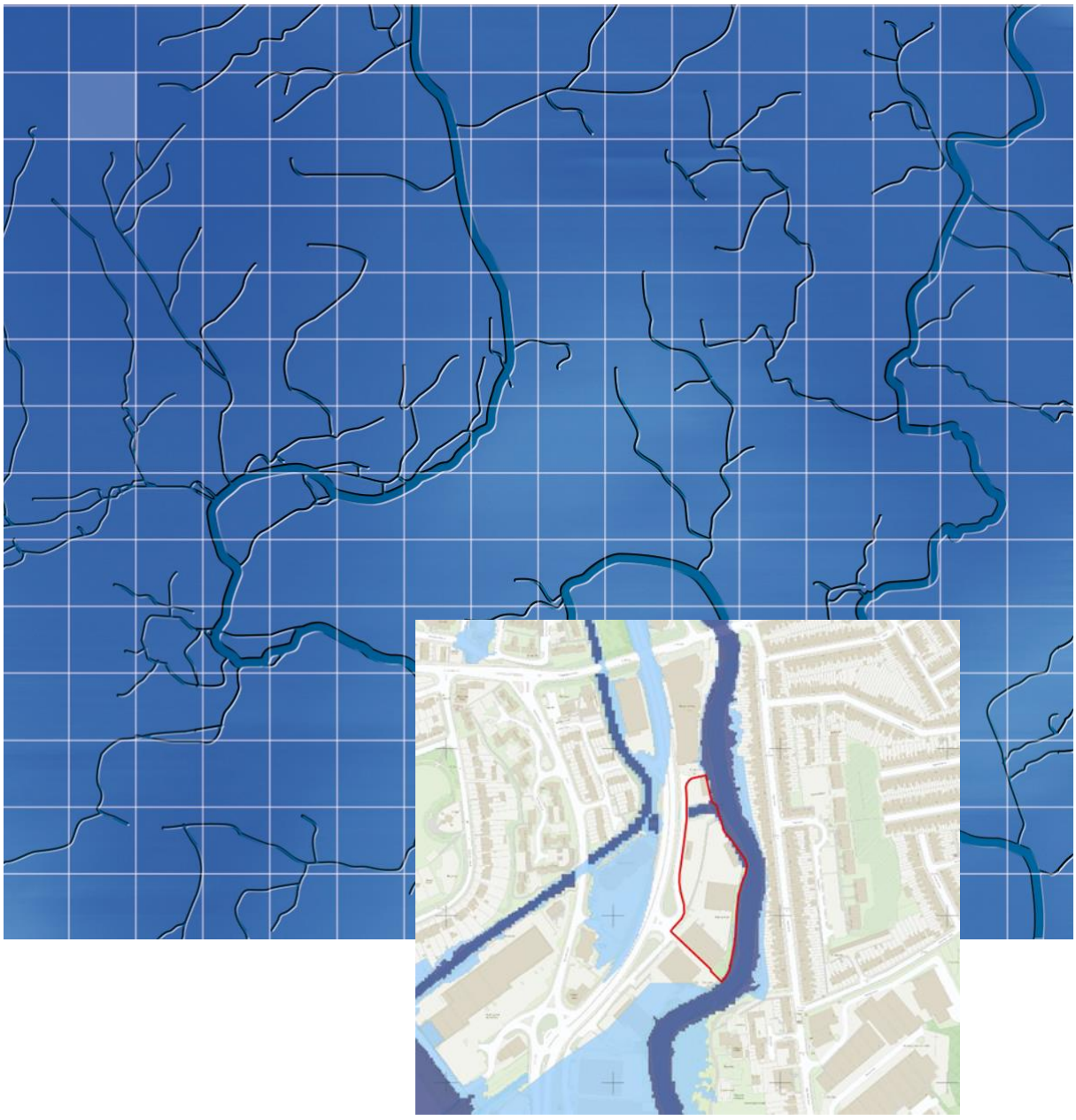
Reading Borough Council

May 2025

# Pulleyn Park (SR4a)

## Level 2 Strategic Flood Risk Assessment



# Reading Borough Council

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## Document issue details

WHS10135

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For and on behalf of Wallingford HydroSolutions Ltd.



The WHS Quality & Environmental Management system is certified as meeting the requirements of ISO 9001:2015 and ISO 14001:2015 providing environmental consultancy (including monitoring and surveying), the development of hydrological software and associated training.

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# Pulleyn Park (SR4a) Level 2 SFRA
# Flood Risk Overview

| | |
|---|---|
| **Fluvial Flood Risk** | **L** |
| **Pluvial Flood Risk** | **L** |
| **Other Sources of Flood Risk** | **L** |
| **Confidence in Assessment** | **M** |

## Flood Risk

Fluvial flood risk represents the greatest risk at the site with the River Kennet adjacent to the site. However, flood extents are mostly limited to the river channel with the majority of the site in Flood Zone 1.

In the location of the site the latest Flood Map for Planning is based on national scale modelling. However, the River Kennet model (Tyle Mill to Thames Confluence) (2018) which informed the previous flood map was assessed to attain further detail on fluvial flooding. Whilst it shows significant flood depths and velocities at the site, these are mostly limited to the river channel and effect a very small proportion of the site. In this respect fluvial flood risk is considered to be low.

It should be noted that pluvial flooding shows a similar proportion of the site to be inundated as fluvial flooding. Like fluvial flooding the risk is considered to be low.

The risk from other sources of flooding is considered to be moderate.

The overall confidence in the assessment is moderate. Whilst detailed modelling is available it does not inform the latest national scale mapping.

