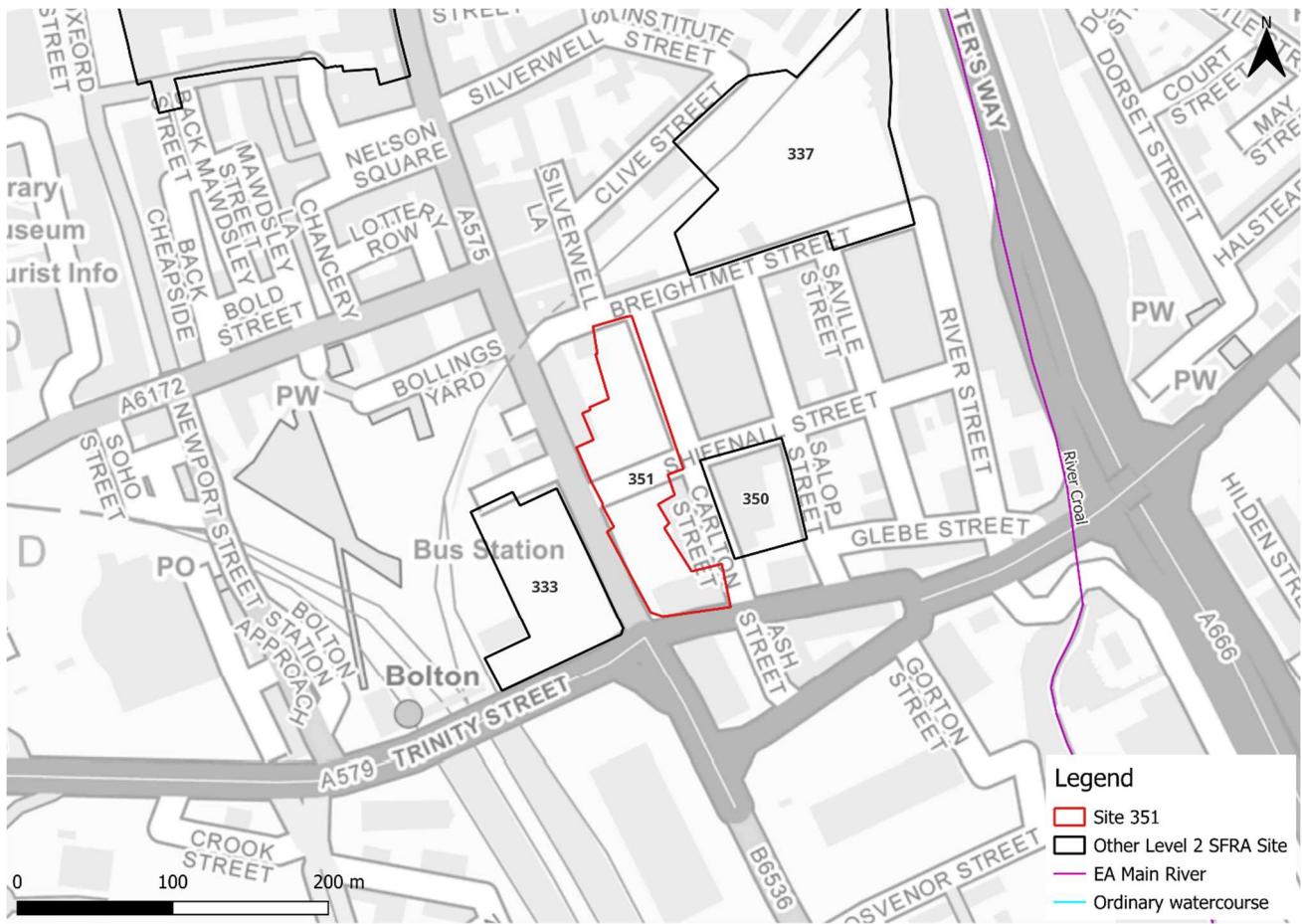


Figure 1-1: Existing site location boundary

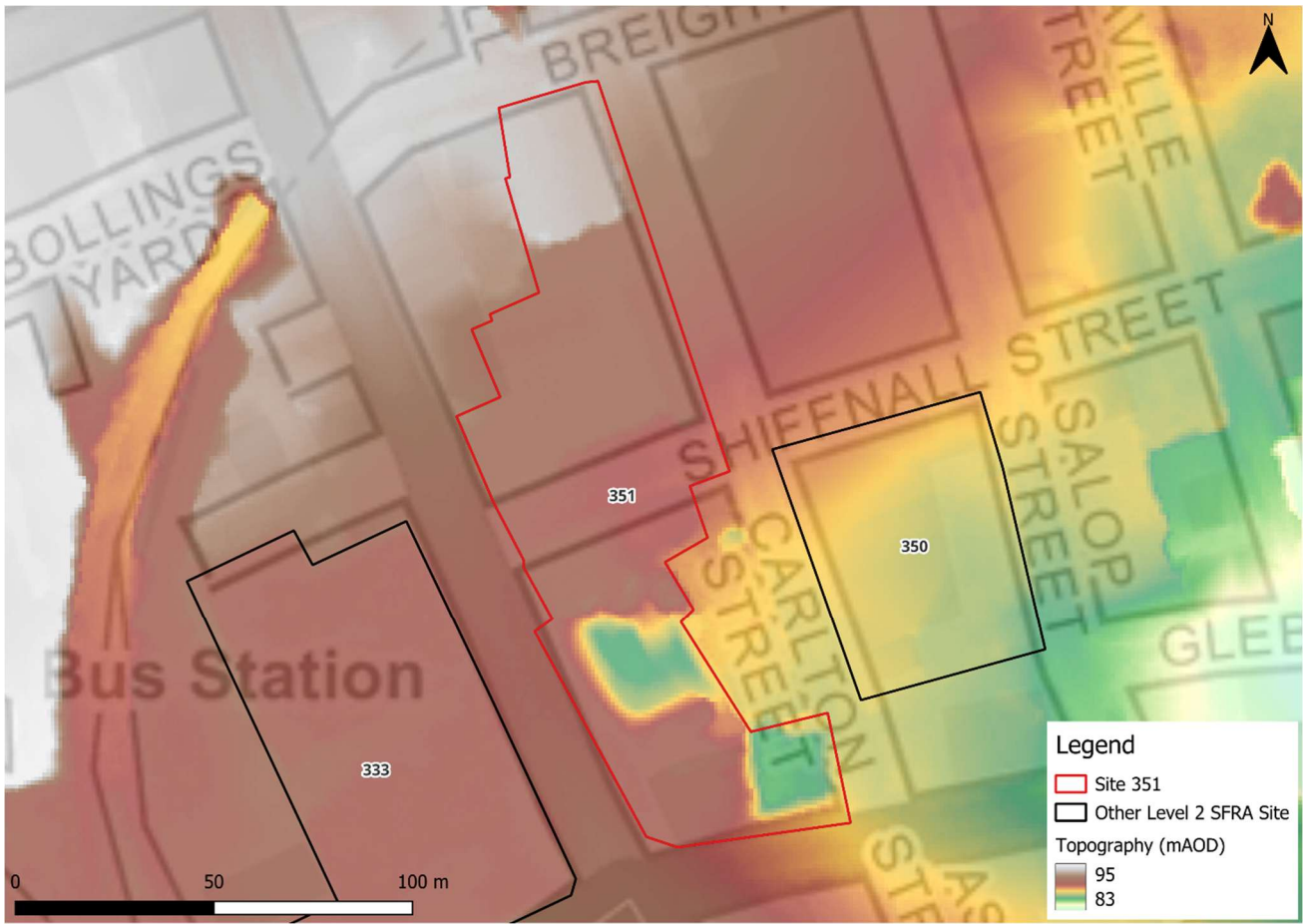


Figure 1-2: Topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the Environment Agency's (EA) Flood Map for Planning (June 2026) and Flood Zone 3b (functional floodplain), as updated through the Bolton Level 1 SFRA, the percentage areas of the site within the flood zones are stated in Table 2-1 and can be viewed on Figure 2-1. This version of the Flood Map for Planning does not consider flood defence infrastructure (Section 2.4).

The entire site is located within Flood Zone 1 and therefore at low risk of flooding from rivers.

Table 2-1: Existing flood risk based on percentage area of site at risk

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

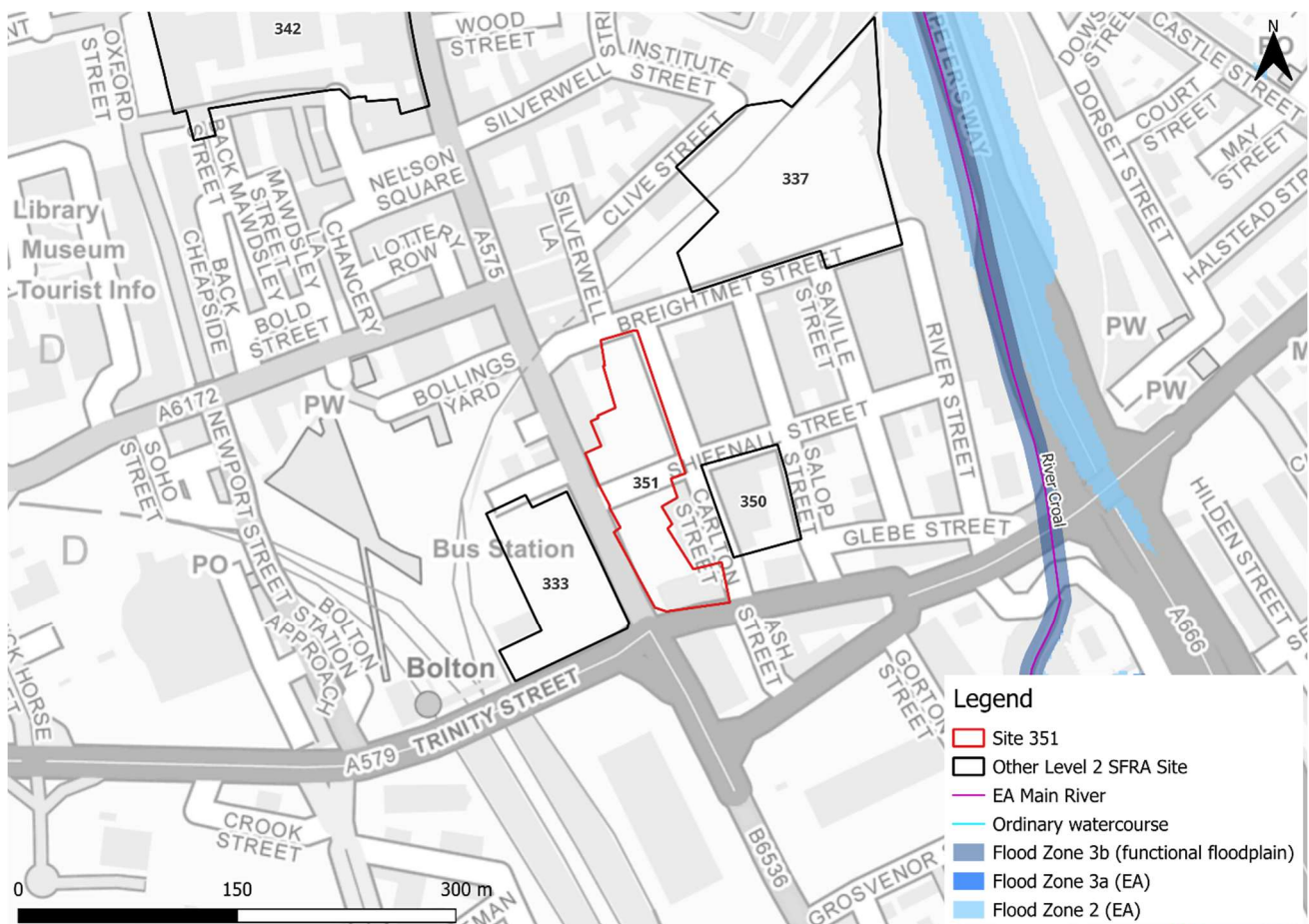


Figure 2-1: Existing risk

2.2 Impacts from climate change

2.2.1 Flood Map for Planning - climate change

The site is not likely to be at fluvial risk when considering climate change, based on the EA's Flood Map for Planning - Flood Zones plus Climate Change dataset.

2.3 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site, according to these datasets.

The LLFA provided its historic floods register. There have been no recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

2.4 Flood risk management

2.4.1 Flood defences

The site does not benefit from any formal engineered flood defences, according to the EA's spatial flood defences dataset.

2.4.2 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the site and surrounding areas. There are no opportunities that could benefit the site.

2.5 Emergency planning

2.5.1 Flood warning

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. The site is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is not located within a FAA.

2.5.2 Access and escape routes

Based on available information on fluvial flooding, safe access and escape routes would likely be achievable via multiple locations surrounding the site (Figure 2-2).

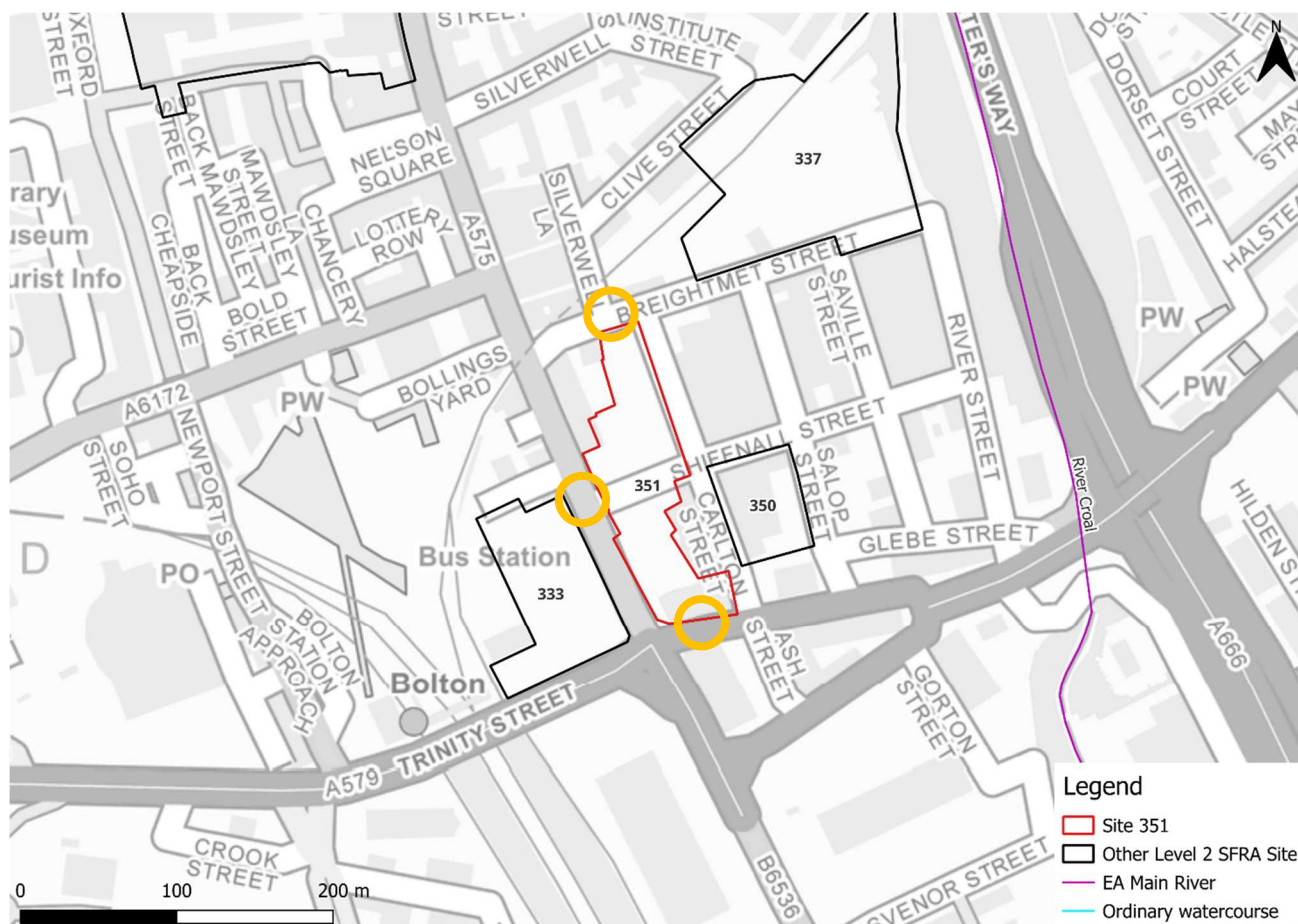


Figure 2-2: Potential access and escape routes

2.6 Observations, mitigation options, site suitability, sequential approach to development management - fluvial

- Observations:
 - The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
 - Given the change in use and therefore vulnerability of the site, the LPA must consider whether the change of use is acceptable and whether the development can be designed to be safe, including for adequate emergency planning provision, accounting for the information provided in this Level 2 SFRA (para 014 FRCC-PPG).
 - The site is wholly located within Flood Zone 1 and therefore at low risk from rivers.
 - The site is not shown to be at additional risk from climate change.
- Access and escape:
 - Safe access and escape routes would likely be achievable via multiple locations surrounding the site.

