

# **Pendle Level 2 Strategic Flood Risk Assessment - Site P309**

**Draft**

**September 2024**

**Prepared for:  
Pendle Borough Council**

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# Contract

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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 Pendle Borough Council Site P309. 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 P309

- Location: Land at Jackdaw Road
- Existing site use: Brownfield
- Existing site use vulnerability: Less vulnerable
- Proposed site use: Employment
- Proposed site use vulnerability: Less vulnerable
- Site area: 2.5 hectares
- Proposed development impermeable area: 2.1 hectares (assumed 85% of total site area)
- Summary of requirements from scoping stage:
  - Level 1 SFRA recommendation was for withdrawal from allocation or more detailed assessment through Level 2 SFRA
  - Assess surface water depths and hazards
  - Climate change proxy assessment



Figure 1-1: existing site location boundary

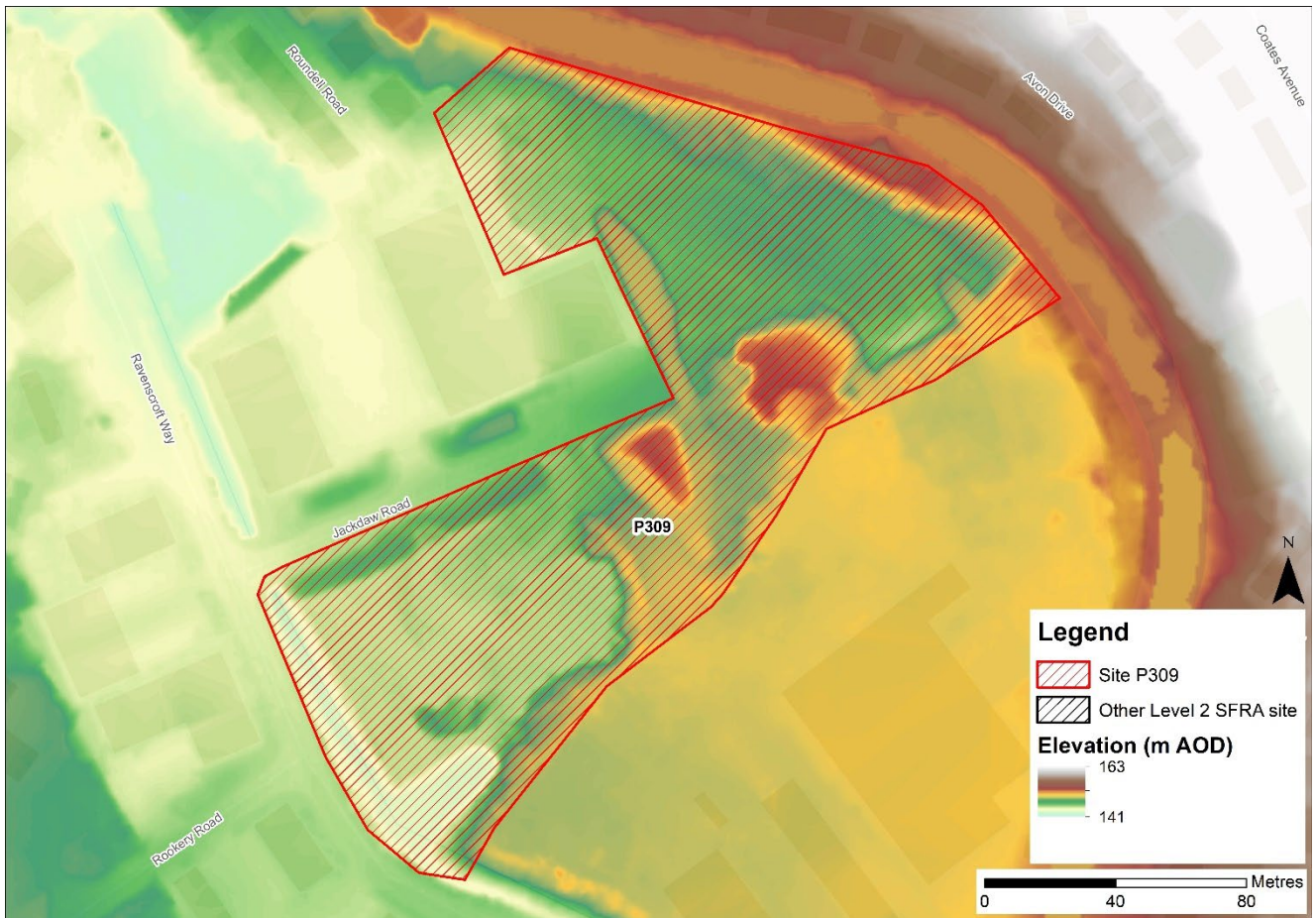


Figure 1-2: topography

## 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.

The site is located entirely within Flood Zone 1.