## Conclusions and Recommendations

The development proposed is categorised as *More Vulnerable Development,* which is permissible in Flood Zone 2, but needs to pass the Exception Test to justify development in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Only a small proportion of the site is located in Flood Zone 3a with the majority of its area falling in Flood Zone 1, surface water flood risk at the site is also limited. In this regard a residential development should be possible.

# Contents

# 1 Introduction

## 1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by Reading Borough Council (RBC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Pulleyn Park (SR4a) in accordance with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and associated guidance from the Environment Agency (EA).

Where there is a risk of flooding at the site, this risk has been quantified with the latest available datasets and any associated limitations with the assessment have been identified.

Where applicable, recommendations for improving our understanding of flood risk and/or mitigating the risk has also been included in this report.

## 1.2 Assessment of Flood Risk

For the site, a detailed assessment of the nature of flood hazard was undertaken. This included using the relevant fluvial modelling data to assess:

- The proportion of the site inundated for a range of return periods
- The speed of onset
- Flood depth
- Flood velocity
- Flood hazard

The sites were assessed against a range of return periods, however the design event, the 100-year (plus central climate change) event, was considered most important for planning purposes.

In addition to the analysis of modelling data, the location, standard and condition of existing flood defences was assessed. Other sources of flooding were also reviewed at each site. This included an assessment of surface water flooding and an assessment of groundwater flooding based on available hydrogeological information from BGS and Soilscapes. Potential access/egress routes were identified with respect to the risk posed from all sources of flooding.

Following a review of flood risk, flood defences and the identification of access/egress routes, an assessment was made on whether a future site-specific FRA would be able to show that the site can be allocated for development. The assessment takes into account the flood risk vulnerability of the development, the scale of development proposed along with any requirements for the Exception Test. In this context, any mitigative actions in the form of ground raising and compensatory storage are identified.

The site assessments also include guidance for the preparation of FRAs, including information about the use of SuDS.

## 1.3 Report Structure

This FRA follows the structure summarised below:

1 - Introduction (this section)

2 - Site Description

3 - Flood Risk

4 – Detailed Review of Primary Flood Risk

5 – Development Viability and FRA Recommendations

# 2 Site Description

## 2.1 General Location Plan

The Pulleyn Park (SR4a) site is 1.29ha and is located directly adjacent to both the River Kennet and the A33, the current land use is car dealerships. It is located in a suburban area in south Reading, see Figure 1.

In the Replacement Local Development Plan (RLDP) this site is proposed to be used for residential use. The RLDP states an indicative potential for 80-120 dwellings.

## 2.2 Topography

Based on 1m LiDAR data, the site is relatively flat. The ground levels within the site boundary range from 37.0 to 39.8m AOD, see Figure 2. The average ground level is 39.2m AOD.

## 2.3 Nearby Watercourses

The site is located directly adjacent to the River Kennet. The River Kennet runs from south to north at this location. The Holy Brook is also situated 60m to the west of the site boundary, it also runs from the south to the north. There is also an unnamed watercourse running through the site, connecting the Holy Brook to the River Kennet, this watercourse thought to be a sluice. Figure 1 shows the location of the watercourses near to the site.