3 Flood risk from surface water

3.1 Existing risk

3.1.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Present Day

Based on the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Extents Present Day map (June 2026), the majority of the site is situated outside of the 0.1% AEP surface water flood extent (Table 3-1). Present day surface water risk is confined to a surface water flow path through the south of the site and an area of ponding within a topographic low spot in the north of the site (Figure 3-1). Surface water risk appears to be constrained by the existing development present onsite.

Greatest flood depths within the site in the 1% AEP event are shown to exceed 1.2 m within the southeast of the site (Figure 3-2). However, across the majority of the site depths are shown to be shallow. Safe access and escape routes would likely be achievable via multiple locations surrounding the site.

Table 3-1: Existing surface water flood risk based on percentage area at risk using the Flood Map for Planning - Surface Water Spatial Planning Extent Present Day map

Less than 0.1% AEP event (% area)	0.1% AEP event (% area)	1% AEP event (% area)	3.3% AEP event (% area)
79	7	8	6

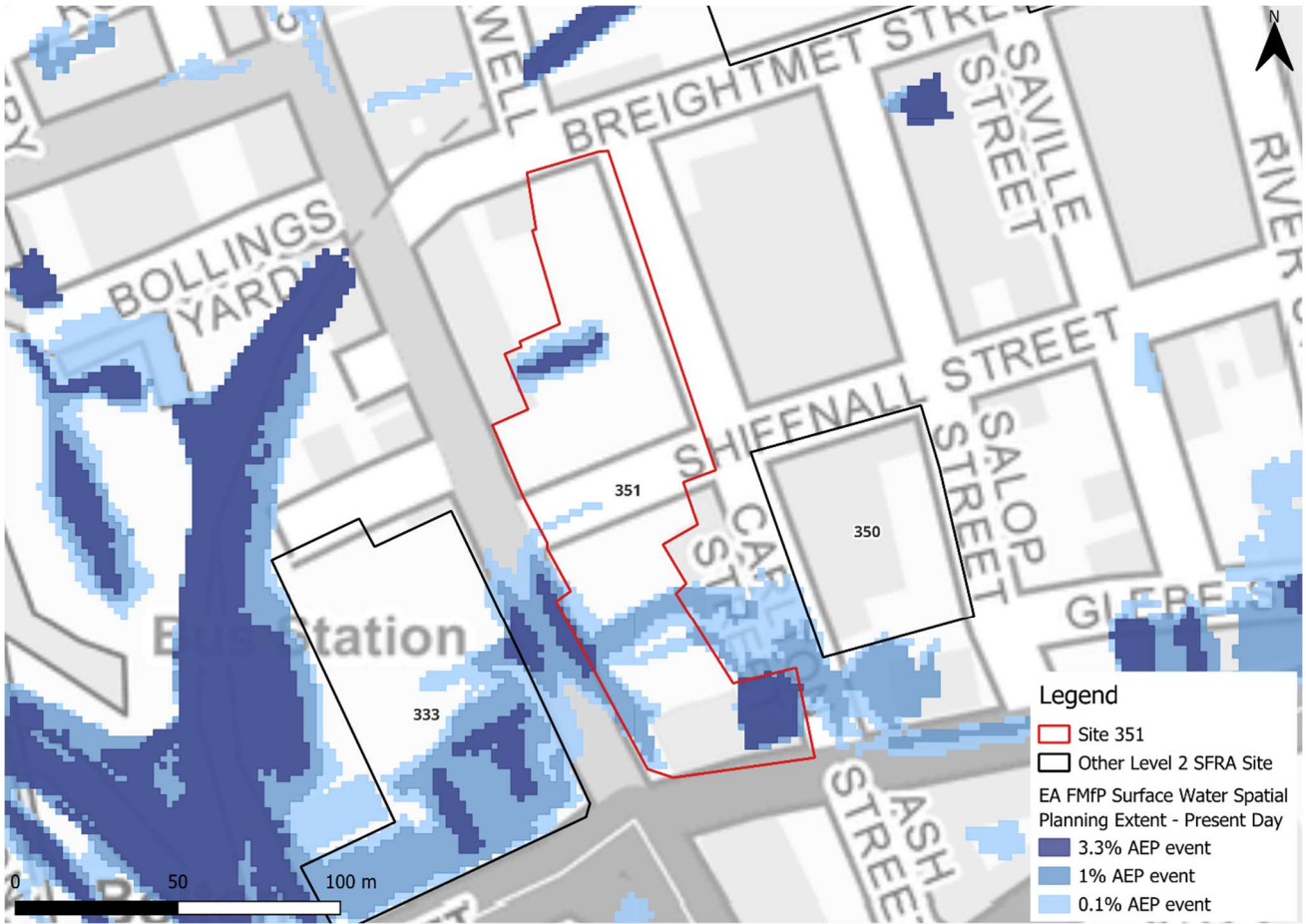


Figure 3-1: Flood Map for Planning - Surface Water Spatial Planning Extents Present Day

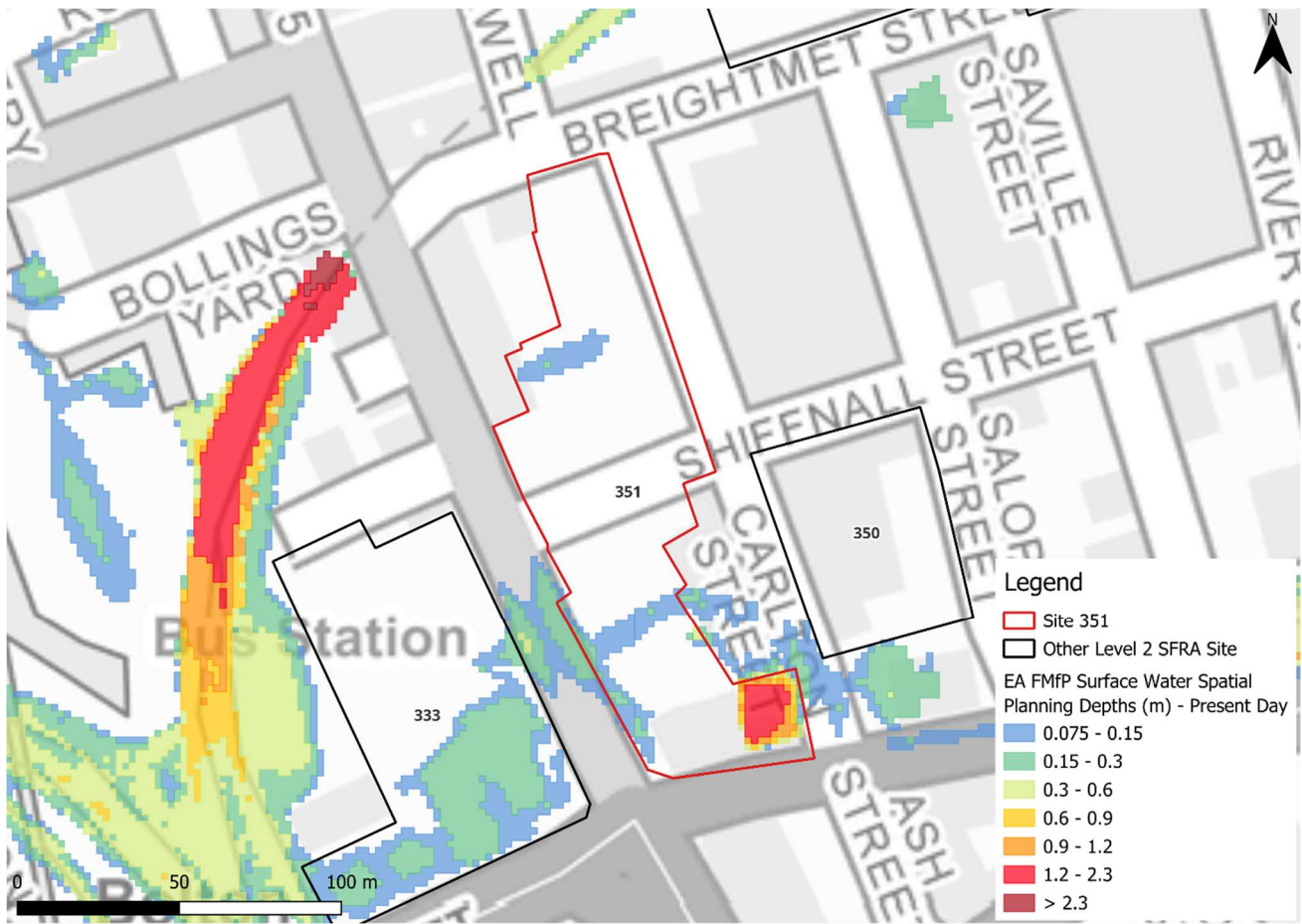


Figure 3-2: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Present Day for the 1% AEP event

3.1.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning data does not include hazard information suitable for planning purposes.

Therefore, this Level 2 SFRA considers the third generation Risk of Flooding from Surface Water (RoFSW) hazard mapping in addition to the Flood Map for Planning - Surface Water Spatial Planning extents and depths, as the best available information. Updated surface water hazard information should be confirmed at the site-specific FRA stage.

Based on the EA's national scale third generation RoFSW map, the greatest flood hazard within the site in the 1% AEP surface water event is categorised as 'significant' (Figure 3-3).

There are differences between the Flood Map for Planning - Surface Water Spatial Planning map and the third generation RoFSW hazard mapping. The Flood Map for Planning - Surface Water Spatial Planning data does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. In contrast, the third generation RoFSW does not map flooding with a hazard rating of less than 0.575. This could explain the differences observed between the Flood Map for Planning and third generation RoFSW maps.



Figure 3-3: Third generation - Risk of Flooding from Surface Water map present day 1% AEP event surface water flood hazard¹

3.2 Impacts from climate change

3.2.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Climate Change

The EA's [climate change allowance guidance](#) states that SFRA's should assess the upper end peak rainfall allowance for the 2070s epoch. This dataset is included in the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Climate Change dataset (June 2026). The peak rainfall intensity allowances for the Irwell management catchment are shown in Table 3-2. The allowance for the 0.1% AEP event is not stated in the EA guidance.

¹ Based on Section 7.5 Hazard rating. What is the Risk of Flooding from Surface Water map? Report version 2.0. April 2019. Environment Agency

Table 3-2: Peak rainfall intensity allowances for the Irwell management catchment

Return period	Central allowance 2070s (% increase)	Upper end allowance 2070s (% increase)
3.3% AEP	30	40
1% AEP	30	45

Figure 3-4 shows the surface water flood extents for the 2070s upper end climate change scenario. Surface water risk is shown to increase in across the site in all events when considering climate change, however depths remain shallow across the majority of the site (Figure 3-5). The area of ponding in the southeast of the site is shown to exceed 1.2 m in depth.

Safe access and escape routes would likely remain achievable via multiple locations surrounding the site.

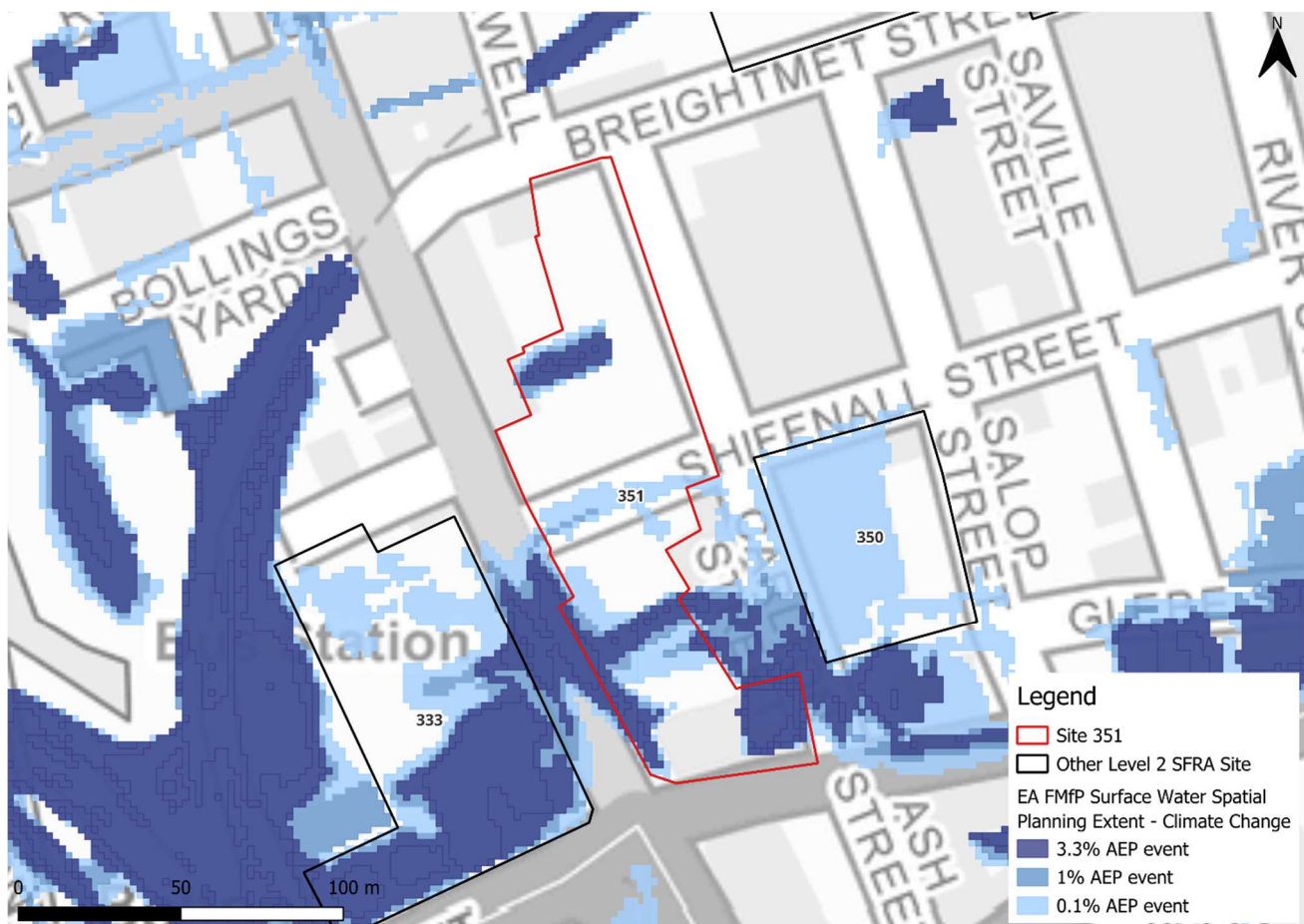


Figure 3-4: Flood Map for Planning - Surface Water Spatial Planning Extents Climate Change (2070s Upper End)

