Pendle Level 2 Strategic Flood Risk Assessment - Site P052

Draft

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Contract

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This report describes work commissioned by Pendle Borough Council by an instruction dated 27 June 2024. The Client's representative for the contract was John Halton of Pendle Borough Council. Kaylyn Carroll of JBA Consulting carried out this work.

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

Acknowledgements

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

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1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Pendle Borough Council Site P052. The content of this Level 2 SFRA site screening report assumes the reader has already consulted the 'Pendle Level 1 SFRA' (2021) and read the 'Pendle Level 2 SFRA Main Report' (2024) and is therefore familiar with the terminology used in this report.

1.1 Site P052

- Location: Former Railway Sidings
- Existing site use: Brownfield; industrial
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Mixed use
- Proposed site use vulnerability: More vulnerable
- Site area: 1.6 ha
- Proposed development impermeable area: 1.4 (assumed as 85% of site area)
- EA model: Sefton Street 2021
- Watercourse: Sefton Street Watercourse
- Summary of requirements from scoping stage:
    - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
    - Subject to Exception Test
    - Assess modelled fluvial depths and hazards
    - Assess surface water depths and hazards
    - Climate change proxy assessment
    - Potential residual risk from Sefton Street Watercourse culvert beneath the site

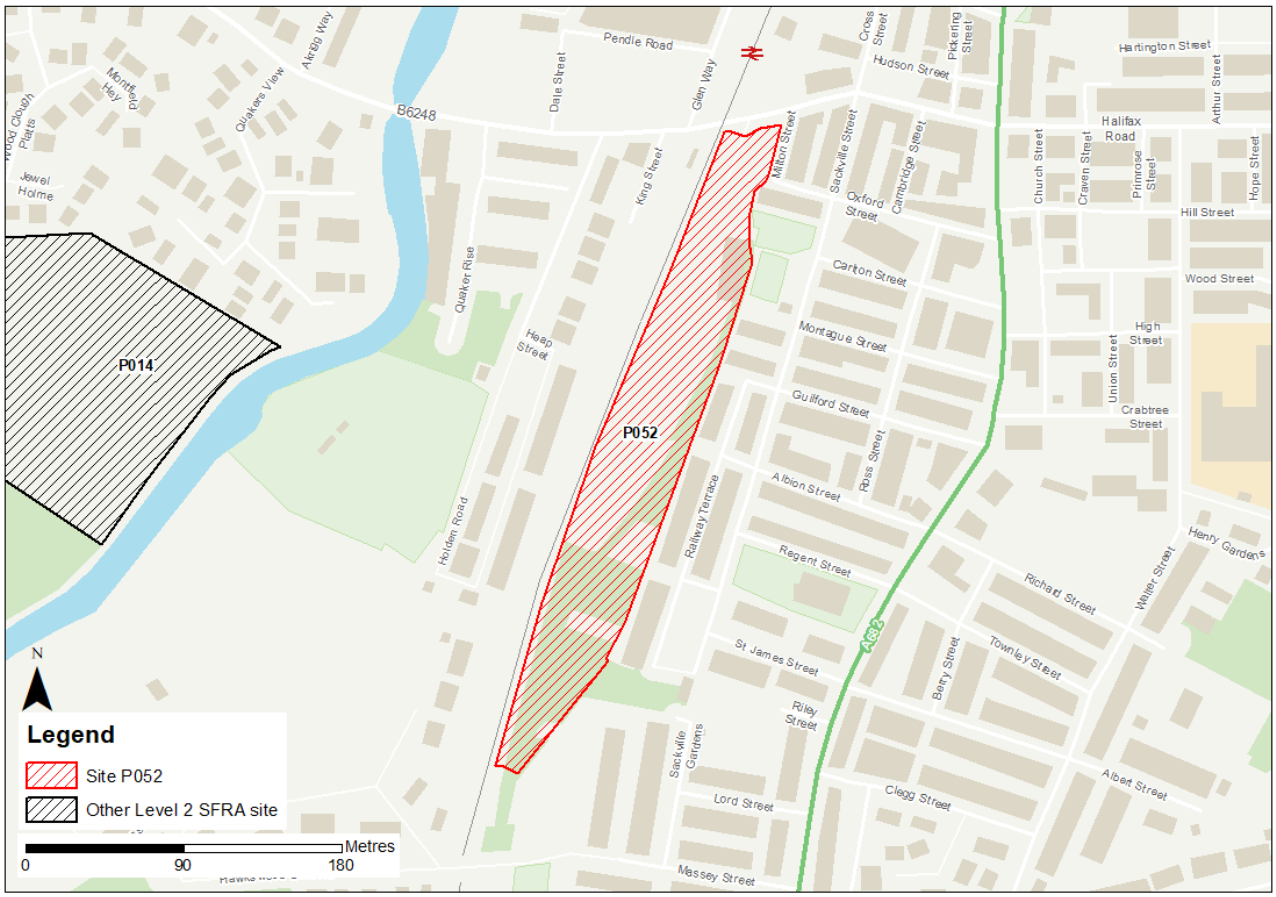

Figure 1-1: existing site location boundary

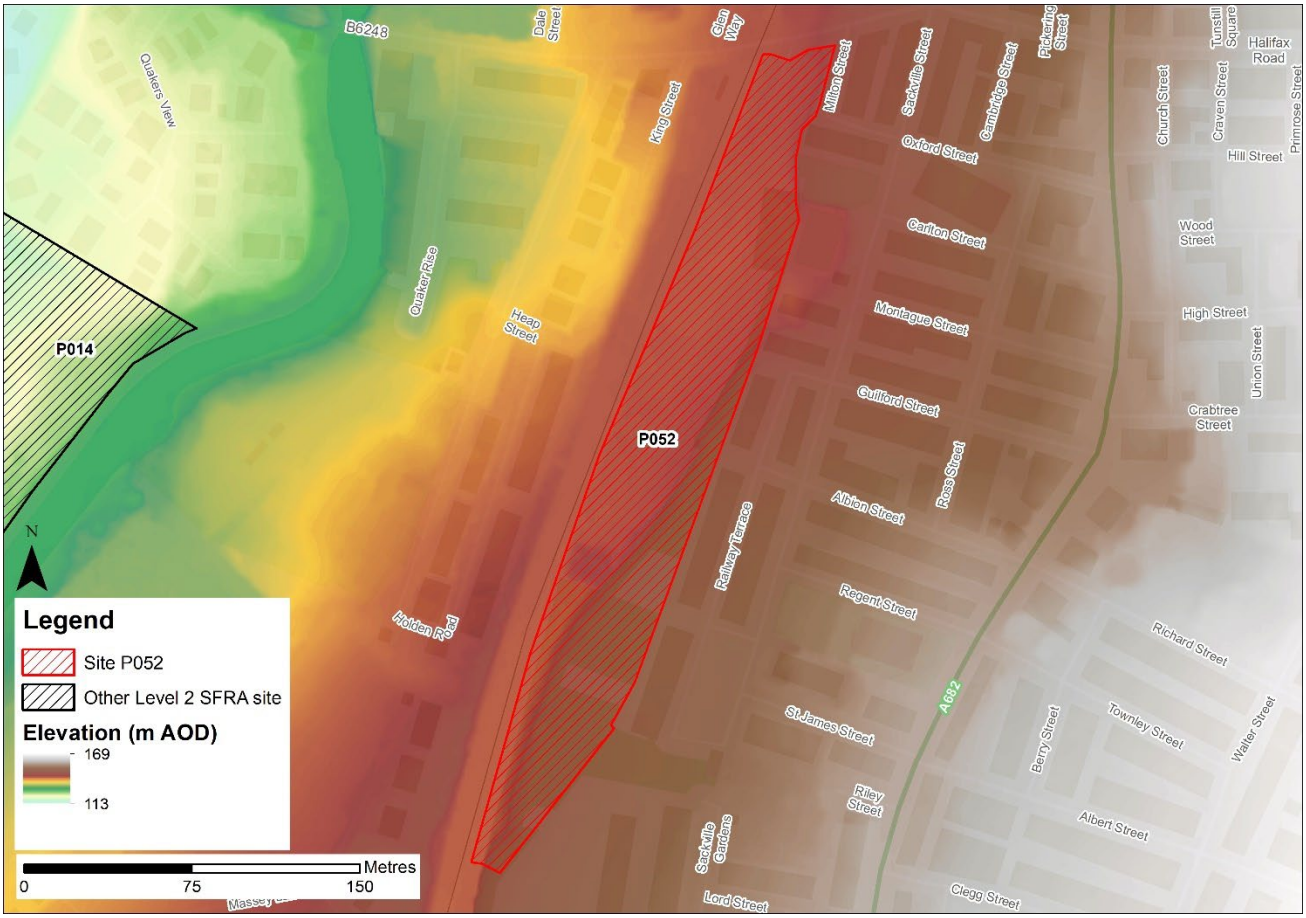

Figure 1-2: topography

2 Flood risk from rivers

2.1 Existing risk

2.1.1 Flood Map for Planning and functional floodplain

Based on the EA's Flood Map for Planning and Flood Zone 3b (functional floodplain) as updated in the Pendle Level 2 SFRA (2024), the percentage areas of the site within each 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. However, there is a flow path included within Flood Zones 3 and 2 through the north of the site. This area of flood risk comes from the Sefton Street culvert underneath the site. All development must avoid the course of this culvert.

Table 2-1: existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
80	4	16	0

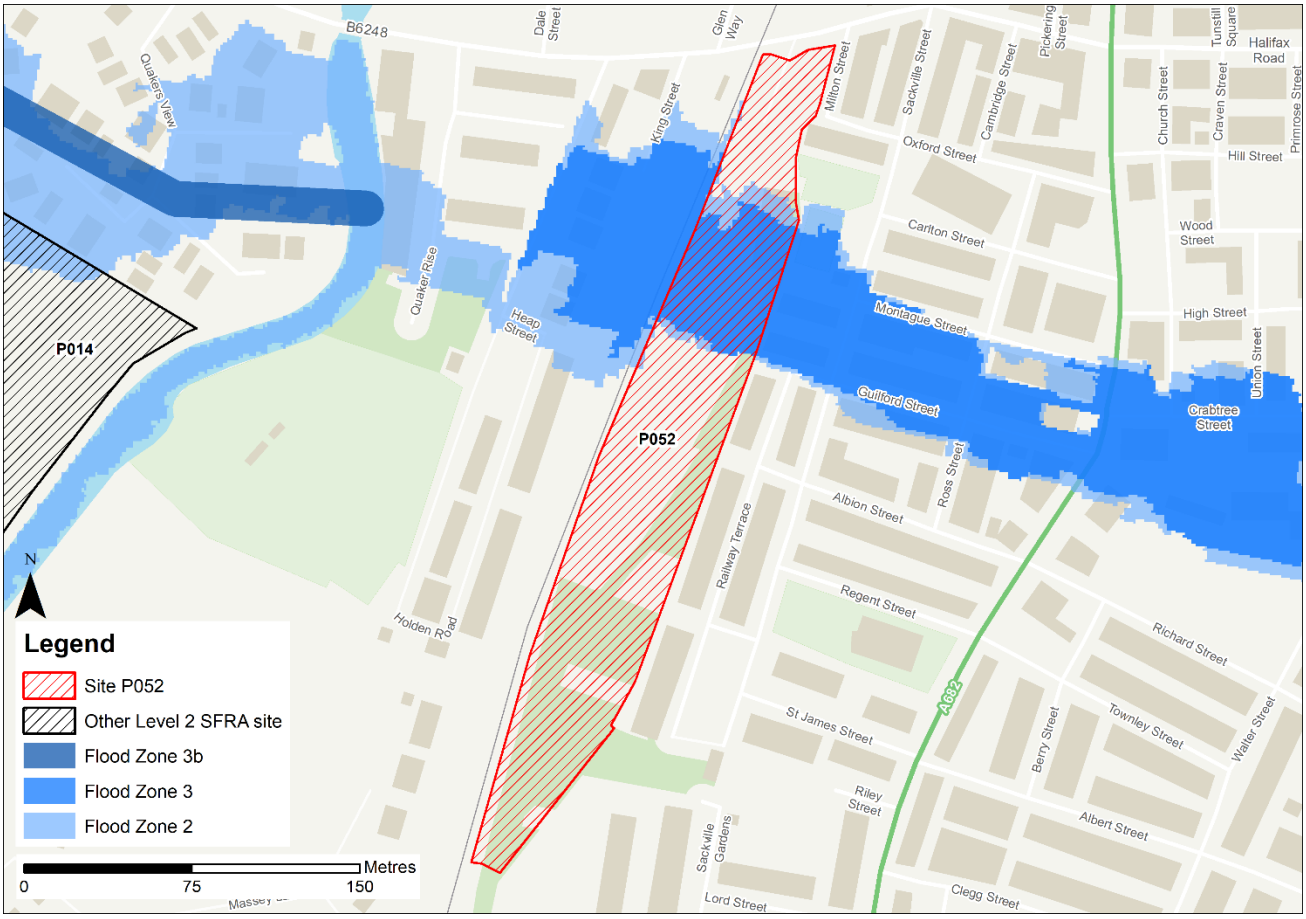

Figure 2-1: existing risk from rivers to the site

2.1.2 Sefton Street 2021 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 the area through the centre of the site modelled to be at risk. Maximum flood depths within the site are modelled to be between 0.15 and 0.3 m. 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 fluvial risk is largely categorised as 'Very low'. There is no modelled flood risk to the rest of the site in the 1% AEP undefended event, reflecting Flood Zone 3.

