Pendle Level 2 Strategic Flood Risk Assessment - Site P014

Draft

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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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Acknowledgements

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

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Contents

List of Figures

List of Tables

1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Pendle Borough Council Site P014. 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 P014

- Location: Land at South Woodclough Platts
- Existing site use: Greenfield
- Existing site use vulnerability: Water compatible
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 2.12 ha
- Proposed development impermeable area: 1.8 ha (assumed 85% of site area)
- EA model: Sefton Street 2021
- Watercourse: Sefton Street Watercourse / Pendle Water
- Summary of requirements from scoping stage:
    - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
    - 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 site P015

Figure 1-1: existing site location boundary

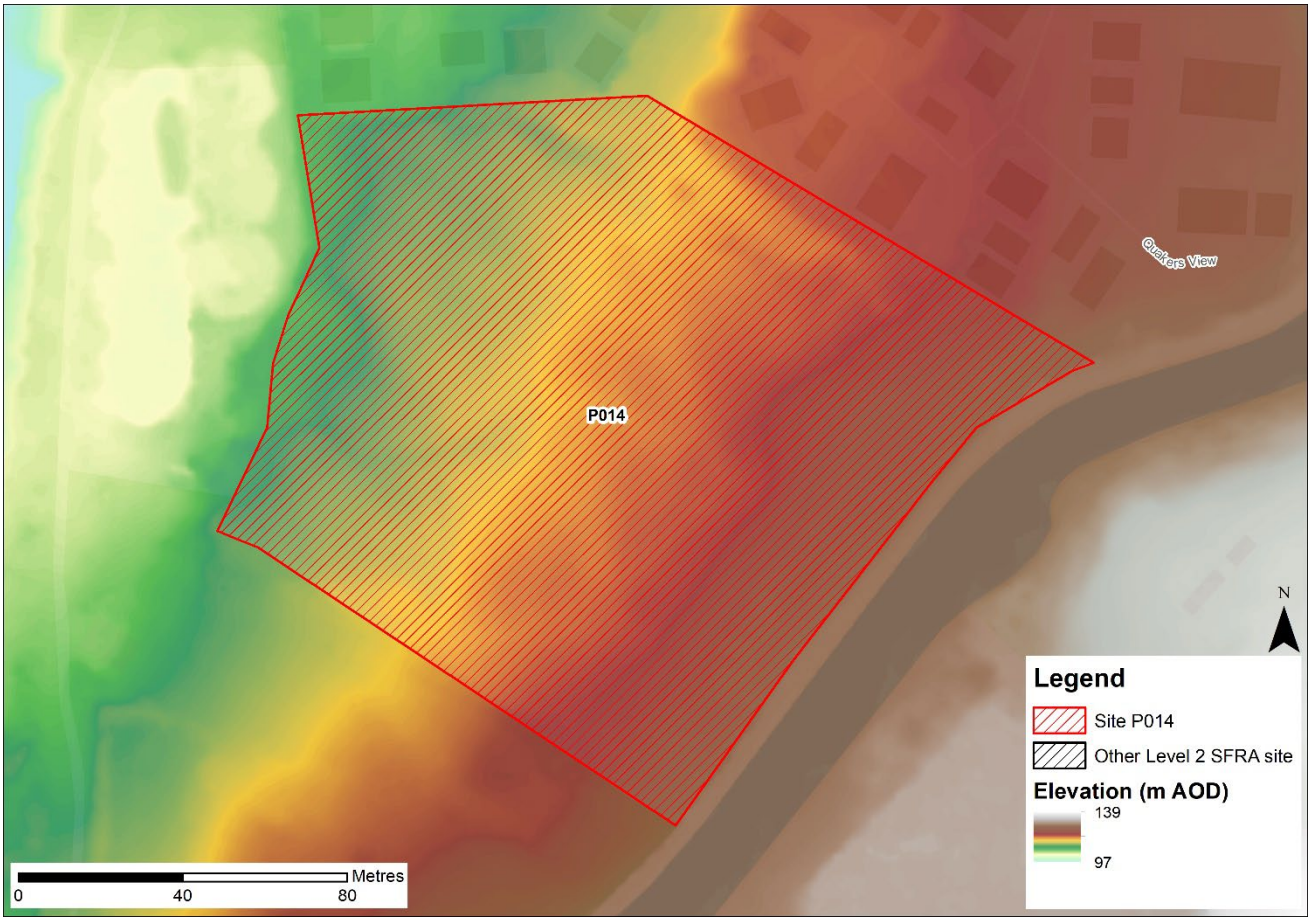

Figure 1-2: topography

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. There is a small area along the northern boundary of the site located within Flood Zone 2 represents flooding from Sefton Street Watercourse to the north. This watercourse is culverted beneath the residential area to the north and outfalls into Pendle Water to the west. The watercourse to the south east is the Leeds and Liverpool Canal for which no flood model is available.

Table 2-1: existing fluvial flood risk

Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3a (%)	Flood Zone 3b (%)
90	10	0	0

