Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19P012

Final

June 2025

Prepared for:

Preston South Ribble Chorley Central Lancashire

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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. Laura Thompson 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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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19P012. 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 19P012

- Location: Alstoms, Strand Road
- Existing site use: Brownfield; industrial
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Employment
- Proposed site use vulnerability: Less vulnerable
- Site area: 6.4 hectares
- Proposed development impermeable area: 5.4 hectares (assumed 85% impermeable area)
- EA model: Ribble-Douglas 2010
- Watercourse: River Ribble
- 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

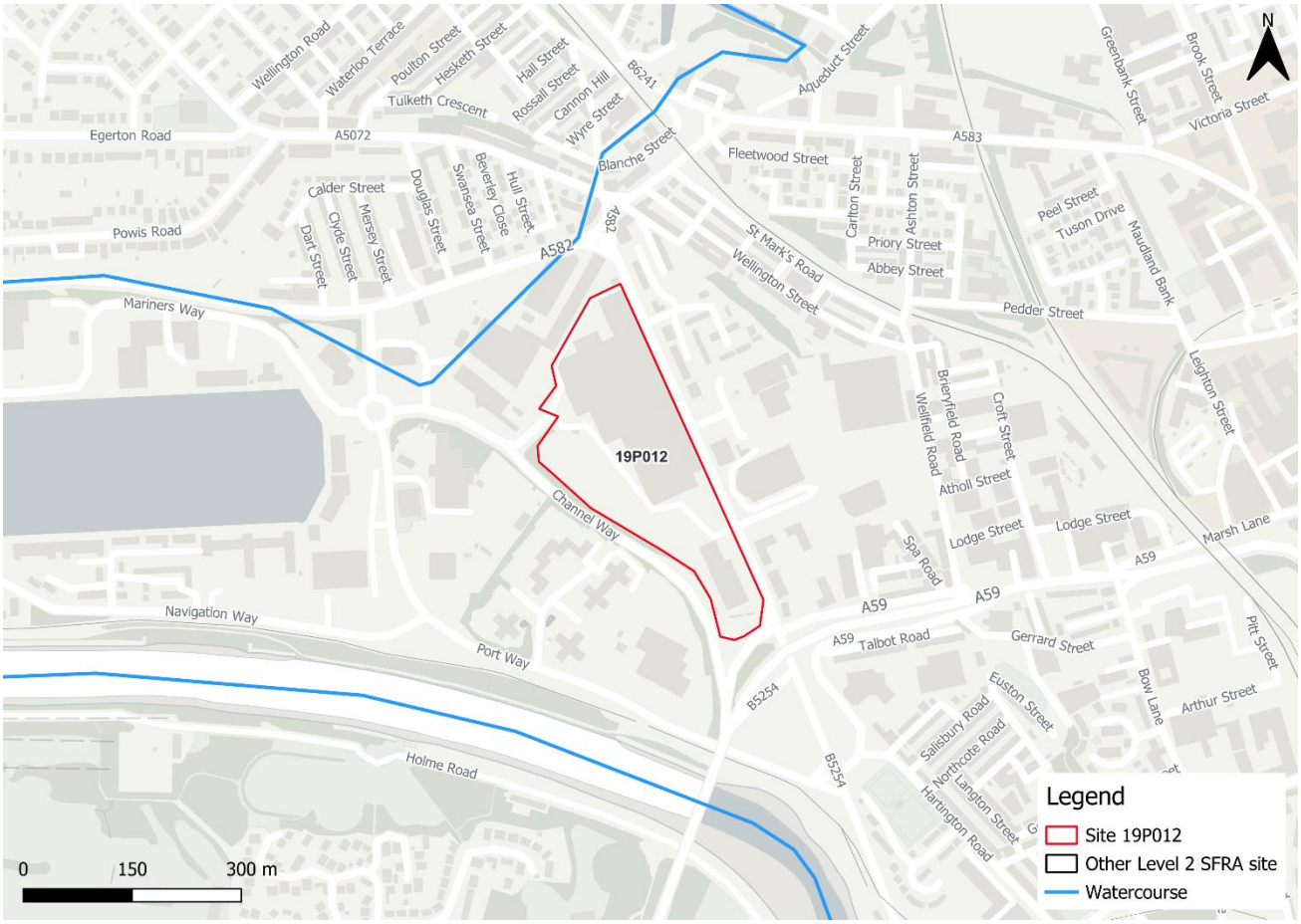

Figure 1-1: Existing site location boundary

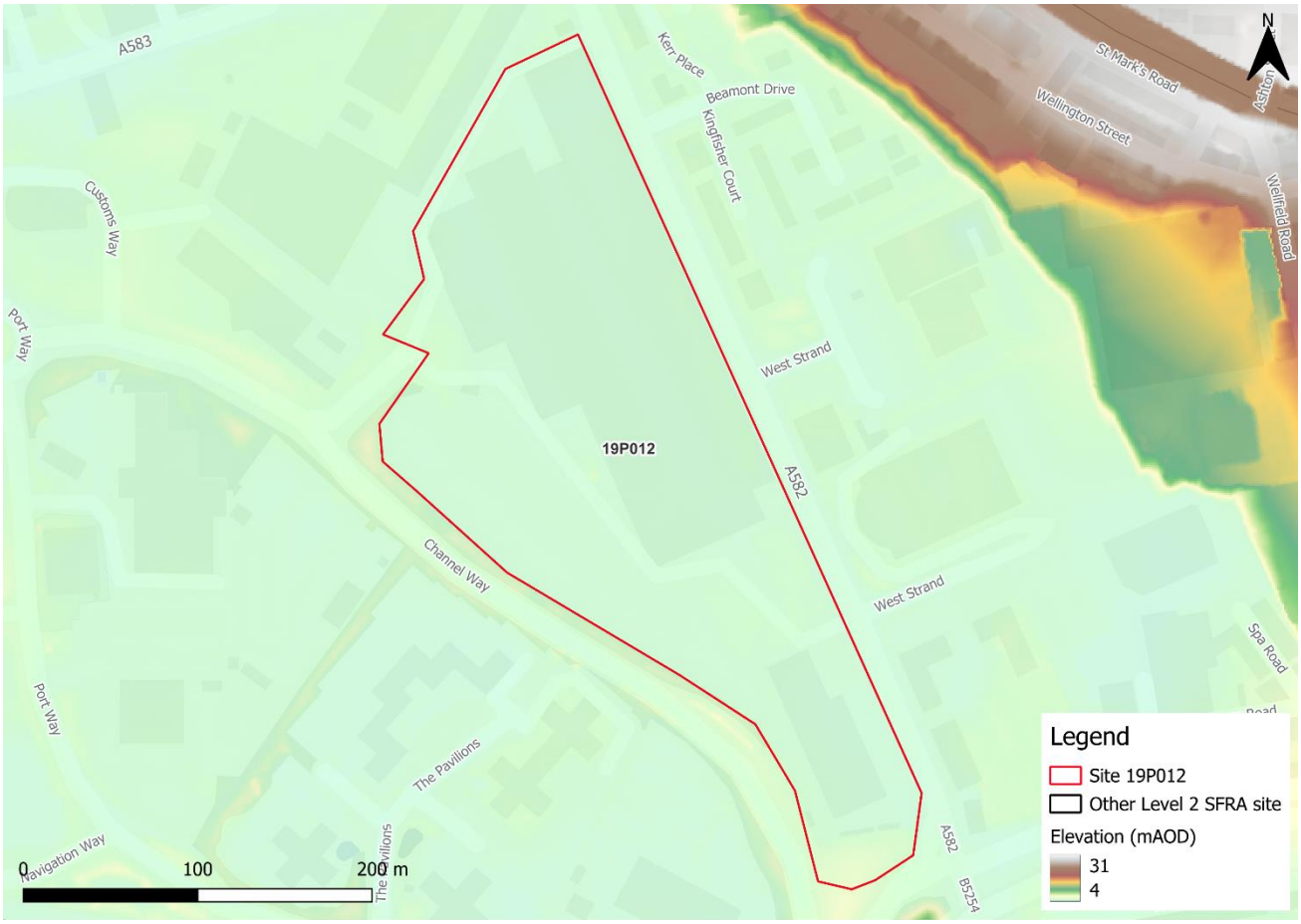

Figure 1-2: Topography

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).

The site is almost entirely located within Flood Zone 2 indicating it is at medium risk of flooding from rivers. Fluvial risk originates from the River Ribble to the south of the site.

Table 2-1: Existing fluvial flood risk

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

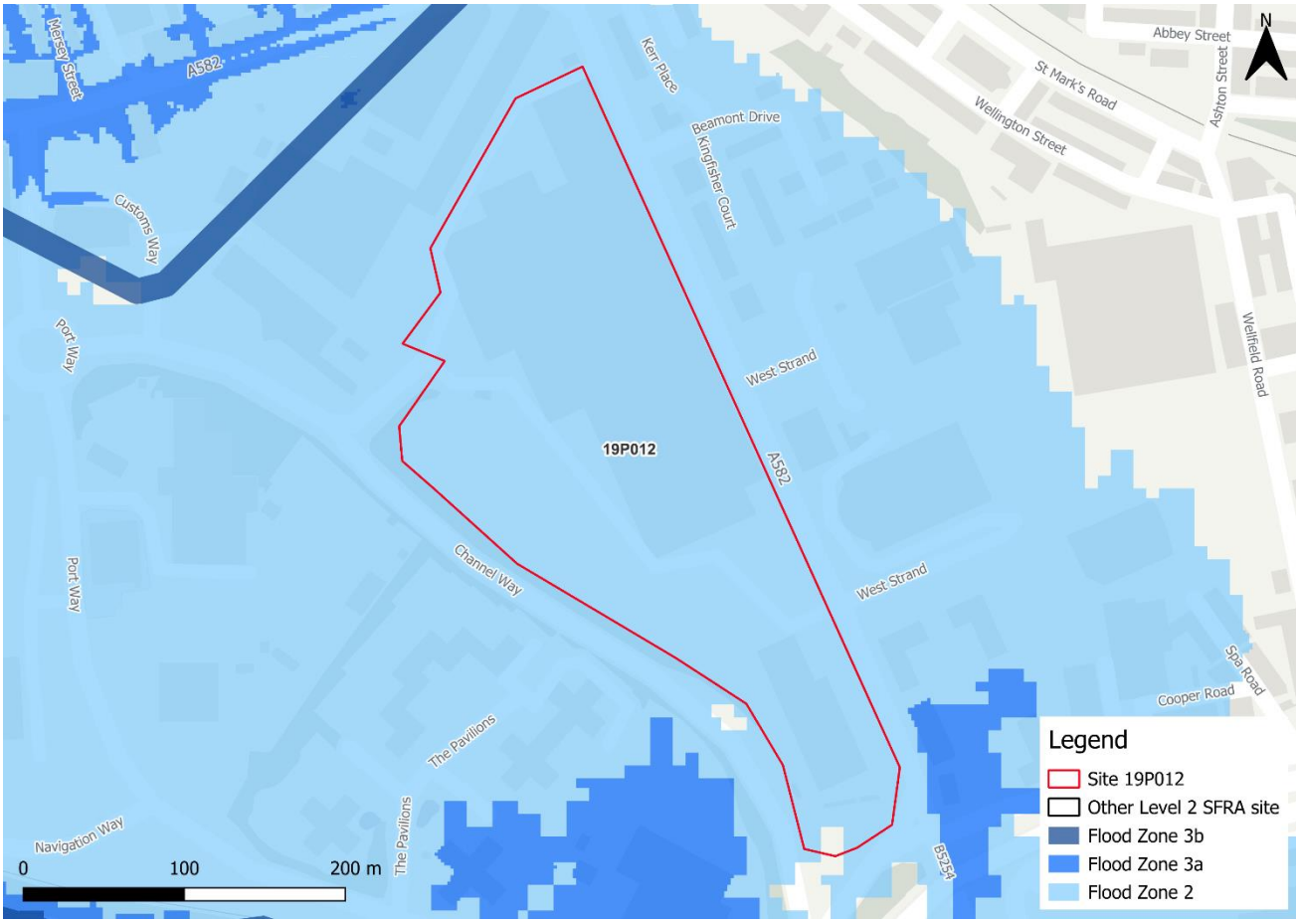

Figure 2-1: Existing risk from rivers to the site

2.1.2 Ribble-Douglas 2010 undefended model outputs

Figure 2-2 shows the modelled flood depths for the 0.1% AEP undefended event which is the event Flood Zone 2 of the Flood Map for Planning is based on. Modelled risk is similar to Flood Zone 2 across the site. However, as the Ribble-Douglas 2010 outputs are slightly different to the Flood Map for Planning in this location it will therefore mean recommendations on development will also be different when accounting for the Flood Map for Planning or the Ribble-Douglas 2010 model. The Environment Agency have confirmed that the defended scenario informs the flood zones in this area as flooding is modelled to be greater in extent than the undefended.

Maximum flood depths within the site are between 0.9 and 1.2 m with areas of hazard categorised as 'Danger for some' (Figure 2-2).

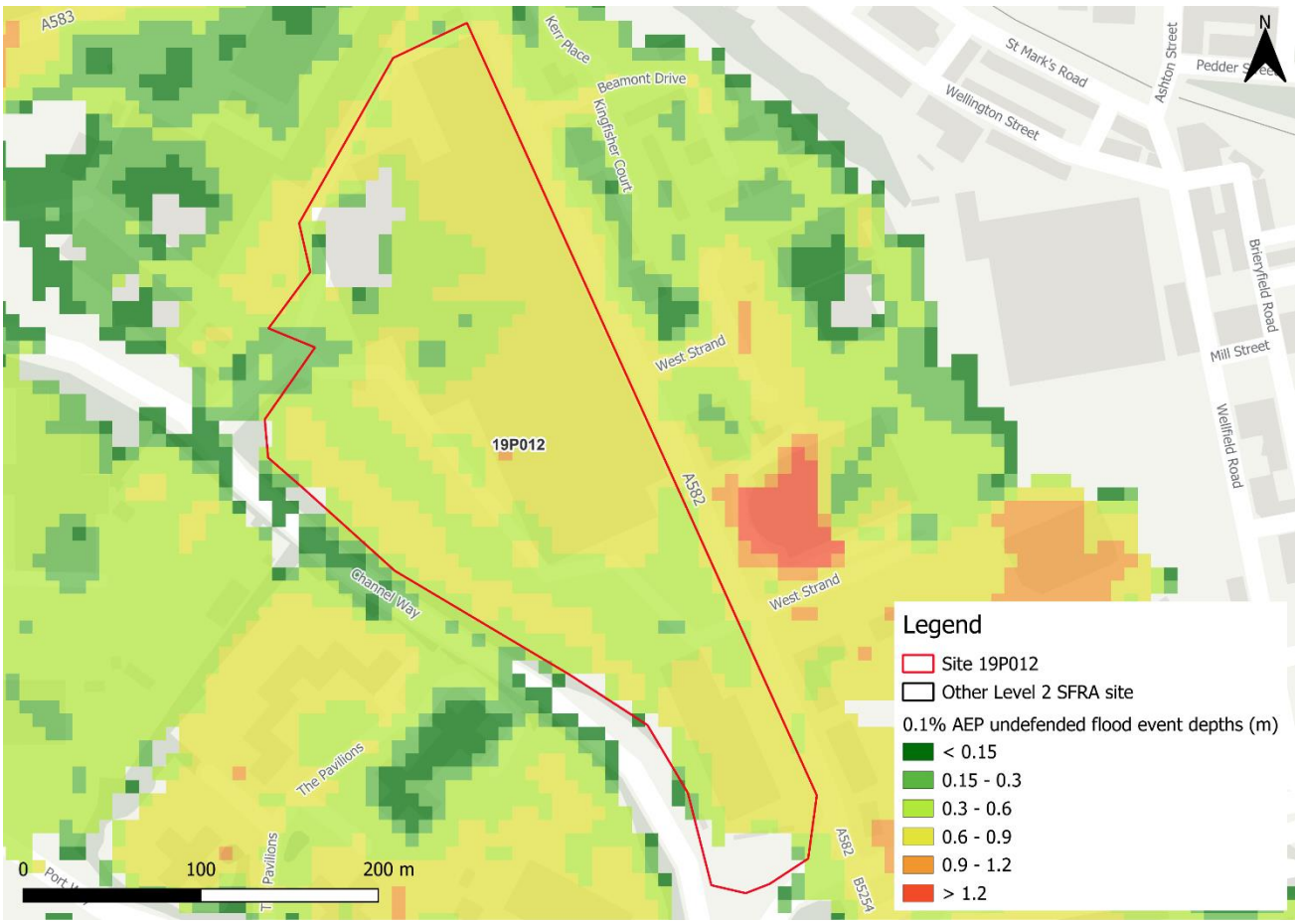

Figure 2-2: Flood depths for 0.1% AEP undefended flood event

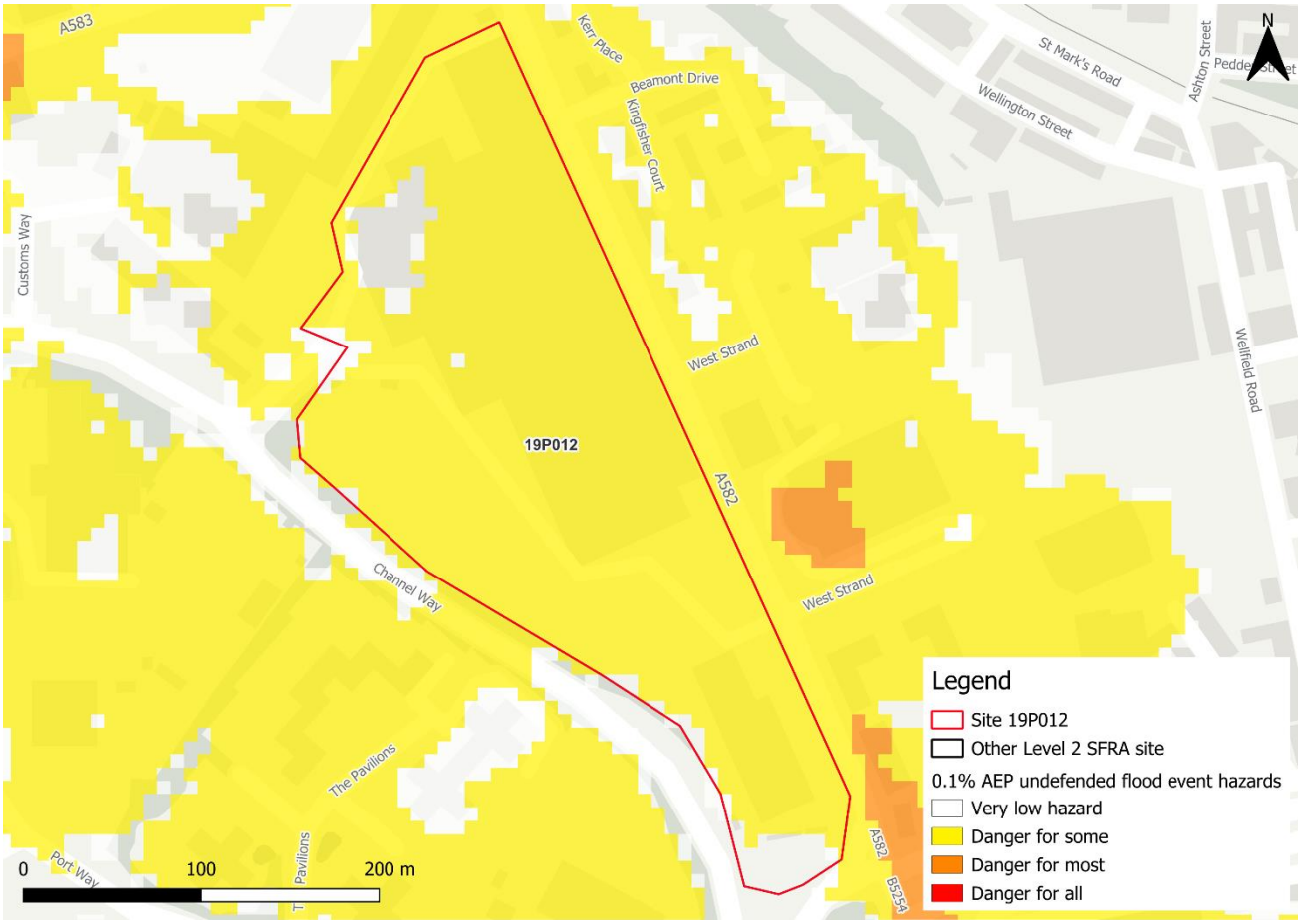

Figure 2-3: Flood hazard[1] for 0.1% AEP undefended flood event

2.2 Impacts from climate change

The impacts of climate change on flood risk from the River Ribble 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 Ribble Management Catchment

Return period	Central allowance 2080s	Higher central allowance 2080s
3.3% (functional floodplain)	36%	46%
1%	36%	46%

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.

Figure 2-4 shows the modelled onsite flood depths for the 1% AEP undefended event plus central climate change allowance. Risk is modelled to be much greater than for present day conditions with almost the entire site at risk, similar to Flood Zone 2. Maximum flood depths are modelled to be between 0.6 and 0.9 m. The functional floodplain is not modelled to increase in extent and remains in channel.

Figure 2-5 shows the modelled flood hazard ratings for the 1% AEP undefended event plus central climate change allowance. Flood hazard within the site is largely categorised as 'Danger for some', with some areas of very low hazard.

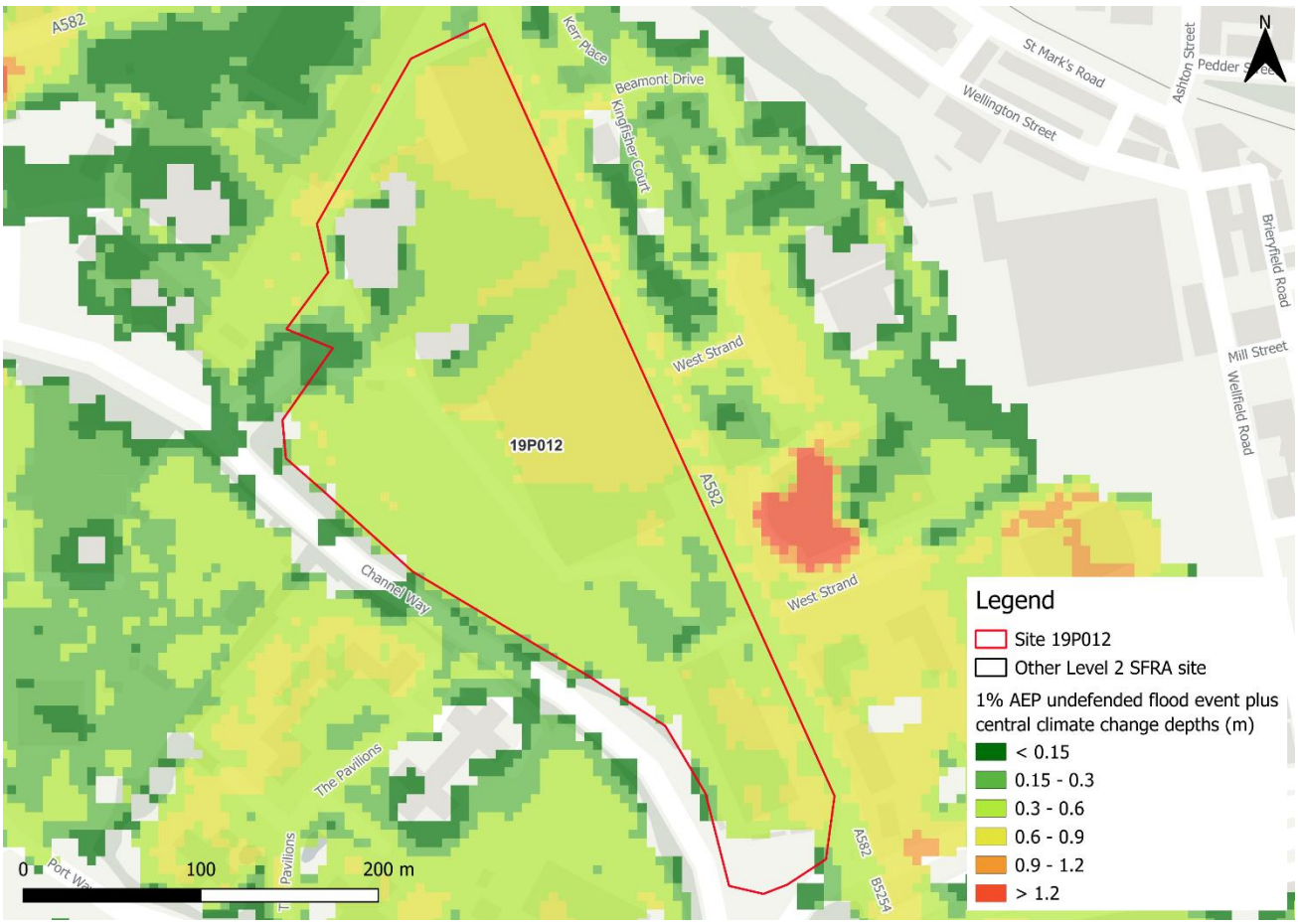

Figure 2-4: Flood depths for 1% AEP undefended flood event central climate change allowance

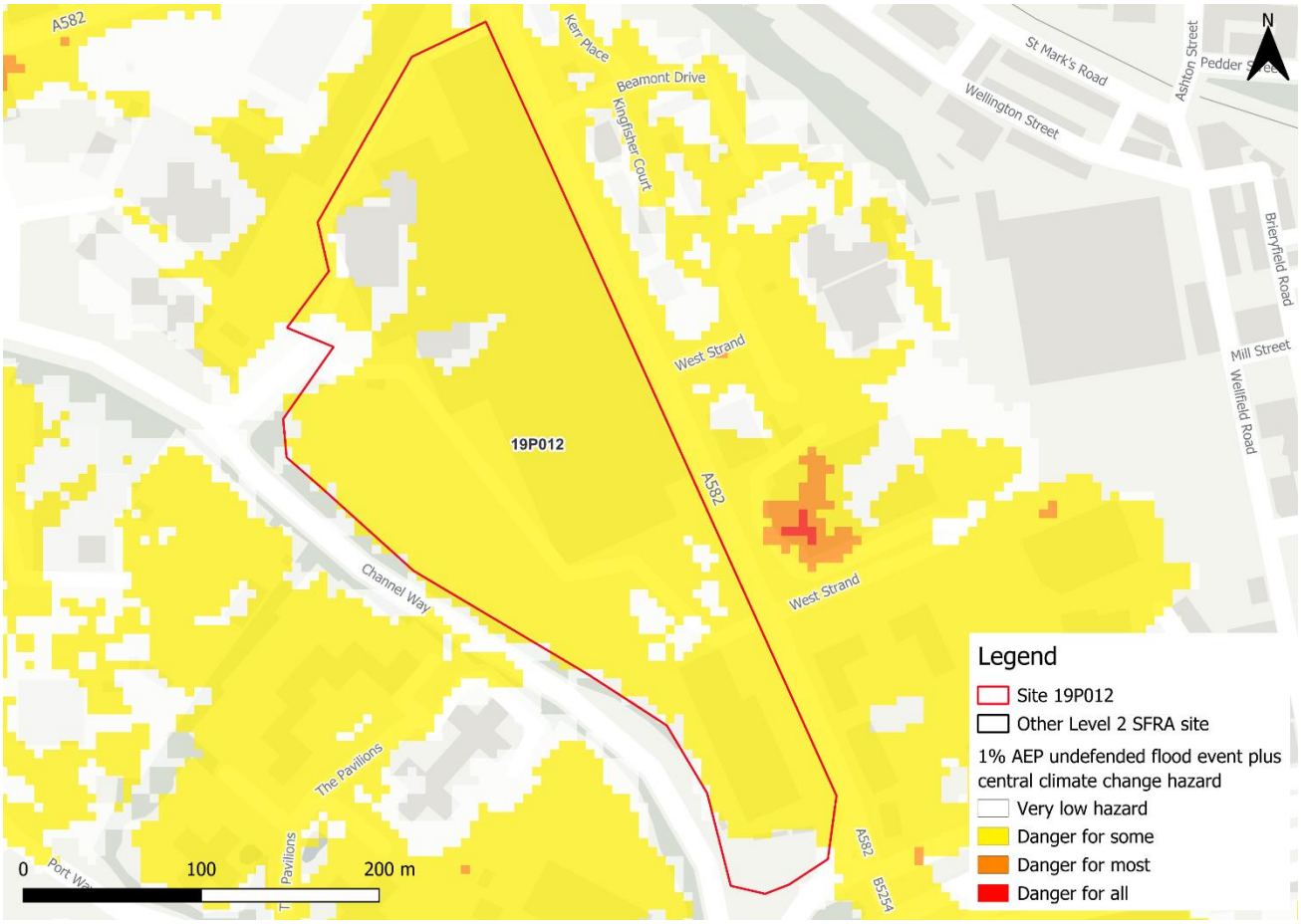

Figure 2-5: Flood hazard for 1% AEP undefended flood event central climate change allowance

2.3 Flood risk management

Flood defences are in place along the right bank of the River Ribble, as shown on Figure 2-6. Information provided in the EA's 'Spatial Flood Defences' dataset states that these defences are raised embankments with a design Standard of Protection (SoP) of 100 years. Actual SoP is unknown. Current condition is also unknown. The owner and maintainer of these defences is unknown.

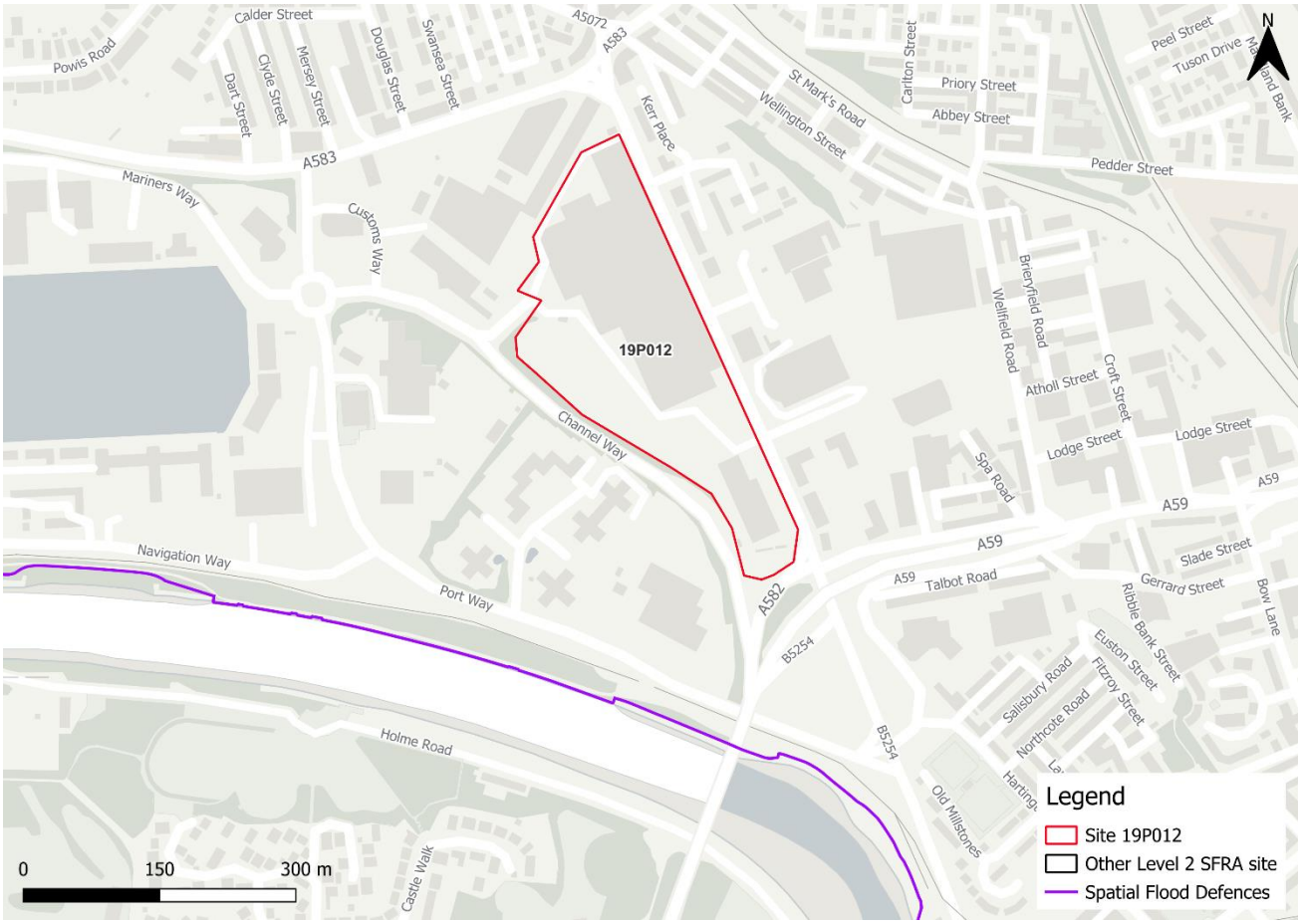

Figure 2-6: EA Spatial Flood Defences dataset

2.3.1 Ribble-Douglas 2010 defended model outputs

Figure 2-7 shows the effect of the River Ribble flood defences on flood risk from the 0.1% AEP event. There is a significantly greater modelled flood depths across the site in the defended event in comparison to the undefended event. This is because the in-channel water levels are consistently higher in the defended scenario throughout Preston, and removing the defences allows for water to flood the area to the south of the River Ribble, rather than the north. Access and escape routes are likely to be challenging to achieve in this event.

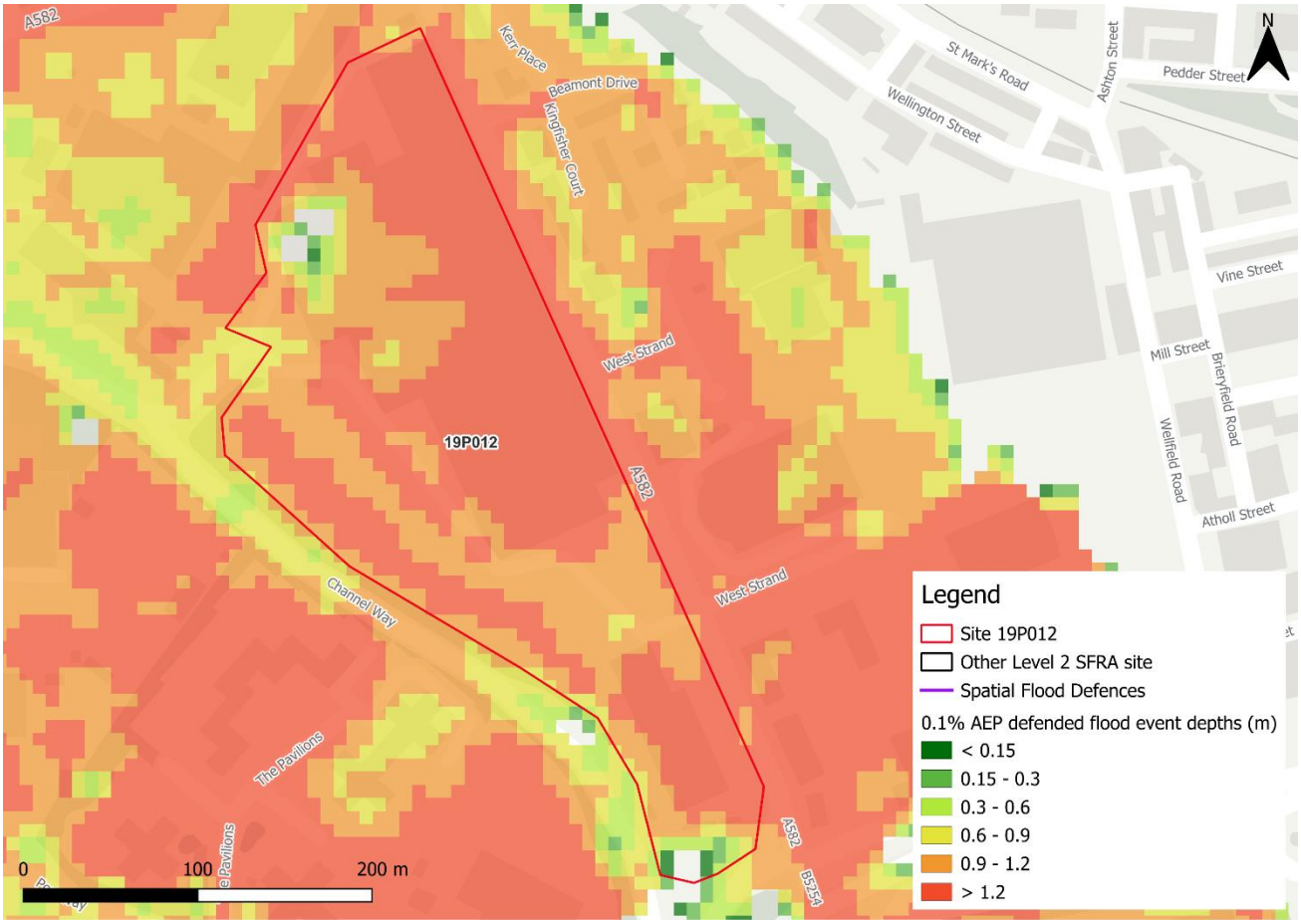

Figure 2-7: Modelled 0.1% AEP defended flood event depths (m) (Ribble-Douglas 2010)

2.3.2 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 19P012 is located within one catchment, namely; Coastal Catchment 176. 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 Guidance[2].
- 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 Lancashire SuDS Guidance

2.3.3 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. Upstream of the site adjacent to the River Ribble, there is potential for tree planting to slow floodwaters, reduce flood peak height and reduce sediment delivery to the watercourse. There is also the potential for floodplain reconnection to connect the floodplain to the channel and allow floodwater to be stored. 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 on Figure 2-8.