Table 2-1: existing fluvial flood risk

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

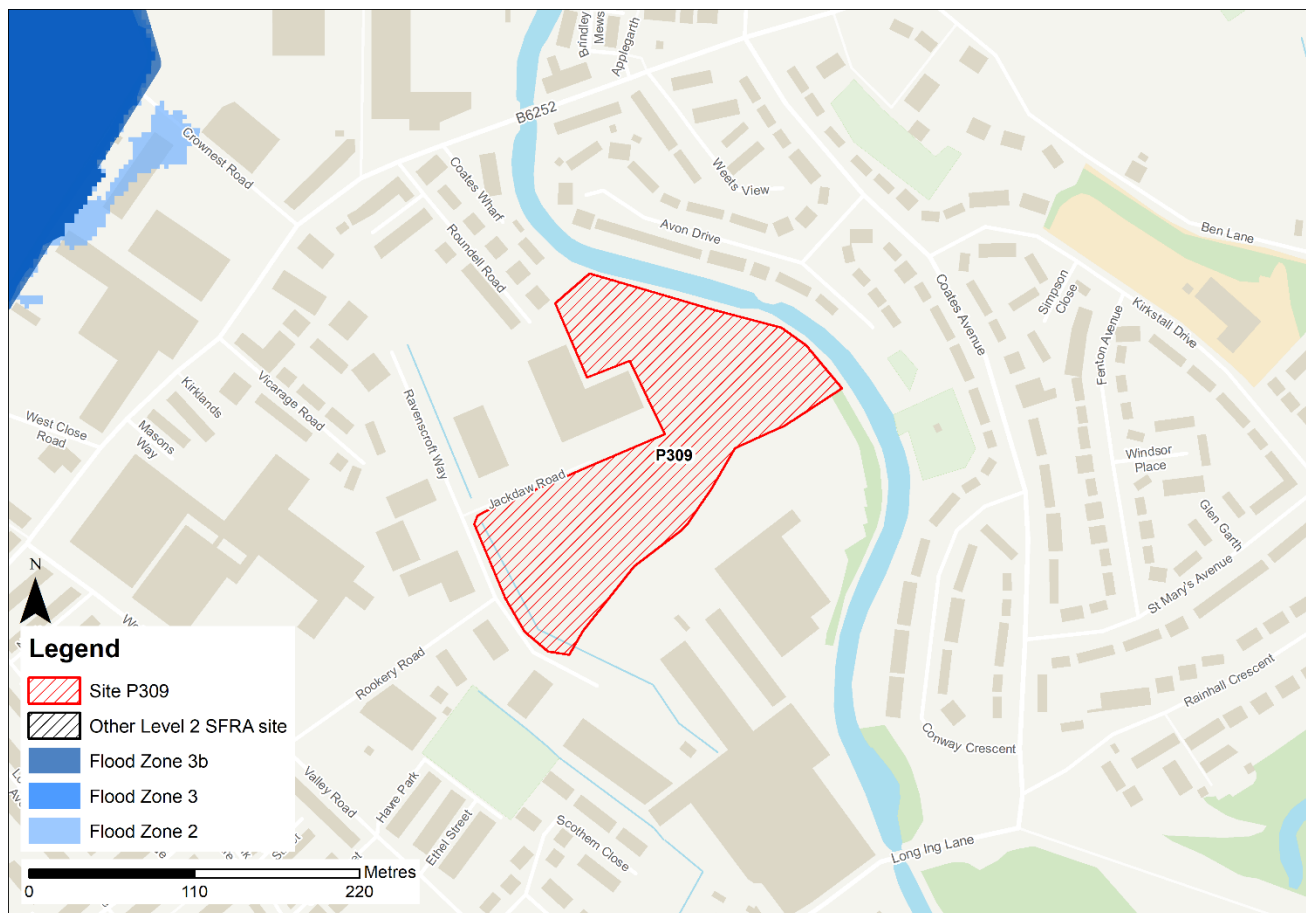


Figure 2-1: existing risk from rivers to the site

## 2.2 Flood risk management

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

### 2.2.1 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. On higher land, to the south of the site, there is the potential for both riparian and wider catchment woodland planting which may help to attenuate water so runoff into Barnoldswick is reduced. There is also the potential for runoff attenuation features, to store floodwater and reduce the speed at which flooding occurs downstream. These areas are shown in Figure 2-6.