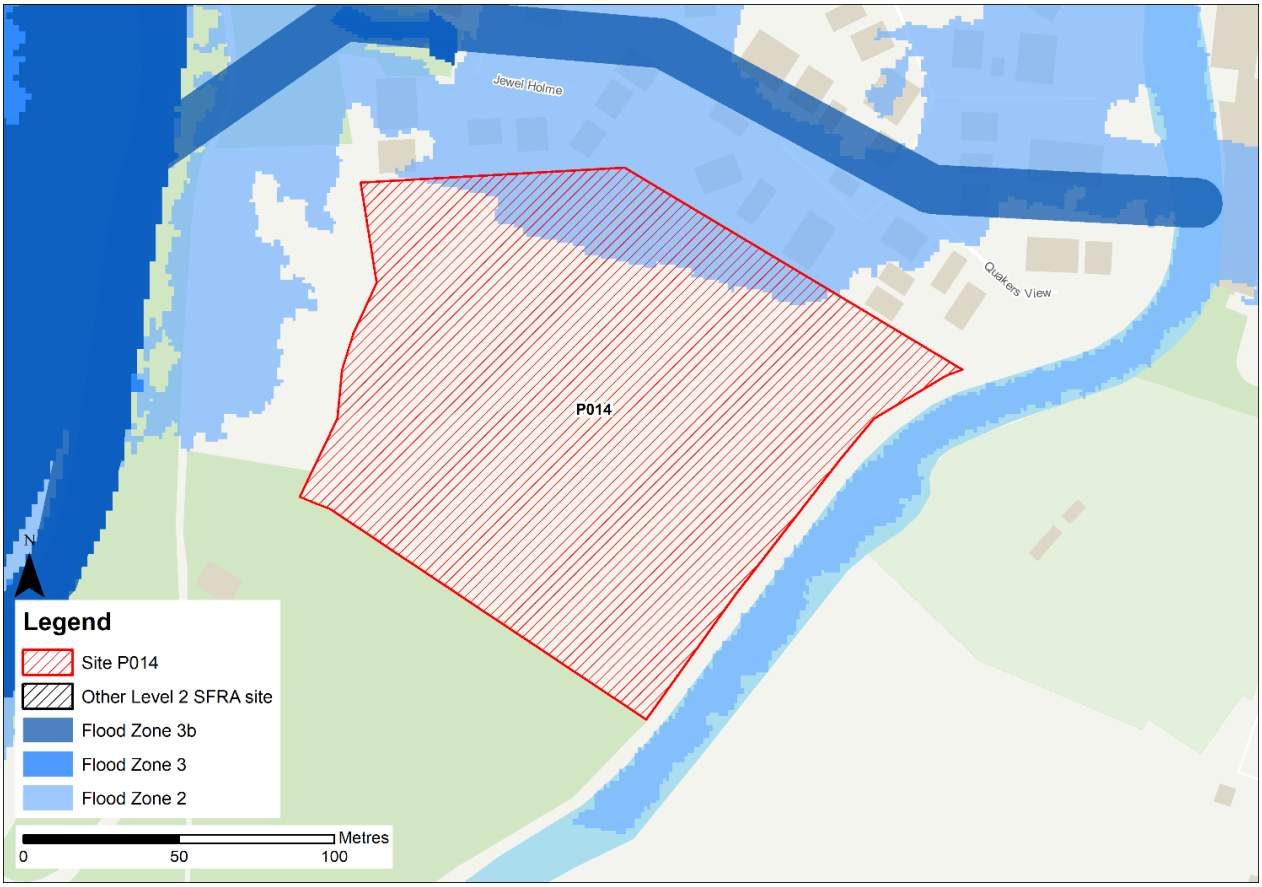

Figure 2-1: existing risk from rivers to the site

2.1.2 Sefton Street 2021 model outputs

Figure 2-2 shows the modelled flood depths for the 0.1% AEP undefended event which is the event Flood Zone 2 of the Flood Map for Planning is based on. Modelled risk to the site is similar to Flood Zone 2 in the vicinity of the site, with the area along the northern boundary of the site modelled to be at risk. Maximum flood depths within the site are shallow at between 0.15 and 0.3 m. Figure 2-3 shows the modelled flood hazard ratings for the 0.1% AEP undefended event to be 'Very low'. There is no modelled flood risk to the rest of the site in the 0.1% AEP undefended event, reflecting Flood Zone 2.