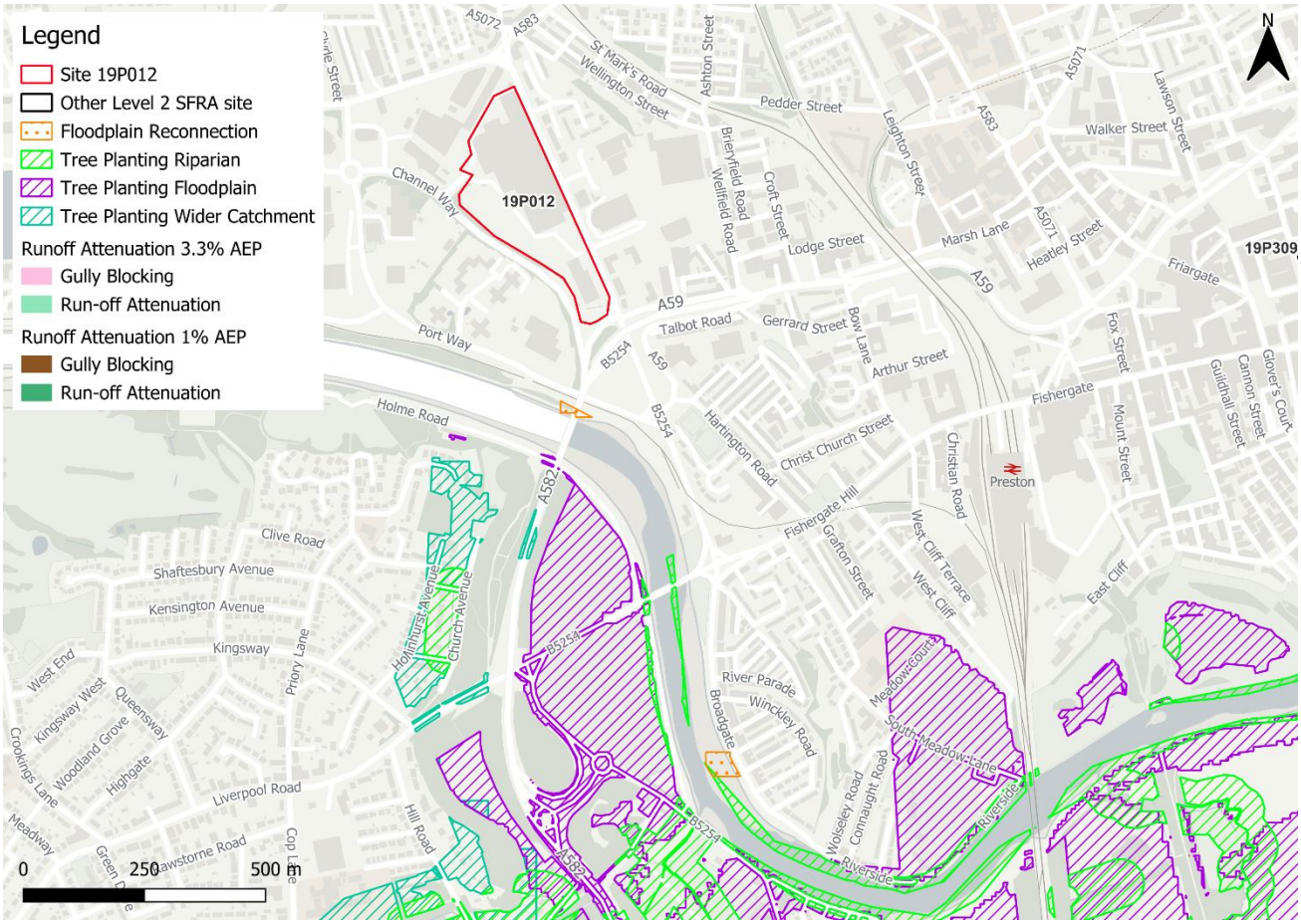

Figure 2-8: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

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

Though the defences along the right bank of the River Ribble do not protect the site in the 0.1% AEP event, there is potential residual risk to the site in the event of a breach during the 1% AEP event. A breach of the defences in this location should be modelled at the site-specific FRA stage.

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 2-9 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 eight reservoirs, five of which are located within Lancashire, however outside of the Central Lancashire authority boundary, and three located within Blackburn with Darwen. All reservoirs with the potential to impact the site are 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, 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. The site is located within one FWA, namely 012FWBL34A - Ribble estuary at Riversway Docklands.

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 012WAFLR - Lower River Ribble and Darwen.

Based on the FMfP and modelled outputs, safe access and escape routes may be challenging to achieve in the extreme 0.1% AEP event and when accounting for climate change during the 1% AEP undefended event.

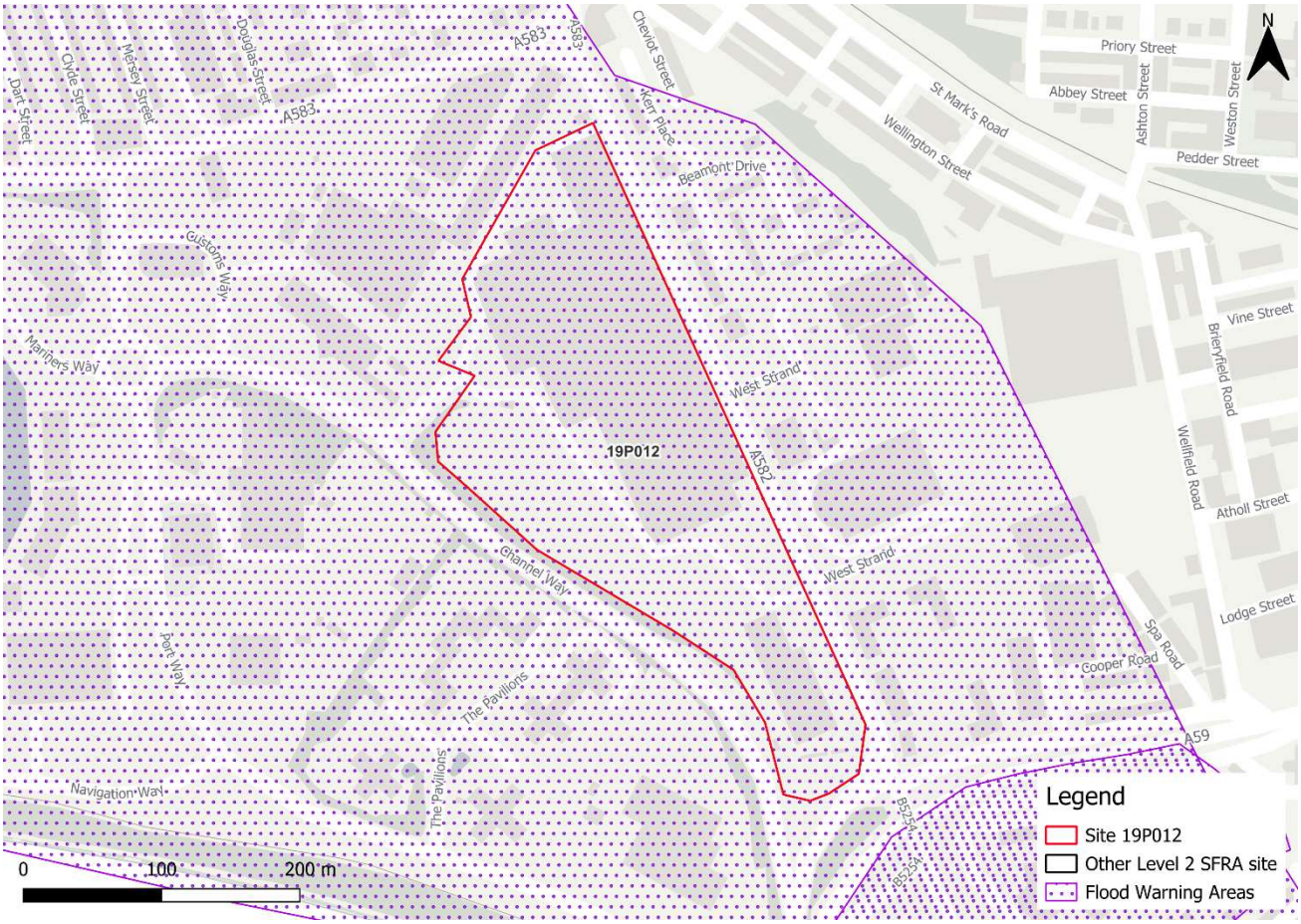

Figure 2-10: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - fluvial

- The site is modelled to be at significant risk from fluvial sources (according to the Ribble-Douglas 2010 model) in the extreme 0.1% AEP undefended and defended scenarios, which impacts almost the entirety of the site. Any development within the 0.1% AEP event flood outline must consider property flood resilience measures and emergency planning procedures.
- Any development within the extreme flood event outline must account for the safety of people within a building if it floods and also the safety of people around a building and in adjacent areas, including people who are less mobile or who have a physical impairment. This includes the ability of users to evacuate before the extreme flood event occurs including for an allowance for climate change. The 0.1% AEP event plus climate change has not been modelled as part of this SFRA.
- Though the defences along the right bank of the River Ribble do not protect the site in the 0.1% AEP event, there is potential residual risk to the site in the event of a breach during the 1% AEP event. A breach of the defences in this location should be modelled at the site-specific FRA stage.
- The EA flood warnings and alerts should continue to be in place to ensure early evacuation of site users before an extreme flood event occurs.

- Safe access and escape routes may be challenging to achieve in the extreme event and when accounting for climate change during the 1% AEP undefended event. Safe access and escape routes should be possible via the A582 to the east of the site during the 1% AEP undefended event.
- The FRA must show that development will be safe for its lifetime taking account of the vulnerability of its users, including for appropriate evacuation procedures and flood response infrastructure are in place to manage the risk associated with the extreme flood event.
- Given the potential reservoir risk to the site, developers should consider[3]:
    - 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

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 wate risk to the site is predominantly 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 a further 6% is at low surface water risk, as shown in Table 3-1.

In the high risk event, surface water risk is confined to a small area of shallow ponding within a topographic low spot in the centre of the site. There are a number of additional scattered areas of ponding across the site in the medium and low risk events. Surface water risk is constrained by the existing development within the site in all events.

Greatest flood depths in the medium risk event are between 0.15 and 0.3 m (Figure 3-1) with some areas of moderate hazard (Figure 3-2). Safe access and escape routes should be achievable via Channel Way to the south 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 (%)
92	6	1	1

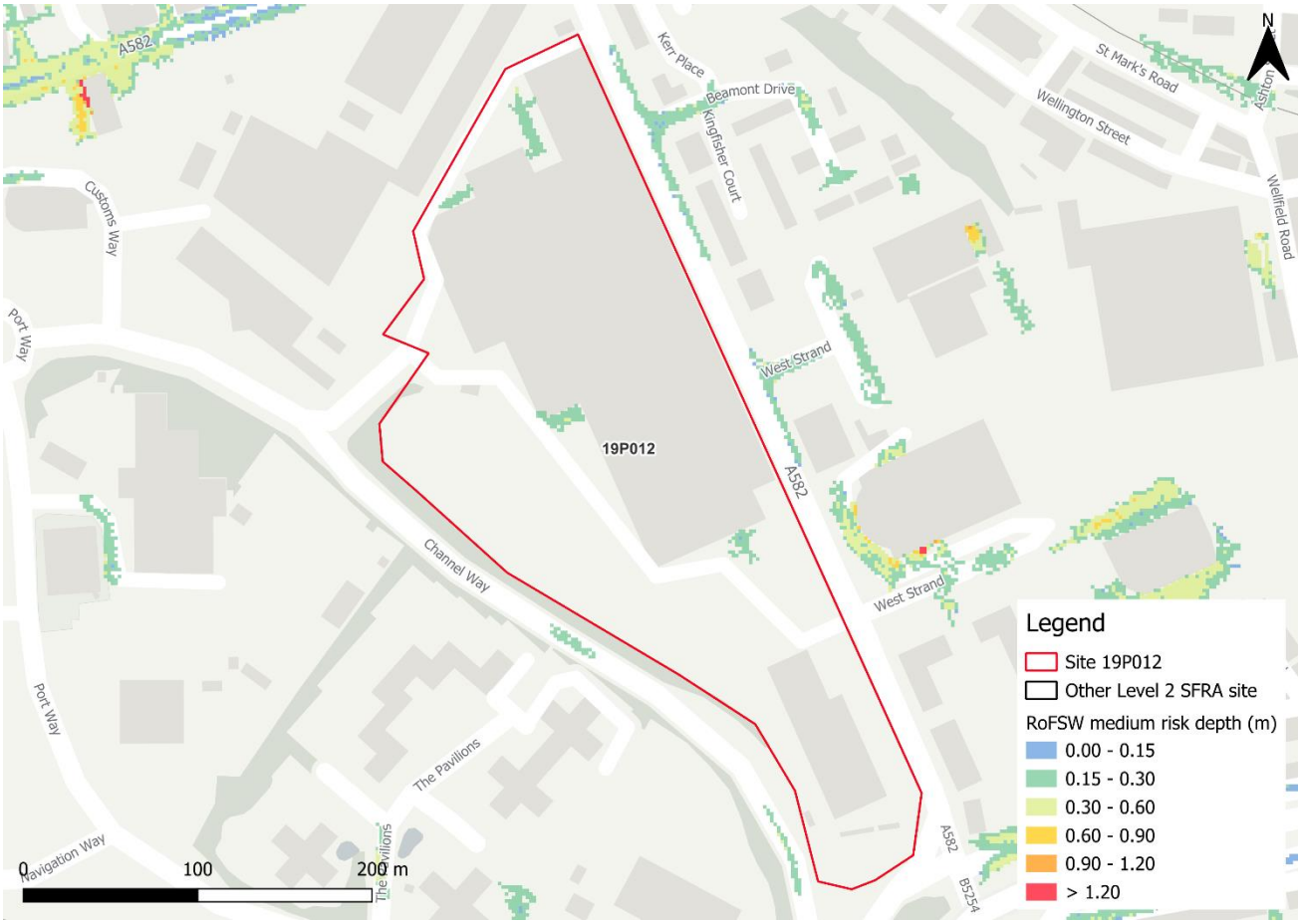

Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

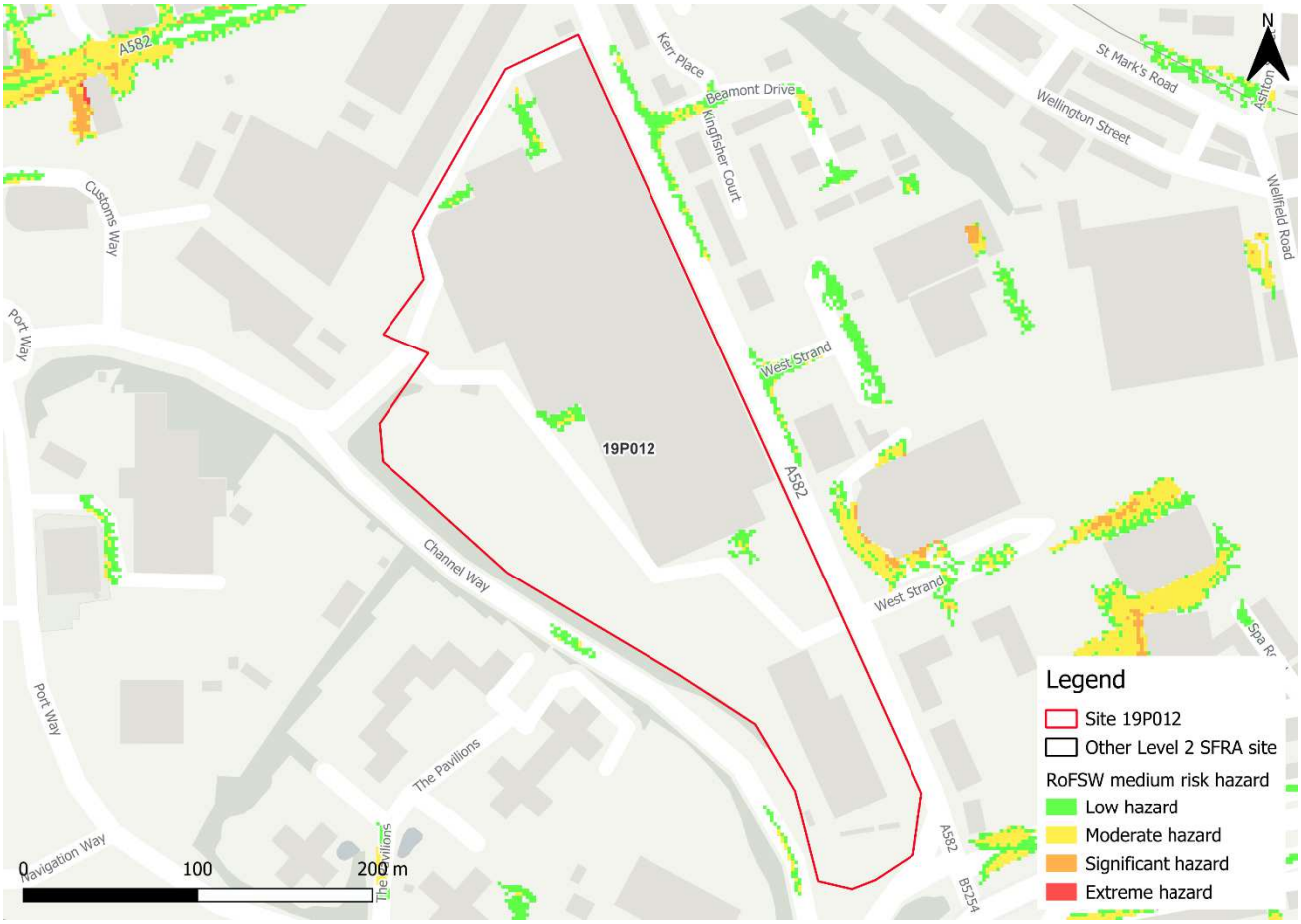

Figure 3-2: Medium risk event surface water flood hazard[4] (Risk of Flooding from Surface Water map)

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 Ribble management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	50%

Figure 3-3 shows the modelled surface water depths for the medium risk event +50% 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

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

risk event. Maximum depths are between 0.3 and 0.6 m with areas of moderate hazard (Figure 3-4). Risk is clearly constrained by the current building onsite.

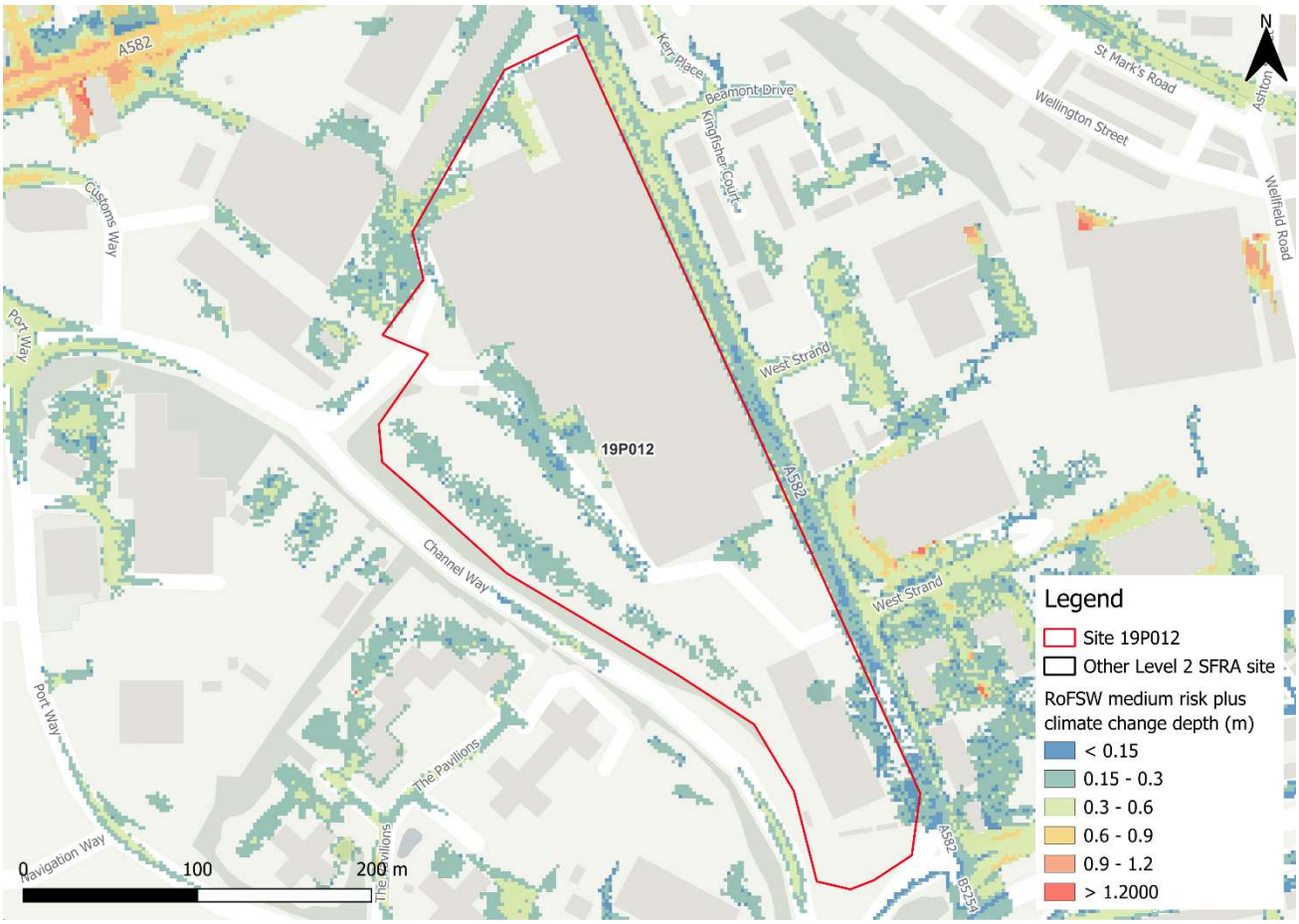

Figure 3-3: Medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

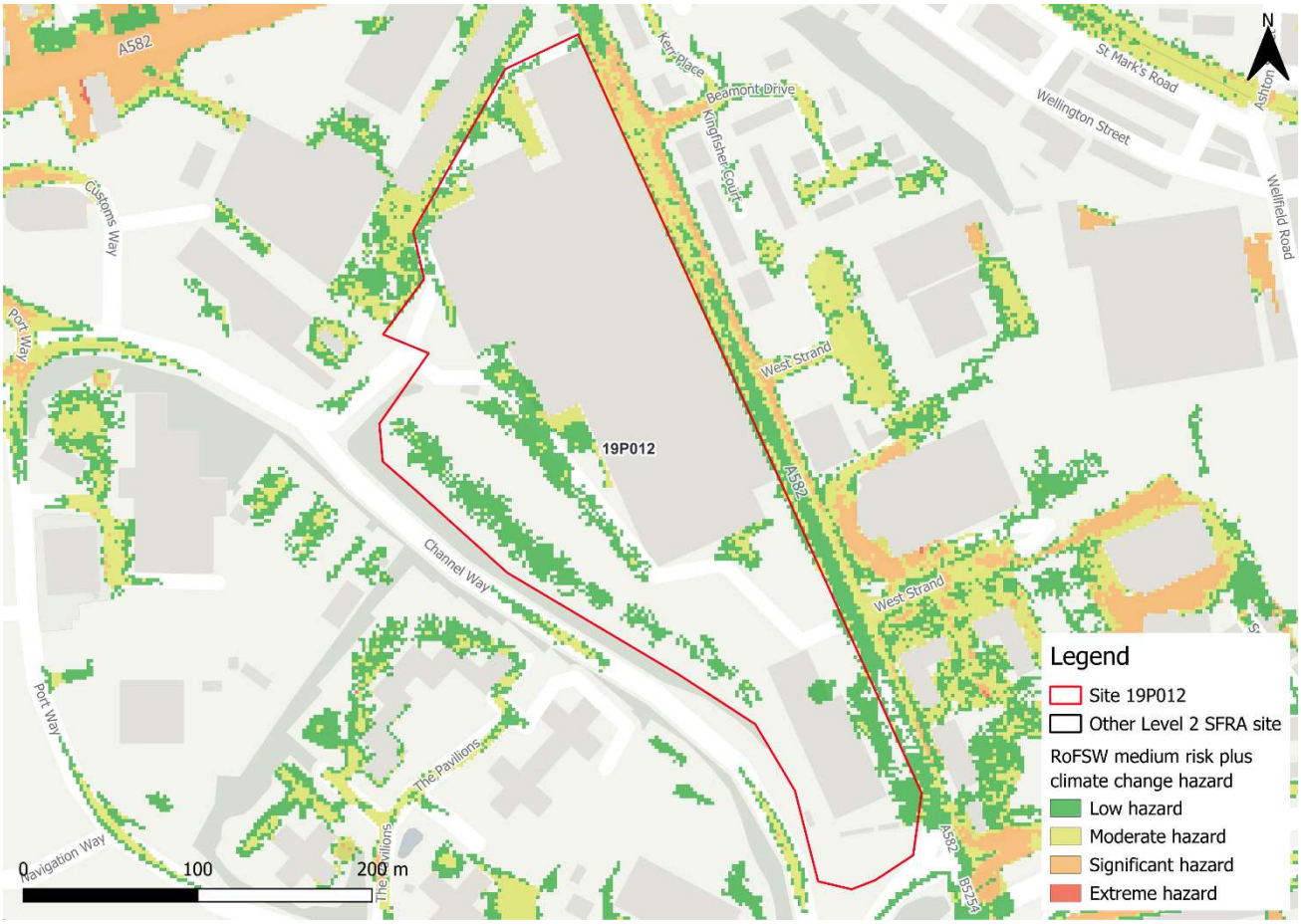

Figure 3-4: Medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is very low, with approximately 92% of the site being at very low risk. Surface water risk in the medium risk event is confined to small areas of shallow ponding within topographic low spots across the site. Surface water risk is constrained by the existing development within the site. Safe access and escape routes should be achievable via Channel Way to the south of the site 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.
- Topographic flow routes and depressions should be considered and included in site design and ideally left in place to flood naturally when required. Any regrading of land must include for like for like volumes to ensure risk is contained safely onsite for the lifetime of development.
- 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.

- Assessment of the current drainage system in place should be carried out to ascertain any current capacity issues and whether the current system could accommodate the proposed employment development or whether further capacity will be required.
- It is assumed the existing onsite development will be demolished for new employment units. A drainage strategy would therefore 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 Guide[5]. Figure 4-1 show the map for Site 19P012 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.

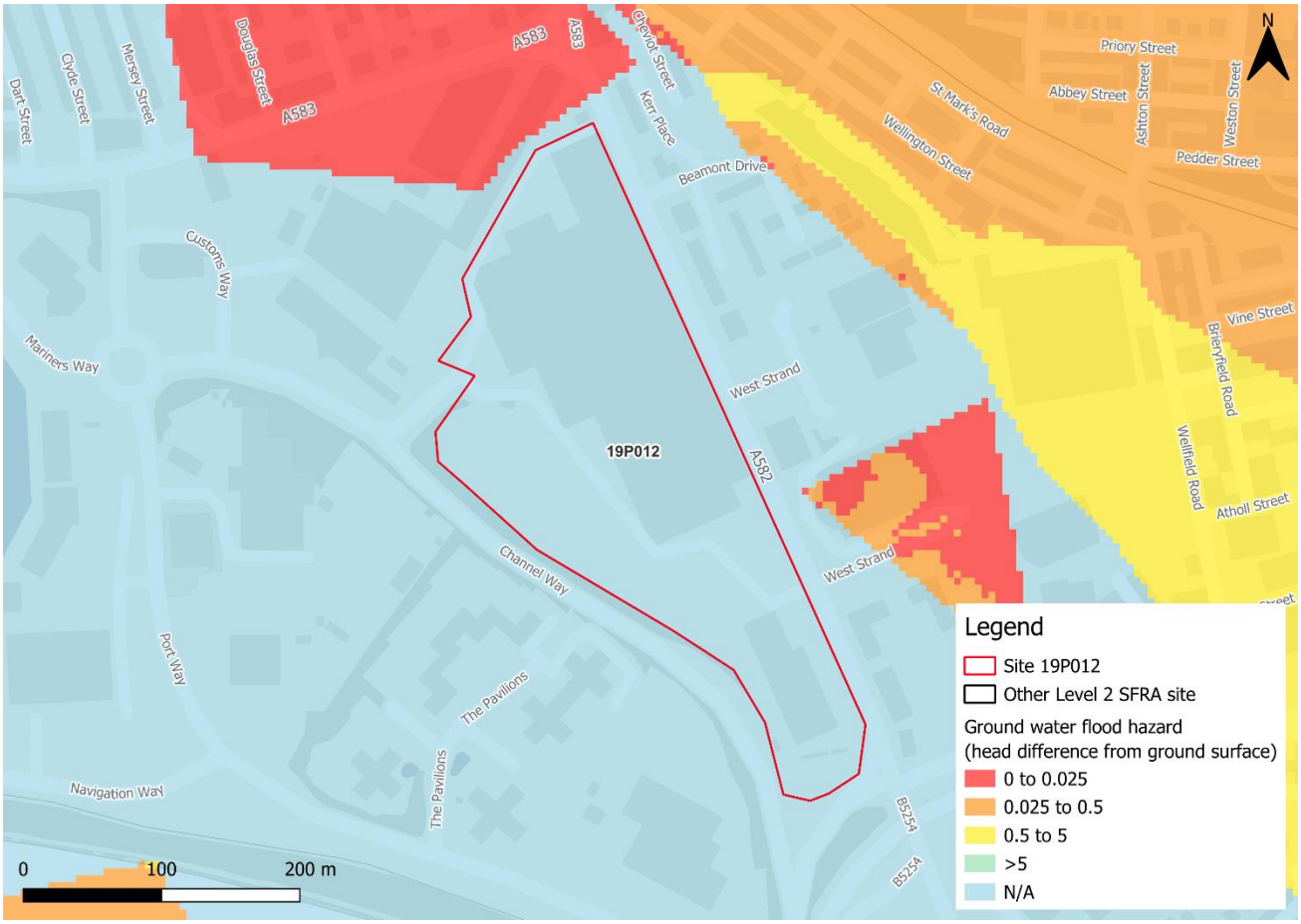

Figure 4-1: JBA 5m Groundwater Emergence Map

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?

This site is not required to pass part b) of the exception test[6] as it is proposed for less vulnerable uses. However, it must still be proven that the development can be safe for its lifetime, which is 75 years for non-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 current information, it should be possible to allocate this site given it is proposed for less vulnerable uses, assuming appropriate mitigation measures and emergency plans are in place.
- Alternative access and escape route arrangements may need to be developed for the site during the extreme 0.1% AEP undefended event with an allowance for climate change.
- The potential residual risk to the site in the 1% AEP event should be investigated further at the site-specific FRA stage, as there may be more significant hazards associated with a breach in comparison to the 0.1% AEP undefended event.
- Current flood warnings should remain in place.
- Property flood resilience measures will be required for any development within a flood risk area.
- A detailed drainage strategy will be required including investigation into the use of infiltration SuDS.
- 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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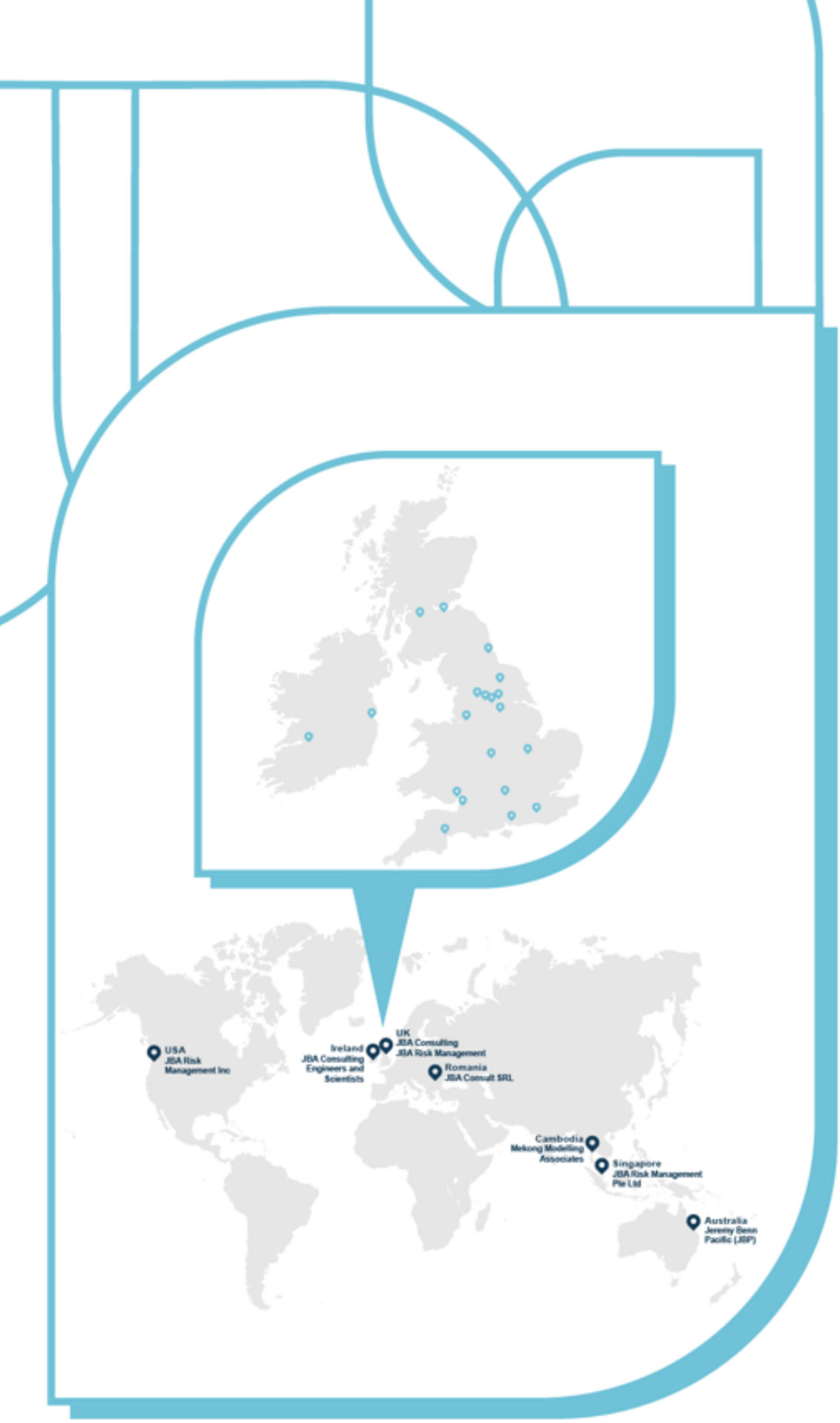

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19P031

Final

June 2025

Prepared for:

Preston South Ribble Chorley Central Lancashire

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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. Freya Nation of JBA Consulting carried out this work.