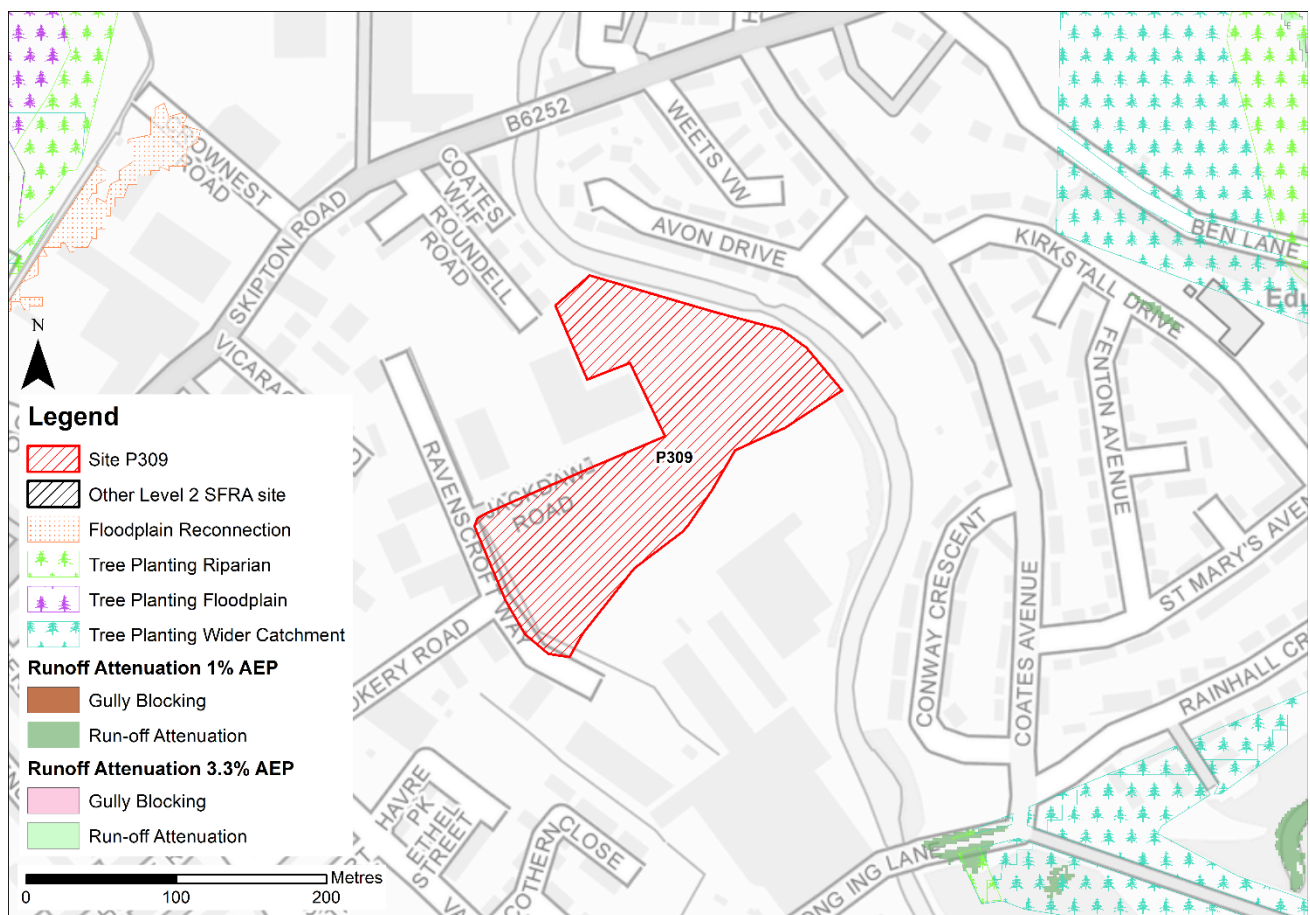


Figure 2-2: Natural Flood Management (NFM) potential mapping

## 2.3 Residual risk

The Leeds Liverpool Canal runs along the northern boundary of the site. There is no known existing flood model of the canal therefore any residual risk from the canal is unknown at this stage. The canal is raised approximately 3m above the site. Therefore, the site is at potential residual flood risk from a breach of the canal system. This scenario must be investigated at the FRA stage including full consultation with the Canal & River Trust.

