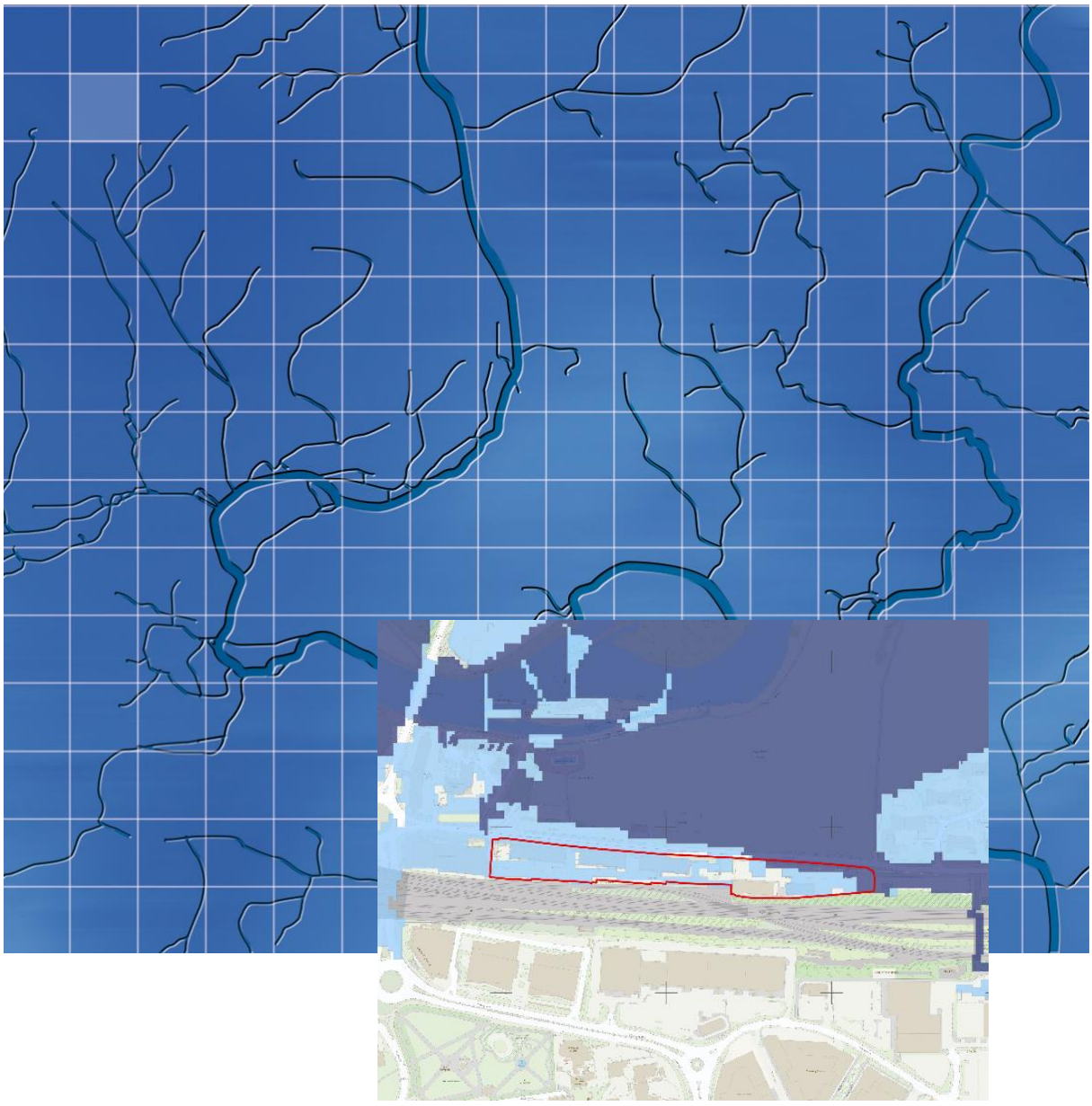
Reading Borough Council

May 2025

Napier Court (CR11i)

Level 2 Strategic Flood Risk Assessment



Reading Borough Council

Napier Court (CR11i) Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10135

Version	Issue date	Issue status	Prepared By	Approved By
1.0	02/05/2025	Draft	Daniel Hamilton (*Principal Consultant*)	Paul Blackman (*Director*)

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.

Registered Office Maclean Building, Benson Lane, Wallingford OX10 8BB
www.hydrosolutions.co.uk

Napier Court (CR11i) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the greatest risk with a significant proportion of the site lying in Flood Zones 2 and 3 based on the EA's fluvial flood map.

In this location the fluvial flood map is based on detailed modelling in the form of the River Thames model (Pangbourne to Sonning) (2021). The outputs of this model were further assessed and show a significant increase in flood extent when climate change is accounted for. In this respect fluvial flood risk is considered high.

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

The overall confidence in the assessment is high. This is based on the availability of recent detailed modelling in the vicinity of the site.

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.

In this regard, a new residential development at the site should be possible given that the majority of the site lies outside of Flood Zones 3a and 3b. However, as part of the Exception Test for any infrastructure located in Flood Zone 3a it must be demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere. This may require infrastructure to be raised above the design flood level of 37.9m AOD.