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Acknowledgements

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

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19P031. 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 19P031

- Location: Land West of Cottam and East of Preston Western Distributor A.
- Existing site use: Mixed use; agricultural land, residential, leisure, education
- Existing site use vulnerability: More vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area: 155.9 hectares
- Proposed development impermeable area: 132.5 hectares (assumed 85% impermeable area)
- EA model: N/A
- Watercourse: Savick Brook along the southern site boundary as well as three tributaries of Savick Brook; Lady Head Runnel and two unnamed watercourses.
- 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

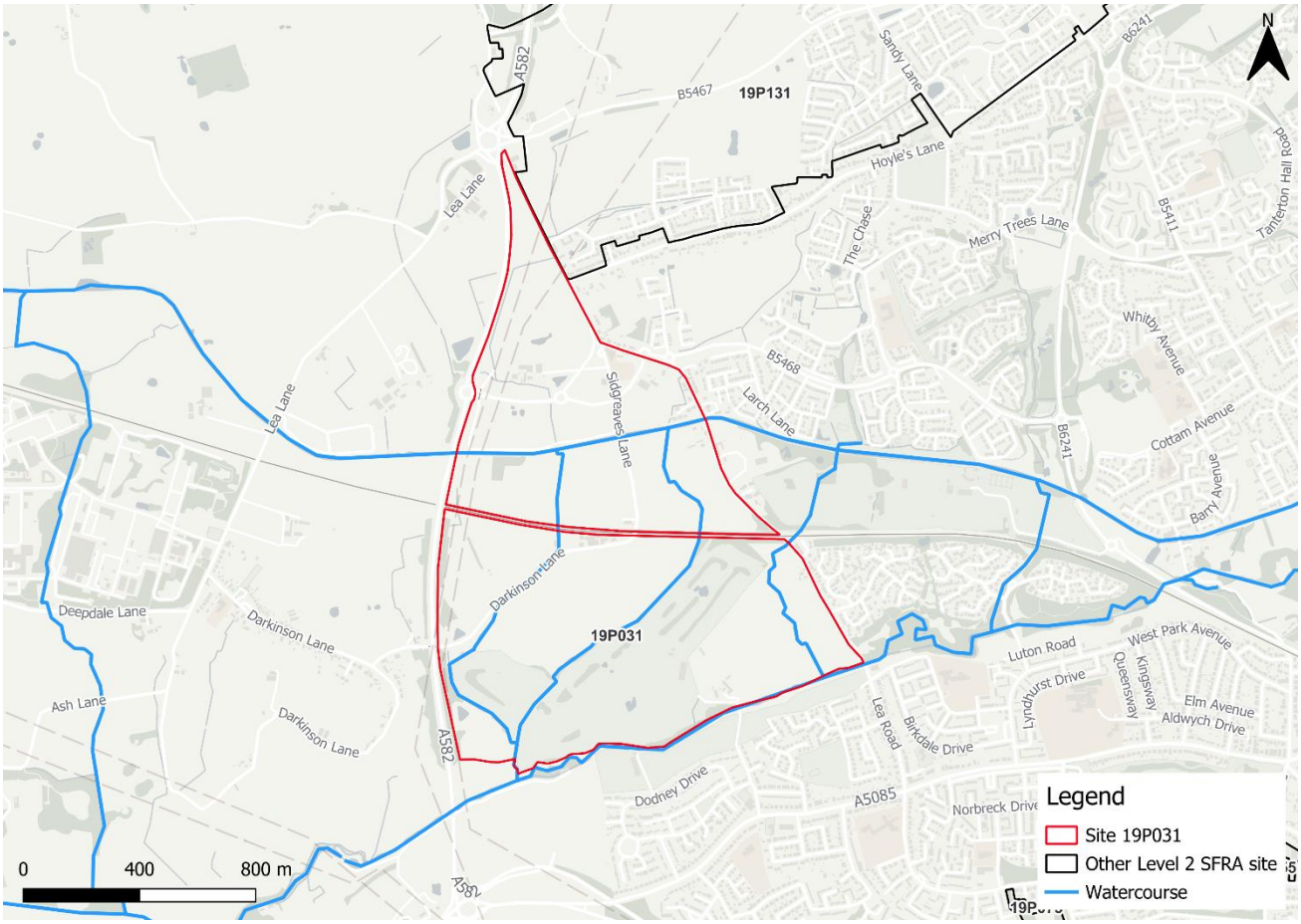

Figure 1-1: Existing site location boundary

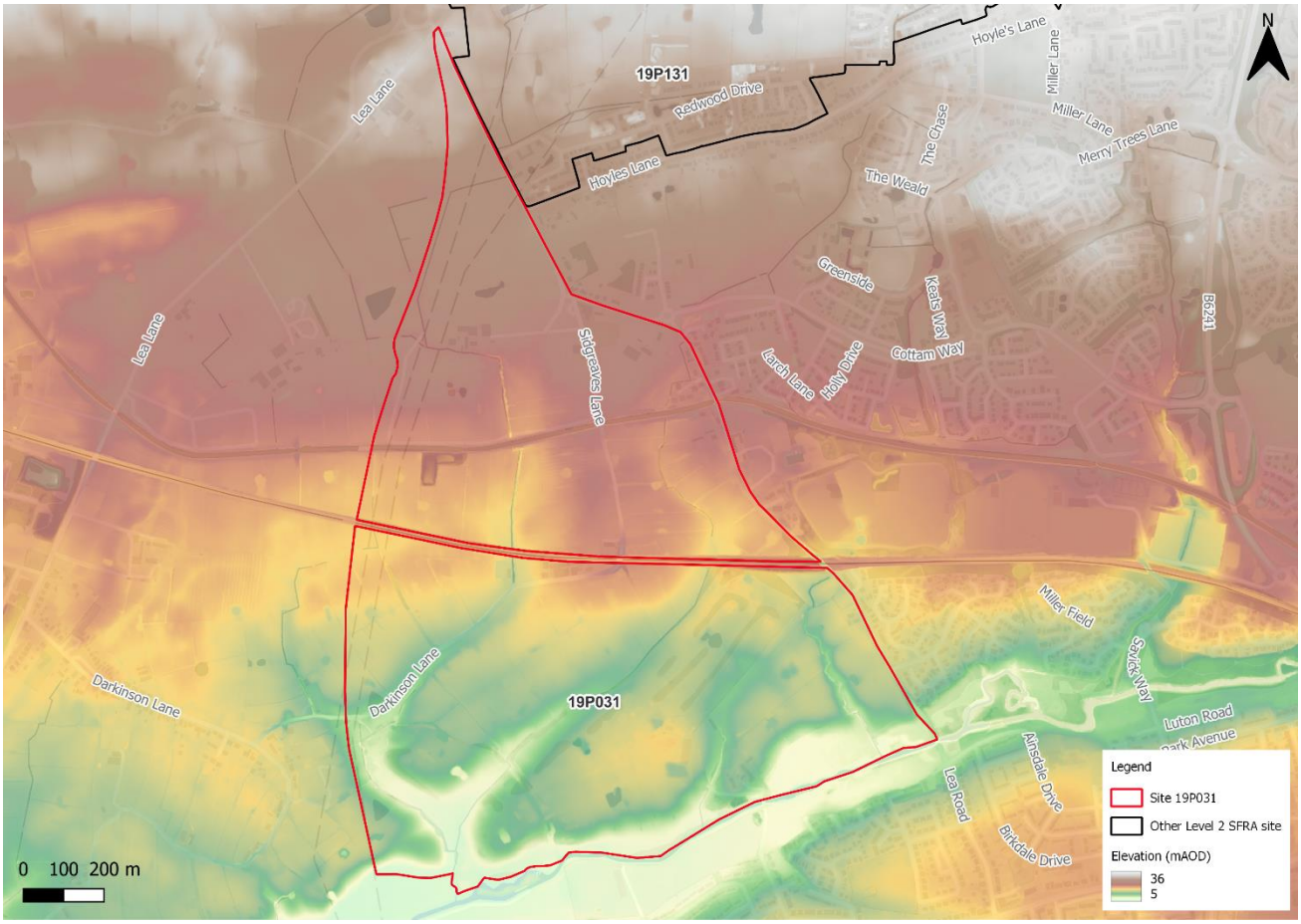

Figure 1-2: Topography

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).

Approximately 6% of the site is modelled to be within Flood Zone 3b. The area along the southern boundary of the site is located within Flood Zone 3b of Savick Brook. There should be no development within the functional floodplain. The functional floodplain in this location is conservatively based on the previous Flood Zone 3 of the Flood Map for Planning (1% AEP undefended event), prior to March 2025 which does not take into account the new NaFRA2 modelling, in the absence of suitable modelled data.

The majority of the remaining area of the site is within Flood Zone 1. Approximately 3% of the site is within Flood Zone 3a and 4% of the site within Flood Zone 2. These areas are largely confined to sections of ponding behind the railway embankment (based on direct rainfall modelling), and along the western and southern site boundaries.

The section of Savick Brook which borders the site is also known as the Millenium Ribble Link, a canalised reach of Savick Brook linking the Lancaster Canal to the River Ribble.

The Lancaster Canal bisects the site and there are three tributaries of Savick Brook (Lady Head Runnel and two unnamed watercourses) which flow through the site and into the brook, at the southern site boundary. The functional floodplain along the Lancaster Canal and tributaries of Savick Brook is based on an 8m buffer either side of the OS Open Rivers Watercourse link dataset. It is recognised that this is an approximation.

Any flood risk assessment (FRA) should produce a detailed model of Savick Brook and its tributaries to understand modelled flood depths and hazards within the site.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
87	4	3	6

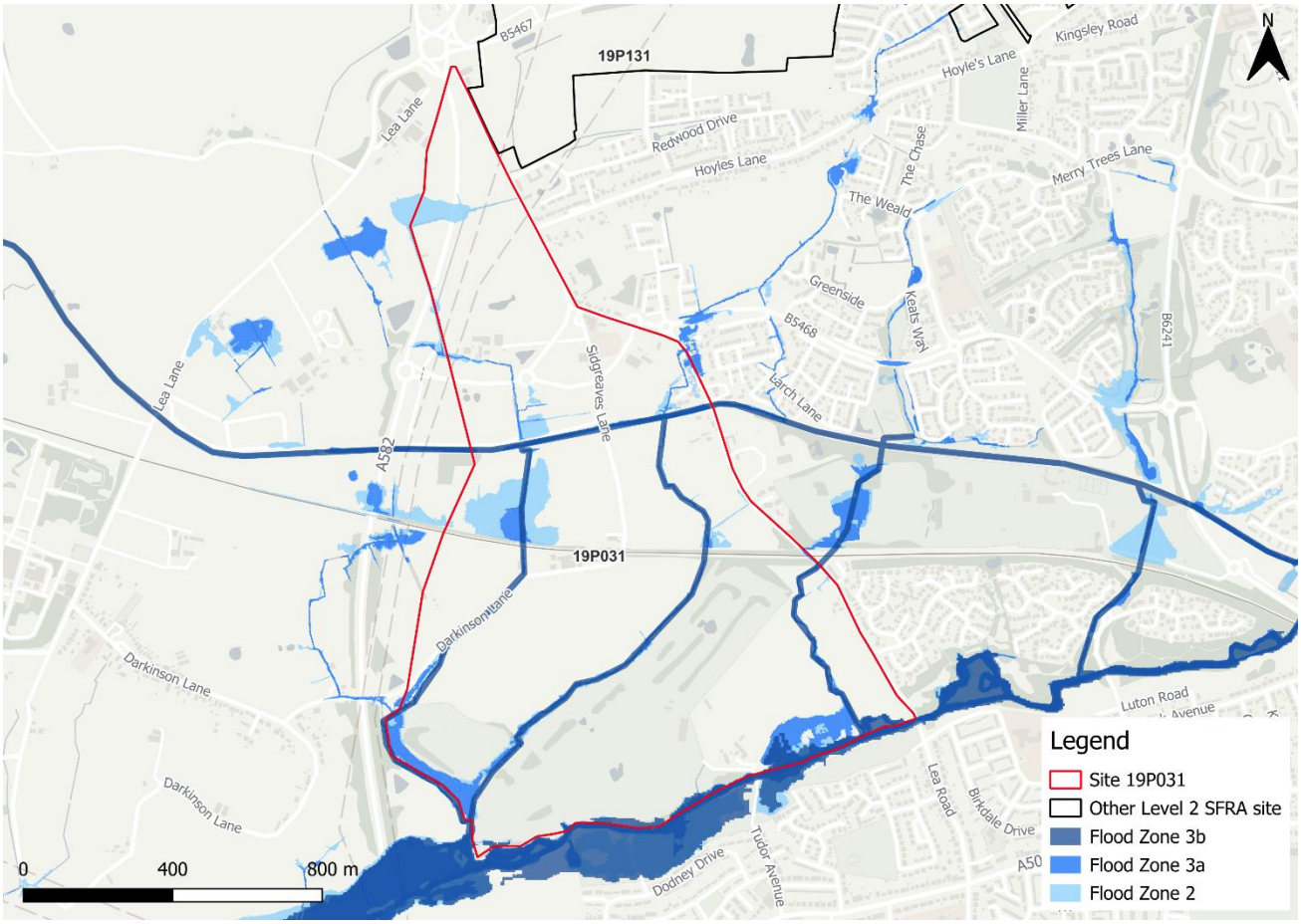

Figure 2-1: Existing risk from rivers to the site

2.2 Impacts from climate change

The impacts of climate change on flood risk from Savick Brook have not been modelled for this SFRA, due to the absence of a detailed flood model. 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, fluvial risk is modelled to increase to a similar extent to the present day Flood Zone 2 (Figure 2-2). This dataset is based on fluvial and tidal models only and doesn't take into account surface water risk from direct rainfall modelling.

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 Savick Brook and its tributaries, 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.

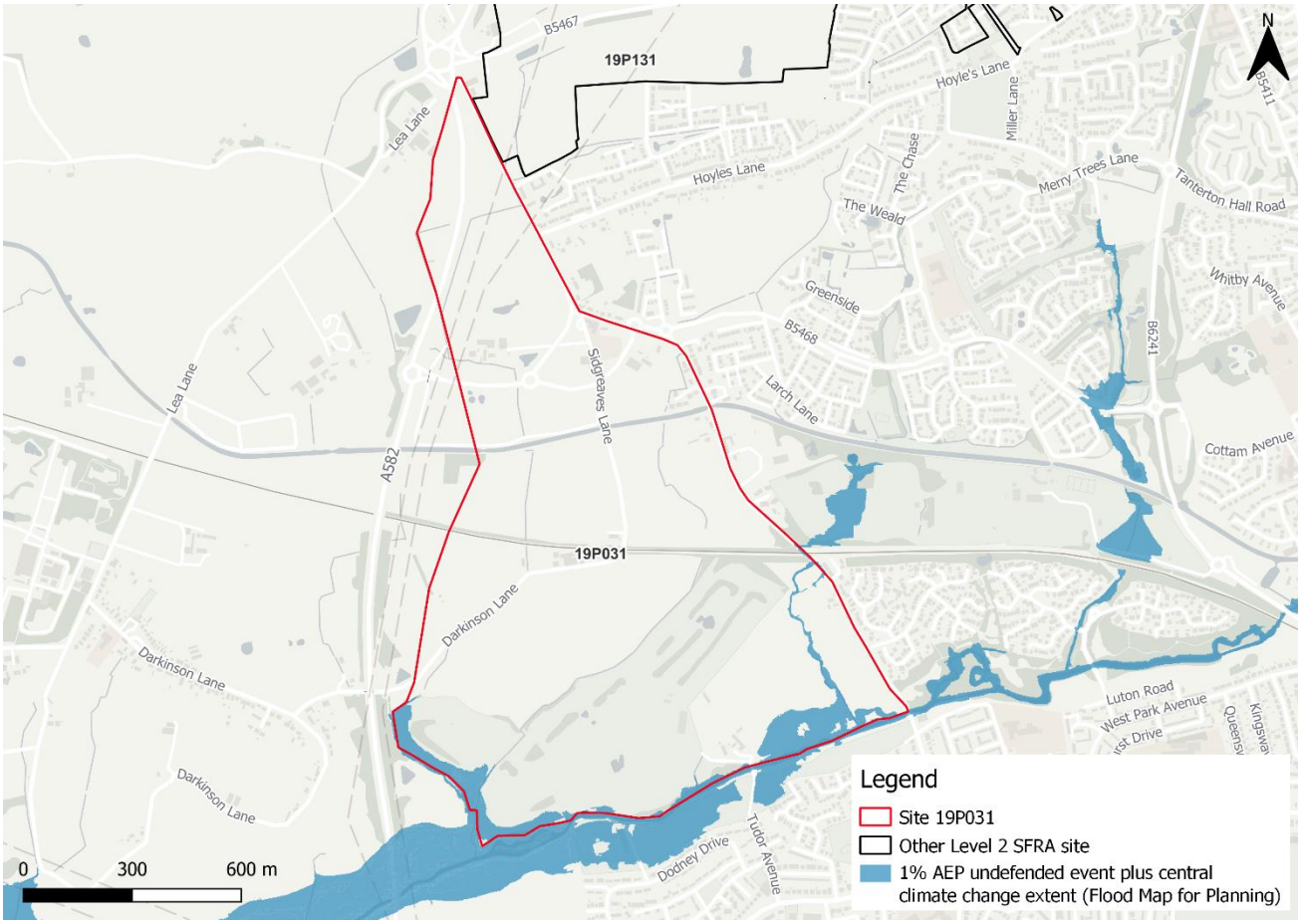

Figure 2-2: Flood extent for 1% AEP undefended flood event plus central climate change allowance (Flood Map for Planning)

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 19P031 is located within one catchment, namely; Savick 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 Guidance[1].
- 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. Within the site, there are significant opportunities for floodplain and riparian tree planting, which can slow flows, reduce sediment delivery to the watercourse and reduce bankside erosion. The majority of the site is also identified to have potential for wider catchment tree planting, which can intercept, slow, store and filter water. There are also opportunities for reconnecting the floodplain to Savick Brook, however, since this section of the brook is a canalised navigation, it is unlikely that floodplain reconnection could be achieved. Additionally, there are areas of potential surface water runoff attenuation across the site. 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.

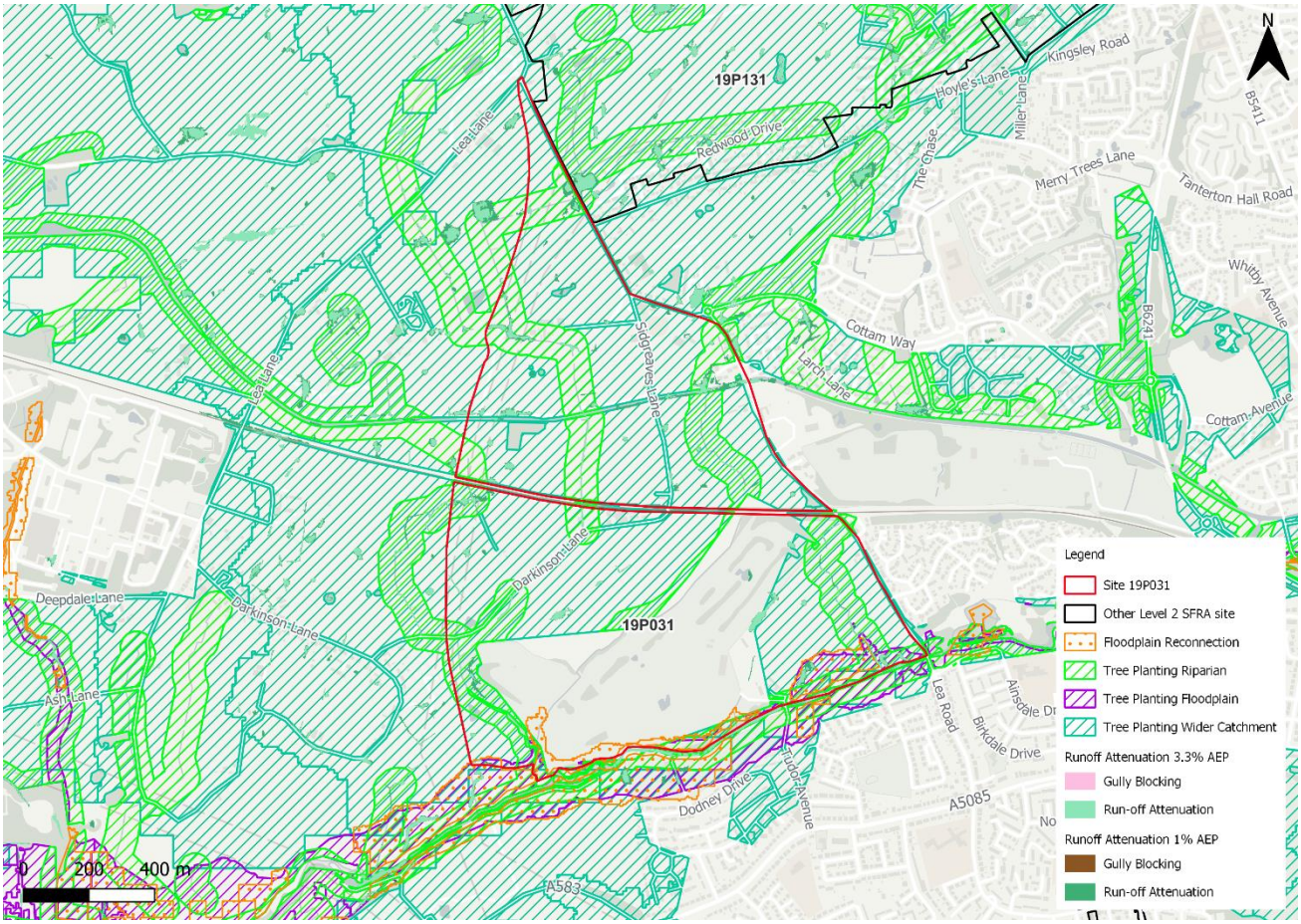

Figure 2-3: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

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

There are potential residual risks to the site from possible blockages of the tributaries of Savick Brook which are culverted beneath roads, farm tracks, Lancaster Canal and the railway line within the site (Figure 2-4). The impacts of culvert blockages have not been modelled as part of this Level 2 SFRA, as there are no available flood models for the watercourses. It is recommended that the site-specific FRA should consider the impact of a blockage of these culverts on residual flood risk to the site. Options for culvert removal should be assessed and inclusion of open watercourses in site design. There should be no development over existing culverts or watercourses.

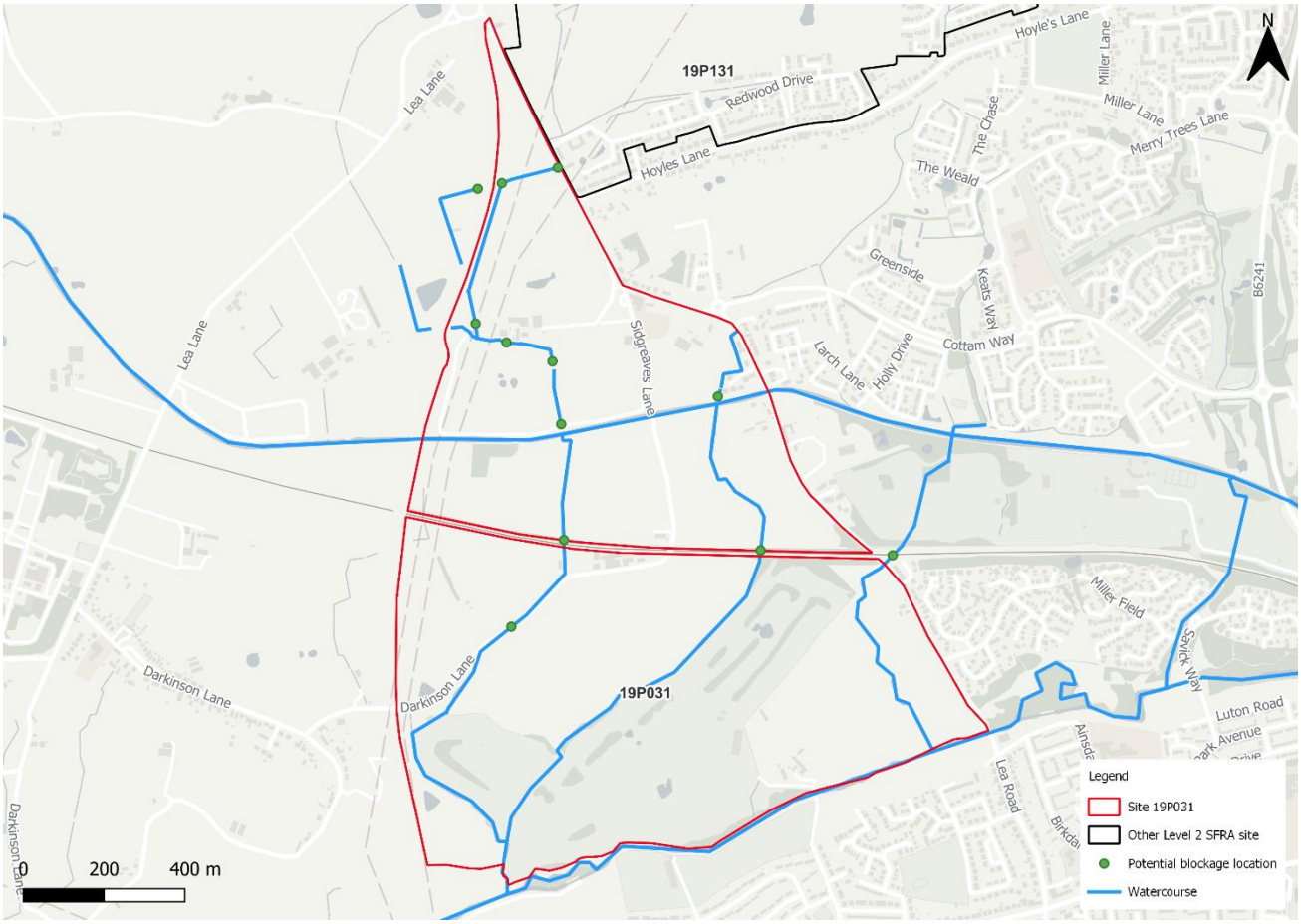

Figure 2-4: Potential culvert blockage locations

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 2-5 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 four reservoirs. Alston No. 1, Alston No.2 and Stocks reservoir, located in Ribble Valley Borough, owned and operated by United Utilities; and Highgate Park FSR in Preston, owned and operated by the Environment Agency. All are located within the Lancashire LLFA area.

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 the Environment Agency, 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.

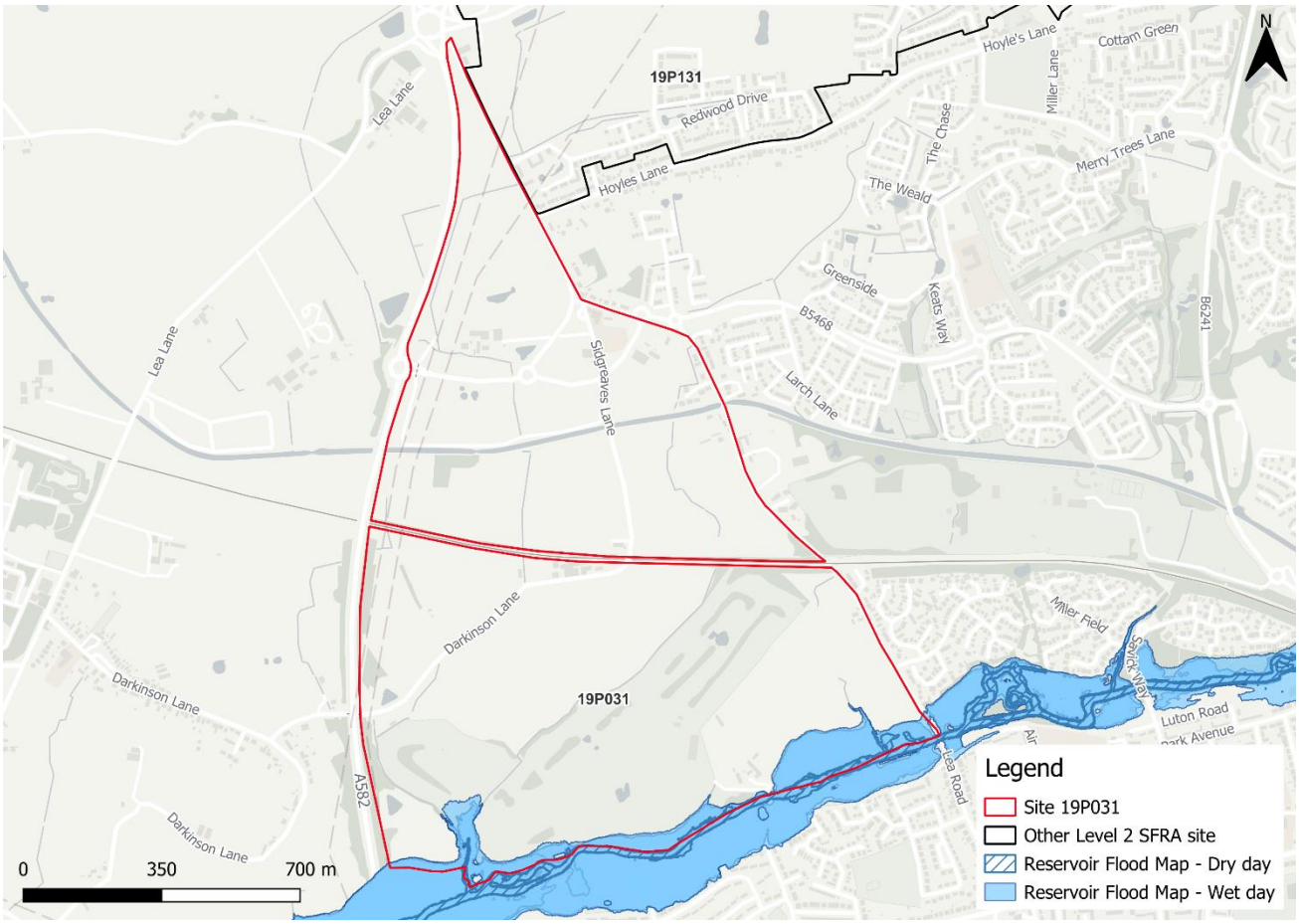

Figure 2-5: Flood risk from reservoirs

2.4.2 Flood risk from canals

Canal & River Trust historic overtopping incidents data indicates that there have been some recorded incidents of the Lancaster Canal overtopping within the vicinity of the site, occurring in 2011 and 2014.

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 19P021 is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. The site is located within a FAA, namely; 012WAFLR - Lower River Ribble and Darwen.

Based on available information, safe access and escape routes are available from multiple locations around the site.

2.7 Observations, mitigation options and site suitability - fluvial

- The site is modelled to be within the functional floodplain along the southern boundary of the site, adjacent to Savick Brook, as well as through the site along the Lancaster Canal, Lady Head Runnel and two unnamed tributaries of Savick Brook. Development is not permitted within the functional floodplain. However, the functional floodplain in this area is conservatively based on the EA's FMfP Flood Zone 3 for Savick Brook and an 8m buffer either side of the OS Open Rivers Watercourse link dataset for the other watercourses.
- A flood risk activity permit may be required if development is planned within 8m of Savick Brook. 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 Savick Brook including for climate change. At this stage, it cannot be proven that this site can be safe for its lifetime.
- Risk from the smaller unmodelled watercourses must be quantified through appropriate modelling. These watercourses should be allowed to flow unobstructed and could be included in site design through a blue / green corridor.
- The site is potentially at residual risk from the possible blockage of the onsite culverts. It is recommended that the site-specific FRA considers the impacts of blockages of these culverts on residual flood risk to the site.
- Safe access and escape routes are available via all roads to and from the site based on available information.
- Given the potential reservoir risk to the site, developers should consider[2]:
    - 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

2 Reservoir flood maps: when and how to use them | Environment Agency | 2021

- 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

- Site 19P031 is located adjacent to the Sandpiper Grange development (planning reference 06/2019/0114). The FRA submitted with the Sandpiper Grange planning application states the site is located within Flood Zone 1 and hydraulic modelling of the watercourse crossing the site is not required by the EA. Flood risk to site 19P031 is greater due to its location within Flood Zone 3b.

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 flood risk within the site is predominantly very low. Approximately 2% of the site is within the high risk surface water zone. A further 2% is at medium risk and 5% is at low surface water flood risk, as shown in Table 3-1.

In the high risk event, surface water risk is scattered across the site. Ponding is shown within topographic low spots, with some additional flow paths coincident with the ordinary watercourses within the site. In the medium risk event, there is a greater extent of surface water ponding and flood depths increase. A flow path emerges within the southwestern corner of the site. In the low risk event, flooding significantly increases with additional flow paths and areas of ponding forming throughout the site. Greatest flood depths in the high risk event are > 1.2 m (Figure 3-1), however these depths are located within the ordinary watercourse channel, with some areas of significant hazard (Figure 3-2). Safe access and escape routes should be available via all roads to and from the site based on current information.

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

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
91	5	2	2

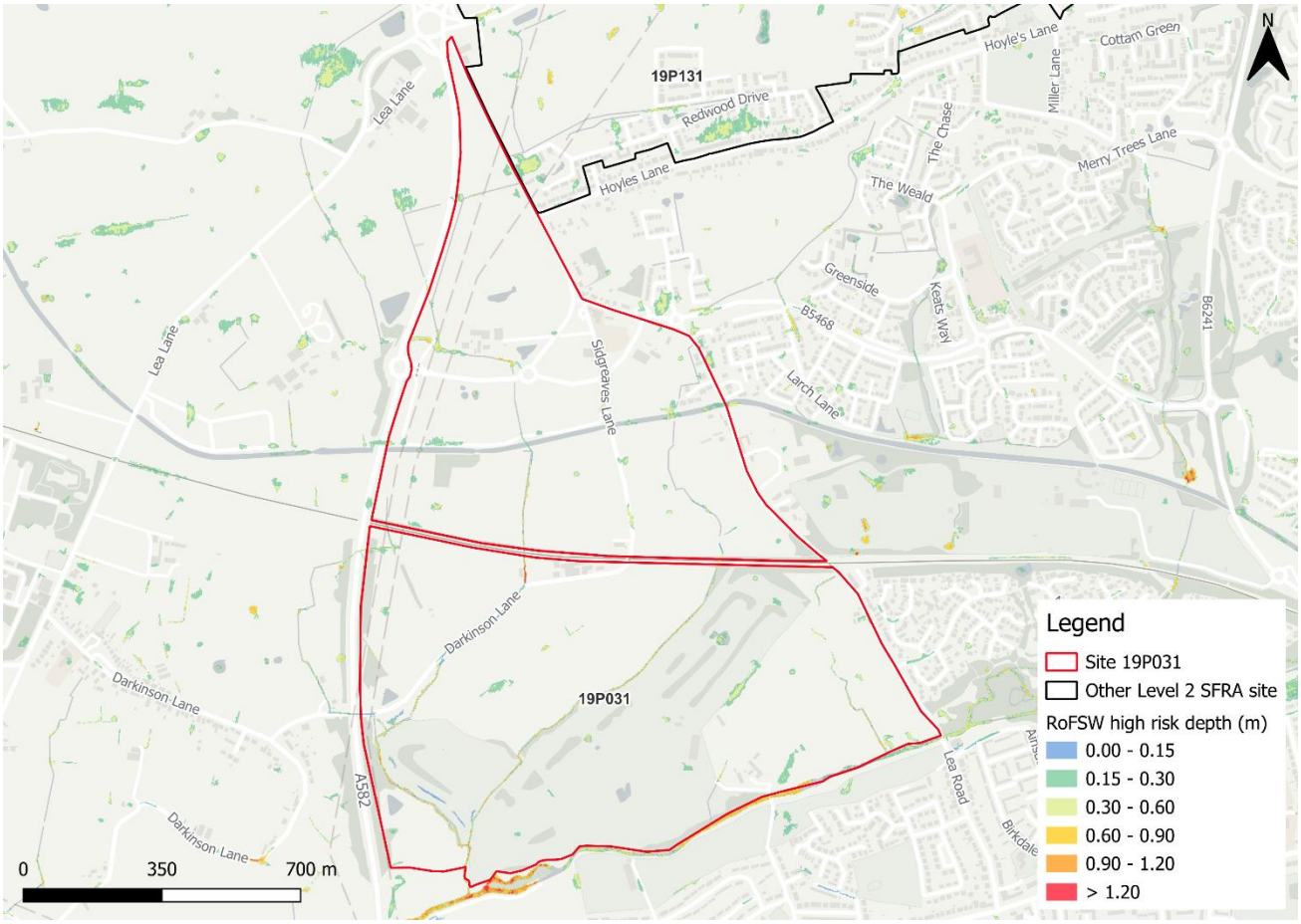

Figure 3-1: High risk event surface water flood depths (Risk of Flooding from Surface Water map)

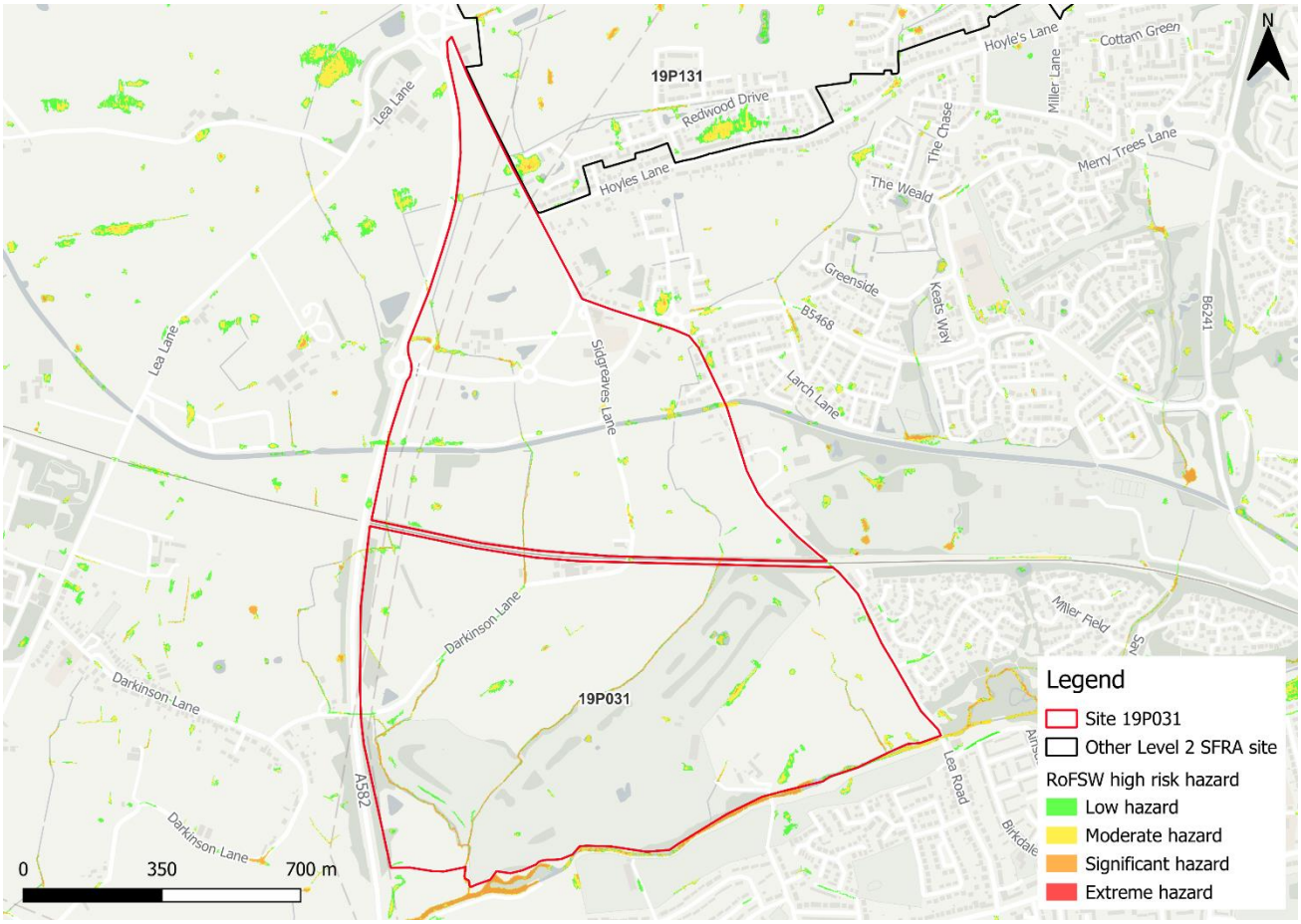

Figure 3-2: High risk event surface water flood hazard[3] (Risk of Flooding from Surface Water map)

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 flood depths during the high risk surface water event plus a 40% allowance for climate change. Risk is modelled to be greater than for present day conditions, with the high risk climate change event showing a similar level of risk to the

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

medium risk present day event. Maximum depths are > 1.2 m, however these are located within the channel of the ordinary watercourses within the site, with areas of hazard categorised as significant (Figure 3-4).