### 2.3.1 Flood risk from reservoirs

The EA's Reservoir Flood Maps (RFM) (2021) show where water may go in the unlikely event of a reservoir or dam failure. 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.

## 2.4 Historic flood incidents

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

## 2.5 Flood warning and access and escape routes

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

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

Safe access and escape should be possible via Jackdaw Road to the west of the site.

## 2.6 Observations, mitigation options and site suitability - fluvial

- The site is wholly located within Flood Zone 1.
- The residual risk of flooding to the site as a result of a breach or overtopping of the Leeds Liverpool Canal should be fully investigated. Modelling may be required to inform on risk. Consultation will be required with the Canal & River Trust.

## 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 very low. Approximately 3% of the site is within the high risk surface water flood zone, as shown in Table 3-1. A further 3% of the site is at medium risk and a further 11% of the site is at low risk.

The area at risk in the high risk event is mainly confined to a distinct flow path along the western boundary of the site, and an area of isolated ponding in a topographic low spot within the north of the site. This is consistent with the medium risk event, however with a few additional areas of ponding scattered across the site. In the low risk event, the area of ponding within the north of the site develops into a significant flow path extending through the site.

Greatest flood depths in the high risk event range between 0.9 and 1.2 m (Figure 3-1) with some areas of significant hazard (Figure 3-2), located along the flow path in the west of the site. Safe access and escape routes should be possible via Jackdaw Road to the west of the site in the high and medium risk events. Safe access and escape routes may be challenging to achieve in the extreme low risk event.

