

Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19C100

Final

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Prepared for:



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This report describes work commissioned by Preston City Council, on behalf of the Central Lancashire Local Plan Team, by an instruction dated 19 August 2024. The Client's representative for the contract was Carolyn Williams of Preston City Council. Georgina Williams JBA Consulting carried out this work.

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Contents

1	Background	1
	1.1 Site 19C100	1
2	Flood risk from rivers	4
	2.1 Existing risk	4
	2.2 Impacts from climate change	7
	2.3 Flood risk management	9
	2.4 Residual risk	11
	2.5 Historic flood incidents	14
	2.6 Flood warning and access and escape routes	14
	2.7 Observations, mitigation options and site suitability - fluvial	15
3	Flood risk from surface water	17
	3.1 Existing risk	17
	3.2 Impacts from climate change	18
	3.3 Observations, mitigation options and site suitability - surface water	20
4	Risk from groundwater	22
5	Overall site assessment	24
	5.1 Can part b) of the exception test be passed?	24
	5.2 Recommendations, FRA requirements and further work	24
6	Licencing	25

List of Figures

Figure 1-1: Existing site location boundary	2
Figure 1-2: Topography	3
Figure 2-1: Existing risk from rivers to the site	5
Figure 2-2: Flood depths for 1% AEP undefended flood event	6
Figure 2-3: Flood hazard for 1% AEP undefended flood event	7
Figure 2-4: Flood depths for 1% AEP undefended flood event +47% (higher central climate change allowance)	8
Figure 2-5: Flood hazard for 1% AEP undefended flood event +47% (higher central climate change allowance)	9
Figure 2-6: Natural Flood Management (NFM) potential mapping	10
Figure 2-7: Flood depths (m) based on a potential M61 culvert blockage during a 1% AEP undefended flood event +47% (higher central climate change allowance)	11
Figure 2-8: Flood hazards based on a potential M61 culvert blockage during a 1% AEP undefended flood event +47% (higher central climate change allowance)	12
Figure 2-9: Flood risk from reservoirs	13
Figure 2-10: EA Flood Warning Areas	14
Figure 3-1: High risk event surface water flood depths (Risk of Flooding from Surface Water map)	17
Figure 3-2: High risk event surface water flood hazard (Risk of Flooding from Surface Water map)	18
Figure 3-3: High risk event surface water flood depths plus 40% climate change (based on Risk of Flooding from Surface Water map)	19
Figure 3-4: High risk event surface water flood hazards plus 40% climate change (based on Risk of Flooding from Surface Water map)	20
Figure 4-1: JBA 5m Groundwater Emergence Map	22

List of Tables

Table 2-1: Existing fluvial flood risk	4
Table 2-2: Modelled climate change allowances for peak river flows for the Douglas Management Catchment	7
Table 3-1: Existing surface water flood risk based on the RoFSW map	17
Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment	18
Table 4-1: Groundwater Flood Hazard Classification	23

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19C100. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Central Lancashire Level 1 SFRA' (2025) and read the 'Central Lancashire Level 2 SFRA Main Report' (2025) and is therefore familiar with the terminology used in this report.

1.1 Site 19C100

- Location: Land at Bagganley Lane
- Existing site use: Mixed use; residential and agricultural
- Existing site use vulnerability: More vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area: 13.3 hectares
- Proposed development impermeable area: 11.3 hectares (assumed 85% impermeable area)
- EA model: Black Brook 2011
- Watercourse: Black Brook
- Summary of requirements from scoping stage:
 - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
 - Subject to the exception test as more vulnerable development proposed in Flood Zone 3a
 - Assessment of modelled fluvial flood depths and hazards
 - Assessment of surface water flood depths and hazards
 - Assessment of all other sources of flood risk
 - Potential residual risk from blockage of M61 culvert along Black Brook

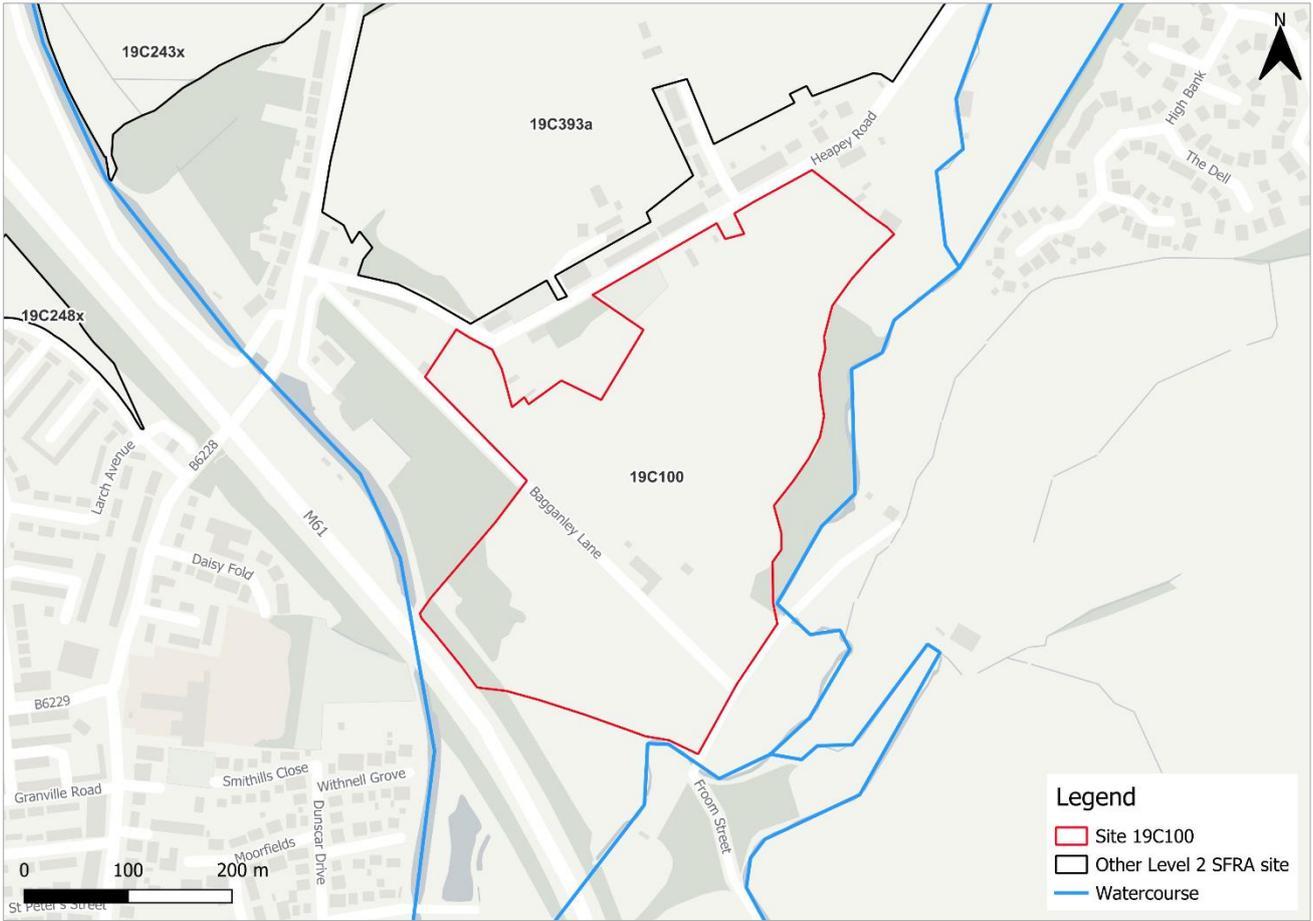


Figure 1-1: Existing site location boundary

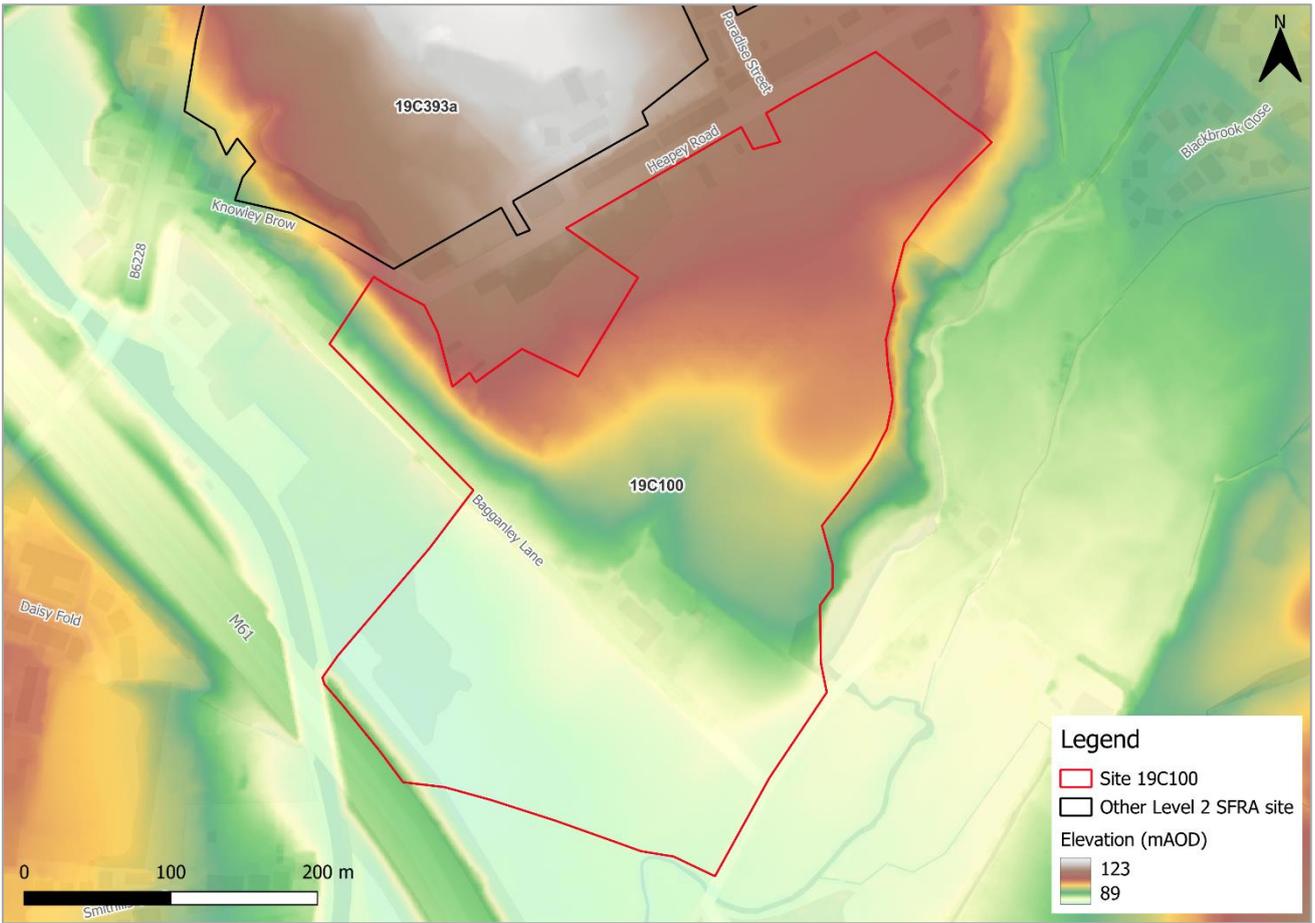


Figure 1-2: Topography

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 and Flood Zone 3b (functional floodplain) as updated in the Central Lancashire Level 1 SFRA (2025), the percentage areas of the site within each fluvial flood zone (accessed May 2025) are stated in Table 2-1 and can be viewed on Figure 2-1. The Flood Map for Planning does not consider flood defence infrastructure (Section 2.3) or the impacts of climate change (Section 2.2).

Approximately 3% of the site is modelled to be within the functional floodplain. Flood Zone 3b is present within the south and southeast of the site. The functional floodplain in this location is conservatively based on the 2% AEP undefended event from the Black Brook 2011 model, in the absence of suitable modelled data. Both Flood Zone 3a and Flood Zone 2 are present within the southwest of the site. The remaining area of the site is modelled to be within Flood Zone 1.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
78	9	10	3

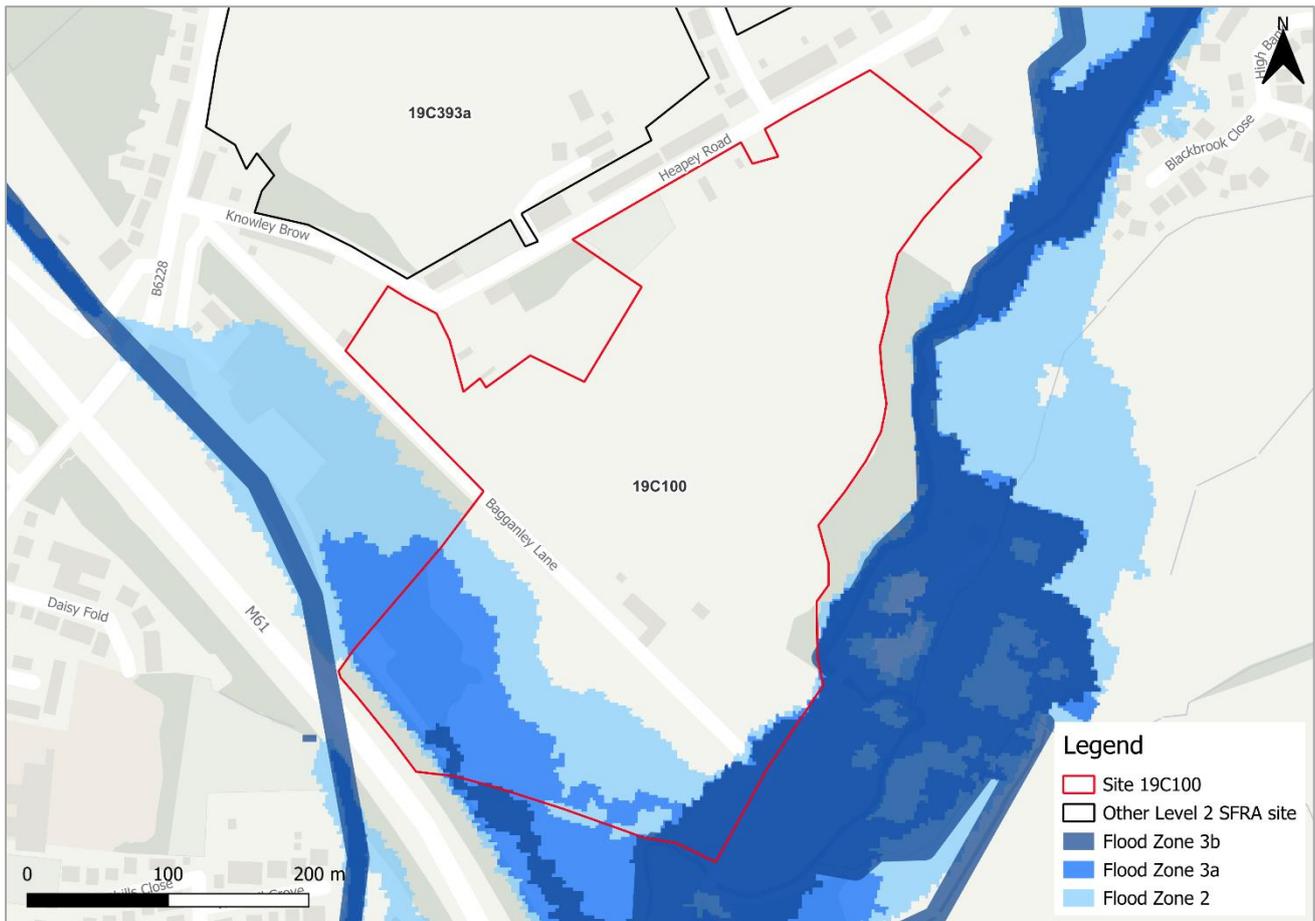


Figure 2-1: Existing risk from rivers to the site

2.1.2 Black Brook 2011 model outputs

Figure 2-2 shows the modelled flood depths for the 1% AEP undefended event which is the event Flood Zone 3 of the Flood Map for Planning is based on. Modelled risk to the site is confined to the south and southeast of the site. Maximum flood depths within the site are largely modelled to be between 0.6 and 0.9 m. Figure 2-3 shows the modelled flood hazard ratings for the 1% AEP undefended event. Flood hazards within the site are largely categorised as 'Danger for some'. There is no modelled flood risk to the rest of the site in the 1% AEP undefended event.

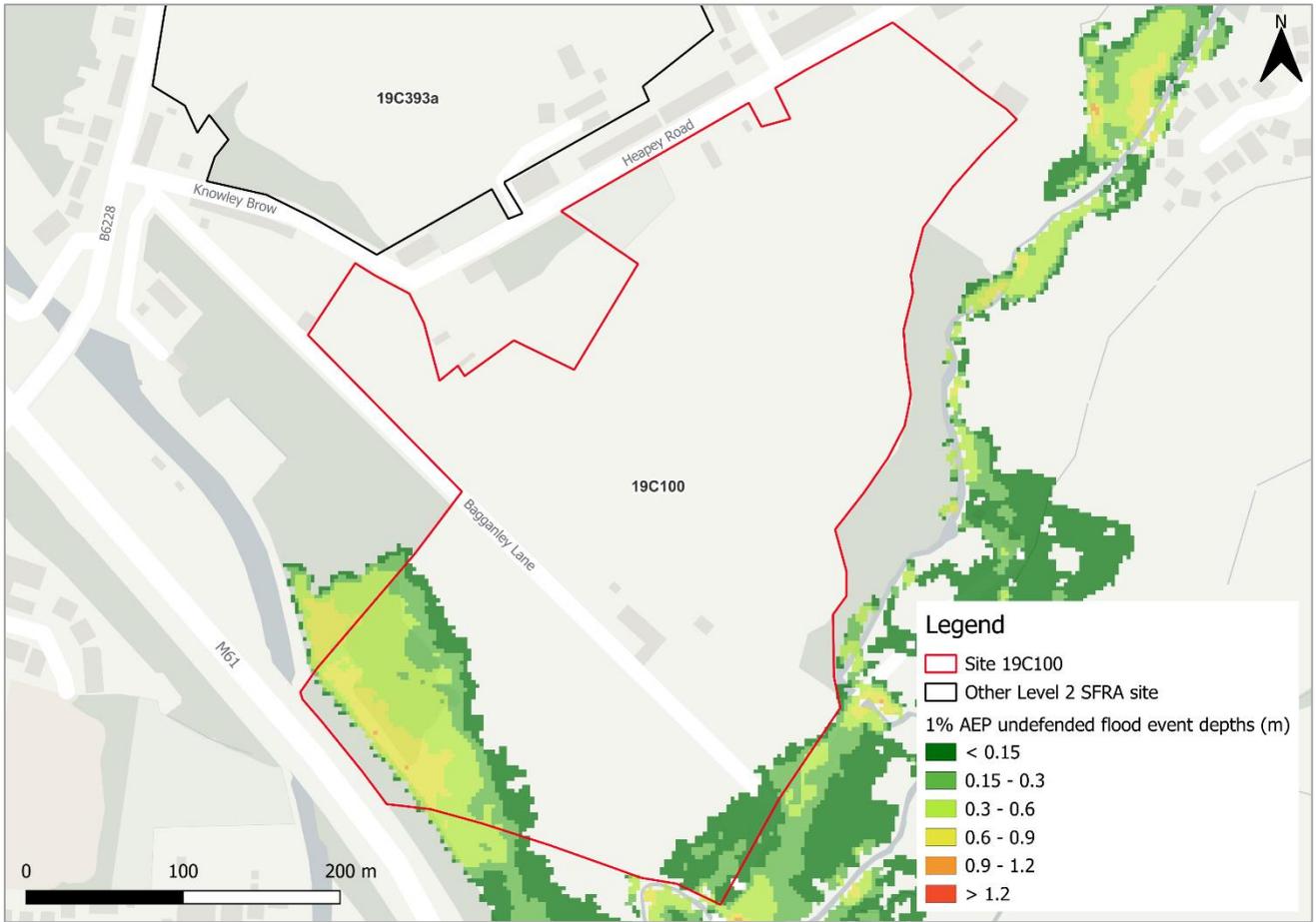


Figure 2-2: Flood depths for 1% AEP undefended flood event

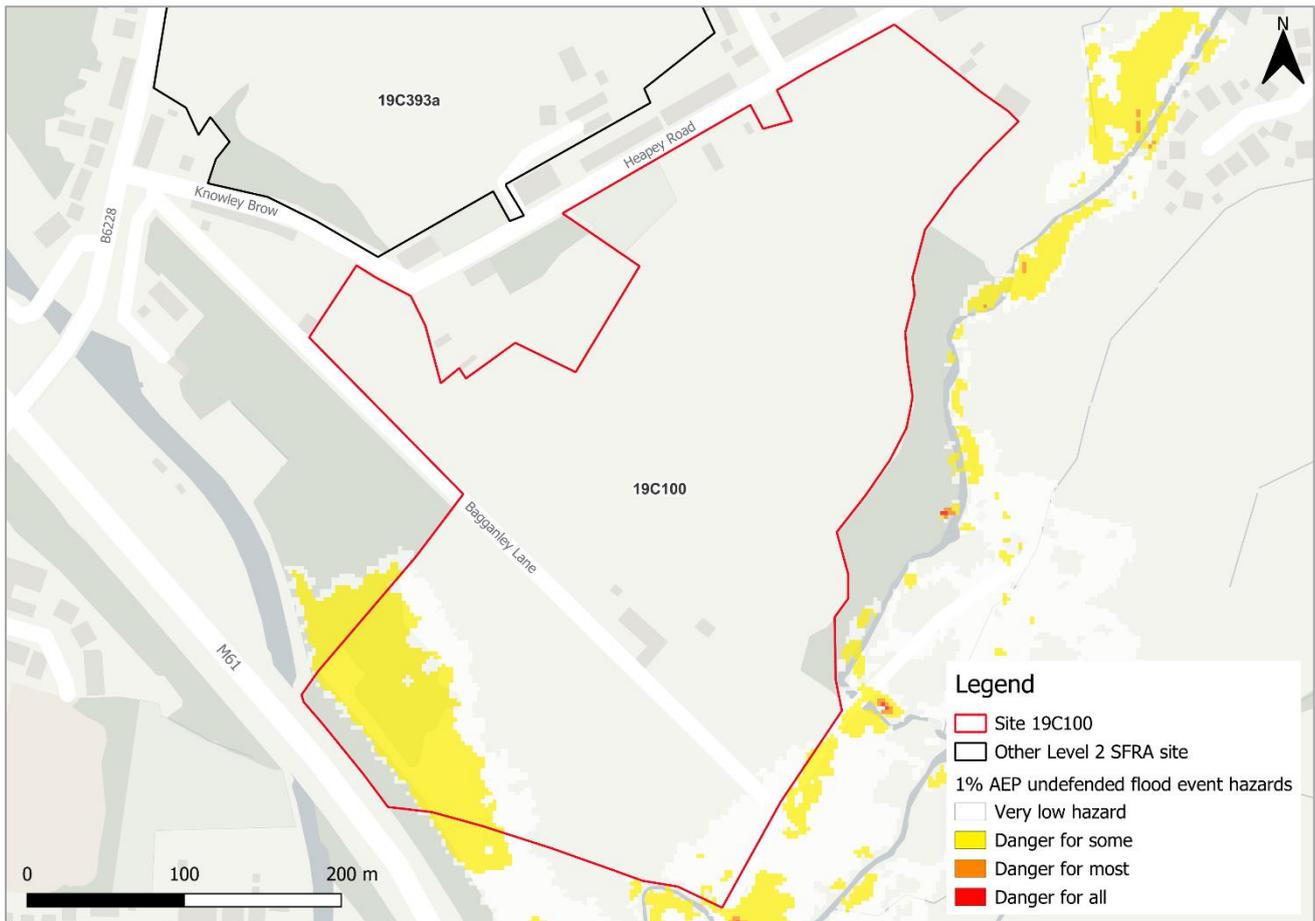


Figure 2-3: Flood hazard¹ for 1% AEP undefended flood event

2.2 Impacts from climate change

The impacts of climate change on flood risk from the Black Brook have been modelled without flood defence infrastructure in place. This allows for direct comparison with the existing risk of the Flood Map for Planning.

With consideration of the EA's SFRA guidance, the latest climate change allowances have been modelled as shown in Table 2-2.

Table 2-2: Modelled climate change allowances for peak river flows for the Douglas Management Catchment

Return period	Central allowance 2080s	Higher central allowance 2080s
3.3% (functional floodplain)	35%	47%
1%	35%	47%

¹ Fluvial hazard ratings based on Table 4 of the SUPPLEMENTARY NOTE ON FLOOD HAZARD RATINGS AND THRESHOLDS FOR DEVELOPMENT PLANNING AND CONTROL PURPOSE – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1. May 2008.

In the climate change event, the site is modelled to be at risk within the south and west. Figure 2-4 shows the modelled flood depths during the 1% AEP undefended flood event +47% climate change allowance. Flood depths within the site are modelled to be > 1.2 m adjacent to the southwestern site boundary. Figure 2-5 shows the modelled flood hazard rating during the 1% AEP undefended flood event +47% climate change allowance. Flood hazard within the site is largely modelled to be categorised as 'Danger for some'.