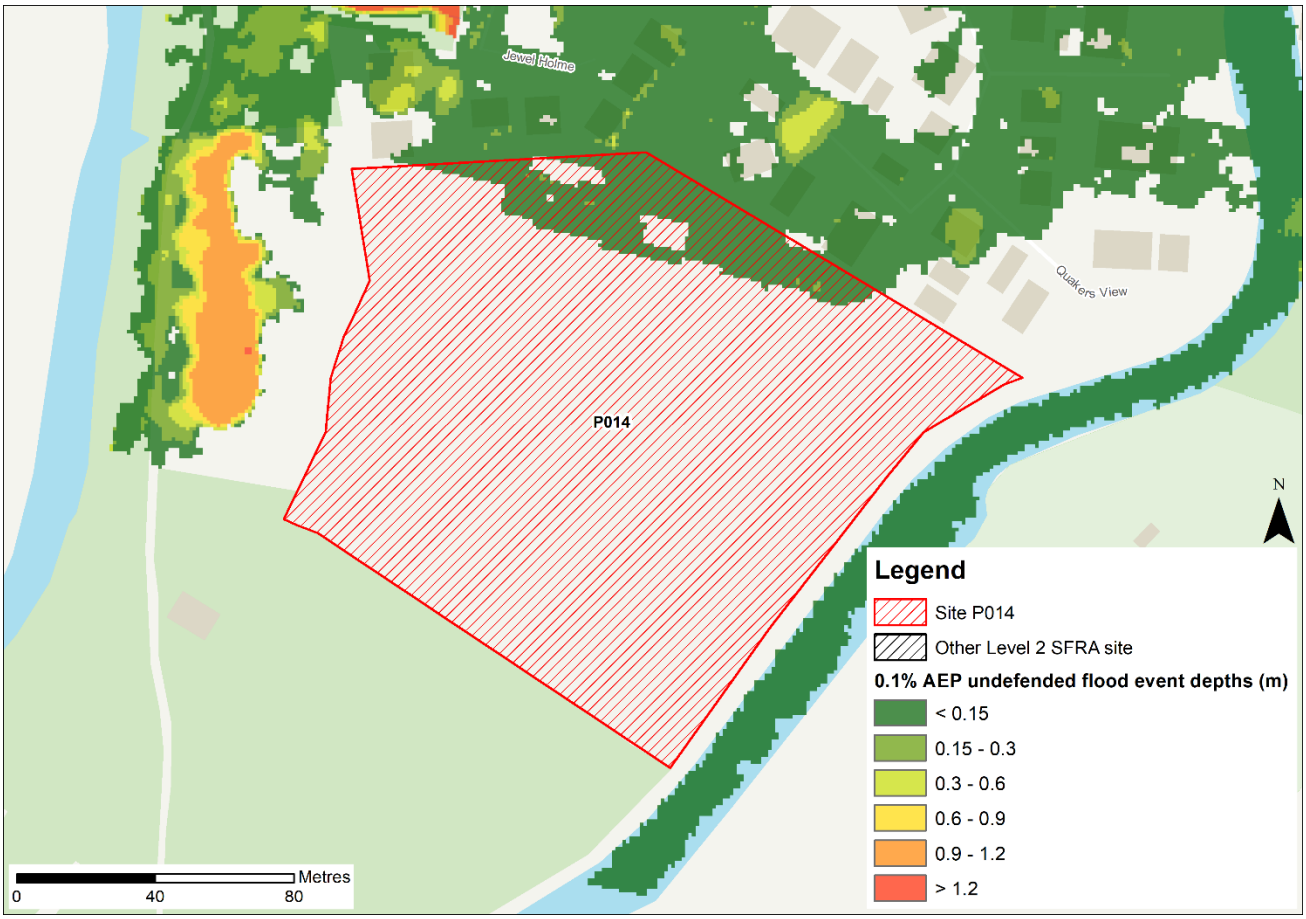

Figure 2-2: flood depths for 0.1% AEP undefended flood event

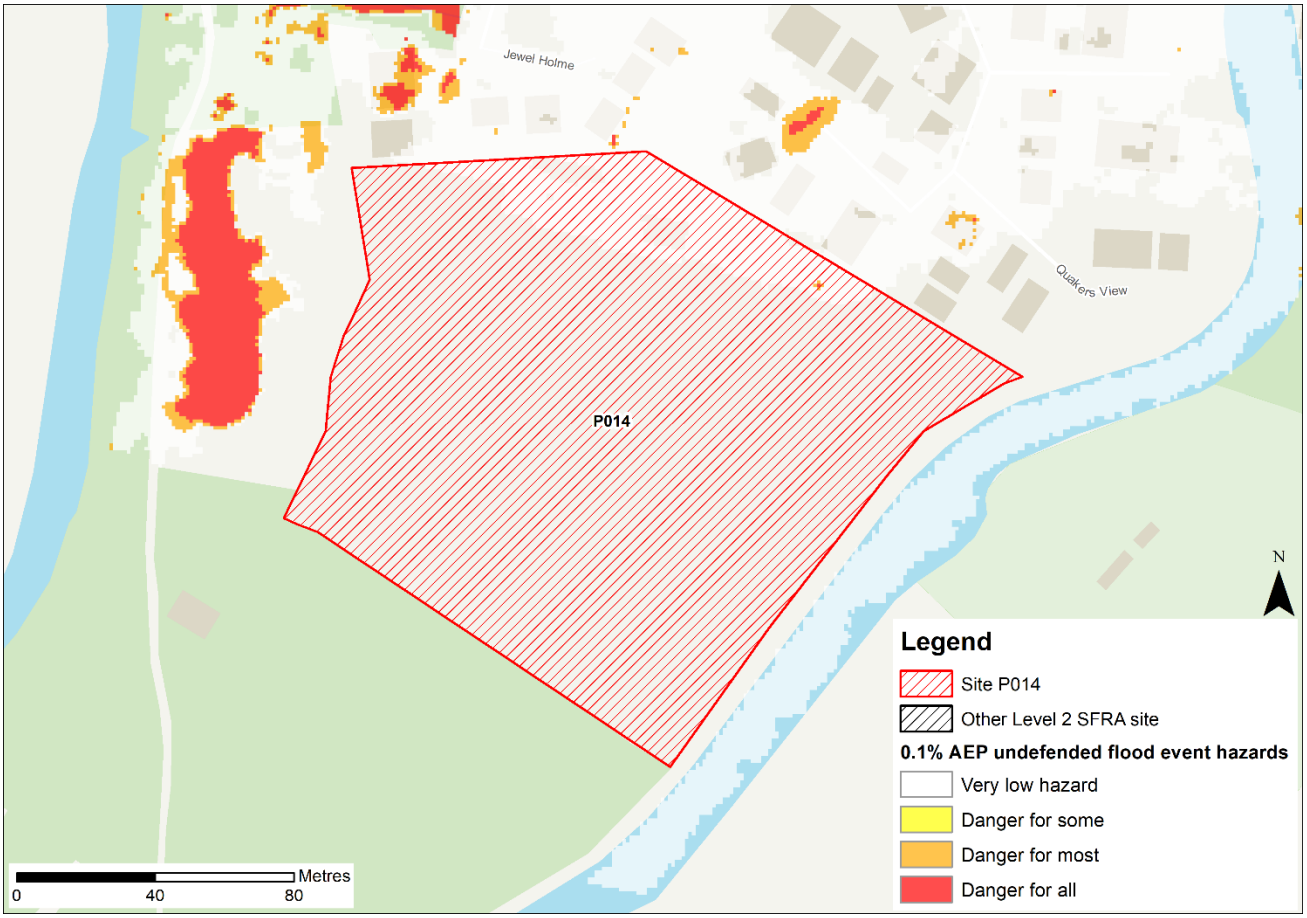

Figure 2-3: flood hazard[1] for 0.1% AEP undefended flood event

2.2 Impacts from climate change

The impacts of climate change on fluvial flood risk have 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. The 0.1% AEP undefended event is discussed in Section 2.1.2.

The impacts of climate change must be modelled using the EA's latest allowances for peak river flows to inform on whether the site can remain safe for its lifetime. 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.

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. There are however areas of natural high ground along the banks of Pendle Water to the west of the site boundary.

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. Both within and upstream of the site, there is significant potential for tree planting to reduce runoff downstream. There is also potential within the site for runoff attenuation features. These areas are shown in Figure 2-6.