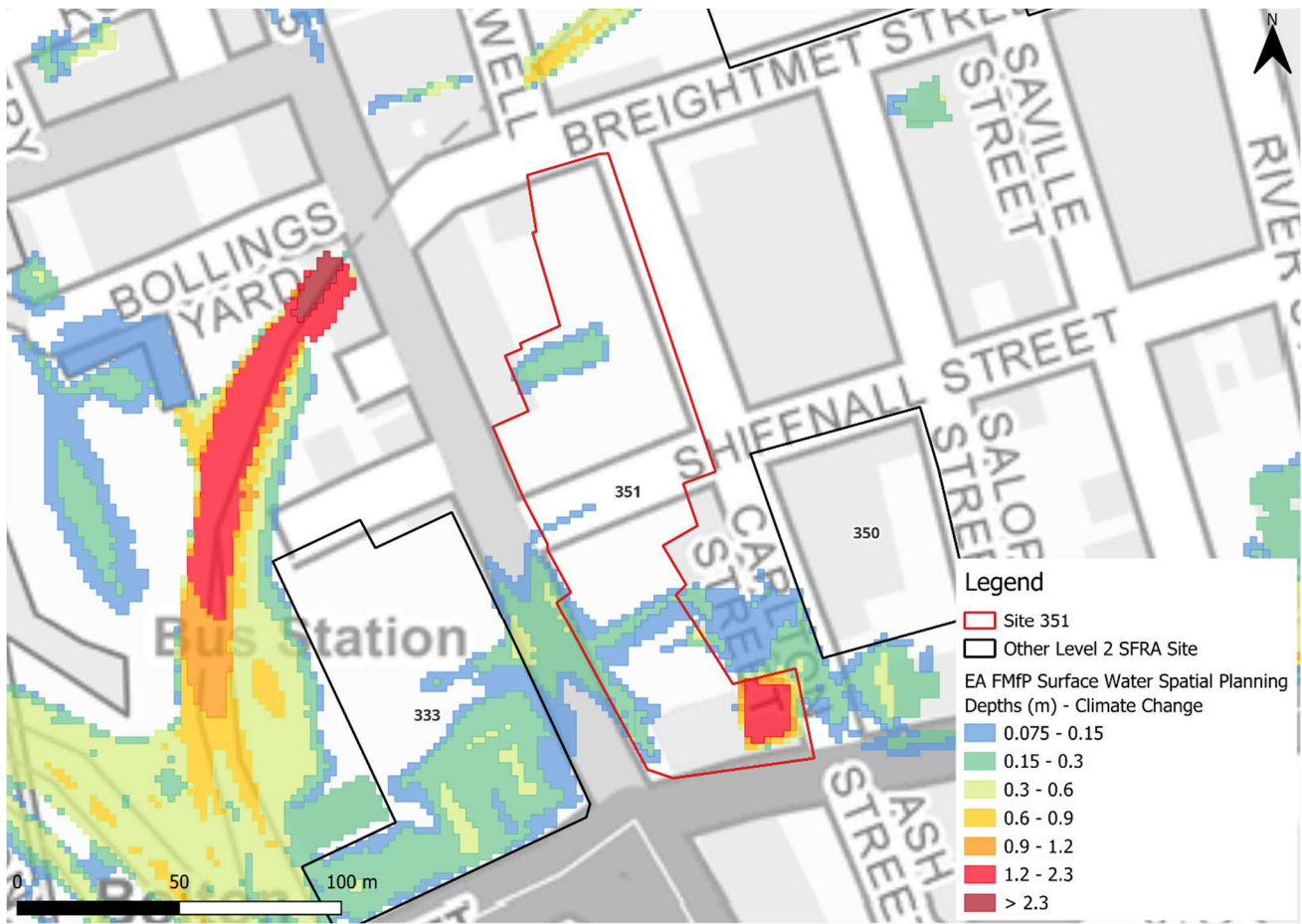


Figure 3-5: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Climate Change for the 1% AEP event (2070s Upper End)

3.2.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning climate change data does not include hazard information suitable for planning purposes. This Level 2 SFRA therefore considers the 0.1% AEP surface water event as a conservative proxy for the 1% AEP event plus climate change, as the best available information to assess surface water flood hazards. The impact of climate change on surface water flood hazards should be considered at the site-specific FRA stage.

Using the RoFSW 0.1% AEP event as a proxy, future surface water flood hazard in the RoFSW 1% AEP event is categorised as 'significant' (Figure 3-6).



Figure 3-6: 0.1% AEP event surface water flood hazard¹, as a proxy for the 1% AEP event plus climate change (Third generation - Risk of Flooding from Surface Water map)

3.3 Sewer flood risk

United Utilities provided their historic risk registers which were aggregated by ward. There are no recorded sewer flooding incidents within the immediate vicinity of the site. There have been three recorded flooding incidents within the Queens Park & Central Ward within which the site is located.

3.4 Observations, mitigation options, site suitability, sequential approach to development management - surface water

- Current risk to the site is predominantly very low, with 79% of the site being outside of the 0.1% AEP surface water flood extent. Present day surface water risk is confined to a surface water flow path through the south of the site and an area of ponding within a topographic low spot in the north of the site. Surface water risk is constrained by the existing development present onsite.
- Risk to the site is shown to increase in across the site in all events when considering climate change, however depths remain shallow across the majority of the site.

- Any drainage strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. The drainage strategy must consider the potential demolition of existing development, and subsequent regrading of land, and the impact this may have on surface water risk to the site and surrounding areas. Given the largely shallow depths within the site, it should be possible to attenuate surface water onsite.
- Brownfield runoff rates or betterment should apply. The developer should consult the LLFA and follow local and National SuDS guidance.
- Assessment of the current drainage system in place should be carried out to ascertain any current capacity issues and whether the current system could accommodate the proposed residential development or whether further capacity will be required.
- Safe access and escape routes would likely be achievable via multiple locations surrounding the site.

4 Groundwater, geology and SuDS suitability

Risk of groundwater emergence is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. Figure 4-1 shows the map covering the site and the surrounding areas. Table 5-1 explains the risk classifications.

The entire site is within an area where there is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.

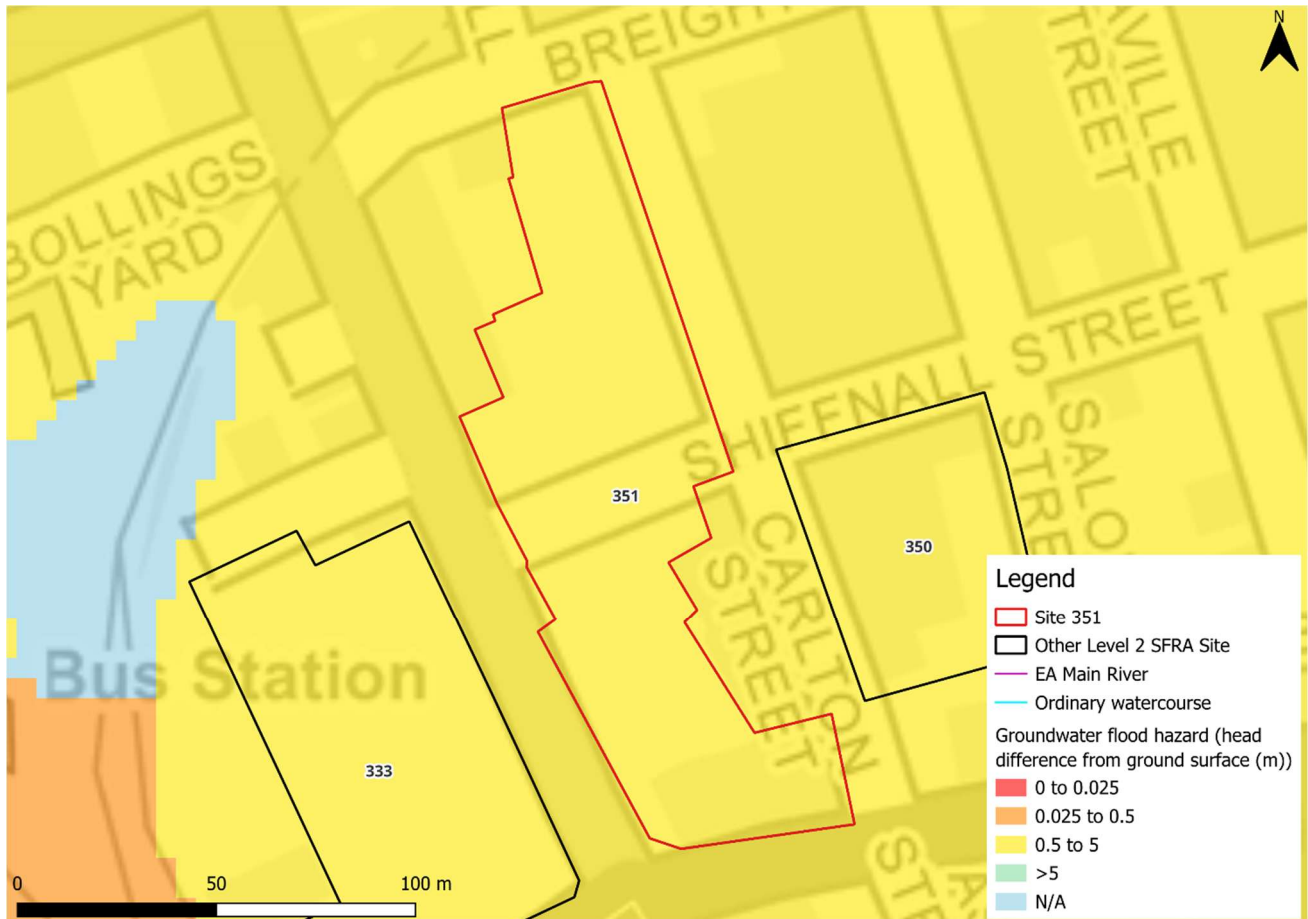


Figure 4-1: JBA 5m Groundwater Emergence Map

Table 4-1: Groundwater Hazard Classification

Groundwater head difference (m)*	Class label
0 to 0.025	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025 to 0.5	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event. There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
*Difference is defined as ground surface in mAOD minus modelled groundwater table in mAOD.	

The underlying bedrock within the site is a combination of mudstone, siltstone, sandstone, coal, ironstone and ferricrete (Figure 4-2). Mudstone, siltstone, coal, ironstone and ferricrete typically have low permeability, whereas sandstone has a higher permeability. Therefore, it is likely that the bedrock beneath the site will contribute to lower levels of infiltration and lower water tables. However, this is not reflected in the groundwater emergence mapping at the site (Figure 4-1).



Figure 4-2: BGS Geology - Bedrock and superficial deposits

5 Residual risk

Although a site may be afforded some protection from defences and / or drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. defence breaches, or blockages of culverts or drainage assets.

There does not appear to be any residual risk to the site from asset blockage or defence breach.

5.1 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. Figure 5-1 shows the RFM in a 'dry day' and 'wet day' scenario. A 'dry day' scenario assumes that the water level in the reservoir is the same as the spillway level or the underside of the roof for a service reservoir and the watercourses upstream and downstream of the reservoir are at a normal level. A 'wet day' scenario assumes a worst-case scenario where a reservoir releases water held on a 'wet day' when local rivers have already overflowed their banks.

The site is at risk from Rumworth Lodge Reservoir in the 'wet day' scenario only. This is located within the Bolton authority area and operated by United Utilities.

The EA's SFRA guidance states that where a proposed development site is at flood risk from a reservoir, then an assessment into whether the reservoir design or maintenance schedule needs improving should be carried out. Expert advice may be required from an all-reservoirs panel engineer. The Council should consult the relevant reservoir undertaker to ascertain whether the proposed development could affect the reservoir's risk designation, it's design category or how it is operated. The Council, as category 1 responders, can access more detailed information about reservoir risk and reservoir owners using the [Resilience Direct](#) system.

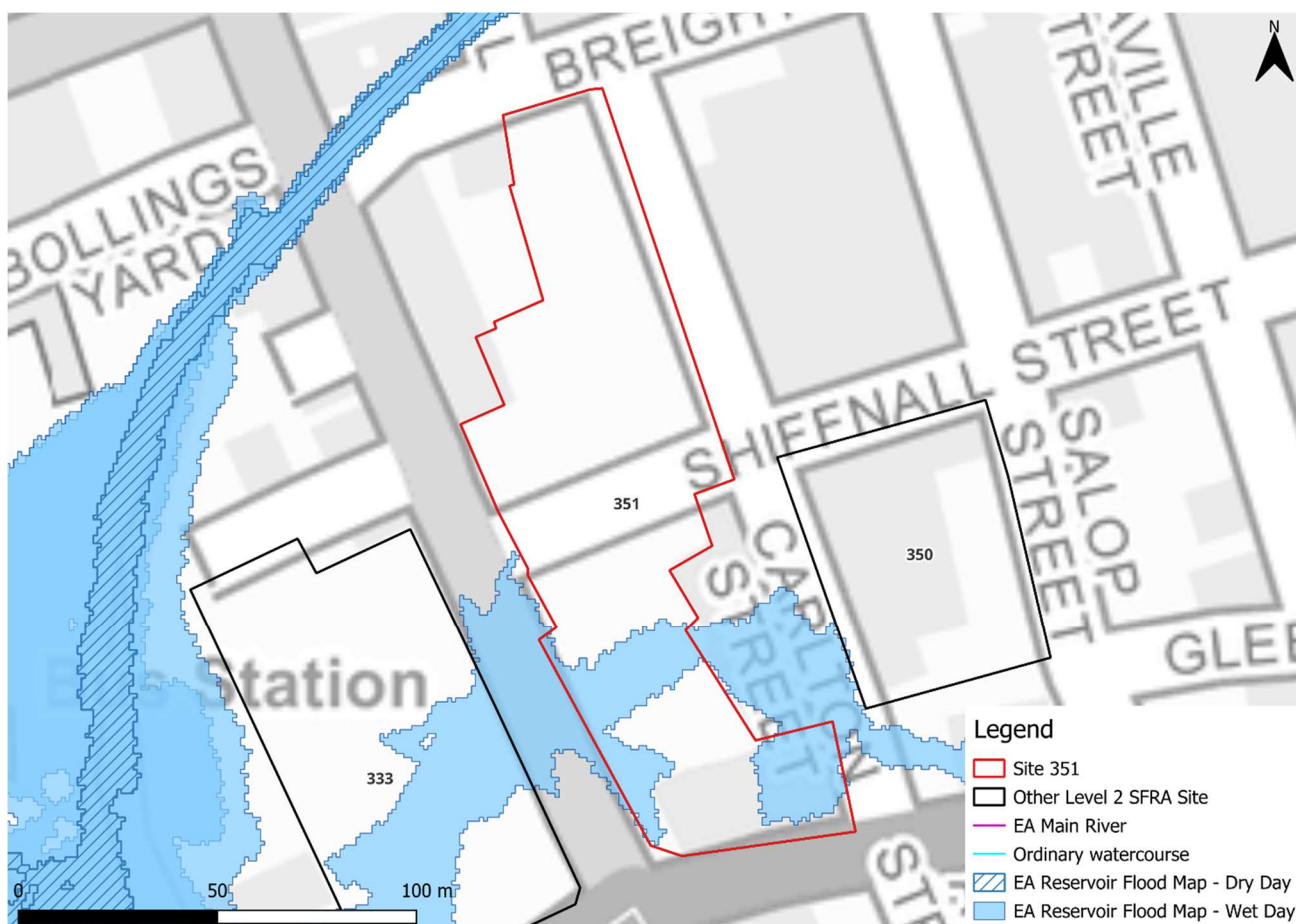


Figure 5-1: EA Reservoir Flood Map

5.2 Observations, mitigation options and site suitability - residual risk

- The site is at potential residual risk from a breach of one reservoir, namely Rumworth, based on the 'wet day' flood extent. This represents a prediction of the credible worst case scenario, therefore the likelihood that such an extreme flood event would occur is remote.
- Given the potential reservoir risk to the site, developers should consider²:
 - Consulting with the local resilience forum for advice on emergency planning,
 - Consulting with relevant reservoir owners to understand the impact development may have on their reservoirs, and
 - Using this Level 2 SFRA to understand whether any proposed development will be safe throughout its lifetime.

² [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

6 Overall site assessment

6.1 Can part b) of the exception test be passed?

This site is not required to pass part b) of the exception test, as it is not located within Flood Zone 3a, however it must still be proven that the development can be safe for its lifetime, which is generally considered to be 100 years for residential development and 75 years for non-residential development.

6.2 Recommendations and site-specific FRA requirements

Based on the evidence presented in the Level 1 SFRA (2026) and this Level 2 SFRA:

- The proposed development of the site would see a change in the risk classification from less vulnerable to more vulnerable, according to the NPPF.
- It should be appropriate to develop this site for more vulnerable purposes given its location largely within Flood Zone 1 and low present day surface water flood risk.
- Were development to be considered, A detailed drainage strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. The drainage strategy must consider the potential demolition of existing development, and subsequent regrading of land, and the impact this may have on surface water risk to the site and surrounding areas. Given the largely shallow depths within the site, surface water risk should be able to be attenuated onsite.
- FRA should be carried out in line with the latest versions of the NPPF; FRCC-PPG; EA online guidance; the Bolton Local Plan, and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with, where applicable, the local planning authority; the lead local flood authority; emergency planning officers; the Environment Agency; United Utilities; the highways authorities; and the emergency services.