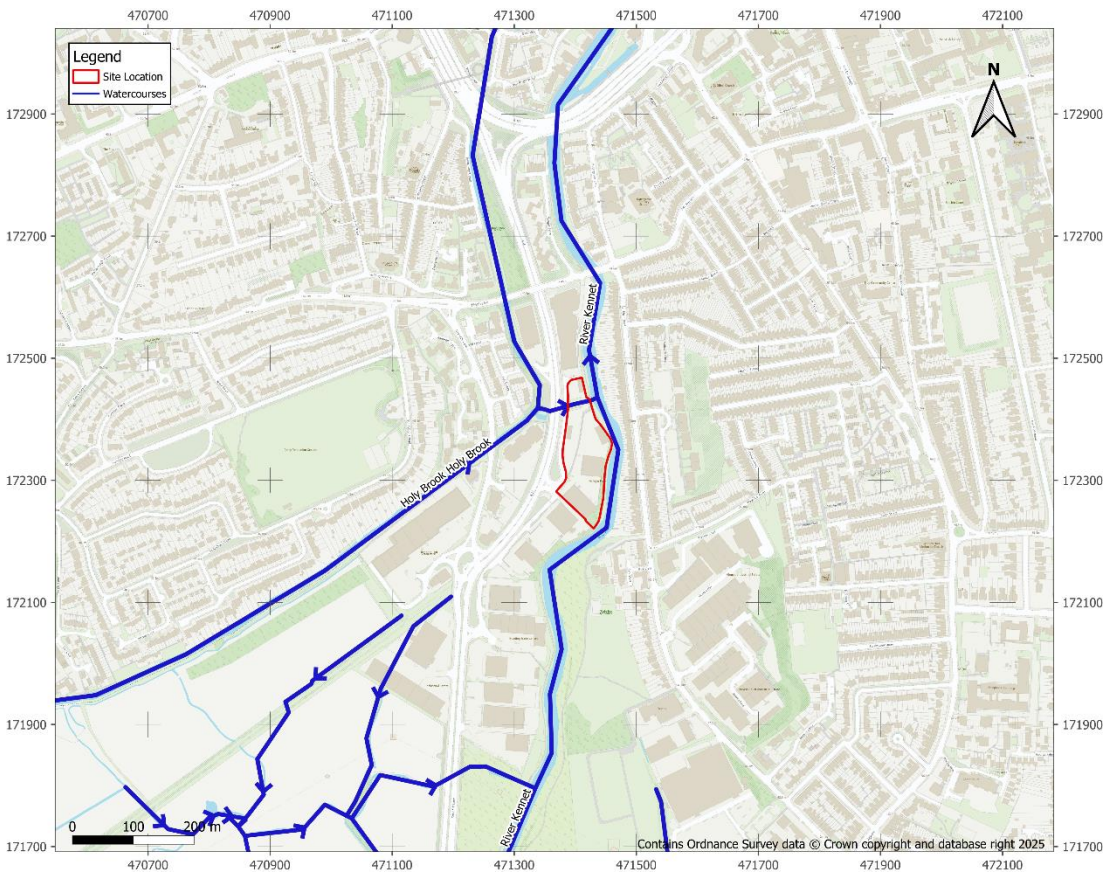


Figure 1 - Site Location

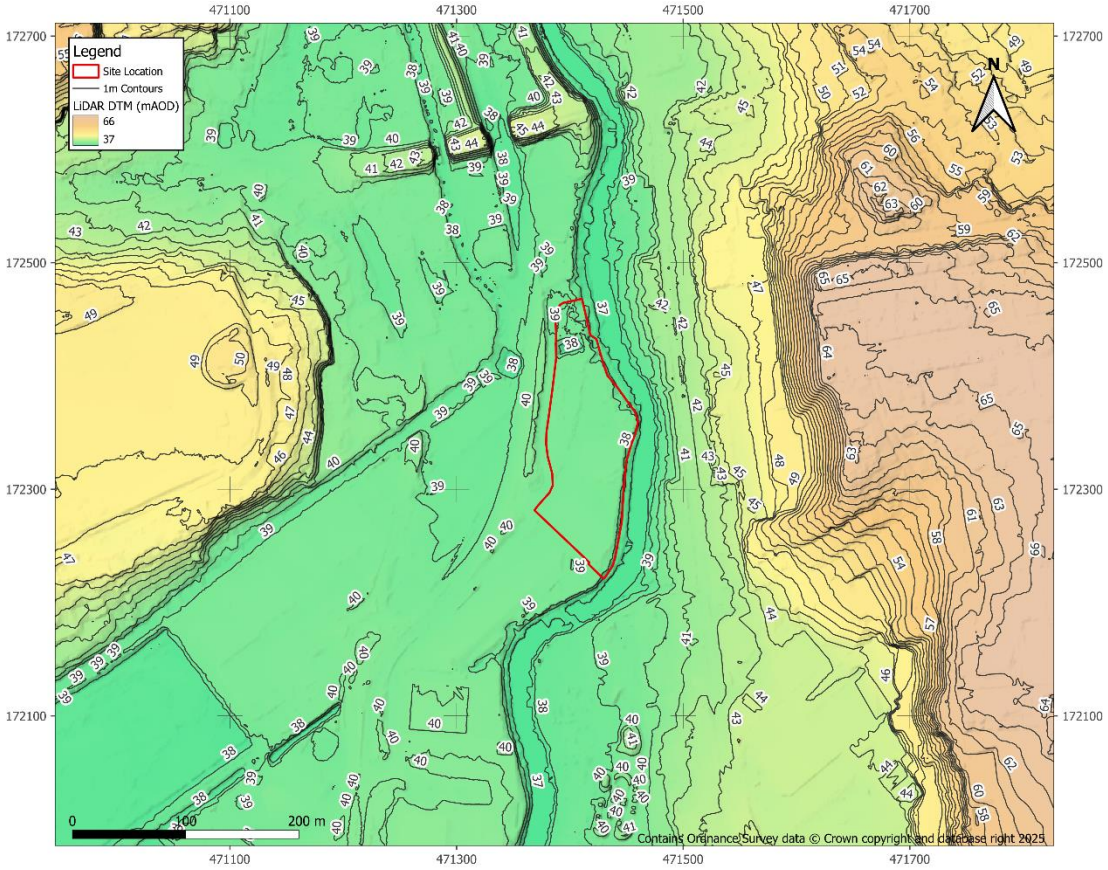


Figure 2 - Topography

# 3 Flood Risk

## 3.1 Historical Flooding

The EA has no records of historic flooding at the site. The closest historical event occurred 15m to the east of the site boundary in January 2003. It was associated with the River Kennet.

## 3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 8% of the site is located within Flood Zone 2, with 6% of the site located in Flood Zone 3a. These proportions are based on the latest national scale modelling, rather than the River Kennet (Tyle Mill to Thames Confluence) (2018) model which informed the previous iteration of the FMfP and the level 1 SFRA for Reading Borough completed in November 2024.

Viewing the 2018 model results when compared to the latest national scale modelling, similar extents were generated for Flood Zone 2 and Flood Zone 3a. The model also has results for the 3.3% AEP event, equivalent to Flood Zone 3b, these show 4% of the site to be inundated during this event. All flooding at this site is located in the north of the site and is associated with the River Kennet and the watercourse connecting the Kennet to the Holy Brook, see Figure 3.

The EA climate change fluvial outputs for Flood Zone 2 and 3 have also been assessed, with the proportion of the site located within Flood Zone 2 increasing to 10% and the proportion of the site located in Flood Zone 3a remaining the same, see Figure 4.

Overall, fluvial flood risk is considered to be low.

## 3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

## 3.4 Surface Water Flood Risk

The EA's surface water flood maps show minimal risk from surface water flooding, 1% of the site is inundated during a 3.3% AEP event, 4% is inundated during a 1.0% AEP event, and 6% is inundated during a 0.1% AEP event, see Figure 5.