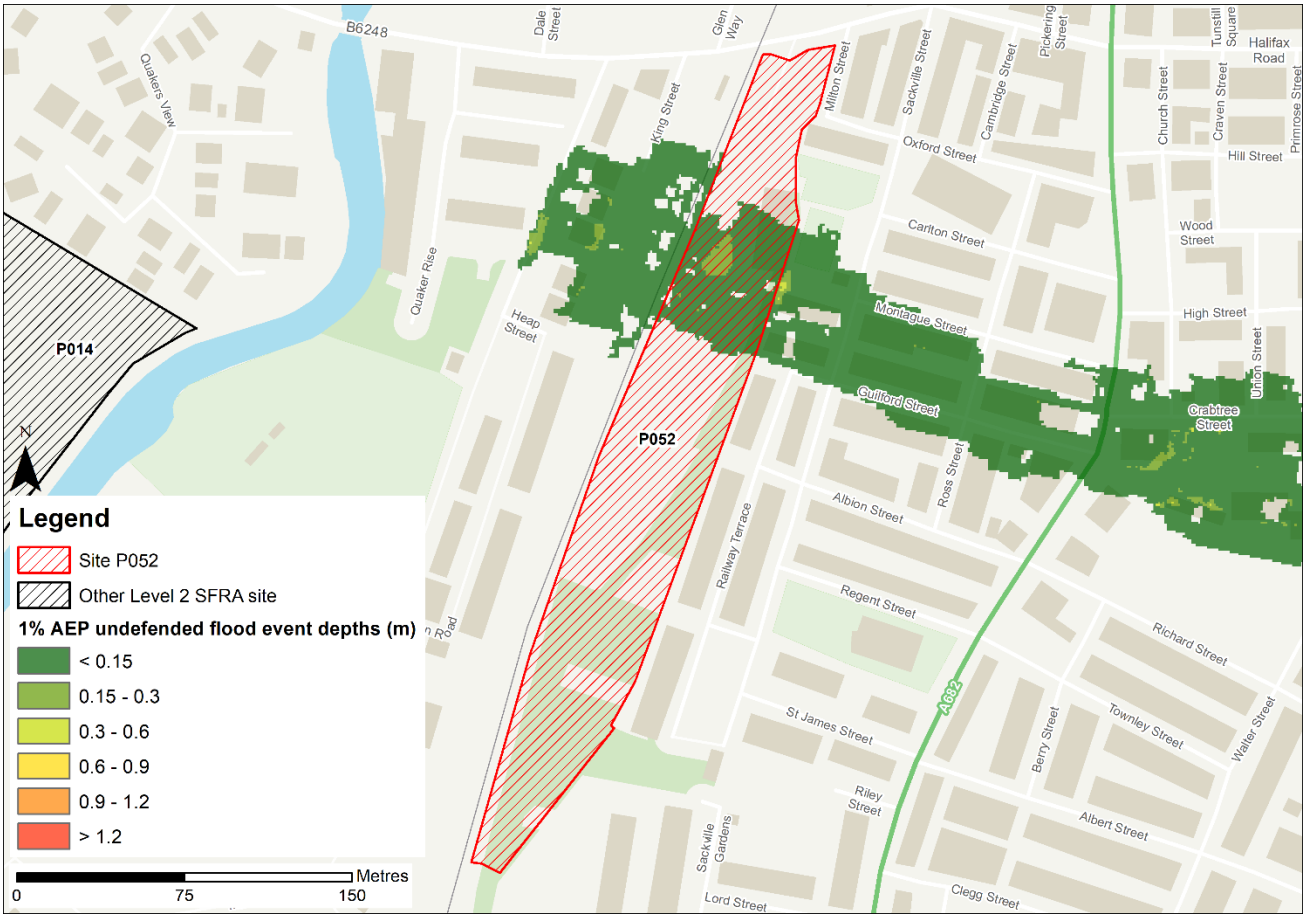

Figure 2-2: flood depths for 1% AEP undefended flood event

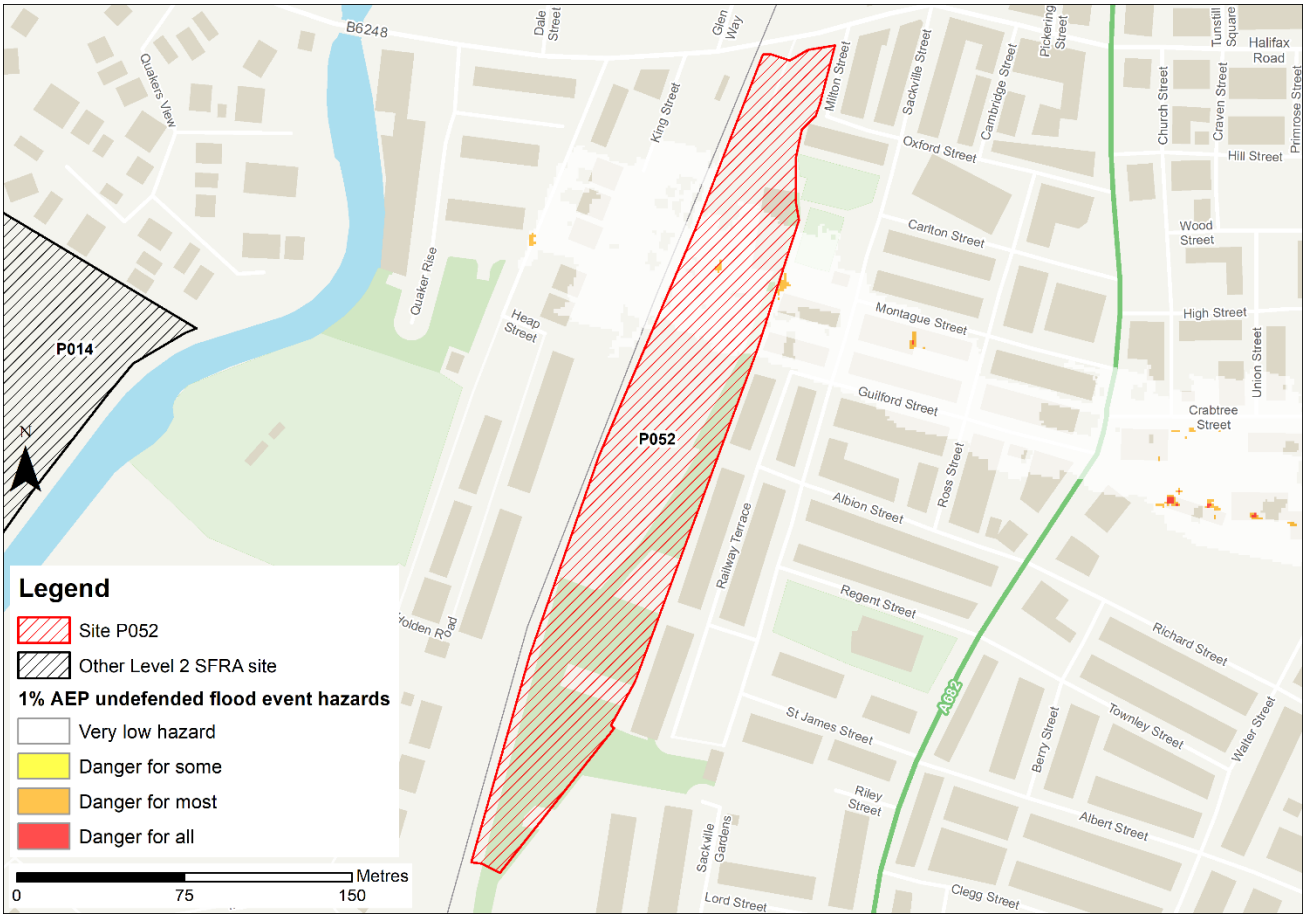

Figure 2-3: flood hazard[1] for 1% AEP undefended flood event

2.2 Impacts from climate change

The impacts of climate change on flood risk from the Sefton Street Watercourse has not been modelled for this SFRA, as the timescales for the Local Plan would not allow for it. Therefore, in the absence of modelled climate change information, the modelled 0.1% AEP undefended event has been used as a conservative proxy for Flood Zone 3 plus climate change. Based on this approach, fluvial risk is modelled to be slightly greater in extent to the present day Flood Zone 3, with nominally greater depths (Figure 2-4) and hazards (Figure 2-5).

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 FRA should include for the most up to date climate change allowances based on a fully up to date flood model.

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.