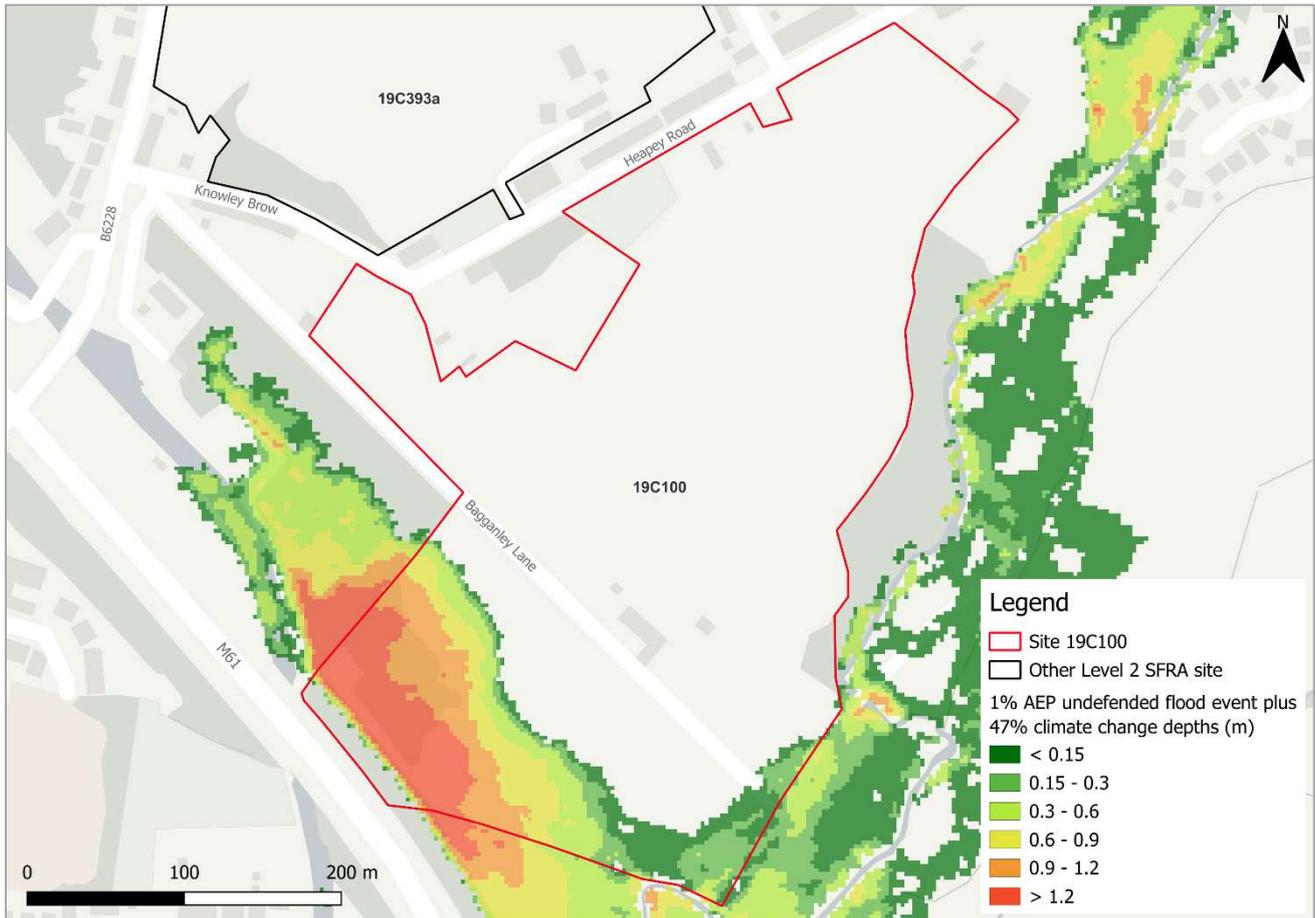


Figure 2-4: Flood depths for 1% AEP undefended flood event +47% (higher central climate change allowance)

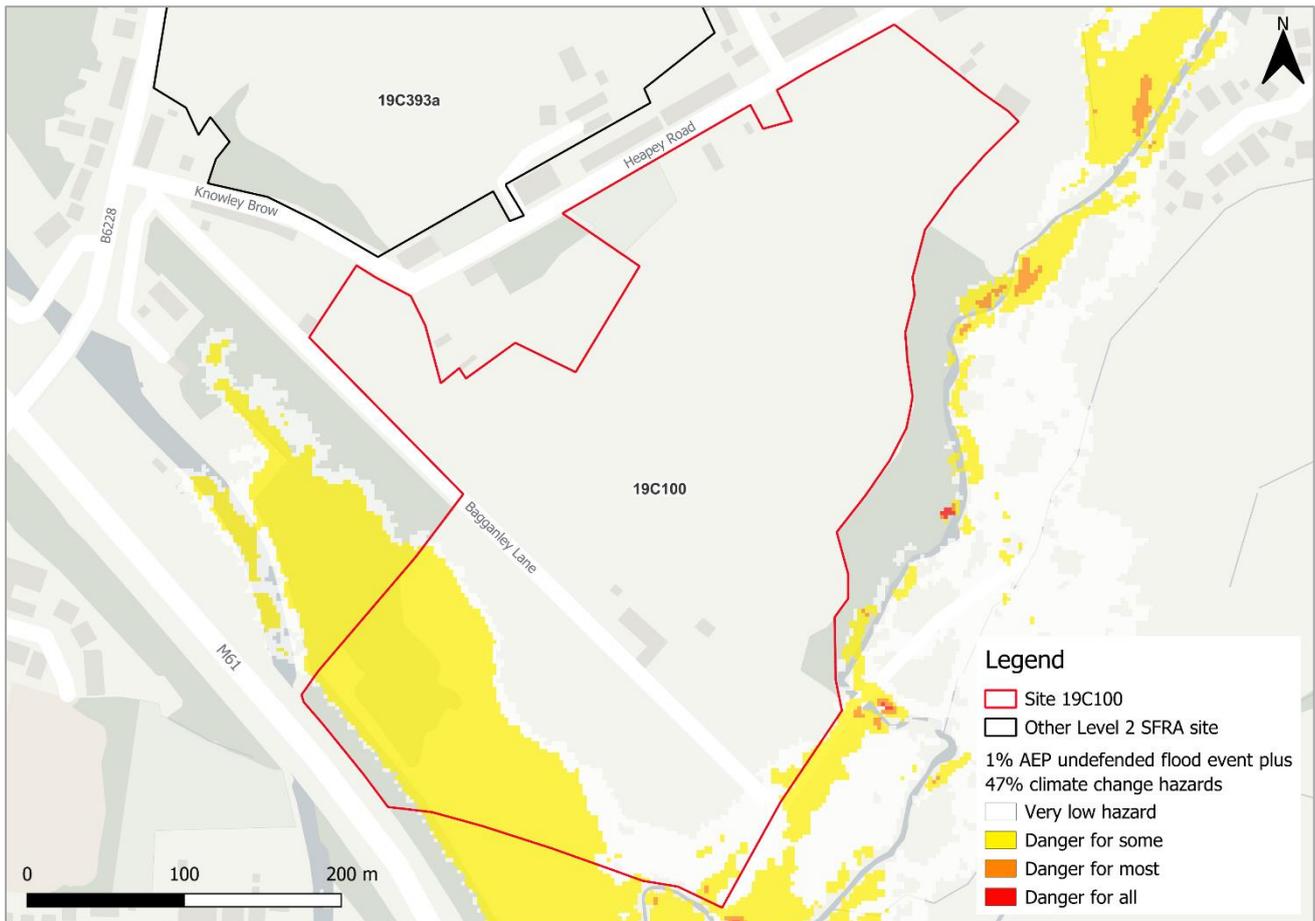


Figure 2-5: Flood hazard for 1% AEP undefended flood event +47% (higher central climate change allowance)

2.3 Flood risk management

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

2.3.1 Cumulative impacts

A cumulative impact assessment was completed through the Central Lancashire Level 1 SFRA (2025), which aimed to identify catchments sensitive to the cumulative impact of development. Site 19C100 is located within two catchments, namely; Lostock US Farington Weir and Yarrow US Big Lodge Water. These are ranked as a medium and low sensitivity catchments respectively. Planning policy considerations for sites at low and medium sensitivity to the cumulative impacts of development that apply to this site include:

- Incorporate SuDS and provide details of adoption, ongoing maintenance, and management, in line with the Lancashire SuDS Guidance².
- Developments should be incentivised to provide wider betterment by being requested to demonstrate in site-specific FRAs and Surface Water Drainage

² [Lancashire SuDS Guidance](#)

2.4 Residual risk

Although a site may be afforded some protection from defences and / drainage infrastructure, there is always a residual risk of flooding from asset failure i.e. breaching / overtopping of flood defences, blockages of culverts or bridge openings.

Residual risk at this site comes from possible blockage of the culvert beneath the M61 which is downstream of the site. The impact of a blockage of this structure has been modelled as part of this Level 2 SFRA, based on the Black Brook 2011 model. Section 2.4.1 presents the blockage modelling outputs.

2.4.1 M61 culvert blockage

Figure 2-7 shows the culvert blockage modelled depths were there to be a 75% blockage the Black Brook culvert beneath the M61. The modelled event represents the 1% AEP undefended event plus 47% climate change allowance. There is greater modelled risk to the site if there were to be a blockage at the M61 in comparison to the baseline climate change event. Maximum flood depths across a large proportion of the area at risk are modelled to be > 1.2 m. Modelled flood hazard is largely categorised as 'Danger for some' with some areas of 'Danger for most' (Figure 2-8).

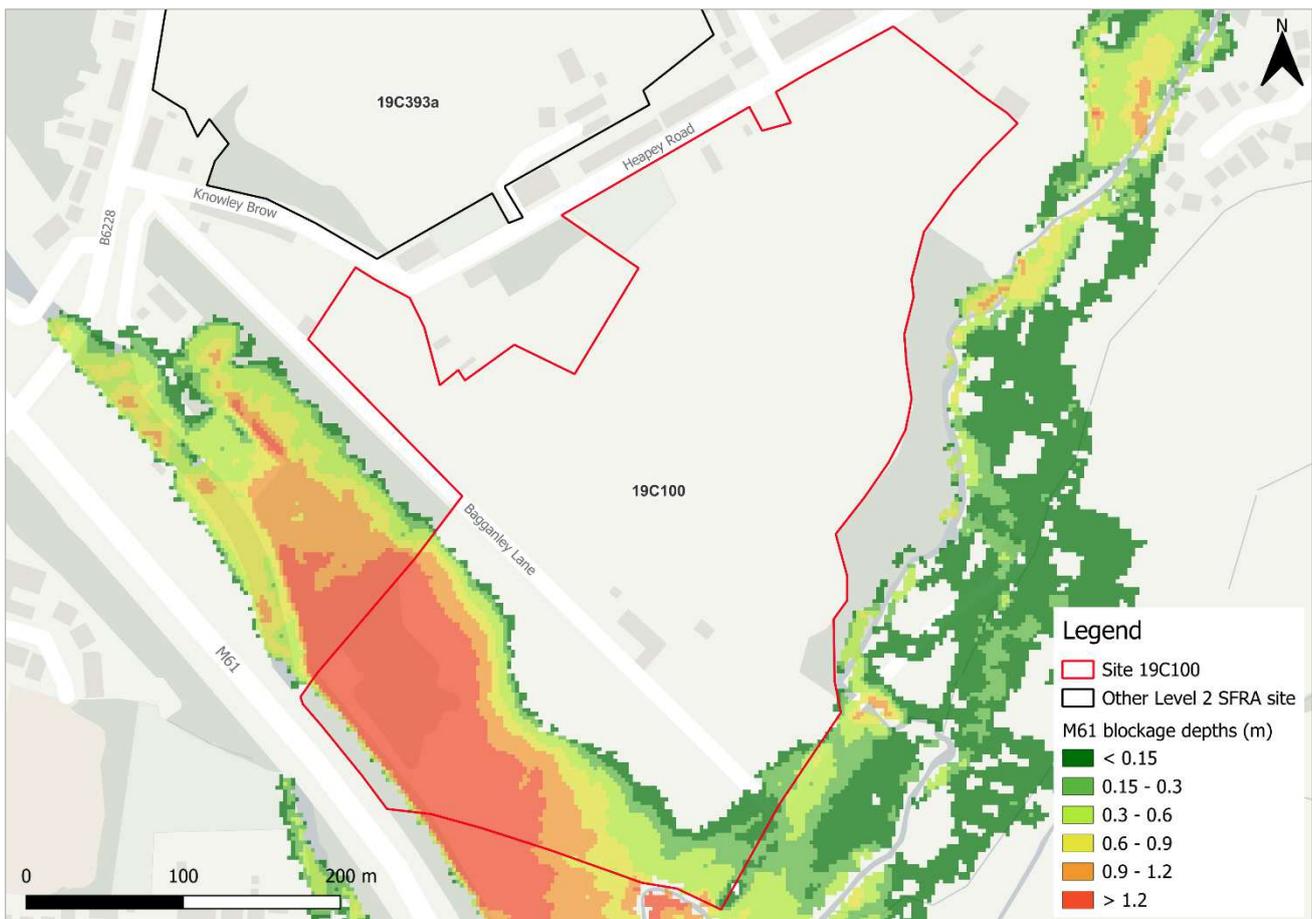


Figure 2-7: Flood depths (m) based on a potential M61 culvert blockage during a 1% AEP undefended flood event +47% (higher central climate change allowance)

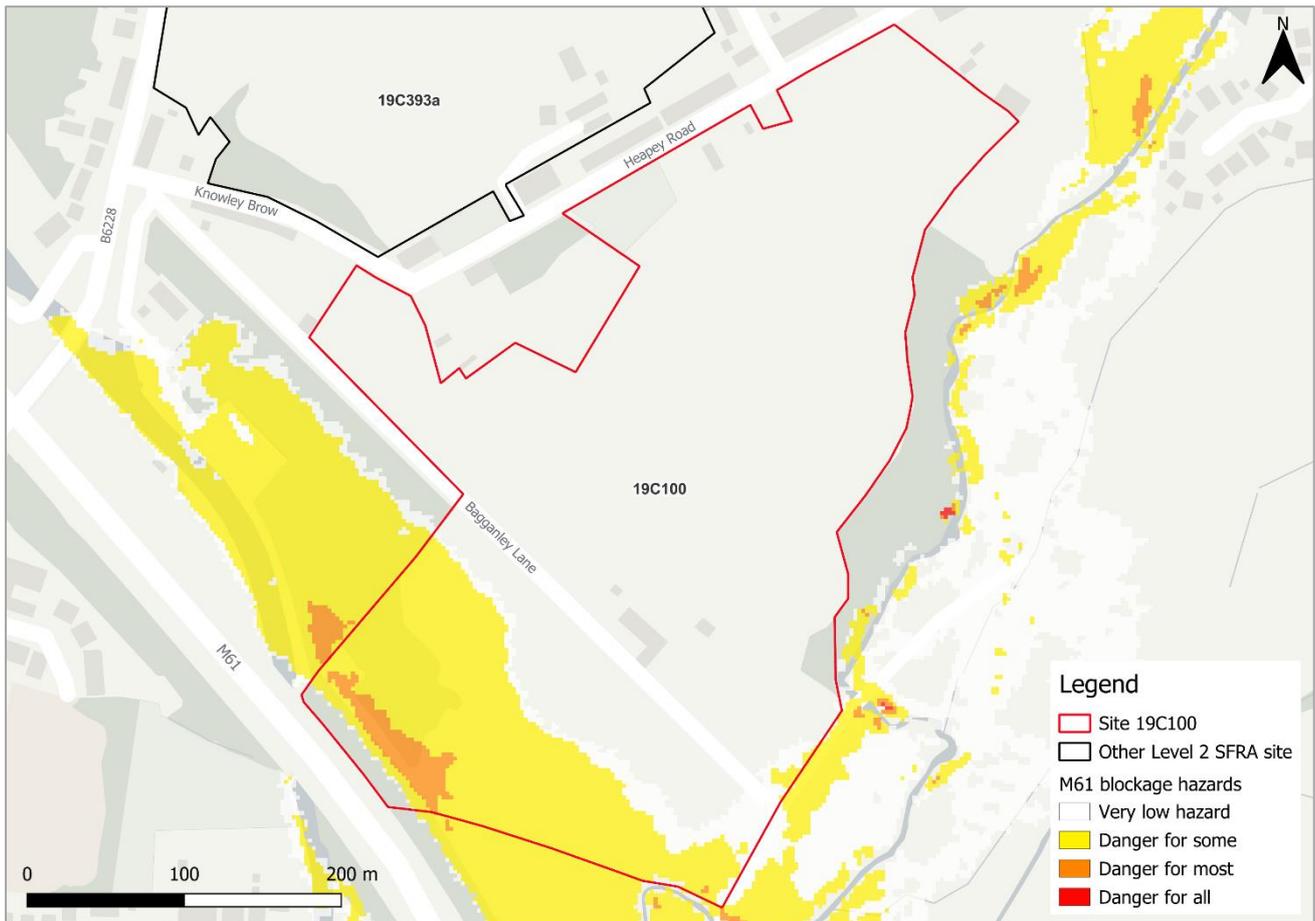


Figure 2-8: Flood hazards based on a potential M61 culvert blockage during a 1% AEP undefended flood event +47% (higher central climate change allowance)

2.4.2 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 2-9 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 Anglezarke, Heapey No.1, Heapey No.2, Heapey No.3, High Bullough and Yarrow reservoirs, all of which are located within Lancashire. Three of these reservoirs are operated by United Utilities and three are operated by Wigan & District Angling Association.

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. At the FRA stage, United Utilities and Wigan & District Angling Association, should be contacted 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.

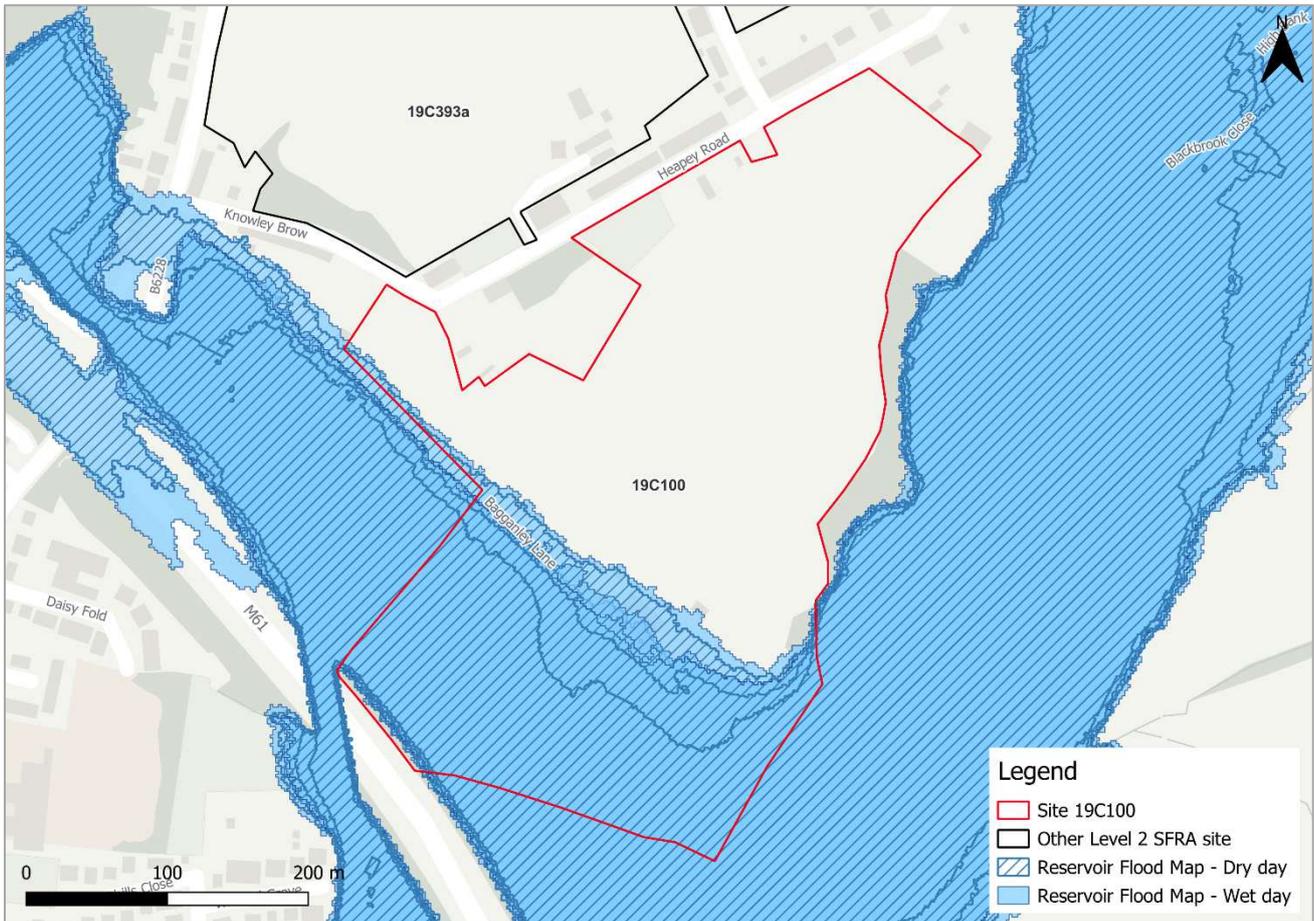


Figure 2-9: Flood risk from reservoirs

2.5 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 incidents within the vicinity of the site.

2.6 Flood warning and access and escape routes

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. Site 19C100 is located within one FWA, namely; 012FWFL59B - Black Brook at Chorley, Heapey Road to Cowling, as shown in Figure 2-10.

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 also located within a FAA, namely; 012WAFly - River Lostock and River Yarrow.

Based on available information, safe access and escape routes could likely be achieved during a flood event from the west of the site via Bagganley Lane to the B6228.

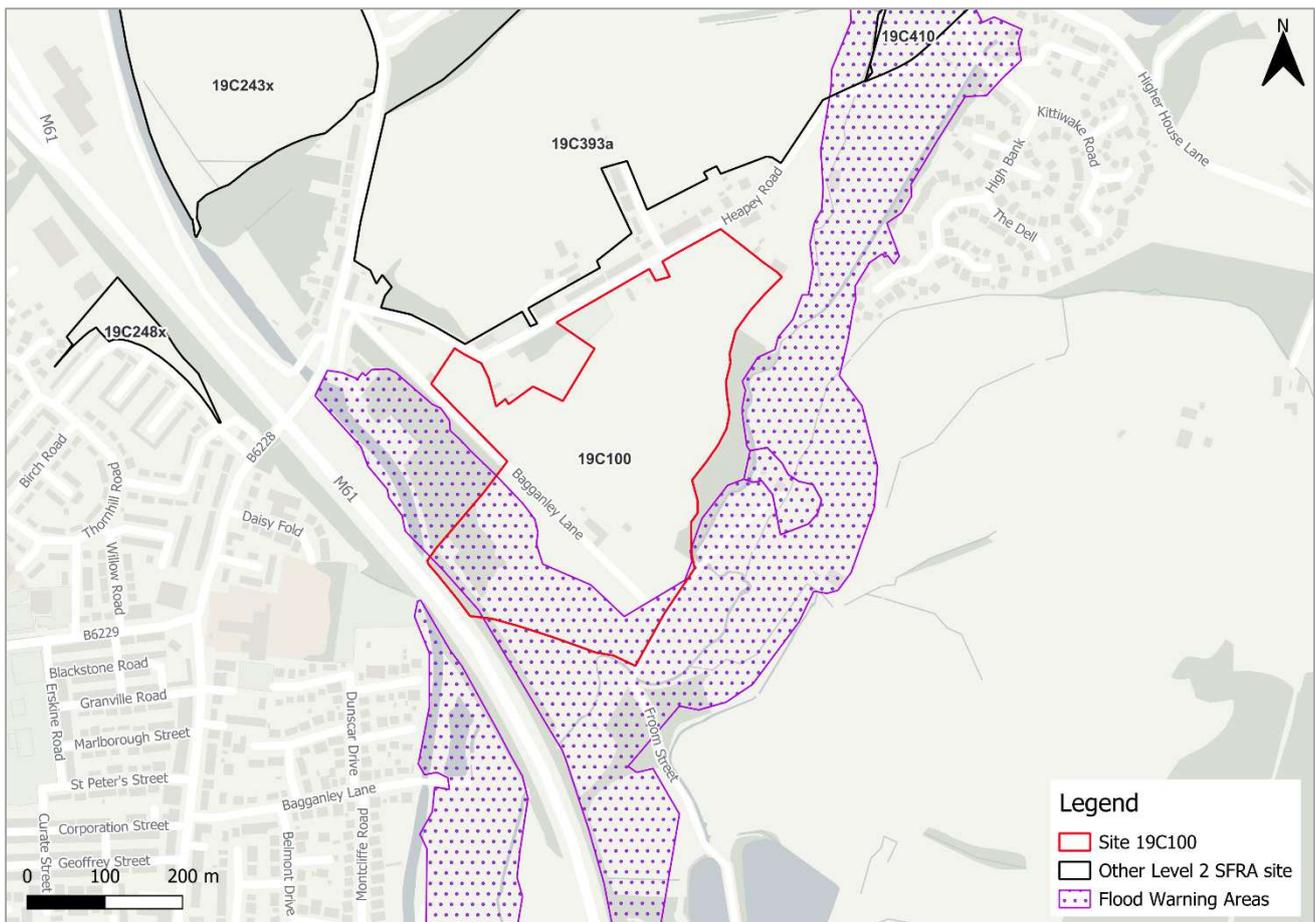


Figure 2-10: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - fluvial

- The site is modelled to be within the functional floodplain in the south and southeast of the site. Development is not permitted within the functional floodplain. If feasible, this area would be used as a green / blue corridor which can provide ecological, social and amenity value. However, the functional floodplain is conservatively based on the Black Brook 2011 2% AEP undefended event.
- Ordinary Watercourse Flood Defence Consent (OWFDC) may be required if development is planned within 8m of the riverbank. The LLFA can advise on whether this would be required. If feasible, this area would be used as a green / blue corridor which can provide ecological, social and amenity value.
- The site is partially located in Flood Zone 3a, as indicated by the Black Brook 2011 model 1% AEP undefended event outputs. Greatest depths within the site boundary are modelled to be between 0.6 and 0.9 m.
- The impacts of climate change on flood risk from Black Brook have been modelled without flood defence infrastructure in place using climate change allowances for peak river flows for the Douglas Management Catchment. Based on this approach, fluvial risk is modelled to be greater in extent to the present day 1% undefended event outputs, covering the south of the site.
- More vulnerable development should be directed away from the area of the site within the modelled Flood Zone 3 plus climate change extent.
- The site is at residual risk from possible blockage of the culvert beneath the M61 which is downstream of the site. Modelled risk shows increased flood extent, depths and hazards during the blockage scenario.
- 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).
- Given the residual risk to this site, the following should be considered:
 - Use of flood resistance and resilience measures,
 - Adequate flood warnings and alerts should remain in place, in consultation with the EA,
 - Provision of emergency escape routes including for vehicular access for emergency services. Judgements on whether the site can be regarded as safe will need to consider the feasibility and provision of evacuation from the site during a flood.
 - Provision of detailed emergency plans and signage for site users.
- Safe access and escape routes could likely be achieved during a flood event from the west of the site via Bagganley Lane to the B6228, based on available information.

- Given the potential reservoir risk to the site, developers should consider³:
 - Whether additional modelling is required to understand the flood risk from the reservoir, referring to the specification for the reservoir flood maps as a starting point
 - Whether the development may have an impact on the reservoir or reservoir owner
 - Referring to the Central Lancashire Level 1 SFRA for information on reservoir risk and recommendations for how to address it
 - Contacting the LPA for pre-application advice
 - Contacting the LPA to understand the need to consult with their emergency planning team and with the reservoir owner
- Were development of this site to proceed, given the proximity of this site to upstream sites 19C410 and 19C393a, and the fact that all sites are adjacent to Black Brook, it would be prudent to formulate a strategy to develop these sites in tandem and for consultation between each developer to take place to ensure a joined-up approach for sustainable development is in place.

³ [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly low. Approximately 2% of the site is within the high-risk surface water flood zone. A further 1% is at medium surface water risk, and a further 8% is at low surface water risk, as shown in Table 3-1.

In the high and medium risk events, there is a short surface water flow path along the drainage ditch in the southwest of the site. In the low risk event, surface water risk to the site is greater in the southwestern area, with an additional surface water flow path in the centre of the site. Greatest flood depths in the high risk event are between 0.3 m and 0.6 m (Figure 3-1) with some areas of moderate hazard (Figure 3-2). Safe access and escape routes should be possible via Bagganley Lane in all events.

Table 3-1: Existing surface water flood risk based on the RoFSW map

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
89	8	1	2

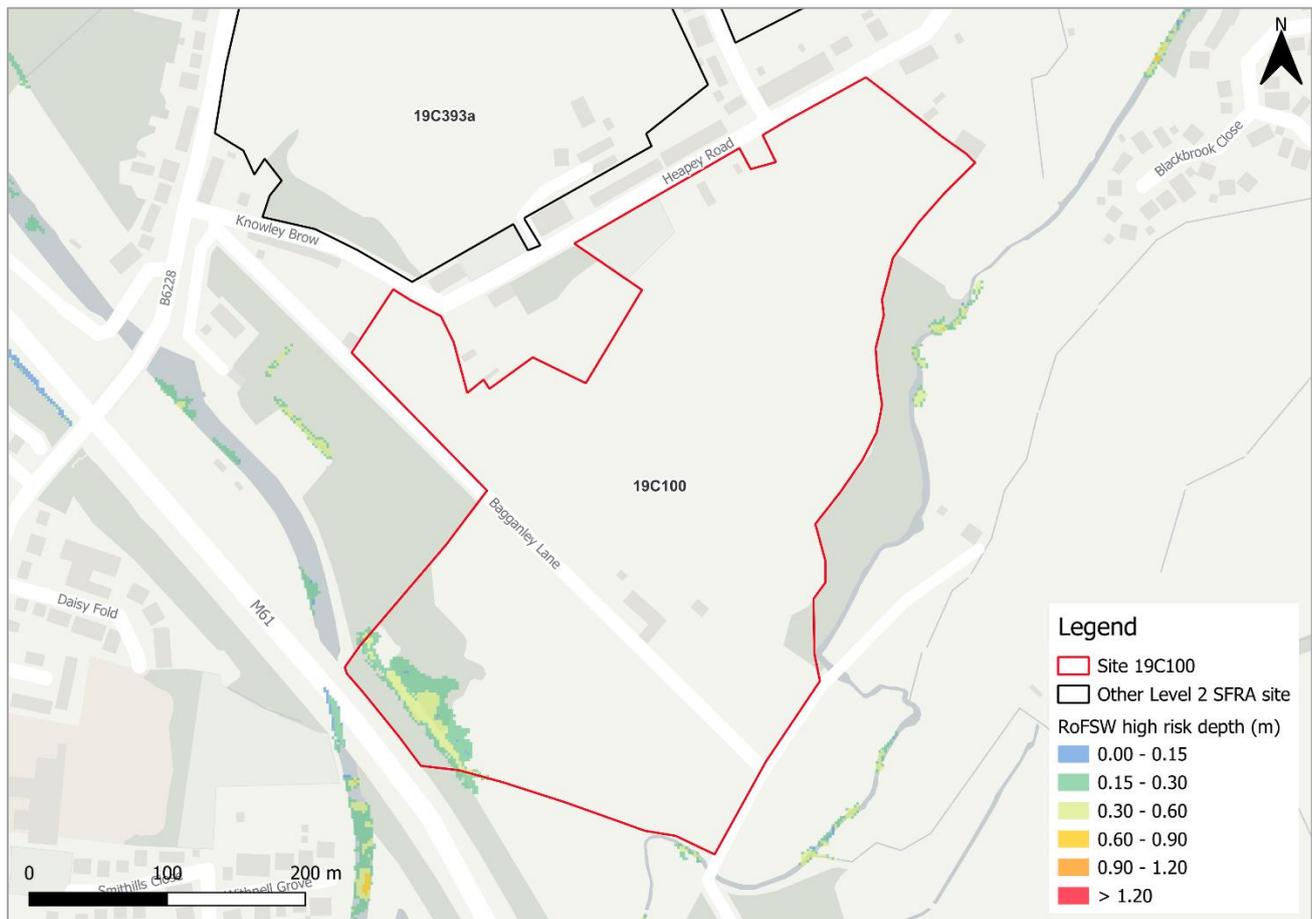


Figure 3-1: High risk event surface water flood depths (Risk of Flooding from Surface Water map)

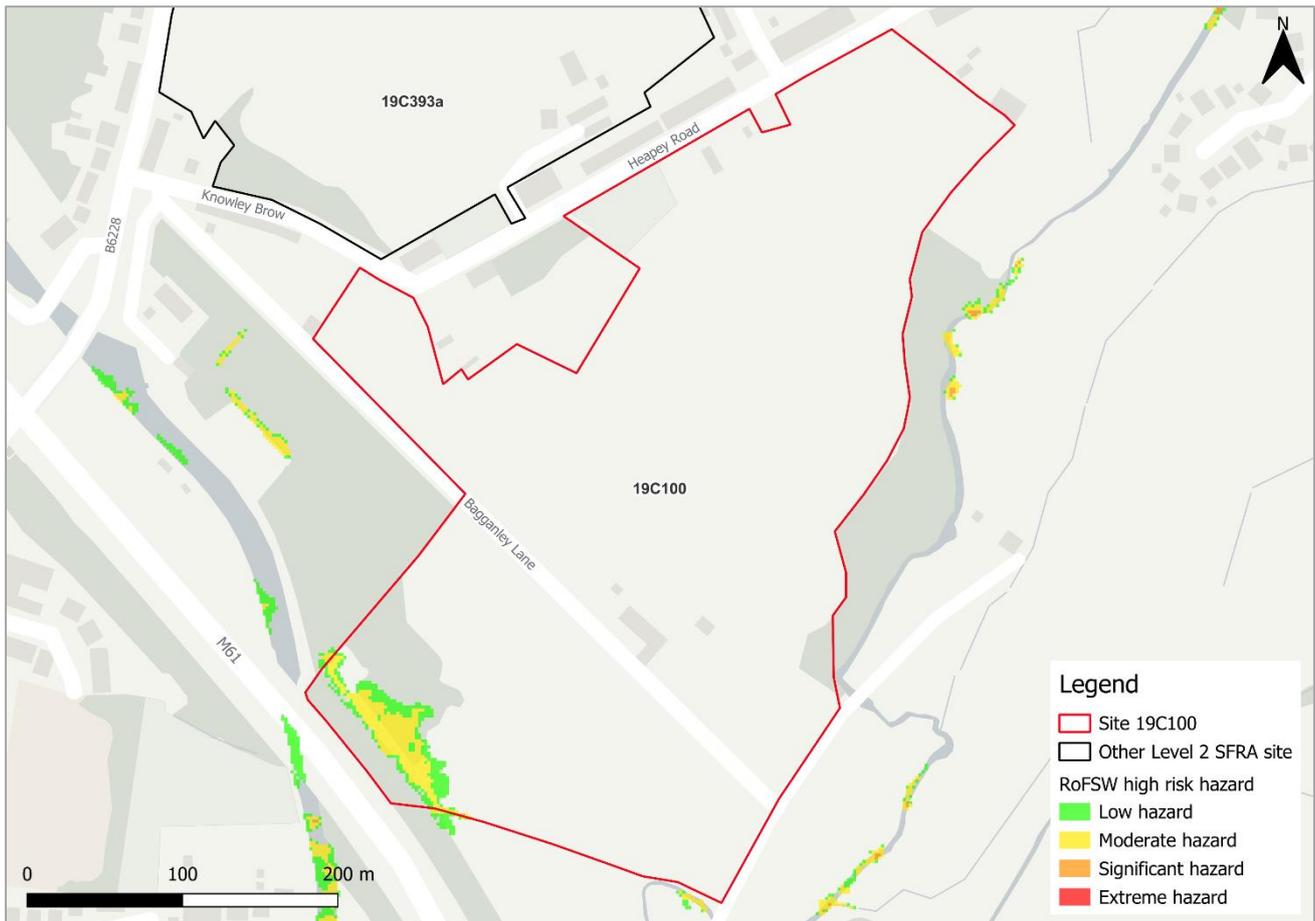


Figure 3-2: High risk event surface water flood hazard⁴ (Risk of Flooding from Surface Water map)

3.2 Impacts from climate change

The impact of climate change on surface water flood risk has been modelled. This allows for direct comparison with the RoFSW map. With consideration of the EA’s SFRA guidance, the latest climate change allowances have been modelled as shown in Table 3-2.

Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	45%

Figure 3-3 shows the high risk surface water flood depths plus 40% climate change. Risk is modelled to be greater in extent than the present day high risk surface water event, similar to the present day medium risk event. The area of ponding within the southwest of the site

⁴ 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

is greater in extent and depth, and an additional surface water flow path emerges through the centre of the site. Maximum flood depths are modelled to be between 0.6 m and 0.9 m, with some areas of significant hazard (Figure 3-4).

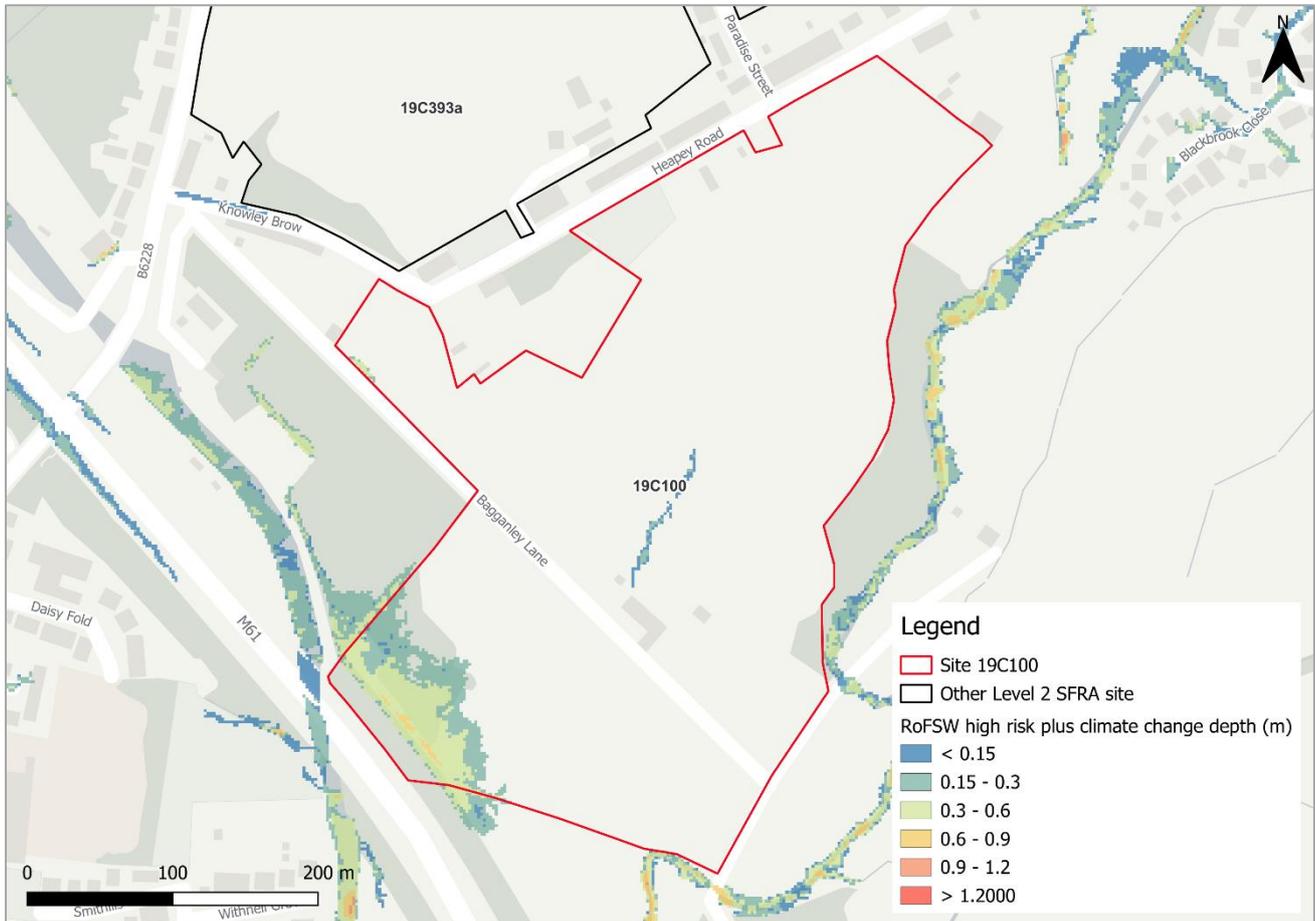


Figure 3-3: High risk event surface water flood depths plus 40% climate change (based on Risk of Flooding from Surface Water map)

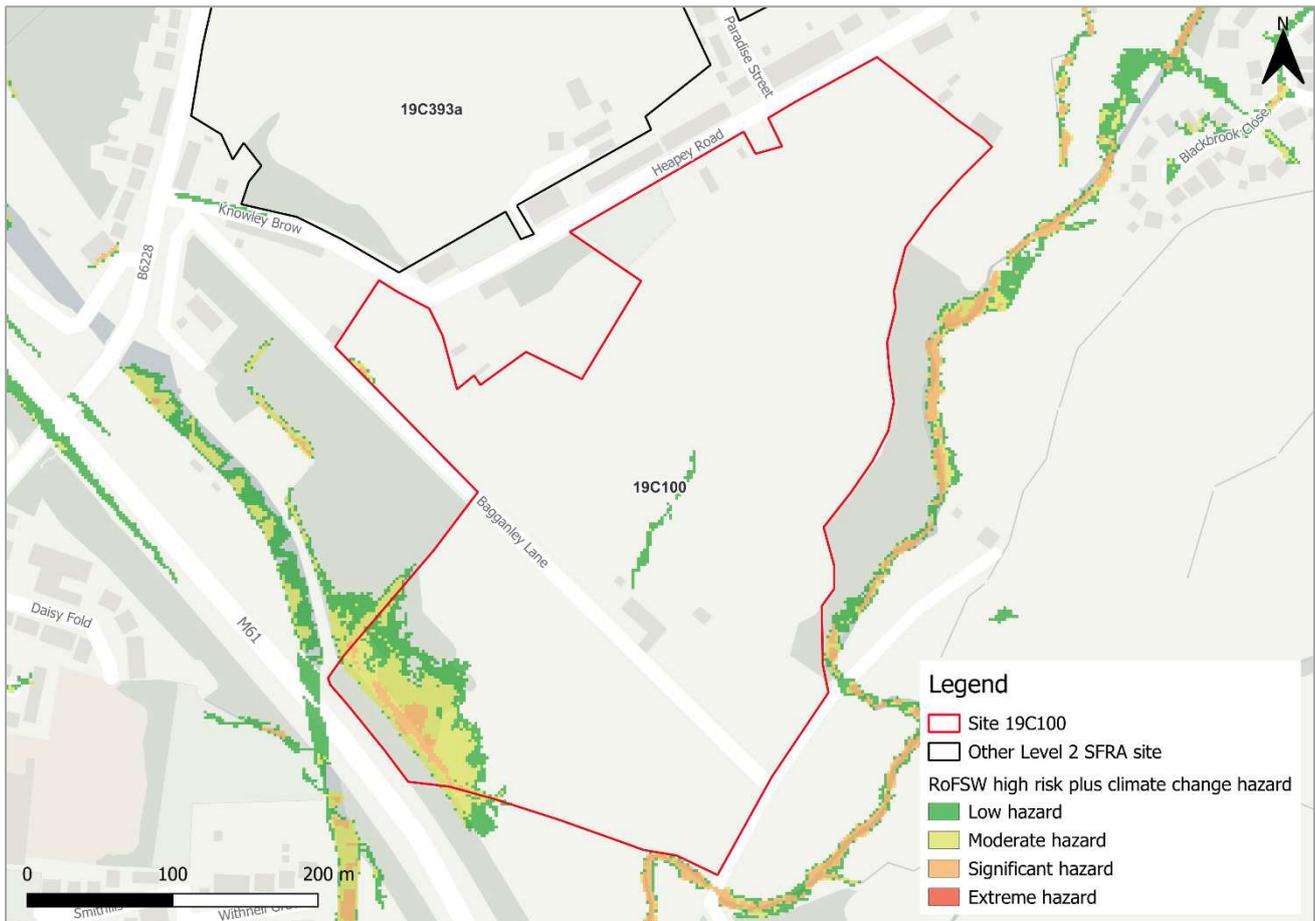


Figure 3-4: High risk event surface water flood hazards plus 40% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is largely very low, with 89% of the site being at very low surface water flood risk. In all events, surface water risk is largely confined to the south of the site, with a short flow path within a drainage ditch through the centre of the site.
- Safe access and escape routes should be achievable via Bagganley Lane in all events.
- The effects of climate change on surface water have been modelled for this SFRA using the high risk surface water flood depths plus 40% climate change. Surface water risk is greater than present day flood risk with more defined surface water flow paths and a greater area of ponding within the south of the site. Any existing flow paths and topographic depressions should be maintained in site design.
- Were development plans to proceed, a full detailed drainage strategy would be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. This will require surface water modelling based on layout plans and detailed design and full consultation with the LLFA.

- The RoFSW map is not suitable for identifying whether an individual property will flood and is therefore indicative. The RoFSW map is not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

4 Risk from groundwater

Risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide⁵. Figure 4-1 show the map for Site 19C100 and the surrounding areas and Table 4-1 explains the risk classifications.

Risk of groundwater emergence varies across the site. Within the south of the site there is a risk groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. Along the eastern boundary and in the north of the site, there is a risk of groundwater emergence to subsurface assets, but surface manifestation of groundwater is unlikely. The rest of the site is in an area where there is low to no risk of groundwater emergence. Ground investigations will be required through the site-specific FRA to ascertain groundwater levels and conditions.

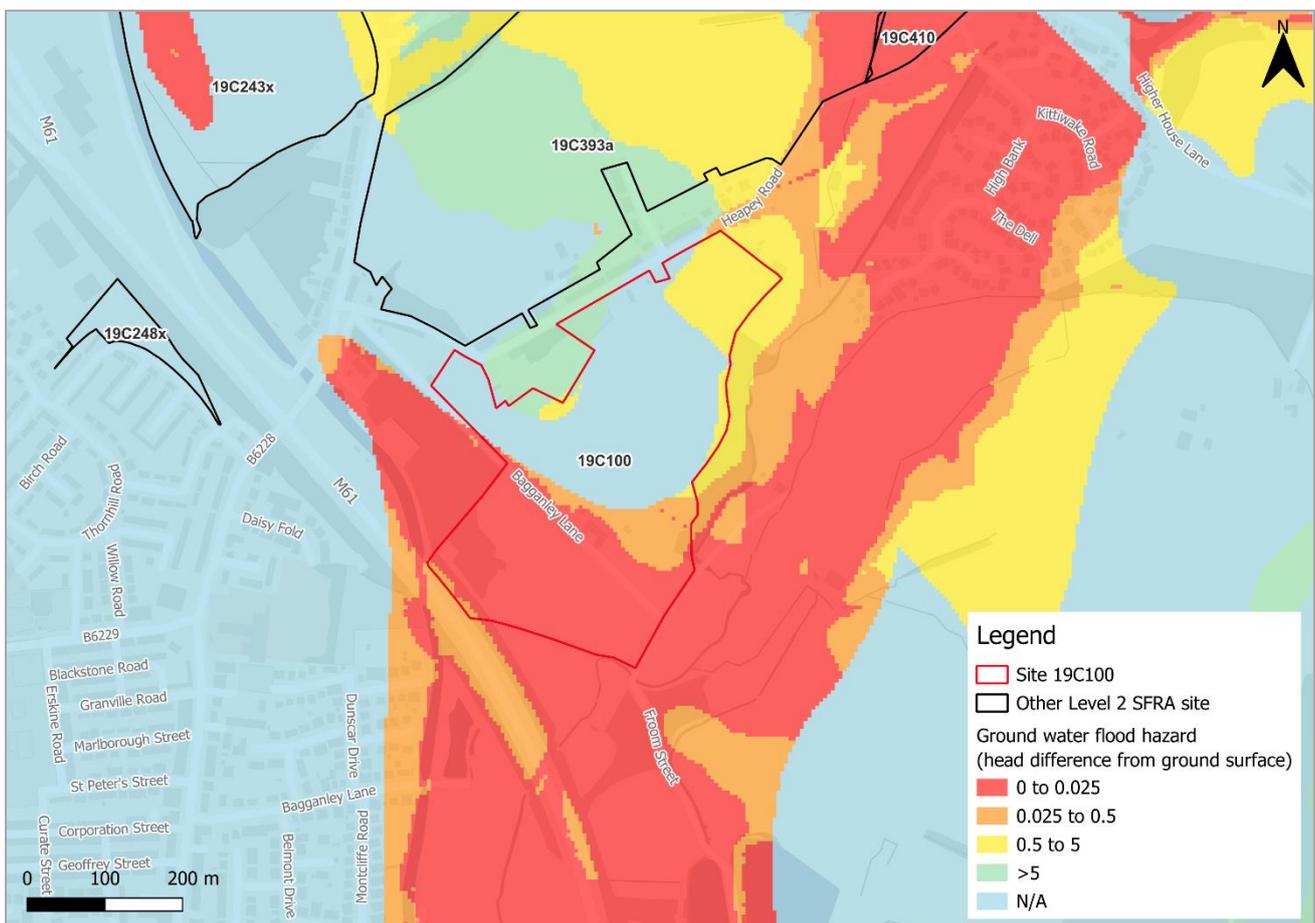


Figure 4-1: JBA 5m Groundwater Emergence Map

⁵ [Strategic flood risk assessment good practice guide. ADEPT. December 2021.](#)

Table 4-1: Groundwater Flood 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.	

5 Overall site assessment

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

To pass part b) of the exception test⁶, it must be proven that the development can be safe for its lifetime, which is 75 years for non-residential development and 100 years for residential development. This site should be able to pass the exception test if development avoids the area of the site within the functional floodplain and modelled to be at risk in the Flood Zone 3a plus climate change event.

5.2 Recommendations, FRA requirements and further work

Based on the evidence presented in the Level 1 SFRA (2025) and this Level 2 SFRA:

- There should be no development within the functional floodplain. There should be no development within 8m of Black Brook. This should be converted to a blue / green corridor to provide ecological, amenity and social value.
- Ownership and maintenance details should be established for the culvert beneath the M61. It will be important to keep this structure free of blockage. Were this site to be developed, appropriate emergency and evacuation plans must be in place to deal with potential residual risk of infrastructure blockage and failure.
- Based on current information, this site could be allocated if more vulnerable development avoids the area within the functional floodplain and the area to the south of the site modelled to be at risk in the 1% AEP event + 47% climate change.
- A detailed drainage strategy will be required for any new development given the large area of this site being converted from open space to development.
- Groundwater conditions must be investigated further through the site-specific FRA.
- Any FRA should undertake a condition assessment of the M61 culvert and further consider residual risk to the site.
- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Central Lancashire Local Plan and LLFA policies; and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with the following, where applicable, the LPA; LLFA; emergency planning officers; EA; UU; the highways authorities; and the emergency services.

⁶ Para 178 National Planning Policy Framework 2024

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19C227x

Final

June 2025

Prepared for:



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JBA Project Code	2023s1344

This report describes work commissioned by Preston City Council, on behalf of the Central Lancashire Local Plan Team, by an instruction dated 19 August 2024. The Client's representative for the contract was Carolyn Williams of Preston City Council. Kaylyn Carroll of JBA Consulting carried out this work.

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Contents

1	Background	1
	1.1 Site 19C227x	1
2	Flood risk from rivers	4
	2.1 Existing risk	4
	2.2 Flood risk management	5
	2.3 Residual risk	6
	2.4 Historic flood incidents	7
	2.5 Flood warning and access and escape routes	7
	2.6 Observations, mitigation options and site suitability - fluvial	8
3	Flood risk from surface water	9
	3.1 Existing risk	9
	3.2 Impacts from climate change	11
	3.3 Observations, mitigation options and site suitability - surface water	13
4	Risk from groundwater	15
5	Overall site assessment	17
	5.1 Can part b) of the exception test be passed?	17
	5.2 Recommendation summary, FRA requirements and further work	17
6	Licencing	18

List of Figures

Figure 1-1: Existing site location boundary	2
Figure 1-2: Topography	3
Figure 2-1: Existing risk from rivers to the site	5
Figure 2-2: Natural Flood Management (NFM) potential mapping	6
Figure 2-3: Flood risk from reservoirs	7
Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)	10
Figure 3-2: Medium risk event surface water flood hazard (Risk of Flooding from Surface Water map)	11
Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)	12
Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)	13
Figure 4-1: JBA 5m Groundwater Emergence Map	15

List of Tables

Table 2-1: Existing fluvial flood risk	4
Table 3-1: Existing surface water flood risk based on the RoFSW map	9
Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment	11
Table 4-1: Groundwater Hazard Classification	16

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19C227x. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Central Lancashire Level 1 SFRA' (2025) and read the 'Central Lancashire Level 2 SFRA Main Report' (2025) and is therefore familiar with the terminology used in this report.

1.1 Site 19C227x

- Location: North of Bonds Lane
- Existing site use: Agriculture
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 3.39 hectares
- Proposed development impermeable area: 2.89 hectares (assumed 85% impermeable area)
- Watercourse: Leeds and Liverpool Canal
- Summary of requirements from scoping stage:
 - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
 - Assessment of present day and future surface water depths and hazards
 - Assessment of all other sources of flood risk



Figure 1-1: Existing site location boundary

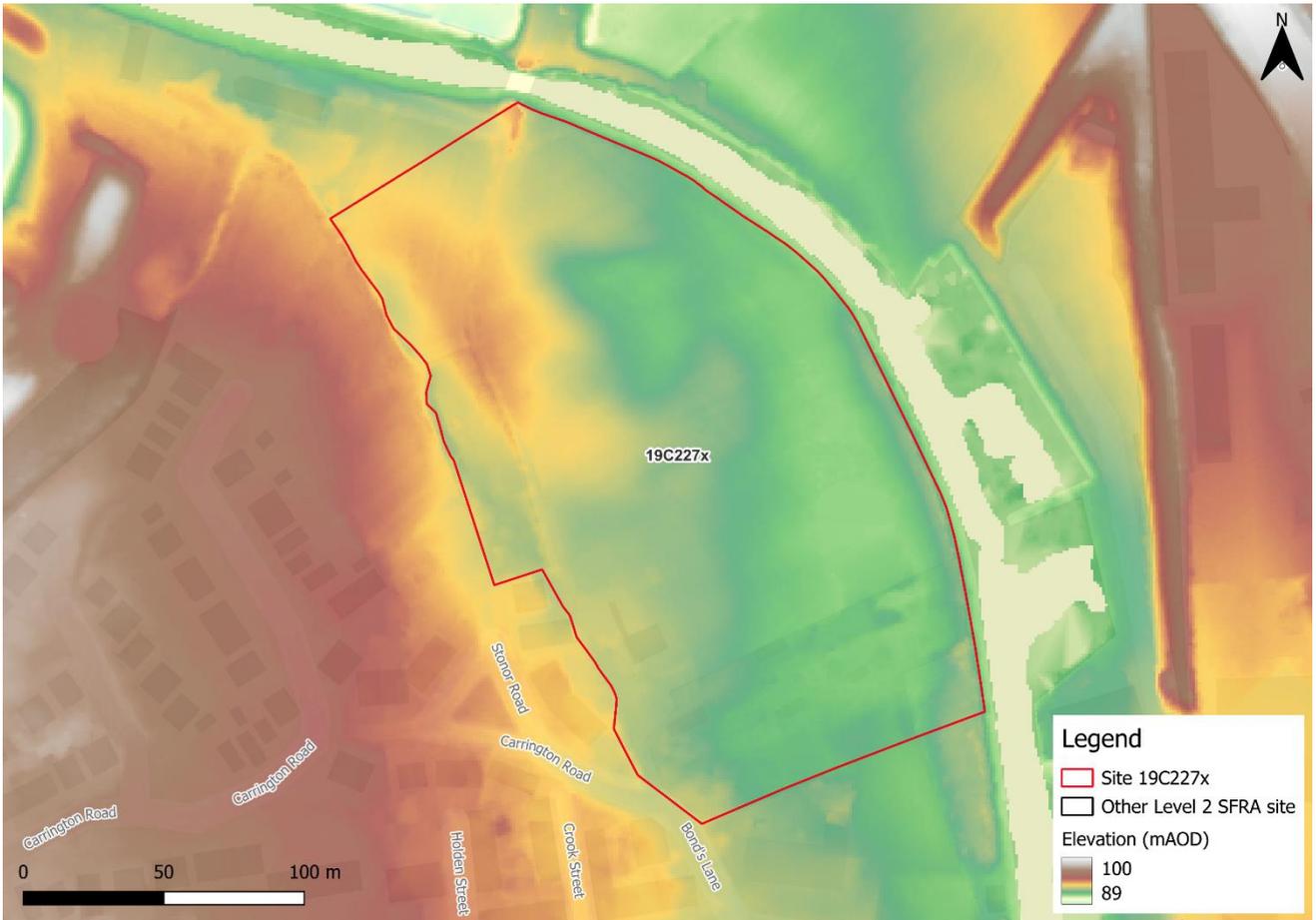


Figure 1-2: Topography

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 (accessed May 2025) and Flood Zone 3b (functional floodplain) as updated in the Central Lancashire Level 1 SFRA (2025), the percentage areas of the site within each fluvial flood zone are stated in Table 2-1 and can be viewed on Figure 2-1. The Flood Map for Planning does not consider flood defence infrastructure (Section 2.2) or the impacts of climate change.

The majority of the site is located within Flood Zone 1, indicating low risk from rivers. There is a very small area of the site located within the functional floodplain however this is conservatively based on an 8m buffer of the OS Open Rivers dataset. This is associated with the Leeds and Liverpool Canal rather than fluvial flood risk from a watercourse. The site boundary, in reality, will not enter the channel of the canal. There is a very small area along the eastern boundary of the site within Flood Zone 2, based on direct rainfall modelling.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
98	1	0	1



Figure 2-1: Existing risk from rivers to the site

2.2 Flood risk management

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

2.2.1 Cumulative impacts

A cumulative impact assessment was completed through the Central Lancashire Level 1 SFRA (2025), which aimed to identify catchments sensitive to the cumulative impact of development. Site 19C227x is located within one catchment, namely; Yarrow US Big Lodge Water. This is ranked as a low sensitivity catchment. Planning considerations that apply to all sites in relation to the cumulative impacts of development can be found in Appendix G of the Level 1 SFRA.

2.2.2 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. Within the north of the site, there are opportunities for riparian tree planting, which can slow flows, reduce sediment delivery to the watercourse and reduce bankside erosion. These areas are shown on Figure 2-2.

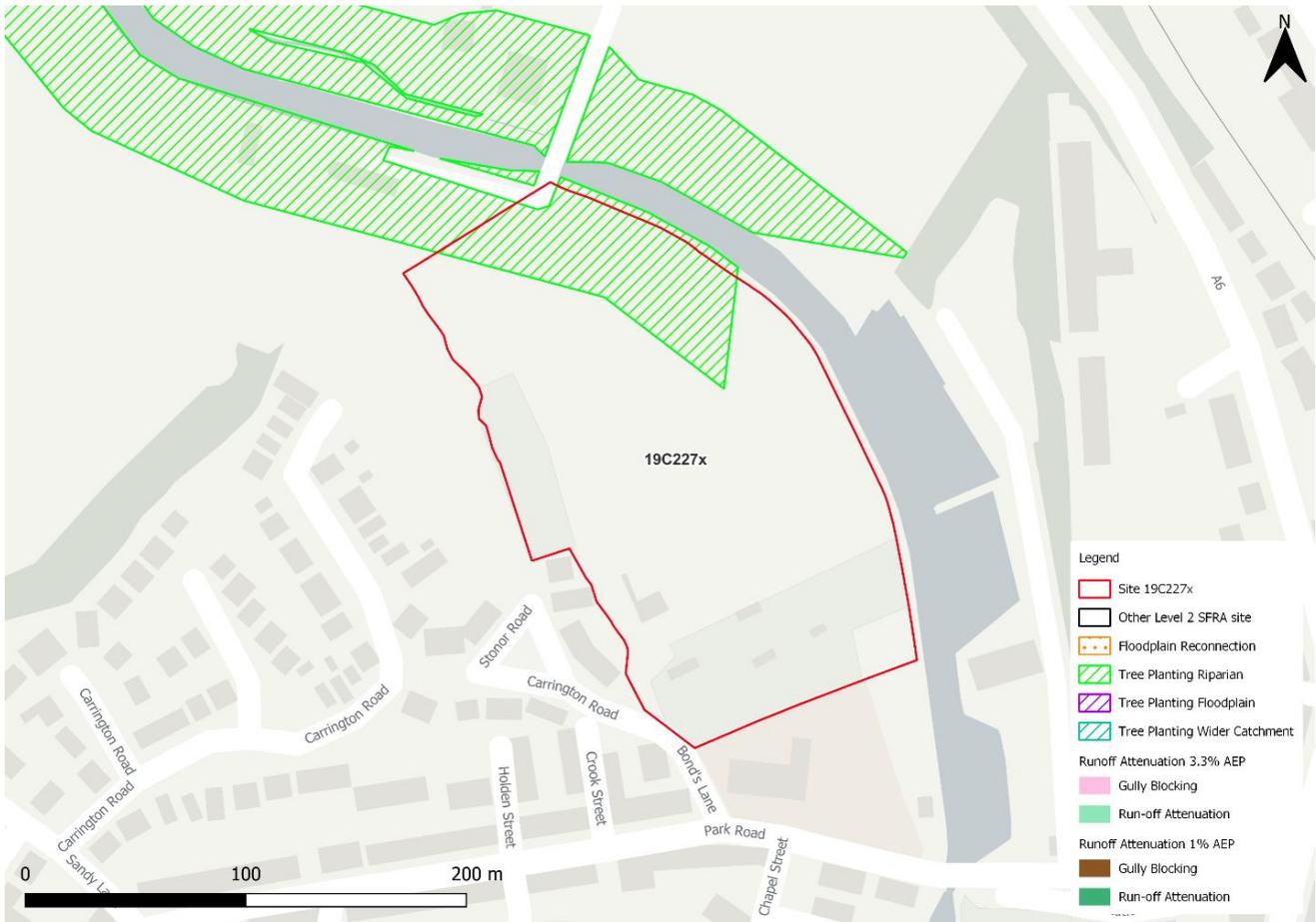


Figure 2-2: Natural Flood Management (NFM) potential mapping

2.3 Residual risk

The Leeds and Liverpool Canal runs along the eastern boundary of the site. There is no known existing flood model of the canal therefore any residual risk from the canal is unknown at this stage. The canal is raised approximately 1m above the site in some locations. Therefore, the site is at potential residual flood risk from a breach of the canal system. This scenario must be investigated at the FRA stage including full consultation with the Canal & River Trust, the canal operator.

