# Pendle Level 2 Strategic Flood Risk Assessment - Site P060

## Draft

**September 2024**

**Prepared for:**
**Pendle Borough Council**

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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.

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## Acknowledgements

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


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## List of Tables

# 1 Background

This is a Level 2 Strategic Flood Risk Assessment (SFRA) site screening report for Pendle Borough Council Site P060. 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 P060

- Location: Former Mansfield High School
- Existing site use: Brownfield
- Existing site use vulnerability: less vulnerable
- Proposed site use: Housing
- Proposed site use vulnerability: More vulnerable
- Site area: 1.5 ha
- Proposed development impermeable area:  1.3 (assumed as 85% of site area)
- EA model: Edge End Brook 2021
- Watercourse: Edge End Brook
- Summary of requirements from scoping stage:
    - Level 1 SFRA recommendation was for more detailed assessment through Level 2 SFRA
    - Assess modelled fluvial depths and hazards
    - Assess surface water depths and hazards
    - Climate change proxy assessment

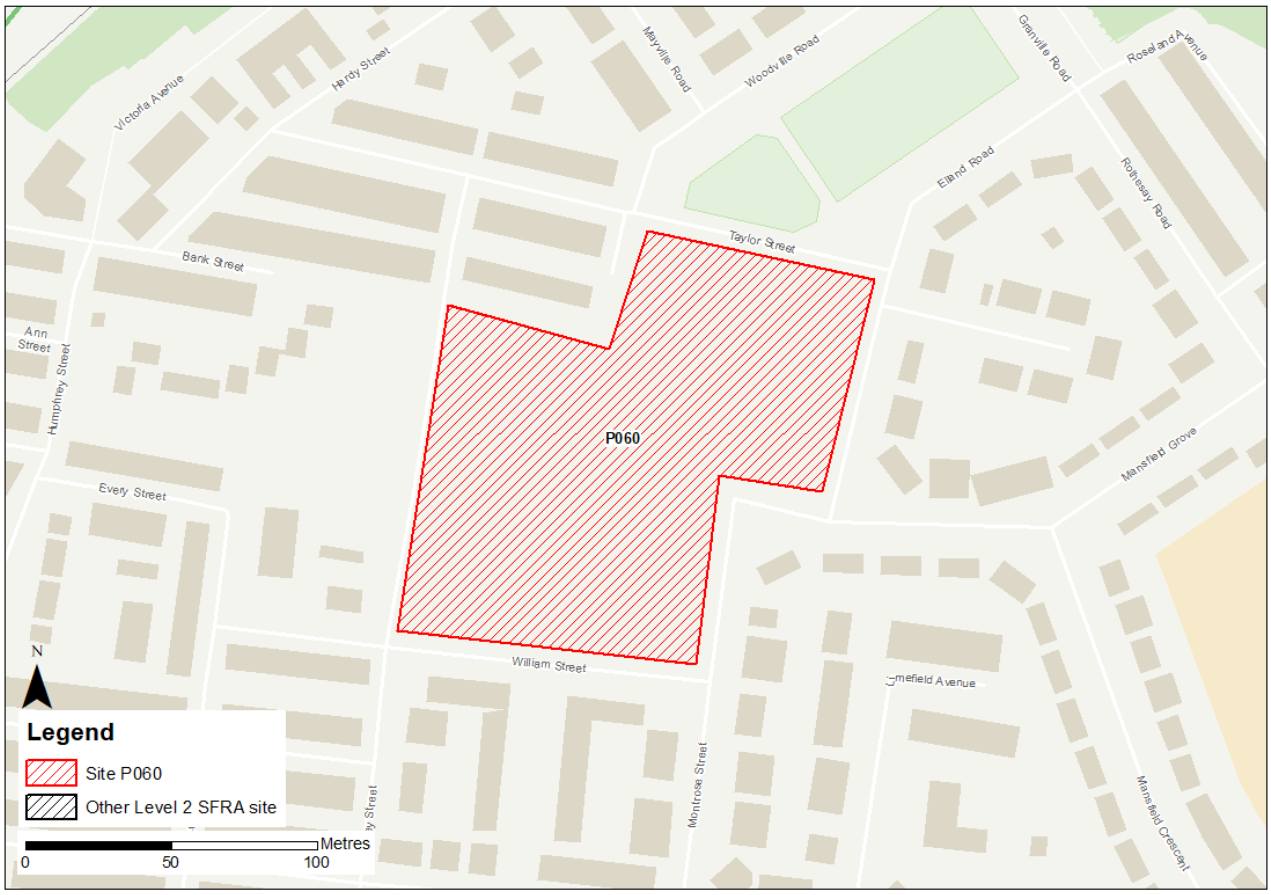


Figure 1-1: existing site location boundary

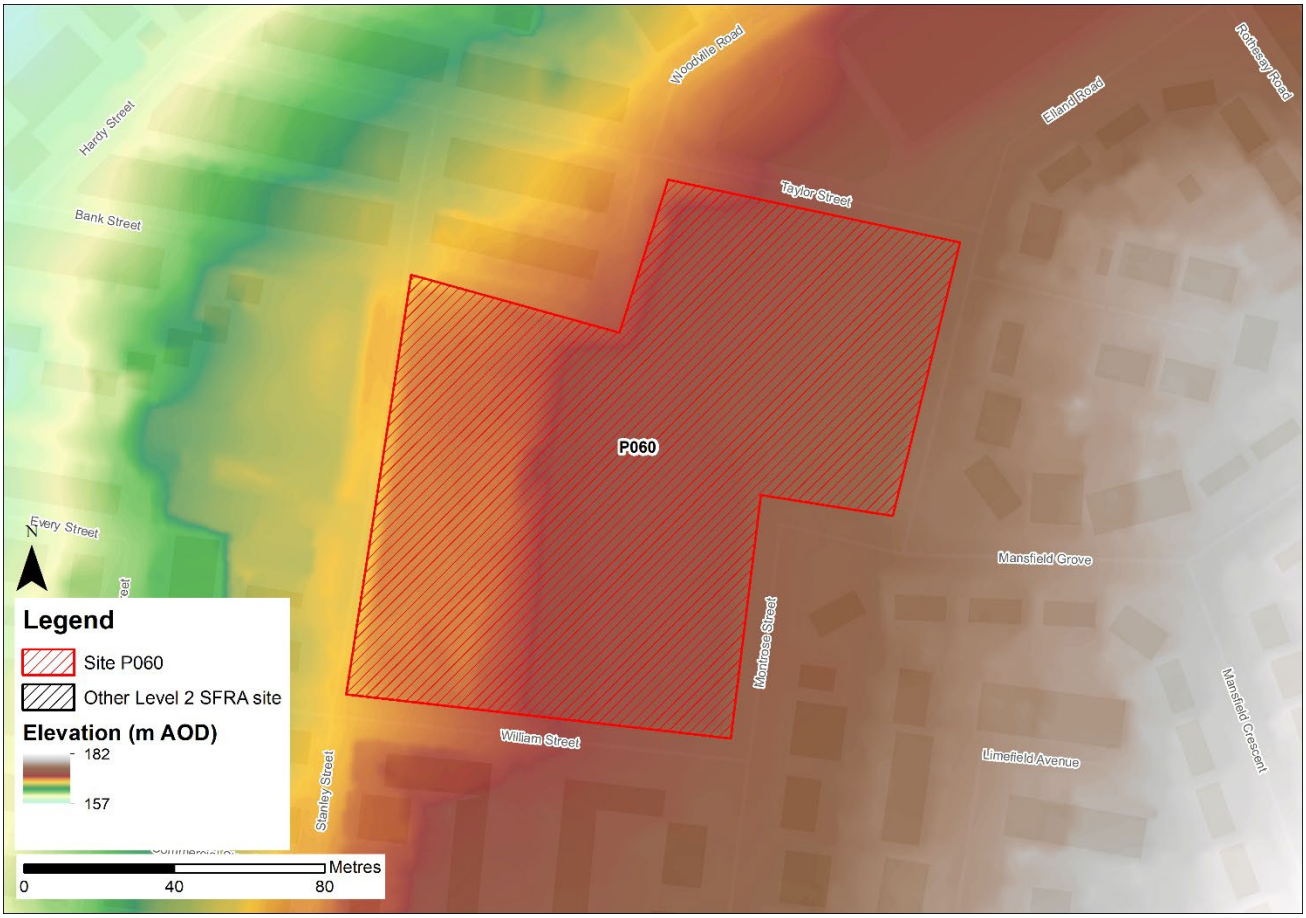


Figure 1-2: topography

# 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 2.2) or the impacts of climate change. The site is wholly located within Flood Zone 1 and is unlikely to be at any additional risk from rivers due to the impacts of climate change.