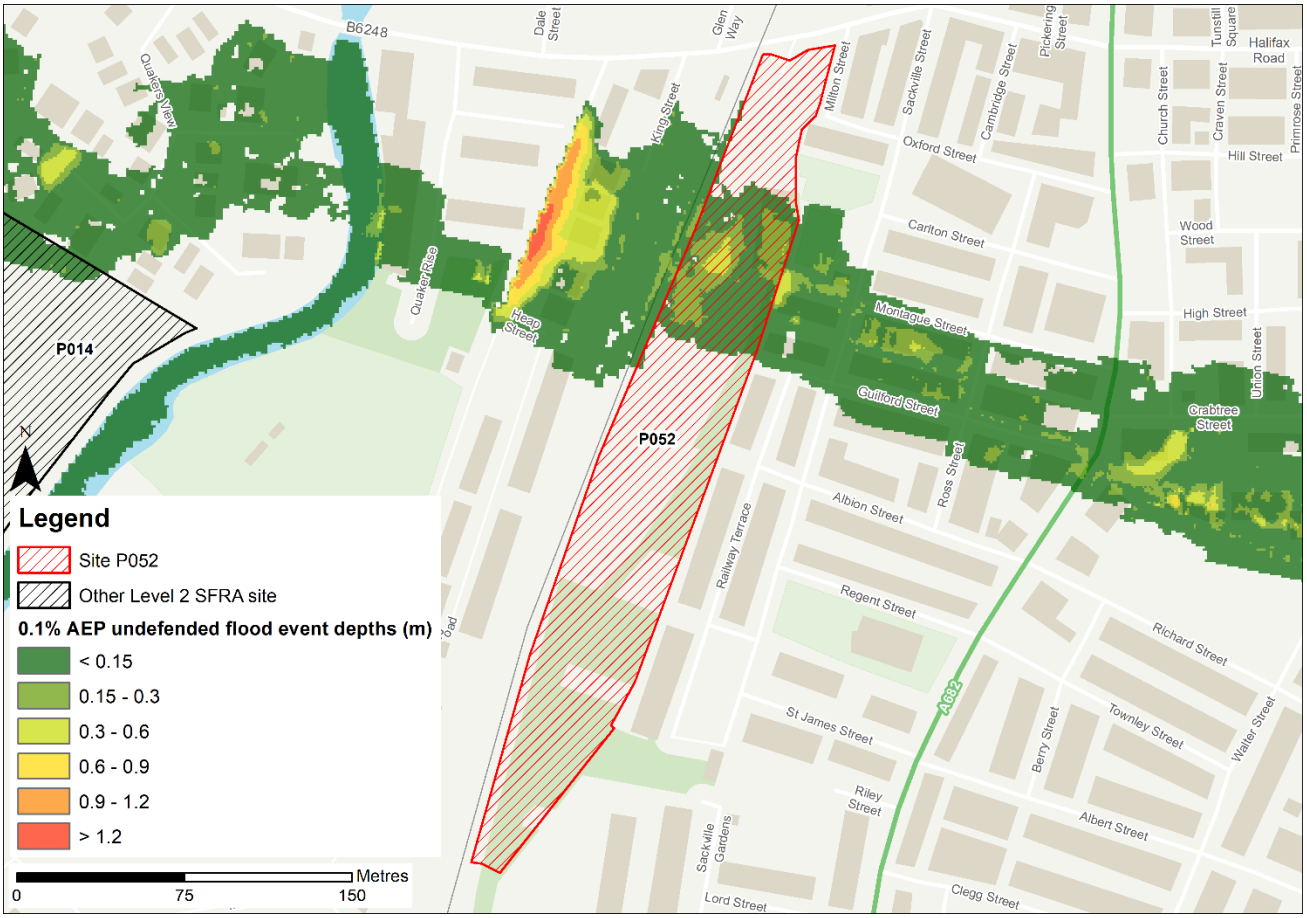

Figure 2-4: flood depths for 0.1% AEP undefended flood event (as a proxy for the 1% AEP undefended event plus climate change)

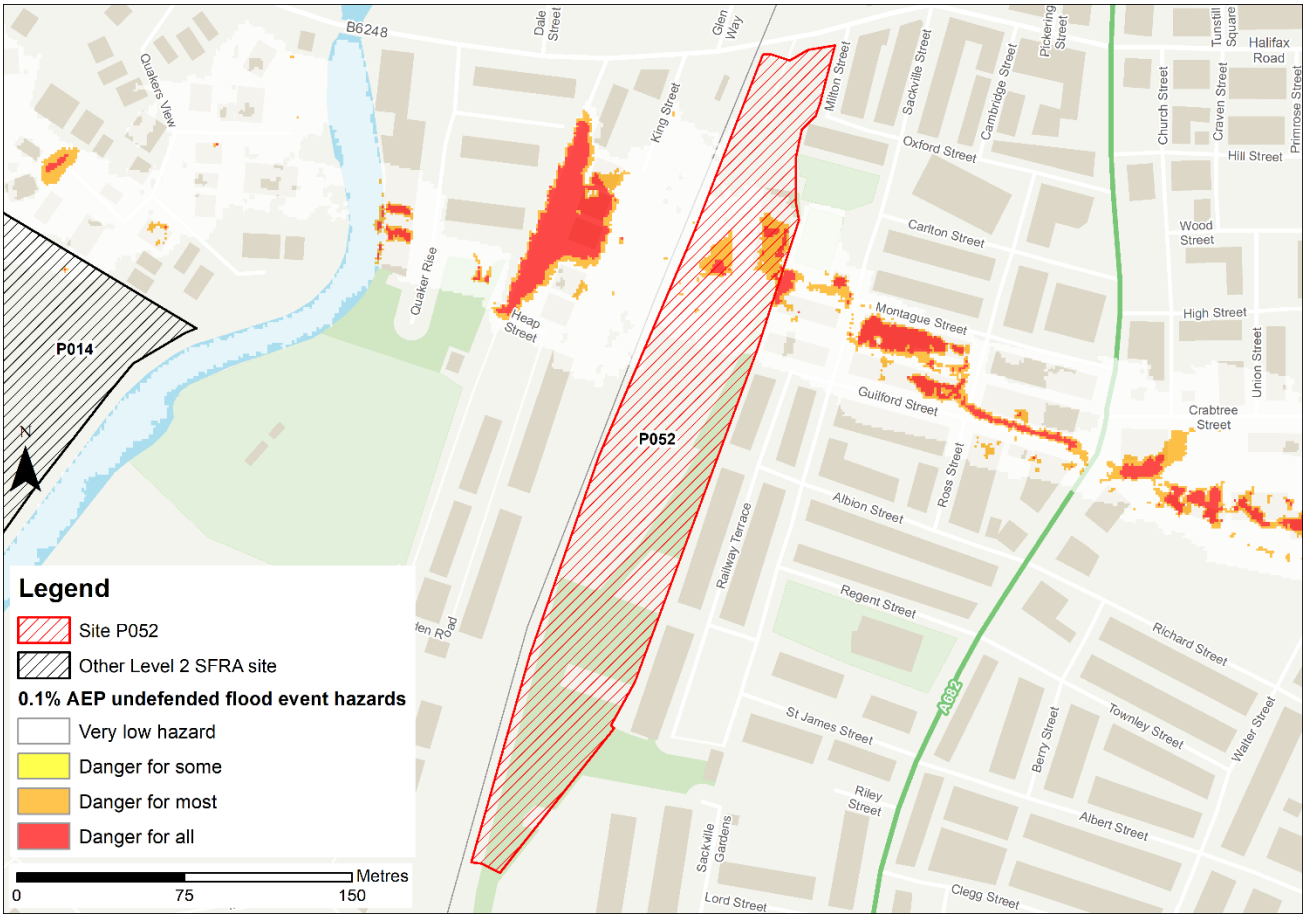

Figure 2-5: flood hazard for 0.1% AEP undefended flood event (as a proxy for the 1% AEP undefended event plus climate change)

2.3 Flood risk management

There are no engineered flood defences within the vicinity of the site that are likely to impact fluvial flood risk.