2.3.1 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 2-3 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 Rivington Lower reservoir, located within the district of Chorley. Rivington Lower is 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 United Utilities 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.

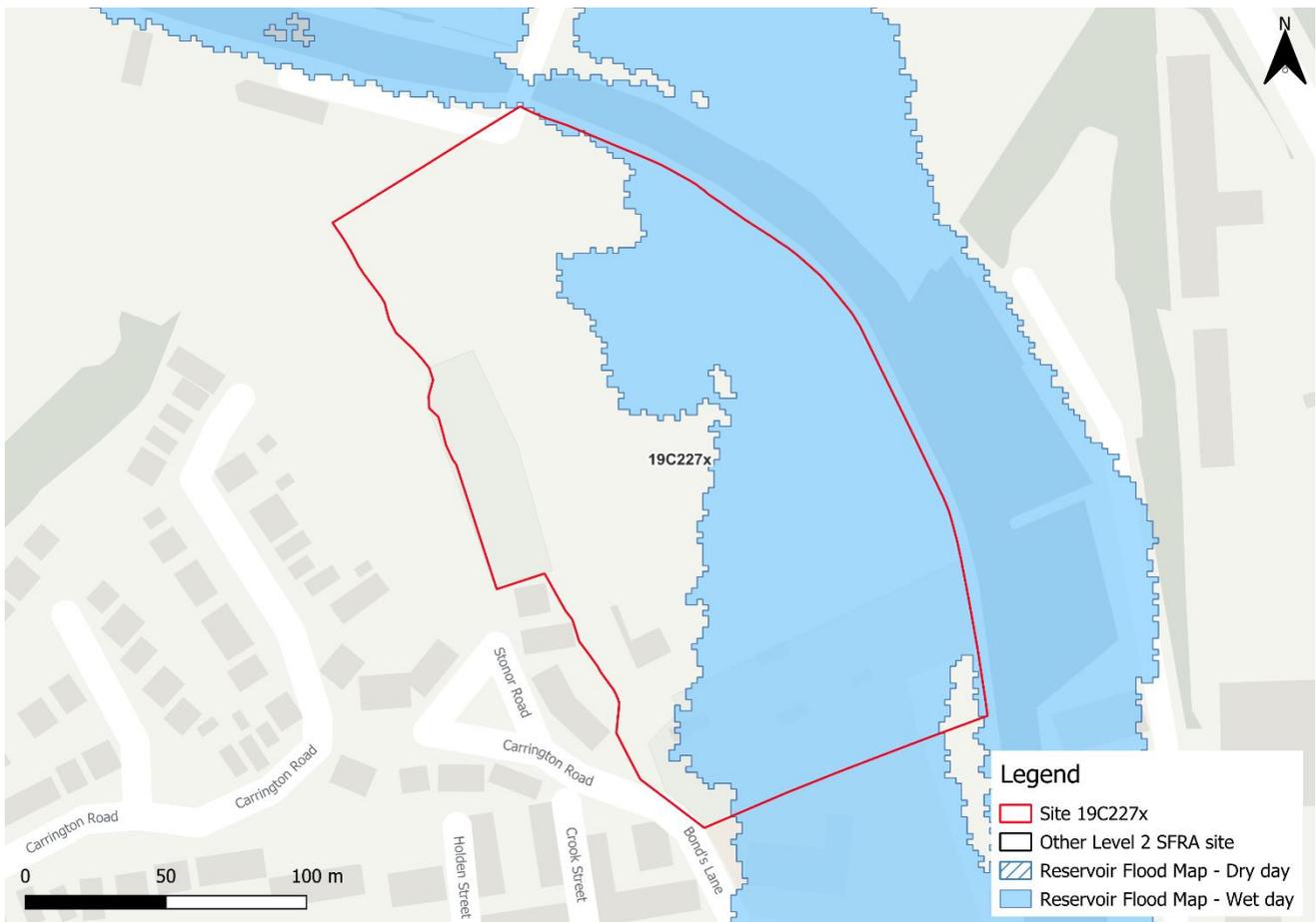


Figure 2-3: Flood risk from reservoirs

2.4 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.

2.5 Flood warning and access and escape routes

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 Flood Warning Area.

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 an FWA. The site is not located within a Flood Alert Area.

Based on available information, safe access and escape routes could likely be achieved during a flood event via Bond's Lane to the south of the site.

2.6 Observations, mitigation options and site suitability - fluvial

- 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 FRA must show that the development can be designed to be safe and that there is adequate emergency planning provision (para 014 FRCC-PPG).
- There is a small area of the site shown to be within the functional floodplain, however this is conservatively based on an 8m buffer of the OS Open Rivers dataset representing the Leeds and Liverpool Canal and the site boundary will not enter the canal channel.
- The site is almost entirely located within Flood Zone 1 and therefore at low flood risk from rivers.
- Given the potential reservoir risk to the site, developers should consider¹:
 - Whether additional modelling is required to understand the flood risk from the reservoir, referring to the specification for the reservoir flood maps as a starting point
 - Whether the development may have an impact on the reservoir or reservoir owner
 - Referring to the Central Lancashire Level 1 SFRA for information on reservoir risk and recommendations for how to address it
 - Contacting the LPA for pre-application advice
 - Contacting the LPA to understand the need to consult with their emergency planning team and with the reservoir owner
- The residual risk of flooding to the site as a result of a breach or overtopping of the Leeds and Liverpool Canal should be fully investigated, given the proximity of the canal and the fact it is up to 1 metre higher in elevation than the site. Modelling may be required to inform on risk. Consultation will be required with the Canal & River Trust and breach modelling may be required to ascertain residual risk.
- Any development should be set back at least 8 metres from the canal embankment. However, this should be confirmed with the Canal & River Trust.

¹ [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly very low. 5% of the site is within the high risk surface water flood risk. A further 5% is at medium surface water risk, and a further 12% of the site is at low surface water flood risk, as shown in Table 3-1.

In the high risk event, surface water is confined to topographic low spots across the site. These areas of ponding increase in both depth and extent in the medium risk event. In the low risk event, there is a significant area of surface water risk within the east of the site, with some additional areas of ponding within topographic low spots and additional surface water flow paths flowing through the south of the site.

Greatest surface water flood depths in the medium risk event are between 0.3 and 0.6 m (Figure 3-1) with areas of moderate hazard (Figure 3-2). Safe access and escape routes should be possible via Bond's Lane in all events. Bond's Lane is inundated in the low risk event however depths and hazards are low therefore safe access and escape should still be possible.

Table 3-1: Existing surface water flood risk based on the RoFSW map

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
78	12	5	5

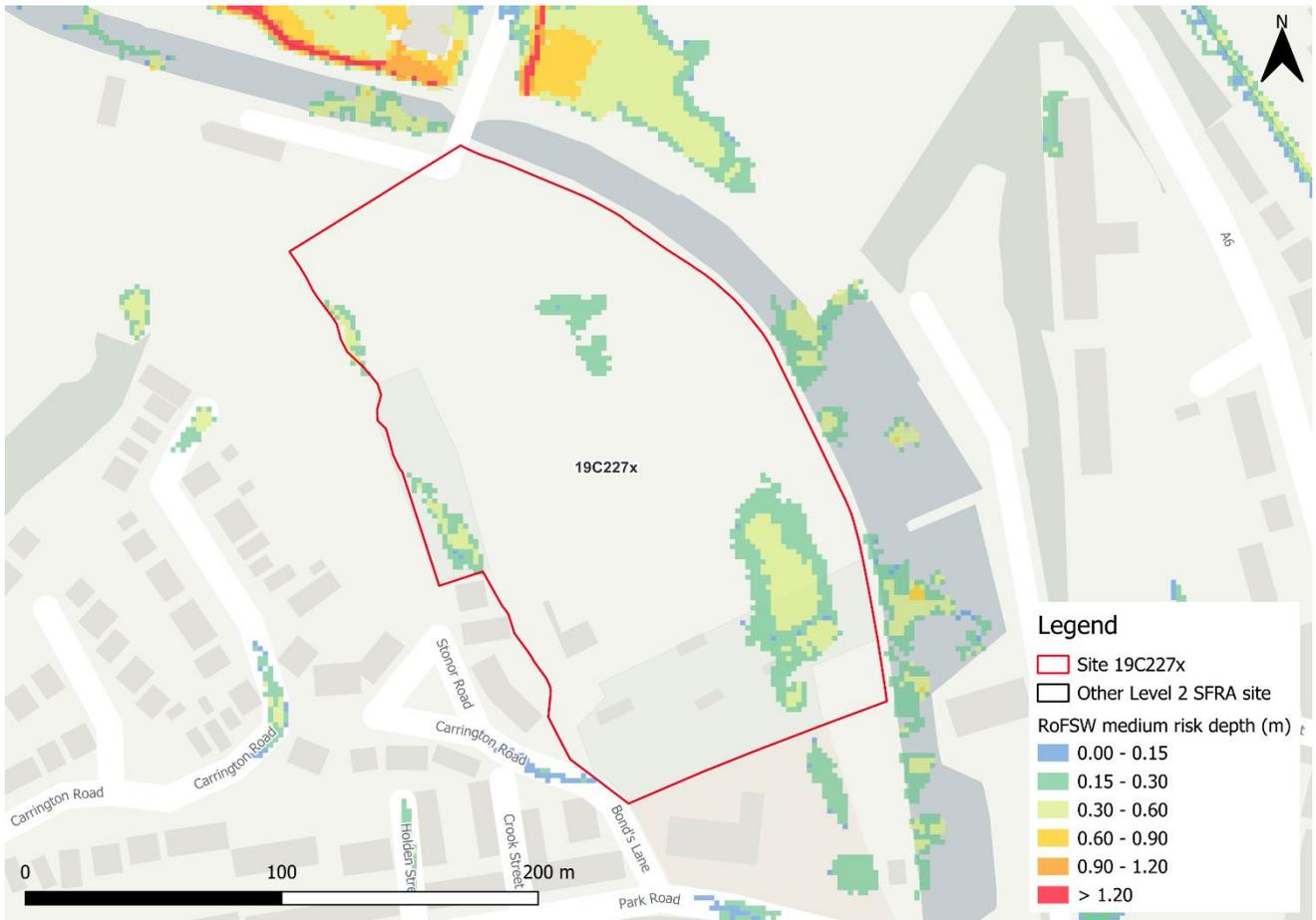


Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

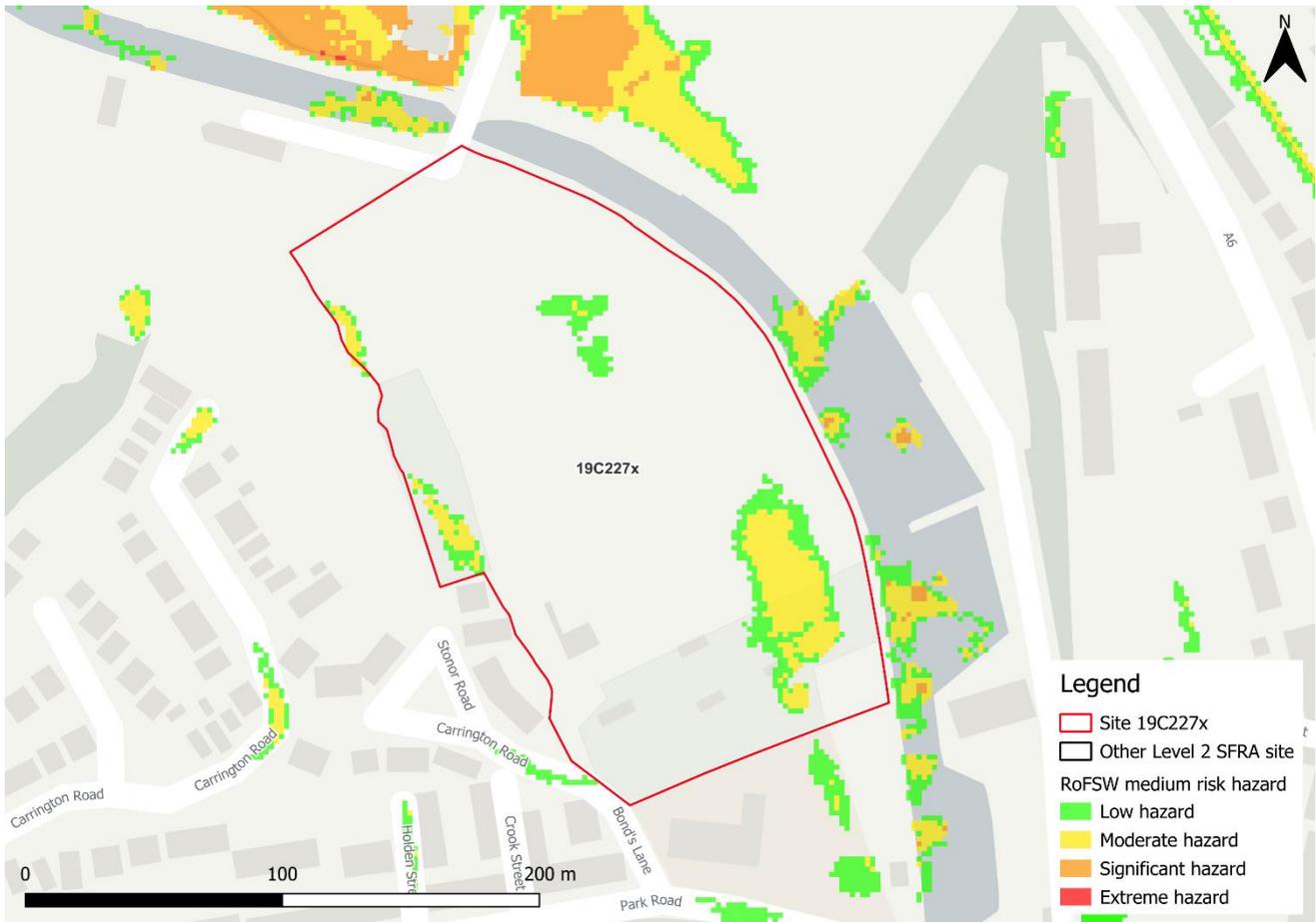


Figure 3-2: Medium risk event surface water flood hazard² (Risk of Flooding from Surface Water map)

3.2 Impacts from climate change

The impact of climate change on surface water flood risk has been modelled. This allows for direct comparison with the RoFSW map. With consideration of the EA’s SFRA guidance, the latest climate change allowances have been modelled as shown in Table 3-2.

Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	45%

Figure 3-3 shows the modelled surface water depths for the medium risk event +45% climate change. Risk is modelled to be significantly greater than present day conditions, with the medium risk climate change event being similar in extent to the present day low

² 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

risk event. Maximum flood depths are modelled to be between 0.6 and 0.9 m, with some areas of significant hazard (Figure 3-4).

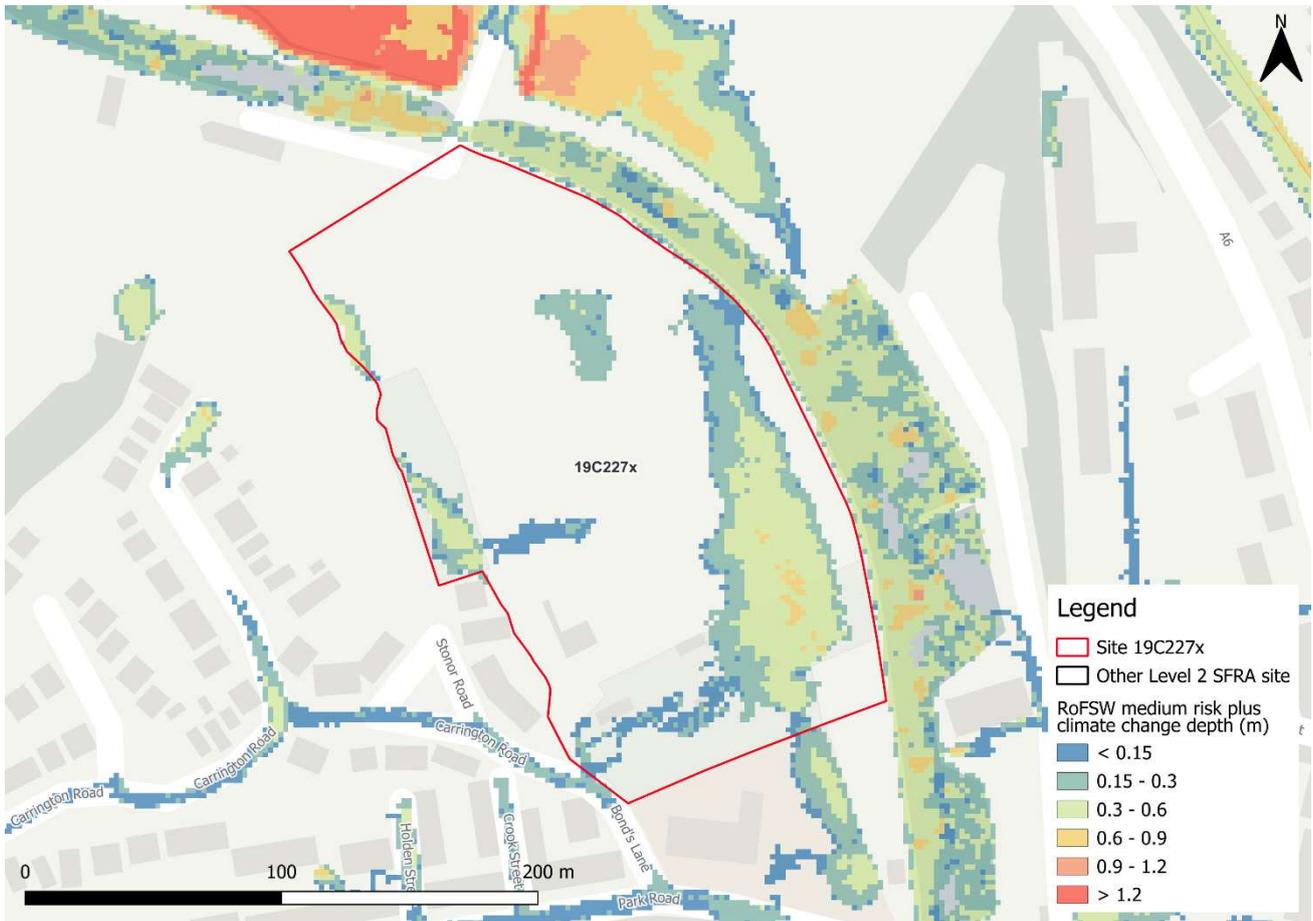


Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)

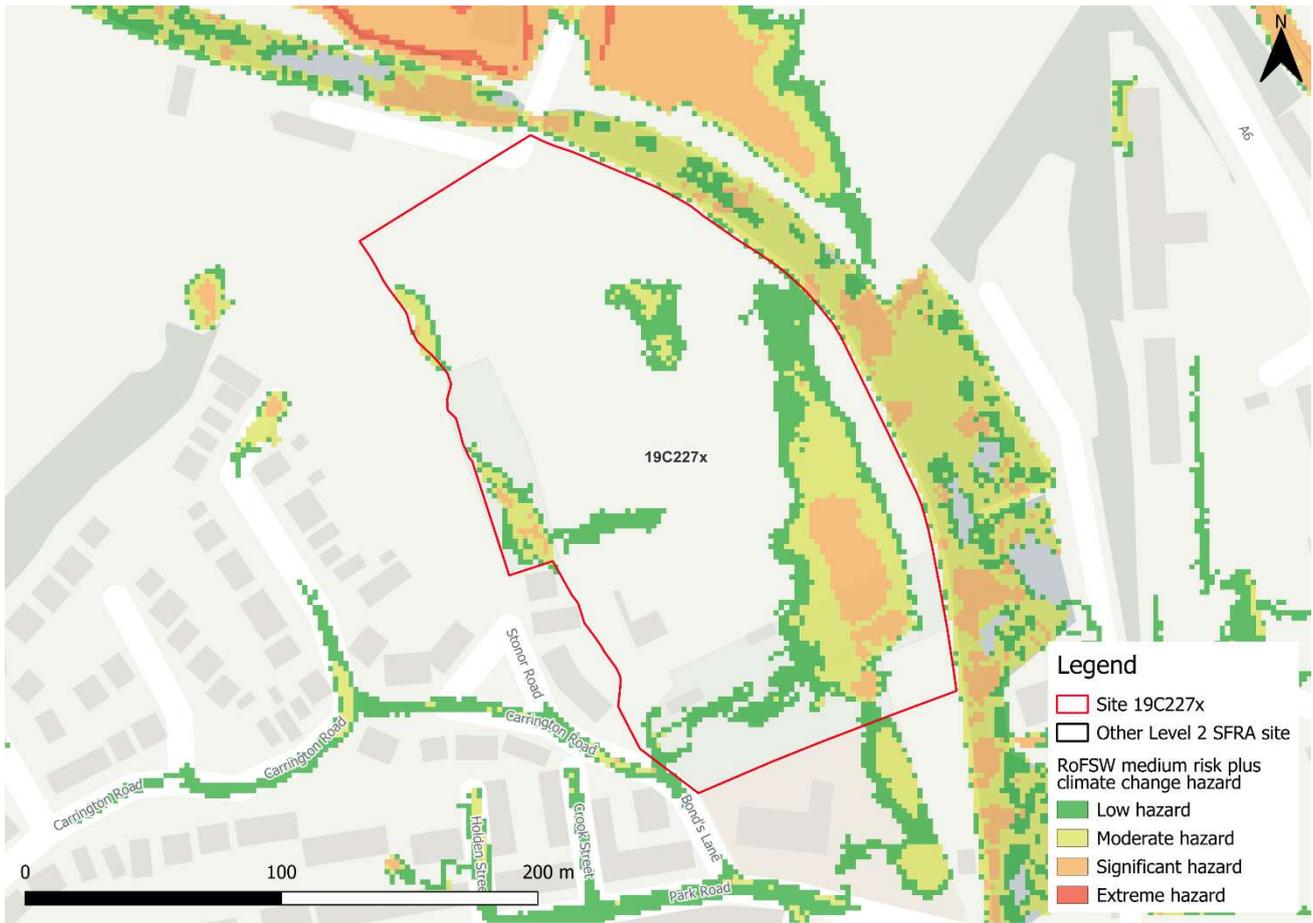


Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is largely very low, with 78% of the site being at very low surface water flood risk. However, in the high and medium risk events, surface water is apparent though is confined to topographic low spots across the site.
- In the low risk event, there is a significant area of surface water risk within the east of the site, with some additional areas of ponding within topographic low spots and additional surface water flow paths flowing through the south of the site.
- Safe access and escape routes should be possible via Bond's Lane in all events. Bond's Lane is inundated in the low risk event however depths and hazards are low therefore safe access and escape should still be achievable.
- The effects of climate change on surface water have been modelled for this SFRA using the medium risk surface water flood depths plus 45% climate change. Surface water risk is greater than present day flood risk with a significant area of ponding within the east of the site. Any existing flow paths and topographic depressions should be maintained in the site design.
- The number of housing units may have to be reduced to accommodate the surface water risk on the site using appropriate SuDS.

- The Groundwater Flood Map (Figure 4-1) indicates that ground conditions may be suitable for infiltration SuDS in the majority of the site. This should be further explored through appropriate ground survey as part of the FRA and drainage strategy.
- Were development to proceed, a drainage strategy would be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. This will require surface water modelling based on layout plans and detailed design and full consultation with the LLFA.
- Site runoff should be maintained at greenfield rates and, where possible, betterment should be achieved.
- Note, the RoFSW map is not suitable for identifying whether an individual property will flood and is therefore indicative. The RoFSW map is not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

4 Risk from groundwater

Risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide³. Figure 4-1 shows the map for Site 19C227x and the surrounding areas and Table 4-1 explains the risk classifications.

The majority of the site is in an area where there is no risk of groundwater emergence. In a small area in the north of the site, groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. Groundwater conditions may be suitable to infiltration SuDS across the majority of the site and where there is surface water ponding.



Figure 4-1: JBA 5m Groundwater Emergence Map

³ [Strategic flood risk assessment good practice guide. ADEPT. December 2021.](#)

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.	

5 Overall site assessment

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

This site is not required to pass part b) of the exception test⁴ 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 100 years for residential development.

5.2 Recommendation summary, FRA requirements and further work

Based on the evidence presented in the Level 1 SFRA (2025) and this Level 2 SFRA:

- Were this site to be allocated based on the information presented in this Level 2 SFRA, it should be appropriate to develop this site for more vulnerable purposes given its location in Flood Zone 1.
- There should be no inappropriate development within the functional floodplain. This should be converted to a blue / green corridor to provide ecological, amenity and social value.
- There is significant risk from surface water in the longer term. A detailed drainage strategy will be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development.
- Surface water should be retained onsite which may reduce units. This will require detailed surface water modelling based on layout plans and detailed design and full consultation with the LLFA on required runoff rates, likely to be greenfield or betterment. The use of infiltration SuDS should be investigated.
- Residual risk from the canal must be accounted for through consultation with the Canal & River Trust.
- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Central Lancashire Local Plan and LLFA policies; and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with the following, where applicable, the LPA; LLFA; emergency planning officers; EA; UU; the highways authorities; and the emergency services.

⁴ Para 178 National Planning Policy Framework 2024

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19C243x

Final

June 2025

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Authorised by	Krista Keating BSc MSc CEnv CSci MCIWEM C.WEM Associate Director

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JBA Project Code	2023s1344

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Contents

1	Background	1
	1.1 Site 19C243x	1
2	Flood risk from rivers	4
	2.1 Existing risk	4
	2.2 Impacts from climate change	5
	2.3 Flood risk management	5
	2.4 Residual risk	7
	2.5 Historic flood incidents	8
	2.6 Flood warning and access and escape routes	8
	2.7 Observations, mitigation options and site suitability - fluvial	9
3	Flood risk from surface water	10
	3.1 Existing risk	10
	3.2 Impacts from climate change	12
	3.3 Observations, mitigation options and site suitability - surface water	14
4	Risk from groundwater	16
5	Overall site assessment	18
	5.1 Can part b) of the exception test be passed?	18
	5.2 Recommendations, FRA requirements and further work	18
6	Licencing	19

List of Figures

Figure 1-1: Existing site location boundary	2
Figure 1-2: Topography	3
Figure 2-1: Existing risk from rivers to the site	5
Figure 2-2: Natural Flood Management (NFM) potential mapping	7
Figure 2-3: Flood risk from reservoirs	8
Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)	11
Figure 3-2: Medium risk event surface water flood hazard (Risk of Flooding from Surface Water map)	12
Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)	13
Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)	14
Figure 4-1: JBA 5m Groundwater Emergence Map	16

List of Tables

Table 2-1: Existing fluvial flood risk	4
Table 3-1: Existing surface water flood risk based on the RoFSW map	10
Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment	12
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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19C243x. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Central Lancashire Level 1 SFRA' (2025) and read the 'Central Lancashire Level 2 SFRA Main Report' (2025) and is therefore familiar with the terminology used in this report.