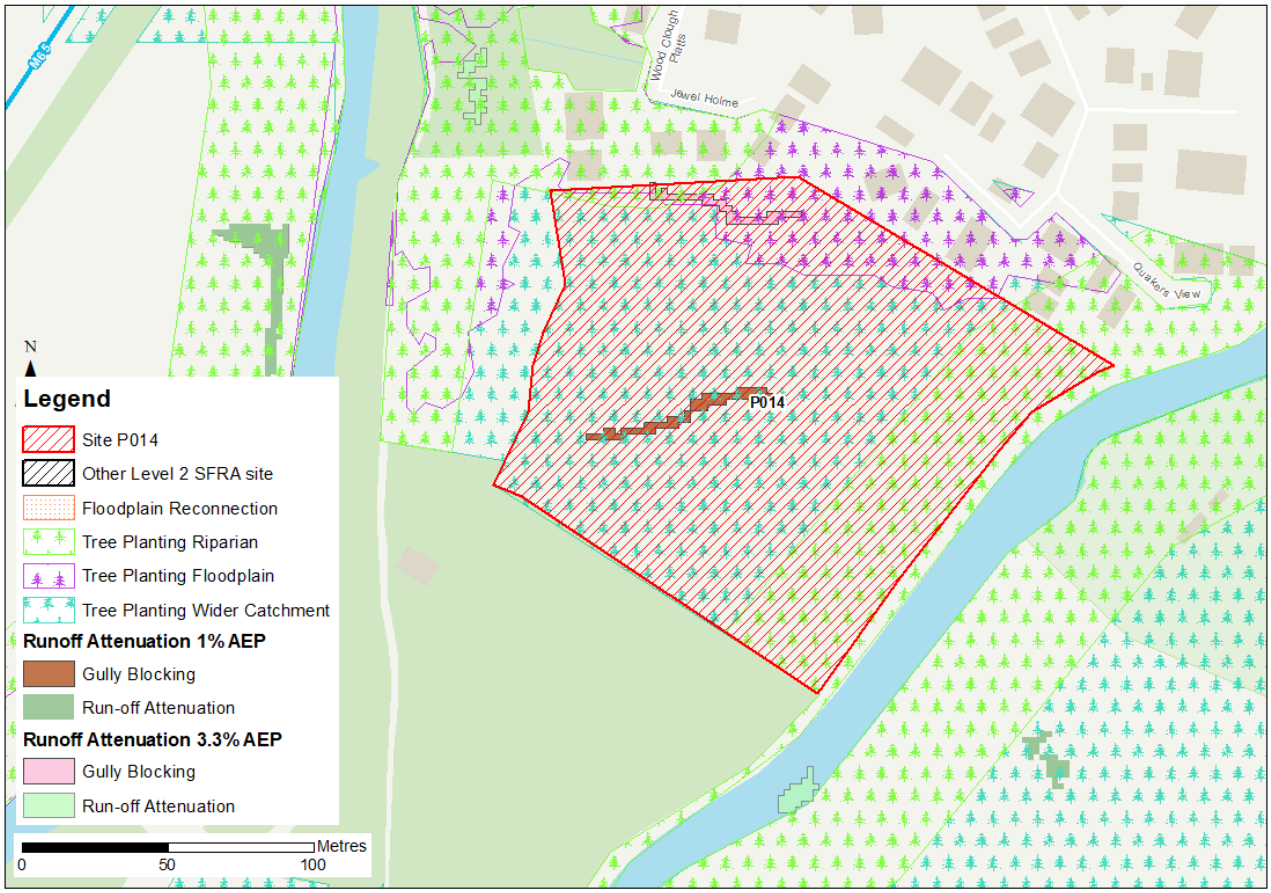

Figure 2-6: Natural Flood Management (NFM) potential mapping.

2.4 Residual risk

Although a site may be afforded some protection from defences, 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 development site P052 until it enters Pendle Water to the west (Figure 2-4). 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 considers the impact of any blockage of this culvert on flood risk to the site.

The Leeds Liverpool Canal runs adjacent to the eastern boundary of the site. There is no known existing flood model of the canal therefore any residual risk from the canal is unknown at this stage. However, the canal is raised approximately 4m above the site. Therefore, the site is at potential residual risk from a breach of the canal system. This scenario must be investigated at the FRA stage including full consultation with the Canal & River Trust.

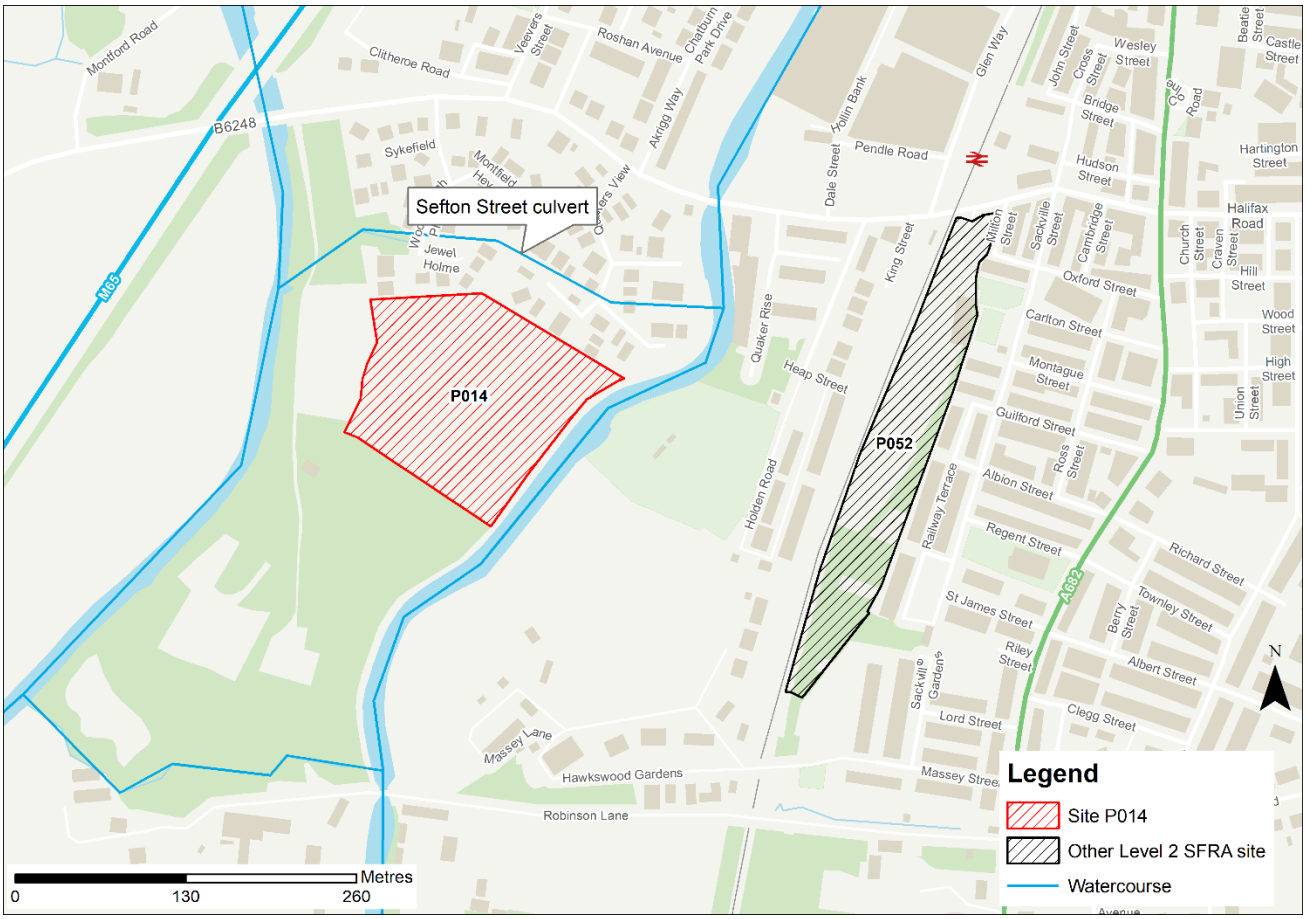

Figure 2-4: Potential culvert blockage location

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.

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 FWA 012FWFL66 - Sefton Street Watercourse at Brierfield, as shown on Figure 2-5.

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 via existing road infrastructure to the north may be challenging to achieve during the extreme event and with climate change. Access and escape routes via the south of the site should be considered in site design.