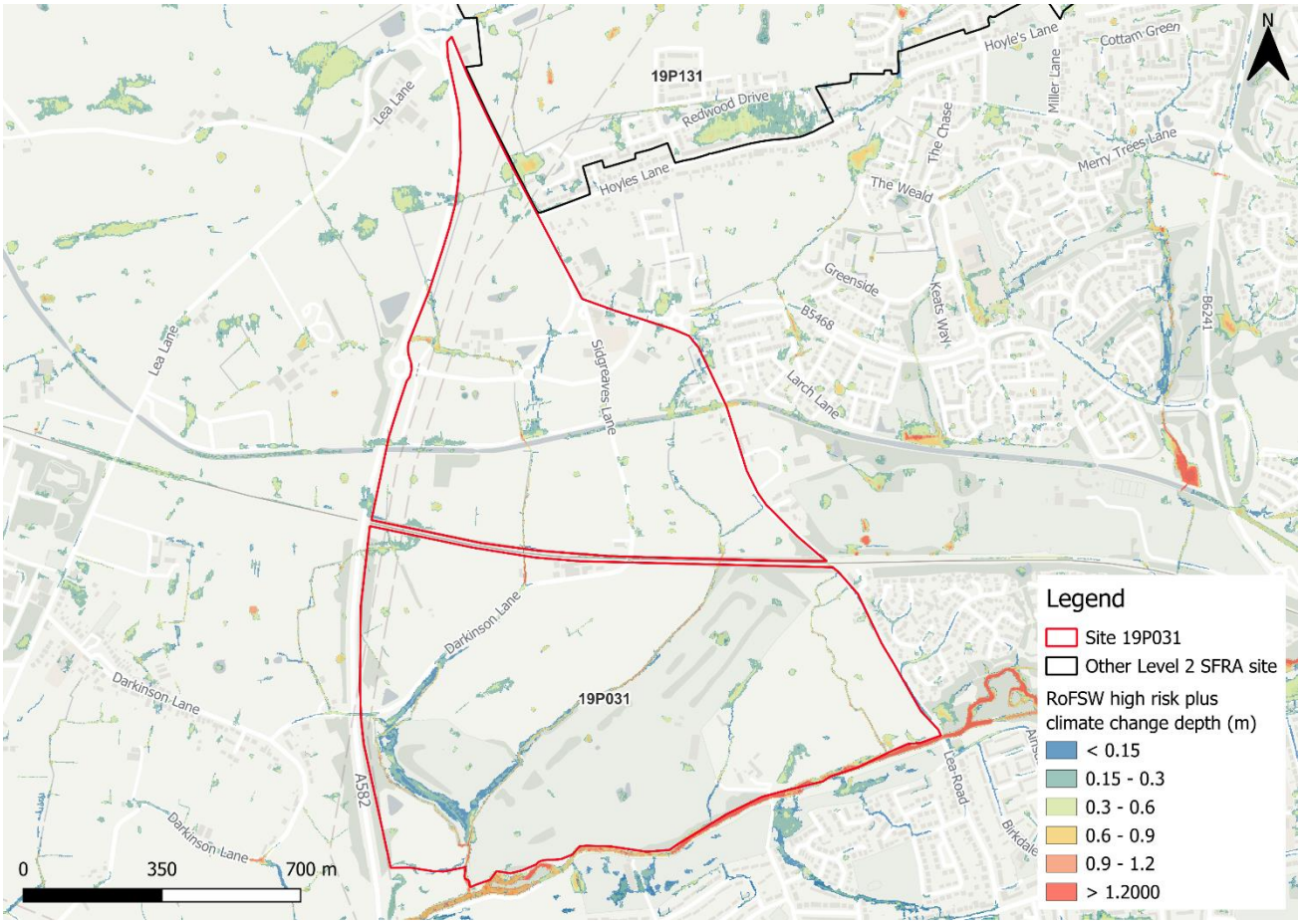

Figure 3-3: High risk event surface water flood depths plus 40% climate change (based on Risk of Flooding from Surface Water map)

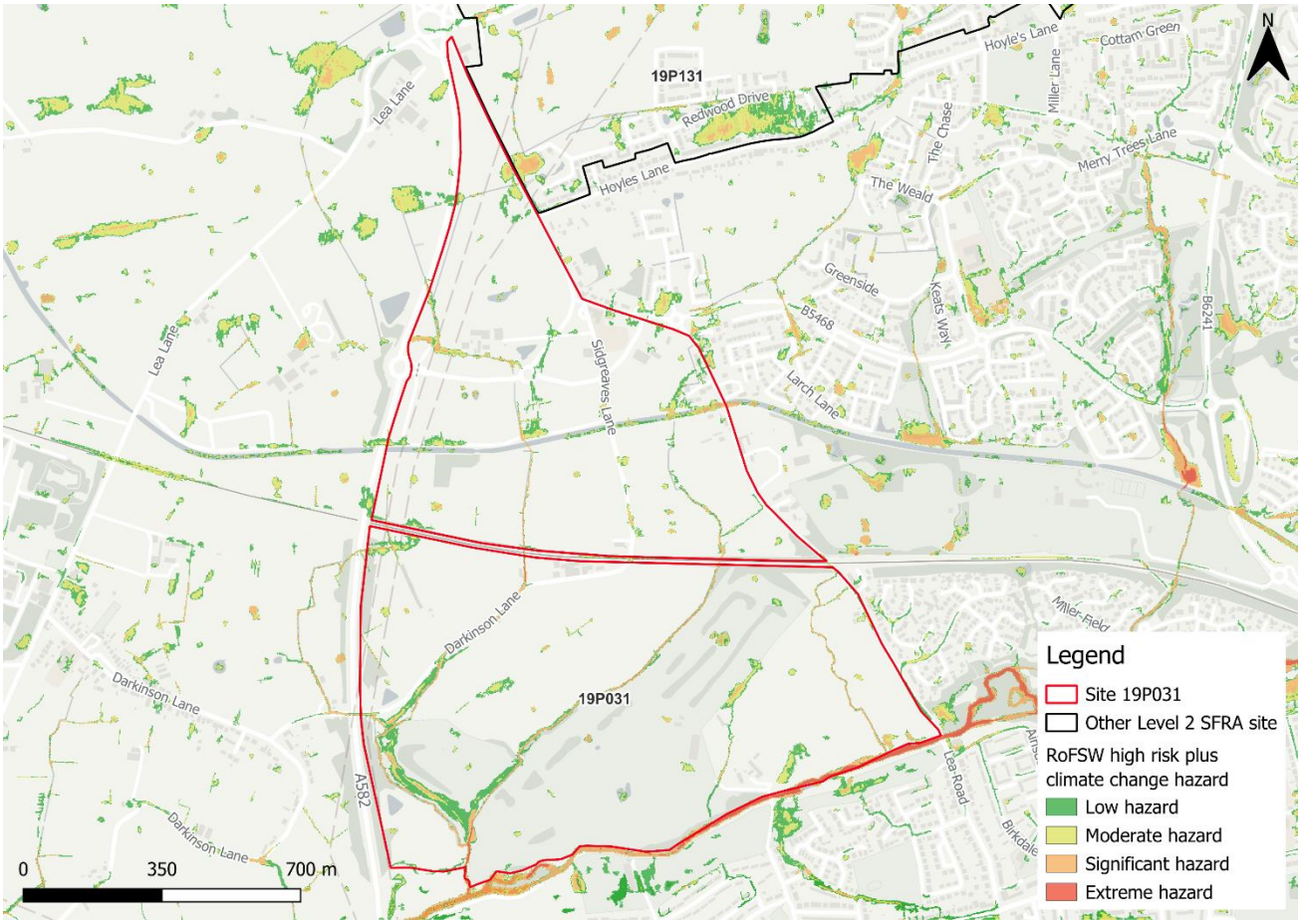

Figure 3-4: High risk event surface water flood hazards plus 40% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is predominantly very low, with approximately 91% of the site being at very low risk. There are scattered areas of surface water ponding within topographic low spots across the site, with some additional surface water flow paths through the site. Any existing topographic depressions and flow paths should be maintained in site design.
- Safe access and escape routes are available at multiple locations.
- The high risk event plus climate change modelling shows significantly increased depths and areas of ponding in comparison to the present day high risk event, similar to the present day medium risk event.
- 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.
- 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.

- Site runoff should be maintained at current rates and, where possible, betterment should be achieved.
- 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.
- The site is located adjacent to the Sandpiper Grange development (planning reference 06/2019/0114). The FRA submitted with this planning application states that the surface water drainage strategy for Sandpiper Grange will use an existing surface water sewer pipe adjacent to Cottam Way which connects to a larger public surface water sewer that outfalls to Savick Brook. A detailed investigation carried out for the Sandpiper Grange site indicates ground conditions and are not suitable for SuDS due to the impermeability of the clayey soils underlying the site. It is recommended similar detailed investigations are carried out for site 19P031 to determine the surface water management options.

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 Guide[4]. Figure 4-1 shows the map for Site 19P031 and the surrounding areas and Table 4-1 explains the risk classifications.

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

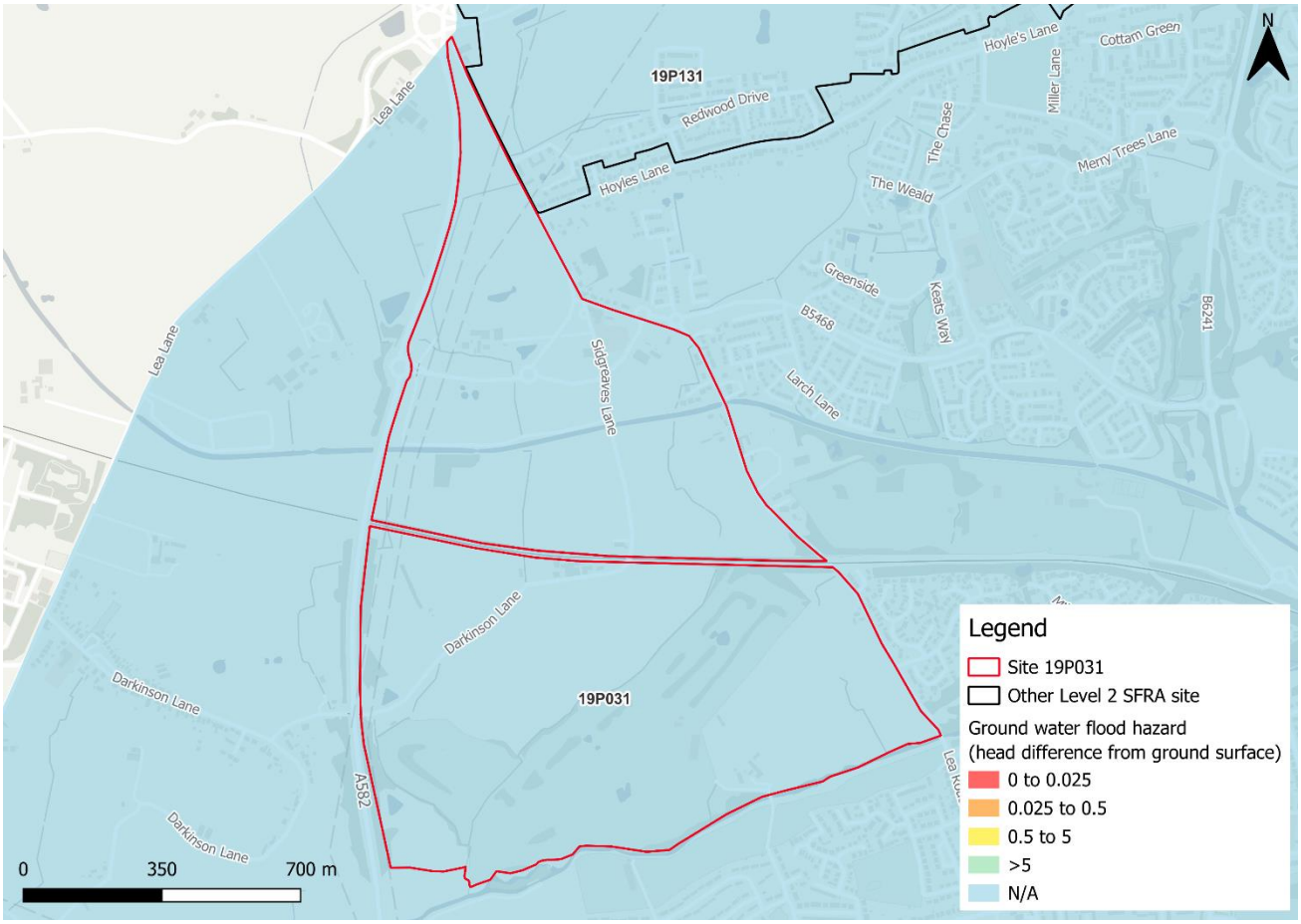

Figure 4-1: JBA 5m Groundwater Emergence Map

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 test[5], 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. Given the absence of modelled climate change data and the use of proxies 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.

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 Savick Brook and its tributaries 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.

Were 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:

- Updated present day and climate change modelling of Savick Brook and its tributaries 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. Risk from the ordinary watercourses should be investigated.
- It would be acceptable to use updated modelling to suitably assess risk through a site-specific FRA, as well as/instead of a Level 2 SFRA update.
- There should be no development within the functional floodplain. There should also be no development within 8m of Savick 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.
- A detailed drainage strategy will be required given the large area of this site. The use of infiltration SuDS should be investigated.
- The site is at potential residual risk from possible blockages of the culverts within the site, which should be considered at the FRA stage.
- 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.

5 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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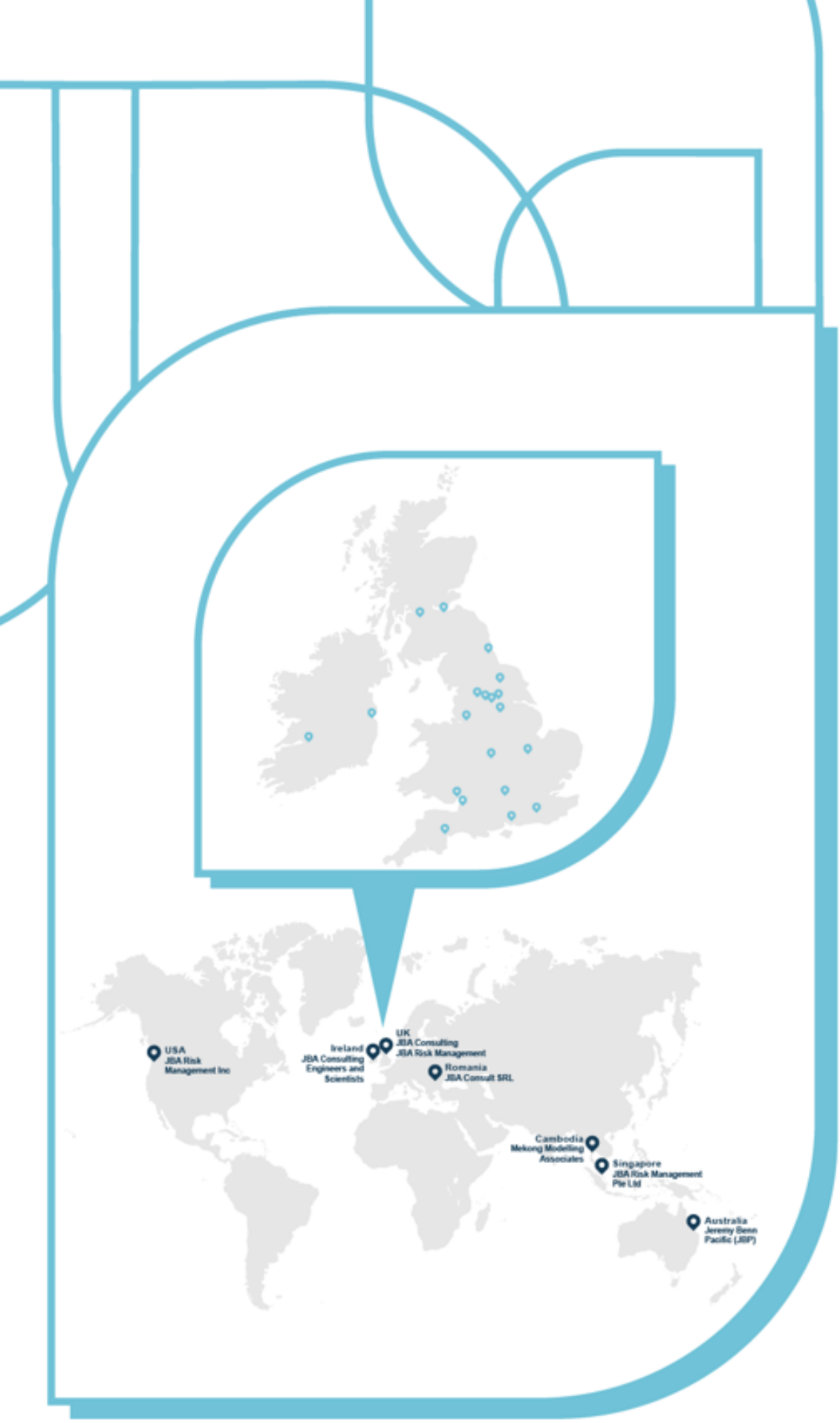

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Central Lancashire Level 2 Strategic Flood Risk Assessment - Site 19P089

Final

June 2025

Prepared for:

Preston South Ribble Chorley Central Lancashire

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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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Acknowledgements

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

Contents

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List of Tables

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19P089. 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 19P089

- Location: Former Tulketh High School, Tag Lane, Preston, PR2 3TX
- Existing site use: Education
- Existing site use vulnerability: More vulnerable
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 6.4 hectares
- Proposed development impermeable area: 5.5 hectares (assumed 85% impermeable area)
- EA model: Savick Brook 2011
- Watercourse: Sharoe 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

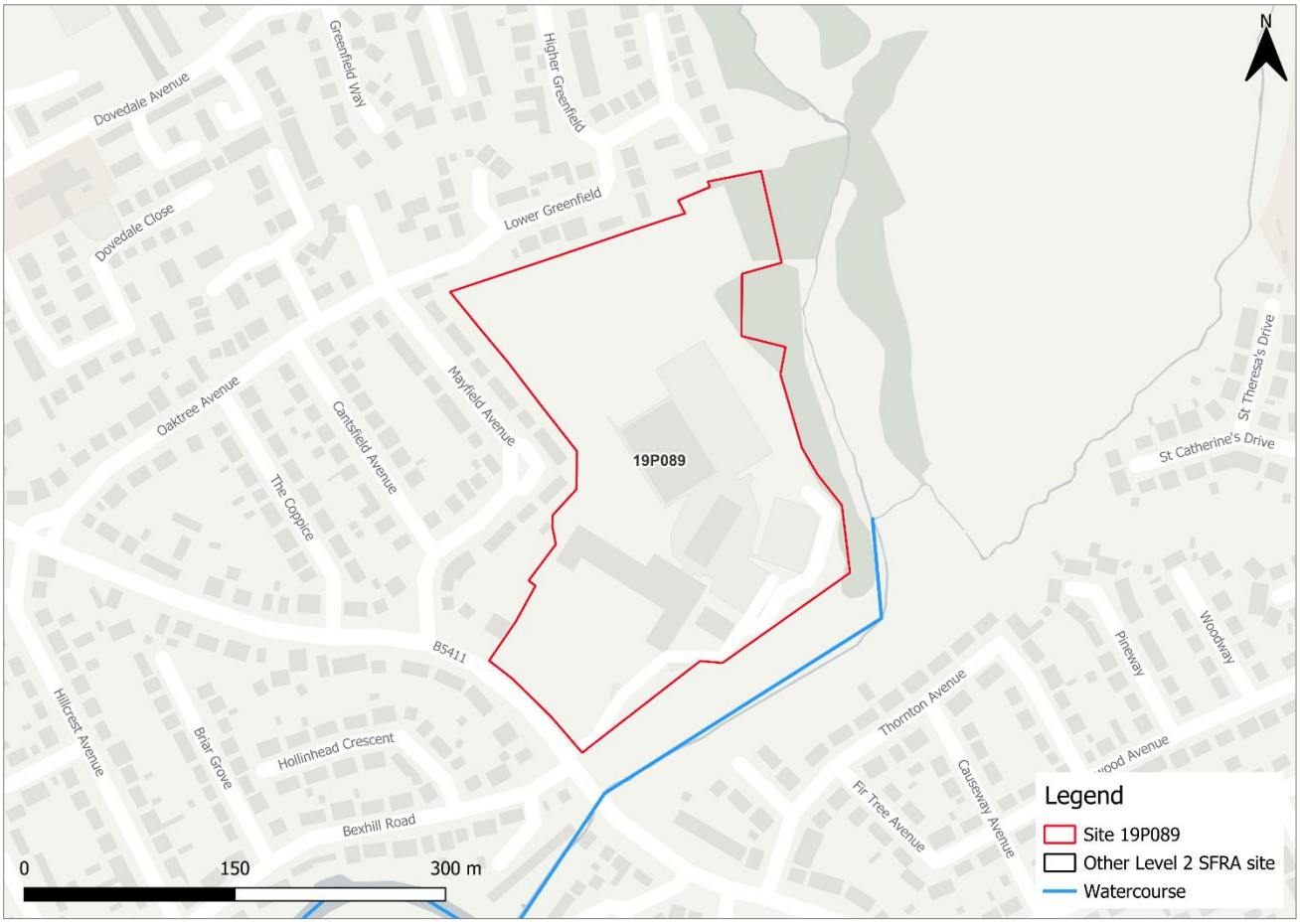

Figure 1-1: Existing site location boundary

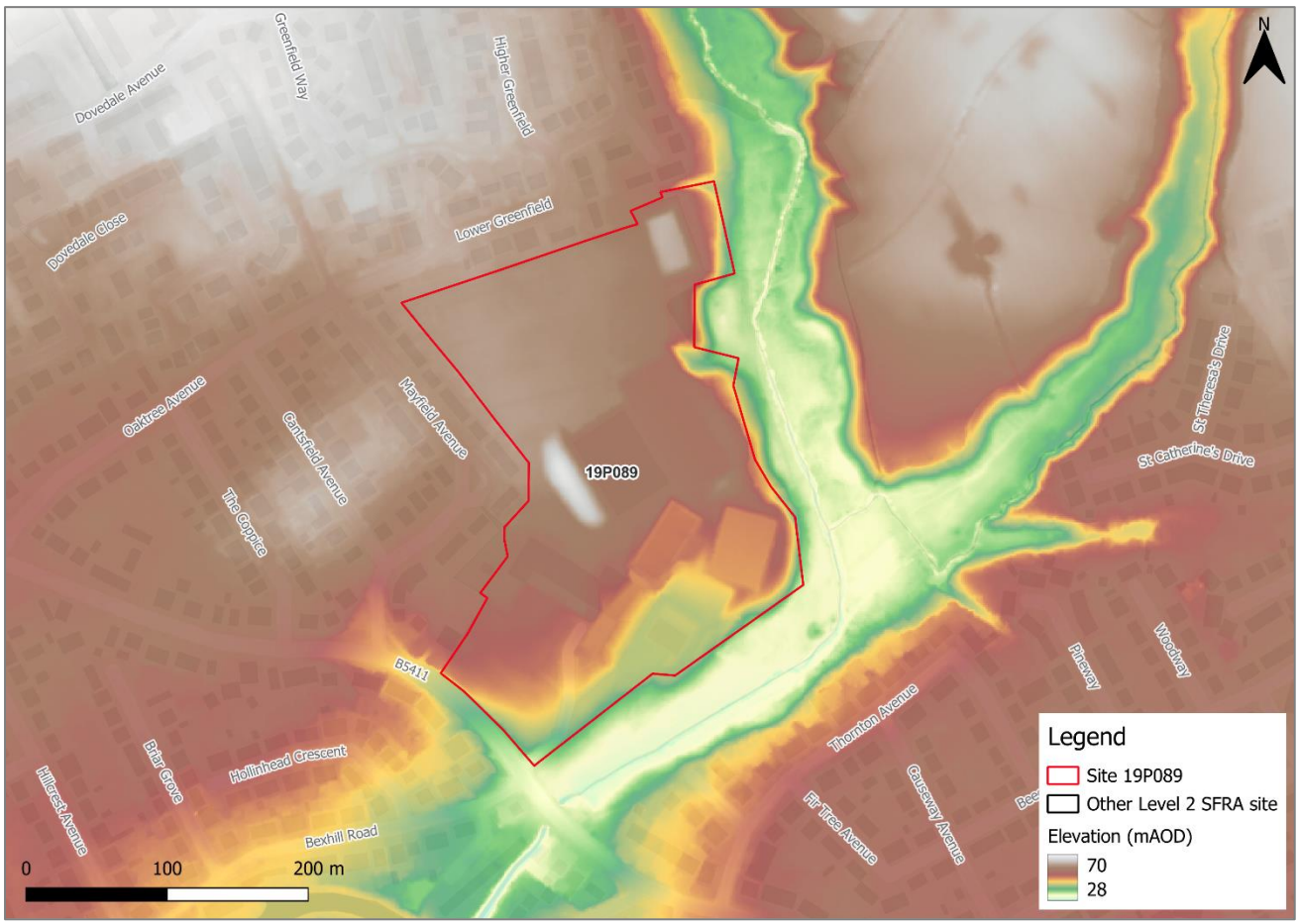

Figure 1-2: Topography

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, 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. Flood Zone 3b is present along the eastern boundary of the site, however this is less than 1% of the total site area. There should be no development within the functional floodplain. However, the functional floodplain in this location is conservatively based on the Savick Brook 0.1% AEP defended event, as delineated within the 2019 functional floodplain extent, in the absence of suitable modelled data. A small area within the south of the site is within Flood Zone 2 of the EA's Flood Map for Planning.

Table 2-1: Existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
99.4	0.2	0	0.3

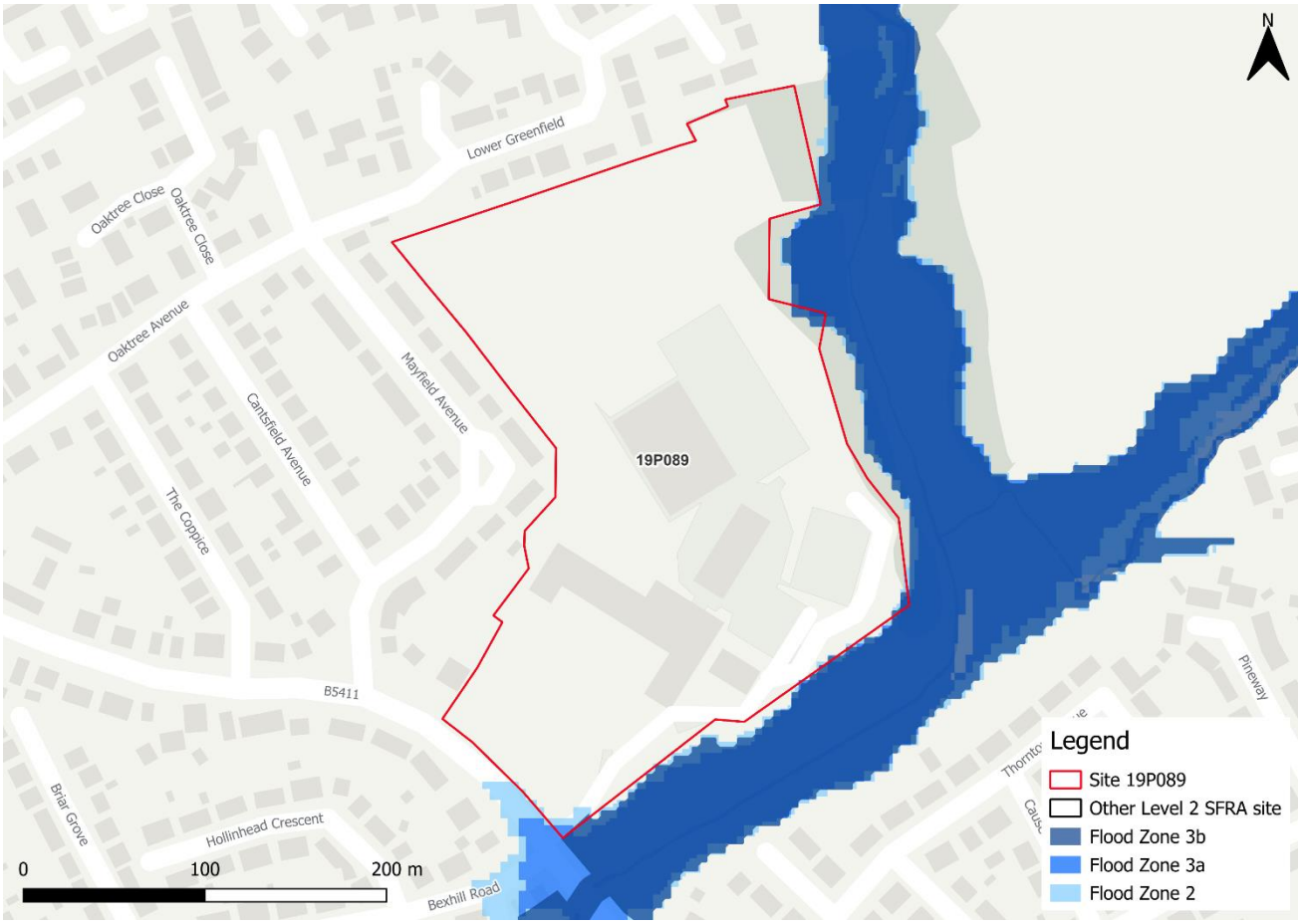

Figure 2-1: Existing risk from rivers to the site

2.1.2 Savick 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 similar to Flood Zone 3 in the vicinity of the site, with a small area along the eastern and southern boundaries of the site modelled to be at risk. Maximum flood depths within the site are modelled to be between 0.3 and 0.6 m, located to the south of the site. Figure 2-3 shows the modelled flood hazard ratings for the 1% AEP undefended event. Modelled flood hazard in the area of the site at risk is largely categorised as 'Very low hazard', with some areas categorised as 'Danger for some'. There is no modelled flood risk to the rest of the site in the 1% AEP undefended event.