2.3.1 Working with Natural Processes

The EA's Working with Natural Processes (WwNP) dataset has been interrogated to identify opportunities for Natural Flood Management (NFM) to reduce flood risk to the site and surrounding areas. There are not any applicable areas that could benefit this site.

2.4 Residual risk

Although a site may be afforded some protection from defences, 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 Sefton Street Watercourse culvert which appears to be culverted for its entire length beneath the site until it enters Pendle Water to the west. The impact of a blockage of this structure has not been modelled as part of this Level 2 SFRA, as the timescales for the Local Plan would not allow

for it. 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. The culvert should also be investigated for capacity and its spatial course confirmed. Condition surveys should also be carried out by the culvert owner, likely to be the EA given this is a main river watercourse.

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.

This site is not modelled to be at risk from reservoir flooding.

2.5 Historic flood incidents

There are no recorded historic flood events within the vicinity of the site.

2.6 Flood warning and access and escape routes

The EA operates a Flood Warning Service for properties located within a Flood Warning Area (FWA) for when a flood event is expected to occur. This site is located within one FWA; namely 012FWFL66 - Sefton Street Watercourse at Brierfield, as shown on Figure 2-6.

Flood alerts may be issued ahead of a flood warning for properties located within a Flood Alert Area (FAA) to provide advance notice of the possibility of flooding occurring. 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; 012WAFEL - River Calder in east Lancashire.

Safe access and escape should be possible via the B6248 to the north of the site or via Albion Street to the east.

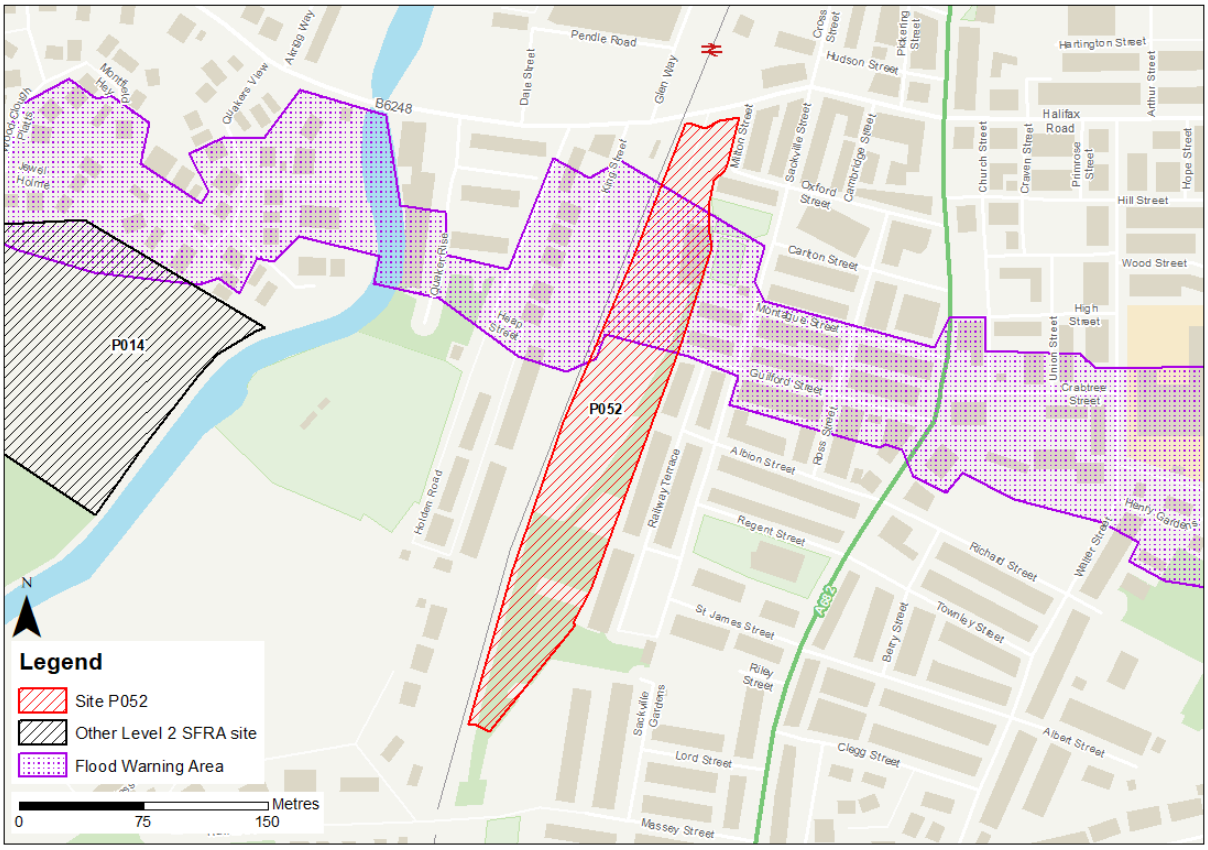

Figure 2-6: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - fluvial

- The proposed development of the site would see a change in the risk classification from less vulnerable to a more vulnerable mixed use site, according to the NPPF classification.
- Given the change in use and therefore vulnerability of the site, the site-specific FRA must show that the development can be designed to be safe and that there is adequate emergency planning provision (para 014 FRCC-PPG).
- The site is partially located in Flood Zone 3, as indicated by the EA's Flood Map for Planning and the Sefton Street model 1% AEP undefended event outputs. More vulnerable development should be directed away from the area of the site within Flood Zone 3.
- The area of risk is along the course of the Sefton Street culvert which is located under the site. No development should take place on top of the culvert. A flood risk activity permit may be required from the EA if development is planned within 8 metres of the bank of Earby Beck, which is a main river. EA advice would normally recommend for no development within 8m of a main river, to enable access for maintenance activities.
- There is potential residual risk to the site from a blockage or failure of this culvert. The impacts of this should be investigated.

- Options into culvert removal should be investigated whereby the watercourse is opened up and included in site layout and design as blue / green infrastructure.
- The 0.1% AEP undefended event outputs have been used as a proxy to provide a conservative 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 greater depths and hazards. However, climate change must be modelled to inform the exception test for this site.
- The EA flood warnings should continue to be in place to ensure early evacuation of site users before an extreme flood event occurs. Safe access and escape routes are available from several locations based on current 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 4% of the site is within the high risk surface water flood zone, as shown in Table 3-1. A further 7% of the site is at medium risk and a further 12% of the site is at low risk.

The area at risk in the high risk event is mainly confined to a distinct flow path through the centre of the site, coincident with the area of fluvial risk within the site. This is consistent with the medium risk event, however with greater extent of risk. In the low risk event, there are two additional flow paths through the north and south of the site.

Greatest flood depths in the high risk event range between 0.15 and 0.3 m (Figure 3-1) with hazard categorised as low (Figure 3-2). Safe access and escape routes should be possible via the B6248 to the north of the site and Albion Street to the east in the high and medium risk events. Safe access and escape routes via the B6248 may be challenging to achieve in the low risk event, however, remain possible via Albion Street.