Table 2-1: existing fluvial flood risk

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

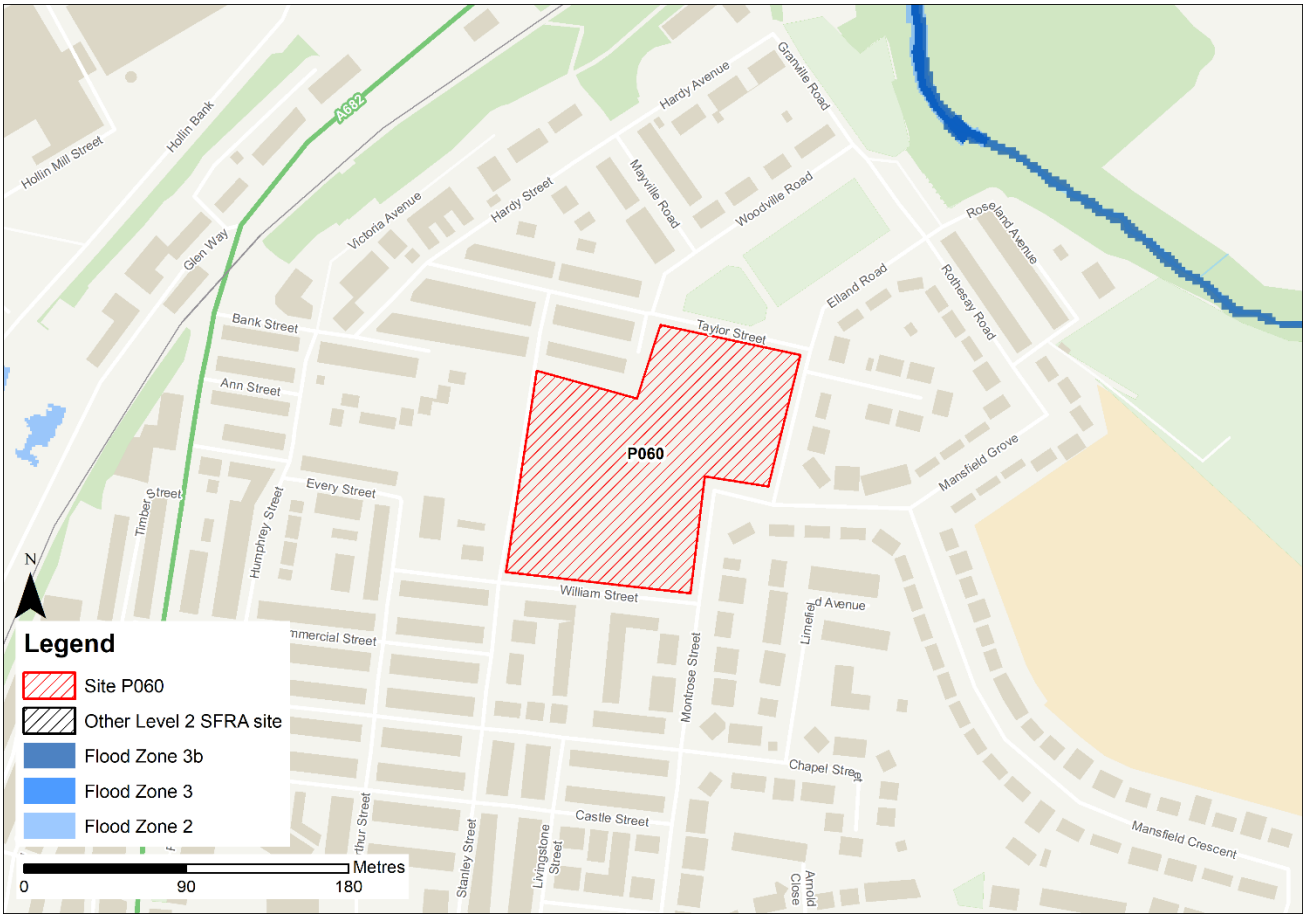


Figure 2-1: existing risk from rivers to the site

## 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. There are not any applicable areas that could benefit this site.

## 2.3 Residual risk

### 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

EA's Historic Flood Map (HFM) and Recorded Flood Outlines (RFO) datasets have been considered. There are no recorded historic flood events within the vicinity of the site.

## 2.5 Flood warning and access and escape routes

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

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 not located within a FAA.

Safe access and escape should be possible via Stanley Street to the west of the site.

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

- The site is wholly located within Flood Zone 1.

# 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 1% of the site is within the high risk surface water flood zone, as shown in Table 3-1. A further 10% of the is at low risk.

The area at risk in the high risk event is confined to an area of isolated ponding in a topographic low spot within the centre of the site. This is consistent with the medium risk event. In the low risk event, the area of ponding within the centre of the site develops into a significant flow path extending through 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 Stanley Street to the west of the site in the high and medium risk events. Stanley Street becomes inundated in the low risk event, therefore safe access and escape should be possible via William Street to the south.

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

| Very low risk (%) | Low risk (%) | Medium risk (%) | High risk (%) |
|---|---|---|---|
| 89 | 10 | 0 | 1 |