A site-specific FRA would need to assess in more detail the development layout, requirements for compensatory storage and site access.

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 Napier Court (CR11i) 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, is the 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 Napier Court (CR11i) site is 1.84ha in area and is located to the south of the River Thames. It is located 0.4 km east of Reading train station. The surrounding land use is mostly suburban with the exception of land to the north which is open space, see Figure 1.

In the Replacement Local Development Plan (RLDP) it is proposed to be used for residential development in the form of 250-370 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site is relatively flat. Higher ground in the form of a railway embankment bounds the site to the south. To the north levels fall gently towards the River Thames, see Figure 2. The ground levels within the site boundary range from 37.2 to 38.7m AOD. The average ground level is 37.9m AOD.

2.3 Nearby Watercourses

The River Thames is sited approximately 120m north of the site. The River Thames runs from west to east at this location. A small unnamed tributary of the Thames is located approximately 100m north of the site. It runs a short distance from west to east before joining the River Thames. Figure 1 shows the location of these watercourses.

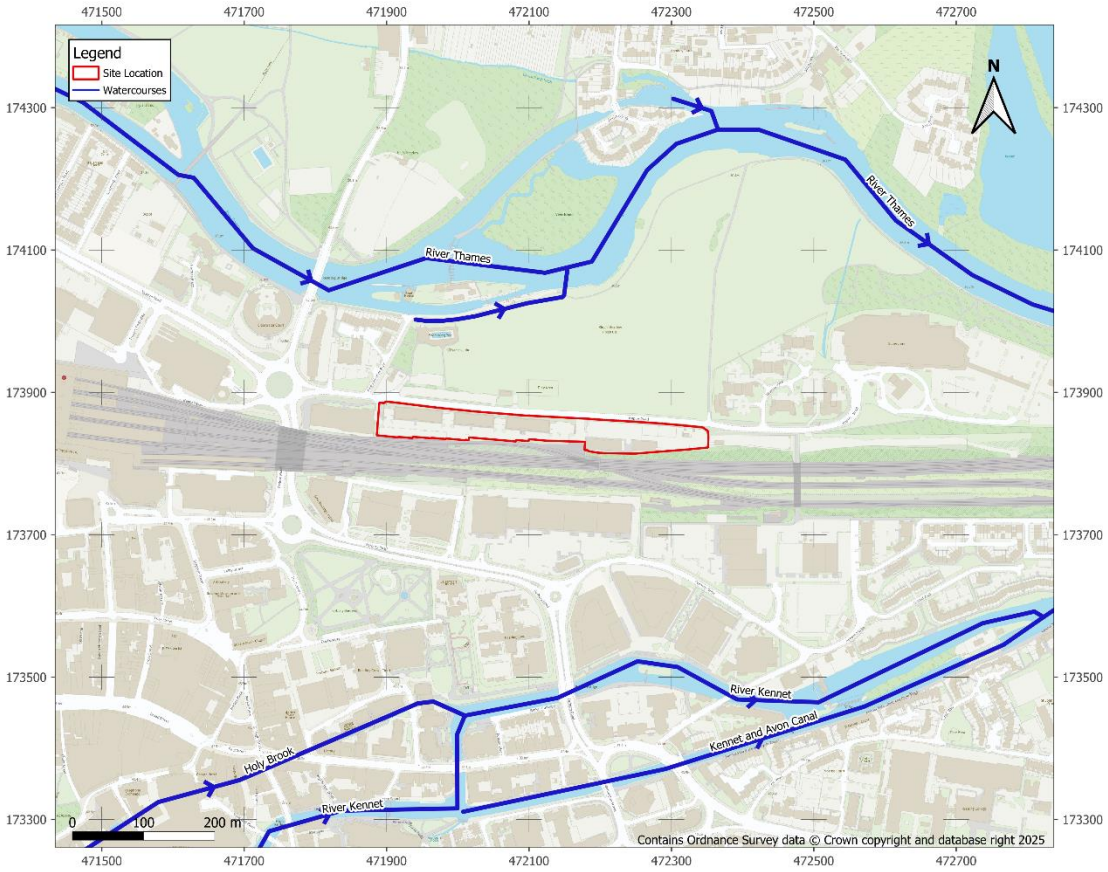


Figure 1 - Site Location

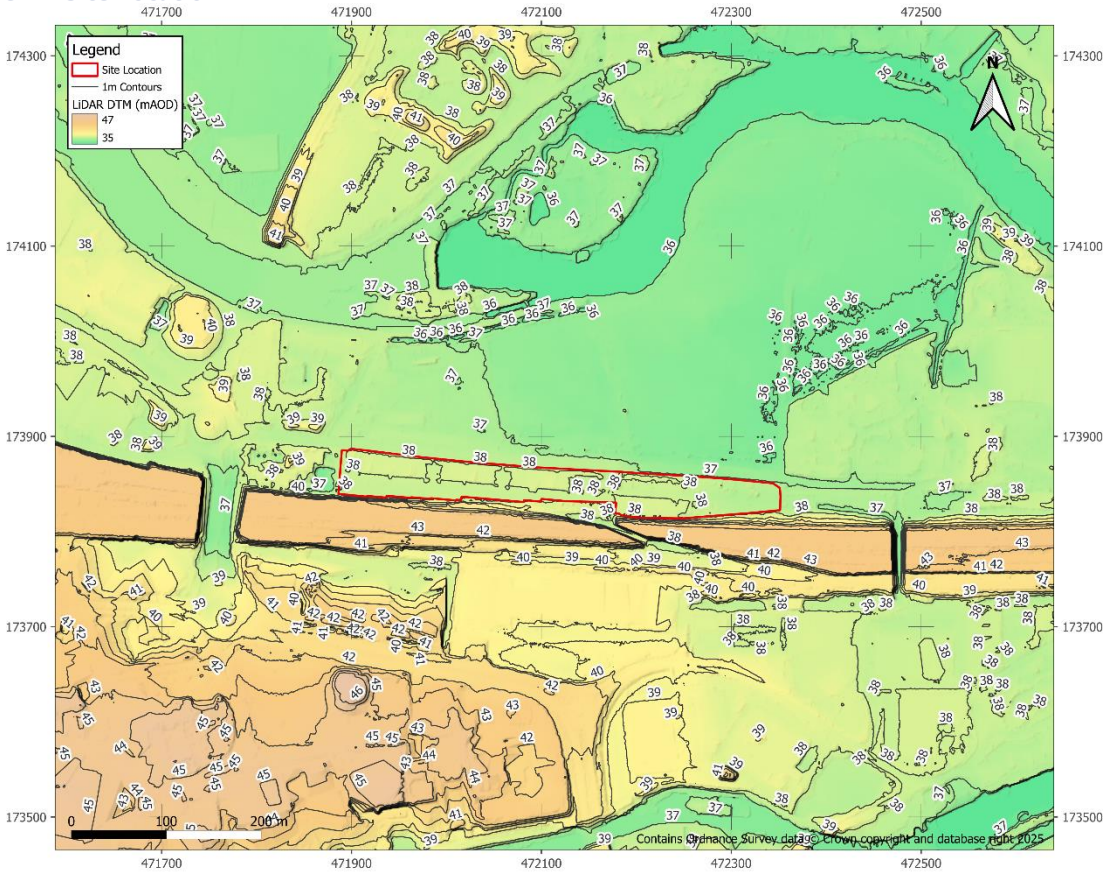


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has records of historic flooding at the site. In total, there are two events recorded in the EA database at this location. These events occurred in March 1947 and January 2003. Both were associated with flooding of the River Thames.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 75% of the site is inundated by Flood Zone 2, with 10% of the site located in Flood Zone 3a. Viewing the model results for the 3.3% AEP event, 2% of the site is located in Flood Zone 3b. All flooding at this site is associated with the River Thames, see Figure 3.