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

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
77	12	7	4

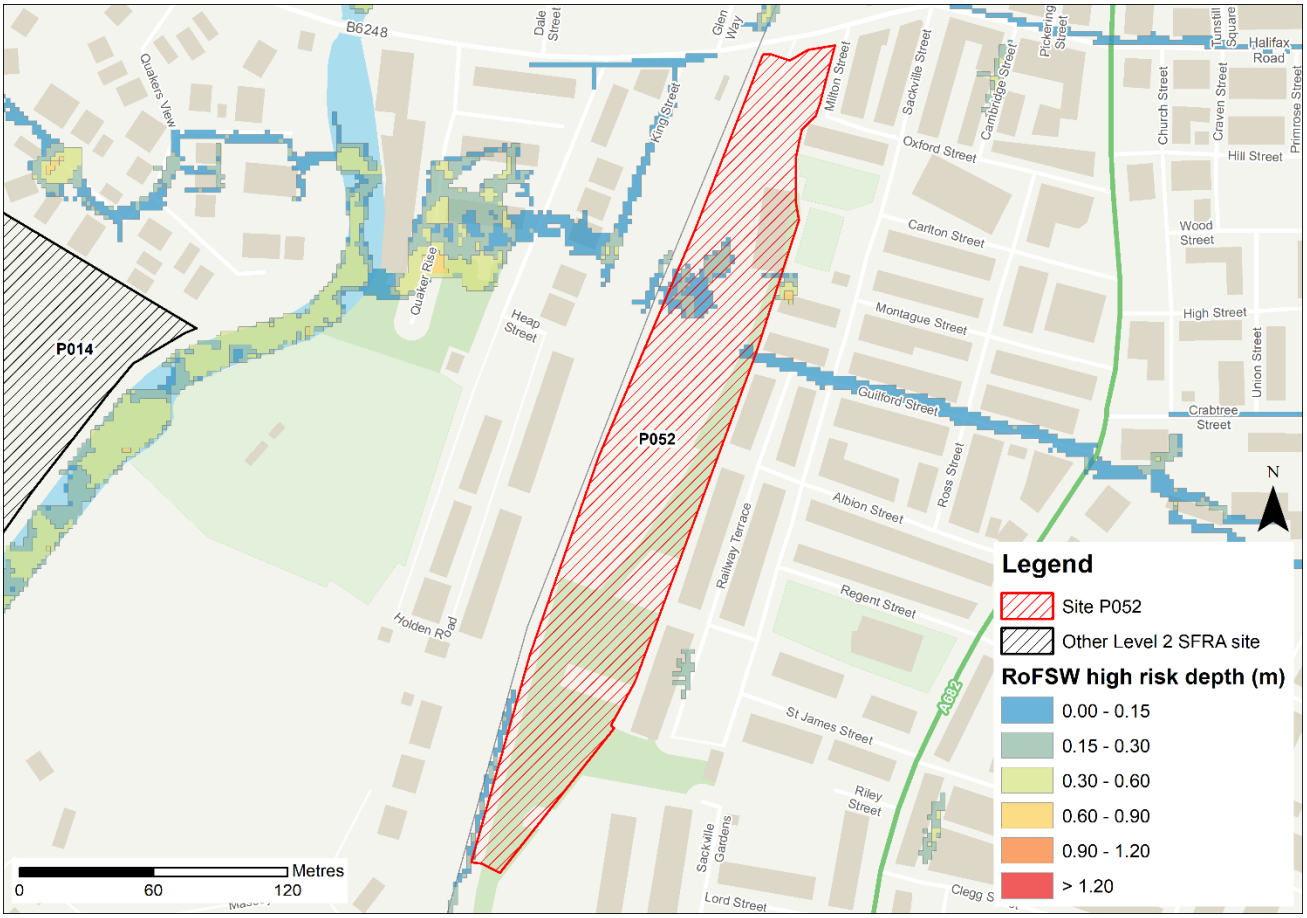

Figure 3-1: high risk event surface water flood depths (Risk of Flooding from Surface Water map)

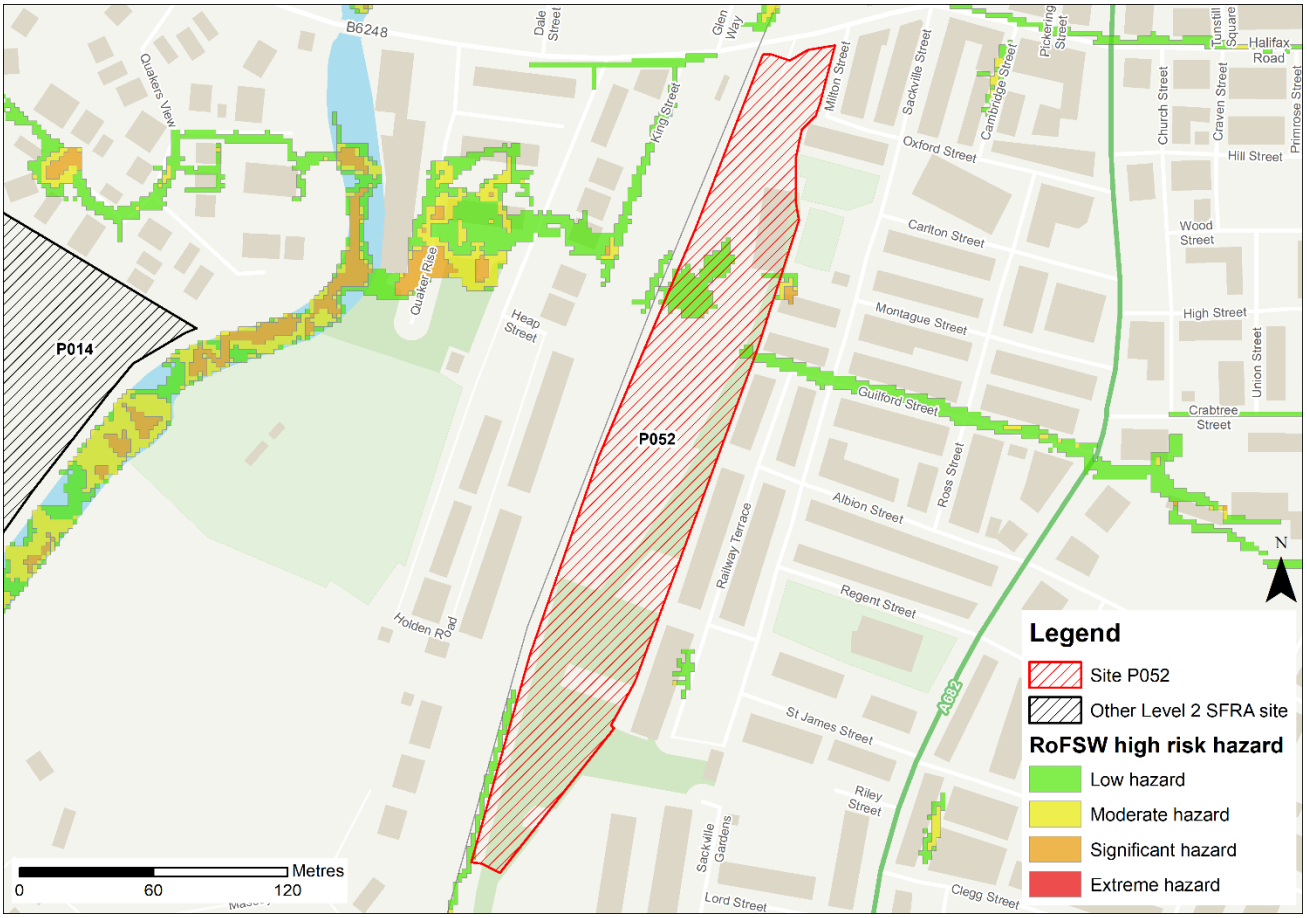

Figure 3-2: high risk event surface water flood hazard[2] (Risk of Flooding from Surface Water map)

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 flood depths for the medium risk event +50% climate change. Risk is modelled to be significantly greater than for present day conditions, with the medium risk plus climate change event being similar in extent to the low risk present day event. Greatest flood depths are modelled to be between 0.3 and 0.6 m with

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

some areas of extreme hazard (Figure 3-4). Safe access and escape routes may be challenging to achieve.