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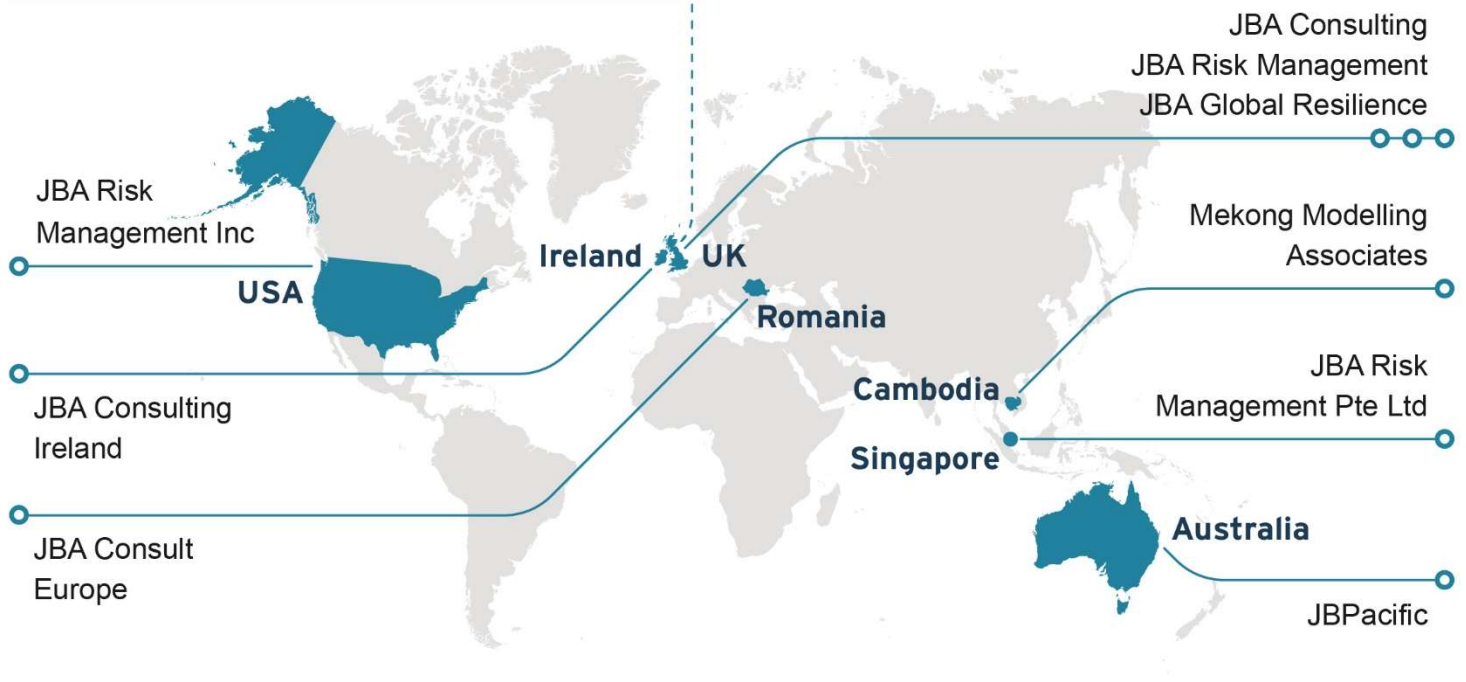
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Bolton Level 2 Strategic Flood Risk Assessment Site Summaries 337-379

Site 379

Final Report

Prepared for
Bolton Council

Date
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Contract

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This report describes work commissioned by Bolton Council by an instruction dated 18 June 2026. The Client's representative for the contract was Sara Dilmamode of Bolton Council. Laura Thompson-Jones of JBA Consulting carried out this work.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between 18 June 2026 and 15 September 2026 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

Acknowledgements

We would like to thank the Environment Agency for their assistance with this work.

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Local Plan Site 379. The content of this report assumes the reader has already consulted the 'Bolton Level 1 SFRA' (2026) and read the 'Bolton Level 2 SFRA Main Report' (2026) and is therefore familiar with the terminology used in this report.

1.1 Site 379

- Location: East of Tempest Road, Site C
- Existing site use: Agriculture, farmhouse dwelling, associated farm buildings
- Existing site use vulnerability: More vulnerable (due to farmhouse)
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area (ha): 120.74
- Watercourse: Knutshaw Brook (unmodelled)
- Summary of requirements from Level 2 SFRA scoping stage:
 - Subject to the Exception Test as more vulnerable development in Flood Zone 3a
 - Assessment of fluvial flood extent (depths, velocities and hazards unable to be assessed as watercourse is unmodelled)
 - Assessment of surface water flood extent, depths and hazards
 - Assessment of all other sources of flood risk
 - Assessment of flood risk management measures and natural flood management

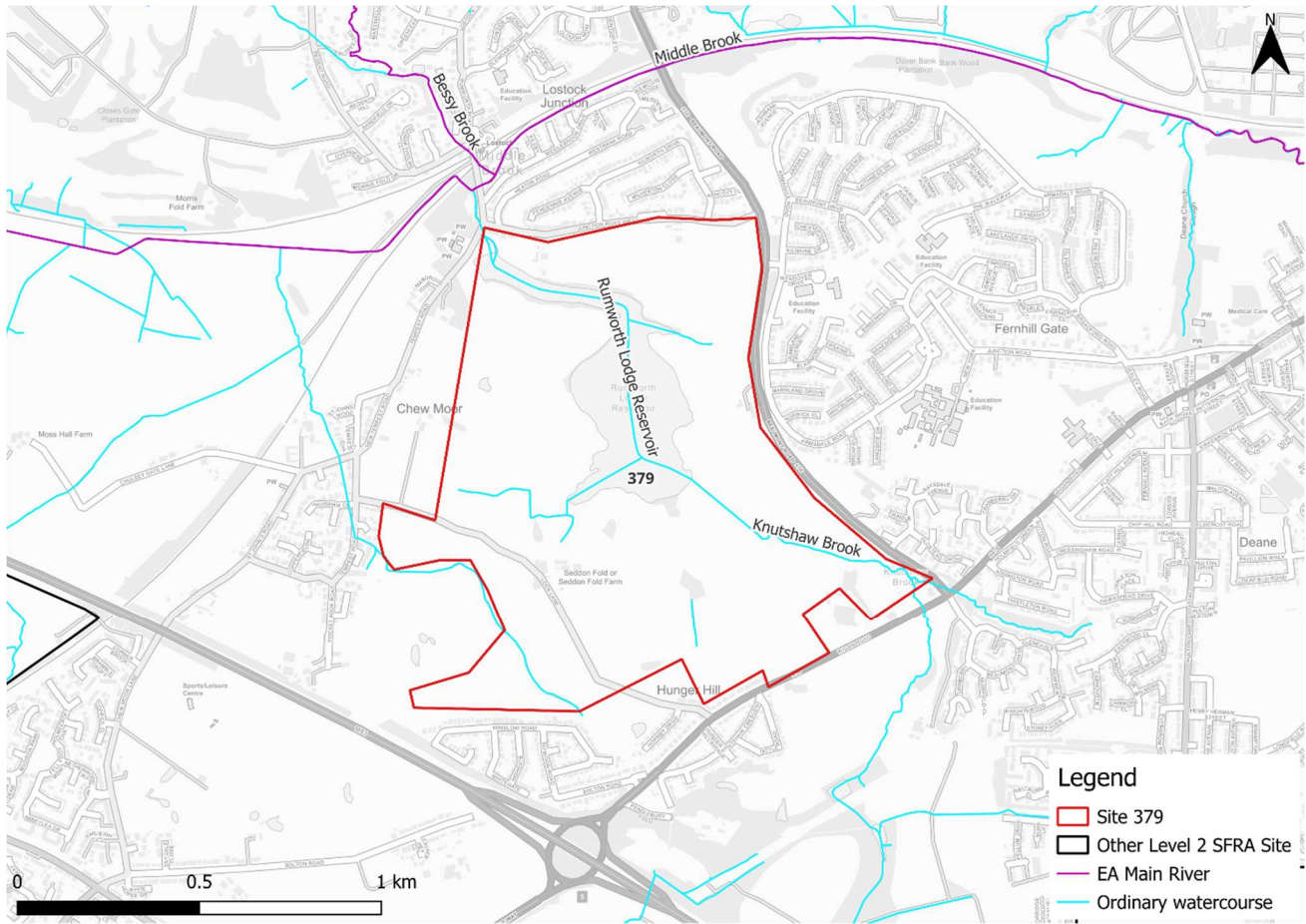


Figure 1-1: Existing site location boundary

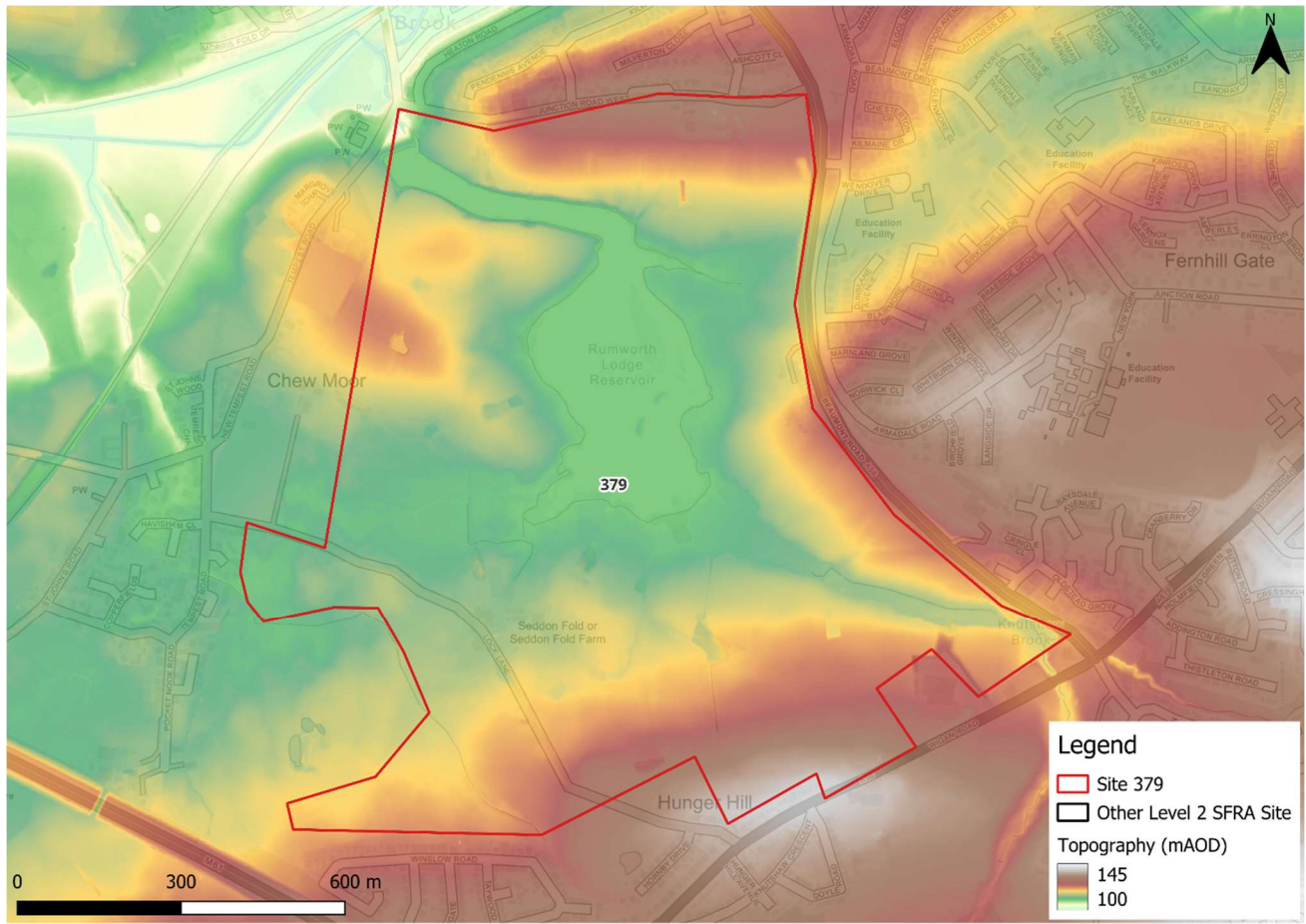


Figure 1-2: Topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the EA's Flood Map for Planning (June 2026) and Flood Zone 3b (functional floodplain), as updated through the Bolton Level 1 SFRA, the percentage areas of the site within the flood zones are stated in Table 2-1 and can be viewed on Figure 2-1. This version of the Flood Map for Planning does not consider flood defence infrastructure (Section 2.4).

Rumworth Lodge Reservoir is present within the centre of the site. Onsite fluvial flood risk is largely confined to the boundaries of the reservoir, including for the large area of functional floodplain. There should be no development within the functional floodplain, however it is assumed that the reservoir will remain in situ, and development would be confined to the surrounding areas. The functional floodplain in this location is based on the EA Rivers and Sea 3.3% AEP defended extent. The remaining area of the site, outside of Rumworth Lodge Reservoir, is located within Flood Zone 1 and therefore at low risk of flooding from rivers.

There is potential fluvial risk from Knutshaw Brook and several ordinary watercourses which feed the reservoir. There is no detailed model covering the reach of Knutshaw Brook or ordinary watercourses within the site. The onsite EA flood zones are based on the New National Model (NNM). Any site-specific FRA should develop a detailed model of Knutshaw Brook and the ordinary watercourses to assess fluvial flood depths, velocities and hazards.

Table 2-1: Existing flood risk based on percentage area of site at risk

Flood Zone 1 (% area)	Flood Zone 2 (% area)	Flood Zone 3a (% area)	Flood Zone 3b (% area)
86	2	1	11

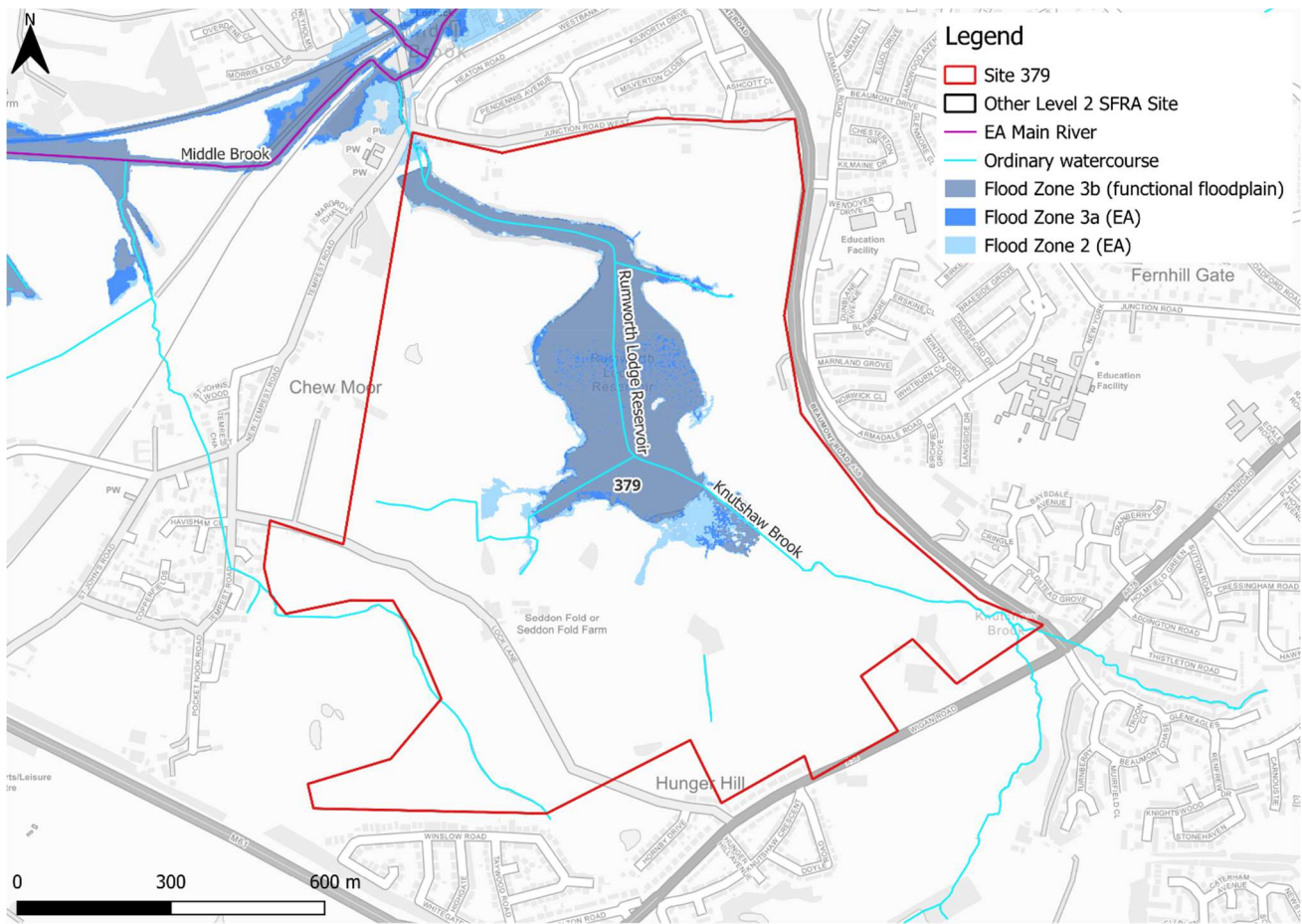


Figure 2-1: Existing risk

2.2 Impacts from climate change

2.2.1 Flood Map for Planning - climate change

The EA's Flood Map for Planning - Flood Zones plus Climate Change dataset shows the site is not at additional risk from fluvial climate change.