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

Very low risk (%)	Low risk (%)	Medium risk (%)	High risk (%)
83	11	3	3

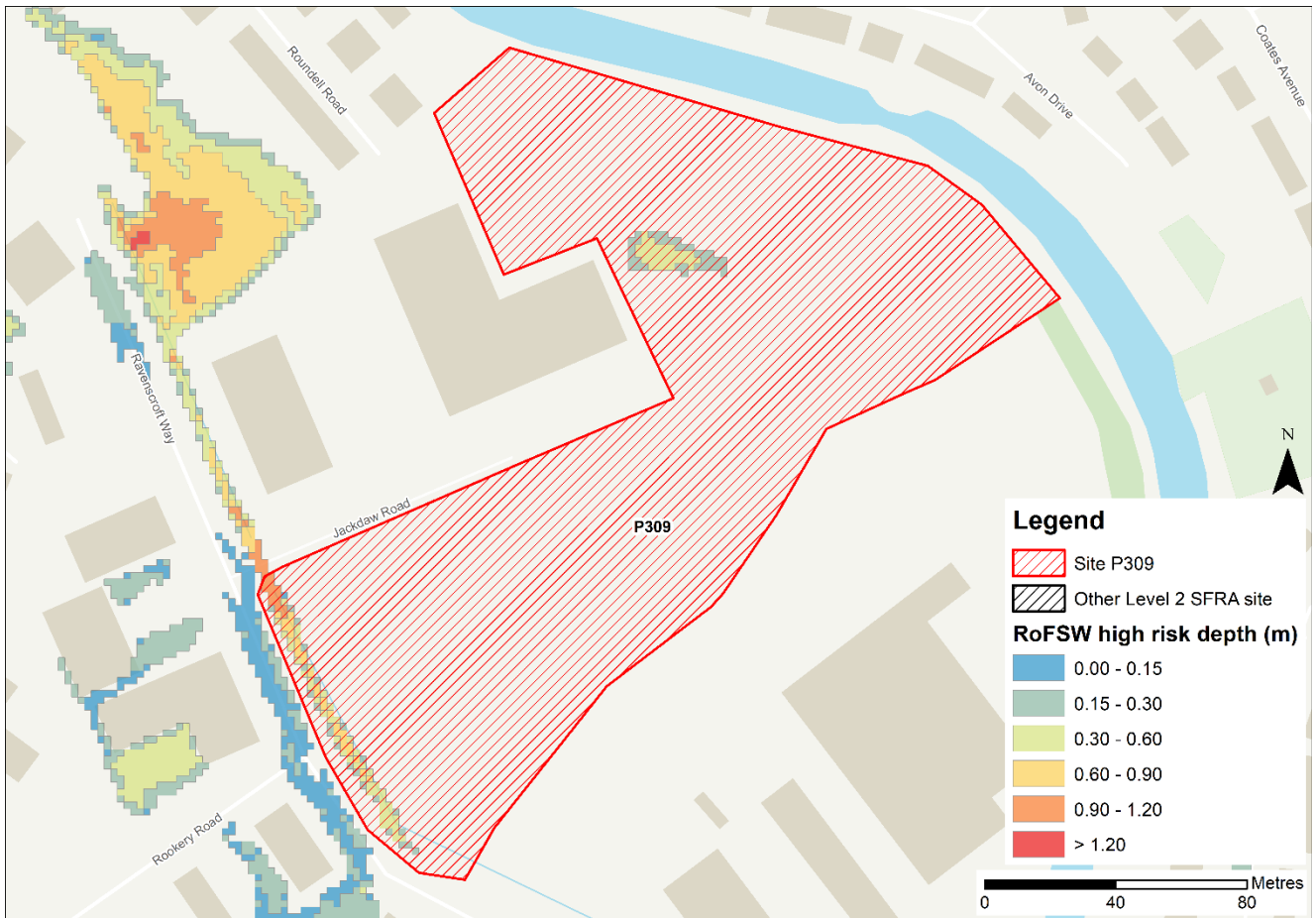


Figure 3-1: high risk event surface water flood depths (Risk of Flooding from Surface Water map)

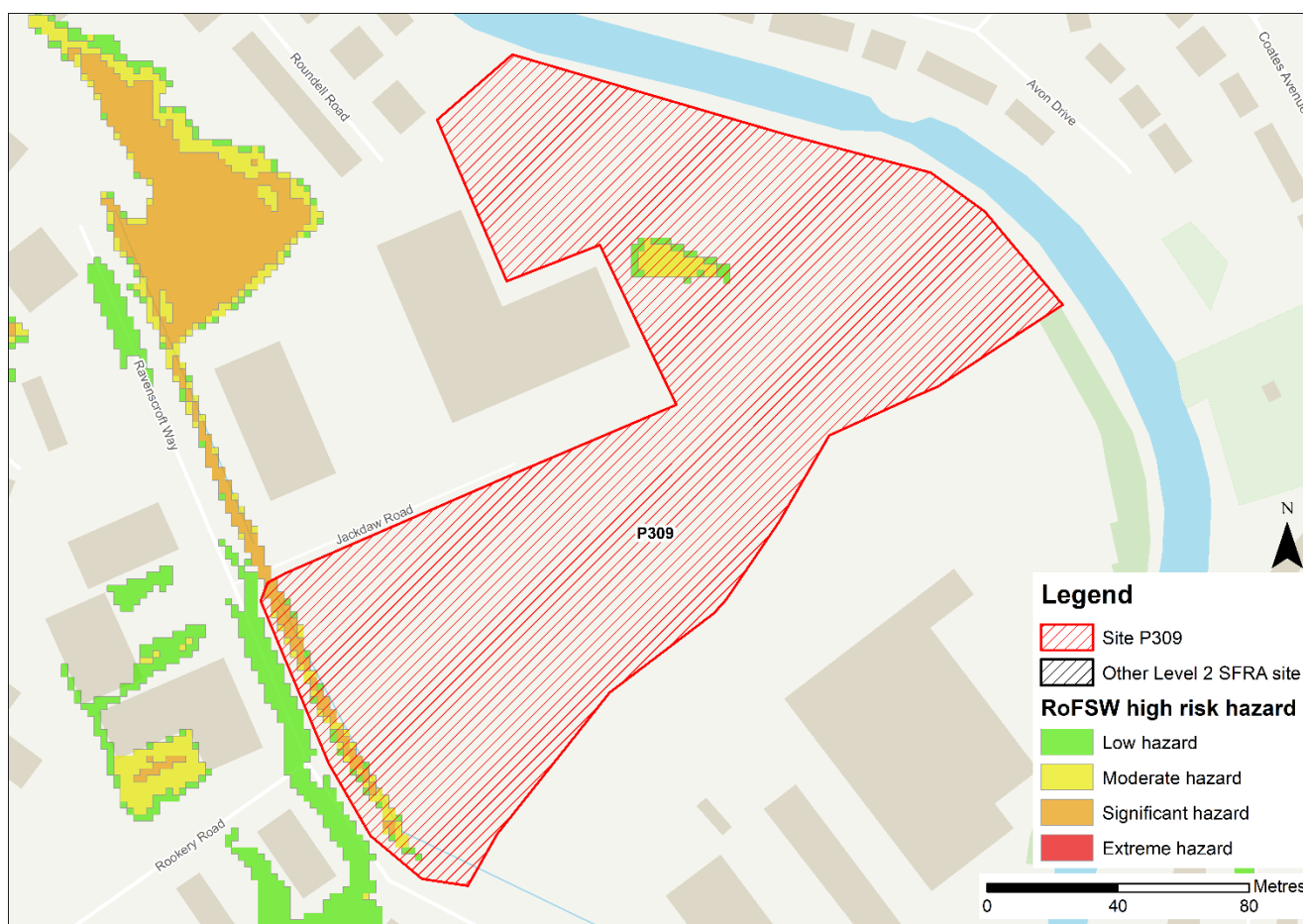


Figure 3-2: high risk event surface water flood hazard<sup>1</sup> (Risk of Flooding from Surface Water map)