When considering the effects of climate change, the proportion of the site at risk for each event increases to 3%, 5%, and 9% respectively. Overall, the surface water flood risk to the site is low. It is assessed in more detail in section 4.

## 3.5 Groundwater Flooding

The site is underlain by a bedrock of chalk in the form of the Seaford Chalk formation and the Newhaven Chalk formation. Both formations are expected to permit high amounts of infiltration. Superficial deposits of Alluvium are also present at this site, these are also expected to be freely draining. The underlying soils are loamy and clayey floodplain soils with naturally high groundwater which are also expected to be freely draining.

Based on the data available the water table at the site could be mobile, translating to a moderate risk of groundwater flooding. More data is required at the planning stage to confirm this. However, given the site's location directly adjacent to a river, groundwater flooding is likely to be heavily correlated with fluvial flooding.

## 3.6 Reservoir Flood Risk

The FMfP shows that there is no risk from reservoir flooding during either the wet day or dry day scenarios, see Figure 7. The nearest area at risk of reservoir flooding is approximately 900m northeast of the site boundary.

## 3.7 Flood Warning Service

The site is partially located within the River Kennet at the Burghfield, Southcote, Coley and Holybrook areas EA Flood Warning Area.

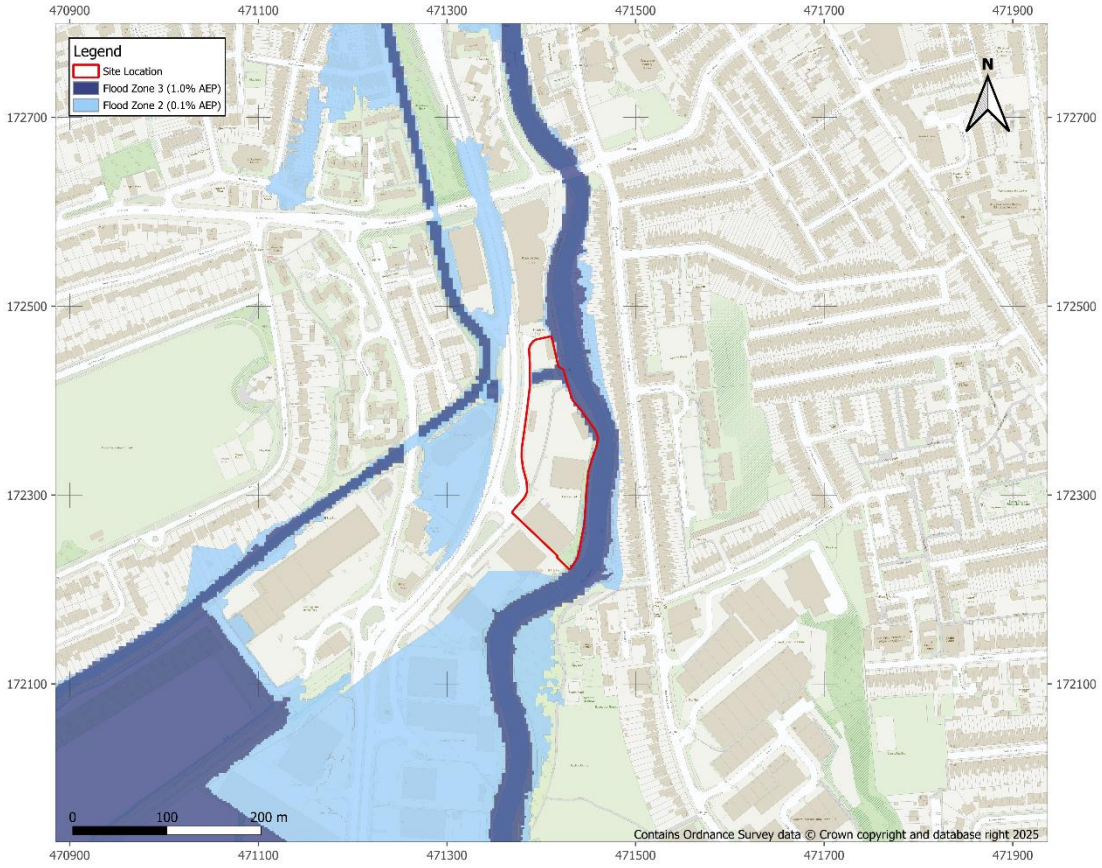


Figure 3 - Fluvial Flood Map

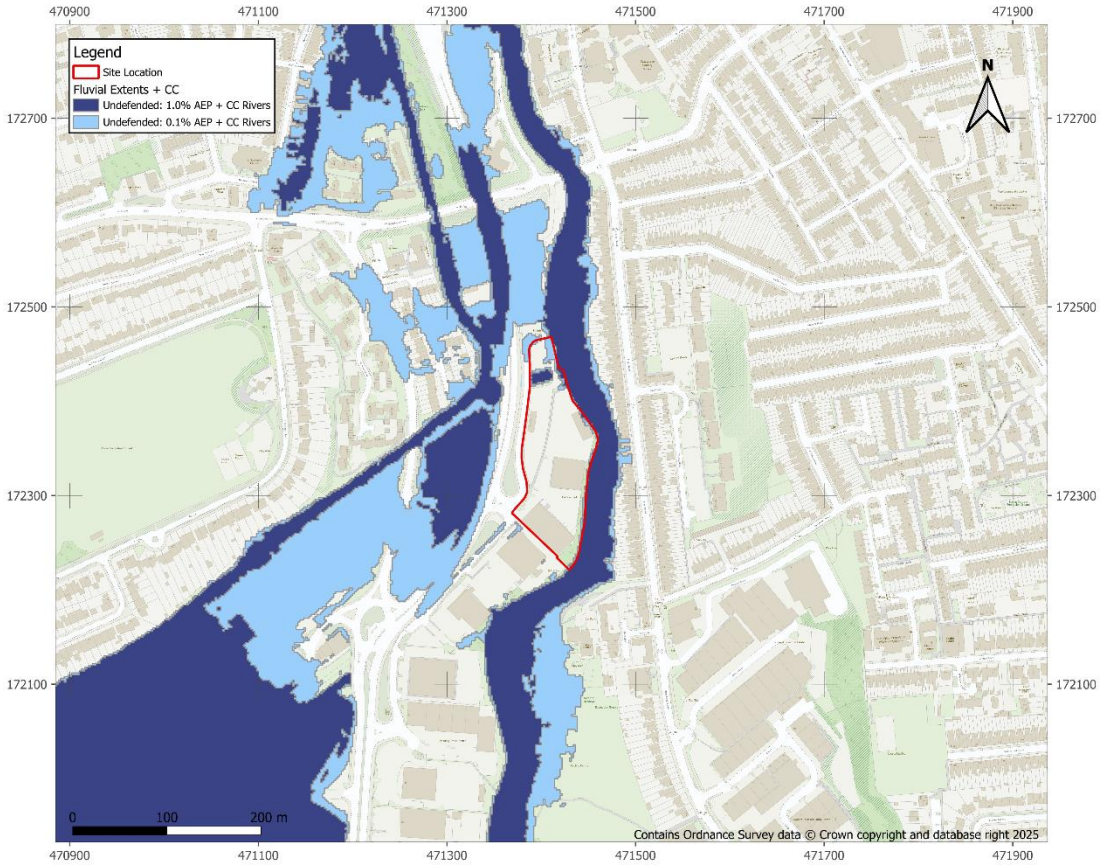


Figure 4 – Fluvial Climate Change Flood Map

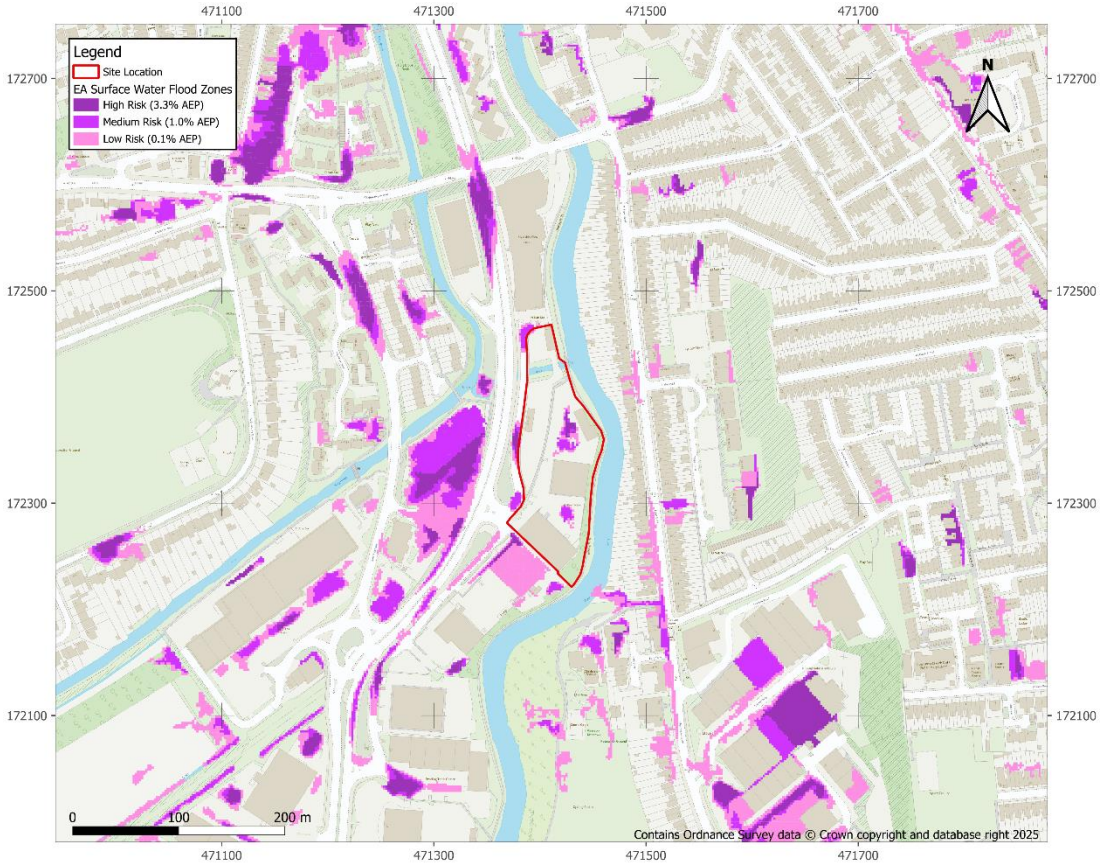


Figure 5 – Surface Water Flood Map

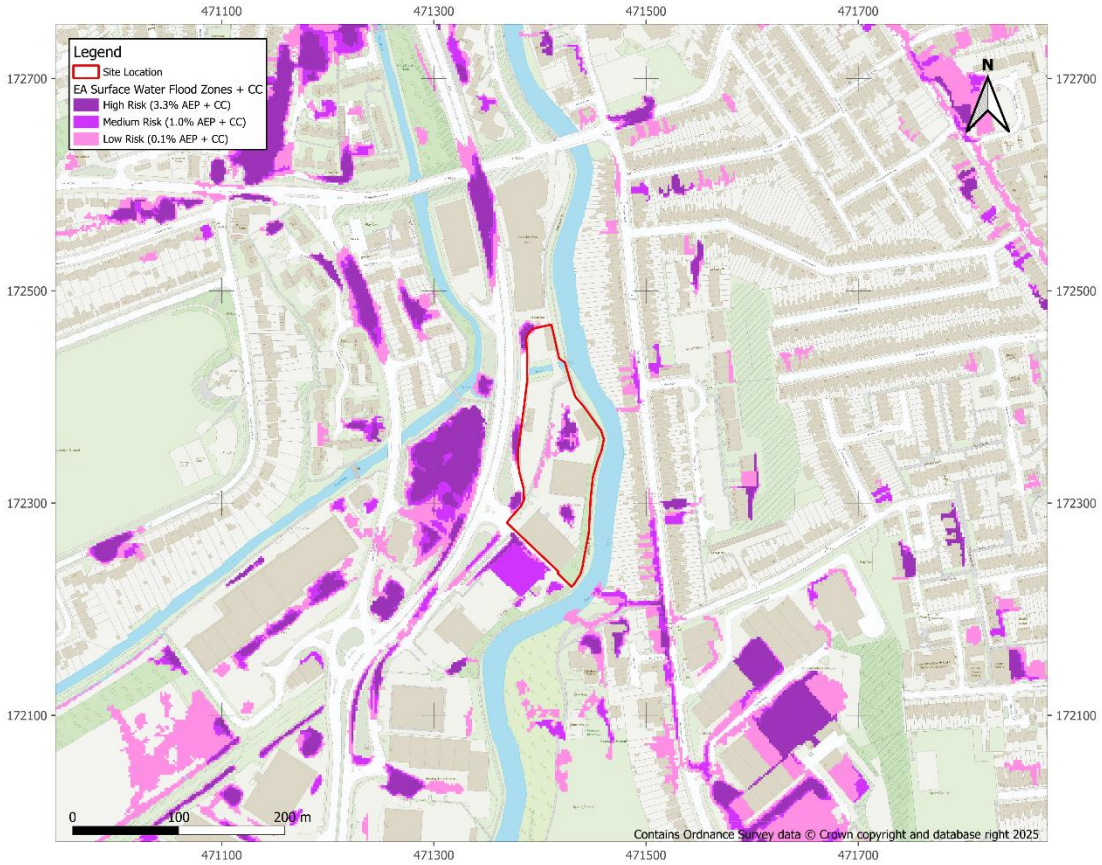


Figure 6 -Surface Water Climate Change Flood Map

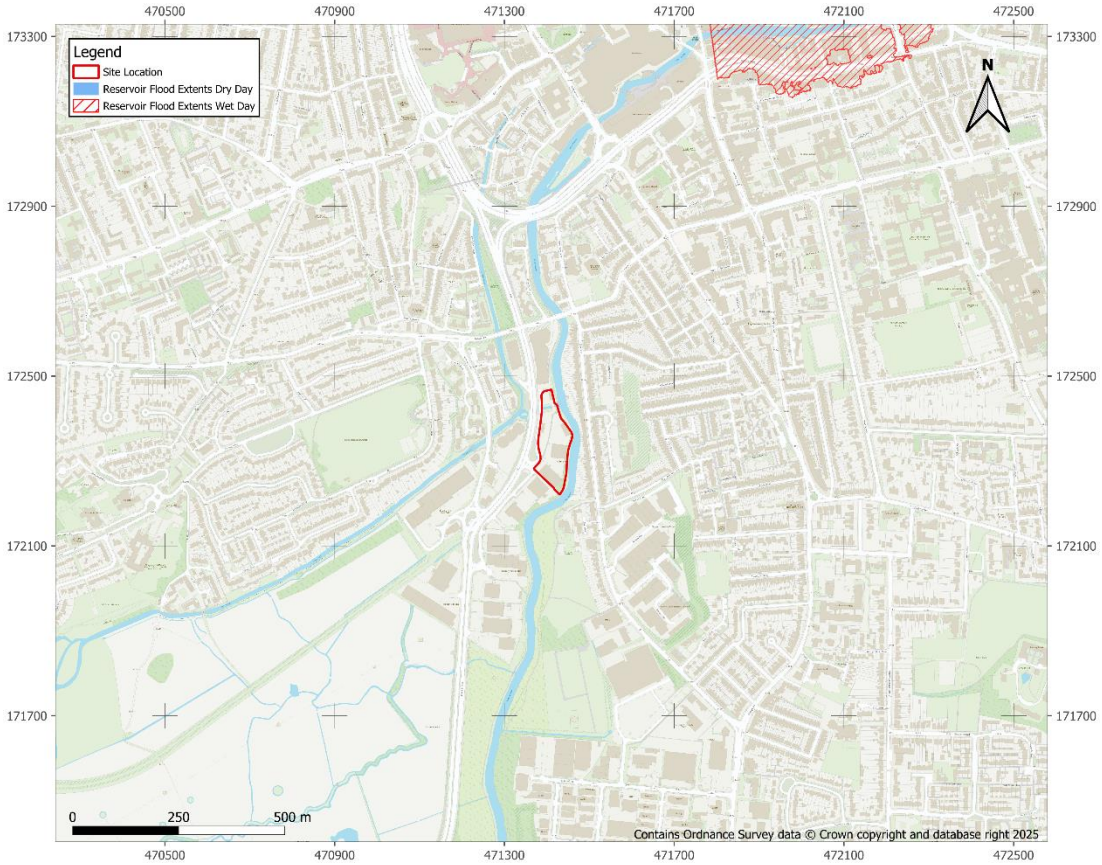


Figure 7 - Reservoir Failure Flood Map

# 4 Detailed Review of Primary Flood Risk

## 4.1 Primary Flood Risk

Fluvial flooding is considered to be the primary flood risk mechanism at the site given its proximity to the River Kennet and the unnamed watercourse that runs through the north of the site. However, it should be noted that pluvial flooding inundates a similar proportion fo the site. The risk from both is considered to be low, however as precautionary approach both fluvial and pluvial flooding are assessed in more detail below.