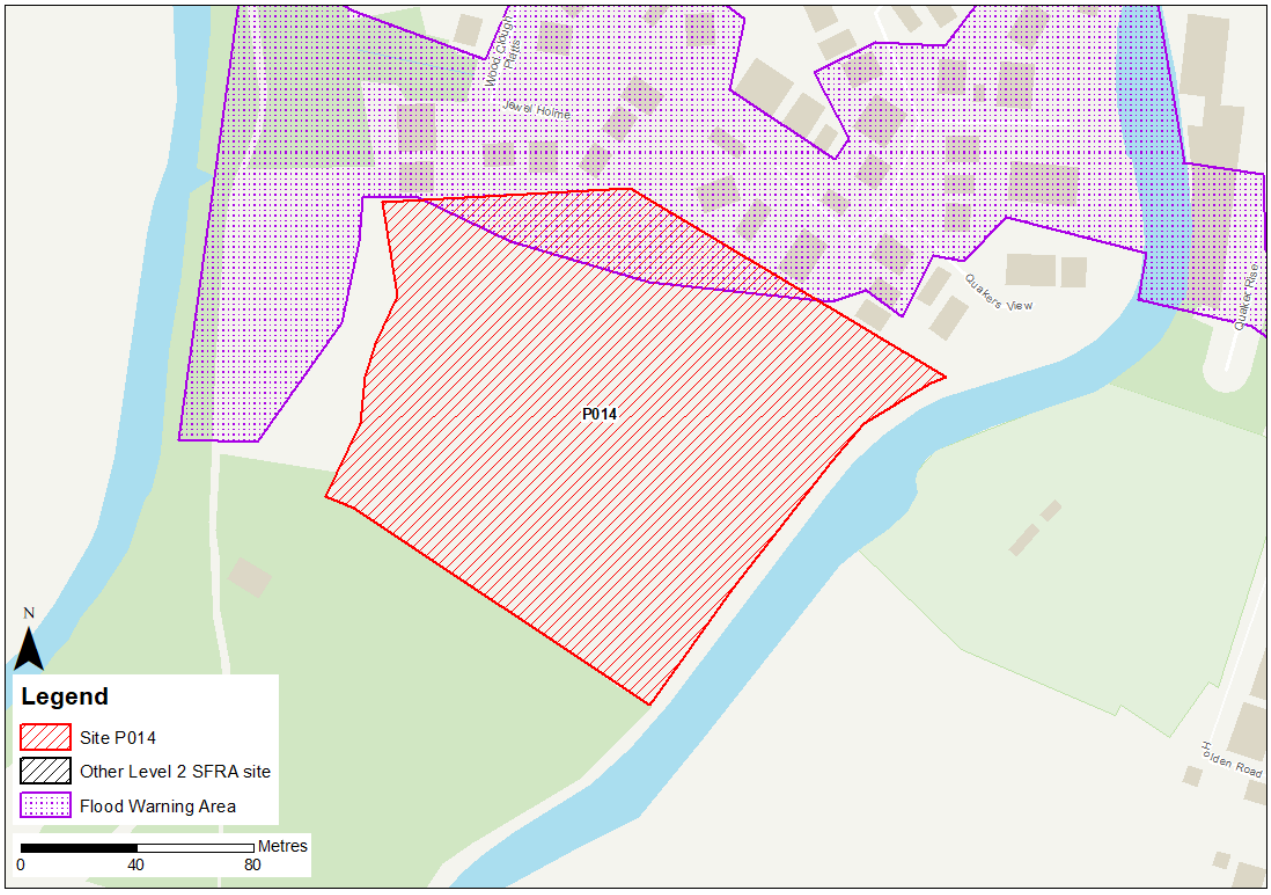

Figure 2-5: EA Flood Warning Areas

2.7 Observations, mitigation options and site suitability - fluvial

- The proposed development of the site would see a change in the risk classification from a water compatible greenfield site to a more vulnerable residential 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 2, as indicated by the EA's Flood Map for Planning and the Sefton Street 2021 modelled 0.1% AEP undefended event outputs. However, flood depths are shallow, and hazards are very low.
- The 0.1% AEP undefended event outputs can be used as a proxy to provide a conservative estimate of the 1% AEP undefended event plus climate change. However, climate change must be fully modelled at the FRA stage to inform on whether the site can be made safe for its lifetime.
- The residual risk of flooding to the site as a result of a breach or overtopping of the Leeds Liverpool Canal, and also from a potential blockage or failure of the Sefton Street culvert should be fully investigated. Modelling may be required to inform on risk. Consultation will be required with the Canal & River Trust and the owner / maintainer of the culvert, likely to be the lead local flood authority.
- Safe access and escape via existing road infrastructure to the north may be challenging to achieve during the extreme event and with climate change. Access and escape routes via the south of the site should be considered in site design.

3 Flood risk from surface water

3.1 Existing risk

Based on the EA's national scale Risk of Flooding from Surface Water (RoFSW) map, surface water risk to the site is predominantly low. Approximately 1% of the site is within the high risk surface water flood zone, as shown in Table 3-1. A further 8% of the site is at medium risk and a further 28% of the site is at low risk.

The area at risk in the high risk event is confined to an area of ponding behind within the north of the site. In the medium risk event, there are two additional surface water flow paths developing through the centre of the site. The surface water flow path through the centre and north of the site in the low risk event is significant, however depths and hazards are largely low.

Greatest flood depths in the high risk event range between 0.15 and 0.3 m (Figure 3-1) with areas of low hazard (Figure 3-2). Safe access and escape routes should be possible via Quakers View to the north of the site in the high and medium risk events. Access and escape routes to the south should be considered to allow evacuation of the site in the case of the extreme low risk event.

Where possible, flow paths and ponds should be maintained onsite with no obstruction from new development.