### 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%	30%	40%
1%	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 > 1.2m with some areas of

<sup>1</sup> 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

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

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

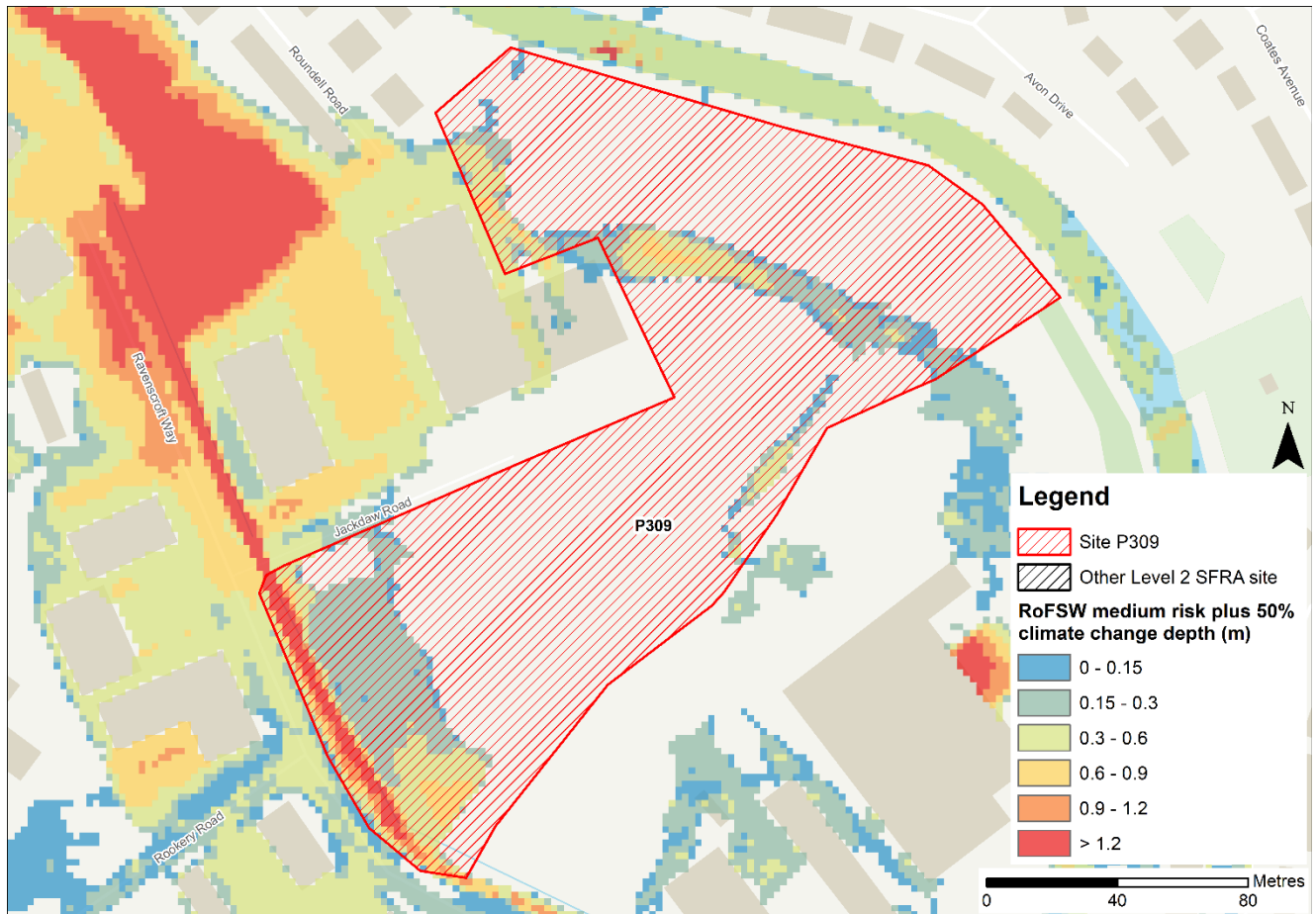


Figure 3-3: medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

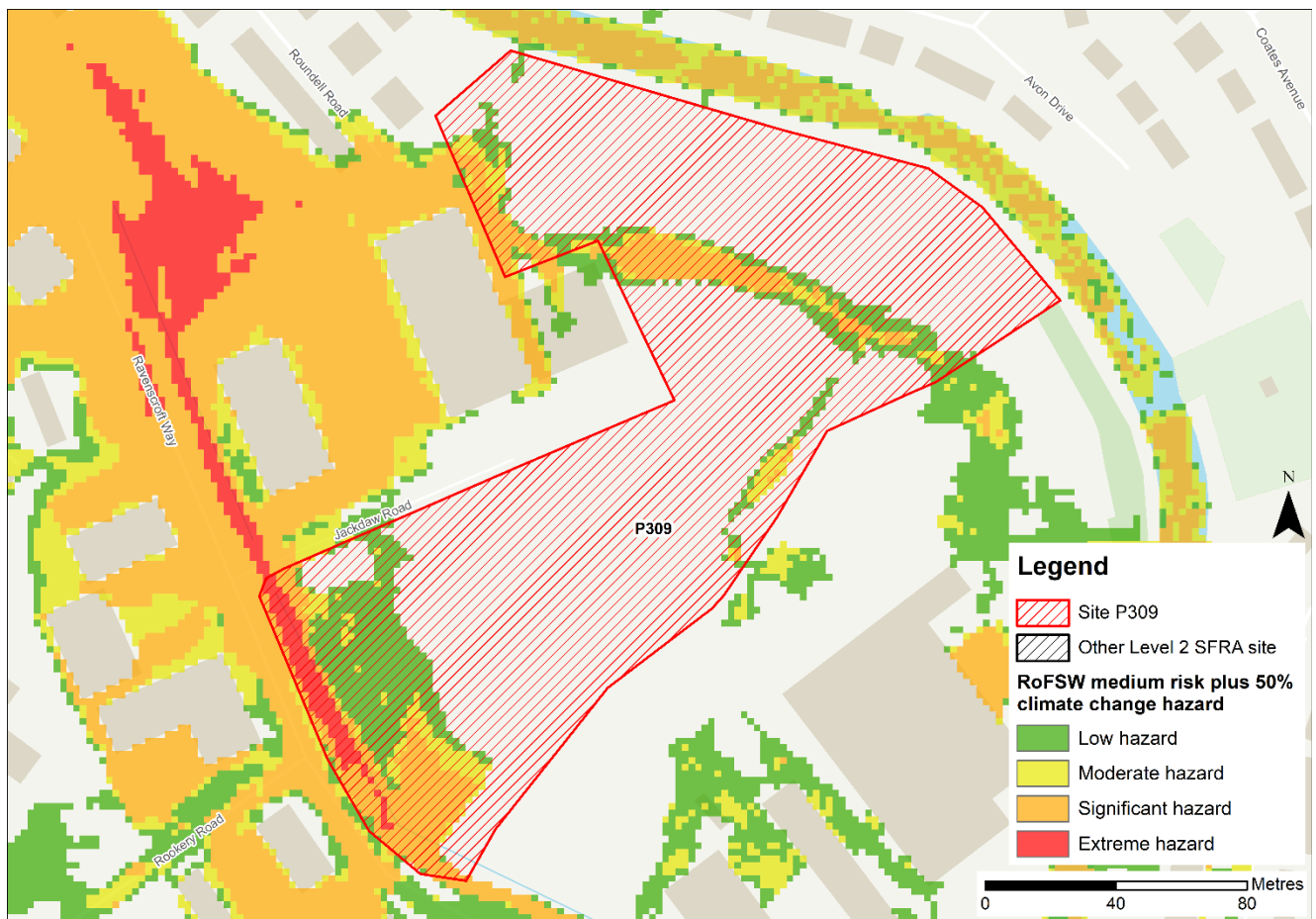


Figure 3-4: medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

### 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. Safe access and escape routes may be challenging to achieve in the extreme low risk event. Any existing flow paths should be maintained 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.
- 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<sup>2</sup>. Figure 4-1 show the map for the site and the surrounding areas and Table 4-1 explains the risk classifications.