The EA climate change fluvial outputs for Flood Zone 2 and 3 have also been assessed. The entire site is inundated by Flood Zone 2 and the proportion of the site located in Flood Zone 3a increases to 38%, see Figure 4.

Fluvial flood risk is considered to be high and is assessed in more detail in section 4.

3.3 Flood Defence Infrastructure

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

3.4 Surface Water Flood Risk

The EA's surface water flood maps show isolated areas of surface water flooding at the site. In total, 1% of the site is inundated in the 3.3% AEP event, 7% is inundated in the 1.0% AEP event and 17% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 4% in the 3.3% AEP event, 12% in the 1.0% AEP event and 21% in the 0.1% AEP, see Figure 6. Overall, the risk of surface water flooding is considered to be low.

3.5 Groundwater Flooding

The site is underlain by a bedrock of chalk in the form of the Seaford Chalk formation. It is expected to permit high amounts of infiltration. Superficial deposits of Alluvium and Till 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, these are expected to have impeded drainage.

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 within a river, groundwater flooding is likely to be heavily correlated with fluvial flooding.

3.6 Reservoir Flood Risk

The FMfP shows that the entire site is at risk from reservoir flooding during the wet day scenario, however the site is not at risk during the dry day scenario, see Figure 7. Whilst the site is shown to be at risk, it should be noted that reservoir failure is a rare event with a very low probability of occurrence. Current reservoir regulations aim to make sure that all reservoirs are properly maintained and monitored to detect and repair any problem.

3.7 Flood Warning Service

The site is located within the River Thames at Reading including the Portman Road, Richfield Avenue industrial estates, Caversham Road and the Lower Caversham flood warning area.