2.3 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site, according to these datasets.

The LLFA provided its historic floods register. There has been one recorded internal flooding incident that has occurred at a residential property adjacent to the western site boundary in 2002. There 19 total recorded events within the Heaton, Lostock & Chew Moor Ward within which the site is located.

2.4 Flood risk management

2.4.1 Flood defences

The site does not benefit from any formal engineered flood defences, according to the EA's spatial flood defences dataset.

2.4.2 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the sites and surrounding areas. There are opportunities within the site for riparian and wider catchment woodland planting. Tree planting can help to slow flows and attenuate flooding. There are also opportunities for run-off attenuation features where it may be possible to temporarily store water and attenuate flooding during high flows. These areas are shown on Figure 2-2. The WwNP mapping is broadscale and indicative. Further investigation is required for any land shown to have potential for WwNP.

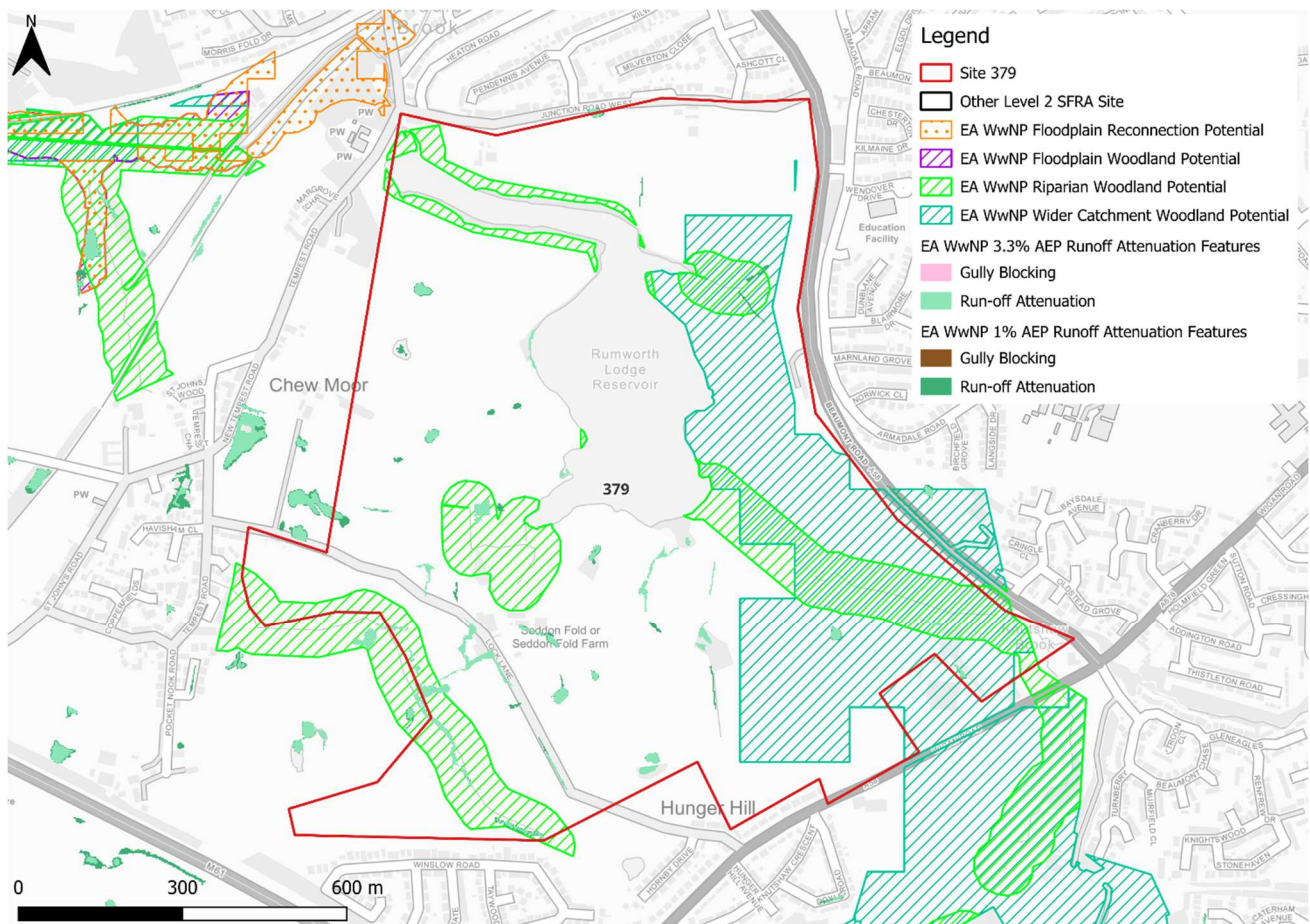


Figure 2-2: Natural Flood Management (NFM) potential mapping

2.5 Emergency planning

2.5.1 Flood warning

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. The site is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is not located within a FAA.

2.5.2 Access and escape routes

Based on available information on fluvial flooding, safe access and escape routes would likely be achievable via multiple points surrounding the site (Figure 2-3). It is recommended that access routes are not constructed over Knutshaw Brook or the ordinary watercourse to the southwest of the site. If this is required, the site-specific must demonstrate that these routes will remain safe, passable, and above estimated design flood levels for the lifetime of the development.

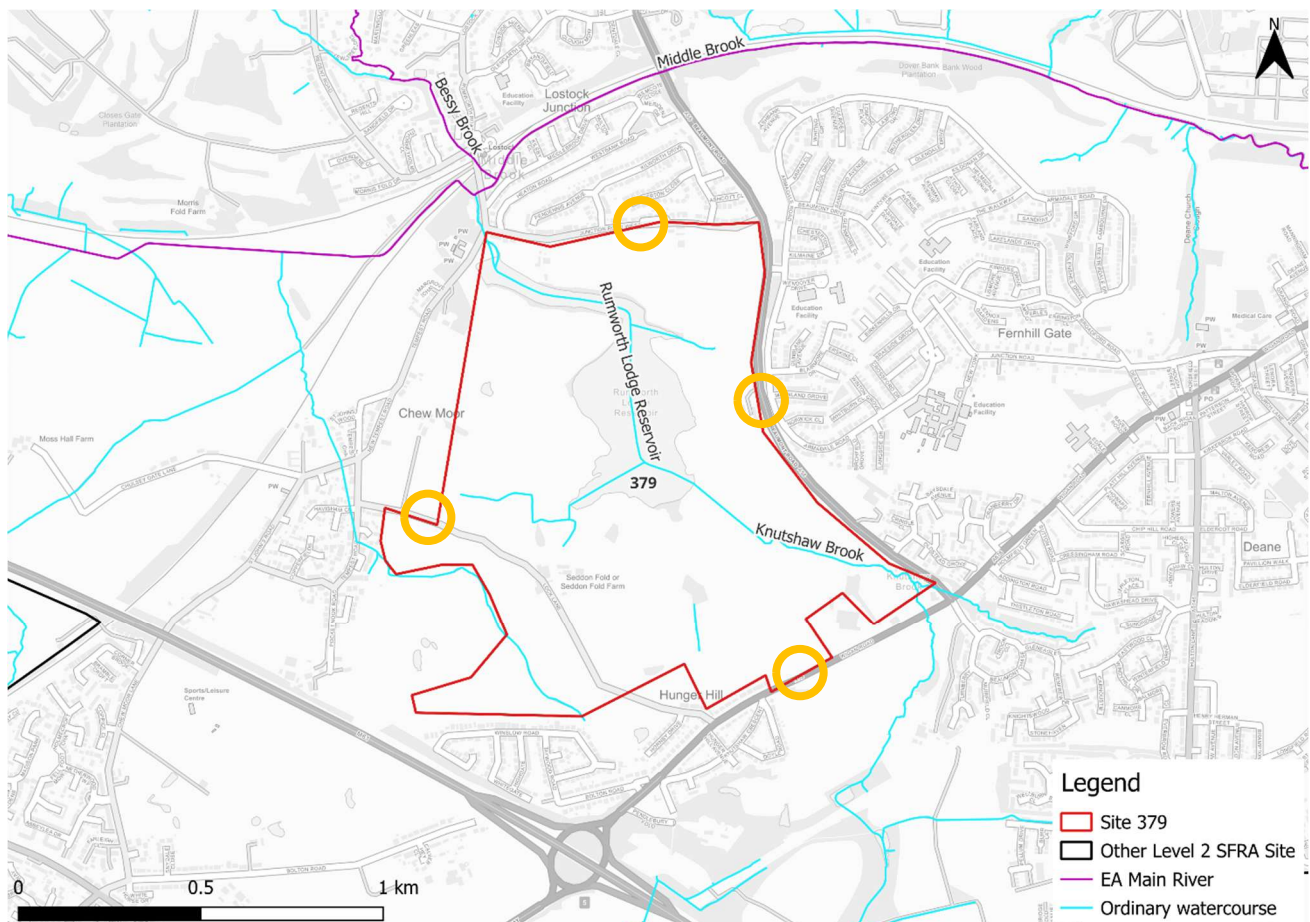


Figure 2-3: Potential access and escape routes

2.6 Observations, mitigation options, site suitability, sequential approach to development management - fluvial

- Observations:
 - The site is within the functional floodplain though the risk is mainly contained within Rumworth Lodge Reservoir. Development is not permitted within the functional floodplain, however it is assumed that the reservoir would remain in place and housing development would be situated within the areas surrounding the reservoir.
 - Rumworth Lodge Reservoir should be subject to regular inspections by a qualified reservoir engineer. The site-specific FRA should consult the reservoir owner to understand whether the proposed development is likely to impact the reservoir's risk designation, operation, or safety requirements.
 - Given the site is more vulnerable and partially within Flood Zone 3a the site must be subject to and must pass the exception test.
 - The remaining areas of the site are wholly located within Flood Zone 1 and therefore at low risk of flooding from rivers.
 - The site is not shown to be at additional risk from climate change.
- Mitigation:
 - Knutshaw Brook flows through the site. There is no detailed model available for the reach of Knutshaw Brook within the site. Therefore, any site-specific FRA may need to develop a detailed model of Knutshaw Brook to assess onsite fluvial flood depths, velocities and hazards.
 - The risk areas adjacent to Knutshaw Brook and the other ordinary watercourses feeding the reservoir should be included as green / blue corridors in site design offering multifunctional benefits alongside flood risk mitigation including Biodiversity Net Gain (BNG) contributions, and social and amenity benefits. This should be feasible without impacting significantly on plot numbers.
 - If works are proposed on or near any of the ordinary watercourses, a separate permission may be required. The type of permission needed from the Lead Local Flood Authority (LLFA) will depend on the activity and location proposed.
 - Development proposals should be informed by appropriate emergency planning arrangements, including the preparation of a site-specific Flood Emergency Plan, identification of access and escape routes, and liaison with the Local Resilience Forum, emergency services and the reservoir undertaker.
- Access and escape:
 - Safe access and escape routes appear to be achievable via multiple points surrounding the site, including for risk of a breach of Rumworth Lodge Reservoir.

3 Flood risk from surface water

3.1 Existing risk

3.1.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Present Day

Based on the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Extents Present Day map (June 2026), the majority of the site is situated outside of the 0.1% AEP surface water flood extent (Table 3-1). There is a significant surface water flow path through the site, along the course of Knutshaw Brook from the southeast, and into Rumworth Lodge Reservoir where there is a significant area of ponding (Figure 3-1). There are also several other smaller flow paths extending from the edges of the site into the reservoir. Surface water risk is present across the remaining area of the site as scattered areas of ponding within topographic low spots. The large percentage included in the 3.3% AEP extent is predominantly due to the presence of the reservoir.

Greatest flood depths within the site in the 1% AEP event exceed 1.2m within in a very small area of ponding in the northwest of the site (Figure 3-2). Safe access and escape routes would likely be achievable via multiple points surrounding the site in all events.

Table 3-1: Existing surface water flood risk based on percentage area at risk using the Flood Map for Planning - Surface Water Spatial Planning Extent Present Day map

Less than 0.1% AEP event (% area)	0.1% AEP event (% area)	1% AEP event (% area)	3.3% AEP event (% area)
77	4	2	17

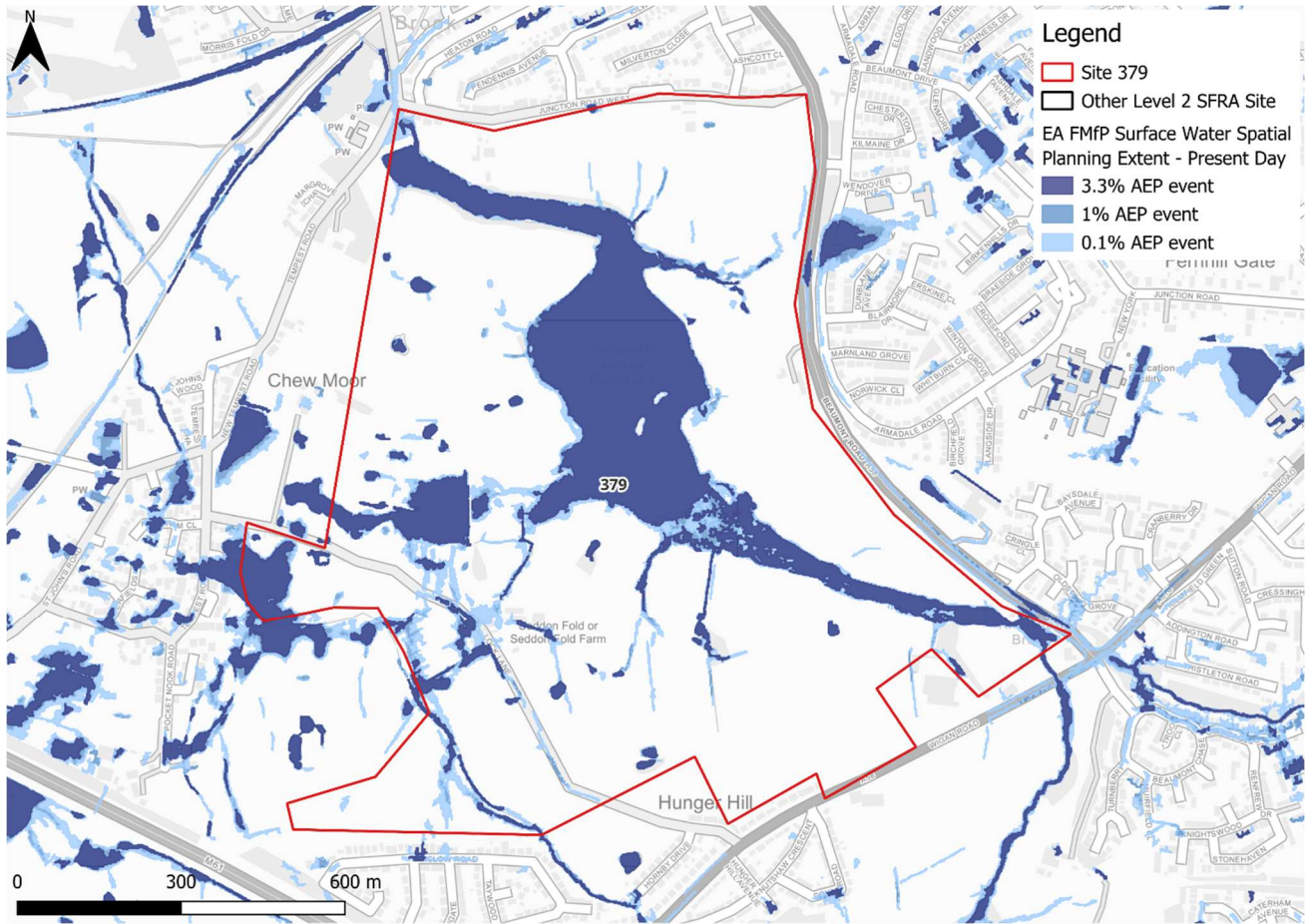


Figure 3-1: Flood Map for Planning - Surface Water Spatial Planning Extents Present Day