1.1 Site 19C243x

- Location: Great Knowley
- Existing site use: Greenfield
- Existing site use vulnerability: Water compatible
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 9.12 hectares
- Proposed development impermeable area: 7.75 hectares (assumed 85% impermeable area)
- Watercourse: Leeds and Liverpool Canal
- Summary of requirements from scoping stage:
 - Level 1 recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
 - Assessment of modelled fluvial flood depths and hazards
 - Assessment of surface water flood depths and hazards
 - Assessment of all other sources of flood risk

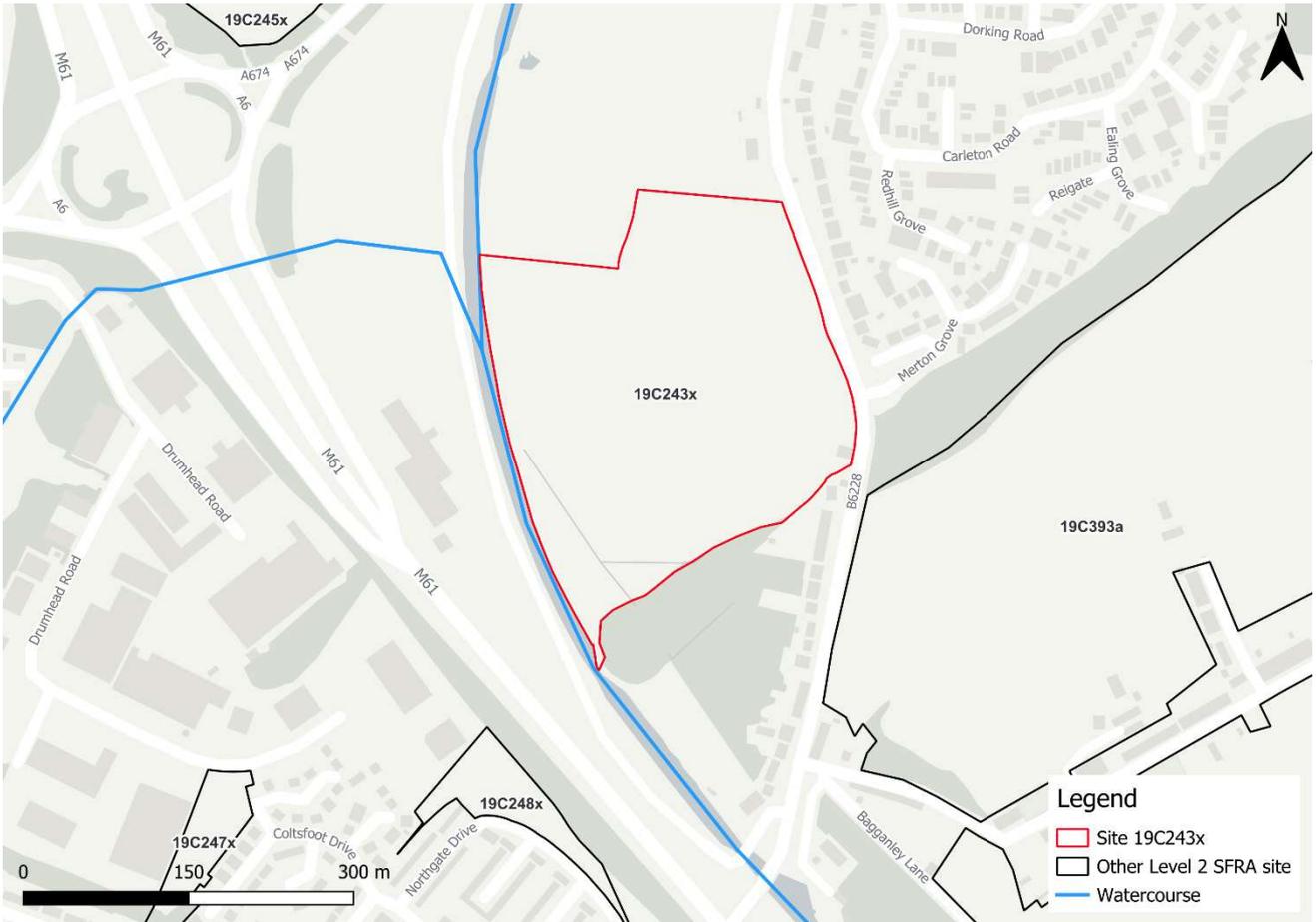


Figure 1-1: Existing site location boundary

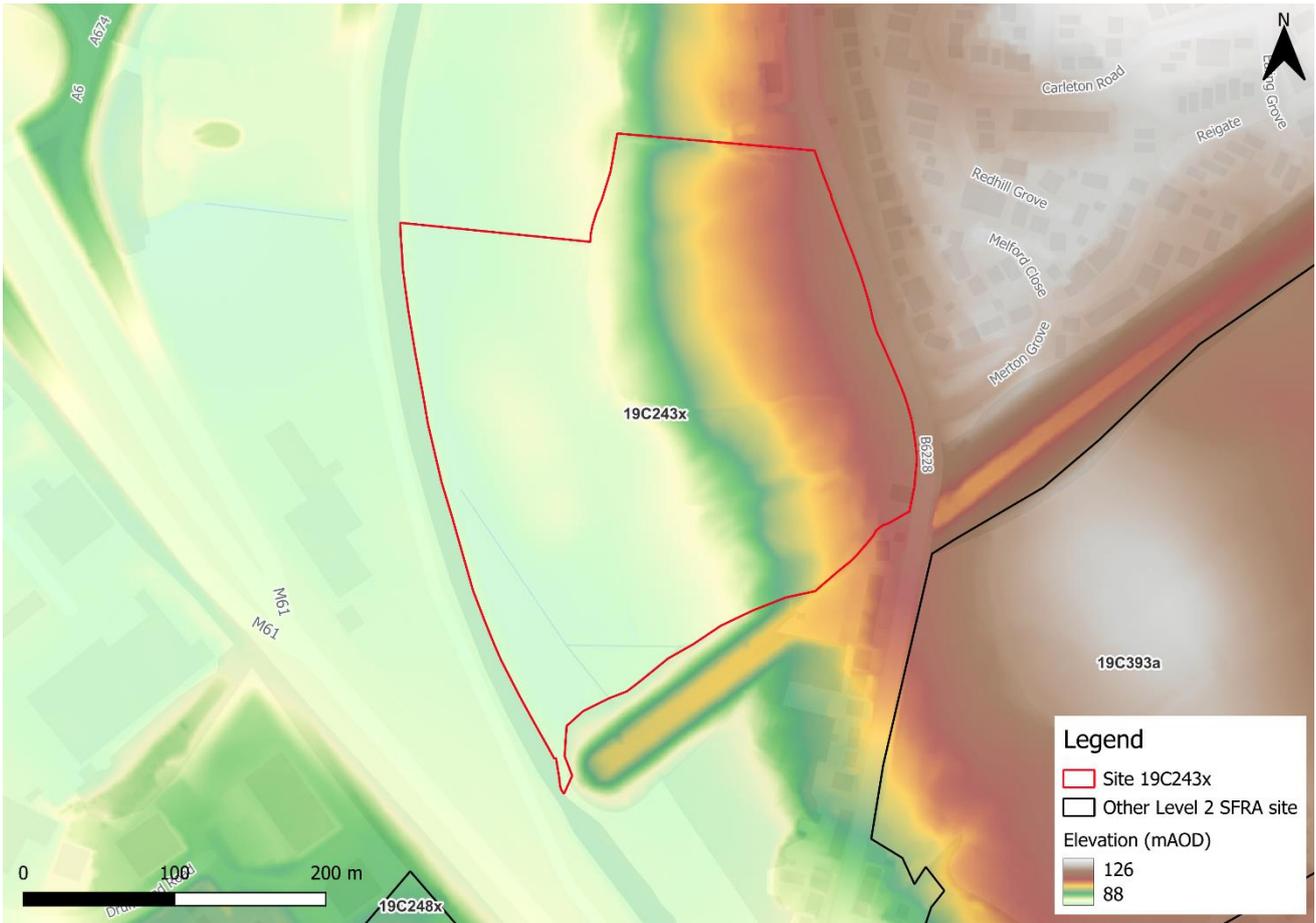


Figure 1-2: Topography

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 (accessed May 2025) and Flood Zone 3b (functional floodplain) as updated in the Central Lancashire Level 1 SFRA (2025), the percentage areas of the site within each fluvial flood zone are stated in Table 2-1 and can be viewed on Figure 2-1. The Flood Map for Planning does not consider flood defence infrastructure (Section 2.3) or the impacts of climate change (Section 2.2).

The majority of the site is located within Flood Zone 1, indicating low risk from rivers. There is a very small area of the site within the functional floodplain however this is conservatively based on an 8m buffer of the OS Open Rivers dataset. This is associated with the Leeds and Liverpool Canal rather than fluvial flood risk from a watercourse. The site boundary, in reality, will not enter the channel of the canal. Adjacent to the western site boundary, there are areas of Flood Zone 3a and Flood Zone 2, which are based on direct rainfall modelling.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
91	4	3	2



Figure 2-1: Existing risk from rivers to the site

2.2 Impacts from climate change

As the area of the site in Flood Zone 3a and Flood Zone 2 is based on direct rainfall modelling, the impact of climate change on flood risk at this site should be considered through the surface water climate change modelling documented in Section 3.2.

2.3 Flood risk management

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

2.3.1 Cumulative impacts

A cumulative impact assessment was completed through the Central Lancashire Level 1 SFRA, which aimed to identify catchments sensitive to the cumulative impact of development. Site 19C243x is located within one catchment, namely; Lostock US Farrington Weir. This is ranked as a medium sensitivity catchment. Planning considerations for sites at medium sensitivity to the cumulative impacts of development that apply to this site include:

- Incorporate SuDS and provide details of adoption, ongoing maintenance, and management, in line with the Lancashire SuDS Guidance¹.
- Developments should be incentivised to provide wider betterment by demonstrating in site-specific FRAs and Surface Water Drainage Strategies what measures can be put in place to contribute to a reduction in flood risk downstream.
- Developments should achieve greenfield runoff rates and volumes in their post-development state.
- Surface Water Management Plans should be developed as required.

The full list of planning policy suggestions can be found in Appendix G of the Level 1 SFRA.

2.3.2 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. Within the west of the site there are opportunities for riparian tree planting, which can slow flows, reduce sediment delivery to the watercourse and reduce bankside erosion. The majority of the site has potential for wider catchment tree planting. These areas are shown on Figure 2-2.

¹ [Lancashire SuDS Guidance](#)

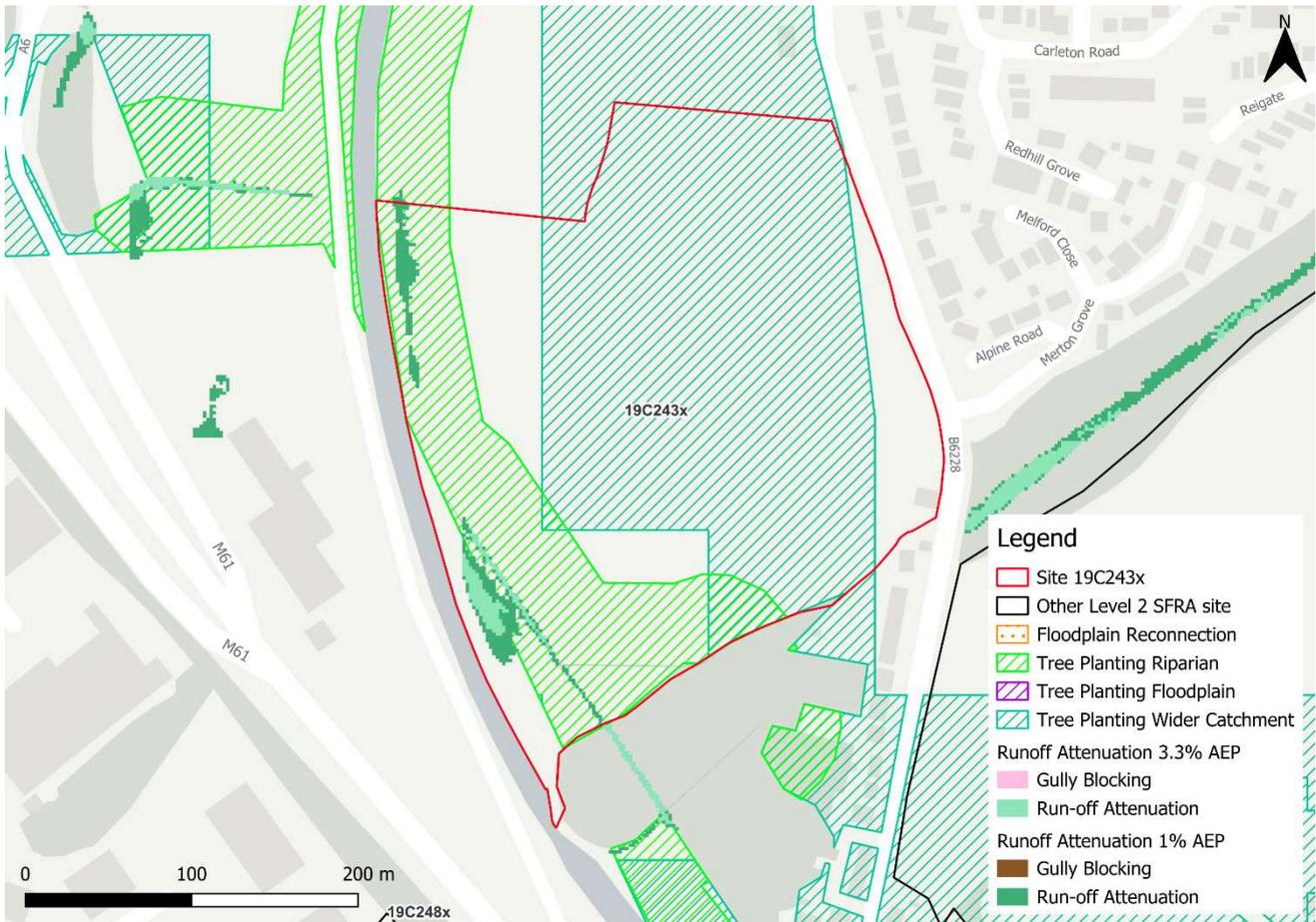


Figure 2-2: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

The Leeds and Liverpool Canal runs along the eastern boundary of the site. There is no known existing flood model of the canal therefore any residual risk from the canal is unknown at this stage. The canal is raised approximately 0.5m above the site in some locations. Therefore, the site is at potential residual flood risk from a breach of the canal system. This scenario must be investigated at the FRA stage including full consultation with the Canal & River Trust, the canal operator.

2.4.1 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 2-3 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 Anglezarke, Heapey No.1, Heapey No.2, Heapey No.3, High Bullough and Yarrow reservoirs, all of which are located within the district of Chorley.

Three of these reservoirs are operated by United Utilities and three are operated by Wigan & District Angling Association.

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 both United Utilities and Wigan & District Angling Association 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.

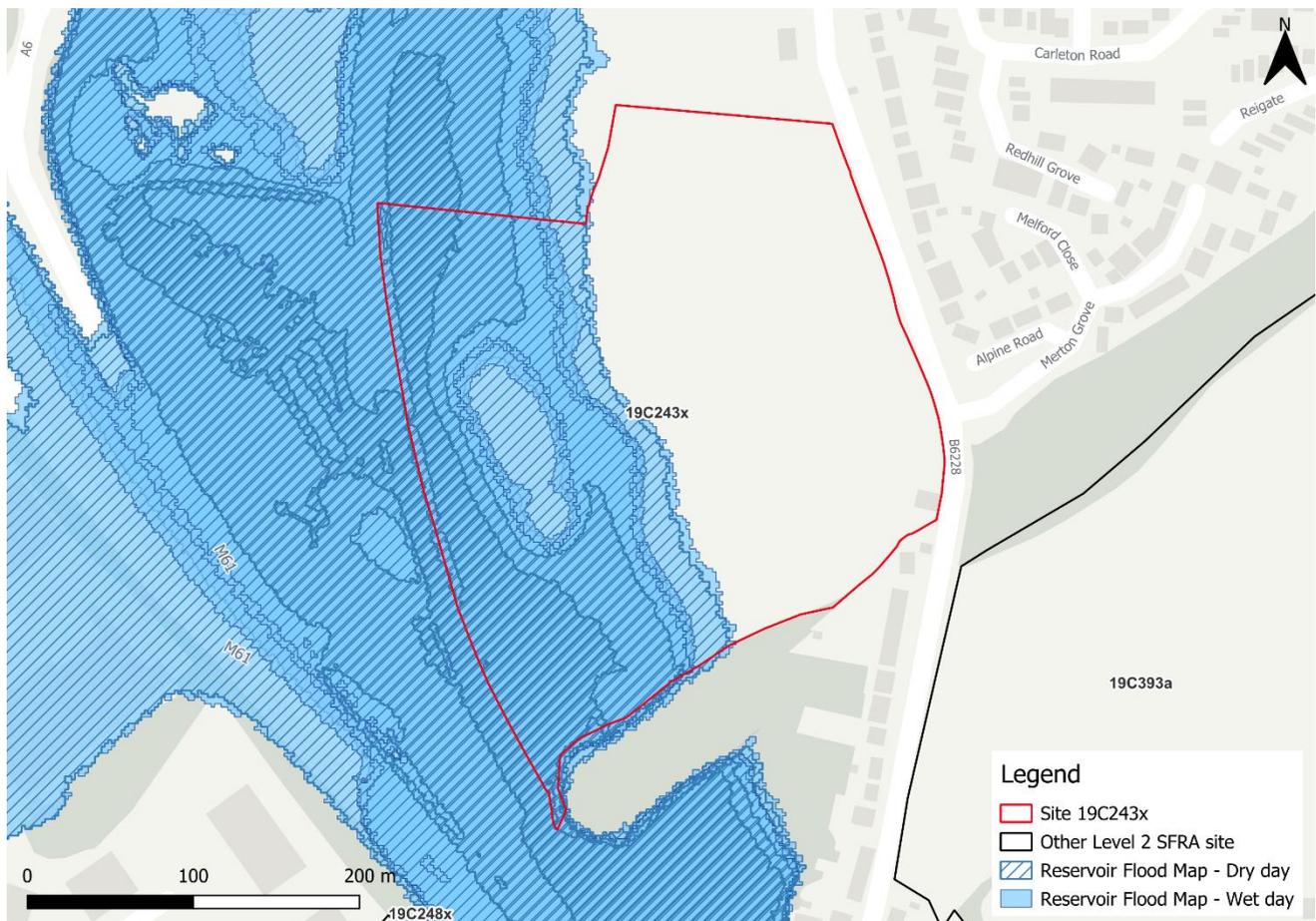


Figure 2-3: Flood risk from reservoirs

2.5 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.

2.6 Flood warning and access and escape routes

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 an FWA. The site is not located within a FAA.

Based on available information, safe access and escape routes could likely be achieved via the B6228.

2.7 Observations, mitigation options and site suitability - fluvial

- 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 FRA must show that the development can be designed to be safe and that there is adequate emergency planning provision (para 014 FRCC-PPG).
- There is a small area of the site shown to be within the functional floodplain, however this is conservatively based on an 8m buffer of the OS Open Rivers dataset representing the Leeds and Liverpool Canal and the site boundary will not enter the canal channel.
- The majority of the site is located within Flood Zone 1 and therefore at low flood risk from rivers. There is a small area along the western boundary of the site within Flood Zone 3a and Flood Zone 2, derived from direct rainfall modelling.
- Given the potential reservoir risk to the site, developers should consider²:
 - Whether additional modelling is required to understand the flood risk from the reservoir, referring to the specification for the reservoir flood maps as a starting point
 - Whether the development may have an impact on the reservoir or reservoir owner
 - Referring to the Central Lancashire Level 1 SFRA for information on reservoir risk and recommendations for how to address it
 - Contacting the LPA for pre-application advice
 - Contacting the LPA to understand the need to consult with their emergency planning team and with the reservoir owner
- The residual risk of flooding to the site as a result of a breach or overtopping of the Leeds and Liverpool Canal should be fully investigated. Modelling may be required to inform on risk. Consultation will be required with the Canal & River Trust and breach modelling may be required to ascertain residual risk.
- Any development should be set back at least 8 metres from the canal embankment. However, this should be confirmed with the Canal & River Trust.

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

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly very low. Approximately 1% of the site is within the high risk surface water flood zone. A further 3% is at medium surface water risk, and a further 9% is at low surface water risk, as shown in Table 3-1.

In the high risk event, surface water is confined to an area of ponding within a topographic low spot in the west of the site. There is surface water flow path located along an existing drainage ditch through the south of the site. In the medium risk event, the area of ponding within the west of the site extends into a flow path along the western boundary, likely due to the raised canal embankment. In the low risk event, there is a significant area of ponding within the west of the site, likely caused by the raised canal embankment.

Greatest surface water flood depths in the medium risk event are between 0.3 and 0.6 m (Figure 3-1) with some areas of moderate hazard (Figure 3-2). Safe access and escape routes should be possible via B6228 during all events.

Table 3-1: Existing surface water flood risk based on the RoFSW map

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
87	9	3	1

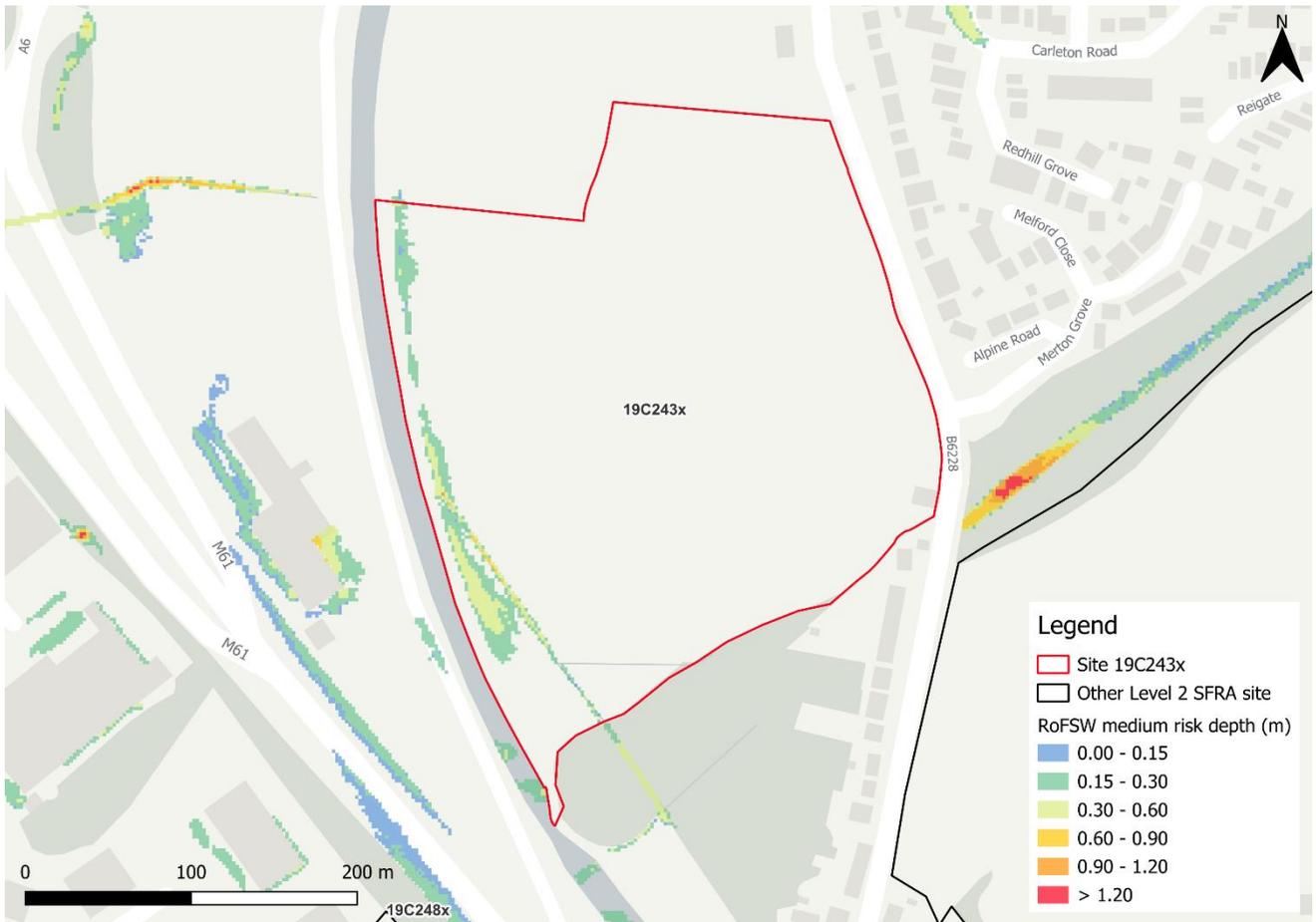


Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

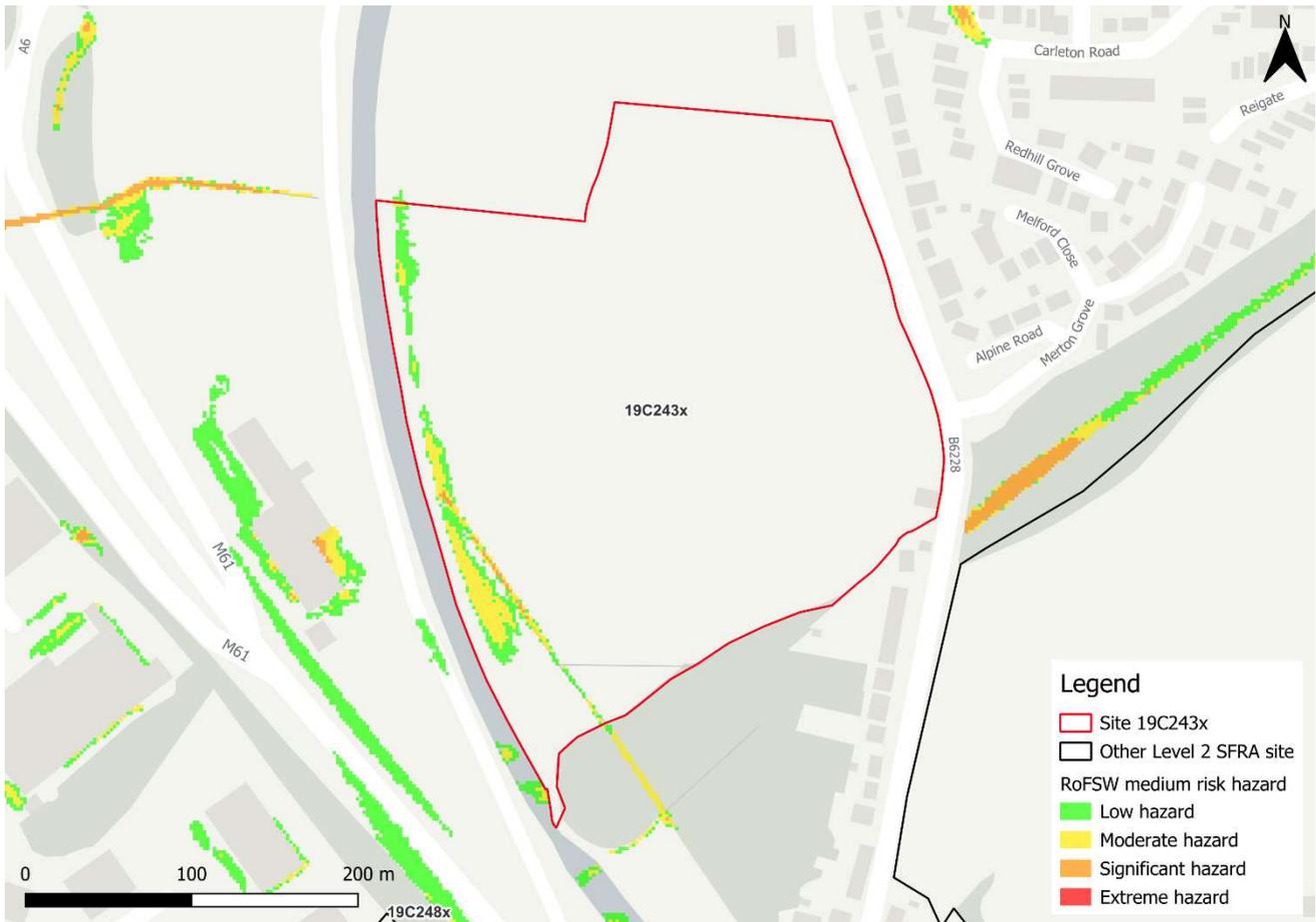


Figure 3-2: Medium risk event surface water flood hazard³ (Risk of Flooding from Surface Water map)

3.2 Impacts from climate change

The impact of climate change on surface water flood risk has been modelled. This allows for direct comparison with the RoFSW map. With consideration of the EA’s SFRA guidance, the latest climate change allowances have been modelled as shown in Table 3-2.

Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	45%

Figure 3-3 shows the modelled surface water depths for the high risk event +40% climate change. Risk is modelled to be significantly greater than present day conditions, with the medium risk climate change event being similar in extent to the present day low risk event.

³ 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

The risk is clearly caused by the raised canal embankment preventing the surface water from flowing westwards. Maximum flood depths are modelled to be between 0.9 and 1.2 m, with hazard categorised as significant (Figure 3-4).