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

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
63	28	8	1

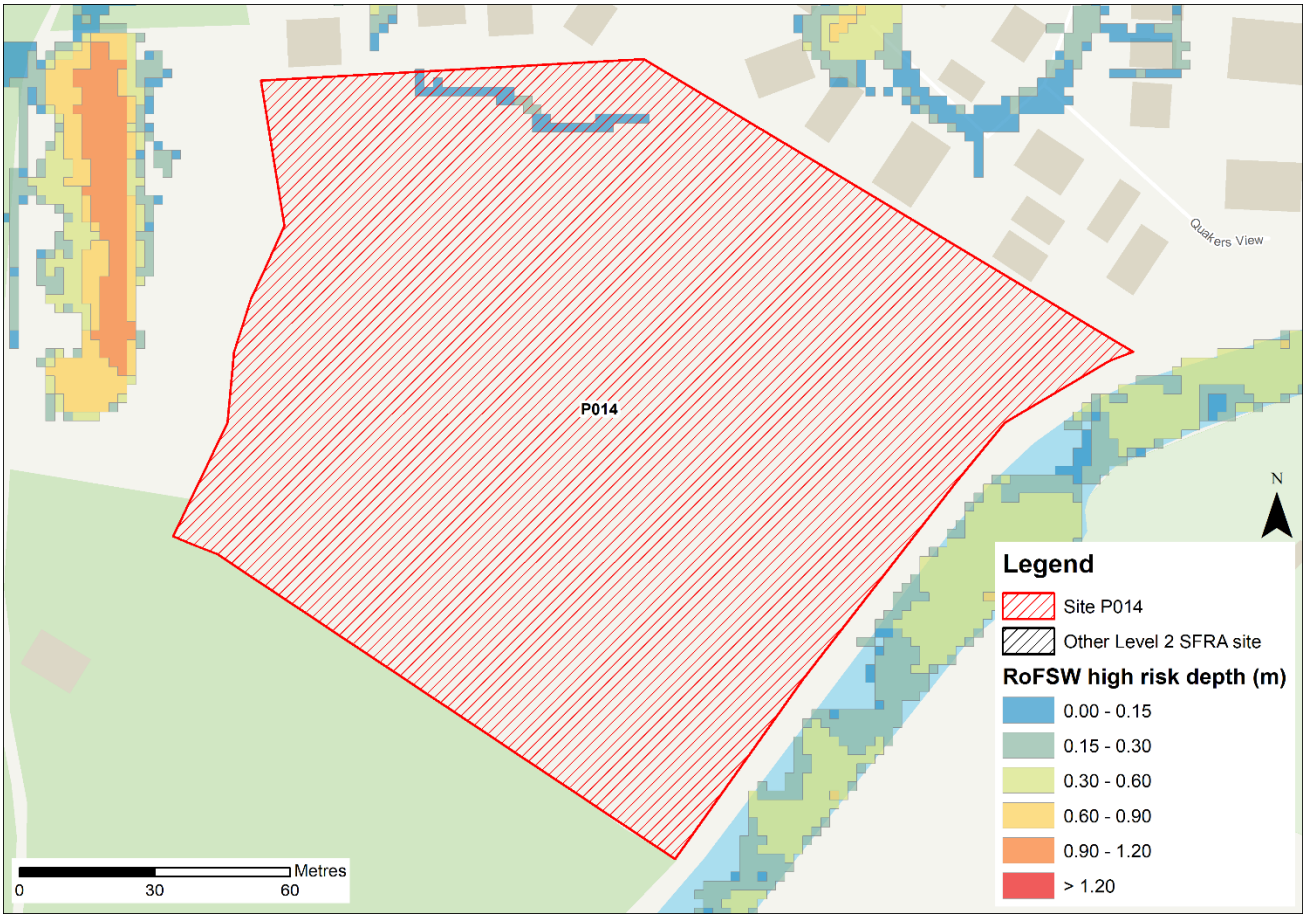

Figure 3-1: high risk event surface water flood depths (Risk of Flooding from Surface Water map)

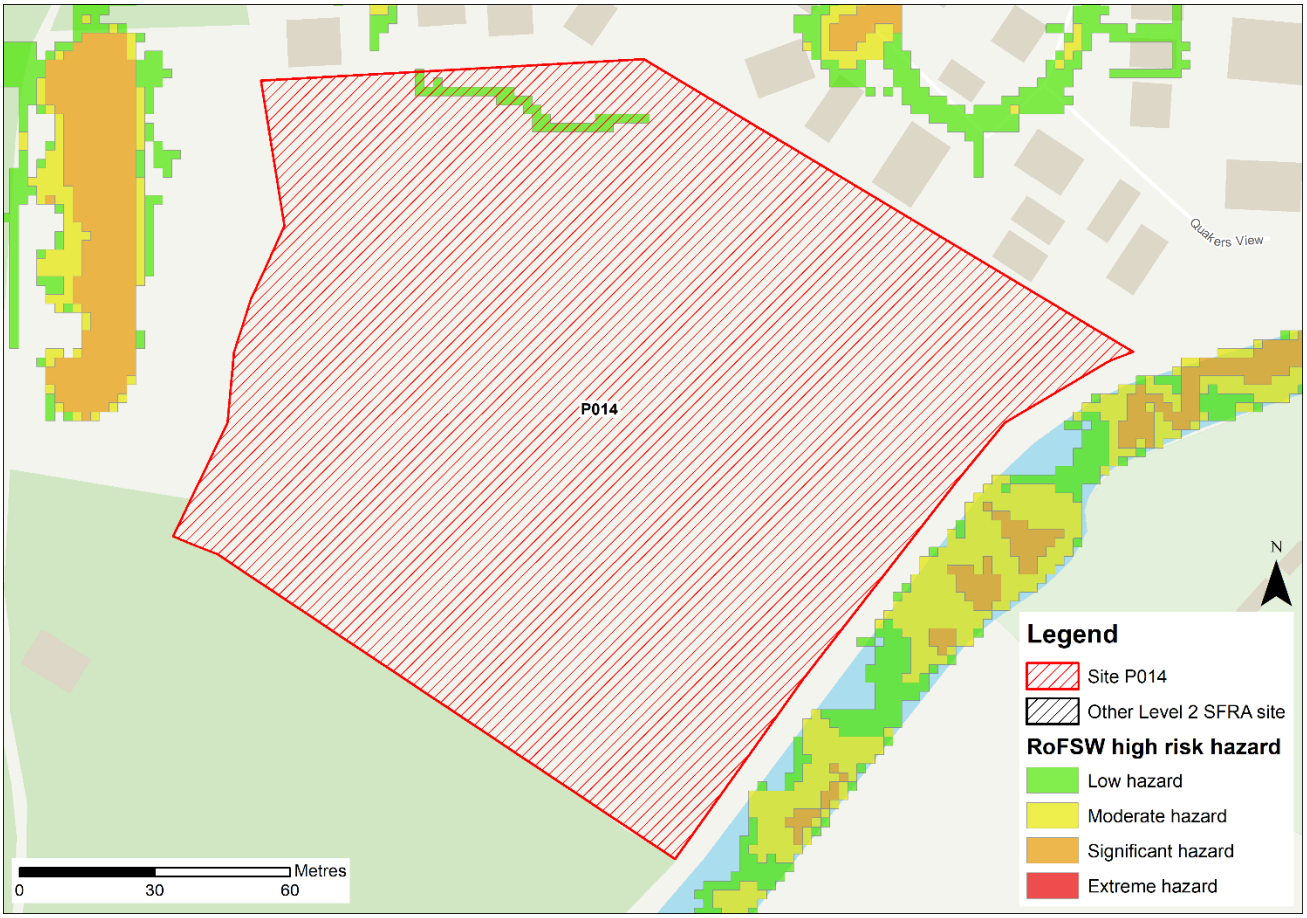

Figure 3-2: high risk event surface water flood hazard[2] (Risk of Flooding from Surface Water map)

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. Surface water appears to flow by topography towards Pendle Water.