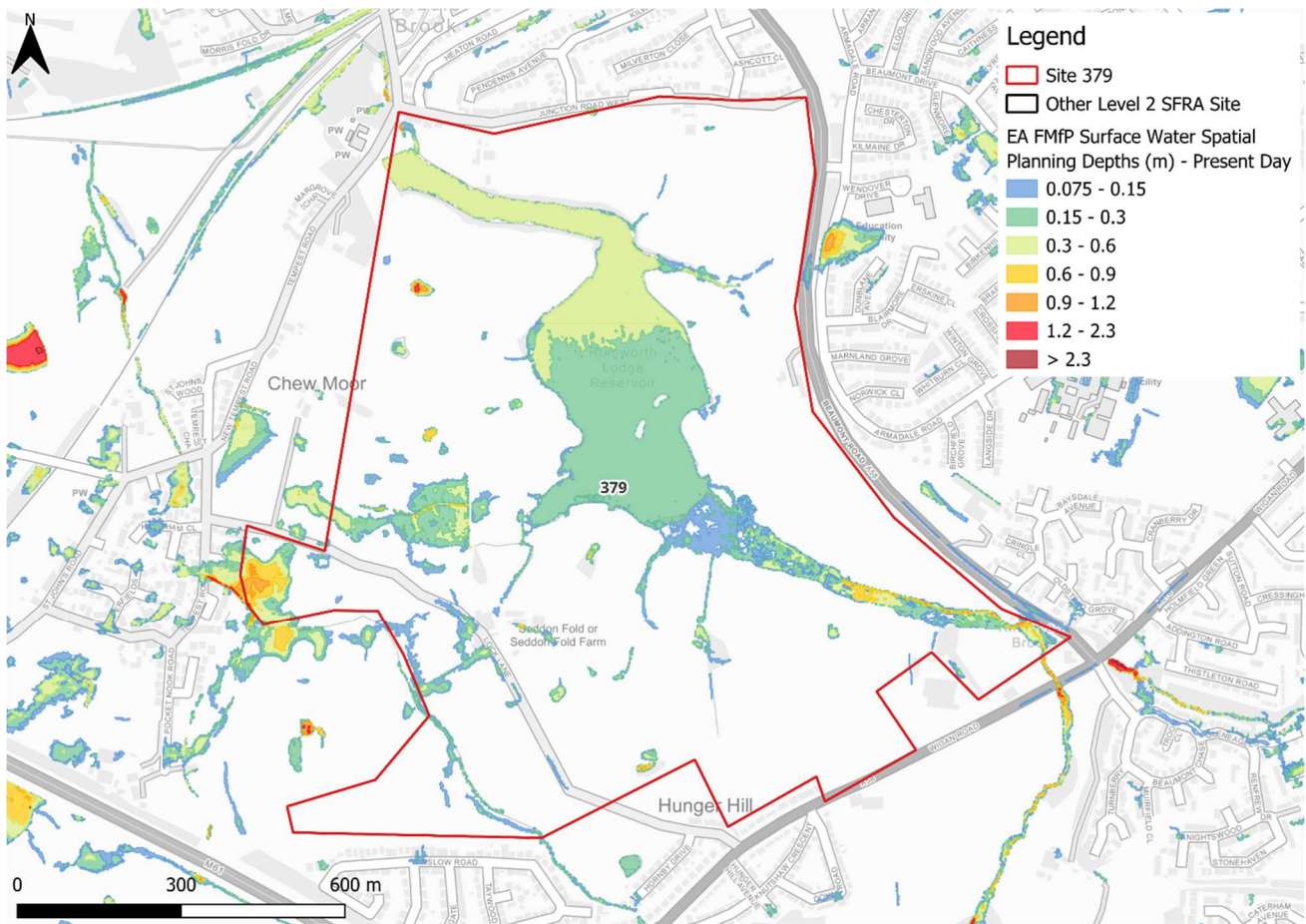


Figure 3-2: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Present Day for the 1% AEP event

3.1.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning data does not include hazard information suitable for planning purposes. Therefore, this Level 2 SFRA considers the third generation Risk of Flooding from Surface Water (RoFSW) hazard mapping in addition to the Flood Map for Planning - Surface Water Spatial Planning extents and depths, as the best available information. Updated surface water hazard information would need to be confirmed at the site-specific FRA stage.

Based on the EA's national scale third generation RoFSW map, the greatest flood hazard within the site in the 1% AEP surface water event is categorised as 'significant' (Figure 3-3).

There are some differences between the Flood Map for Planning - Surface Water Spatial Planning map and the third generation RoFSW hazard mapping. The Flood Map for Planning - Surface Water Spatial Planning data does not map flooding less than 0.075m (7.5cm) in depth. Therefore, where the map may show no flooding, there may be shallow flooding up to a depth of 0.075m. In contrast, the third generation RoFSW does not map flooding with a hazard rating of less than 0.575. This could explain the differences observed between the Flood Map for Planning and third generation RoFSW maps.

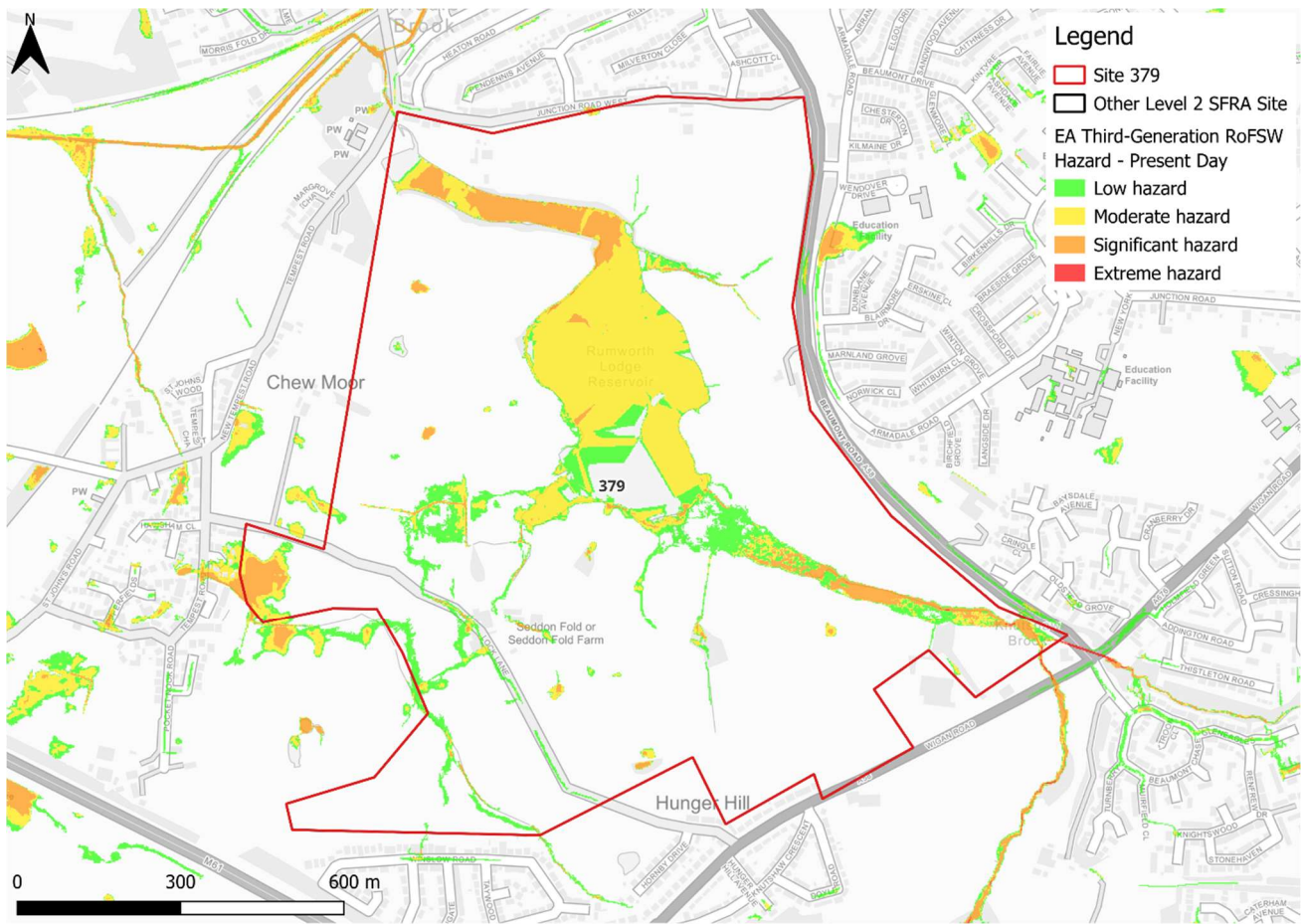


Figure 3-3: Third generation - Risk of Flooding from Surface Water map present day 1% AEP event surface water flood hazard¹

3.2 Impacts from climate change

3.2.1 Flood Map for Planning - Surface Water Spatial Planning Extents and Depths Climate Change

The EA's [climate change allowance guidance](#) states that SFRA's should assess the upper end peak rainfall allowance for the 2070s epoch. This dataset is included in the EA's national scale Flood Map for Planning - Surface Water Spatial Planning Climate Change dataset (June 2026). The peak rainfall intensity allowances for the Irwell management catchment are shown in Table 3-2. The allowance for the 0.1% AEP event is not stated in the EA guidance.

¹ Based on Section 7.5 Hazard rating. What is the Risk of Flooding from Surface Water map? Report version 2.0. April 2019. Environment Agency

Table 3-2: Peak rainfall intensity allowances for the Irwell management catchment

Return period	Central allowance 2070s (% increase)	Upper end allowance 2070s (% increase)
3.3% AEP	30	40
1% AEP	30	45

Figure 3-4 shows the surface water flood extents for the 2070s upper end climate change scenario. Surface water risk increases across the site when considering climate change, particularly within the 0.1% AEP event. The areas of ponding are shown to increase in extent, with a number of additional surface water flow paths present across the site.

The greatest flood depths onsite in the 1% AEP event are shown to exceed 2.3 m within the area downstream of the reservoir spillway within the northwestern corner of the site (Figure 3-5). The additional hillslope flow paths are shown to be shallow. Safe access and escape routes would likely remain achievable via multiple points surrounding the site when considering climate change.

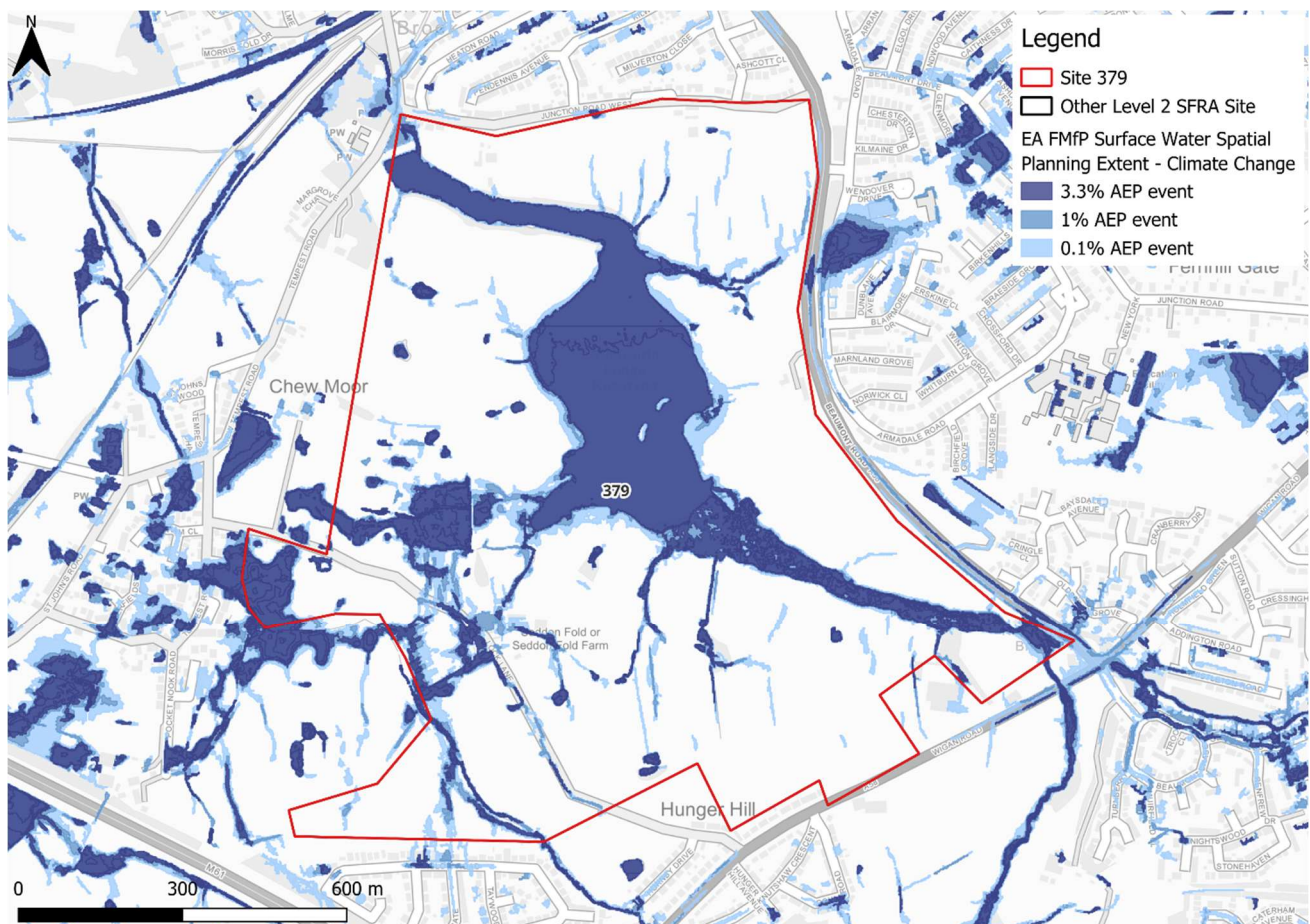


Figure 3-4: Flood Map for Planning - Surface Water Spatial Planning Extents Climate Change (2070s Upper End)

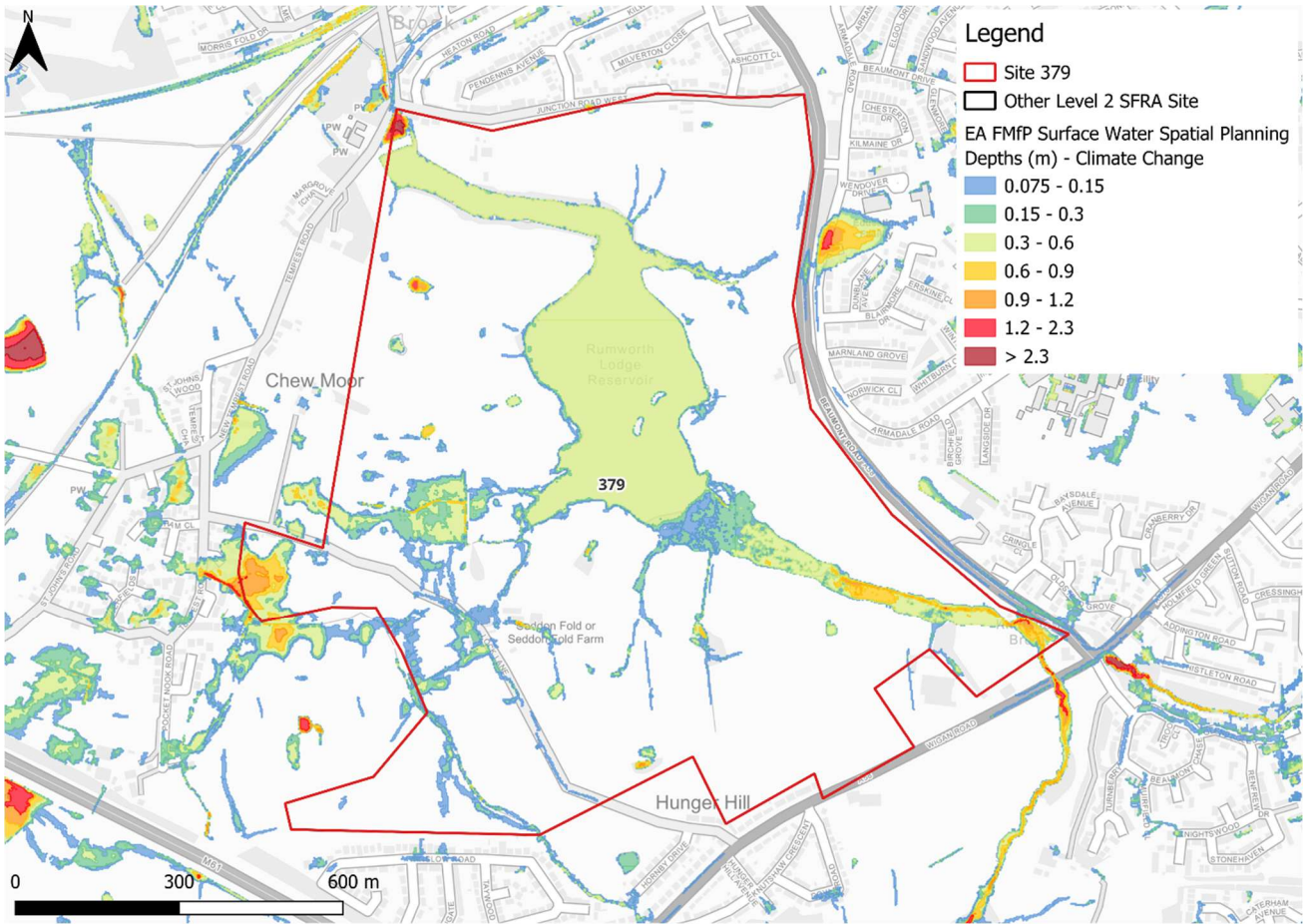


Figure 3-5: Flood Map for Planning - Surface Water Spatial Planning Depths (m) Climate Change for the 1% AEP event (2070s Upper End)

3.2.2 Risk of Flooding from Surface Water - Third Generation Hazard

At the time of writing, the EA's latest Flood Map for Planning - Surface Water Spatial Planning climate change data does not include hazard information suitable for planning purposes. This Level 2 SFRA therefore considers the 0.1% AEP surface water event as a conservative proxy for the 1% AEP event plus climate change, as the best available information to assess surface water flood hazards. The impact of climate change on surface water flood hazards should be considered at the site-specific FRA stage.