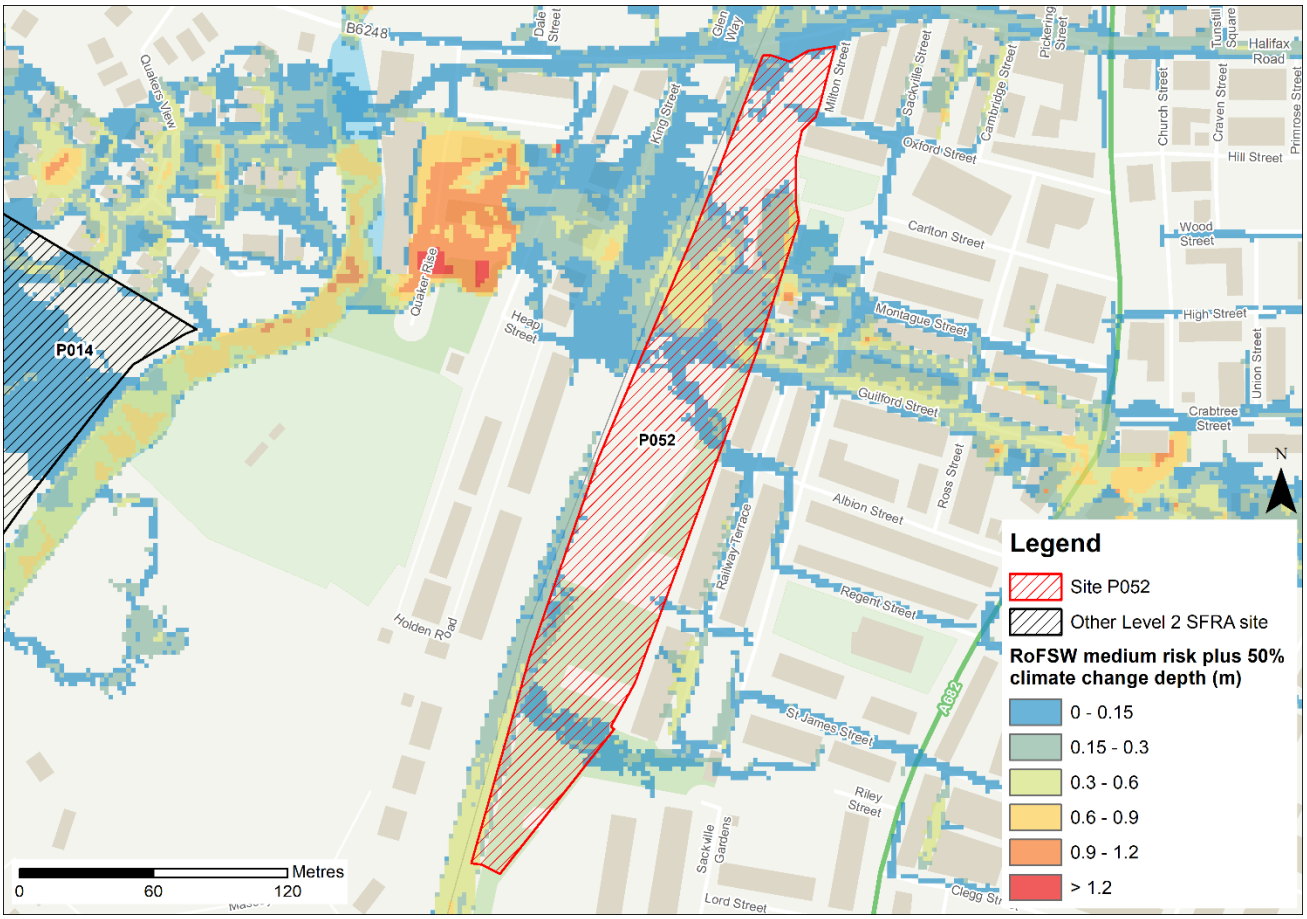

Figure 3-3: medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

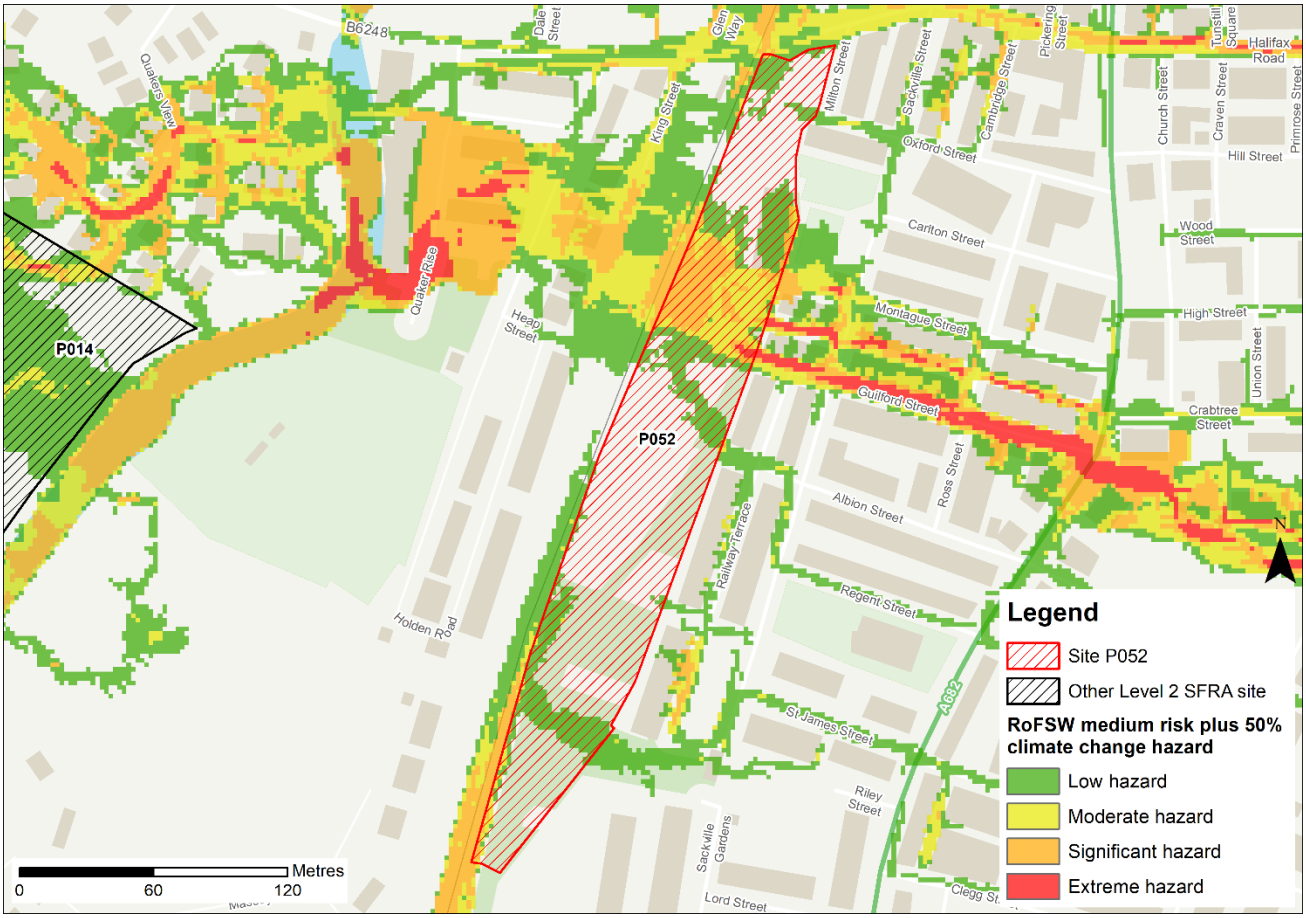

Figure 3-4: medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

3.3 Observations, mitigation options and site suitability - surface water

- The site is predominantly at very low surface water flood risk in the present day, with a flow path through the site where the culvert is located in all events. Safe access and escape routes are likely to be achievable in all present day events.
- The modelled climate change outputs indicate significant increased surface water flood risk to the site in the medium risk event. Safe access and escape routes may be challenging to achieve in the long term.
- A detailed drainage strategy will be required for this site and the wider area to ensure there is no increase in surface water flood risk elsewhere as a result of new development. This will require detailed surface water modelling based on layout plans and detailed design and full consultation with the LLFA on required runoff rates.
- The use of appropriate SuDS should be investigated. The groundwater table is likely to be low in this location judging from the Groundwater Flood Map in Figure 4-1 therefore infiltration SuDS may be an option. This will require appropriate ground and infiltration survey.
- 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 Flood risk from groundwater

Flood risk from groundwater sources is assessed in this SFRA using JBA's 5m Groundwater Flood Map. This dataset is recommended for use by the EA in the SFRA Good Practice Guide[3]. Figure 4-1 show the map for the site and the surrounding areas and Table 4-1 explains the risk classifications.

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

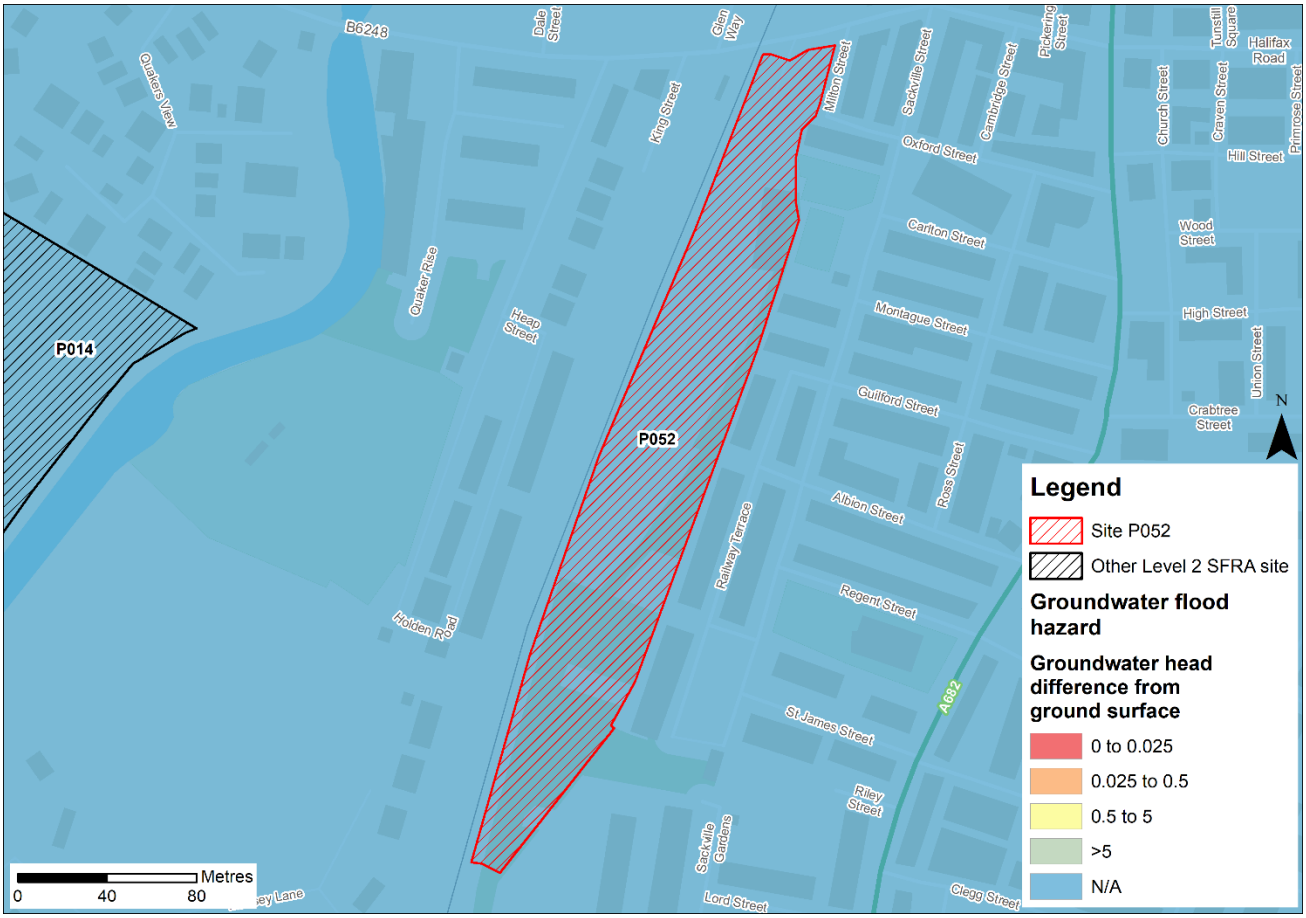

Figure 4-1: JBA 5m Groundwater Flood Map

3 Strategic flood risk assessment good practice guide. ADEPT. December 2021.

Table 4-1: Groundwater Flood Hazard Classification

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

5 Overall site assessment

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