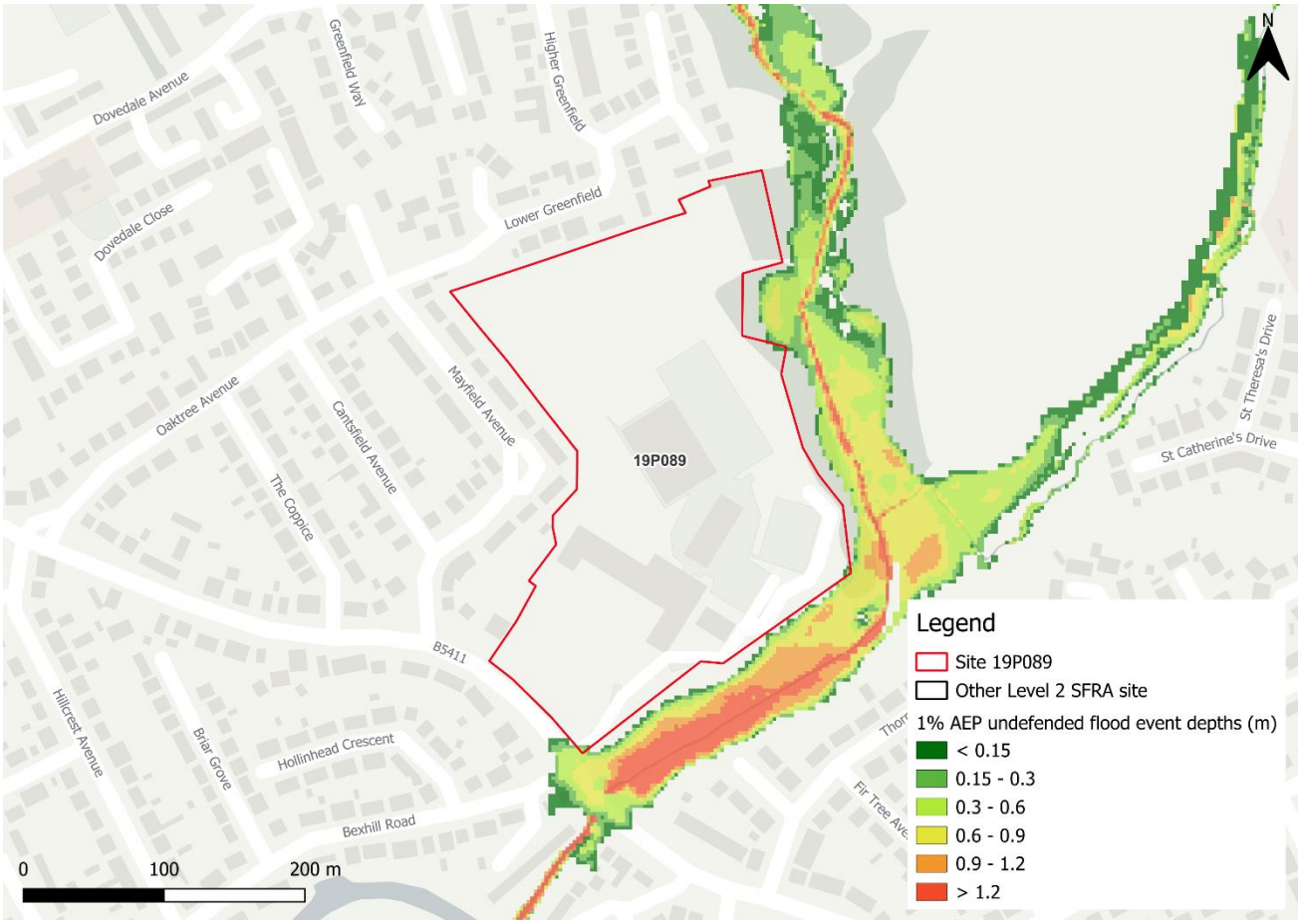

Figure 2-2: Flood depths for 1% AEP undefended flood event

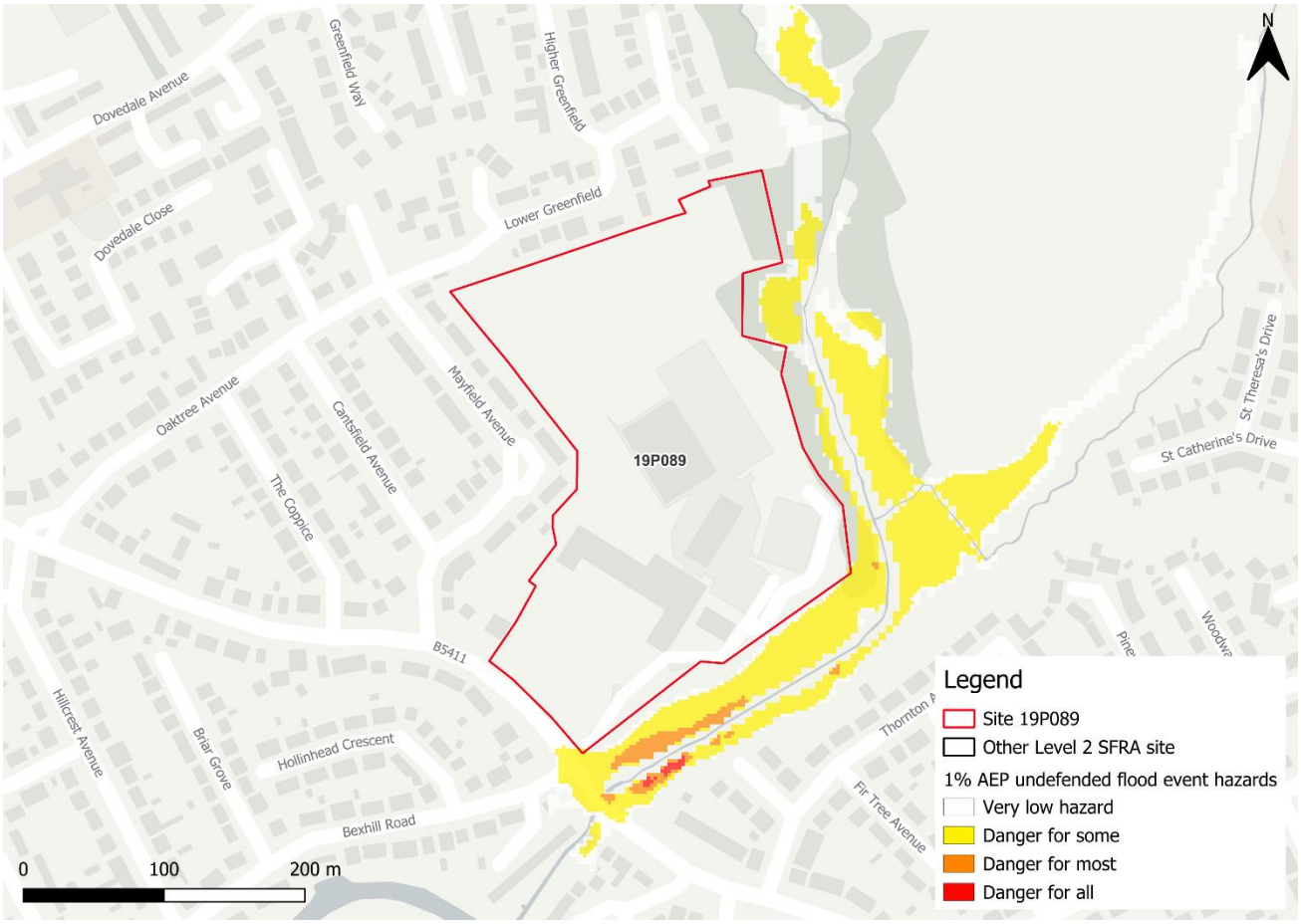

Figure 2-3: Flood hazard[1] for 1% AEP undefended flood event

2.2 Impacts from climate change

The impact of climate change on flood risk from Sharoe Brook has not been modelled for this SFRA, as not all files for the Savick Brook model were made available to be able to run the model. Therefore, in the absence of modelled climate change information, the Savick Brook 0.1% AEP undefended event (Figure 2-4) can be used as a conservative proxy for Flood Zone 3 plus climate change. Based on this approach, fluvial risk is modelled to remain largely similar in extent to the present day Flood Zone 3 (Figure 2-1).

The impacts of climate change must be modelled using the EA's latest allowances for peak river flows to inform the exception test. Therefore, any updates to this Level 2 SFRA and/or any site-specific FRA produced to inform a planning application should include the most up to date climate change allowances.

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. Environment Agency.

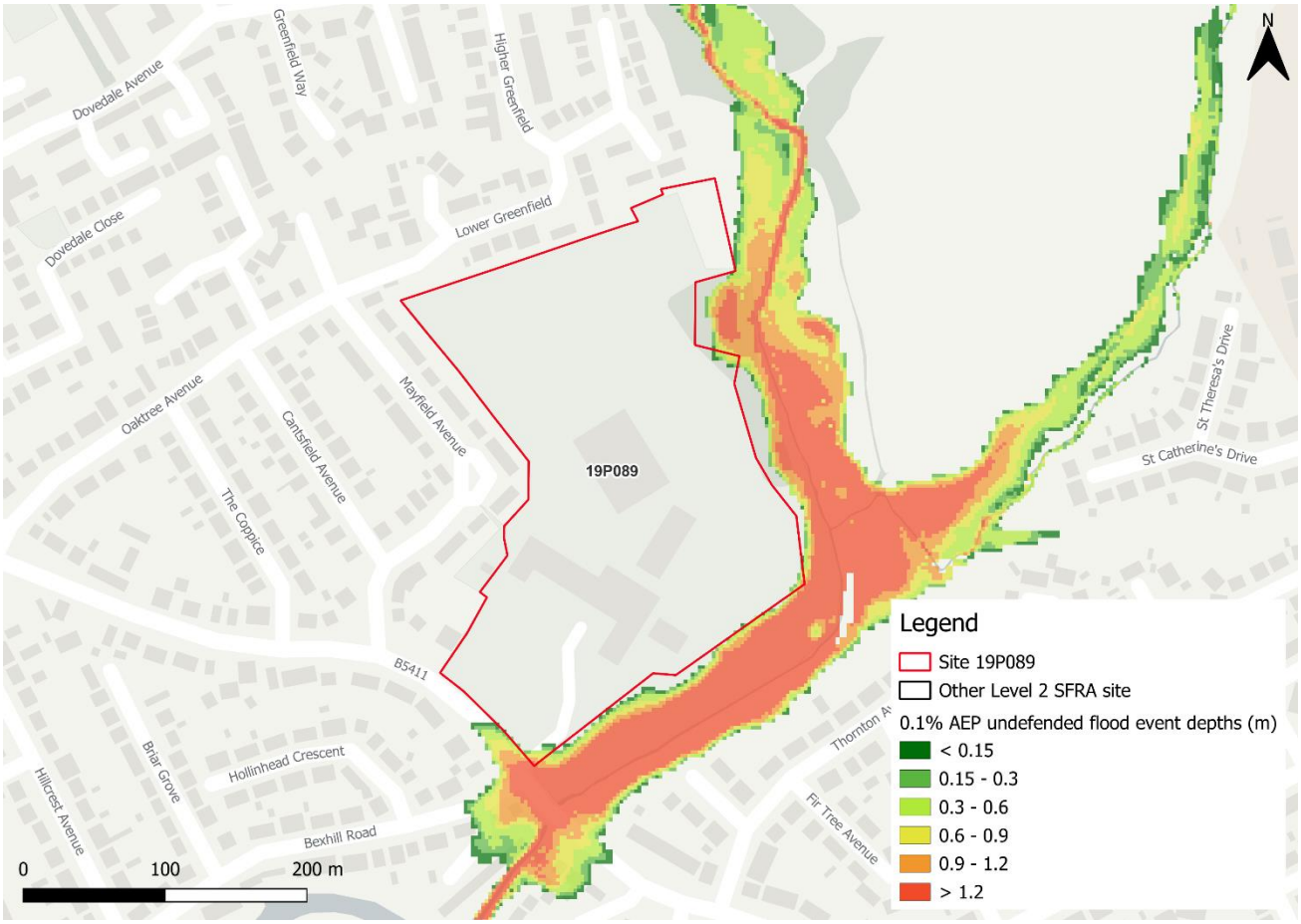

Figure 2-4: Flood depths for 0.1% AEP undefended flood event (as a proxy for the 1% AEP undefended event plus climate change)

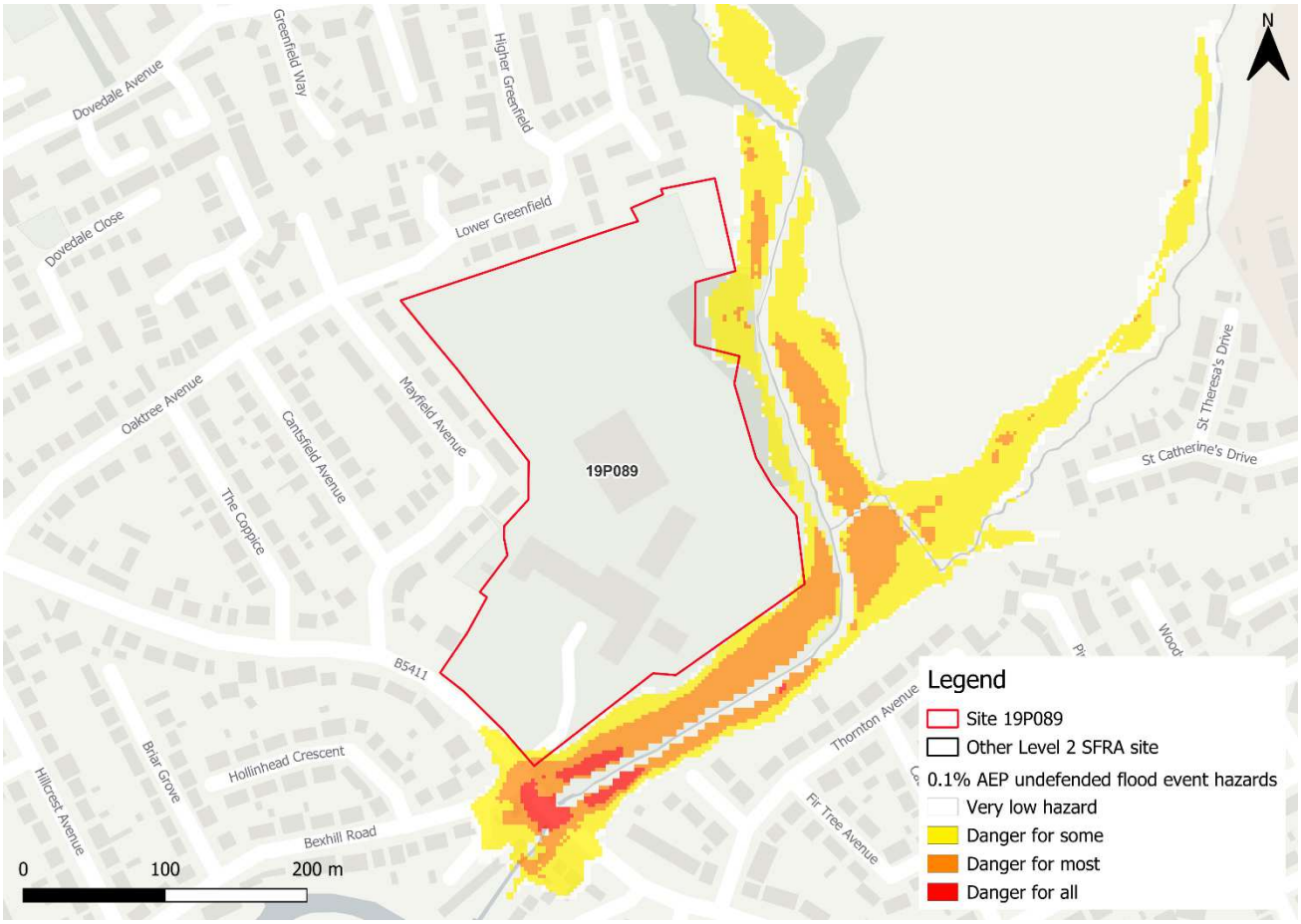

Figure 2-5: Flood hazard for 0.1% AEP undefended flood event (as a proxy for the 1% AEP undefended event plus climate change)

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 19P089 is located within one catchment, namely; Savick 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 Guidance[2].
- 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

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. There is the potential for floodplain reconnection both upstream and adjacent to the site, allowing floodwater from Sharoe Brook to be stored. 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 on Figure 2-6.

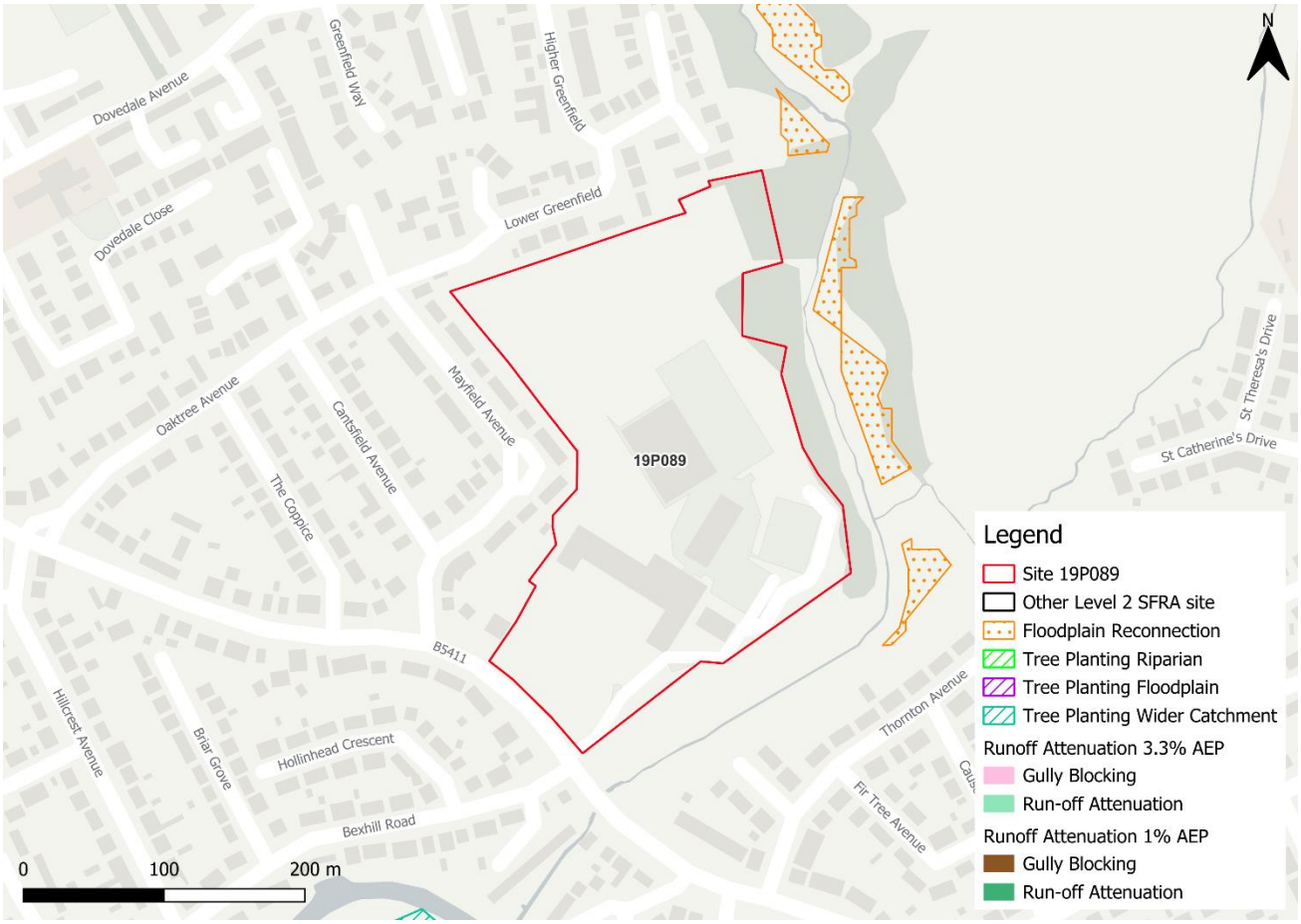

Figure 2-6: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

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

There is potential residual risk to the site from a possible blockage of the culvert along Sharoe Brook which runs beneath the B5411 to the south of the site (Figure 2-7). The impact of a blockage of this structure has not been modelled as part of this Level 2 SFRA, as not all files for the Savick Brook model were made available to be able to run the model. It is recommended that the site-specific FRA should consider the impact of a blockage of this culvert on residual flood risk to the site.

Figure 2-7: Potential blockage location

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. 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 19P089 is not located within a FWA.

Flood alerts may be issued before a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding. A flood alert may be issued when there is less confidence that flooding will occur in a FWA. A small area to the north west of the site is located within a FAA, namely; 012WAFLR- Lower River Ribble and Darwen.

Based on available information, safe access and escape routes could likely be achieved during a flood event via the B5411.

2.7 Observations, mitigation options and site suitability - fluvial

- The site is modelled to be partially within the functional floodplain along the eastern boundary of the site, adjacent to Share Brook. Development is not permitted within the functional floodplain. However, the functional floodplain in this area is conservatively based on the Savick Brook 0.1% AEP defended event, as delineated within the 2019 functional floodplain extent.
- A flood risk activity permit may be required if development is planned within 8m of the riverbank. 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 0.1% AEP undefended event outputs have been used as a proxy to provide a precautionary estimate of the 1% AEP undefended event plus climate change. Based on this approach, fluvial risk is modelled to remain largely similar in extent to the present day Flood Zone 3, with some slightly larger areas of significant depths. However, climate change must be modelled at the site-specific FRA stage to provide a fully robust assessment of future flood risk to the site. At this stage, it cannot be proven that this site can be safe for its lifetime.
- It would be acceptable to use updated climate change modelling to suitably assess risk through a site-specific FRA, as well as/instead of a Level 2 SFRA update.
- The site is at residual risk from possible blockage of the culvert beneath the B5411 downstream of the site. It is recommended that the site-specific FRA should consider the impact of a blockage of this culvert on residual flood risk to the site.

- Safe access and escape should be possible via the B5411 to the south 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 high risk surface water flood zone. A further 2% is at low surface water risk, as shown in Table 3-1.

In the high risk event, surface water risk is confined to a short flow path within the centre of the site, constrained by existing development. In the low risk event, risk is slightly greater with some additional short flow paths, constrained by the existing buildings within the site.

Greatest surface water 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 the B5411 to the southwest of the site in the high and medium risk events. Safe access and escape routes may not be possible in the low risk event given surface water flooding along the B5411.

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

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
97	2	0	1

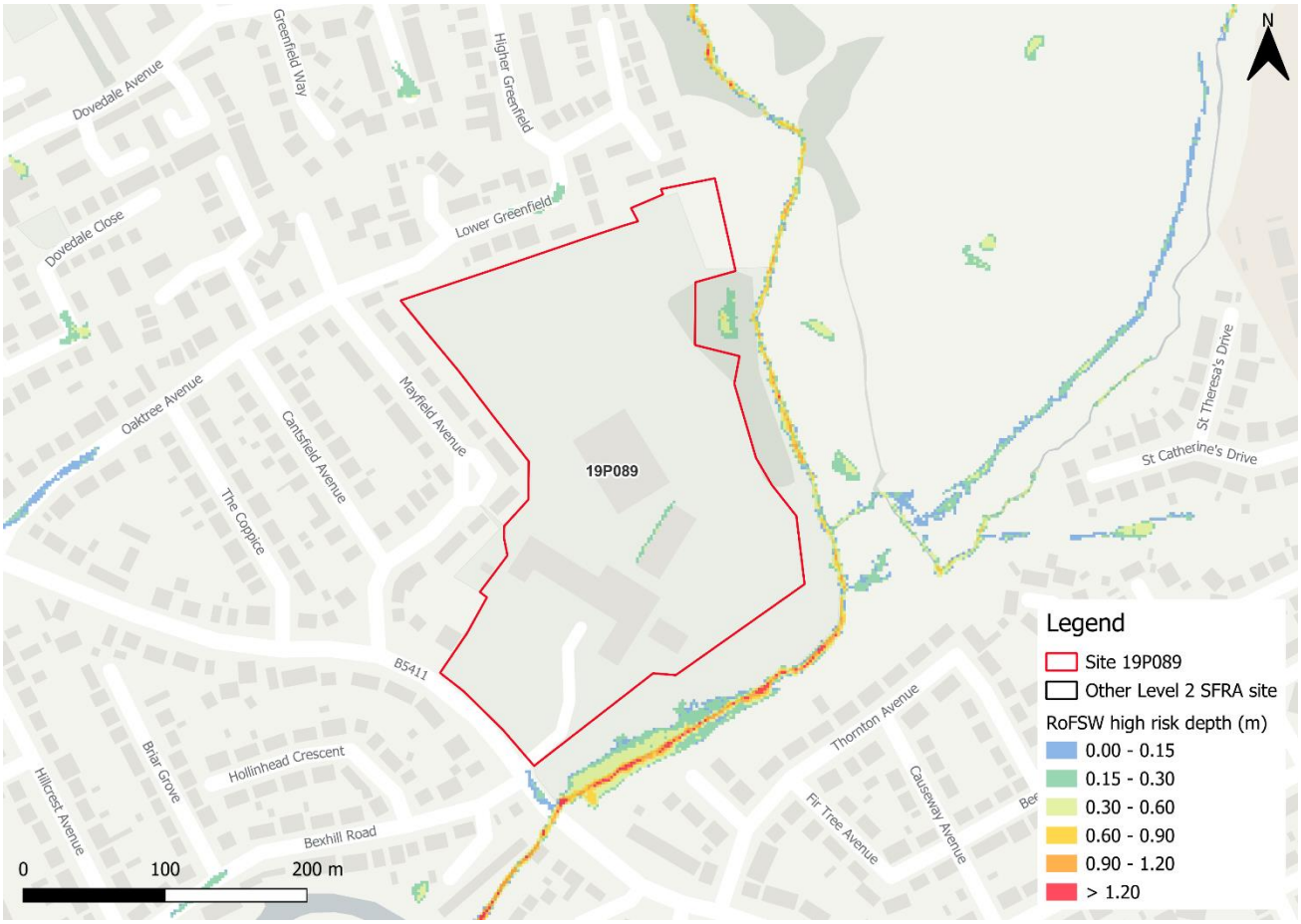

Figure 3-1: High risk event surface water flood depths (Risk of Flooding from Surface Water map)

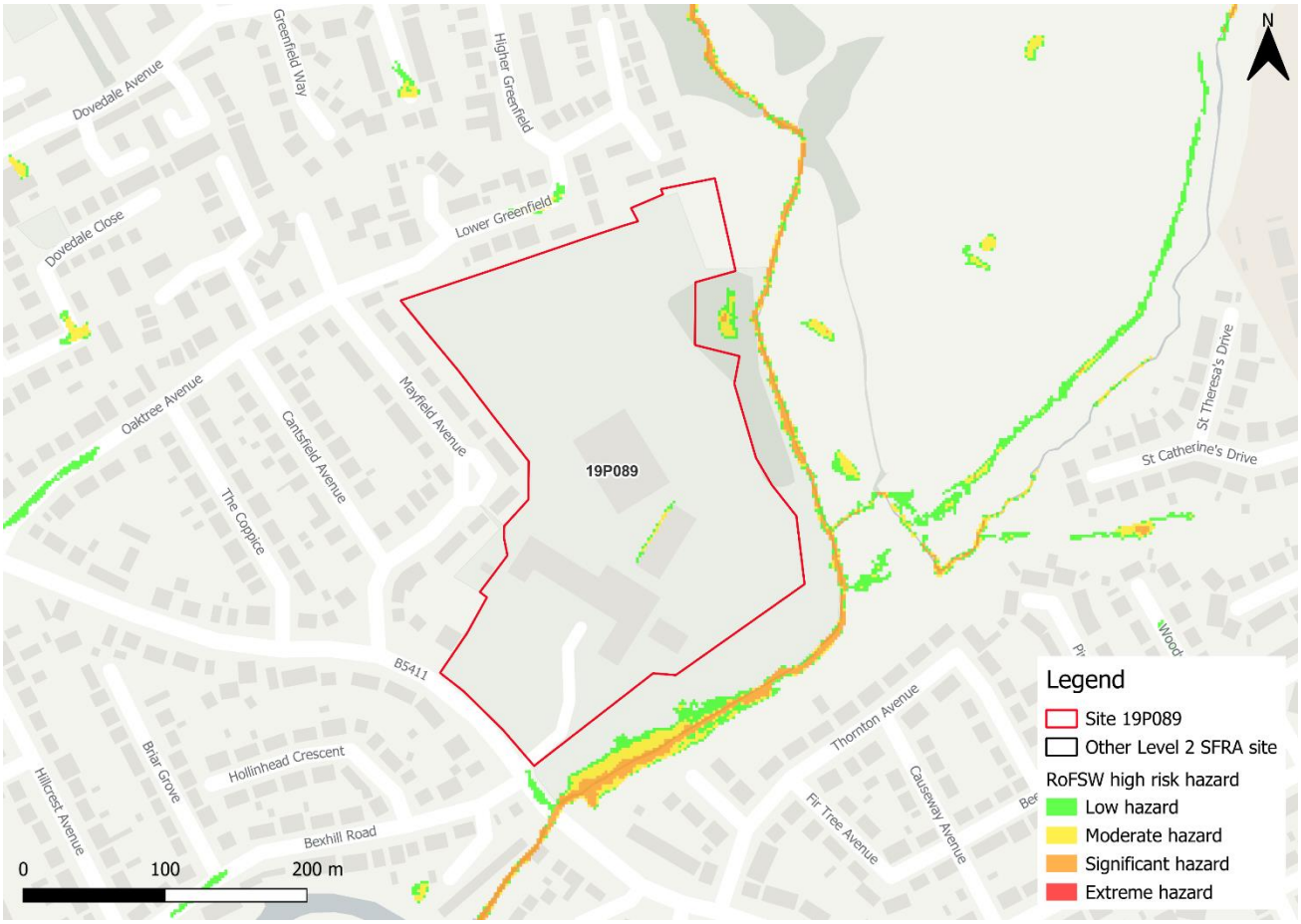

Figure 3-2: High risk event surface water flood hazard[3] (Risk of Flooding from Surface Water map)

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 Ribble management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	50%

Figure 3-3 shows the high risk surface water flood depths plus 40% climate change. Risk is modelled to be slightly greater than the present day high surface water risk flood extent, with multiple short flow paths present across the site constrained by the existing

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

development. Risk is similar in extent and depth to the present day low risk event. Maximum flood depths are modelled to be between 0.3m and 0.6m, with some areas of significant hazard (Figure 3-4).

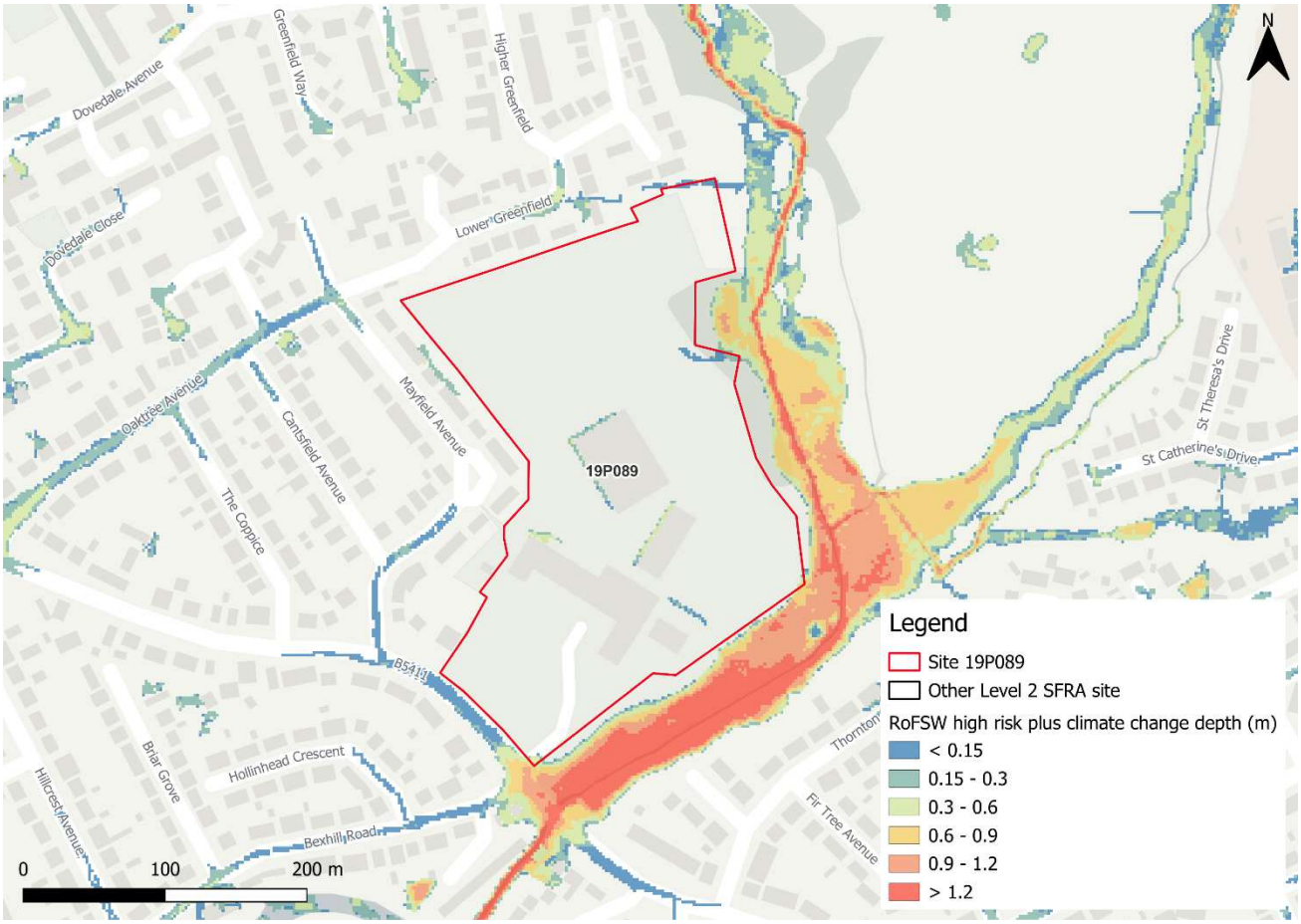

Figure 3-3: High risk event surface water flood depths plus 40% climate change (based on Risk of Flooding from Surface Water map)

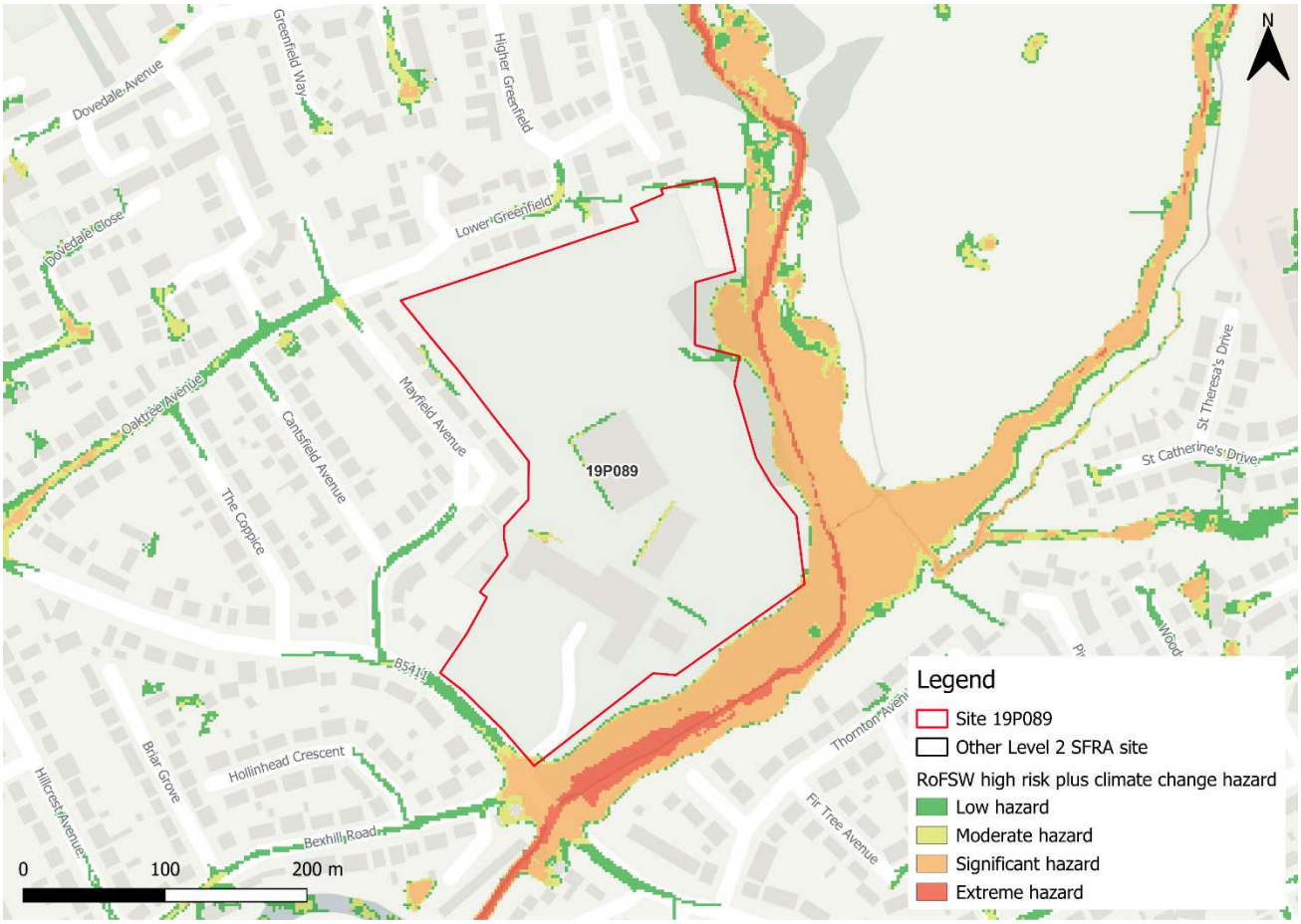

Figure 3-4: High risk event surface water flood hazards plus 40% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is largely very low, with 97% of the site being at very low surface water flood risk. In all events, surface water risk is largely confined to areas constrained by existing development as short flow paths. Surface water risk in the high and medium risk events is confined to a flow path constrained by a single existing building.
- Safe access and escape routes should be achievable via B5411 in the high and medium risk events, though may not be possible in the low risk event given the extent surface water flooding along this route.
- 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 significantly greater than the present day high risk event, with the climate change event being similar in extent and depth to the present day low risk event. Any existing flow paths should be maintained in site design.
- 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.
- It is assumed the current structures will be demolished for new housing units. A drainage strategy would therefore 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.
- Assessment of the current drainage system in place should be carried out to ascertain any current capacity issues and whether the current system could accommodate the proposed residential development or whether further capacity will be required.
- 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 Guide[4]. Figure 4-1 show the map for Site 19P089 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 risk of groundwater emergence. Groundwater conditions may therefore be suited to infiltration SuDS.

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 test[5], 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 data and the use of proxies 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.

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 Sharoe 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.

Were 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:

- Updated climate change modelling of Sharoe 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.
- It would be acceptable to use updated modelling to suitably assess risk through a site-specific FRA, as well as/instead of a Level 2 SFRA update.
- There should be no development within the functional floodplain. There should also be no development within 8m of Sharoe 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.
- A detailed drainage strategy will be required for any new development. The use of infiltration SuDS should be investigated.
- The site is at potential residual risk from a possible blockage of the culvert beneath the B5411, which should be considered as part of a site-specific FRA.
- 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.