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

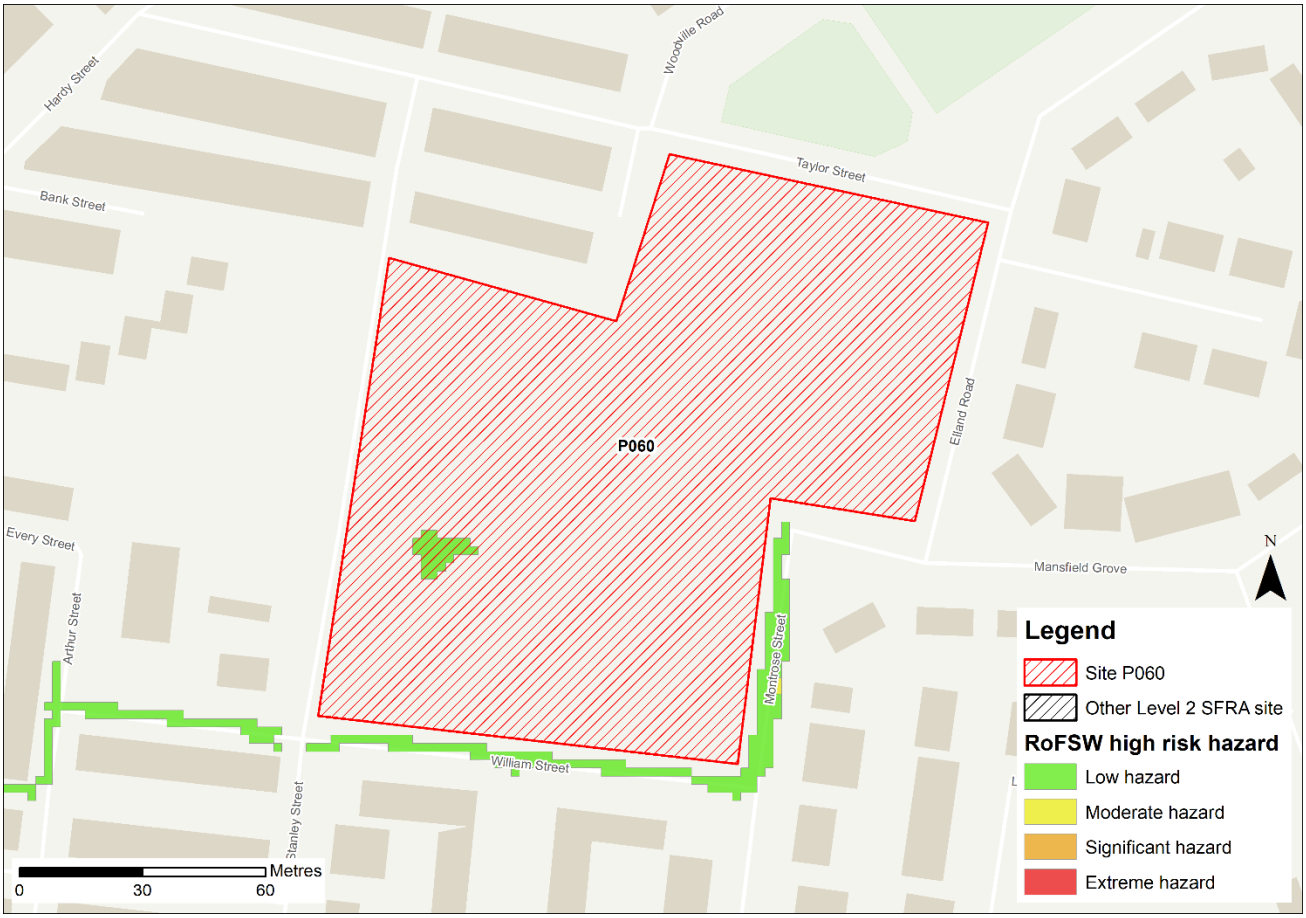


Figure 3-2: high risk event surface water flood hazard[1] (Risk of Flooding from Surface Water map)

## 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

1 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 significant hazard (Figure 3-4). Safe access and escape routes should be achievable via William Street to the south, given the low depths and hazards along this route.