## 4.2 Flood Risk Metrics

The national scale modelling does not provide details on flood depths, velocities, hazard or speed of onset. Therefore, the River Kennet model (Tyle Mill to Thames Confluence) (2018) was assessed to attain further detail on fluvial flooding.

For the 100-yr plus central climate change (21%) design event, the maximum flood level at the site is 38.44 m AOD, significantly lower than the average ground level on the site. The hazard map for this event (see Figure 8) shows that flooding and therefore significant flood hazard is located either within or very close to the river channel. Given the location of the site relative to the River Kennet, speed of onset values are very fast (<1-hr), however as mentioned fluvial flood extents are limited to a small proportion of the site. Table 1 shows the flood risk metrics associated with the design event.

Table 1- Flood Risk Metrics

| | Design Event 1.0% AEP (+21%) |
|---|---|
| Percentage Inundated (%) | 6% |
| Average Flood Depth (m) | 0.93m* (Max- 1.87m) |
| Average Velocity (m/s) | 1.56m/s* (Max – 8.00m/s) |
| Speed of Onset (hrs) | <1-hr |

**Maximum values taken from within the river channel.*

The EA surface water flood maps plus climate change were assessed for further detail on potential surface water flooding at this location. The current extents are based on national scale mapping, velocity data is not available however depth banding is available. The depth bands indicate that for the 1.0% AEP plus climate change design event flooding on site is below 0.2m in depth. The velocity of surface water flows is assumed to be low given the flat terrain of the site.

## 4.3 Access and egress

The suggested access and egress route consists of exiting the site southbound, along the A33. There is no fluvial flooding and minimal surface water flooding along this route, see Figure 9. Movement within the site should be possible because whilst speed of onset values are fast much of the site is flood free during the design event.

It is recommended that occupants utilise the nearby flood warning system to ensure prompt evacuation, this is because of the inherent uncertainty of hydraulic models and the site's adjacency to two watercourses.