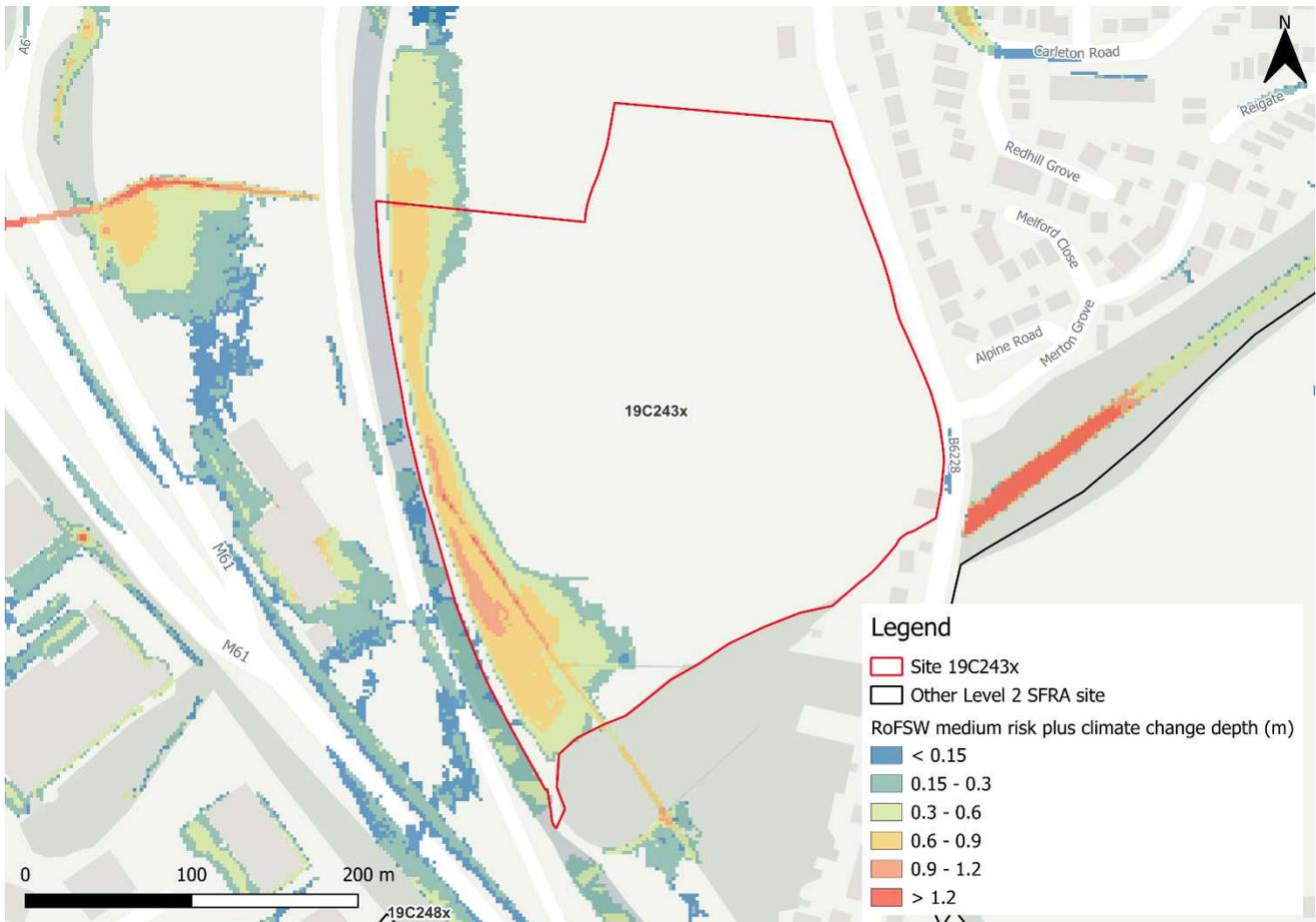


Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)

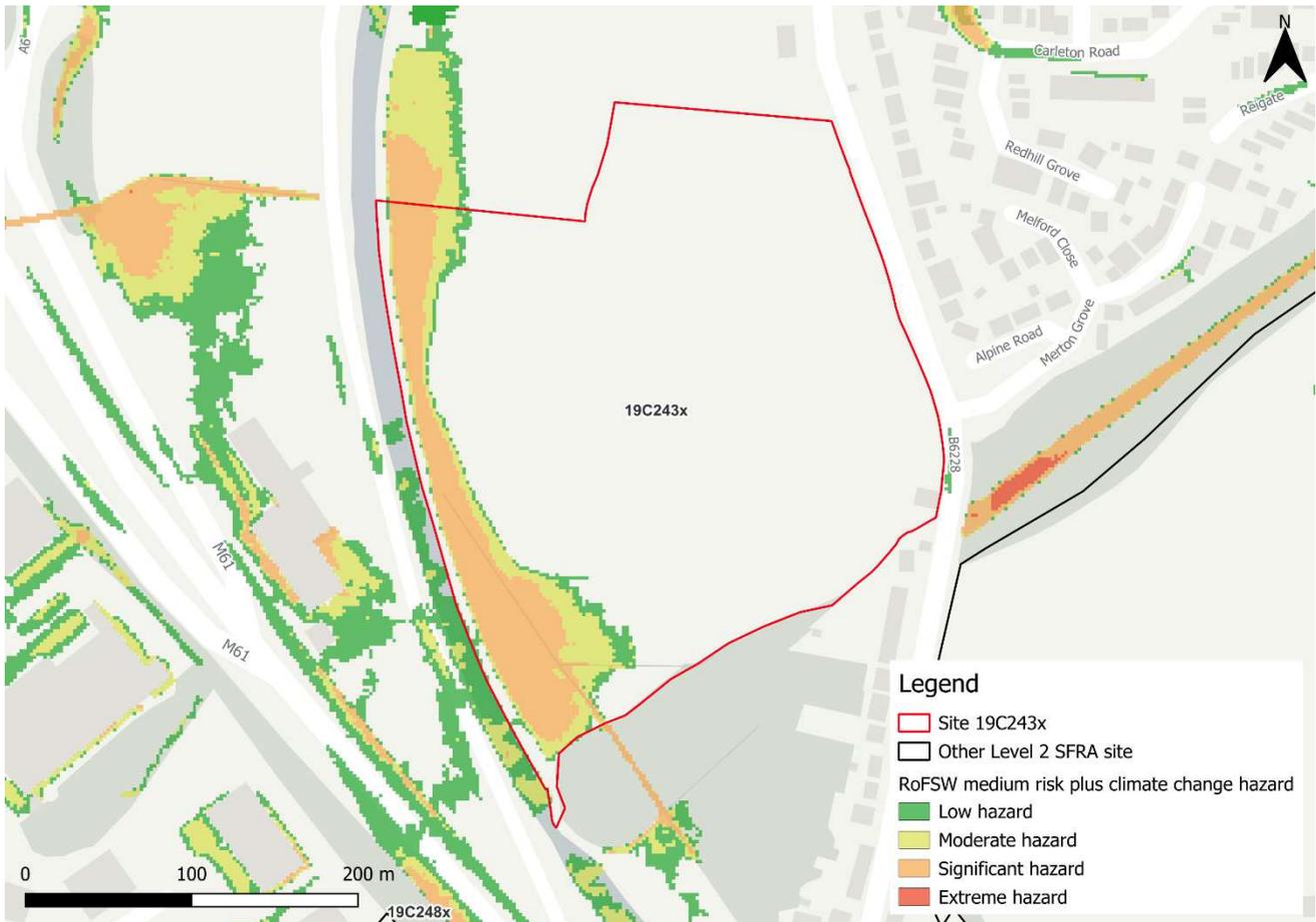


Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is very low, with 87% of the site being at a very low risk. Surface water risk in the high and medium risk events is confined to the western boundary of the site, ponding within topographic low spots and within an existing drainage ditch.
- In the low risk event, there is a significant area of ponding within the west of the site. Safe access and escape routes should be achievable via B6228 in all events.
- The medium risk modelled climate change outputs indicate a similar extent risk to the present day low risk event, with a number of flow paths emerging through the site. Any existing flow paths and topographic depressions should be maintained in site design.
- The risk is clearly caused by the raised canal embankment preventing the surface water from flowing westwards. Development should be setback from this area alongside the embankment which should be used for SuDS.
- The Groundwater Flood Map (Figure 4-1) indicates that ground conditions may be suitable for infiltration SuDS across the majority of the site. This should be

further explored through appropriate ground survey as part of the FRA and drainage strategy.

- Were development to proceed, a drainage strategy would be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. This will require surface water modelling based on layout plans and detailed design and consultation with the LLFA.
- Site runoff should be maintained at greenfield rates and, where possible, betterment should be achieved.
- Note, the RoFSW map is not suitable for identifying whether an individual property will flood and is therefore indicative. The RoFSW map is no appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

4 Risk from groundwater

Risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide⁴. Figure 4-1 shows the map for Site 19C243x and the surrounding areas and Table 4-1 explains the risk classifications.

The risk of groundwater emergence varies across the site. Within the west of the site, there is a risk groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. The remaining area of the site is within an area where there is no groundwater risk. Groundwater conditions may therefore be suited to infiltration SuDS across the majority of the site. Ground investigations will be required within the west of the site through the site-specific FRA to ascertain groundwater levels and conditions. Given the proximity of this high risk area to the surface water flood risk area, this area should be included within any SuDS design.

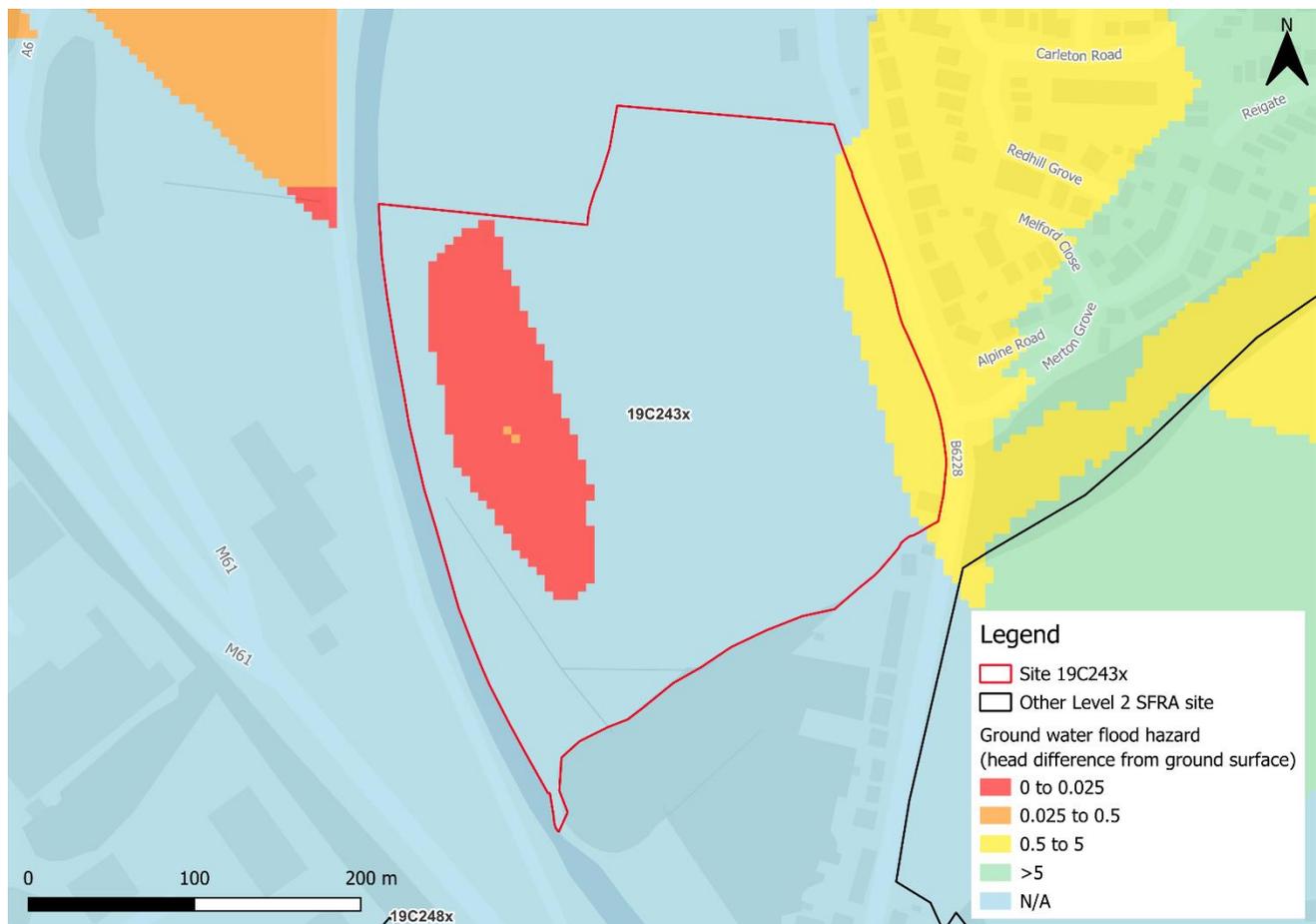


Figure 4-1: JBA 5m Groundwater Emergence Map

⁴ [Strategic flood risk assessment good practice guide. ADEPT. December 2021.](#)

Table 4-1: Groundwater Flood 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.	

5 Overall site assessment

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

To pass part b) of the exception test⁵, it must be proven that the development can be safe for its lifetime, which is 100 years for residential development. This site should be able to pass the exception test if all development is directed away from the area of risk on site to Flood Zone 1.

5.2 Recommendations, FRA requirements and further work

Based on the evidence presented in the Level 1 SFRA (2025) and this Level 2 SFRA:

- Based on the evidence in this SFRA, it should be appropriate to develop this site for more vulnerable purposes given the majority of the site being located in Flood Zone 1.
- There should be no inappropriate development within the functional floodplain. This should be converted to a blue / green corridor to provide ecological, amenity and social value.
- There is significant risk from surface water in the longer term. A detailed drainage strategy will be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development.
- Surface water should be retained onsite in the western area of the site where appropriate SuDS should be put in place. This may require surface water modelling based on layout plans and detailed design and full consultation with the LLFA on required runoff rates, likely to be greenfield or betterment. The use of infiltration SuDS should be investigated.
- Residual risk from the canal must be accounted for through consultation with the Canal & River Trust.
- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Central Lancashire Local Plan and LLFA policies; and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with the following, where applicable, the LPA; LLFA; emergency planning officers; EA; UU; the highways authorities; and the emergency services.

⁵ Para 178 National Planning Policy Framework 2024

6 Licencing

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19C264x

Final

June 2025

Prepared for:



www.jbaconsulting.com

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Contract

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This report describes work commissioned by Preston City Council, on behalf of the Central Lancashire Local Plan Team, by an instruction dated 19 August 2024. The Client's representative for the contract was Carolyn Williams of Preston City Council. Kaylyn Carroll of JBA Consulting carried out this work.

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Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Acknowledgements

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

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Contents

1	Background	1
	1.1 Site 19C264x	1
2	Flood risk from rivers	4
	2.1 Existing risk	4
	2.2 Impacts from climate change	6
	2.3 Flood risk management	6
	2.4 Residual risk	8
	2.5 Historic flood incidents	9
	2.6 Flood warning and access and escape routes	9
	2.7 Observations, mitigation options and site suitability - fluvial	10
3	Flood risk from surface water	11
	3.1 Existing risk	11
	3.2 Impacts from climate change	13
	3.3 Observations, mitigation options and site suitability - surface water	15
4	Risk from groundwater	17
5	Overall site assessment	19
	5.1 Can part b) of the exception test be passed?	19
	5.2 Recommendations, FRA requirements and further work	19
6	Licencing	20

List of Figures

Figure 1-1: Existing site location boundary	2
Figure 1-2: Topography	3
Figure 2-1: Existing risk from rivers to the site	5
Figure 2-2: Flood extent for 1% AEP undefended flood event plus central climate change allowance (Flood Map for Planning)	6
Figure 2-3: Natural Flood Management (NFM) potential mapping	8
Figure 2-4: Flood risk from reservoirs	9
Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)	12
Figure 3-2: Medium risk event surface water flood hazard (Risk of Flooding from Surface Water map)	13
Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)	14
Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)	15
Figure 4-1: JBA 5m Groundwater Emergence Map	17

List of Tables

Table 2-1: Existing fluvial flood risk	4
Table 3-1: Existing surface water flood risk based on the RoFSW map	11
Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment	13
Table 4-1: Groundwater Flood Hazard Classification	18

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19C264x. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Central Lancashire Level 1 SFRA' (2025) and read the 'Central Lancashire Level 2 SFRA Main Report' (2025) and is therefore familiar with the terminology used in this report.

1.1 Site 19C264x

- Location: Pear Tree Lane
- Existing site use: Agriculture
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 4.63 hectares
- Proposed development impermeable area: 3.94 hectares (assumed 85% impermeable area)
- Watercourse: Chapel Brook (unmodelled)
- Summary of requirements from scoping stage:
 - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
 - Assessment of surface water flood depths and hazards
 - Assessment of all other sources of flood risk



Figure 1-1: Existing site location boundary

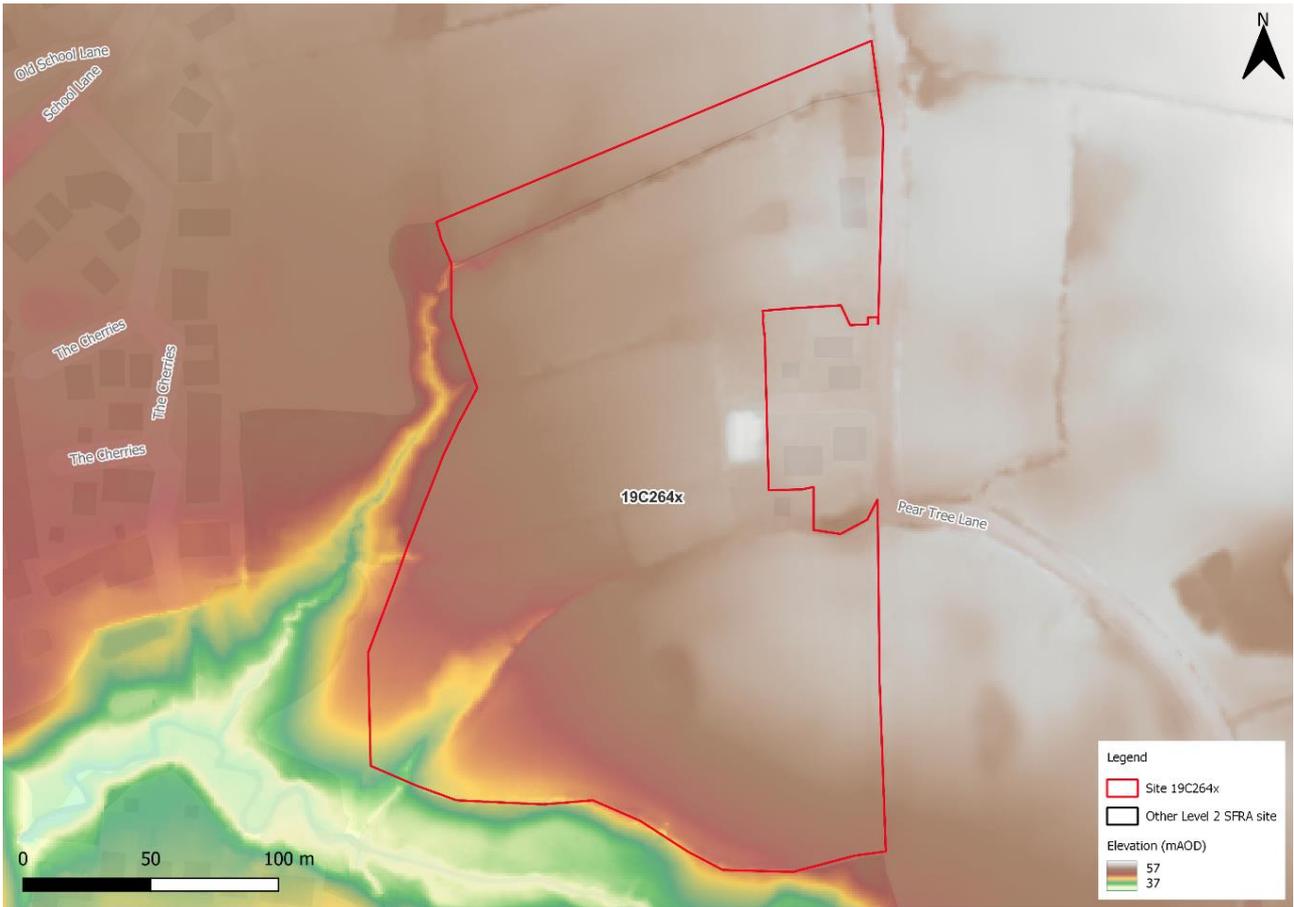


Figure 1-2: Topography

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 (accessed May 2025) and Flood Zone 3b (functional floodplain) as updated in the Central Lancashire Level 1 SFRA (2025), the percentage areas of the site within each fluvial flood zone are stated in Table 2-1 and can be viewed on Figure 2-1. The Flood Map for Planning does not consider flood defence infrastructure (Section 2.3) or the impacts of climate change (Section 2.2).

The majority of the site is located within Flood Zone 1 indicating that the site is at low risk of flooding from rivers. There is a very small area along the southern boundary of the site within Flood Zone 2, from Chapel Brook to the south of the site. Rushton Brook is a small, unmodelled watercourse present through the north of the site. Risk from this watercourse and from Chapel Brook should be quantified. Additional modelling may be required at the FRA stage.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
99	1	0	0

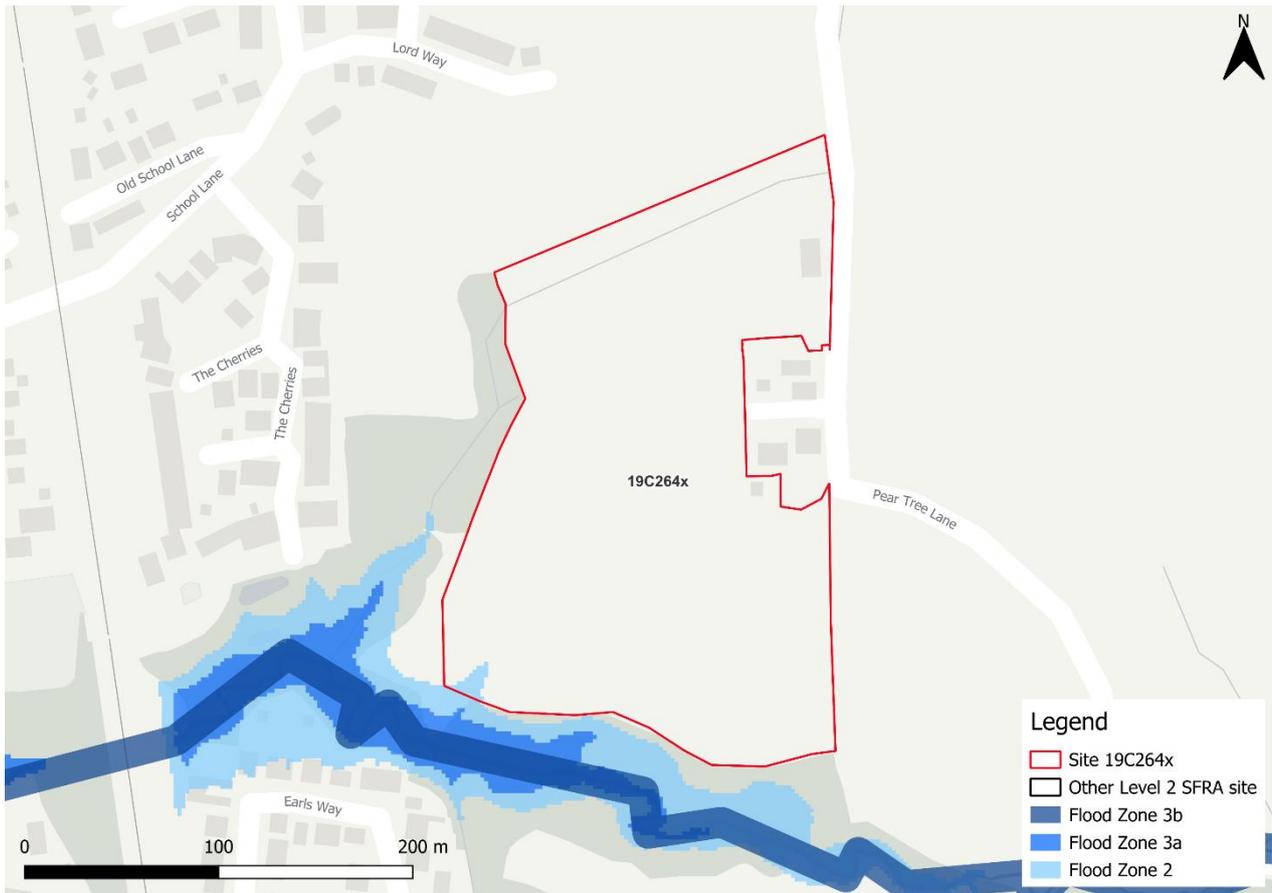


Figure 2-1: Existing risk from rivers to the site

2.2 Impacts from climate change

The impact of climate change on flood risk from Chapel Brook has not been modelled for this SFRA, as a model covering Chapel Brook was not made available for consideration. Therefore, the FMfP 1% AEP undefended plus central climate change extent has been used to assess future risk to the site. Based on this approach, future risk is similar in extent to the present day Flood Zone 2 (**Error! Reference source not found.**).

The impacts of climate change must be modelled using the EA's latest allowances for peak river flows to assess flood depth, hazard and velocity in order to inform the exception test. The EA should be consulted on the data source of the Flood Map for Planning in this location. If the Flood Map for Planning is based on a detailed model of Chapel Brook, any updates to this Level 2 SFRA and/or any FRA should make use of this model and include for the most up to date climate change allowances.



Figure 2-2: Flood extent for 1% AEP undefended flood event plus central climate change allowance (Flood Map for Planning)

2.3 Flood risk management

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

2.3.1 Cumulative impacts

A cumulative impact assessment was completed through the Central Lancashire Level 1 SFRA (2025), which aimed to identify catchments sensitive to the cumulative impact of development. Site 19C264x is located within one catchment, namely, Yarrow Culbeck Brook to tidal. This is ranked as a high sensitivity catchment. Planning considerations for sites at high sensitivity to the cumulative impacts of development that apply to this site include:

- National and local flood risk planning policy must be stringently applied within these areas, with flood risk from all sources given the appropriate priority, particularly when applying the Sequential and Exception Tests.
- Both greenfield and brownfield developments to achieve 20% betterment over pre-development greenfield runoff peak flows and volumes in their post development state.
- For larger sites and strategic developments (e.g. new settlements and urban extensions):
 - The LLFA, Environment Agency, and LPA should be consulted at pre-application stage.
 - The FRA should examine the cumulative impacts of proposed peak surface water runoff rates and volumes from across the site on the peak flows, duration of flooding and timing of flood peaks in receiving watercourses. This should include the impact of other developments within the WFD catchment, if appropriate, as advised by the LPA/LLFA.
 - A Surface Water Drainage Masterplan should be developed and implement appropriate drainage sub-catchments for the management of surface water, with specific runoff rate and volume requirements set for each sub-catchment, in line with the SuDS management train.

The full list of planning policy suggestions can be found in Appendix G of the Level 1 SFRA.

2.3.2 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. Both within and upstream of the site there is potential for both riparian and wider catchment woodland planting to attenuate flows and reduce the volume of runoff downstream. A Flood Risk Activity Permit (FRAP) may be required for NFM activities or works within the floodplain when planning permission is not required. These areas are shown in Figure 2-3.

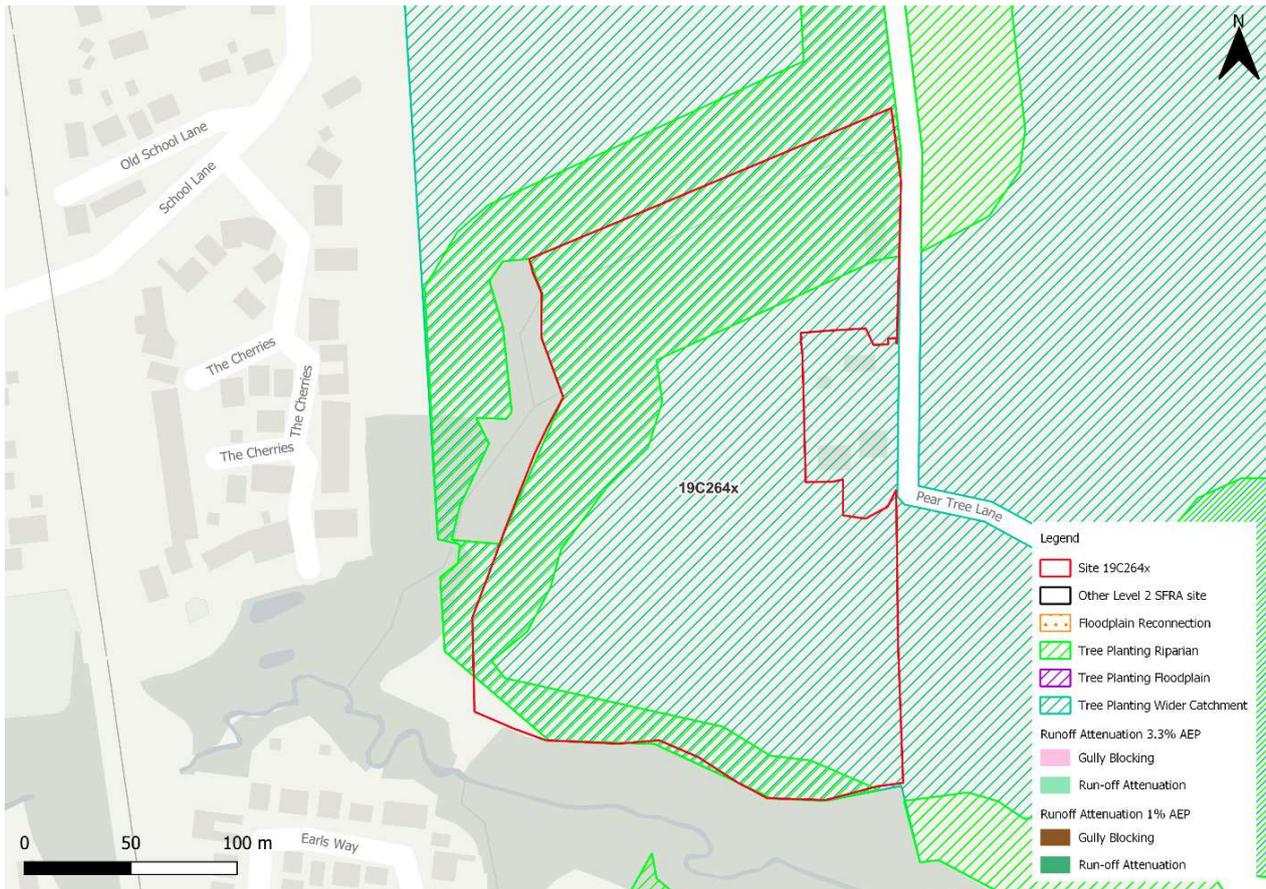


Figure 2-3: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

2.4.1 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 2-4 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 one reservoir located within Chorley, namely Anglezarke reservoir, 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 United Utilities 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.