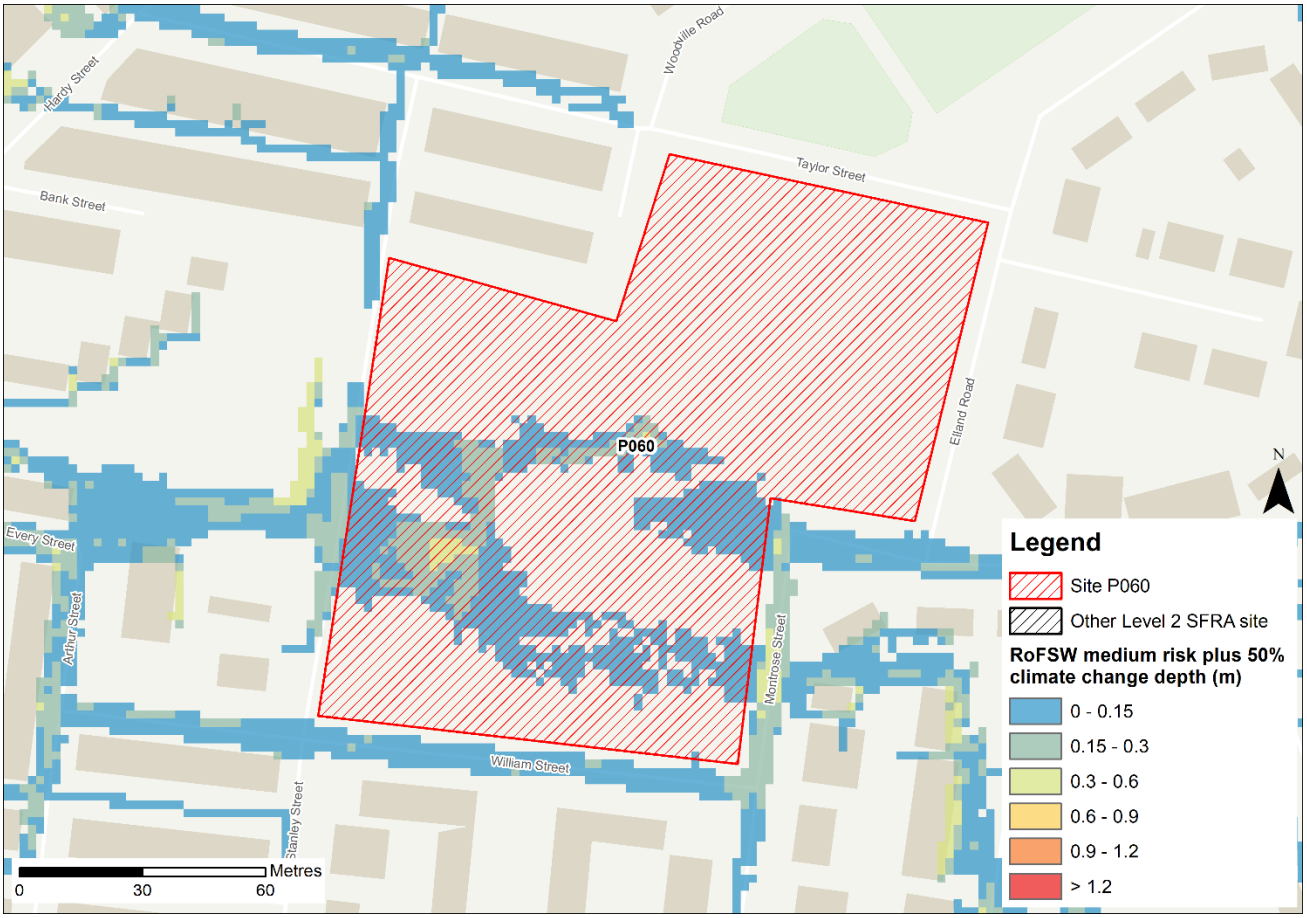


Figure 3-3: medium risk event surface water flood depths plus 50% climate change (based on Risk of Flooding from Surface Water map)