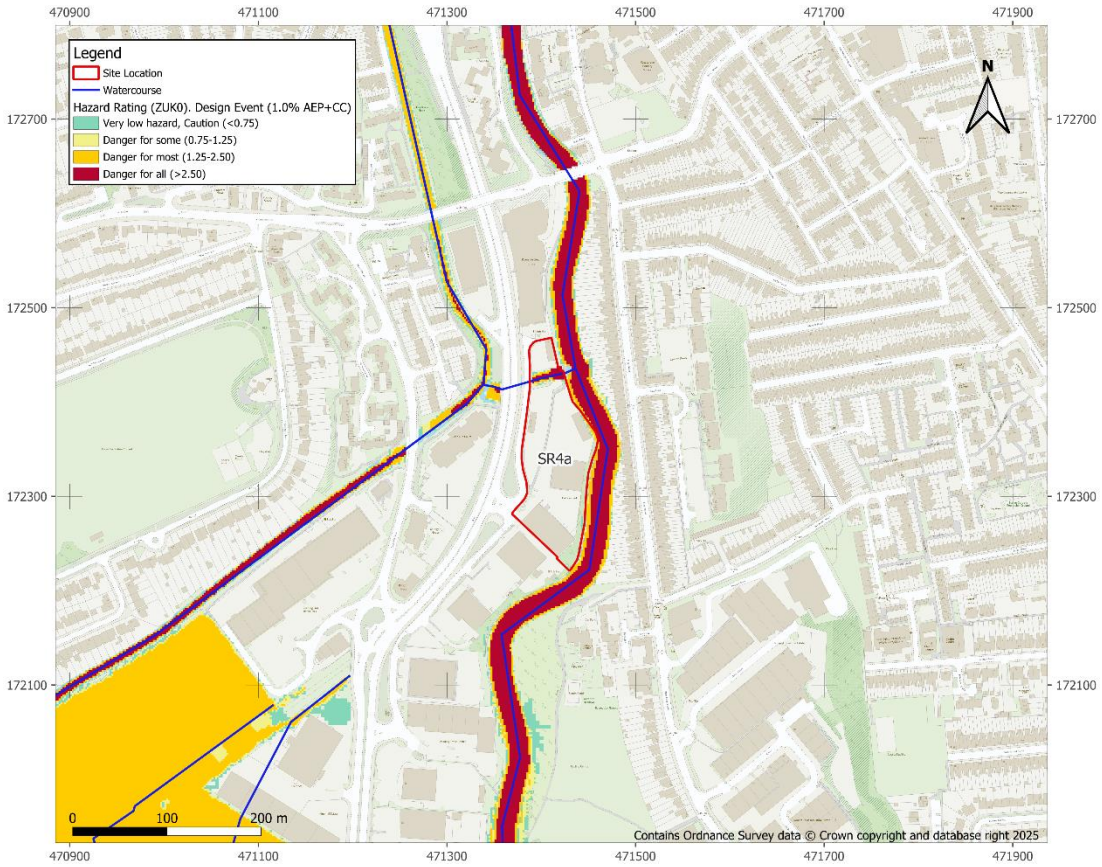


Figure 8 – Flood Hazard Map for the Design Event

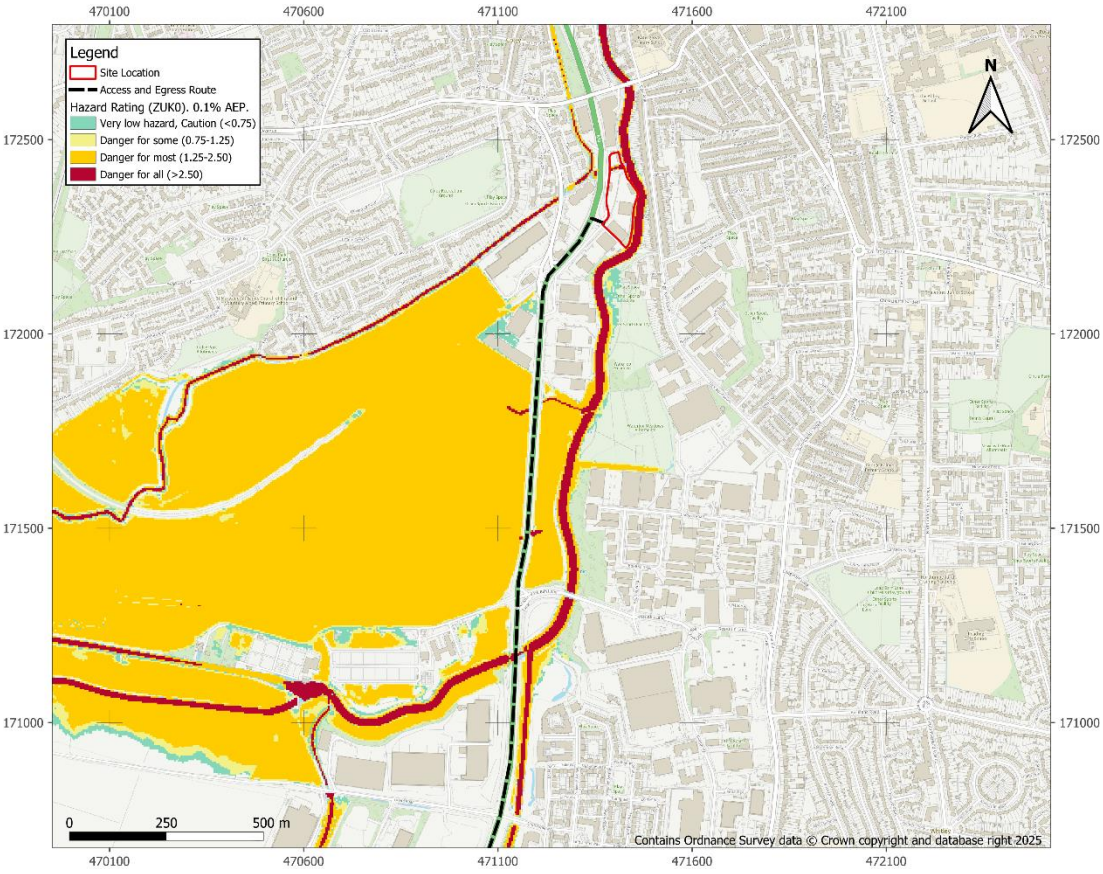


Figure 9 – Access/Egress Routes

# 5 Development Viability and FRA recommendations

## 5.1 Development Categorisation

The development proposed is categorised as *More Vulnerable Development,* which is permissible in Flood Zone 2, but needs to pass the Exception Test to justify development in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Only a small proportion of the site is located in Flood Zone 3a with the majority of its area falling in Flood Zone 1, surface water flood risk at the site is also limited. In this regard a residential development should be possible.

## 5.2 Scale of Development

The total site area is currently 1.29ha; allocated for residential development for between 80-120 dwellings. Given the size of the site, it is assumed that the residential development onsite will either be high density housing or utilise multistorey flats. In any case it is assumed that given the scale of the development it is likely to cover the majority of the site area. To reduce the impact on floodplain storage, building footprints and infrastructure should be sited outside of the modelled fluvial and surface water design flood extent.

## 5.3 Sequential Approach

Whilst it should be possible to locate the majority of infrastructure in Flood Zone 1 it is important that a sequential approach is implemented at the site, prioritising more vulnerable residential development in lower flood risk areas with ancillary infrastructure such as car parks and green spaces located in higher flood risk areas if required. This is under the assumption that it is demonstrated that it does not increase flood risk elsewhere and is designed to be appropriately resistant and resilient to flooding. For this site it is recommended that both the fluvial and surface water climate change extents are used, which more clearly show the graduation in flood risk across the site.

## 5.4 Other Site-Specific Considerations

The drainage strategy for the proposed development should be suitably designed to manage additional runoff arising from the development and ensure that surface water flood risk at the site and to third party land is not increased.

In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the non-statutory technical standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site is freely draining. However, the water table is likely high and at the same level as the river, therefore the significant use of infiltration SuDS solutions may be challenging. It is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates, this will confirm whether infiltration could be viable in some areas. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.