Using the RoFSW 0.1% AEP event as a proxy, future surface water flood hazard in the RoFSW 1% AEP event is categorised as 'extreme' adjacent to the Knutshaw Brook watercourse (Figure 3-6).

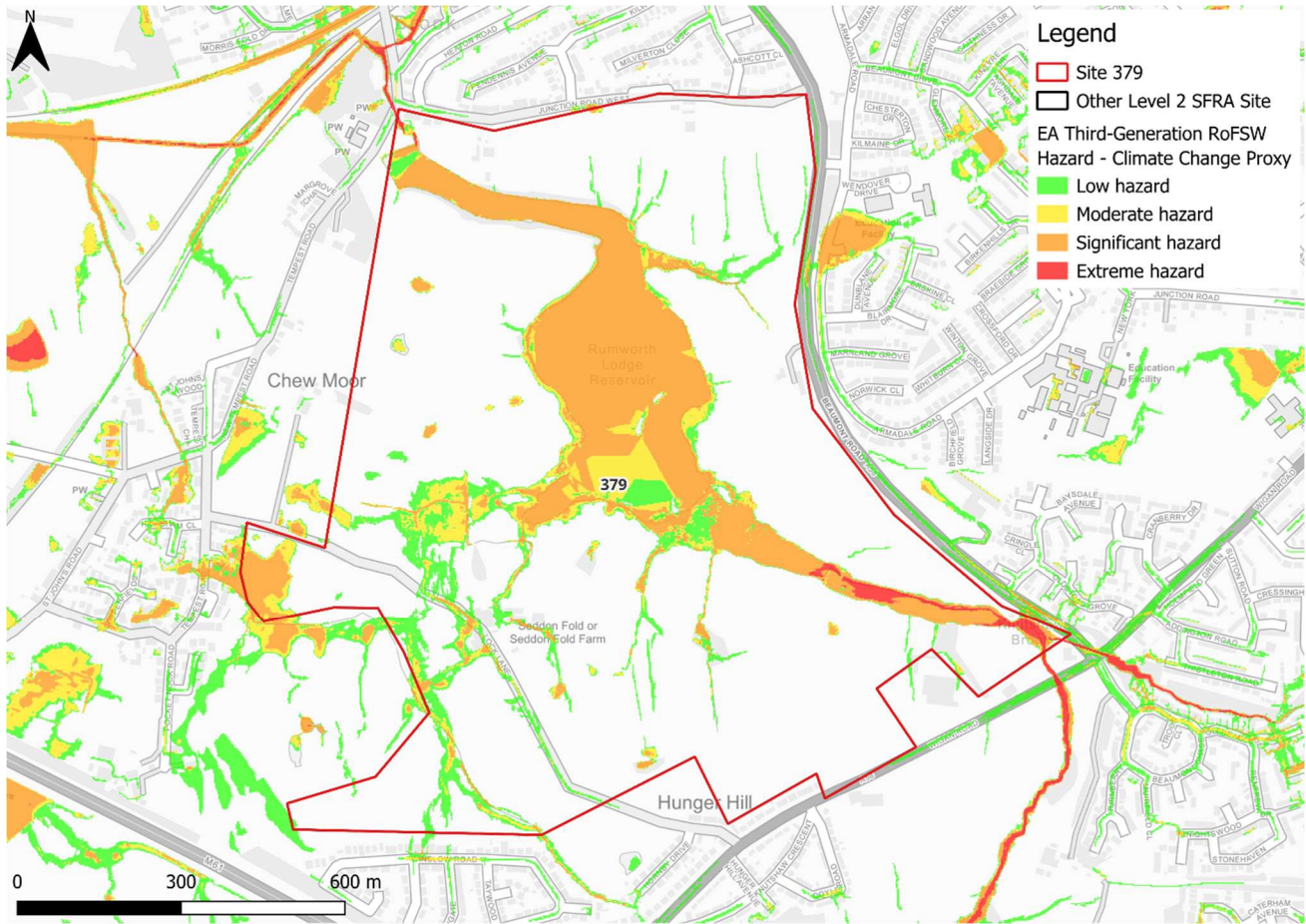


Figure 3-6: 0.1% AEP event surface water flood hazard¹, as a proxy for the 1% AEP event plus climate change (Third generation - Risk of Flooding from Surface Water map)

3.3 Sewer flood risk

United Utilities provided their historic risk registers which were aggregated by ward. There are no recorded sewer flooding incidents within the immediate vicinity of the site. There are 16 recorded historic incidents that have occurred within the Heaton, Lostock & Chew Moor Ward.

3.4 Observations, mitigation options, site suitability, sequential approach to development management - surface water

- The majority of the site is situated outside of the 0.1% AEP surface water flood extent, however there are areas of surface water ponding within the site. There are also a number of surface water flow paths through the site, the most significant being along the Knutshaw Brook watercourse in the southeast of the site.
- Risk to the site is shown to increase in extent across the site when considering the impact of climate change, with a particularly greater extent of surface water flooding within the 0.1% AEP event. There are a number of additional, shallow surface water flow paths along the hillslopes when considering climate change.

- A detailed drainage strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. Greenfield runoff rates should apply. The developer should consult the LLFA and follow local and National SuDS guidance. All topographic low spots and surface water flow paths through the site should be considered within site design, left free of development and allowed to flood naturally when required.
- Safe access and escape routes would likely be achievable via multiple points surrounding the site in a surface water flood event.

4 Groundwater, geology and SuDS suitability

Risk of groundwater emergence is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. Figure 4-1 shows the map covering the sites and the surrounding areas. Table 4-1 explains the risk classifications.

The majority of the site is located within an area where there is no risk of groundwater emergence. Infiltration SuDS may therefore be suitable within these areas. There are some areas where there is a risk of groundwater emergence to both surface and subsurface assets.

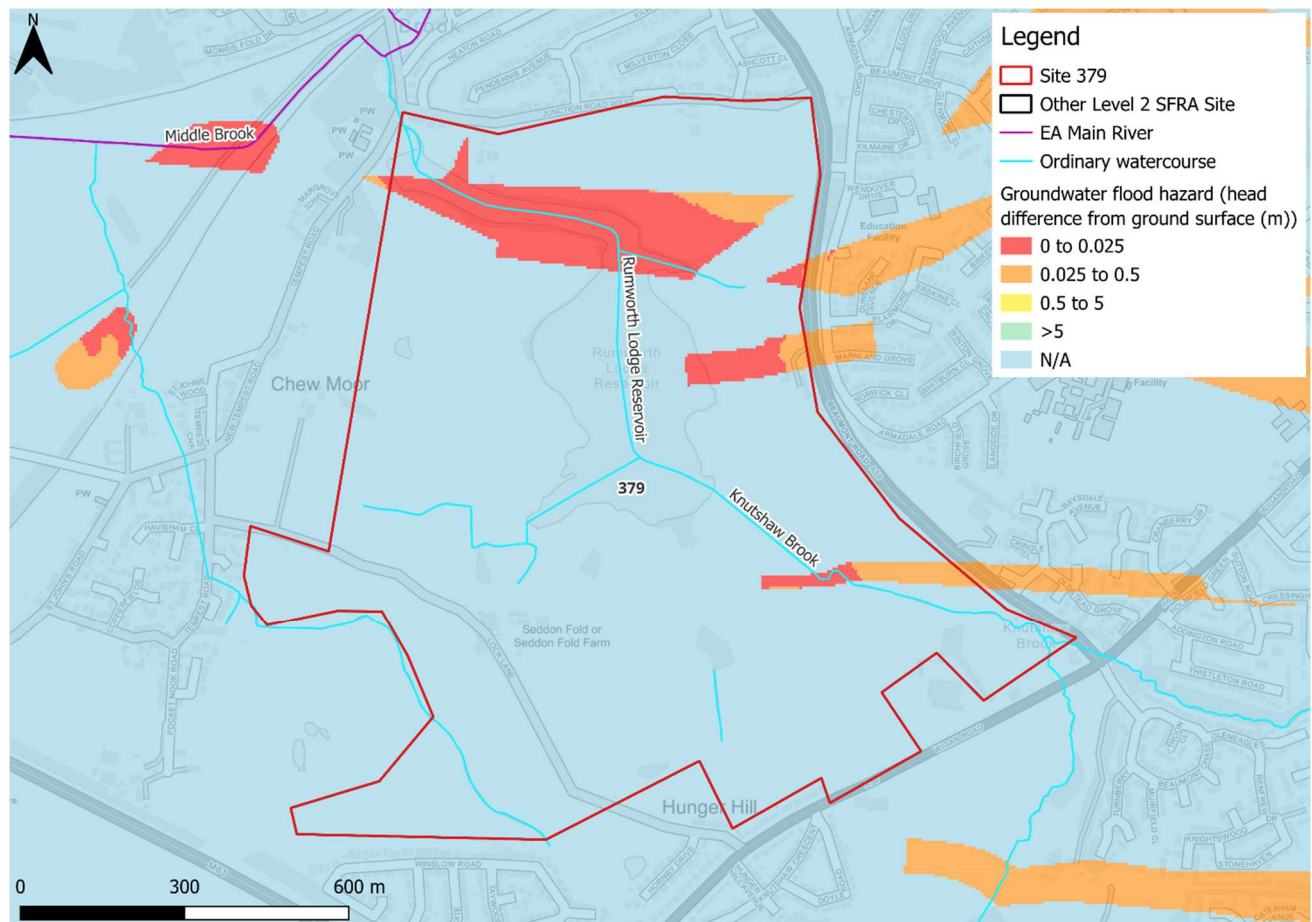


Figure 4-1: JBA 5m Groundwater Emergence Map

Table 4-1: Groundwater Hazard Classification

Groundwater head difference (m)*	Class label
0 to 0.025	Groundwater levels are either at very near (within 0.025m of) the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to both surface and subsurface assets. Groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots.
0.025 to 0.5	Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.
0.5 to 5	Groundwater levels are between 0.5m and 5m below the ground surface in the 100-year return period flood event. There is a risk of flooding to subsurface assets, but surface manifestation of groundwater is unlikely.
>5	Groundwater levels are at least 5m below the ground surface in the 100-year return period flood event. Flooding from groundwater is not likely.
N/A	No risk. This zone is deemed as having a negligible risk from groundwater flooding due to the nature of the local geological deposits.
*Difference is defined as ground surface in mAOD minus modelled groundwater table in mAOD.	

The underlying bedrock within the site is a combination of mudstone, siltstone, sandstone, coal, ironstone and ferricrete (Figure 4-2). Mudstone, siltstone, coal, ironstone and ferricrete typically have low permeability, whereas sandstone has a higher permeability. Therefore, it is likely that the bedrock beneath the site will contribute to lower levels of infiltration and lower water tables. This is reflected in the groundwater emergence mapping largely showing no risk of groundwater emergence within the site (Figure 4-1).

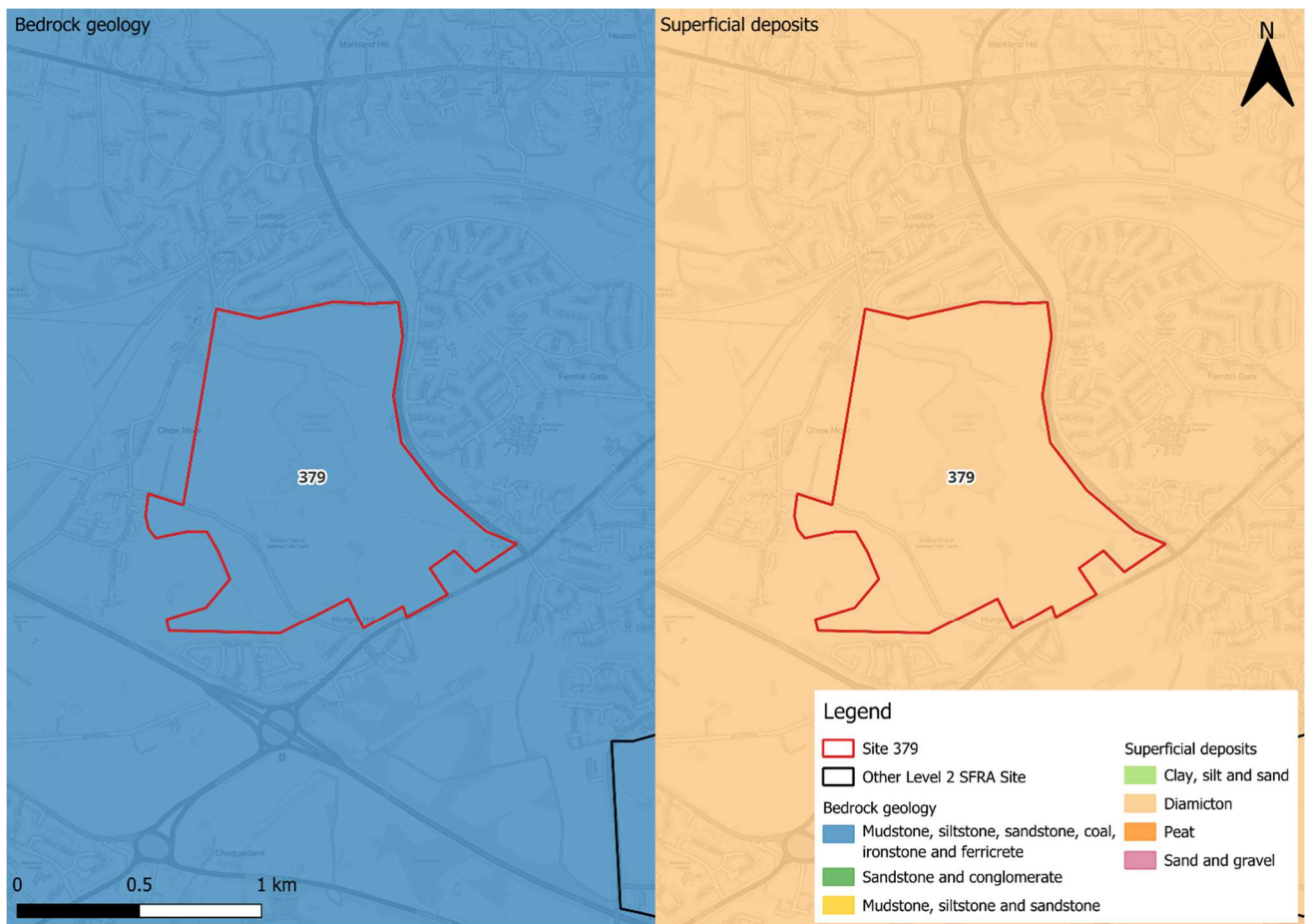


Figure 4-2: BGS Geology - Bedrock and superficial deposits

5 Residual risk

Although a site may be afforded some protection from defences and / or drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. defence breaches, or blockages of culverts or drainage assets. Residual risk at this site comes from the potential blockage or structural failure of the culvert beneath Tempest Road to the northwest of the site.

5.1 Potential blockage

A blockage or failure of the structure beneath Tempest Road may cause water in the channel to back up and cause flooding to the site, depending on the severity of the blockage and magnitude of the flood event. Culvert course, capacity and condition surveys may be required, including for consultation with the culvert owner.