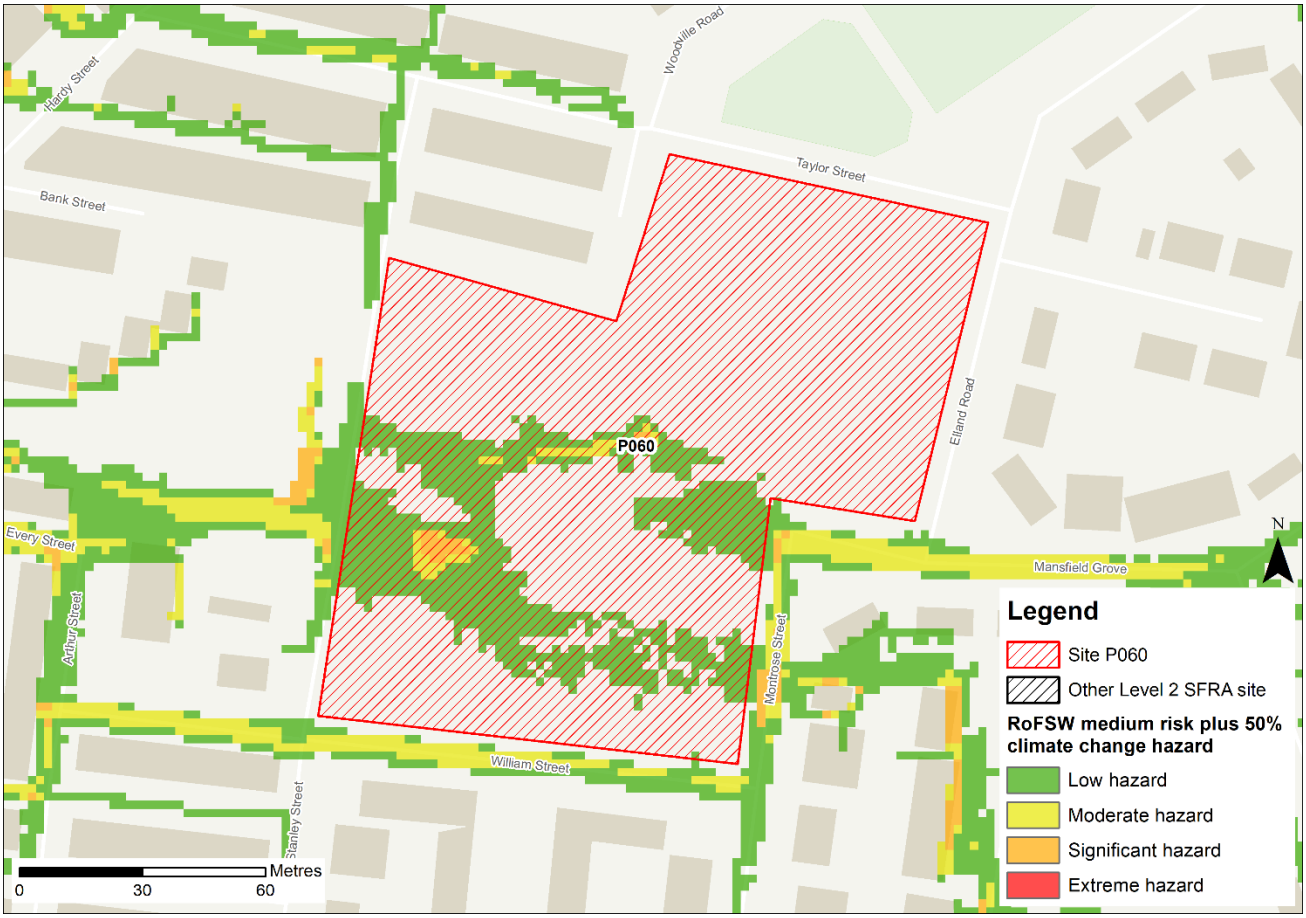


Figure 3-4: medium risk event surface water flood hazards plus 50% climate change (based on Risk of Flooding from Surface Water map)

## 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 small area of ponding within the centre of the site in the high and medium risk events. Safe access and escape routes are likely to be achievable in all present day events.
- The modelled climate change outputs indicate increased surface water flood risk to the site in the medium risk event. Safe access and escape routes should remain achievable via William Street to the south.
- 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[2]. 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

2 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.<br>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.<br>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<br>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.<br>Flooding from groundwater is not likely. |
| N/A | No risk.<br>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[3], 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 wholly located within Flood Zone 1 and is not shown to be at risk from climate change based on the proxies used.

## 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 more vulnerable purposes given its location in Flood Zone 1 and at low additional risk in the long term.
- However, there is significantly greater surface water flood risk to the site in the long term, though depths and hazards across the majority of the site remain low.
- This risk should be reviewed as part of a detailed drainage strategy for the site 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.

## 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 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.

3 Para 164 National Planning Policy Framework 2023

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