5 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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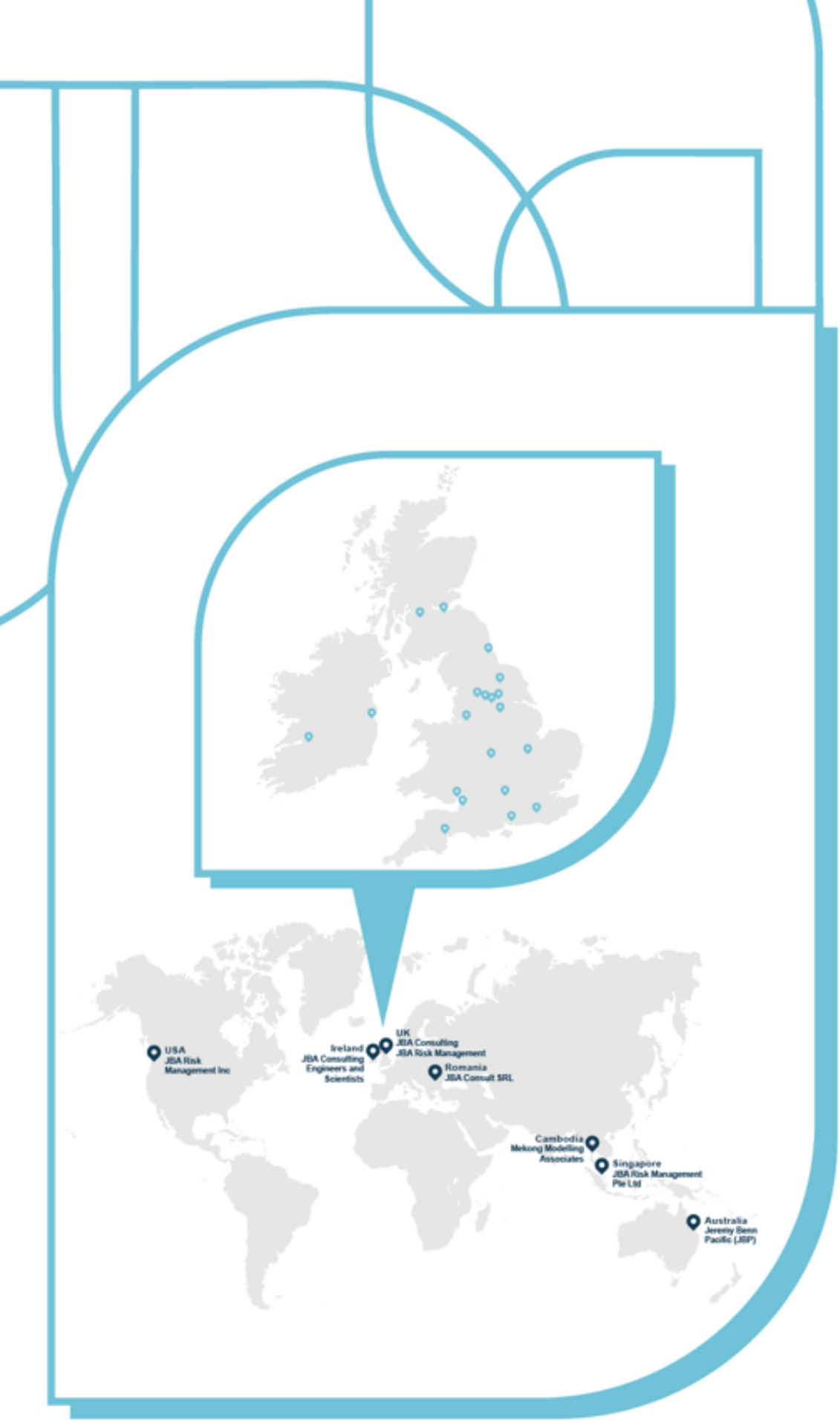

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Prepared for:

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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. Laura Thompson of JBA Consulting carried out this work.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between 19 August 2024 and 20 June 2025 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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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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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for the Central Lancashire Local Plan Site 19P178. 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 19P178

- Location: Riversway Phase B Site Specific Policy, Maritime Way, Preston, PR2 2HT
- Existing site use: Greenfield
- Existing site use vulnerability: Water compatible
- Proposed site use: Employment
- Proposed site use vulnerability: Less vulnerable
- Site area: 16.6 hectares
- Proposed development impermeable area: 14.1 hectares (assumed 85% impermeable area)
- EA model: Ribble Estuary 2014 / Ribble-Douglas 2010
- Watercourse: River Ribble. Drainage ditch through the centre of the site.
- 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

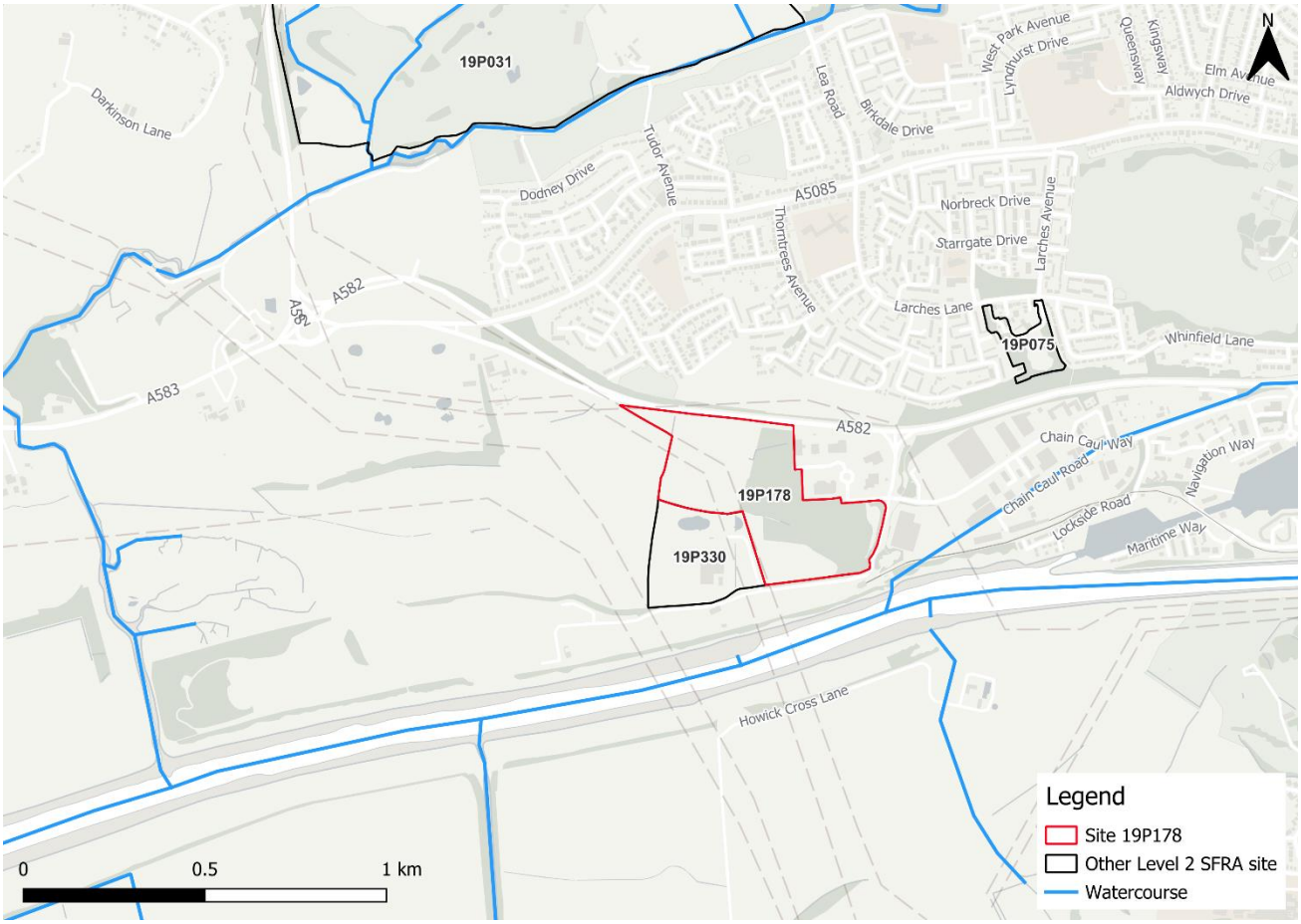

Figure 1-1: Existing site location boundary

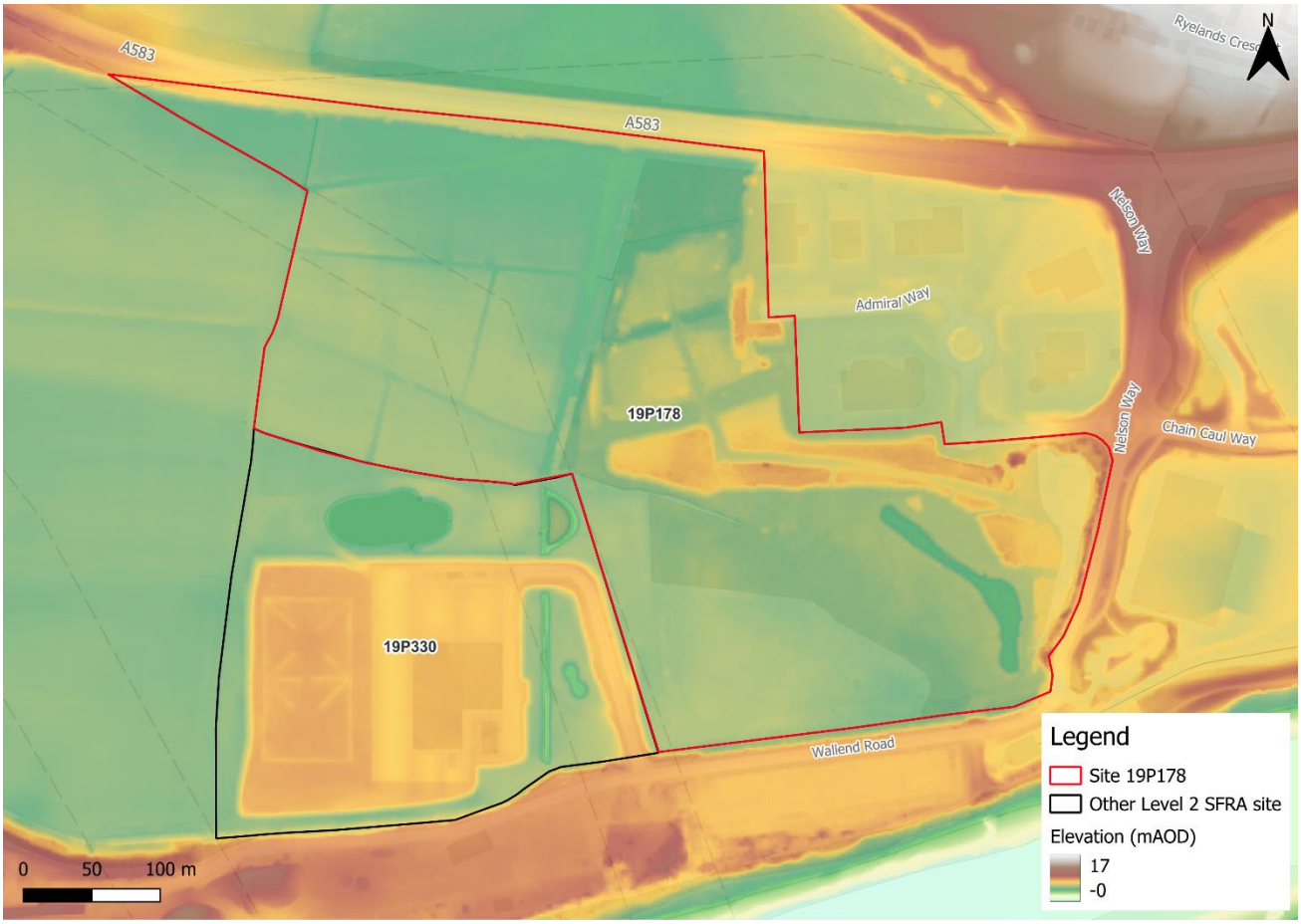

Figure 1-2: Topography

2 Flood risk from rivers and the sea

2.1 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, the percentage areas of the site within each tidal 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).

Flood Zone 3a is present through the centre of the site and is therefore at high risk of flooding, based on direct rainfall modelling. Almost the entire remaining area of the site is located within Flood Zone 2 indicating it is at medium risk of flooding from rivers and the sea.

Table 2-1: Existing tidal flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
1	93	6	0

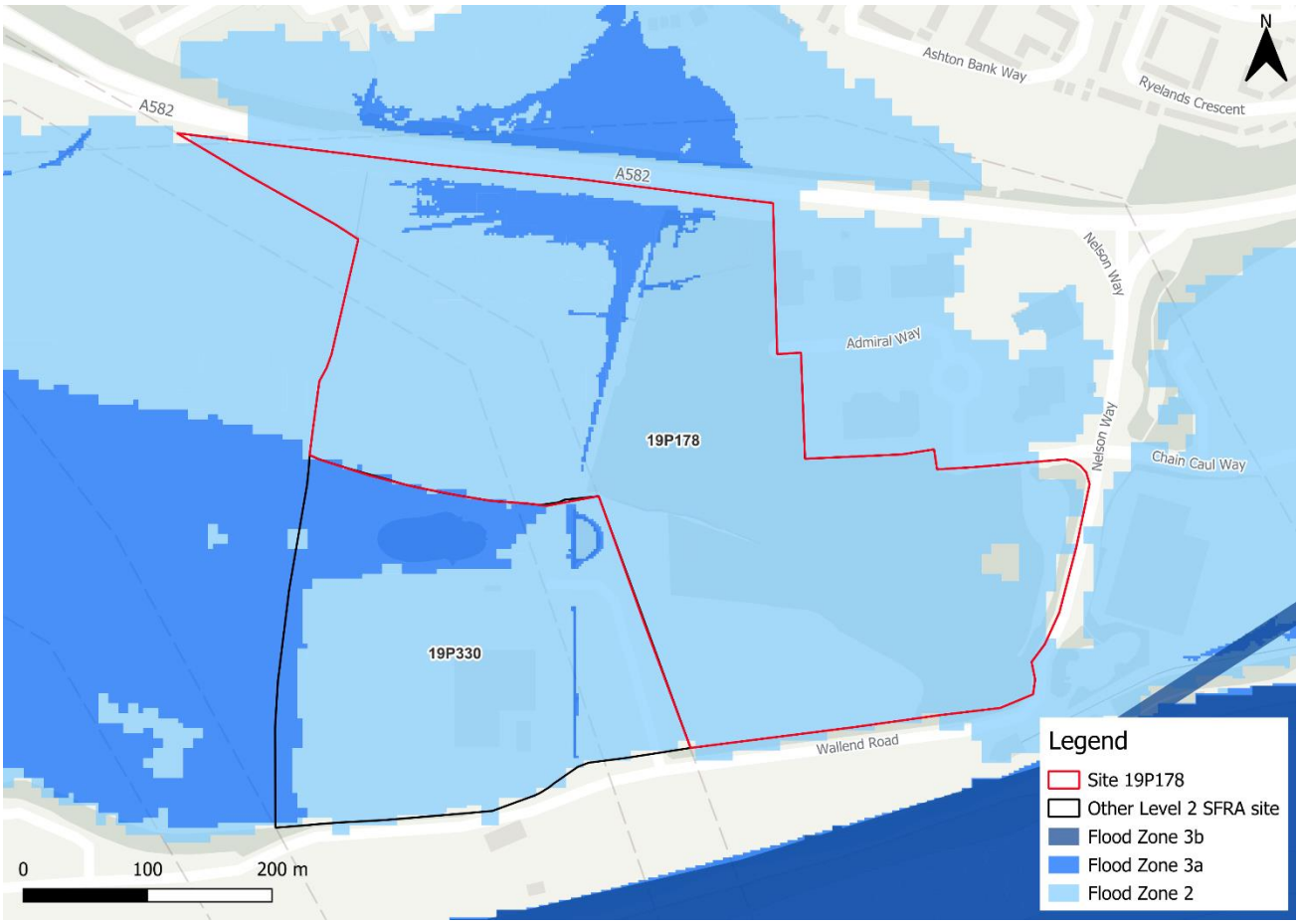

Figure 2-1: Existing risk from rivers and the sea to the site

2.1.1 Ribble-Douglas 2010 undefended model outputs

The Ribble-Douglas model outputs are different to the Flood Map for Planning and will therefore mean recommendations on development will also be different when accounting for the Flood Map for Planning or the outputs from the Ribble-Douglas model. The Environment Agency have confirmed that the defended scenario informs the flood zones in this area as flooding is modelled to be greater in extent than the undefended.

There is no modelled present day undefended risk to the site from the Ribble-Douglas 2010 combined fluvial and tidal model (Figure 2-2).

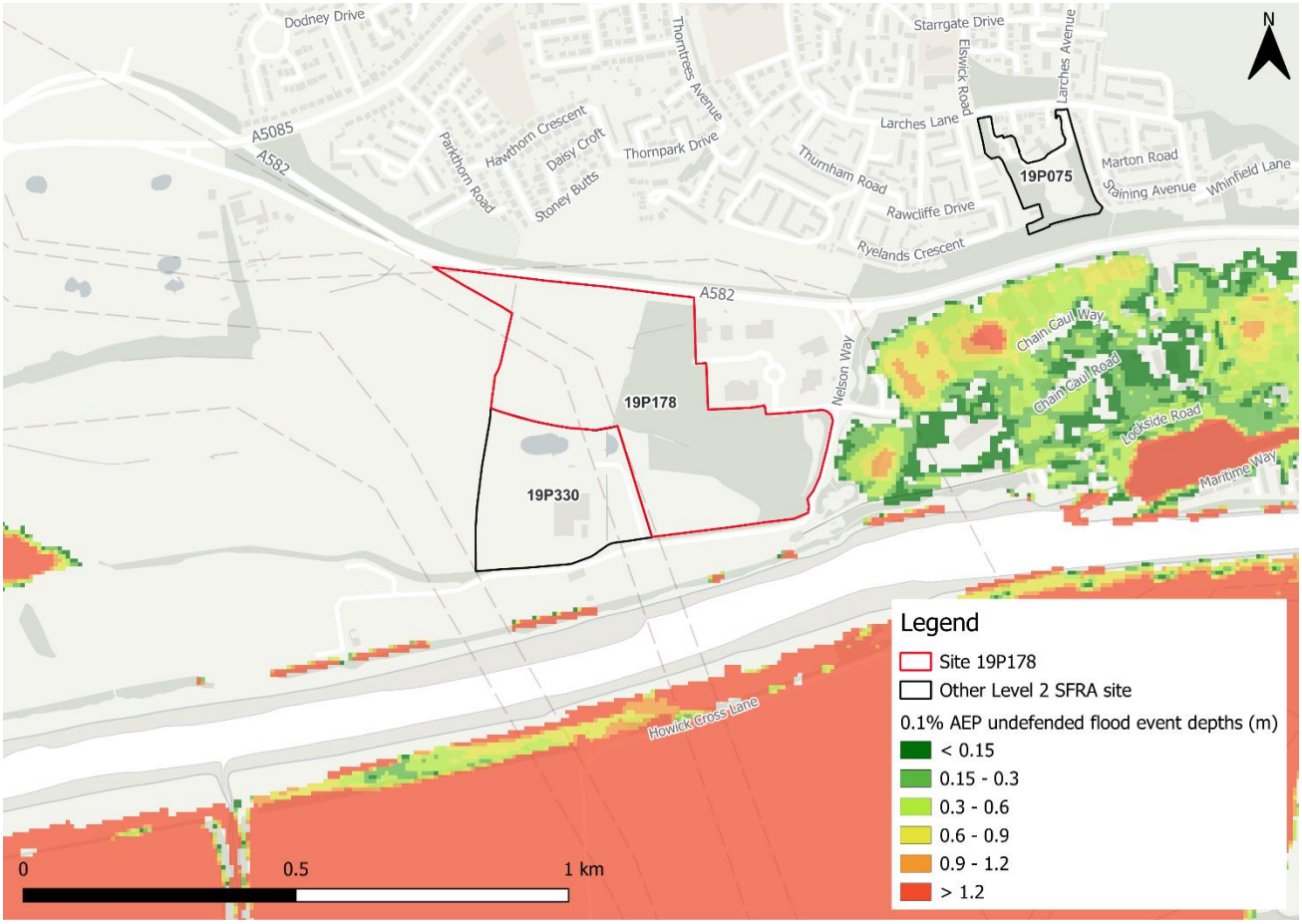

Figure 2-2: Flood depths (m) for 0.1% AEP undefended flood event (Ribble-Douglas 2010)

2.1.2 Ribble Estuary 2014 undefended model outputs

The Ribble Estuary model outputs are different to the Flood Map for Planning and will therefore mean recommendations on development will also be different when accounting for the Flood Map for Planning or the outputs from the Ribble Estuary model.

Figure 2-3 shows the modelled flood depths for the 0.1% AEP undefended event. There is modelled risk to through the centre of the site, along the existing drainage ditch. There is no modelled risk to the rest of the site in this event based on the Ribble Estuary 2014 undefended model.

Figure 2-4 shows the modelled flood hazard ratings for the 0.1% AEP undefended event. Flood hazard within the site is largely categorised as 'very low hazard', with a small area of 'Danger for some' located within the drainage ditch in the centre of the site.

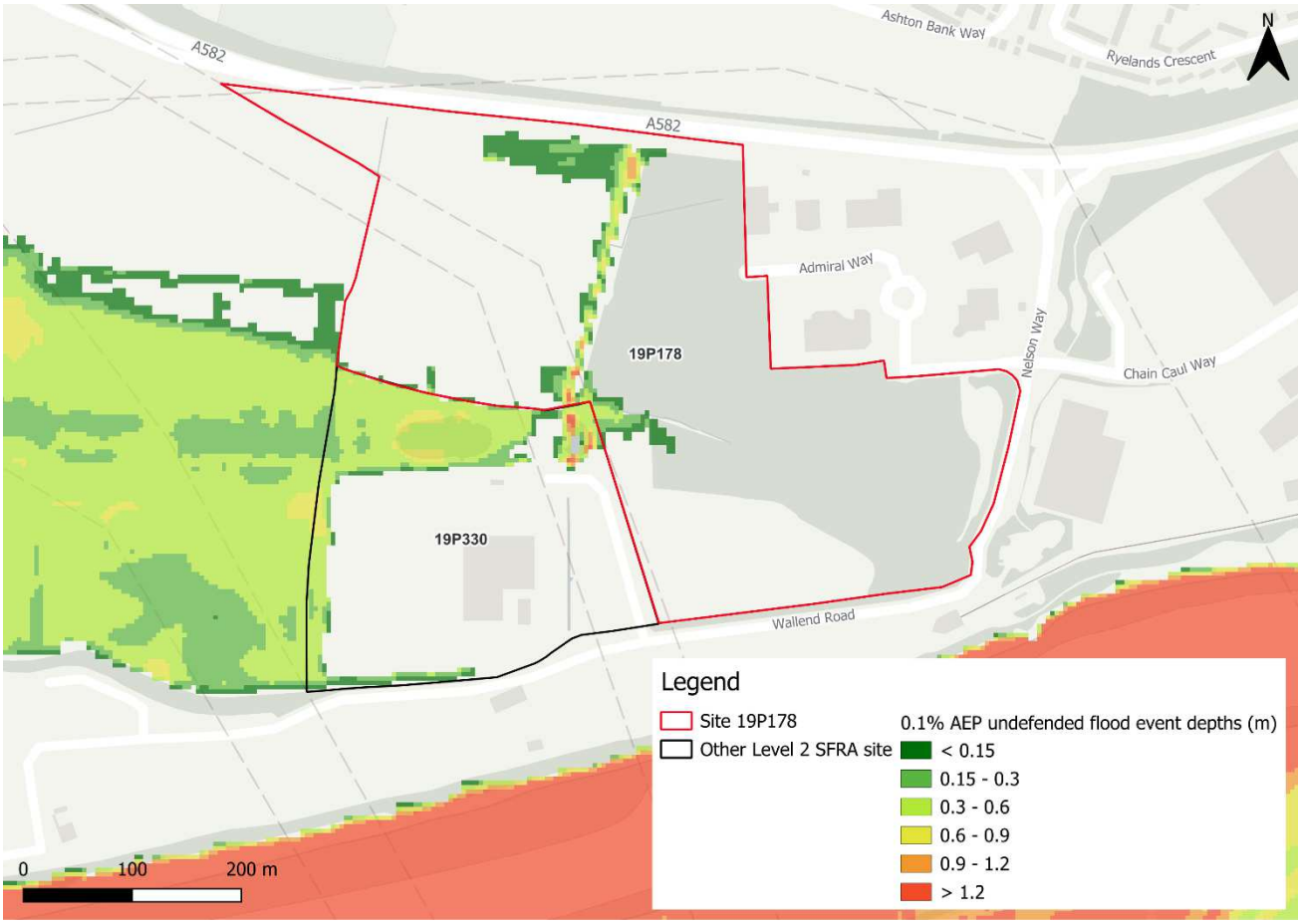

Figure 2-3: Flood depths (m) for 0.1% AEP undefended flood event (Ribble Estuary 2014)

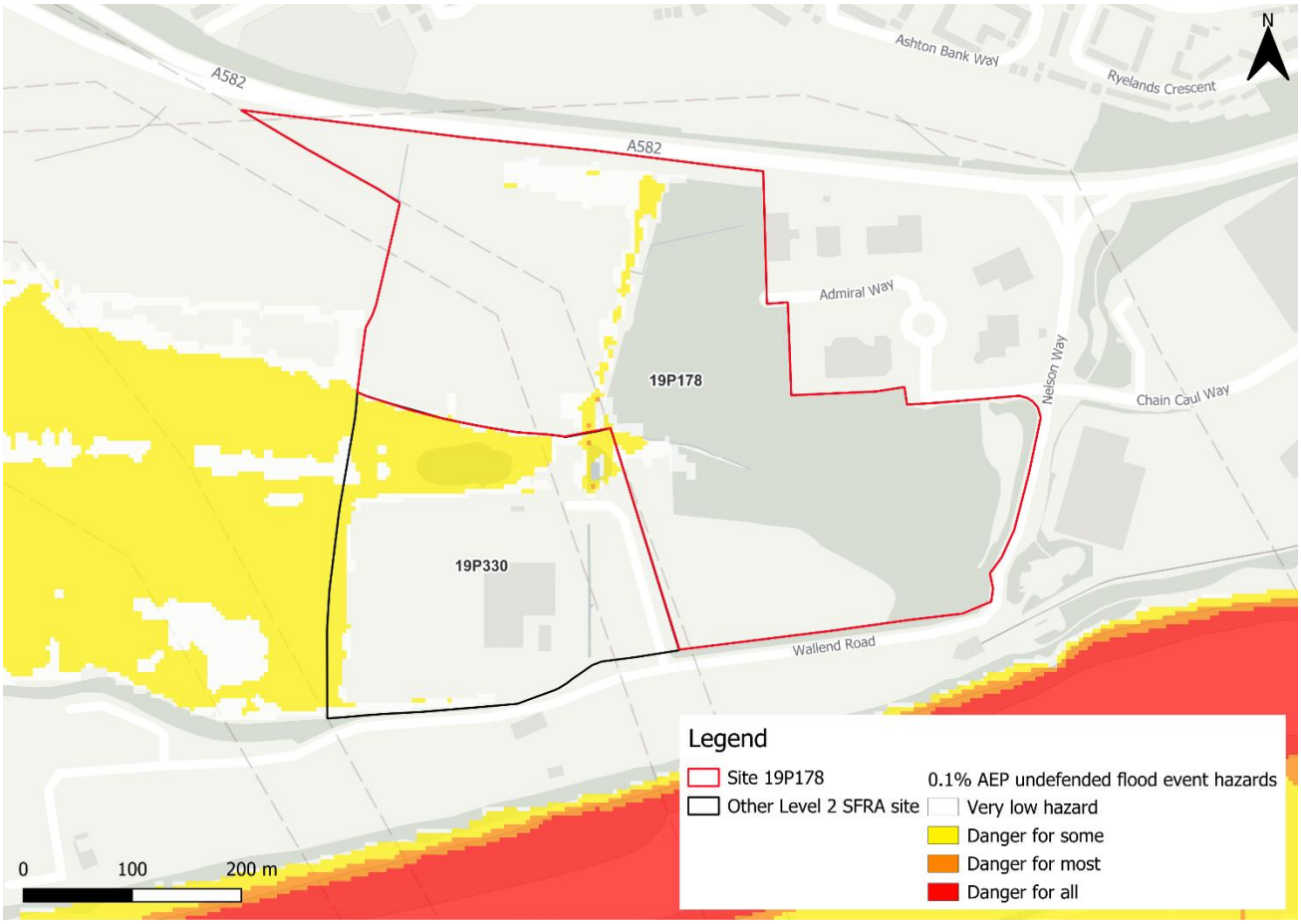

Figure 2-4: Flood hazard for 0.1% AEP undefended flood event (Ribble Estuary 2014)

2.2 Impacts from climate change

The impacts of climate change on flood risk from the Ribble-Douglas 2010 and Ribble Estuary 2014 models have been modelled without flood defence infrastructure in place. This allows for direct comparison with the existing risk of the Flood Map for Planning. However, as discussed, both the Ribble-Douglas 2010 and Ribble Estuary 2014 undefended model outputs do not reflect 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 and Table 2-3.

Table 2-2: Modelled climate change allowances for peak river flows for the Ribble Management Catchment (Ribble-Douglas 2010 model)

Return period	Central allowance 2080s	Higher central allowance 2080s
3.3% (functional floodplain)	36%	46%
1%	36%	46%

Table 2-3: Modelled climate change allowances for sea level rise for the North West river basin district (Ribble Estuary 2014 model)

Allowance category	2000-2035 (mm)	2036-2065 (mm)	2066-2095 (mm)	2096-2125 (mm)	Cumulative rise 2000-2125 (m)
Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41
Higher central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01

2.2.1 Ribble-Douglas 2010 climate change model outputs

Although there is no modelled impact to the site in the present day 1% AEP event in the fluvial and tidal combined Ribble-Douglas 2010 model, there is a significant impact to the site when accounting for climate change. Figure 2-5 shows the onsite modelled flood depths for the 1% AEP undefended event plus higher central sea level rise allowance. Risk is modelled to be much greater than for present day conditions within this model, with a flow path extending through the centre of the site. Maximum flood depths are modelled to be significant at > 1.2 m.

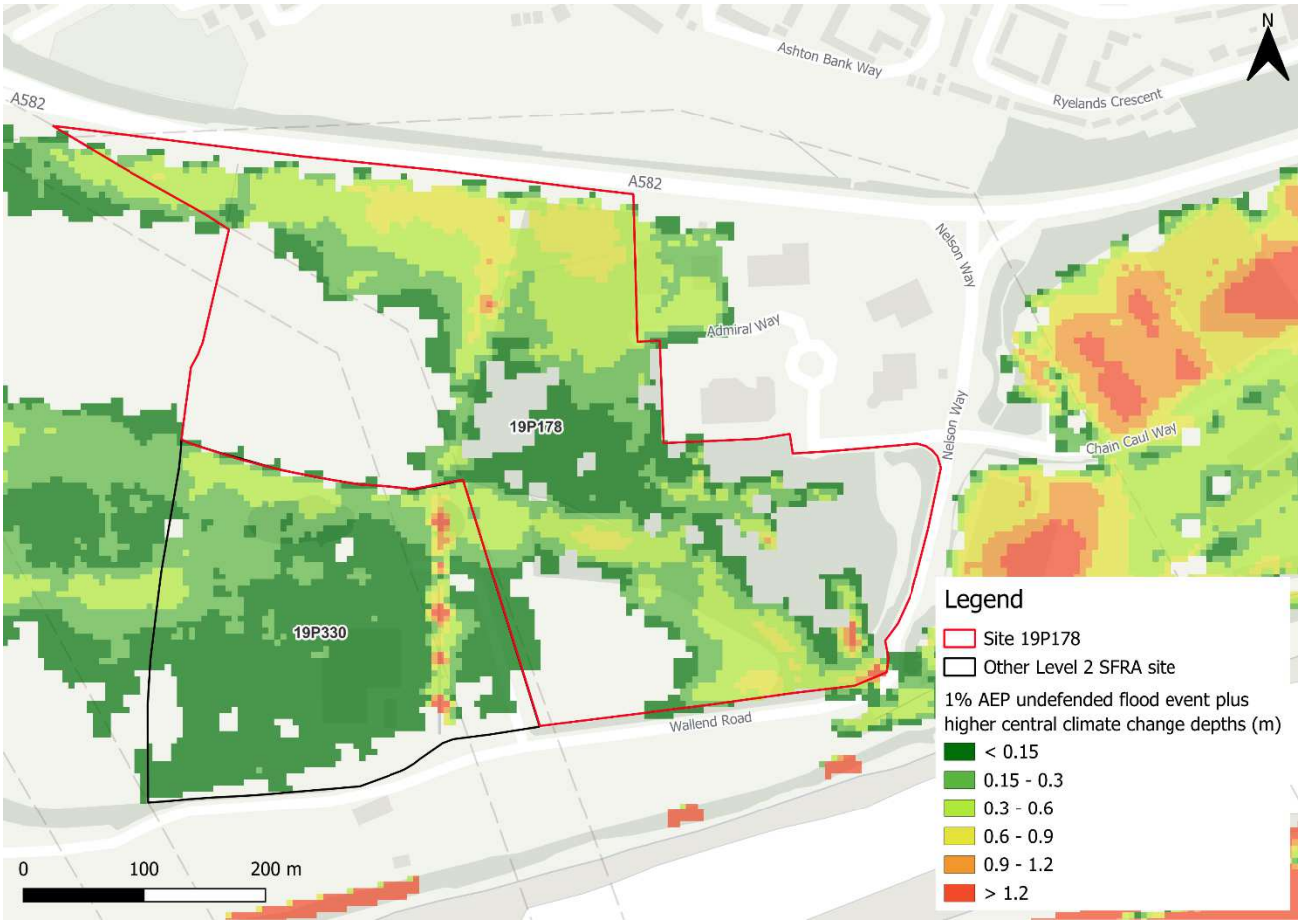

Figure 2-5: Flood depths (m) for 1% AEP undefended flood event plus higher central climate change allowance (Ribble-Douglas 2010)

Figure 2-6 shows the modelled flood hazard ratings for the 1% AEP undefended event plus higher central sea level rise allowance. Flood hazard within the site is largely categorised as 'Danger for some', with a small area of 'Danger for most' located within the drainage ditch in the centre of the site.

There is no modelled risk to the site in the 1% AEP undefended event plus central sea level rise allowance.