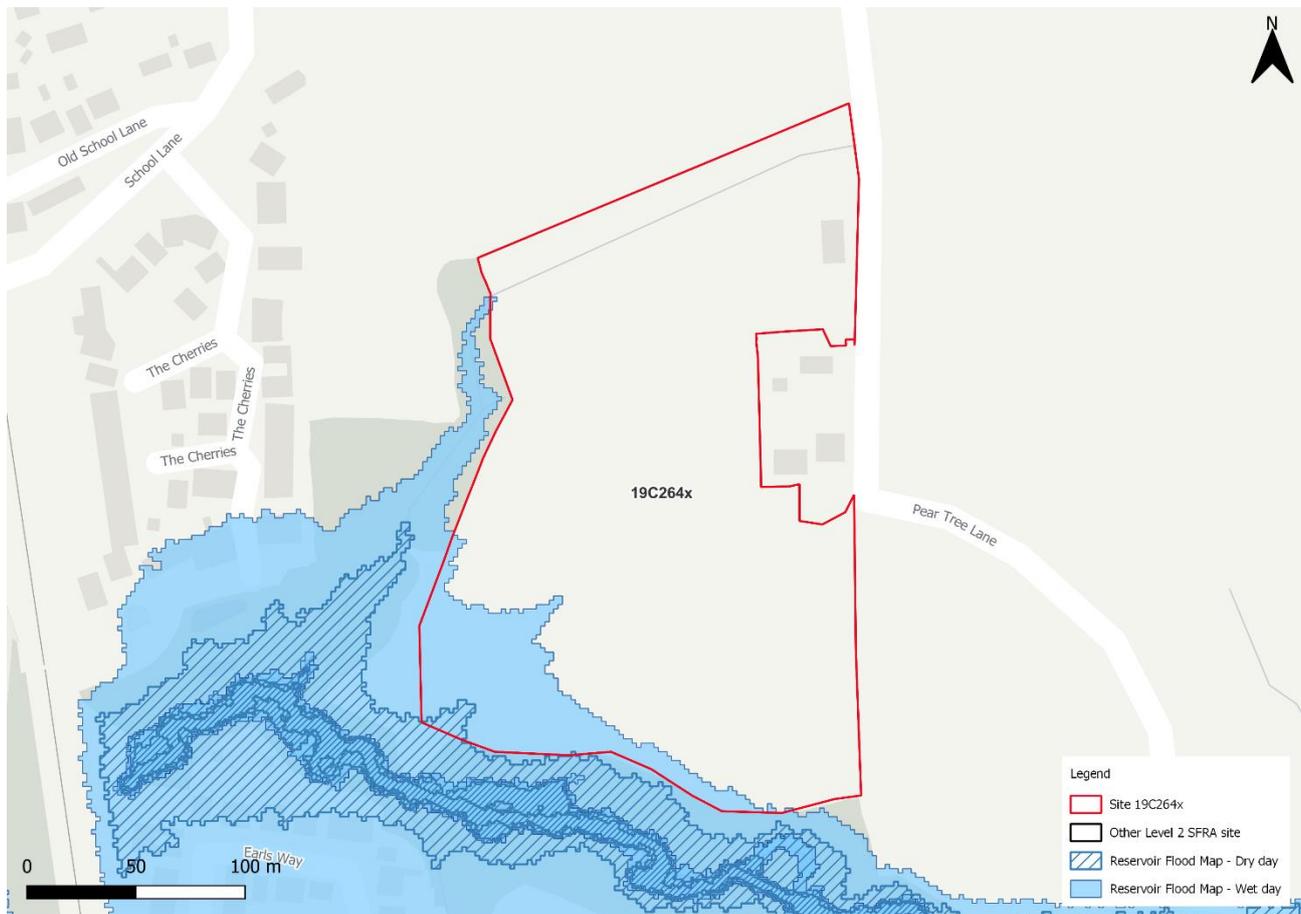


Figure 2-4: Flood risk from reservoirs

2.5 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 incidents within the vicinity of the site.

2.6 Flood warning and access and escape routes

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 an FWA. The site is not located within a FAA.

Based on available information, safe access and escape routes could likely be achieved during a flood event via Pear Tree Lane.

2.7 Observations, mitigation options and site suitability - fluvial

- The proposed development of the site is anticipated to 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 FRA must show that the development can be designed to be safe and that there is adequate emergency planning provision (para 014 FRCC-PPG).
- The majority of the site is located within Flood Zone 1. There is a small area along the southern boundary of the site within Flood Zone 2.
- Rushton's Brook is a small, unmodelled watercourse which flows adjacent to the northern boundary of the site. Any FRA should quantify the risk to the site from this watercourse.
- The FMfP 1% AEP undefended event plus central climate change allowance extent has been used to assess future risk to the site. Flood depths, velocity and hazards were not available at the time of writing, therefore a fully robust assessment of fluvial flood risk to this site cannot be carried out.
- Any update to the Level 2 SFRA and/or any FRA should include for detailed modelling of Chapel Brook including for climate change.
- Given the potential reservoir risk to the site, developers should consider¹:
 - Whether additional modelling is required to understand the flood risk from the reservoir, referring to the specification for the reservoir flood maps as a starting point
 - Whether the development may have an impact on the reservoir or reservoir owner
 - Referring to the Central Lancashire Level 1 SFRA for information on reservoir risk and recommendations for how to address it
 - Contacting the LPA for pre-application advice
 - Contacting the LPA to understand the need to consult with their emergency planning team and with the reservoir owner
- The Council should consult United Utilities to ascertain whether the proposed development could affect the reservoir's risk designation, its design category or how it is operated

¹ [Reservoir flood maps: when and how to use them | Environment Agency | 2021](#)

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly seen to be very low. Approximately 1% of the site is within the high risk surface water flood zone. A further 1% is at medium surface water risk, and 3% of the site is observed to be at low surface water risk, as shown in Table 3-1.

In the high and medium risk events, surface water risk is confined to a flow path through the north of the site, coincident with the Rushton's Brook watercourse. There is a deep area of ponding along the eastern boundary of the site, however this is largely confined to outside of the boundary. Access should be directed to the north of the site, avoiding this significant risk area. In the low risk event, an additional flow path emerges through the south of the site, extending from the area of ponding along the eastern boundary of the site in the high and medium risk events.

Greatest flood depths within the medium risk event are between 0.6 and 0.9 m (Figure 3-1) with some areas of significant hazard (Figure 3-2), however these are confined to the Rushton's Brook watercourse. Safe access and escape routes should be possible via Pear Tree Lane in all events.

Table 3-1: Existing surface water flood risk based on the RoFSW map

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
95	3	1	1

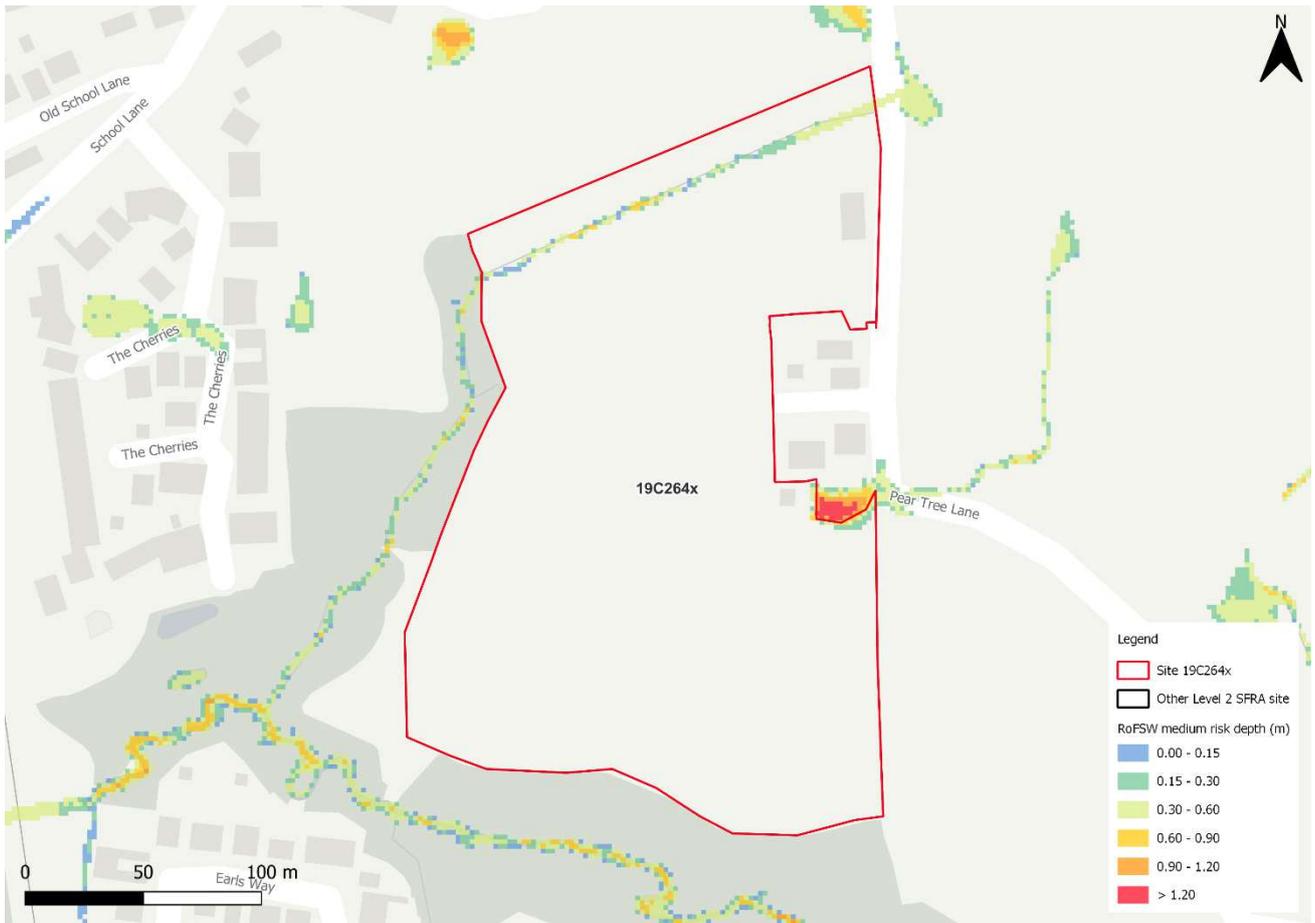


Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

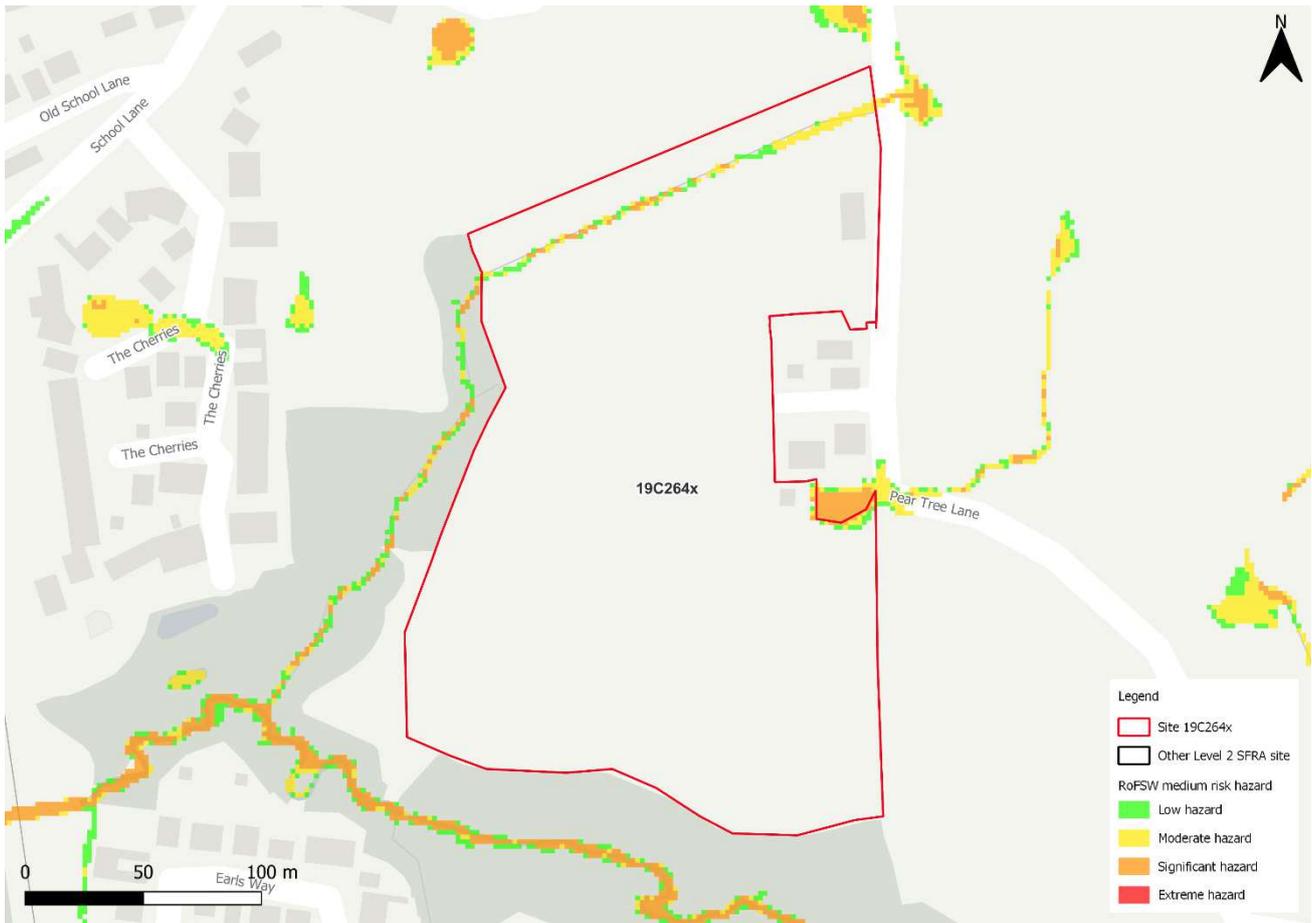


Figure 3-2: Medium risk event surface water flood hazard² (Risk of Flooding from Surface Water map)

3.2 Impacts from climate change

The impact of climate change on surface water flood risk has been modelled. This allows for direct comparison with the RoFSW map. With consideration of the EA’s SFRA guidance, the latest climate change allowances have been modelled as shown in Table 3-2.

Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	45%

Figure 3-3 shows the medium risk surface water flood depths plus 45% climate change. Risk is modelled to be greater than present day conditions, with the medium risk climate change event being similar in extent to the present day low risk event. There are some

² 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

additional areas of ponding within topographic low spots in the north of the site. A clear shallow flow route is modelled to develop through the south of the site, draining into Chapel Brook. Maximum flood depths outside of the Rushton's Brook watercourse are modelled to be between 0.3 and 0.6 m (Figure 3-3) with some areas of significant hazard (Figure 3-4). If feasible, both flow paths should be retained and included in site layout and design as features. Availability of safe access and escape routes may become an issue with deep ponding to the access road in the east in two locations.

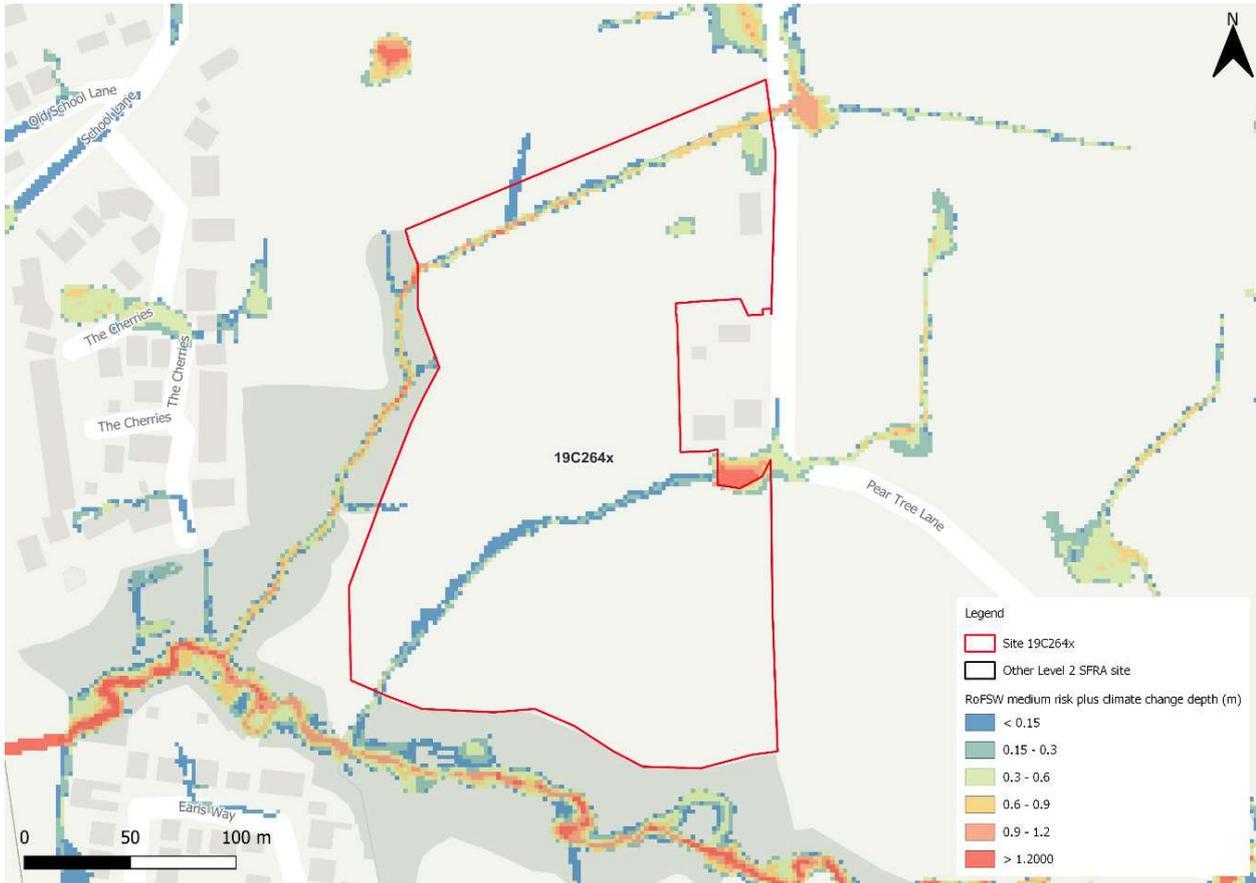


Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)



Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is predominantly very low, with approximately 95% of the site being at very low risk. Surface water risk in the high and medium risk events is largely confined to the channel of the existing watercourse on site.
- The modelled medium risk climate change outputs indicate a similar extent of risk to the present day low risk event, with additional areas of ponding emerging through the site. Existing flow paths and topographic depressions should be maintained in site design.
- Safe access and escape routes should be achievable via Pear Tree Lane in all events. However, with climate change access from this road may become limited given the ponding in two locations. This risk should be investigated further through the drainage strategy.
- The Groundwater Emergence Map (Figure 4-1) indicates that ground conditions may be suitable for infiltration SuDS. This should be further explored through appropriate ground survey as part of the FRA and drainage strategy.
- Site runoff should be maintained at greenfield rates and, where possible, betterment should be achieved.
- A full drainage strategy would be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. This will

require surface water modelling based on layout plans and detailed design and full consultation with the LLFA.

- Note, the RoFSW map is not suitable for identifying whether an individual property will flood and is therefore indicative. The RoFSW map is not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

4 Risk from groundwater

Risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide³. Figure 4-1 shows the map for the site and the surrounding areas and Table 4-1 explains the risk classifications.

The entirety of the site is in an area where there is no groundwater risk. Groundwater conditions may therefore be suited to infiltration SuDS.

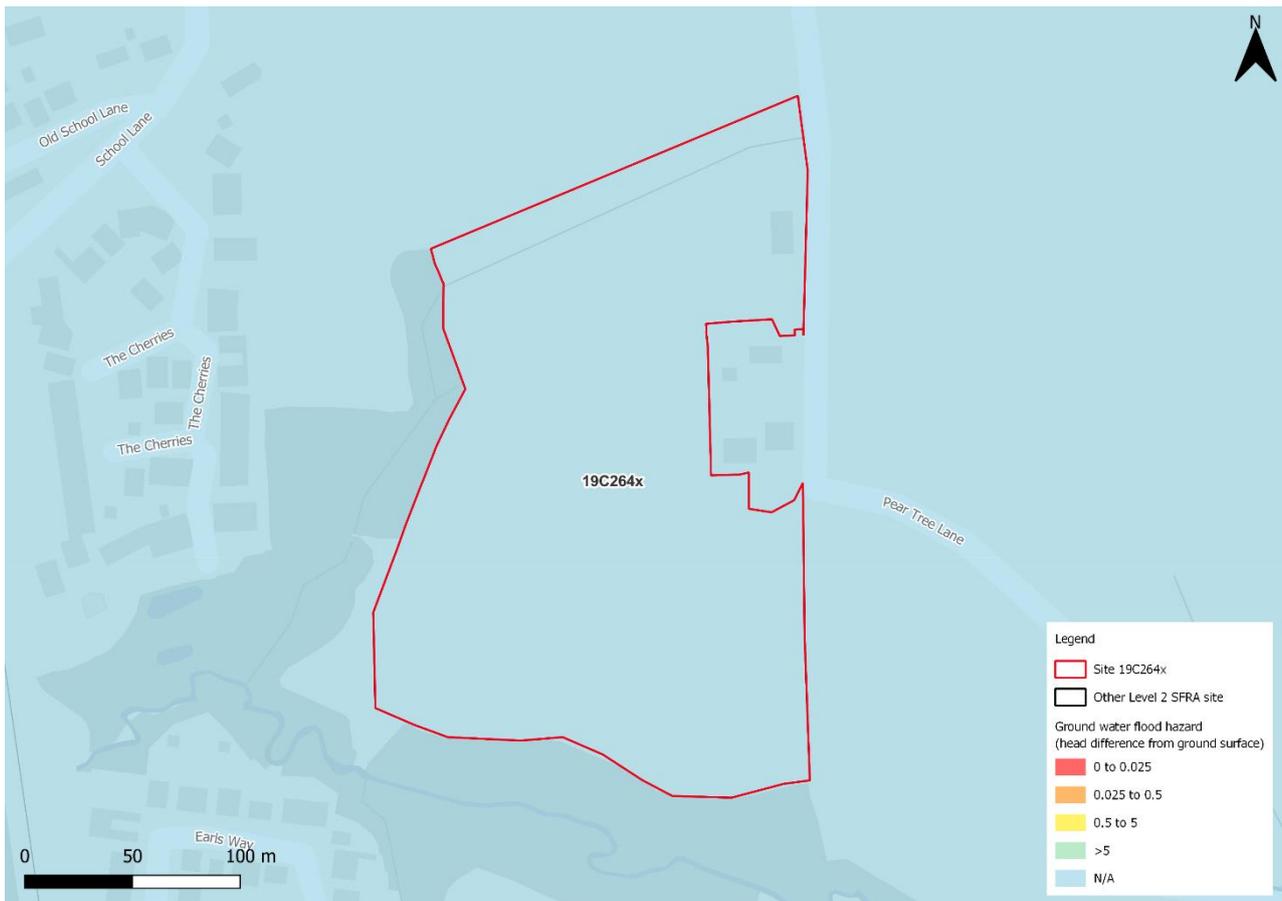


Figure 4-1: JBA 5m Groundwater Emergence Map

³ [Strategic flood risk assessment good practice guide. ADEPT. December 2021.](#)

Table 4-1: Groundwater Flood 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.	

5 Overall site assessment

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

This site is not required to pass part b) of the exception test⁴ 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 100 years for residential development.

5.2 Recommendations, FRA requirements and further work

Based on the evidence presented in the Level 1 SFRA (2025) and this Level 2 SFRA:

- Based on the evidence in this SFRA, it should be appropriate to develop this site for more vulnerable purposes given the majority of the site is in Flood Zone 1 and at very low surface water flood risk.
- Fluvial risk to the site from Rushton's Brook and Chapel Brook should be quantified as part of a site-specific FRA and should account for the latest climate change allowances.
- A drainage strategy should include for the surface water flow paths and account for limited access to the road on the eastern boundary.
- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Central Lancashire Local Plan and LLFA policies; and national and local SuDS policy and guidelines.
- Throughout the FRA process, consultation should be carried out with the following, where applicable, the LPA; LLFA; emergency planning officers; EA; UU; the highways authorities; and the emergency services.

⁴ Para 178 National Planning Policy Framework 2024

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19C411

Final

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This report describes work commissioned by Preston City Council, on behalf of the Central Lancashire Local Plan Team, by an instruction dated 19 August 2024. The Client's representative for the contract was Carolyn Williams of Preston City Council. Georgina Williams of JBA Consulting carried out this work.

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

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Contents

1	Background	1
	1.1 Site 19C411	1
2	Flood risk from rivers	4
	2.1 Existing risk	4
	2.2 Impacts from climate change	5
	2.3 Flood risk management	6
	2.4 Residual risk	8
	2.5 Historic flood incidents	8
	2.6 Flood warning and access and escape routes	9
	2.7 Observations, mitigation options and site suitability - fluvial	9
3	Flood risk from surface water	11
	3.1 Existing risk	11
	3.2 Impacts from climate change	13
	3.3 Observations, mitigation options and site suitability - surface water	15
4	Risk from groundwater	17
5	Overall site assessment	19
	5.1 Can part b) of the exception test be passed?	19
	5.2 Recommendations, FRA requirements and further work	19
6	Licencing	21

List of Figures

Figure 1-1: Existing site location boundary	2
Figure 1-2: Topography	3
Figure 2-1: Existing risk from rivers to the site	5
Figure 2-2: Flood extent for 1% AEP undefended flood event plus central climate change allowance (Flood Map for Planning)	6
Figure 2-3: Natural Flood Management (NFM) potential mapping	7
Figure 2-4: Recorded historic flood events onsite and around the site	8
Figure 2-5: EA Flood Warning Areas	9
Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)	12
Figure 3-2: Medium risk event surface water flood hazard (Risk of Flooding from Surface Water map)	13
Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)	14
Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)	15
Figure 4-1: JBA 5m Groundwater Emergence Map	17

List of Tables

Table 2-1: Existing fluvial flood risk	4
Table 3-1: Existing surface water flood risk based on the RoFSW map	11
Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment	13
Table 4-1: Groundwater Hazard Classification	18

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19C411. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Central Lancashire Level 1 SFRA' (2025) and read the 'Central Lancashire Level 2 SFRA Main Report' (2025) and is therefore familiar with the terminology used in this report.

1.1 Site 19C411

- Location: Land south west of The Green and Langton Brow
- Existing site use: Mixed use; residential and commercial
- Existing site use vulnerability: More vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area: 2.4 hectares
- Proposed development impermeable area: 2 hectares (assumed 85% impermeable area)
- EA model: N/A
- Watercourse: Syd Brook
- Summary of requirements from scoping stage:
 - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
 - Assessment of modelled fluvial flood depths and hazards
 - Assessment of surface water flood depths and hazards
 - Assessment of all other sources of flood risk



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 (accessed May 2025) and Flood Zone 3b (functional floodplain), as updated in the Central Lancashire Level 1 SFRA (2025), the percentage areas of the site within each fluvial flood zone are stated in Table 2-1 and can be viewed on Figure 2-1. The Flood Map for Planning does not consider flood defence infrastructure (Section 2.3) or the impacts of climate change (Section 2.2).