To pass part b) of the exception test[4], it must be proven that the development can be safe for its lifetime, which is 100 years for residential development, taking account of the vulnerability of its users, without increasing risk elsewhere, and, where possible, will reduce flood risk overall.

- Based on current information, the exception test cannot be passed for this site as it cannot, at this stage, be proven that the site can be safe for its lifetime, in the absence of updated modelled climate change information. The lead local flood authority must be consulted on the surface water flood risk.

5.2 Recommendation summary

Based on the evidence presented in the Level 1 SFRA (2021) and this Level 2 SFRA:

- Updated climate change modelling of Sefton Street Watercourse should be used to update this Level 2 SFRA or to inform the site-specific FRA to provide a robust assessment of flood risk to this site and the surrounding areas in order to inform the exception test.
- A detailed drainage strategy will be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. Surface water flood risk should be retained onsite. This will require detailed surface water modelling based on layout plans and detailed design and full consultation with the LLFA on required runoff rates. The use of infiltration SuDS should be investigated.
- Residual risk from the culverted watercourse must be accounted for.
- Were this site to be allocated based on current information, the LPA must make it clear that this site cannot be developed until the required information detailed in this SFRA.

5.3 FRA requirements and further work

- Any FRA must further consider the impacts of climate change on fluvial flood risk to the site.
- Any FRA must further consider surface water flood risk including a drainage strategy which should include ground investigation for infiltration SuDS suitability.
- Any FRA should undertake a capacity and condition assessment of the culverted Sefton Street watercourse and investigate the impact of a potential blockage of the structures.

4 Para 164 National Planning Policy Framework 2023

- Any FRA should be carried out in line with the NPPF; FRCC-PPG; EA guidance; Pendle 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.

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