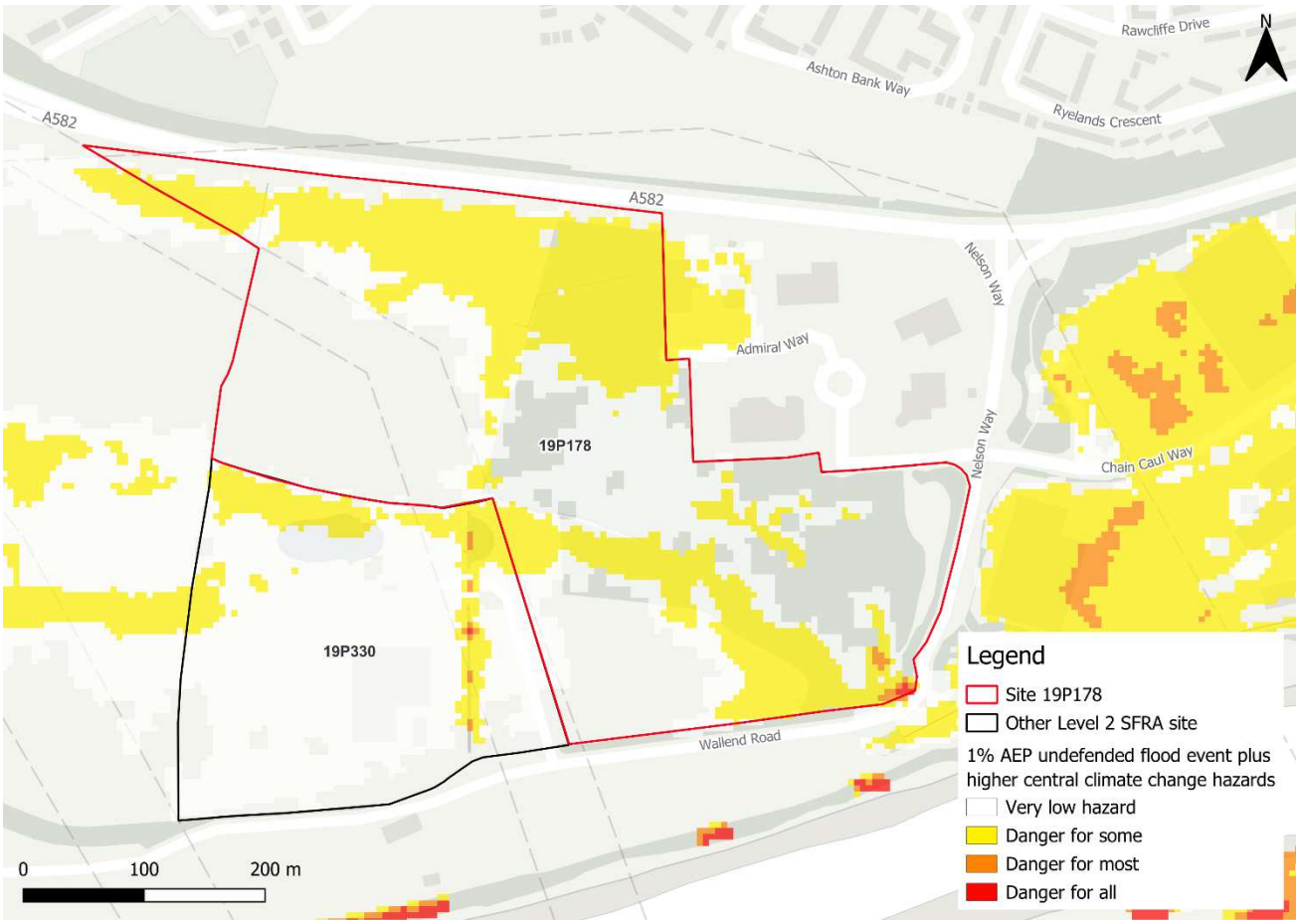

Figure 2-6: Flood hazard[1] for 1% AEP undefended flood event plus higher central climate change allowance (Ribble-Douglas 2010)

2.2.2 Ribble Estuary 2014 climate change model outputs

Figure 2-7 shows the onsite modelled flood depths for the 0.1% AEP undefended event plus higher central sea level rise allowance. Risk is modelled to be much greater than for present day conditions within this model, with almost the entire site modelled to be at risk, similar to Flood Zone 2. Maximum flood depths are modelled to be significant at > 1.2 m. The functional floodplain is not modelled to increase in extent and remains in channel. There is no modelled risk to the site

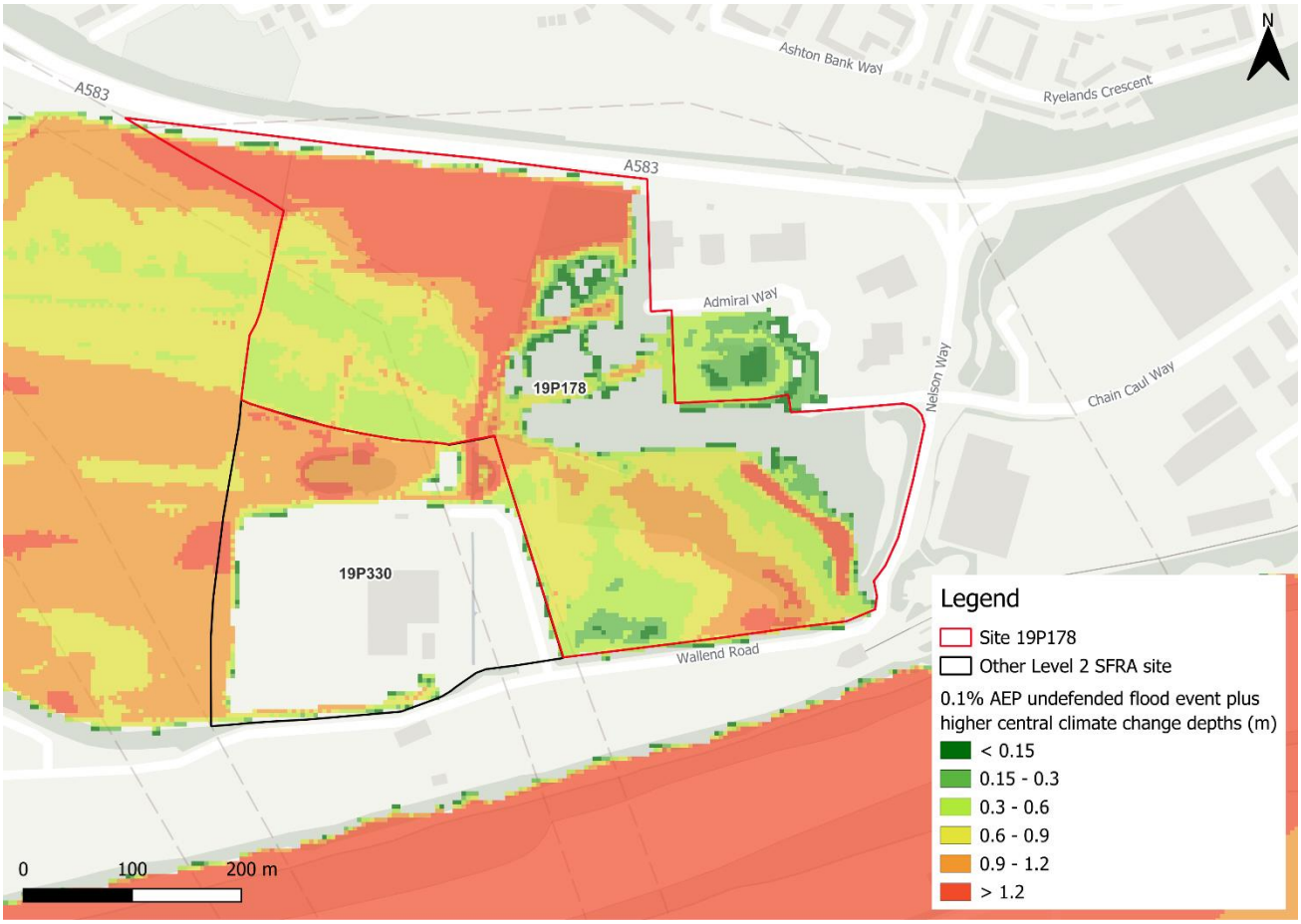

Figure 2-7: Flood depths (m) for 0.1% AEP undefended flood event plus higher central climate change allowance (Ribble Estuary 2014)

Figure 2-8 shows the modelled flood hazard ratings for the 0.1% AEP undefended event plus higher central sea level rise allowance. Flood hazard within the site is largely categorised as 'Danger for some', with a small area of 'Danger for most' located within the drainage ditch in the centre of the site.

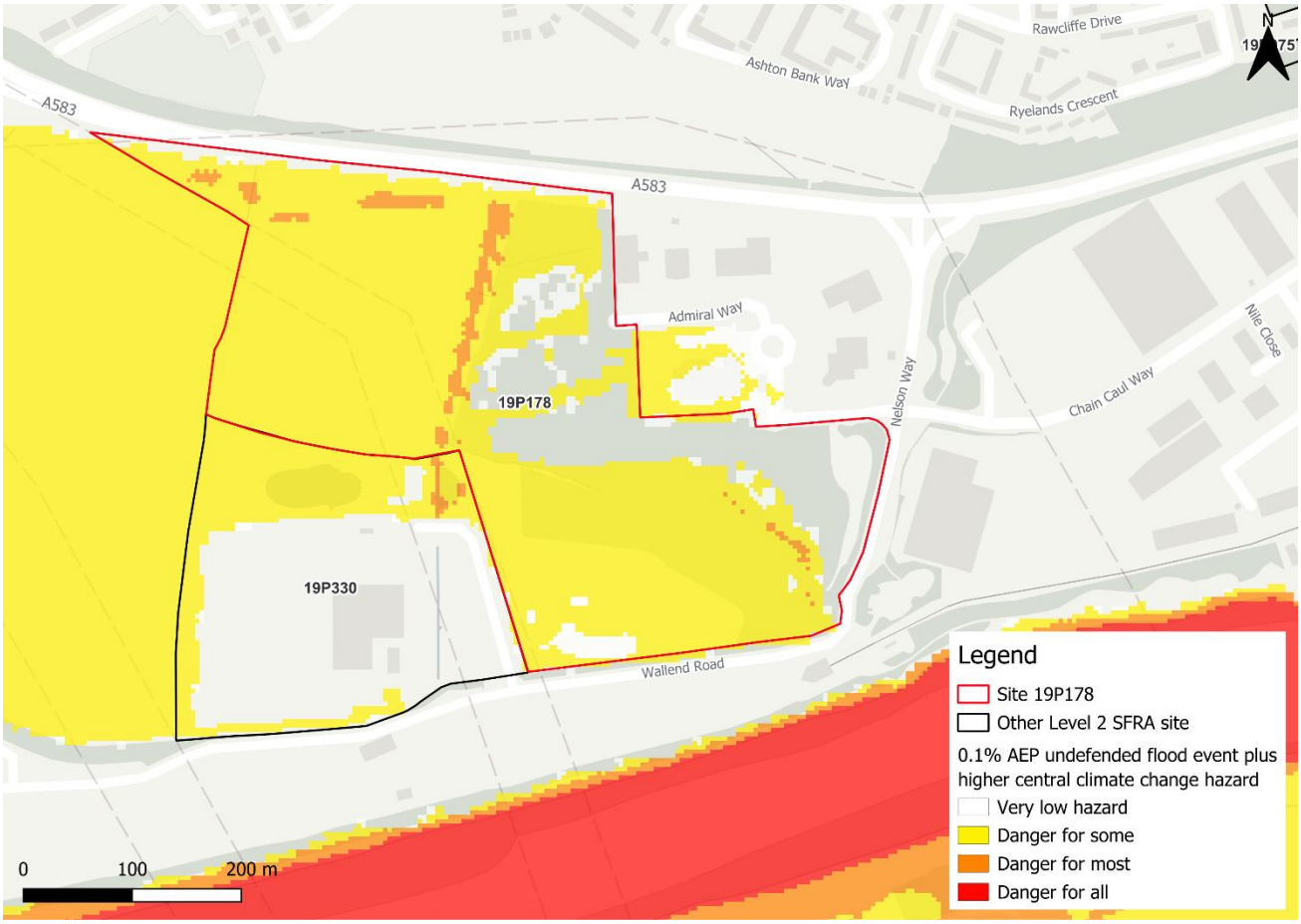

Figure 2-8: Flood hazard[1] for 0.1% AEP undefended flood event plus higher central climate change allowance (Ribble Estuary 2014)

2.3 Flood risk management

Flood defences are in place along the right (northern) bank of the tidally influenced River Ribble, as shown on Figure 2-9. Information provided in the EA's 'Spatial Flood Defences' dataset states that this defence is a raised embankment with a design Standard of Protection (SoP) of 100 years. Actual SoP is unknown. Current condition is also unknown. The dataset states that a private individual, company or charity owns and maintains this defence.

There is also an embankment located to the west of the site which is modelled to provide some level of protection to the site. Design SoP, actual SoP and current condition are all unknown. The dataset states that the local authority owns and maintains this defence. The embankment is situated approximately 2.5 m above the floodplain, as measured from the LIDAR. The measured level from the LIDAR aligns with the embankment crest level within

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. Environment Agency.

the EA's Spatial Flood Defences dataset. The Environment Agency have confirmed that inspections of this asset is completed every 24 months.

There is residual risk of defence failure or overtopping. Section 2.4.1 discusses the breach modelling carried out for this SFRA and the impacts to the site and surrounding areas.

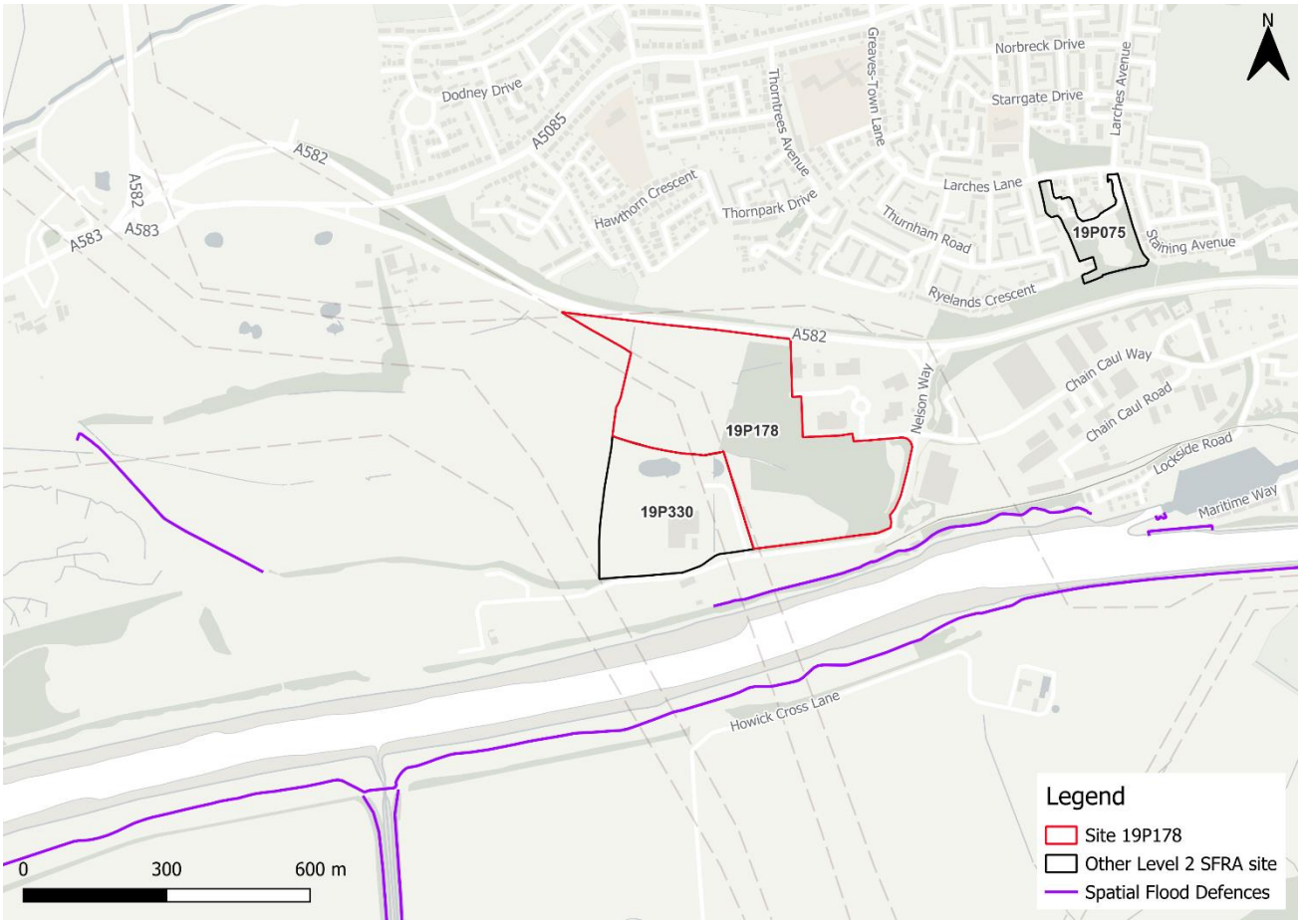

Figure 2-9: EA Spatial Flood Defences dataset

2.3.1 Ribble-Douglas 2010 defended model outputs

Figure 2-10 shows the effect of the River Ribble flood defences on flood risk from the 0.1% AEP event. There is a significantly greater risk to the site in the defended event in comparison to the undefended event. This is because the in-channel water levels are consistently higher in the defended scenario throughout Preston, and removing the defences allows for water to flood the area to the south of the River Ribble, rather than the north. The model outputs indicate that flooding overtops the area of natural high ground (NGR 350526, 429357 - green point on Figure 2-10) and subsequently impacts the site. The defended event is also modelled to overtop the marshland defence to the west of the site. From observing the depths either side of this defence it appears this is overtopping from east (upstream) to west (downstream), rather than a failure of this defence to protect the site from flooding from the west. Access and escape routes are likely to be challenging to achieve in this event.

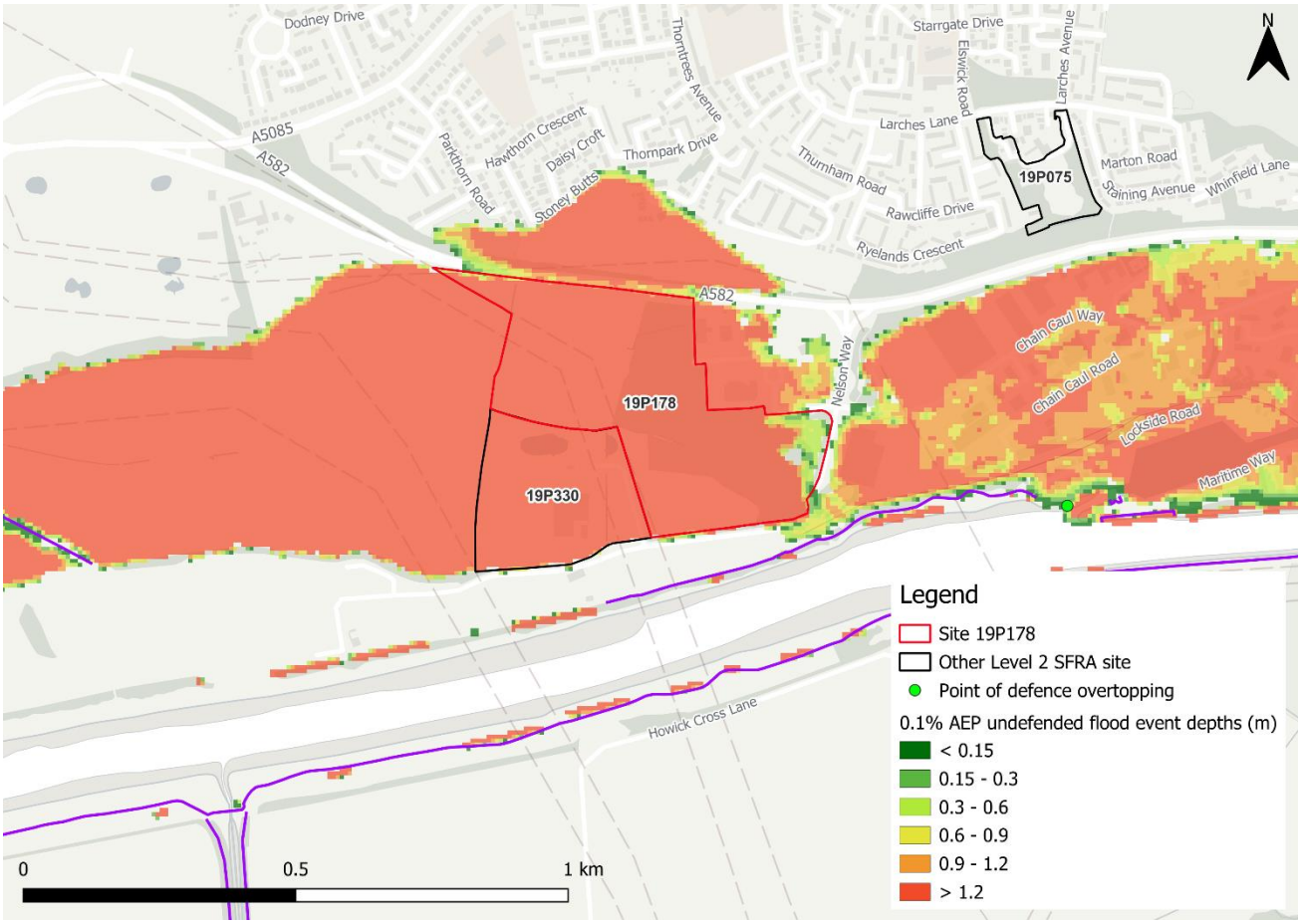

Figure 2-10: Modelled 0.1% AEP defended flood event depths (m) (Ribble-Douglas 2010)

2.3.2 Ribble Estuary 2014 defended model outputs

Figure 2-11 shows the effect of the Ribble Estuary flood defences on flood risk from the 0.1% AEP event. The raised embankments along the River Ribble do not protect the site given their standard of protection of 100 years. The embankment to the west of the site protects the site in the defended event, holding floodwaters in the marshland area. Maximum depths behind the embankment are modelled to be approximately 1.5 m. The modelled impacts of climate change for the 0.1% AEP defended event are also constrained by this embankment. Access and escape routes are not affected in this event.

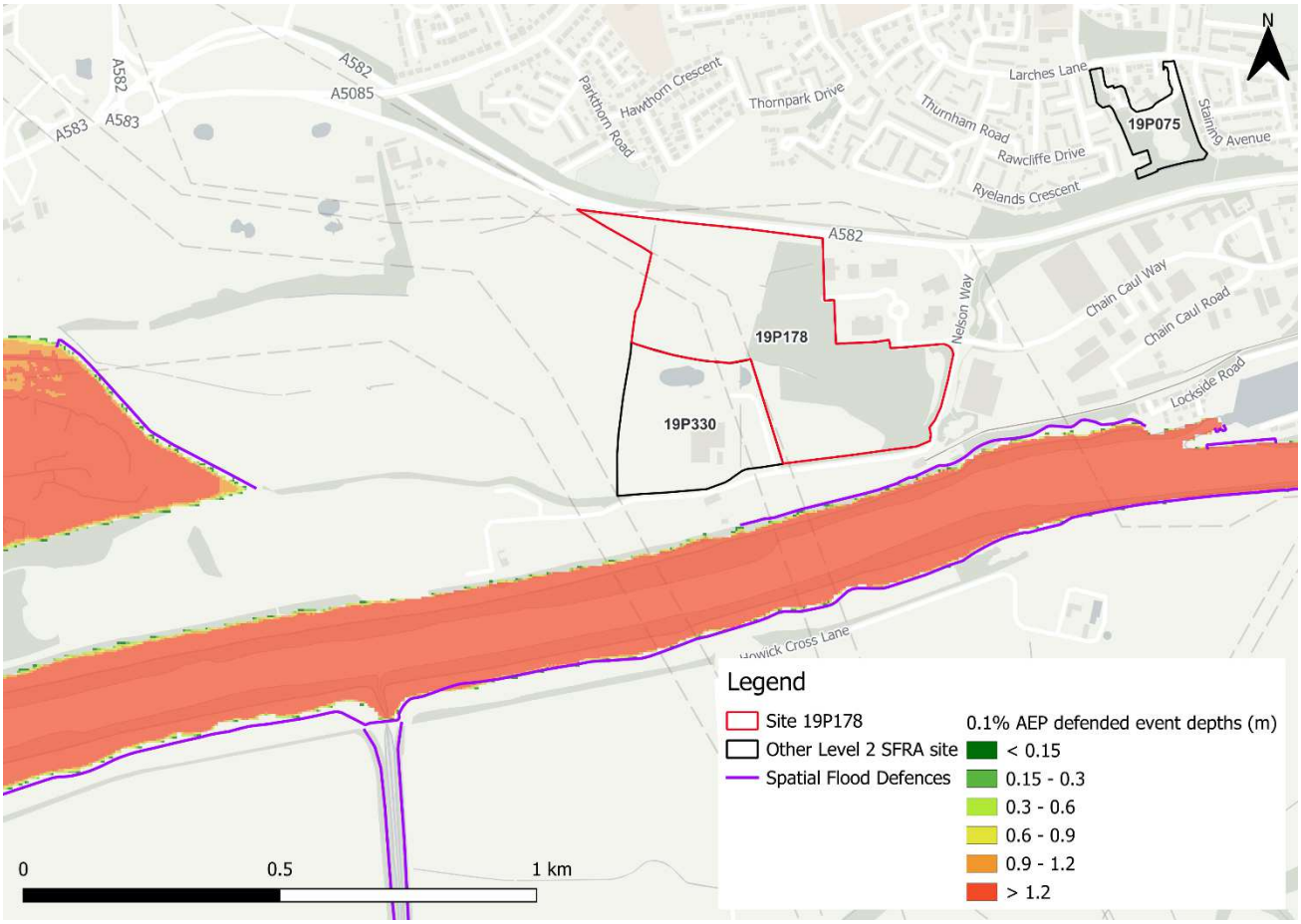

Figure 2-11: Modelled 0.1% AEP defended flood event depths (m) (Ribble Estuary 2014)

2.3.3 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 19P178 is located within one catchment, namely; Coastal Catchment 176. 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 Guidance[2].
- 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 Lancashire SuDS Guidance

2.3.4 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 tree planting to slow floodwaters, reduce flood peak height and reduce sediment delivery to the watercourse. 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 on Figure 2-12. Further investigation into using this site for tree planting should be undertaken. This could provide multiple benefits as well as flood risk mitigation, including biodiversity net gains, social and amenity value.

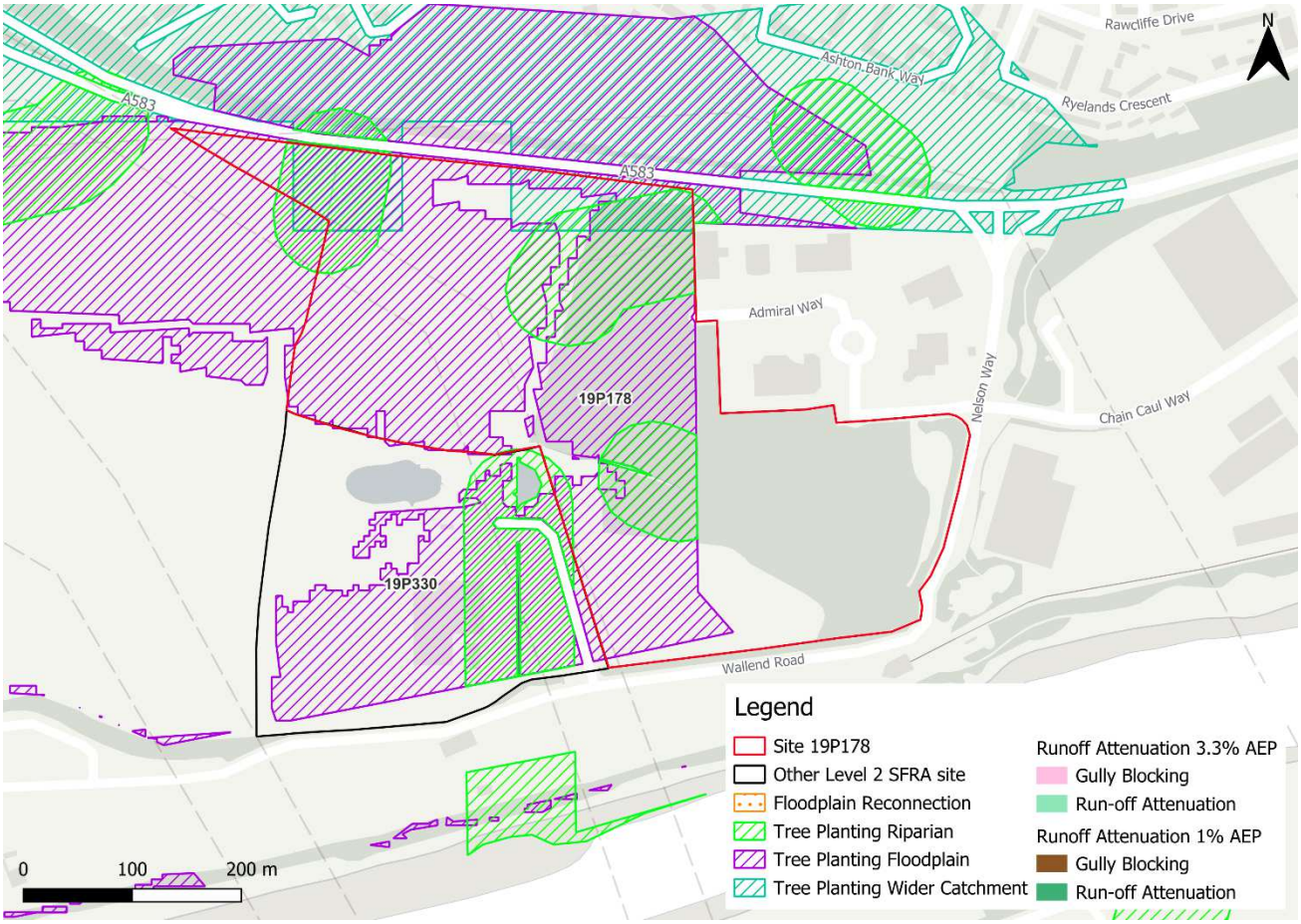

Figure 2-12: Natural Flood Management (NFM) potential mapping

2.4 Residual risk

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

Residual risk at this site comes from possible breaching / overtopping of the flood defences to the west of the site (Figure 2-9). Section 2.4.1 presents the breach modelling outputs. There may also be additional residual risks of defence breaching to this site that have not been explored in this Level 2 SFRA.

2.4.1 Marsh defence breach

Figure 2-13 shows the modelled flood depths in the event of a breach of the marsh embankment adjacent to Savick Brook at NGR 348423, 429502 (green point on Figure 2-13), based on the Ribble Estuary 2014 model. The modelled event represents the 0.5% AEP event plus higher central sea level rise allowance. The modelled breach outputs show a significantly greater risk to the site than the 0.5% AEP defended event plus higher central sea level rise allowance. Maximum depths within the site are significant at > 1.2 m with some areas of hazard categorised as 'Danger for most' (Figure 2-14).

Based on the Ribble Estuary 2014 breach modelling outputs, this site is at significant residual risk of flooding.

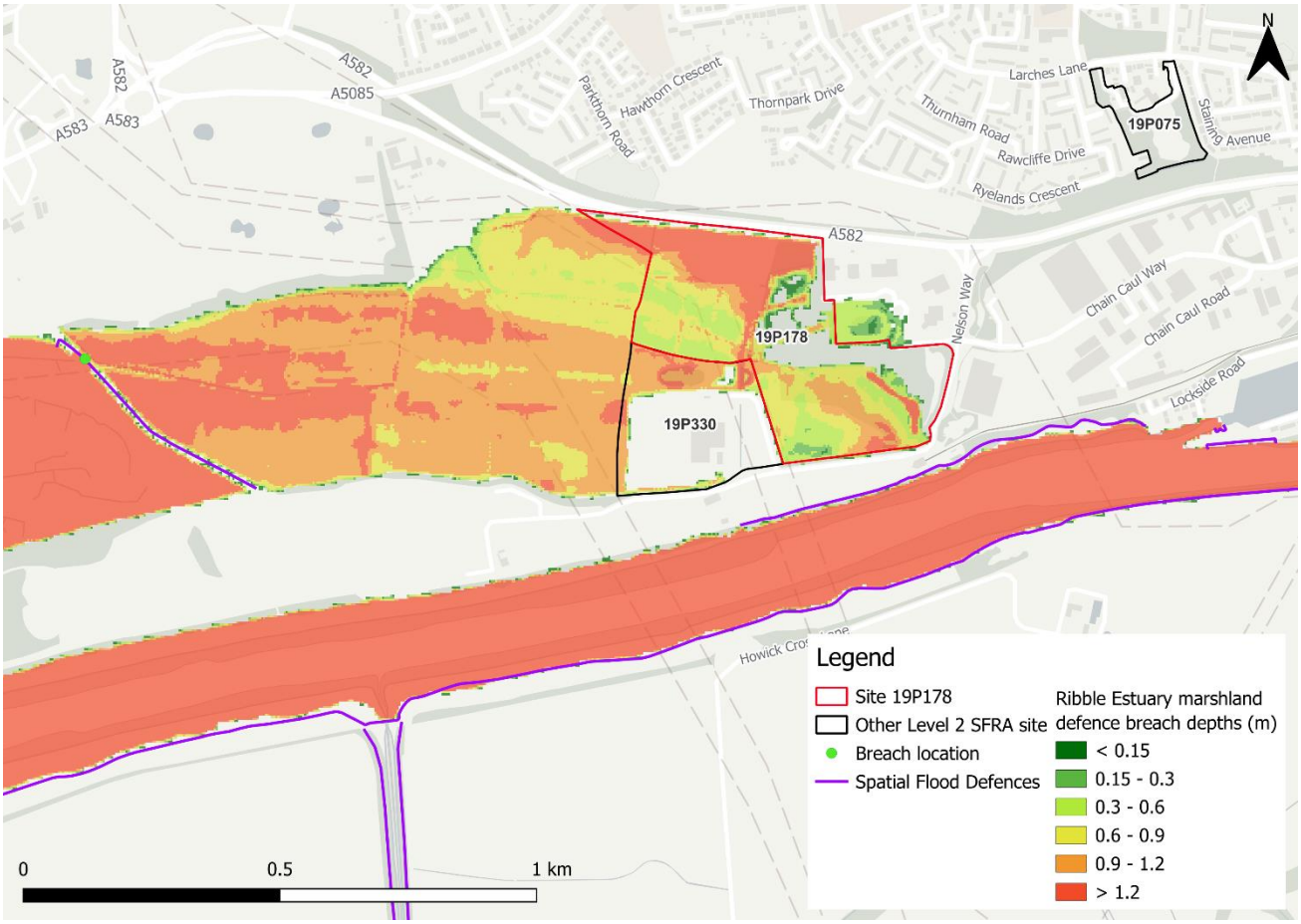

Figure 2-13: Flood depths (m) based on a breach of the marshland defence during a 0.5% AEP defended flood event plus higher central sea level rise allowance

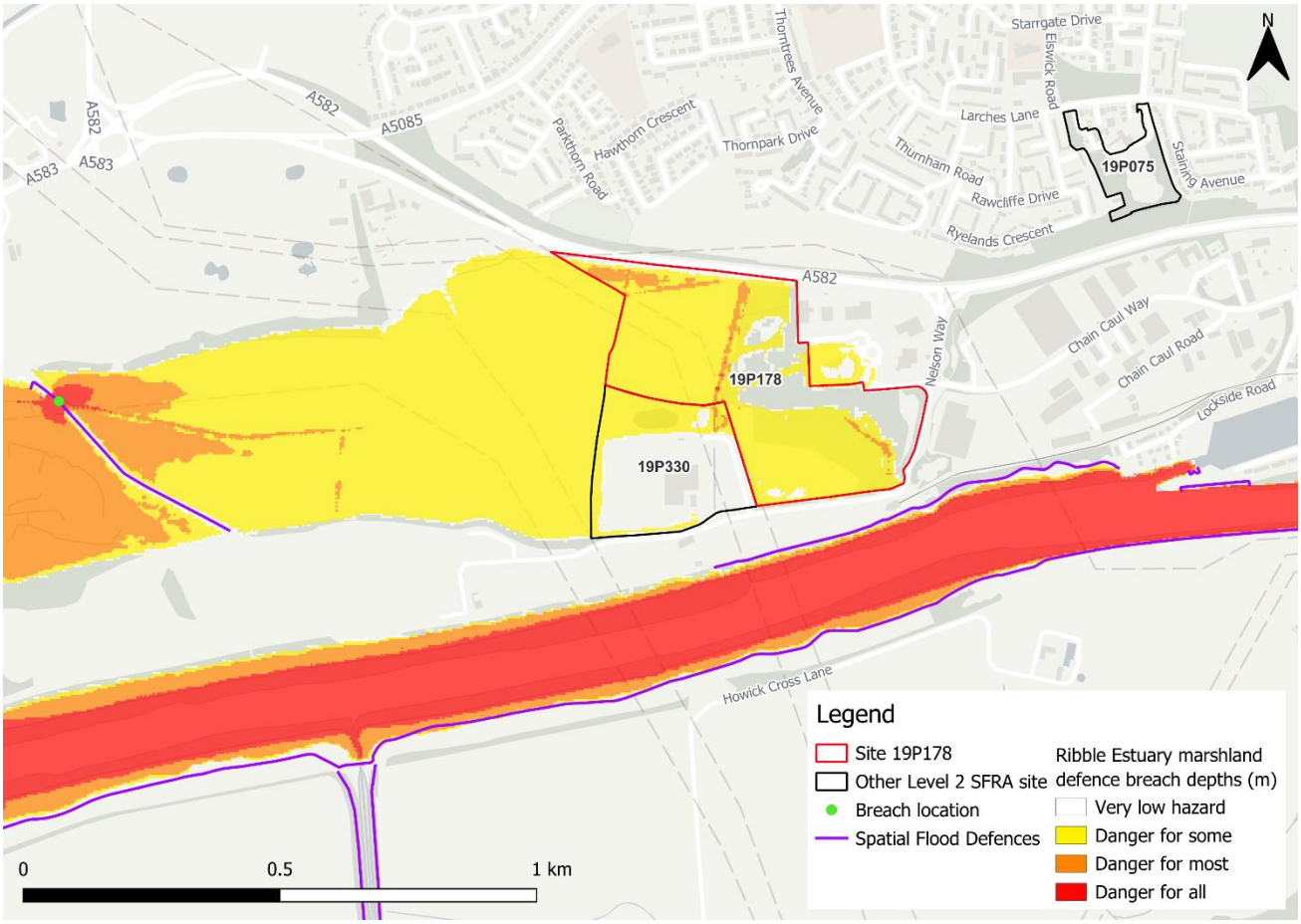

Figure 2-14: Marshland defence breach hazards

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 2-15 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 eight reservoirs, five of which are located within the Lancashire County Council administrative area, however outside of the Central Lancashire authority area, and three located within Blackburn with Darwen. All reservoirs with the potential to impact the site are 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 reservoirs 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.