Figure 5-1 indicates the location of the culvert beneath Tempest Road. The potential residual risk to the site following a blockage of this asset should be assessed through the site-specific FRA.

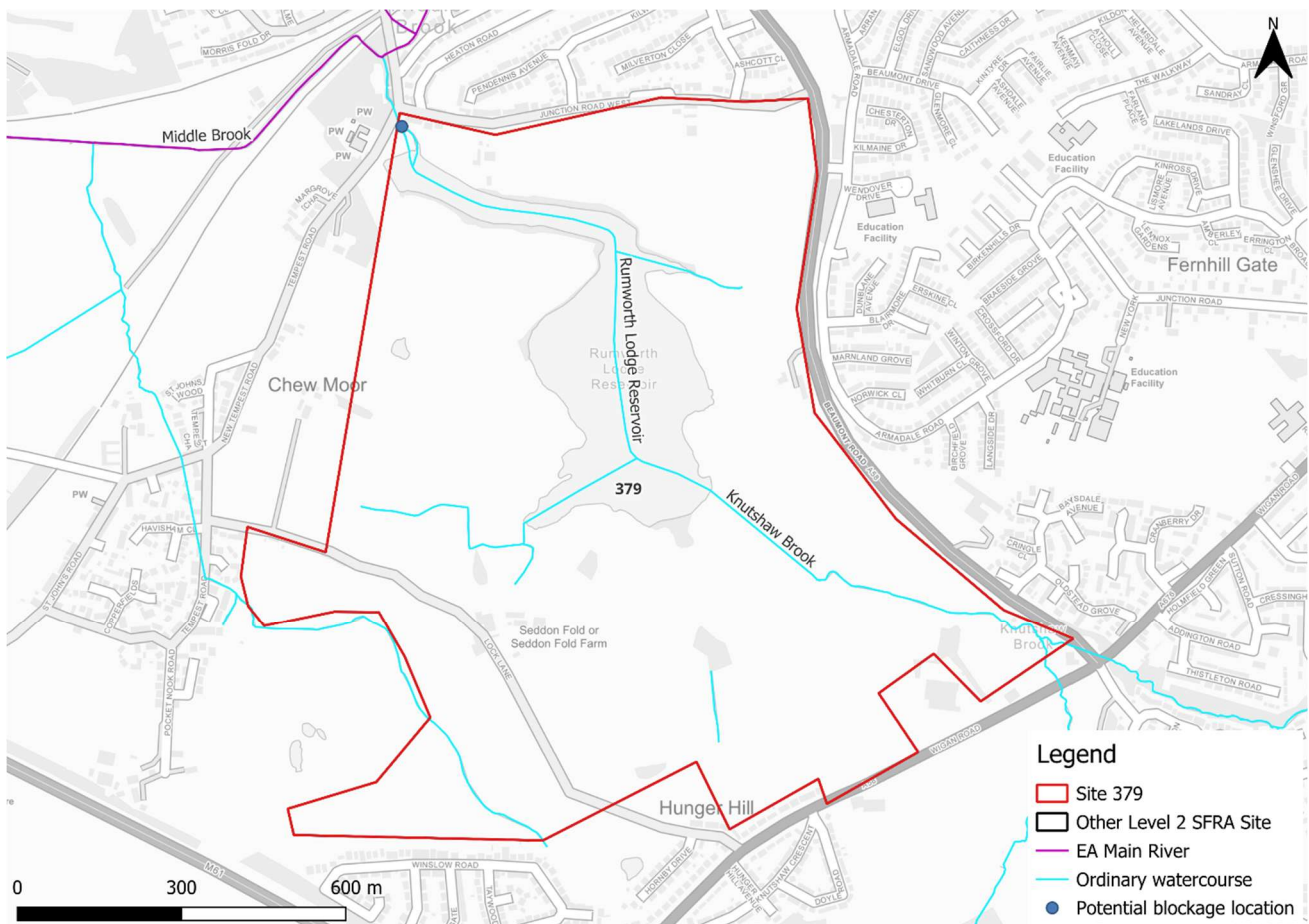


Figure 5-1: Potential blockage location

5.2 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. Figure 5-2 shows the RFM in a 'dry day' and 'wet day' scenario. A 'dry day' scenario assumes that the water level in the reservoir is the same as the spillway level or the underside of the roof for a service reservoir and the watercourses upstream and downstream of the reservoir are at a normal level. A 'wet day' scenario assumes a worst-case scenario where a reservoir releases water held on a 'wet day' when local rivers have already overflowed their banks.

The site is potentially at risk from two reservoirs, namely Rumworth Lodge, which is located onsite, and High Rid, which is also located within the Bolton authority area. These are both operated by United Utilities. The residual risk from both Rumworth Lodge and High Rid reservoirs is low, with extents being confined to the northwestern corner of the site. Development should be situated away from this area of the site and directed towards the surrounding areas of the reservoir.

The EA's SFRA guidance states that where a proposed development site is at flood risk from a reservoir, then an assessment into whether the reservoir design or maintenance schedule needs improving should be carried out. Expert advice may be required from an all-reservoirs panel engineer. The Council should consult the relevant reservoir undertaker to ascertain whether the proposed development could affect the reservoir's risk designation, its design category or how it is operated. The Council, as category 1 responders, can access more detailed information about reservoir risk and reservoir owners using the [Resilience Direct](#) system.

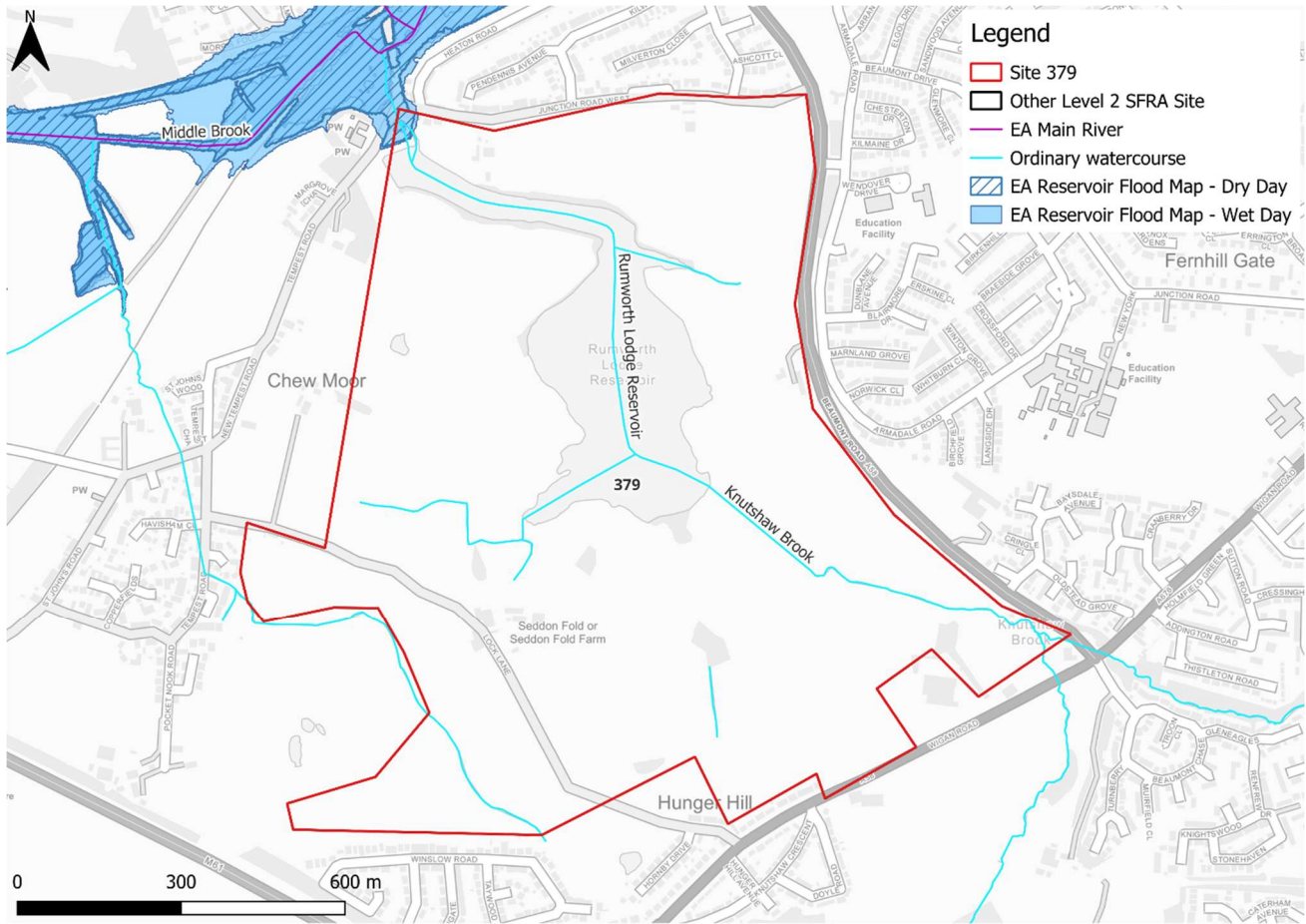


Figure 5-2: Flood risk from reservoirs

5.3 Observations, mitigation options and site suitability - residual risk

- The site is at potential residual risk from a blockage of the culvert beneath Tempest Road to the northwest of the site. The site-specific FRA should consider modelling a blockage scenario to understand whether there would be any additional risk to the site.
- Areas adjacent to culverts and bridges are at particular risk from the rapid onset of fast flowing and deep flooding, with little or no warning if structures become blocked. Emergency plans must be in place for such areas and safe access and escape routes must be in place for the lifetime of development. Resistance and resilience measures may also need to be put in place to manage residual flood risk when avoidance measures have been exhausted.
- The LPA should use the information on residual risk in this Level 2 SFRA to state in the local plan strategic policies a preferred mitigation strategy for ensuring development will be safe throughout its lifetime in relation to urban form, risk management and where flood mitigation measures are likely to have wider sustainable design implications (para 042, FRCC-PPG).

- The site is also at potential residual risk from a breach of two reservoirs. Given the potential reservoir risk to the site, developers should consider²:
 - Consulting with the local resilience forum for advice on emergency planning,
 - Preparing a site-specific Flood Emergency Plan, with identification of suitable access and escape routes,
 - Consulting with relevant reservoir owners and undertakers to understand the impact development may have on the risk designation of the reservoirs, and
 - Using this Level 2 SFRA to understand whether any proposed development will be safe throughout its lifetime.
- Regular safety inspections of the reservoir should be undertaken by a qualified reservoir engineer. Permanent access routes for maintenance and inspections should be included within site layout and design. This should also be considered during construction.

² [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

6 Overall site assessment

6.1 Can part b) of the exception test be passed?

This site is required to pass part b) of the exception test, given it is proposed for more vulnerable uses and is located within Flood Zone 3a. It must also be proven that the development can be safe for its lifetime, which is generally considered to be 100 years for residential development.

Based on the information presented in this Level 2 SFRA, this site would likely pass the exception test given fluvial flood risk is largely confined to the onsite reservoir and ordinary watercourses that flow into it, with the surrounding areas being located within Flood Zone 1. The exception test should be reapplied if additional information on fluvial risk from Knutshaw Brook and the other ordinary watercourses becomes available.

6.2 Recommendations and site-specific FRA requirements

Based on the evidence presented in the Level 1 SFRA (2026) and this Level 2 SFRA:

- It should be appropriate to develop this site for more vulnerable purposes given its location largely within Flood Zone 1 assuming development will avoid the areas immediately adjacent to Rumworth Lodge Reservoir.
- There is no detailed model available for Knutshaw Brook or the other ordinary watercourses within the site. Therefore, fluvial flood depths, velocities and hazards were unable to be assessed through this Level 2 SFRA. The site-specific FRA may need to produce detailed modelling of the watercourses, including for the impacts of climate change.
- Regular safety inspections of the reservoir should be undertaken by a qualified reservoir engineer. Permanent access routes for maintenance and inspections should be included within site layout and design.
- The developer should consult with United Utilities to understand whether the proposed development would impact the category or risk designation of Rumworth Lodge Reservoir.
- The risk areas adjacent to Knutshaw Brook and the other ordinary watercourses feeding the reservoir should be included as green / blue corridors in site design.
- A detailed drainage strategy must ensure there is no increase in surface water flood risk elsewhere as a result of new development. Topographic flow paths and areas of ponding should be included in site layout and design.
- The FRA should undertake a condition and capacity assessment of the culvert beneath Tempest Road to the northwest of the site.
- FRA should be carried out in line with the latest versions of the NPPF; FRCC-PPG; EA online guidance; the Bolton Local Plan, and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with, where applicable, the local planning authority; the lead local flood authority; emergency

planning officers; the Environment Agency; United Utilities; the highways authorities; and the emergency services.

7 Licencing

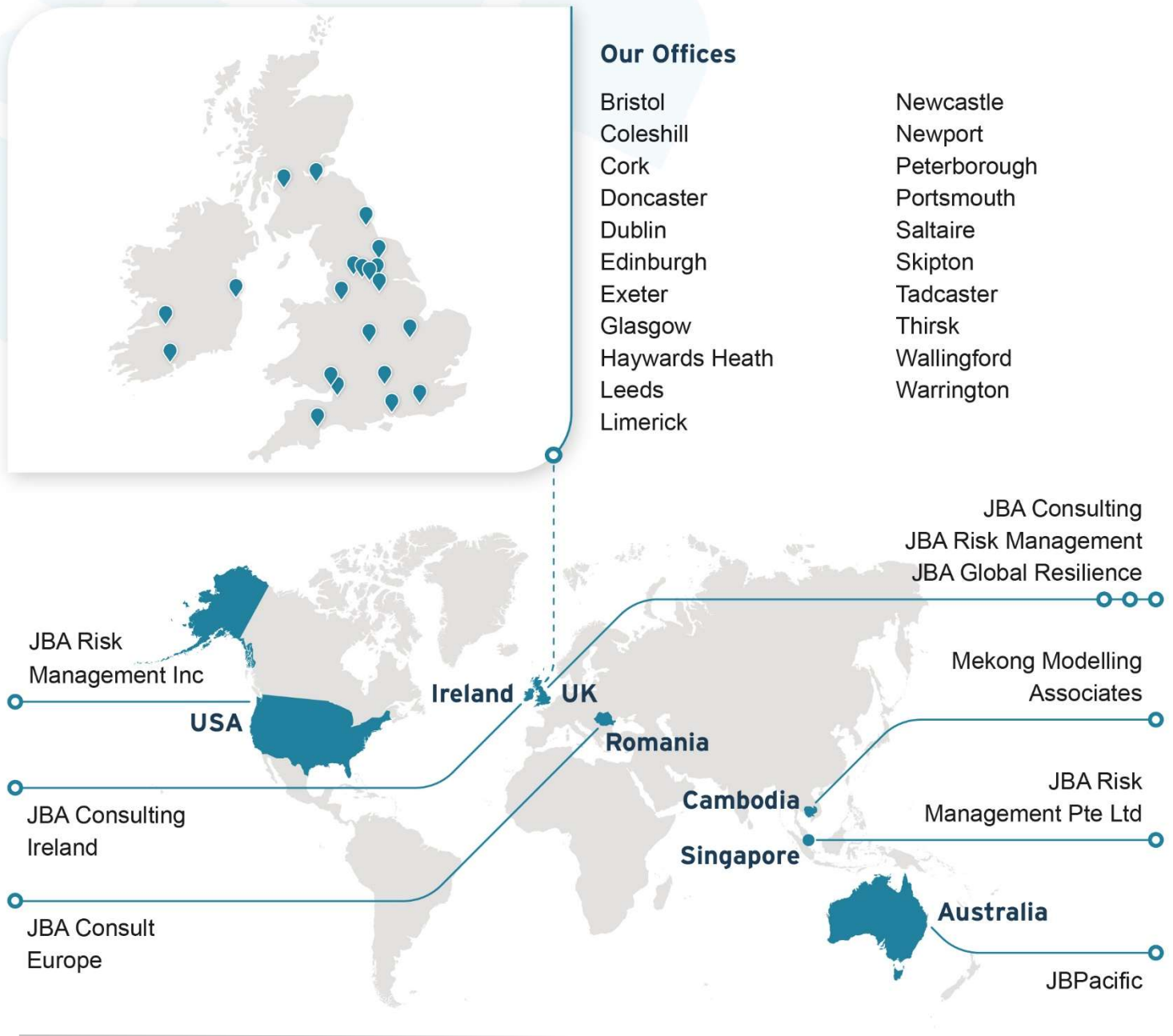
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