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

Greatest flood depths are modelled to be between 0.6 and 0.9 m with some areas of extreme hazard (Figure 3-4). Safe access and escape routes may be challenging to achieve via existing road infrastructure to the north. Access and escape routes to the south should be considered to enable the evacuation of the site in the long term.

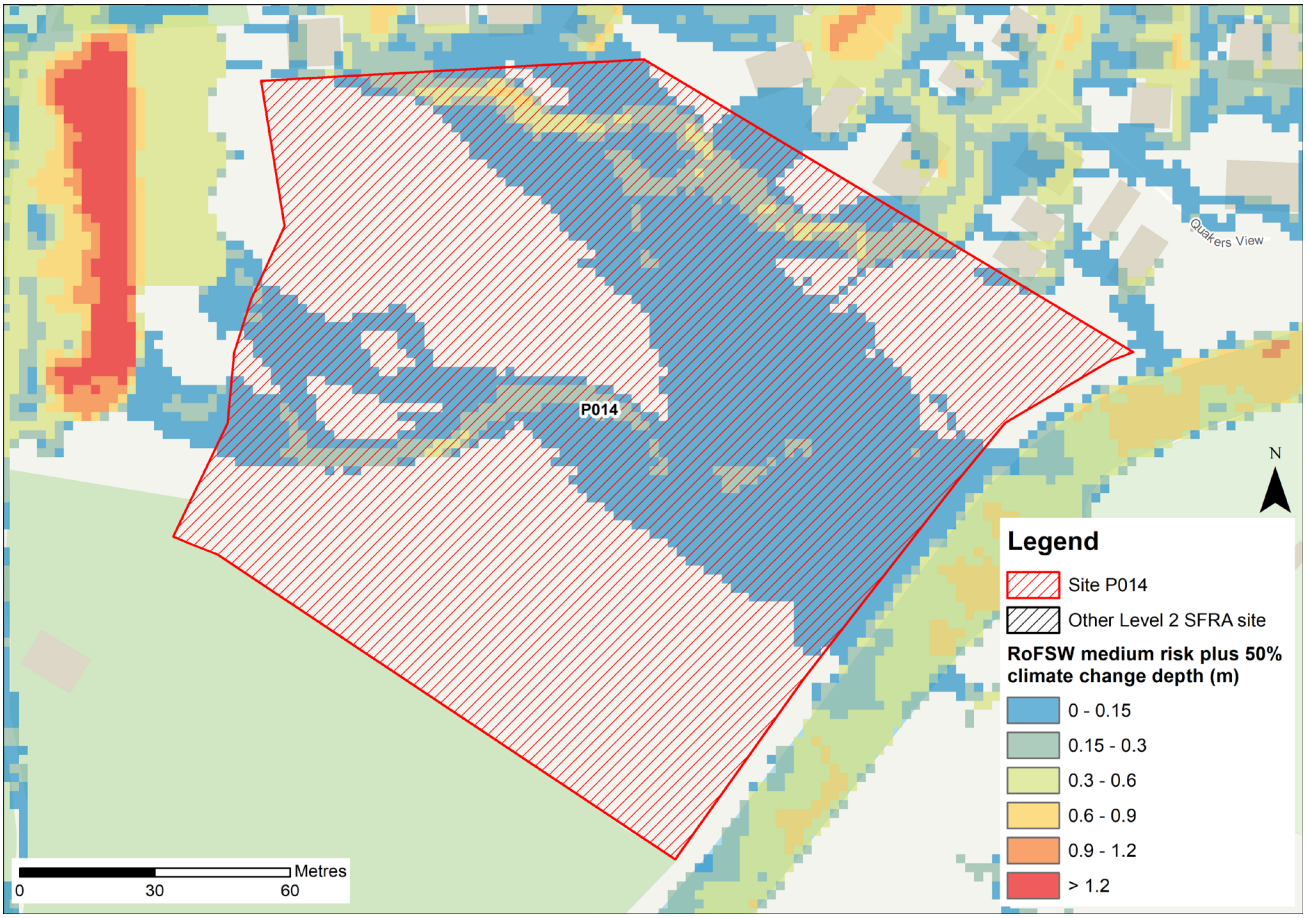

Figure 3-3: medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

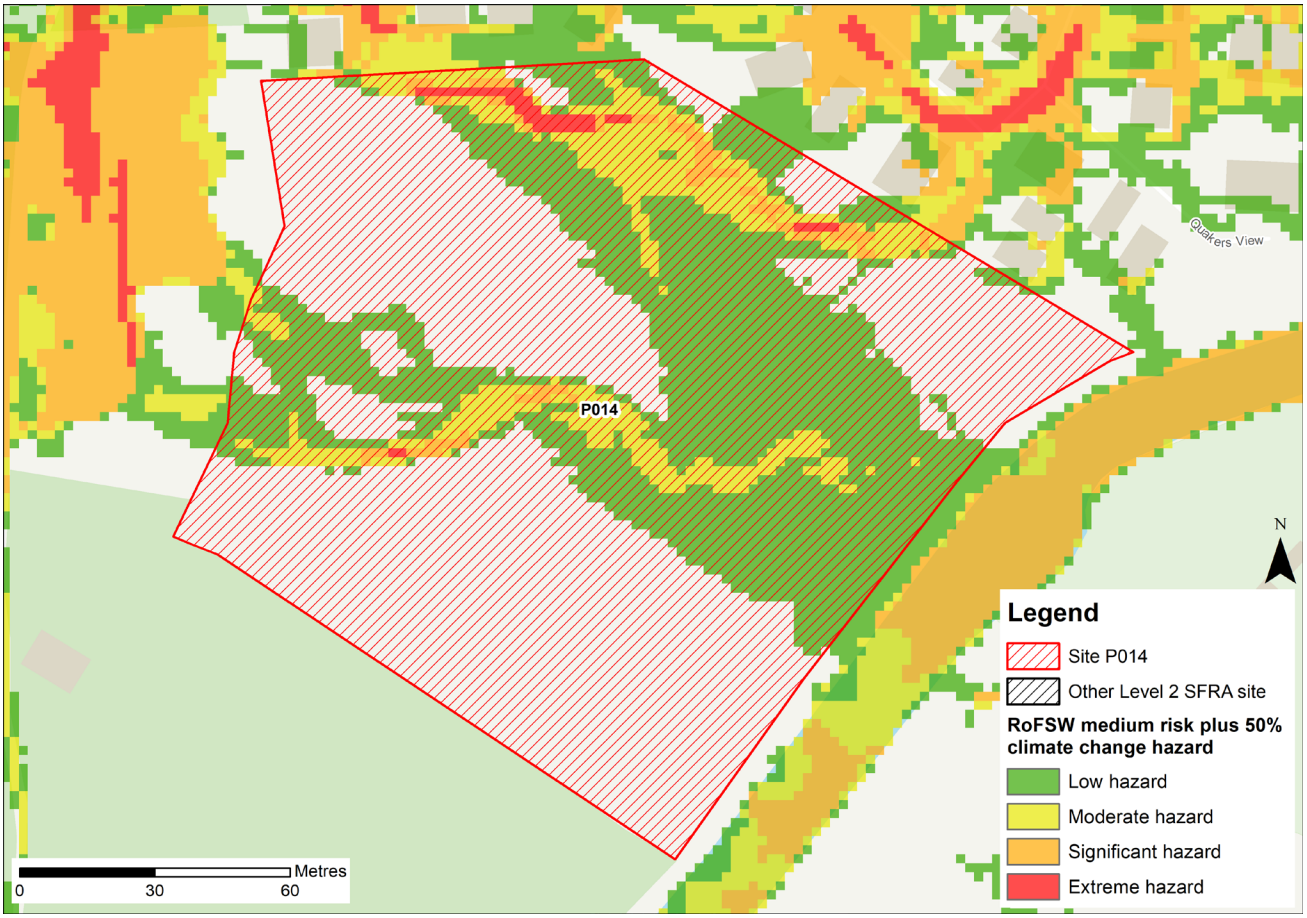

Figure 3-4: medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

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. There are two significant flow paths through the site in the low risk event. Safe access and escape routes via existing road infrastructure may be challenging to achieve in the extreme low risk event. Any existing flow paths should be retained in site design where possible.
- The modelled climate change outputs indicate a significant increase in surface water flood risk to the site in the medium risk event. Safe access and escape routes may be challenging to achieve. Access and escape routes to the south should be considered to allow evacuation of the site in the case of the medium risk event plus climate change.
- 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.