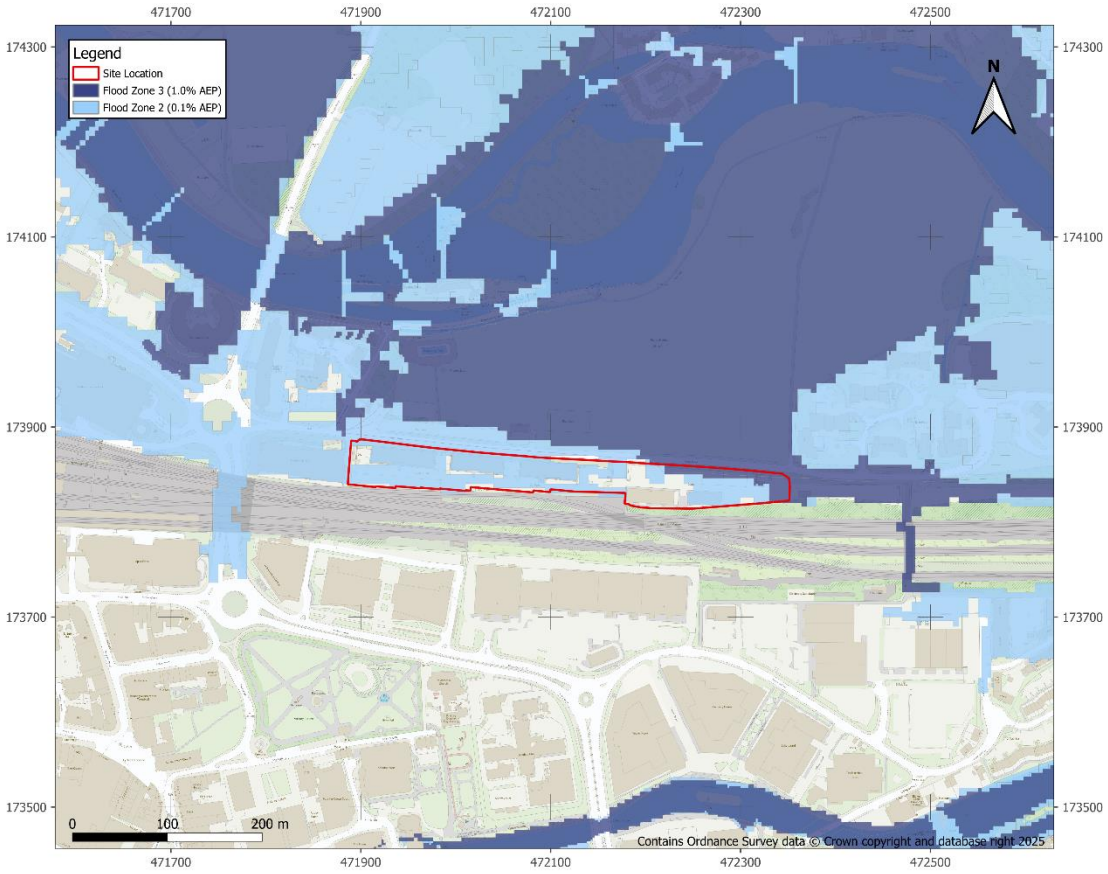


Figure 3 - Fluvial Flood Map

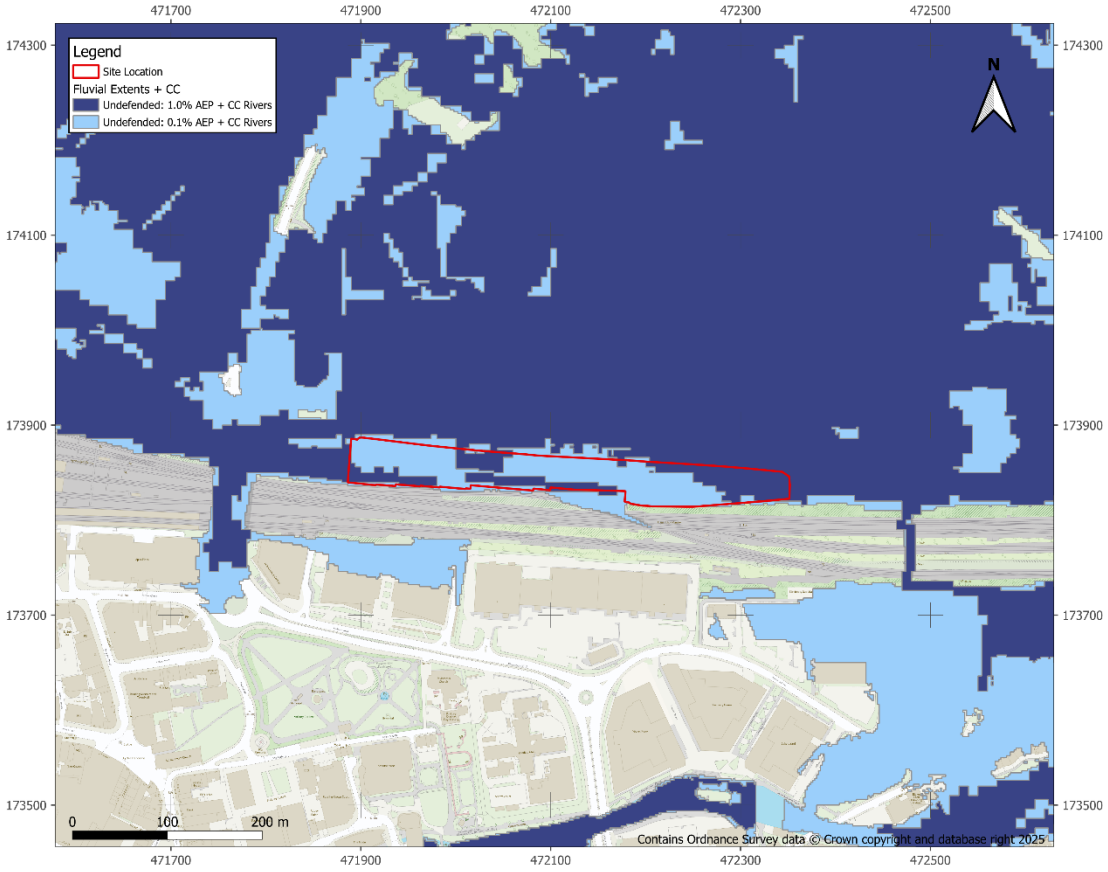


Figure 4 – Fluvial Climate Change Flood Map

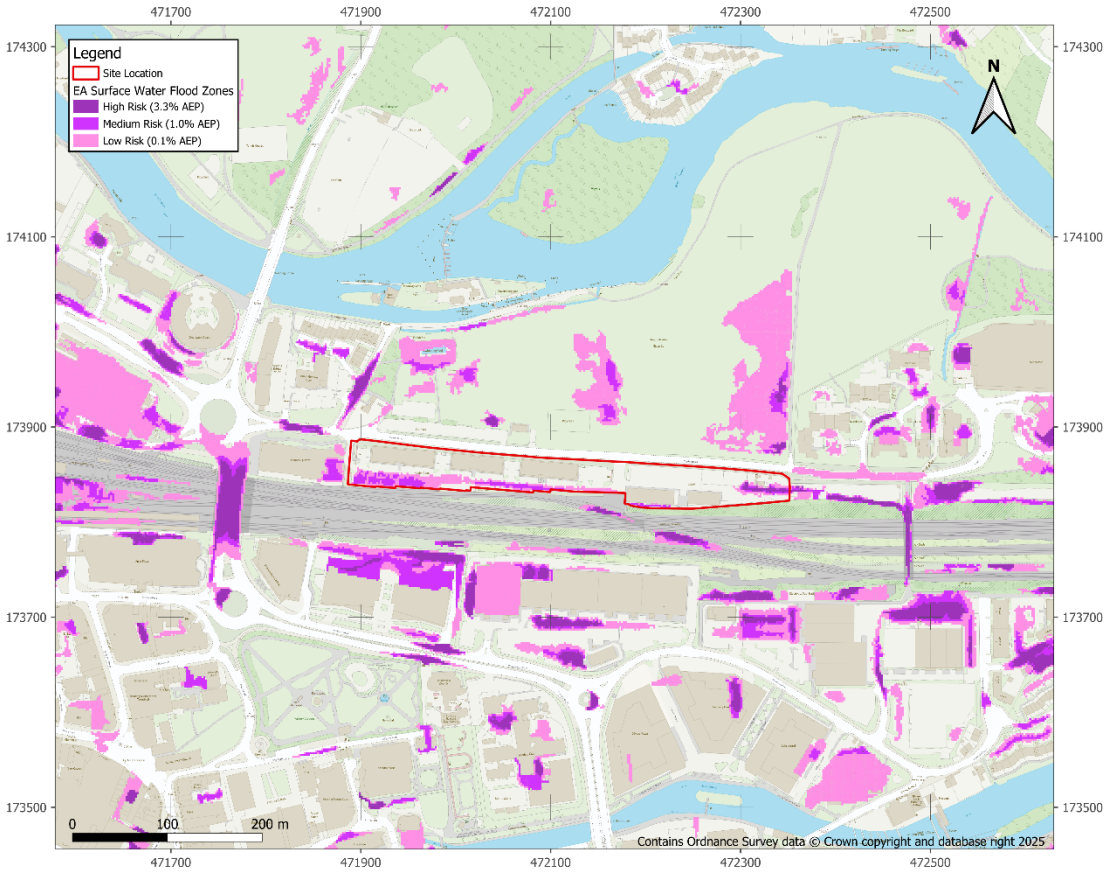


Figure 5 – Surface Water Flood Map