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

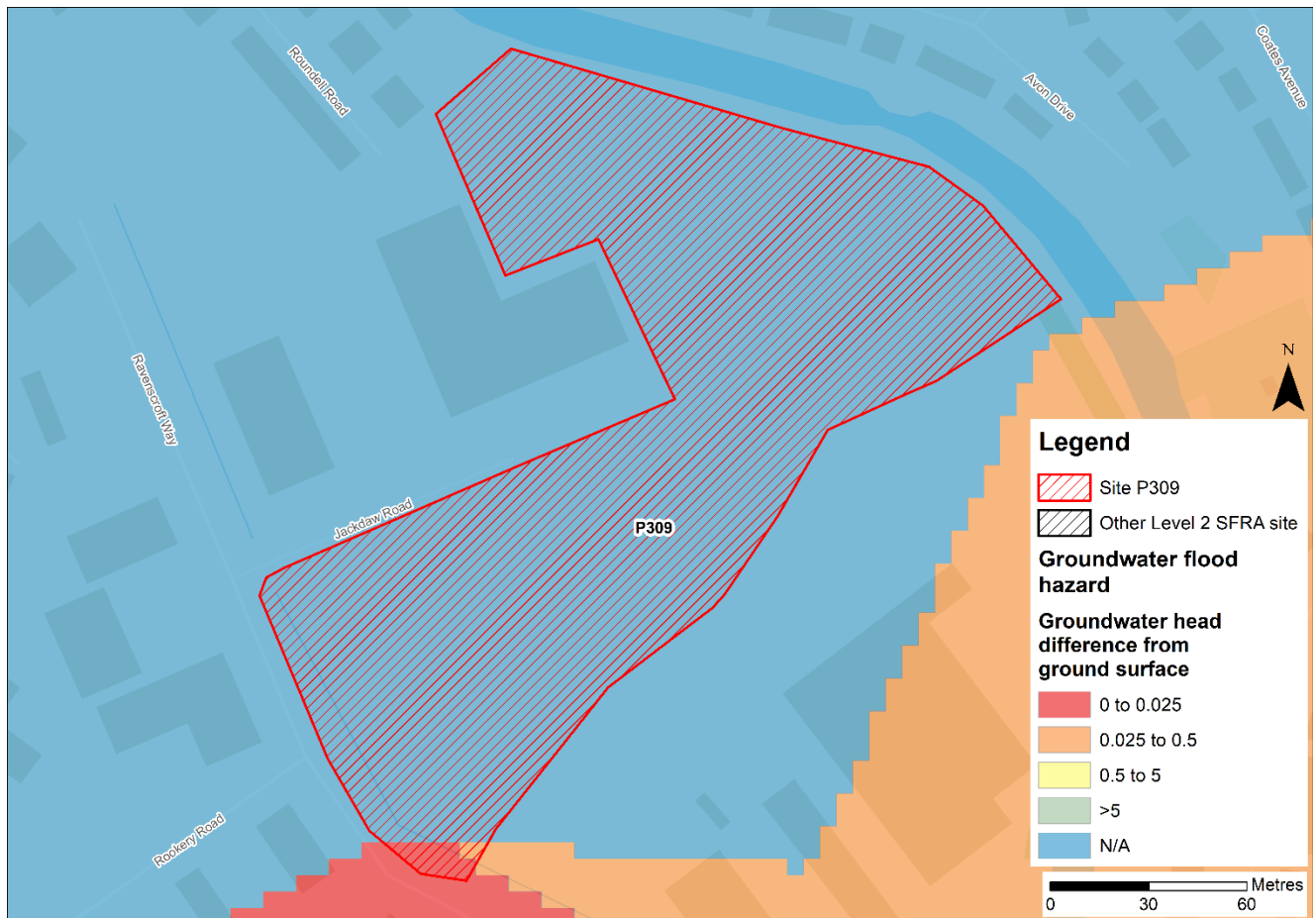


Figure 4-1: JBA 5m Groundwater Flood Map

<sup>2</sup> [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<sup>3</sup>, it must be proven that the development can be safe for its lifetime, which is 75 years for non-residential development, taking account of the vulnerability of its users, without increasing risk elsewhere, and, where possible, will reduce flood risk overall.

- This site is not required to pass the exception test as it is proposed for less vulnerable uses. 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:

- It should be appropriate to develop this site for less vulnerable purposes given its location in Flood Zone 1.
- However, there is significant risk from surface water in the longer term. A detailed drainage strategy will be required to ensure there is no increase in surface water flood risk elsewhere as a result of new development. Surface water 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 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 surface water flood risk including a drainage strategy which should include ground investigation for infiltration SuDS suitability.
- Any FRA must investigate potential residual risk from the canal.
- 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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<sup>3</sup> Para 164 National Planning Policy Framework 2023

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