Functional floodplain is largely present in the southeast of the site and is present along the entire southern boundary of the site, adjacent to Syd Brook. The area of functional floodplain onsite should be left free of development. It should be noted that functional floodplain along Syd Brook has been conservatively based on previous Flood Zone 3 of the Flood Map for Planning, prior to March 25, which does not take into account the new NaFRA2 modelling. Undertaking updated modelling of the Syd Brook should be considered at the FRA stage. 21% of the site is located within Flood Zone 3a, a further 4% is located within Flood Zone 2 and the remaining 43% is within Flood Zone 1.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
43	4	21	32



Figure 2-1: Existing risk from rivers to the site

2.2 Impacts from climate change

The impact of climate change on flood risk from Syd Brook has not been modelled for this SFRA, as a model covering Syd Brook was not made available for consideration. Therefore, the FMfP 1% AEP undefended plus central climate change extent has been used to assess future risk to the site. Based on this approach, future risk is similar in extent to the present day Flood Zone 2 (Figure 2-2).

The impacts of climate change must be modelled using the EA's latest allowances for peak river flows to assess flood depth, hazard and velocity in order to inform the exception test. The EA should be consulted on the data source of the Flood Map for Planning in this location. If the Flood Map for Planning is based on a detailed model of Syd Brook, any updates to this Level 2 SFRA and/or any FRA should make use of this model and include for the most up to date climate change allowances.



Figure 2-2: Flood extent for 1% AEP undefended flood event plus central climate change allowance (Flood Map for Planning)

2.3 Flood risk management

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

2.3.1 Cumulative impacts

A cumulative impact assessment was completed through the Central Lancashire Level 1 SFRA (2025), which aimed to identify catchments sensitive to the cumulative impact of development. Site 19C411 is located within one catchment, namely; Syd Brook. This is ranked as a medium sensitivity catchment. Planning policy considerations for sites at medium sensitivity to the cumulative impacts of development that apply to this site include:

- Incorporate SuDS and provide details of adoption, ongoing maintenance, and management, in line with the Lancashire SuDS Guidance¹.
- Developments should be incentivised to provide wider betterment by being requested to demonstrate in site-specific FRAs and Surface Water Drainage

¹ [Lancashire SuDS Guidance](#)

Strategies what measures can be put in place to contribute to a reduction in flood risk downstream.

- Developments are to aim to achieve greenfield runoff rates and volumes in their post-development state.
- Surface Water Management Plans should be developed as required.

The full list of planning policy suggestions can be found in Appendix G of the Level 1 SFRA.

2.3.2 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. In the southern area of the site, there are significant opportunities for woodland planting to reduce runoff downstream. Upstream of the site, along Syd Brook, there is also potential to reconnect the channel to the floodplain, allowing flood water to be stored during a flood event. A Flood Risk Activity Permit (FRAP) may be required for NFM activities or works within the floodplain when planning permission is not required. These areas are shown in Figure 2-3.

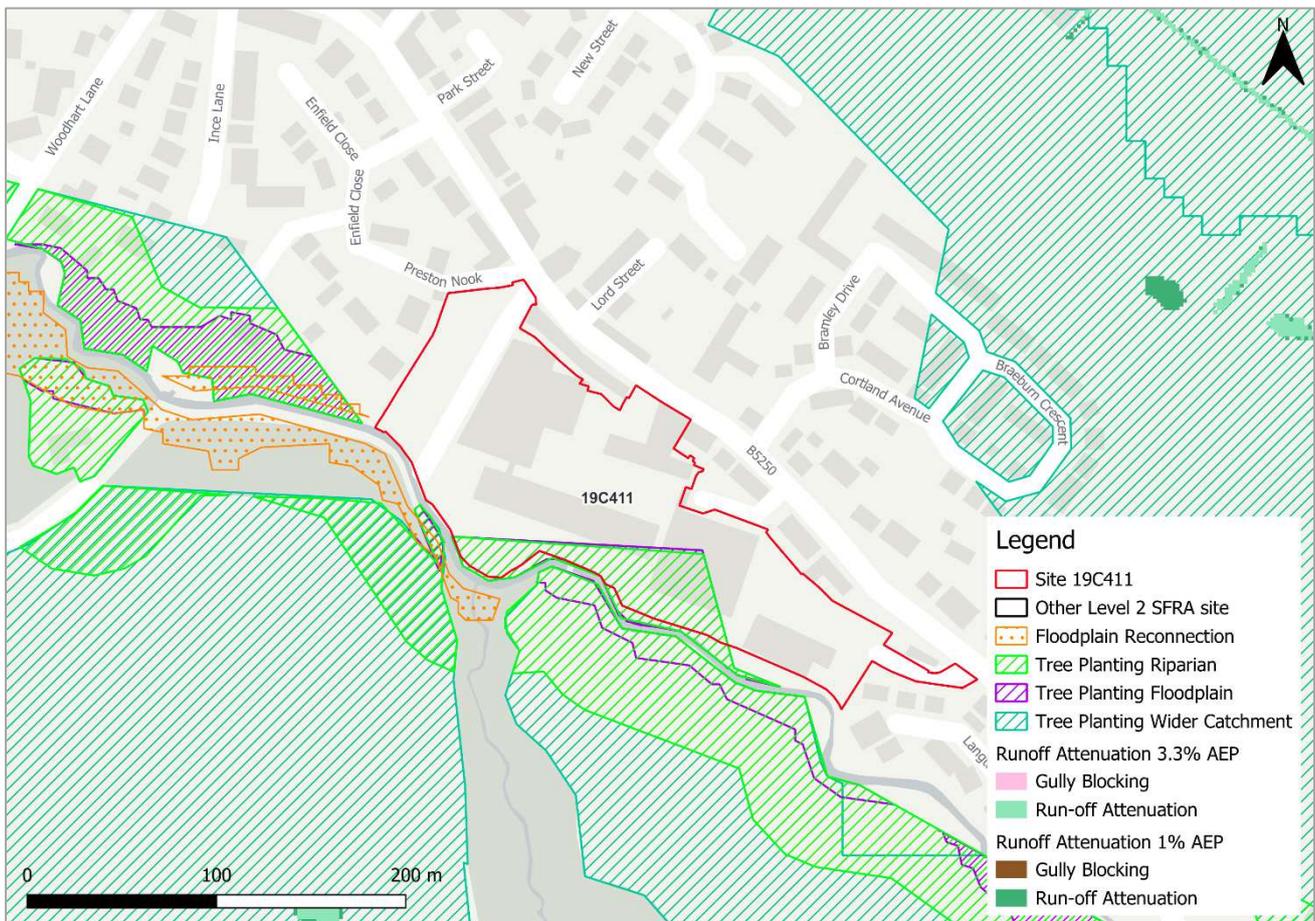


Figure 2-3: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

2.4.1 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. 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 not modelled to be at risk from reservoir flooding.

2.5 Historic flood incidents

The EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. Historic risk to the site is shown in Figure 2-4 which shows that an area along to the southeast of the site has been subject to flooding in the past. The RFO dataset references that the historic event occurred in December 2015 during the Boxing Day Floods due to channel capacity exceedance of Syd Brook which runs adjacent to the southern boundary of the site.



Figure 2-4: Recorded historic flood events onsite and around the site

2.6 Flood warning and access and escape routes

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. Site 19C411 is located within one FWA, namely; 012FWFL65 - Syd Brook at Eccleston, as shown in Figure 2-5.

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 also located within a FAA, namely; 012WAFly - River Lostock and River Yarrow.

Based on available information, safe access and escape routes could likely be achieved during a flood event via the B5250 to the north of the site.

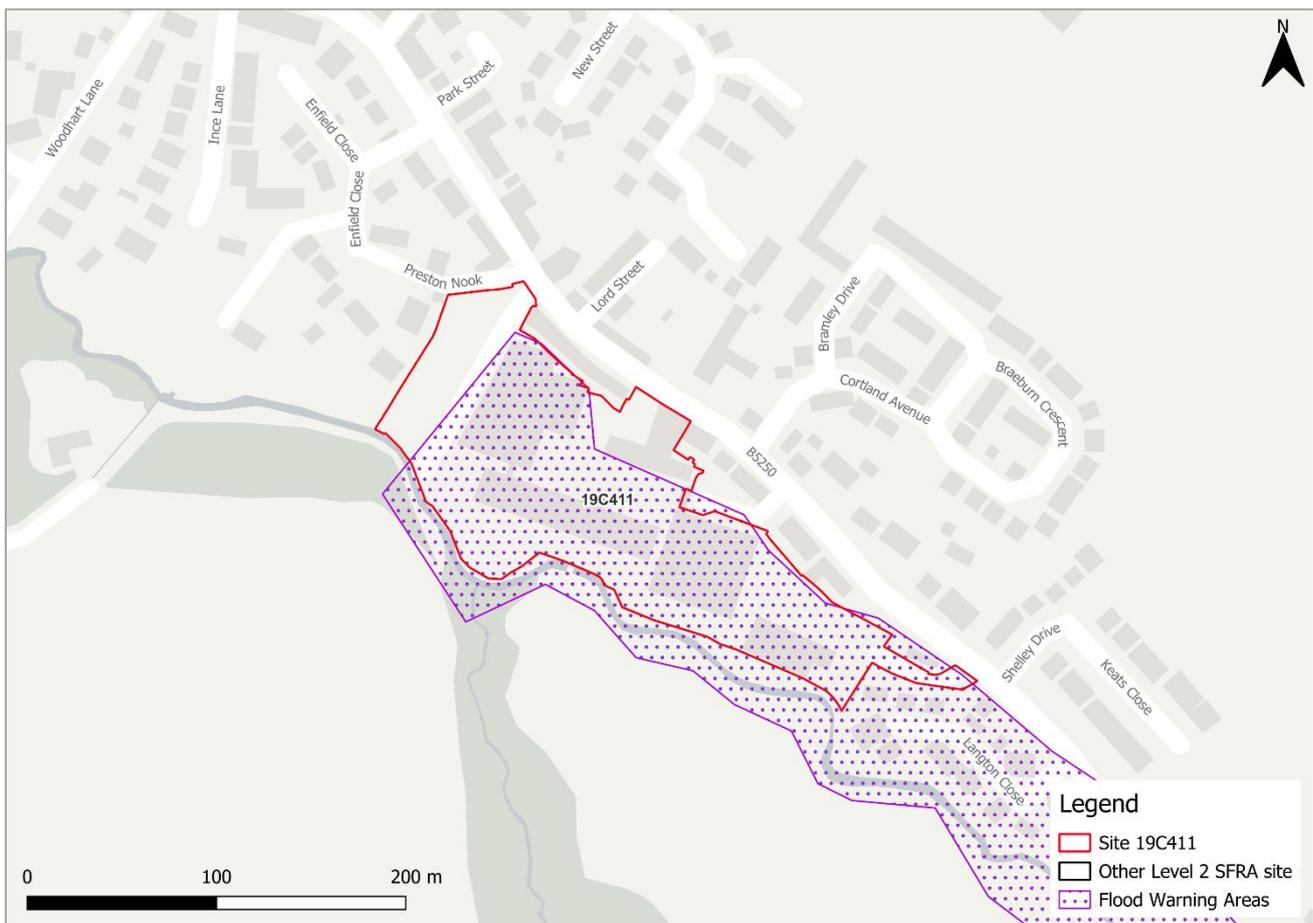


Figure 2-5: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - fluvial

- The site is modelled to be within the functional floodplain in the east and along the southern boundary of the site, adjacent to Syd Brook. Development is not permitted within the functional floodplain. However, the functional floodplain in this area is conservatively based on the previous Flood Zone 3 of the Flood Map for Planning, prior to March 25.

- A flood risk activity permit may be required from the EA if development is planned within 8m of the bank of Syd Brook, which is a main river. EA advice would normally recommend for no development within 8m of a main river, to enable access for maintenance activities. The EA can advise on whether a permit will be required. If feasible, this area would be used as a green / blue corridor which can provide ecological, social and amenity value.
- The FMfP 1% AEP undefended event plus central climate change allowance extent has been used to assess future risk to the site. Flood depths, velocity and hazards were not available at the time of writing, therefore a fully robust assessment of fluvial flood risk to this site cannot be carried out.
- Any update to the Level 2 SFRA and/or any FRA should include for detailed modelling of Syd Brook including for climate change.
- Safe access and escape routes are available via the B5250 located north of the site, based on available information.

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly very low. Approximately 1% of the site is within the medium risk surface water flood zone. A further 13% is at low surface water risk, as shown in Table 3-1.

In the medium risk event, surface water risk is largely confined to a small, shallow area of ponding in a topographic low spot towards the south of the site. In the low risk event, there are a number of surface water flow paths developing through the site, largely confined to the hardstanding roads and are constrained by the existing development within the site.

Greatest flood depths in the medium risk event range between 0.3 and 0.6 m (

Figure 3-1) with some areas of moderate hazard (Figure 3-2). Safe access and escape routes should be possible via the B5250 to the north of the site in all events.

Table 3-1: Existing surface water flood risk based on the RoFSW map

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
86	13	1	0



Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

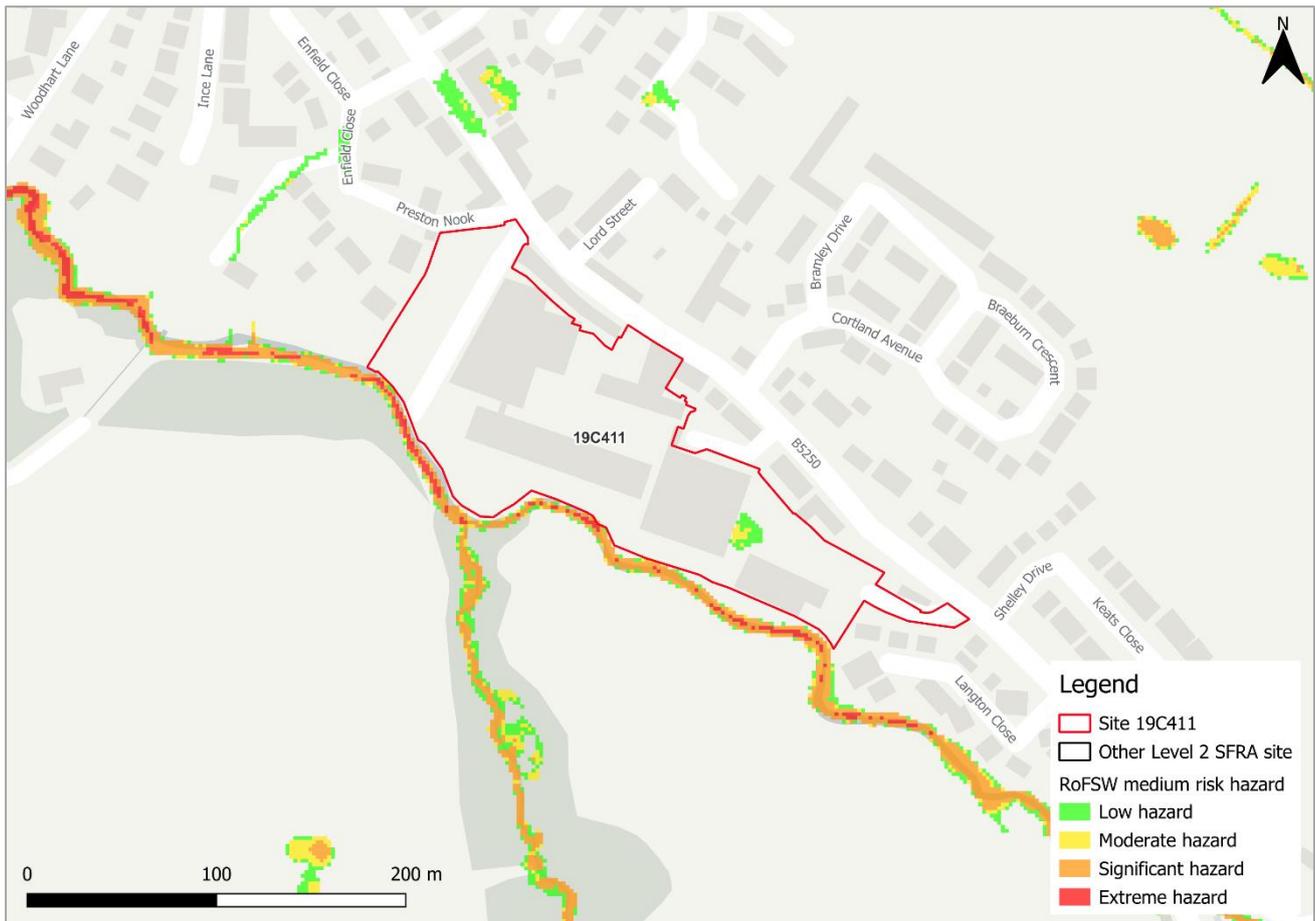


Figure 3-2: Medium risk event surface water flood hazard² (Risk of Flooding from Surface Water map)

3.2 Impacts from climate change

The impact of climate change on surface water flood risk has been modelled. This allows for direct comparison with the RoFSW map. With consideration of the EA’s SFRA guidance, the latest climate change allowances have been modelled as shown in Table 3-2.

Table 3-2: Modelled climate change allowances for rainfall for the Douglas management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	45%

Figure 3-3 shows the medium risk surface water flood depths plus 45% climate change. There are a number of additional surface water flow paths within the medium risk event constrained by the existing development within the site, similar to the present day low risk

² 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

event. Maximum flood depths are modelled to be 0.6m and 0.9m, with some areas of significant hazard (Figure 3-4).

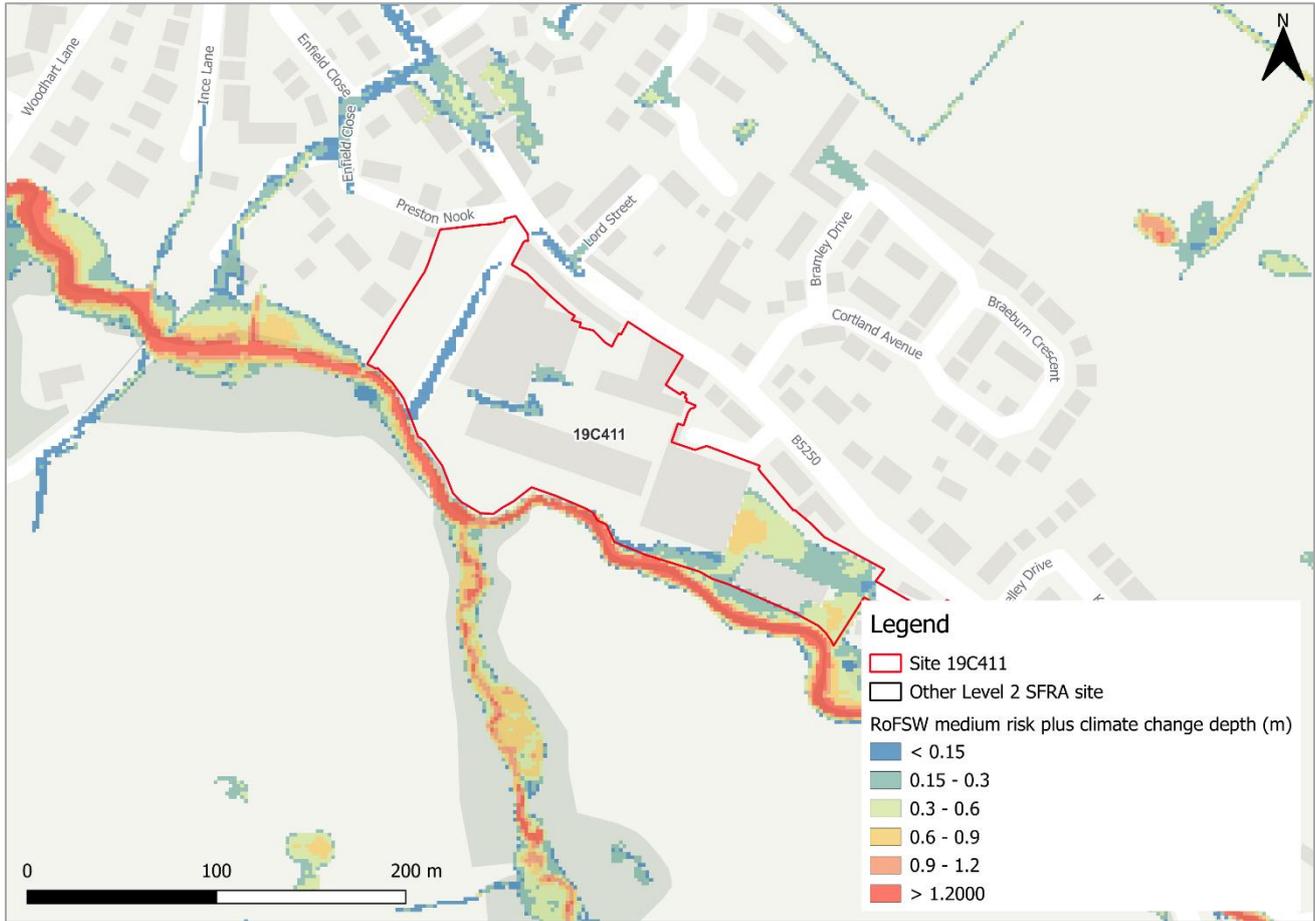


Figure 3-3: Medium risk event surface water flood depths plus 45% climate change (based on Risk of Flooding from Surface Water map)



Figure 3-4: Medium risk event surface water flood hazards plus 45% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is largely very low, with 86% of the site being at very low surface water flood risk. In the medium risk event, surface water risk is confined to an area of ponding within a topographic low spot and is constrained by the existing development within the site.
- The effects of climate change on surface water have been modelled for this SFRA using the medium risk surface water flood depths plus 45% climate change. There are additional surface water flow paths and areas of ponding due to existing development constraints within the medium risk plus climate change event in comparison to the present day medium risk event. Any existing flow paths and topographic depressions should be maintained in site design.
- Safe access and escape routes should be achievable via the B5250 in all events.
- The Groundwater Emergence Map (Figure 4-1) indicates that ground conditions may be suitable for infiltration SuDS in the majority of the site. This should be further explored through appropriate ground survey as part of the FRA and drainage strategy.
- Were development to proceed, a drainage strategy would be required to ensure there is no increase in surface water flood risk elsewhere as a result of new

development. This will require surface water modelling based on layout plans and detailed design and full consultation with the LLFA.

- Site runoff should be maintained at current rates and, where possible, betterment should be achieved.
- 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 new development or whether further capacity will be required.
- The RoFSW map is not suitable for identifying whether an individual property will flood and is therefore indicative. The RoFSW map is not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

4 Risk from groundwater

Risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Emergence Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide³. Figure 4-1 shows the map for Site 19C411 and the surrounding areas and Table 4-1 explains the risk classifications.

Within the southwest of the site there is a risk groundwater may emerge at significant rates and has the capacity to flow overland and/or pond within any topographic low spots. In this area there is a risk of flooding to both surface and subsurface assets. The rest of the site is in an area where there is no risk of groundwater emergence. Groundwater conditions may therefore be suited to infiltration SuDS in these areas.

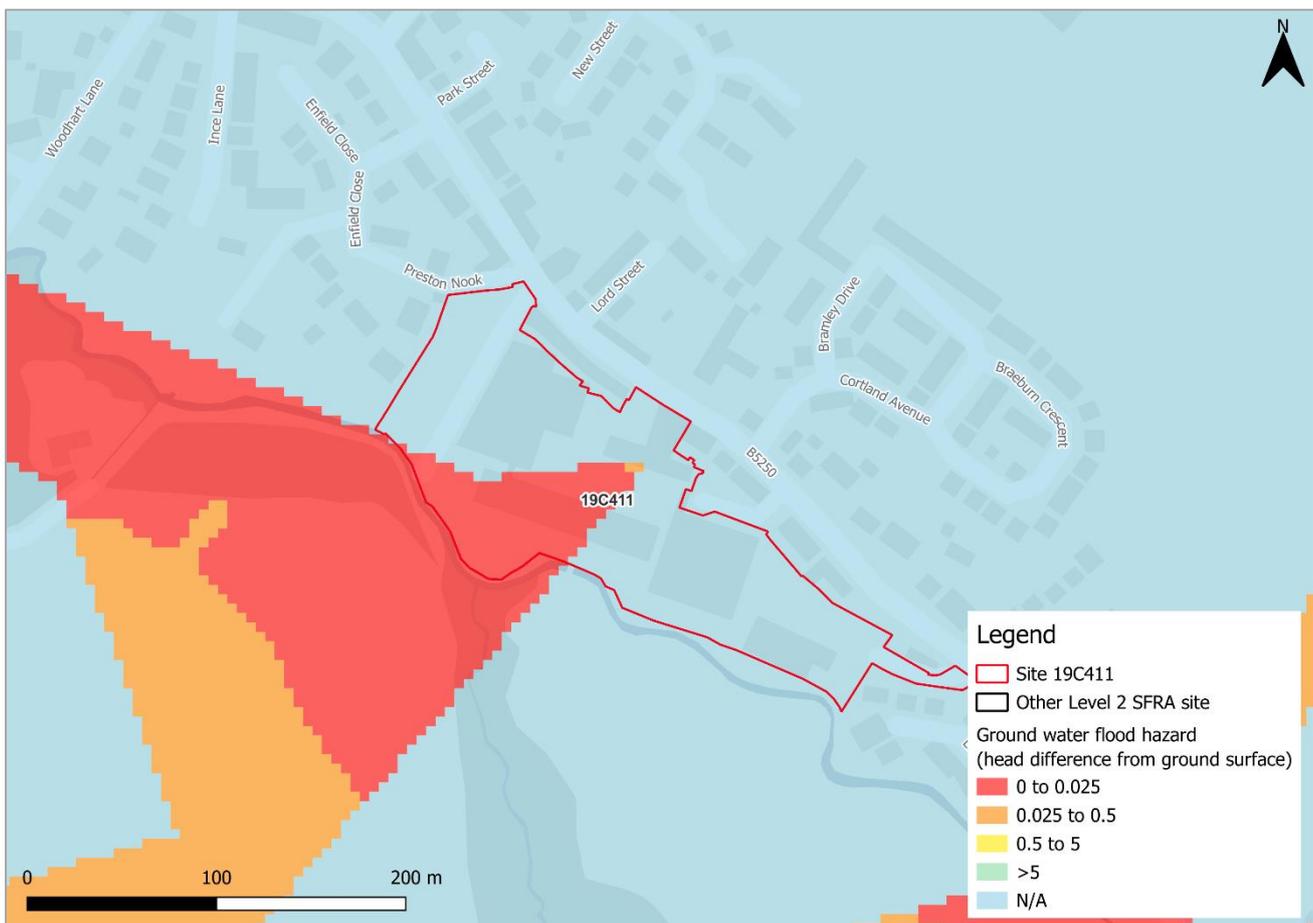


Figure 4-1: JBA 5m Groundwater Emergence Map

³ [Strategic flood risk assessment good practice guide. ADEPT. December 2021.](#)

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.	

5 Overall site assessment

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

To pass part b) of the exception test⁴, it must be proven that the development can be safe for its lifetime, which is 100 years for residential development. Given the absence of modelled climate change depth and hazard data to inform future fluvial flood risk to the site, it cannot be proven that this site can remain safe for its lifetime and therefore the exception test cannot be passed, at this stage.

The areas of flood risk within this site cannot be developed until the required information detailed in this SFRA on existing and future flood risk from Syd Brook is fully ascertained. This is because, at this stage, it cannot be proven that the site can remain safe for its lifetime. The site can only be allocated if all development can be directed to areas of low flood risk.

Where additional, more detailed modelled information on flood risk become available through an update to the SFRA or through a site-specific FRA, that show the risk area to be lower than currently shown, more of the site could then be developed. Conversely, were the risk to be greater, any development must account for this. Flood risk elsewhere should not be increased as a result of development.

5.2 Recommendations, FRA requirements and further work

Based on the evidence presented in the Level 1 SFRA (2025) and this Level 2 SFRA:

- Based on current information, this site should not be developed for residential use, unless all built development can be sited in Flood Zone 1. This will significantly impact on development yields.
- Updated present day and climate change modelling of Syd Brook should be used to update this Level 2 SFRA at the earliest opportunity to provide a robust strategic assessment of flood risk to this site and surrounding areas.
- There should be no development within the functional floodplain. There should also be no development within 8m of Syd Brook. The EA recommend for an 8m no development buffer for all main rivers to enable access for maintenance activities. This should be converted to a blue / green corridor to provide ecological, amenity and social value.
- More vulnerable development should be directed to the areas of the site within Flood Zone 1.
- A detailed drainage strategy will be required for any new development. The use of infiltration SuDS should be investigated.
- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Central Lancashire Local Plan and LLFA policies; and national and local SuDS policy and guidelines.

⁴ Para 178 National Planning Policy Framework 2024

- Throughout the FRA process, consultation should be carried out with the following, where applicable, the LPA; LLFA; emergency planning officers; EA; UU; the highways authorities; and the emergency services.

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