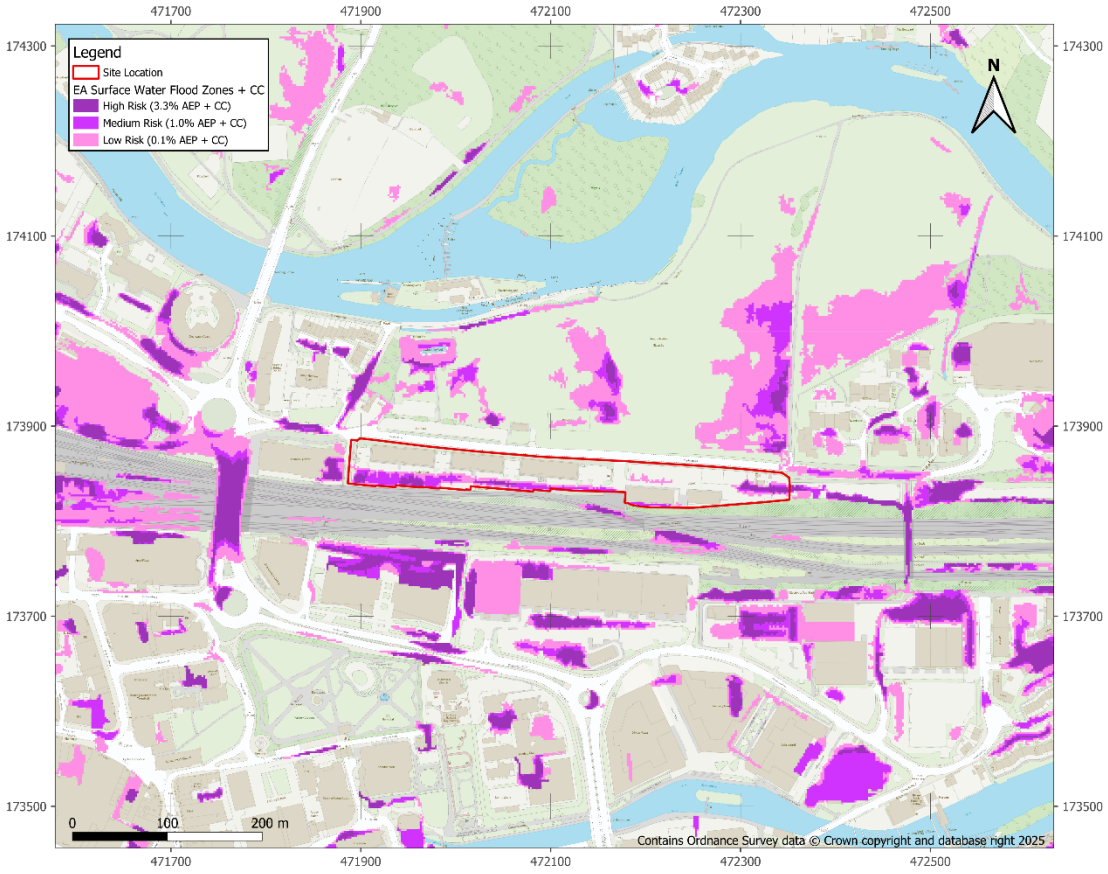


Figure 6 -Surface Water Climate Change Flood Map

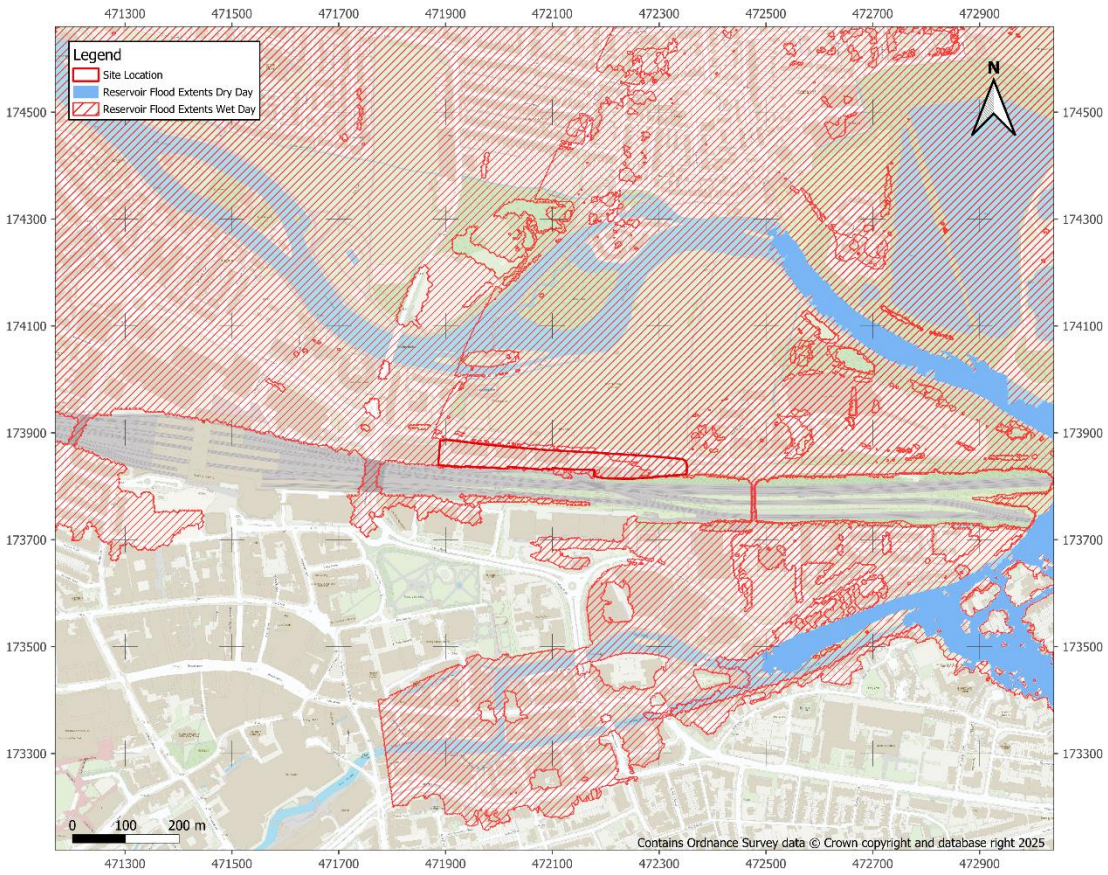


Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is fluvial in origin. The flood risk is quantitively assessed in more detail below.

4.2 Flood Risk Metrics

The River Thames model (Pangbourne to Sonning) (2021), which informs the latest FMfP, was assessed to attain further detail on fluvial flooding.