- 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 Site P014 and the surrounding areas and Table 4-1 explains the risk classifications.

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

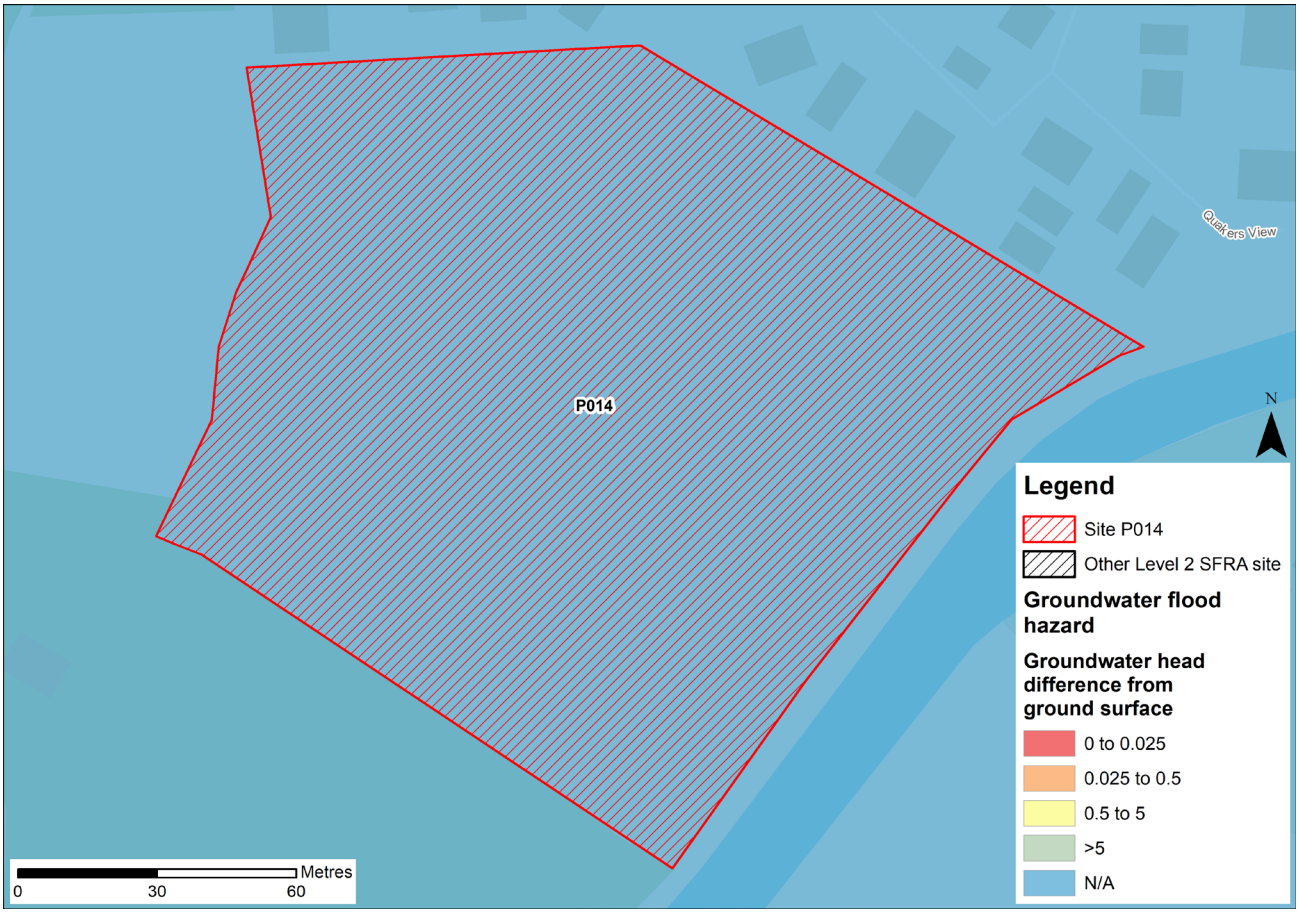

Figure 4-1: JBA 5m Groundwater Flood Map

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.

- The site is not required to pass the exception test as it is not located within Flood Zone 3a. However, it must be proven at the FRA stage that the site can remain safe for its lifetime. The lead local flood authority must be consulted on the surface water 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 on the Sefton Street model should be used to update this Level 2 SFRA or to inform the site-specific FRA to provide a robust assessment of fluvial flood risk to this site and the surrounding areas.
- 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 canal and 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 is fully ascertained.

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 condition assessment of the culverted Sefton Street watercourse and investigate the impact of a potential blockage of the structures.
- Any FRA should undertake a condition assessment of the canal embankment adjacent to the site and investigate the impact of a potential breach of the canal.

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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