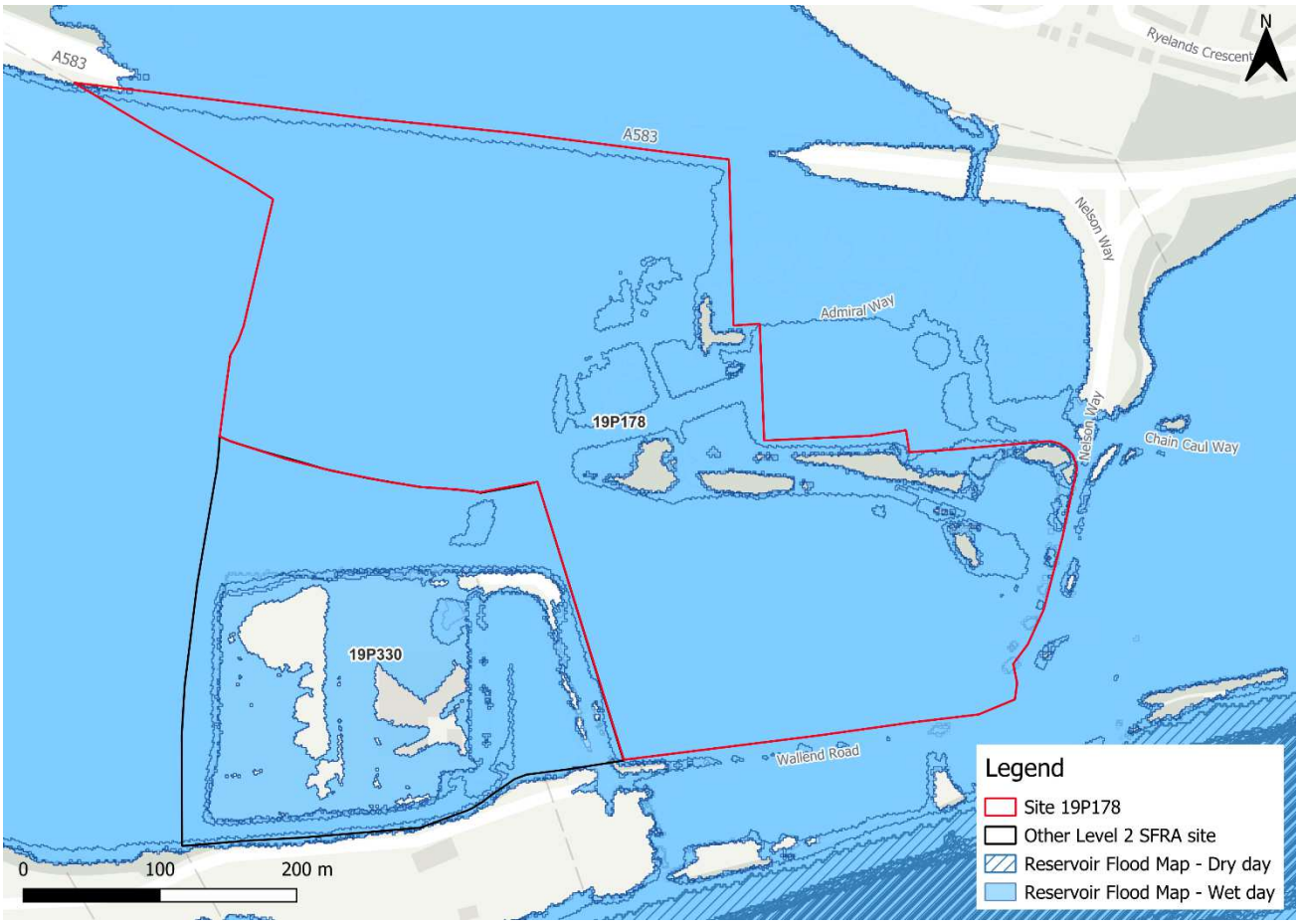

Figure 2-15: Flood risk from reservoirs

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 partially located within one FWA, namely; 012FWBL34A - Ribble estuary at Riversway Docklands.

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 almost entirely located within two FAA's, namely 012WATRE - Ribble estuary west of Preston and 012WAFLR - Lower River Ribble and Darwen.

Based on the Flood Map for Planning and modelled flood outputs, safe access and escape routes could likely be achieved during a flood event via Nelson Way to the east of the site.

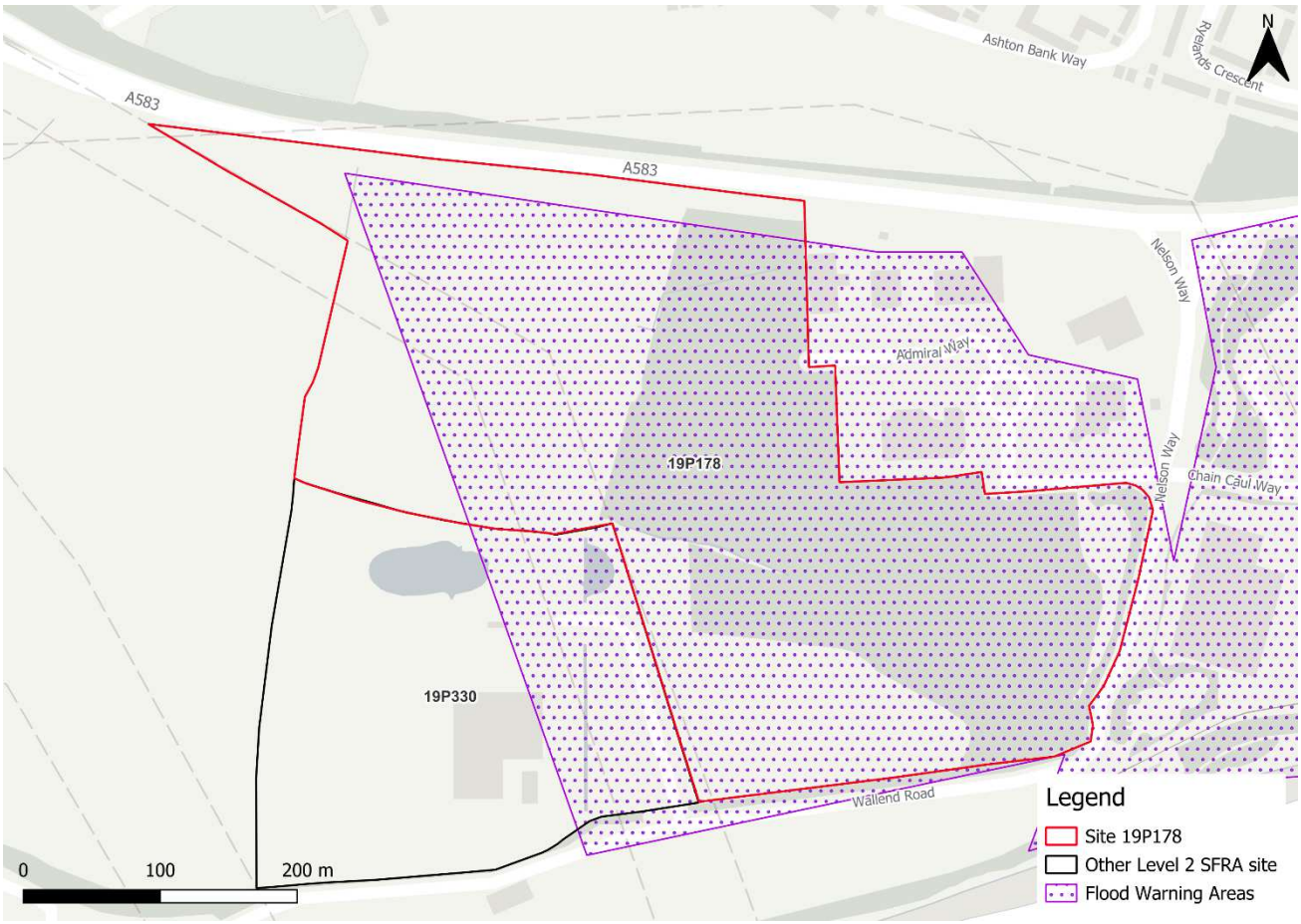

Figure 2-16: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - rivers and sea

- The site is modelled to be at risk from tidal sources (according to the Ribble Estuary 2014 model) in the 0.1% AEP event undefended scenario though to a lesser degree than shown by Flood Zone 2.
- There is no present day modelled undefended risk to the site from fluvial sources (according to the Ribble-Douglas 2010 model). Flood Zone 2 at the site is based on the defended 0.1% AEP event as flood risk in this area is modelled to be greater in the defended event.
- Modelled risk from climate change increases the undefended risk to the site in both the Ribble-Douglas 2010 and Ribble Estuary 2014 models.
- When accounting for defences, the present day Ribble Estuary 2014 0.1% AEP event outputs are constrained by the embankment to the west of the site, leaving the site at low risk in the future. However, it is not appropriate to consider the site flood free as residual flood risk remains from possible defence breaches.
- Areas behind flood defences are at particular risk from the rapid onset of fast flowing and deep flooding, with little or no warning if defences are breaches.

Emergency plans must be in place for such areas and safe access and escape routes must be in place for the lifetime of the development. Resistance and resilience measures may also be put in place to manage residual flood risk when avoidance measures have been exhausted.

- The LPA should use the information on residual risk in this Level 2 SFRA to state in the local plan strategic policies a preferred mitigation strategy for ensuring development will be safe throughout its lifetime in relation to urban form, risk management and where flood mitigation measures are likely to have wider sustainable design implications (para 042, FRCC-PPG).
- When considering whether defended sites could be appropriate for development, the FRCC-PPG states that the likelihood of defences keeping pace with climate change should be considered, i.e. available funding streams and funding options such as Community Infrastructure Levy, planning obligations / S106 agreements, or Partnership Funding.
- The local authority maintains the flood defence to the west of the site. The local authority should therefore be in a position to advise on funding and maintenance arrangements for these defences into the future. Consultation with the EA will also be required on whether this site is suitable for development.
- Given the residual risk to this site, the following should be considered:
    - Use of flood resistance and resilience measures
    - Adequate flood warning 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 users.
- Given the site is proposed for less vulnerable uses, it should be appropriate for the site to be developed if appropriate resilience measures are put in place. The area at risk could be converted to open space and used as a multifunctional greenspace for flood storage, amenity use and to provide environmental / ecological benefits. Safe access and escape routes must be available at times of flood.
- The site-specific FRA must show that development will be safe for its lifetime, taking into account the vulnerability of its users, including for appropriate evacuation procedures and flood response infrastructure are in place to manage the residual risk associated with the extreme flood event.
- Given the potential reservoir risk to the site, developers should consider[3]:
    - 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

3 Reservoir flood maps: when and how to use them | Environment Agency | 2021

- 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 neighbouring site 19P330, 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 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 2% of the site is within the high risk surface water flood zone. A further 2% is at medium surface water risk, and a further 13% is at low surface water risk, as shown in Table 3-1.

In the high and medium risk events, surface water risk is largely confined to the drainage ditch within the centre of the site, with some small areas of ponding within topographic low spots across the site. In the low risk event, there is a significant area of ponding behind the raised A582 within the north of the site.

Greatest flood depths in the medium risk event are > 1.2 m however these are located within the drainage ditch present within the site boundary (Figure 3-1). Greatest flood depths outside of the ditch are between 0.6 and 0.9 m, with areas of hazard categorised as significant (Figure 3-2). Safe access and escape routes should be possible via Nelson Way to the east 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 (%)
83	13	2	2

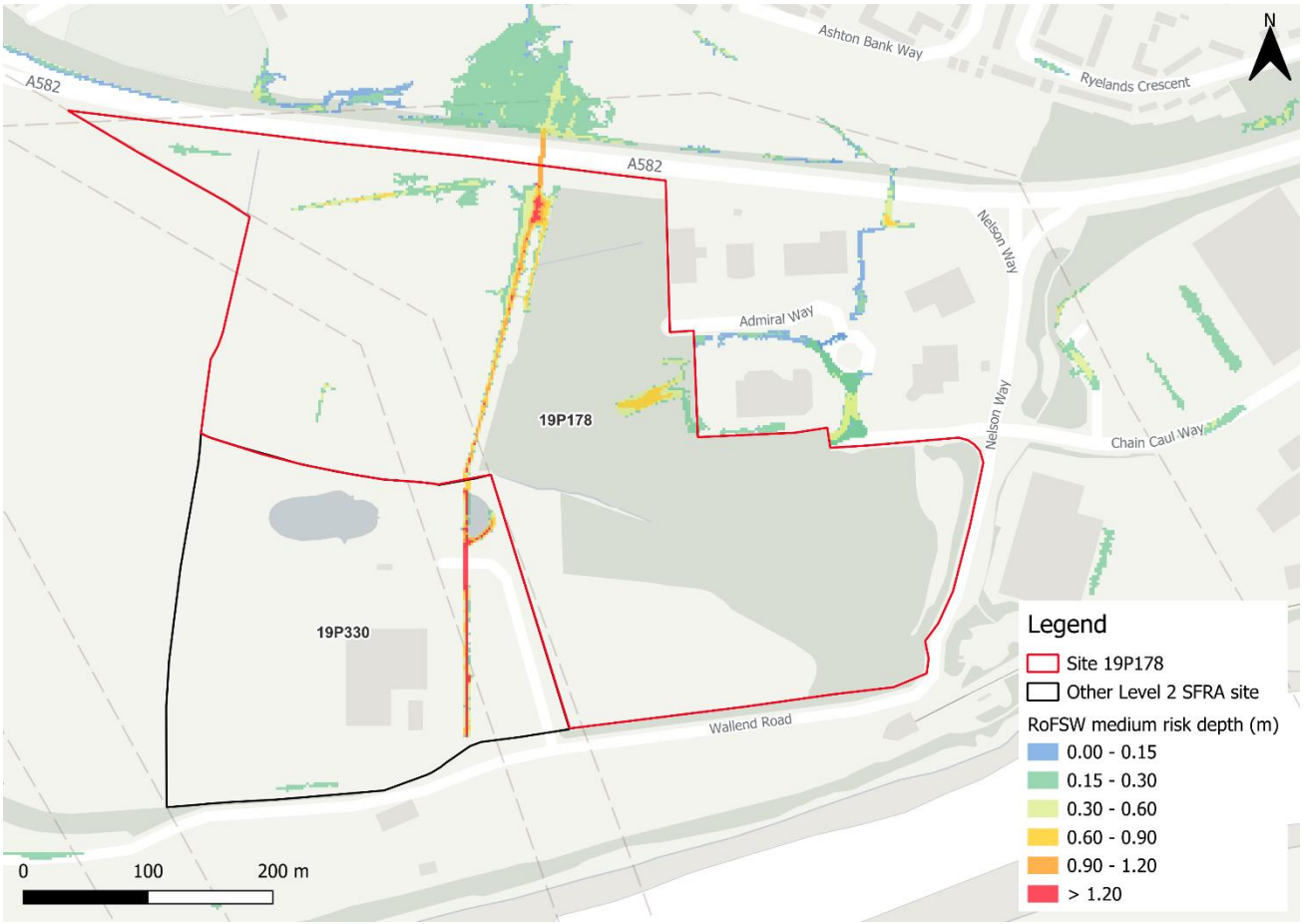

Figure 3-1: Medium risk event surface water flood depths (Risk of Flooding from Surface Water map)

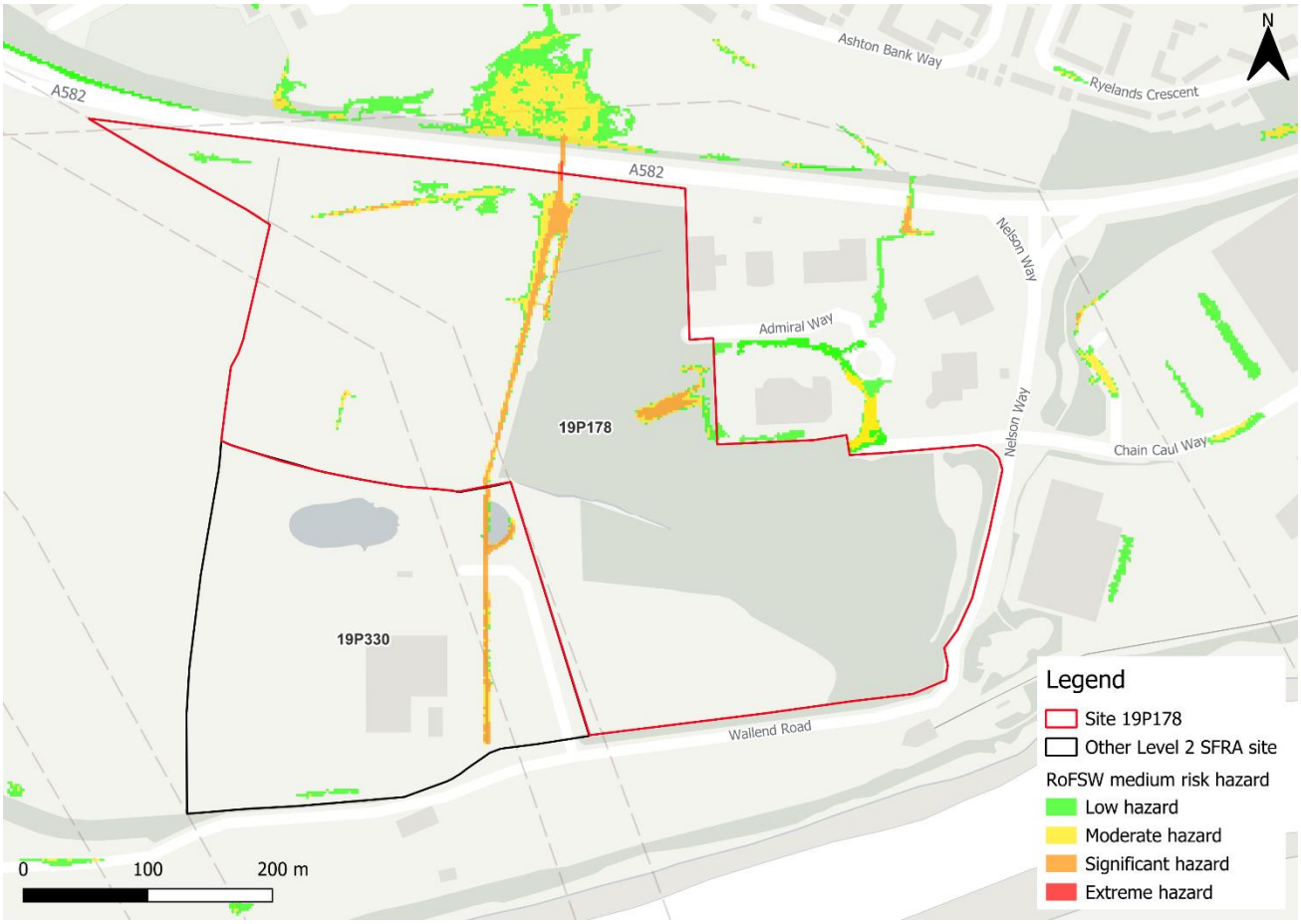

Figure 3-2: Medium risk event surface water flood hazard[4] (Risk of Flooding from Surface Water map)

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 Ribble management catchment

Return period	Central allowance 2070s	Upper end allowance 2070s
3.3% (high risk)	30%	40%
1% (medium risk)	35%	50%

Figure 3-3 shows the modelled surface water depths for the medium risk event +50% 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

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

risk event. Maximum depths are between 0.9 and 1.2 m with some areas of significant hazard (Figure 3-4). There are several flow paths through the site and a large area of significant ponding in the north, kept within the site by the A582 road which is clearly raised above the levels of the site. There appears to be a culvert beneath the road flowing from upstream of the A582 towards the south, draining the land to the north of the road into the site.

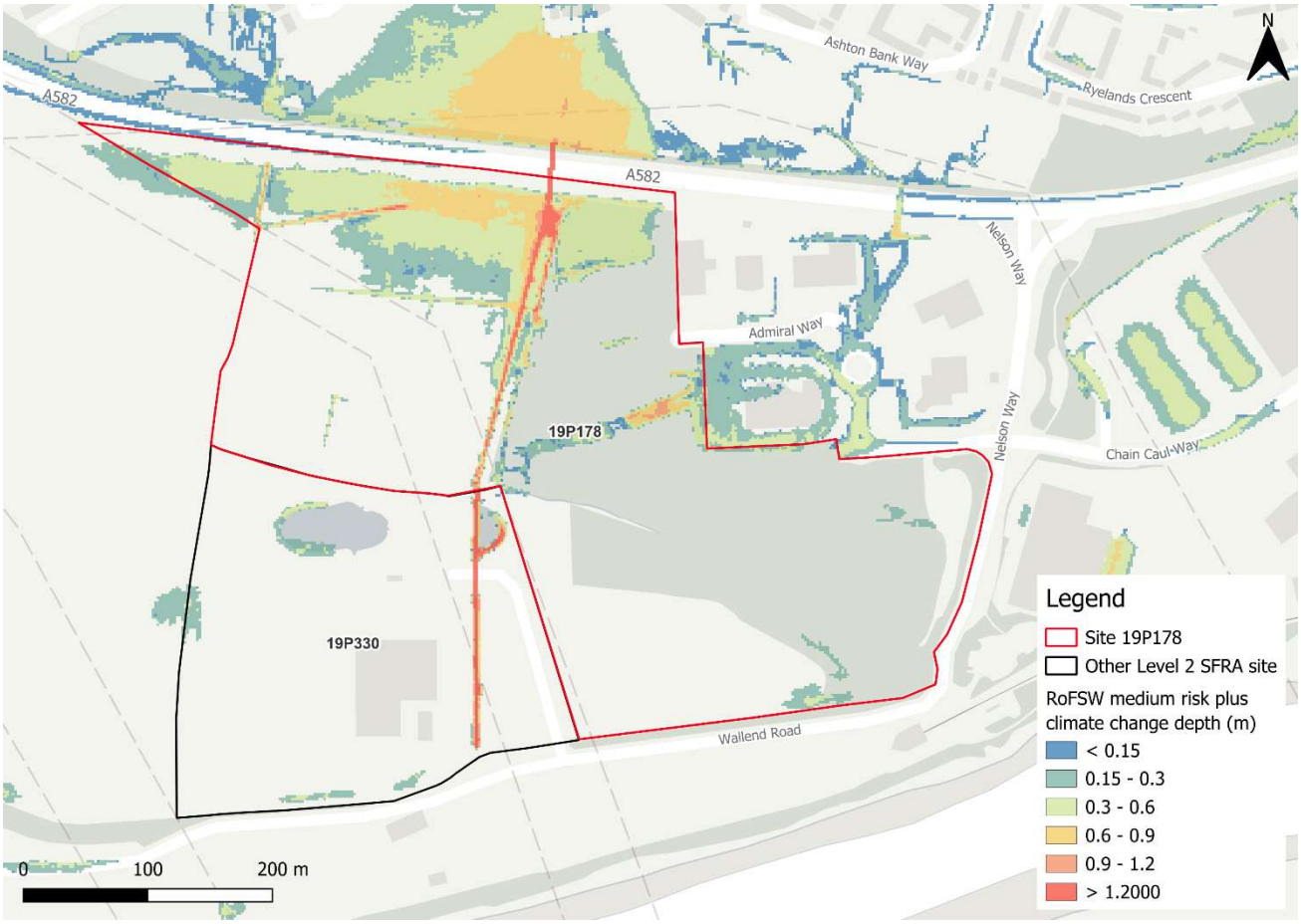

Figure 3-3: Medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

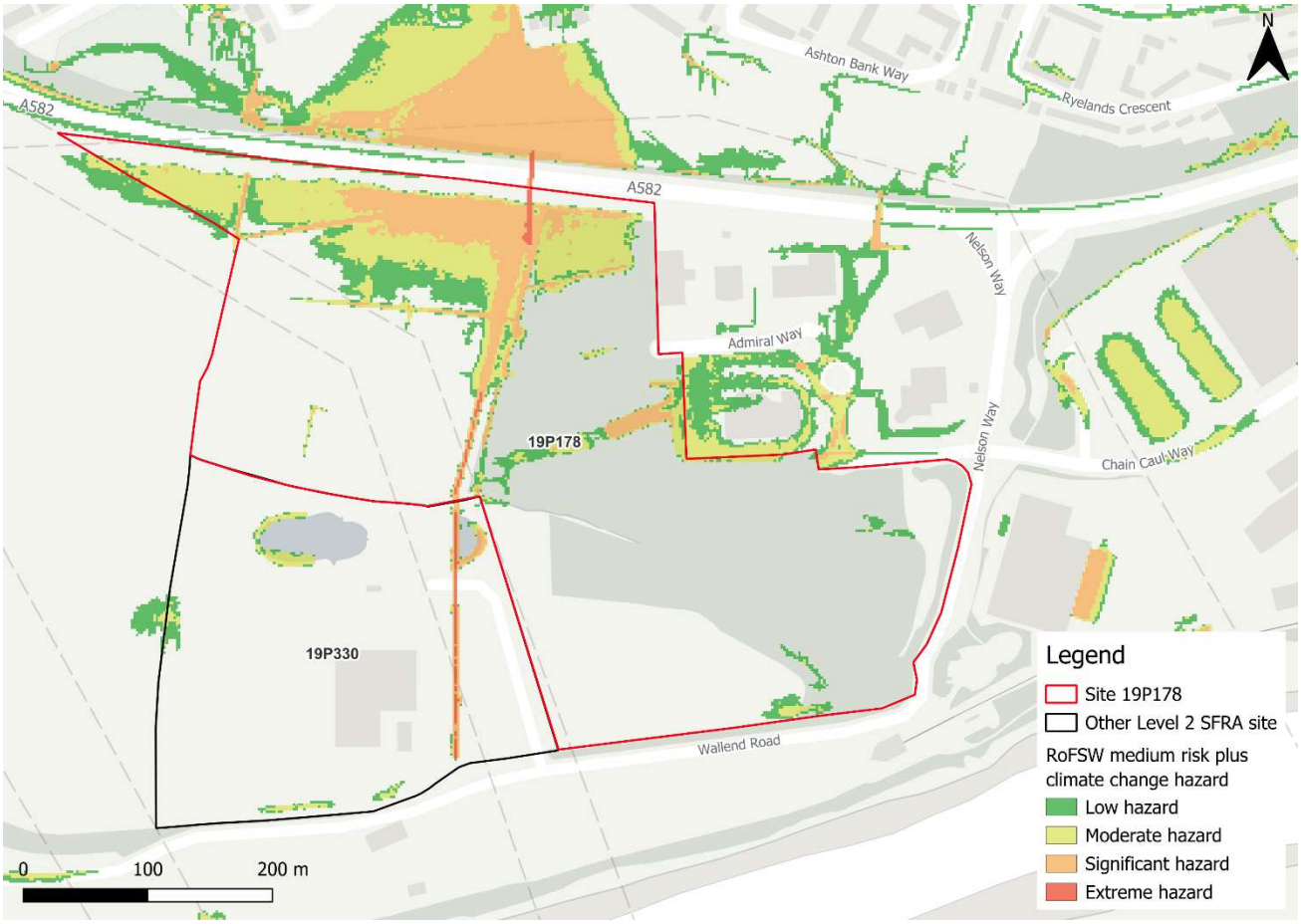

Figure 3-4: Medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- Current risk to the site is very low, with approximately 83% of the site being at very low risk. Surface water risk in the high and medium risk events is present within the drainage ditch in the centre of the site, with some areas of scattered surface water ponding.
- There is a large area of ponding behind the A583 embankment within the north of the site in the low risk event.
- The medium risk modelled climate change outputs indicate a similar extent risk to the present day low risk event. Safe access and escape routes should be achievable via Nelson Way to the east of the site in all events.
- The drainage ditch should be kept in place and remain unobstructed. The ditch should be maintained and included within the landscaping design of the development.
- There appears to be an existing culvert beneath the A582 which drains the upstream land into the site. The culvert should be kept in place and remain unobstructed to prevent surface water flood risk increasing upstream of the site.
- The use of appropriate SuDS should be investigated. The groundwater table is likely to be low across the site judging from the Groundwater Emergence Map in

Figure 4-1 therefore infiltration SuDS may be an option. This will require appropriate ground and infiltration survey, and surface water modelling based on layout plans and detailed design and full consultation with the LLFA.

- 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.
- 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 Guide[5]. Figure 4-1 shows the map for Site 19P178 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.

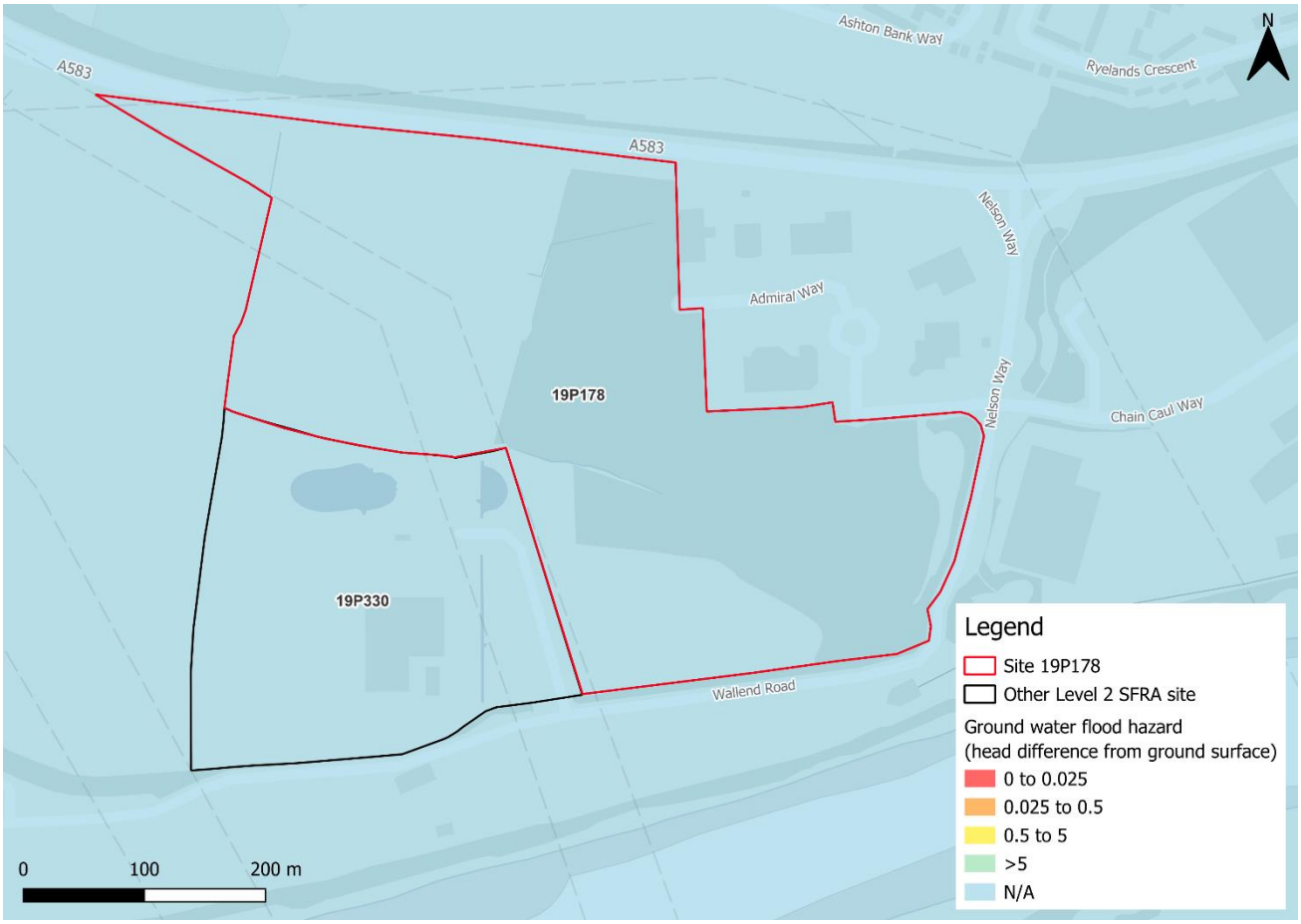

Figure 4-1: JBA 5m Groundwater Emergence Map

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?

This site is not required to pass part b) of the of the exception test[6] as it is proposed for less vulnerable uses. However, it must still be proven that the development can be safe for its lifetime, which is 75 years for non-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:

- There is residual risk to the site from a breach of the embankment to the west of the site. Depths and hazards in the area at risk are significant. 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.
- Early discussions should take place between the local authority and the EA with regards to the defence infrastructure and subsequent options for site development.
- The defences are owned and maintained by the local authority. The local authority should therefore be in a position to advise on funding and maintenance arrangements for these defences into the future.
- The drainage ditch within the centre of the site should be kept in place and remain unobstructed. The ditch should be maintained and included within the landscaping design of the development. This should be reviewed as part of a detailed drainage strategy for the site.
- Based on the evidence within this SFRA, it should be appropriate to develop this site for less vulnerable uses if appropriate resilience measures are put in place. The area at risk could be converted to open space and used as a multifunctional greenspace for flood storage, amenity use and to provide environmental / ecological benefits. Safe access and escape routes must be available at times of flood.
- Any FRA must further consider residual risk and the inclusion of detailed emergency plans and the provision of safe access and escape routes in the extreme low risk event.
- 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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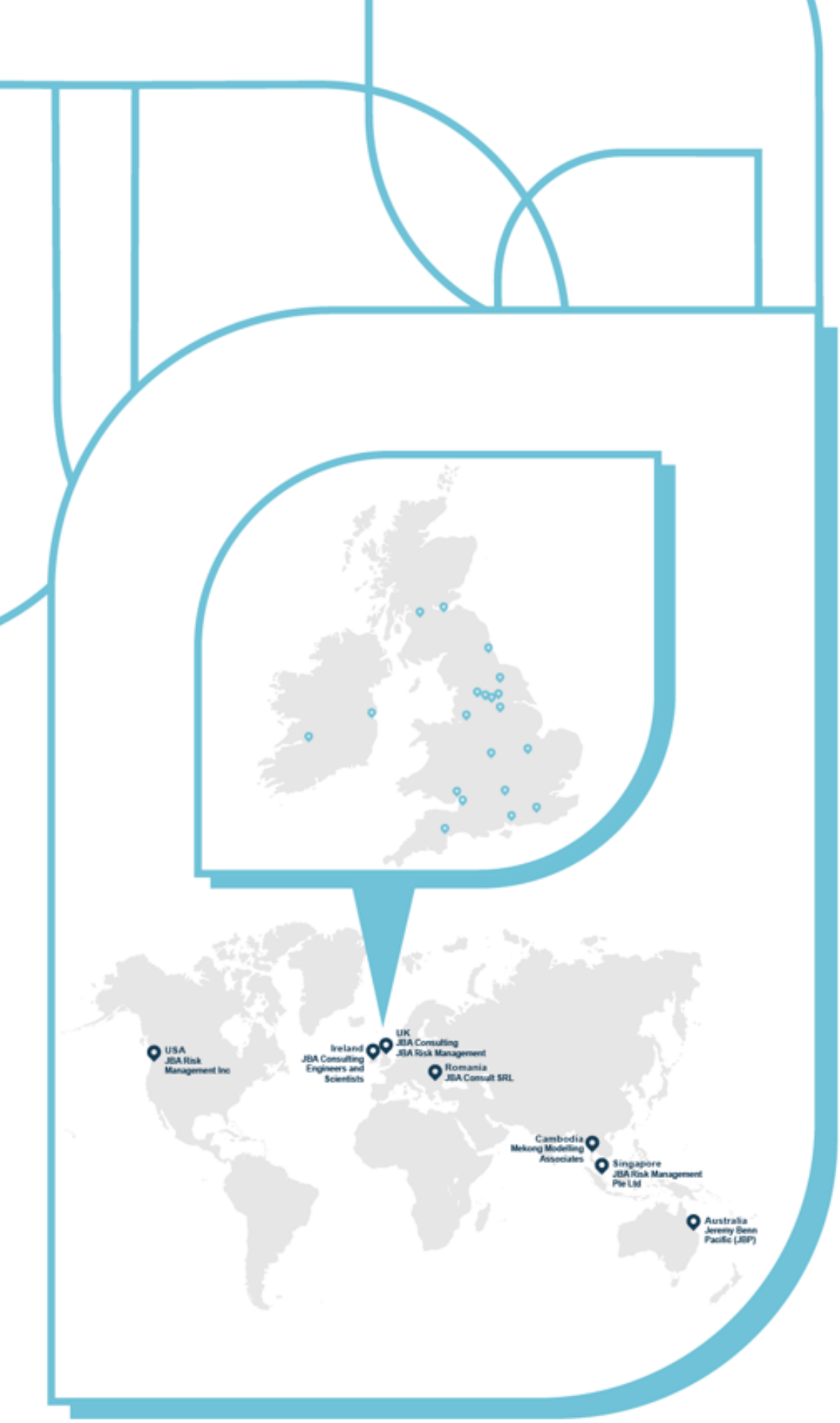

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