For the 100-yr plus central climate change (31%) design event, the maximum flood level at the site is 37.9 m AOD, similar to the average ground level on the site. The hazard map for this event (see Figure 8) shows that where flooding occurs on the site hazard is mostly *low,* this is with the exception of a small area in the east of the site where hazard indicates *danger for some* and *danger for most*, indicating higher flood depths and velocities. There is a reasonable lag time between water first leaving the banks of the Thames and encroaching onto the site, with a speed of onset value of 42.0 hrs. Table 1 shows the flood risk metrics associated with the design event.

Table 1- Flood Risk Metrics

	Design Event 1.0% AEP (+31%)
Percentage Inundated (%)	38%
Average Flood Depth (m)	0.21m (Max- 0.63m)
Average Velocity (m/s)	0.04m/s (Max – 0.14m/s)
Speed of Onset (hrs)	42.0-hr

4.3 Access and egress

Vehicular access to and from the site would be westwards along the Napier Rd before heading southwards along Vastern Rd. This initial part of the route lies within Flood Zone 2 (0.1% AEP) and is at risk of flooding in the design event also. For both events flood hazard is generally low, however in some locations especially along the Vastern Rd the hazard rating indicates *danger for some* and *danger for most*.

Approximately 300m into the route it becomes flood free. Onward travel would likely continue southeasterly along Forbury Road, see Figure 9. Most of the land south of the site lies in Flood Zone 1. In terms of pluvial flood risk, flooding is most pronounced along the Vastern Rd. Whilst this risk is generally considered manageable, a site-specific FRA should consider in more detail the nature of the flood risk to determine how quickly it occurs and the degree of hazard.

To ensure the access route can be utilised before the site or route is inundated, early flood warning will be essential. It should be noted that the River Thames catchment which the site falls within is dominated by chalk, it has relatively slow river response times to storm events, being groundwater, rather than surface water dominated. This increases the time taken for inundation and for adequate warnings and preparation in an extreme flood event. This is partly reflected by the relatively slow speed of onset values for the site despite its position close to the banks of the river.

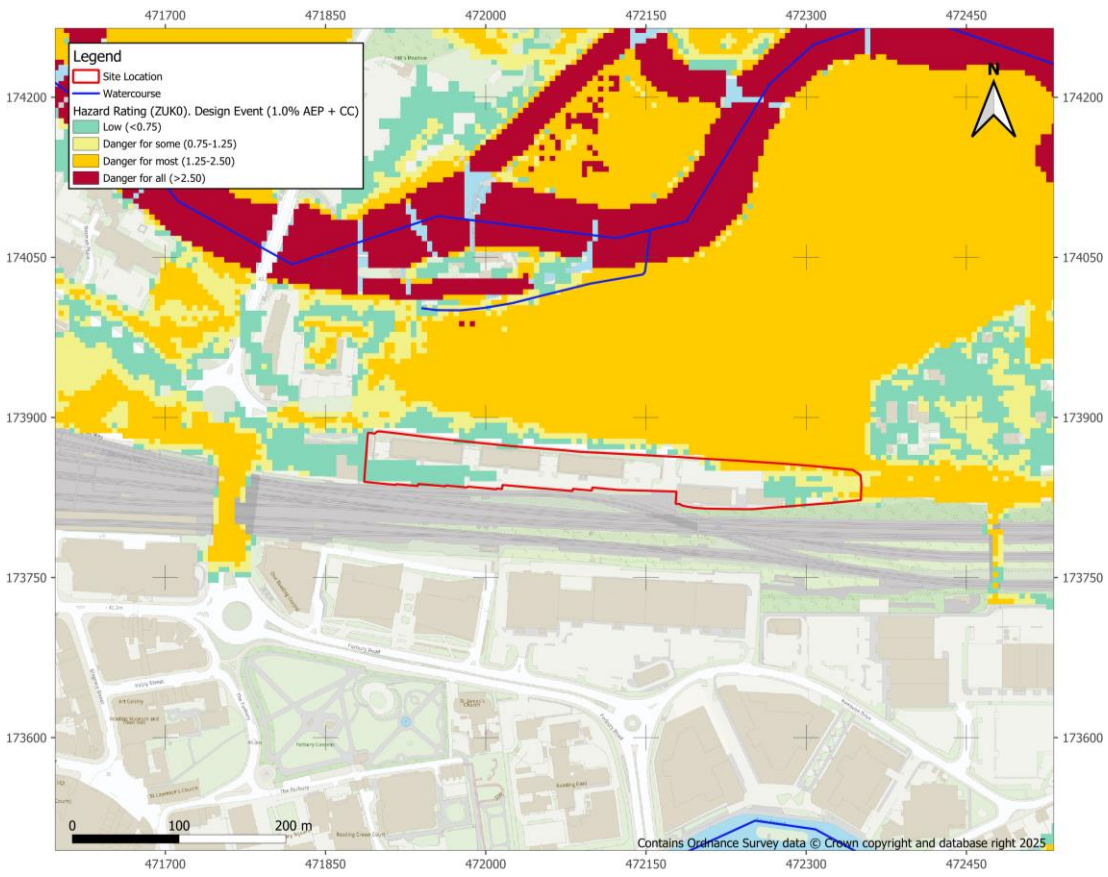


Figure 8 – Flood Hazard Map for the Design Event

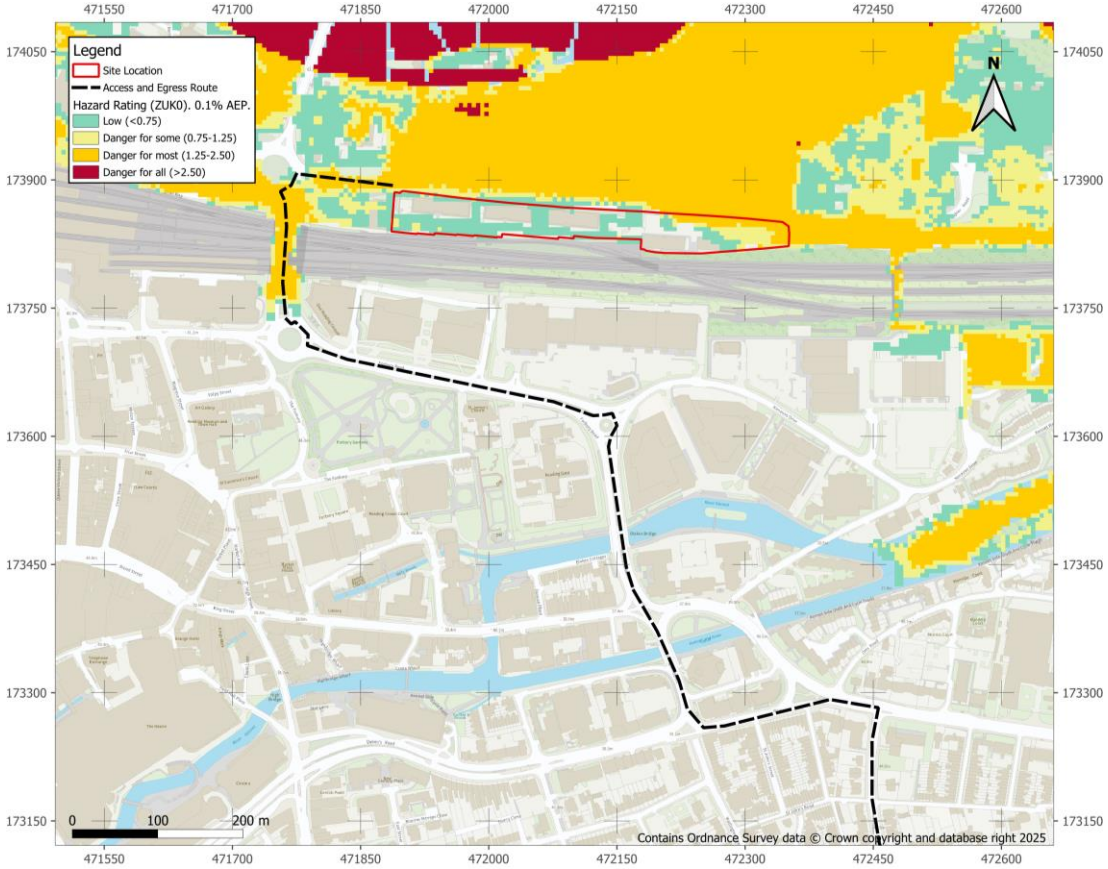


Figure 9 – Access/Egress Routes

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.

In this regard, a new residential development at the site will be possible given that the majority of the site lies outside of Flood Zones 3a and 3b. However, as part of the Exception Test any infrastructure located in Flood Zone 3a must demonstrate that the development will be safe for its lifetime, without increasing flood risk elsewhere. This may require infrastructure to be raised above the design flood level of 37.9m AOD.

5.2 Scale of Development

The total site area is 1.84ha; allocated for between 250-370 dwellings. Given the size of the site, it is assumed that the development will either be high density housing or utilise multistorey flats. As mentioned, 2% of the site (0.02ha) lies in Flood Zone 3b so is not developable.

As 10% of the site lies in Flood Zone 3a some infrastructure may need to be located in this area. This infrastructure will need to be raised, which will in turn compromise floodplain storage requiring compensatory storage elsewhere on site. Given the size and constraints of the site, the provision of compensatory storage could be challenging and will reduce the amount of developable land available.

A site-specific FRA would need to assess in more detail the requirements for compensatory storage.

5.3 Sequential Approach

It is important that a sequential approach is implemented at the site, prioritising more vulnerable residential development outside of Flood Zone 3a and in Flood Zone 2 wherever possible. To facilitate this, the majority of ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas. This is under the assumption that it does not increase flood risk elsewhere and is designed to be appropriately resistant and resilient to flooding.

5.4 Other Site-Specific Considerations

There is limited surface water flood risk within the site, therefore it should not be a barrier to development. However, parts of the access route are shown to be at surface water risk. A site-specific FRA should consider in more detail the nature of the surface water flood risk to determine how quickly it occurs and the degree of hazard on site. If new infrastructure is proposed, 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.

As mentioned, new infrastructure may compromise flood plain storage. Hydraulic modelling may need to be undertaken to assess 3rd party impacts and compensatory storage requirements. Storage and modelling requirements should be confirmed with the EA for a site-specific FRA.