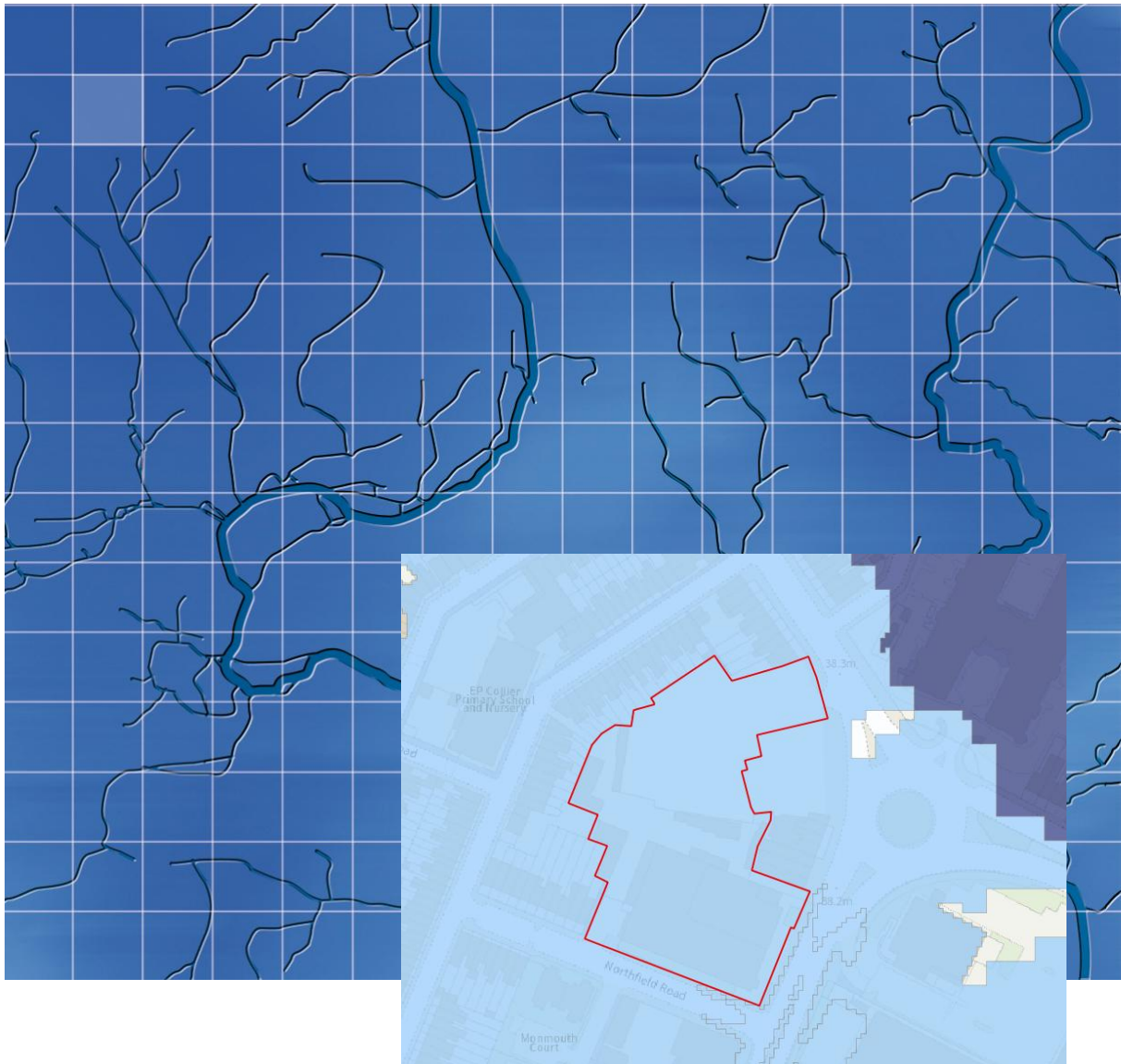


Reading Borough Council

May 2025

West of Caversham Road (CR11f)

Level 2 Strategic Flood Risk Assessment



WHS

Reading Borough Council

West of Caversham Road (CR11f) Level 2 Strategic Flood Risk Assessment

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For and on behalf of Wallingford HydroSolutions Ltd.

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West of Caversham Road (CR11f) Level 2 SFRA

Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the greatest risk with the whole of the site lying in Flood Zone 2 based on the EA's fluvial flood map. No part of the site is located within Flood Zone 3a.

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 the model show a significant proportion of the site (88%) to be inundated during the design 1.0% AEP plus climate change event. The flood hazard rating at the site is generally *low*, indicating limited flood depths and velocities. Overall, fluvial flood risk is considered to be moderate.

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.

None of the site is located in Flood Zone 3a so a residential development should be possible, however there are some barriers. A large proportion of the site is inundated during the design event which takes account of climate change; therefore, a significant amount of infrastructure may need to be raised to ensure it is safe for the development's lifetime. This could in turn compromise floodplain storage which will need to be offset by compensatory storage. Access routes to and from the site are located within Flood Zone 2 and the design flood extent however development is already established in the area and given the slow response time of the Thames this should be manageable.

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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 land West of Caversham Road (CR11f) 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 Soilscales. 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 land West of Caversham Road (CR11f) site is 0.92 ha and located approximately 500 m northwest of Reading Station, see Figure 1. The site is surrounded by residential terraced housing to the west and north, and commercial land uses to the east and south.

Currently the site houses a self-storage warehouse which is classed as less vulnerable development. In the Replacement Local Development Plan (RLDP) it is proposed to be used for more vulnerable development in the form of 94-140 residential dwellings. On-site open space will also be included within the development.

2.2 Topography

Based on 1m LiDAR data, the site is relatively flat, with a slight topographic depression in the northwest, see Figure 2. The ground levels within the site boundary range from 37.8 to 38.7 m AOD. The average ground level is 38.2 m AOD.

2.3 Nearby Watercourses

The site is located approximately 150 m southwest of the River Thames at its closest point. The River Thames runs from northwest to southeast in this part of Reading, see Figure 1. The local plan also highlights that Vastern ditch is culverted beneath the area north of the station.

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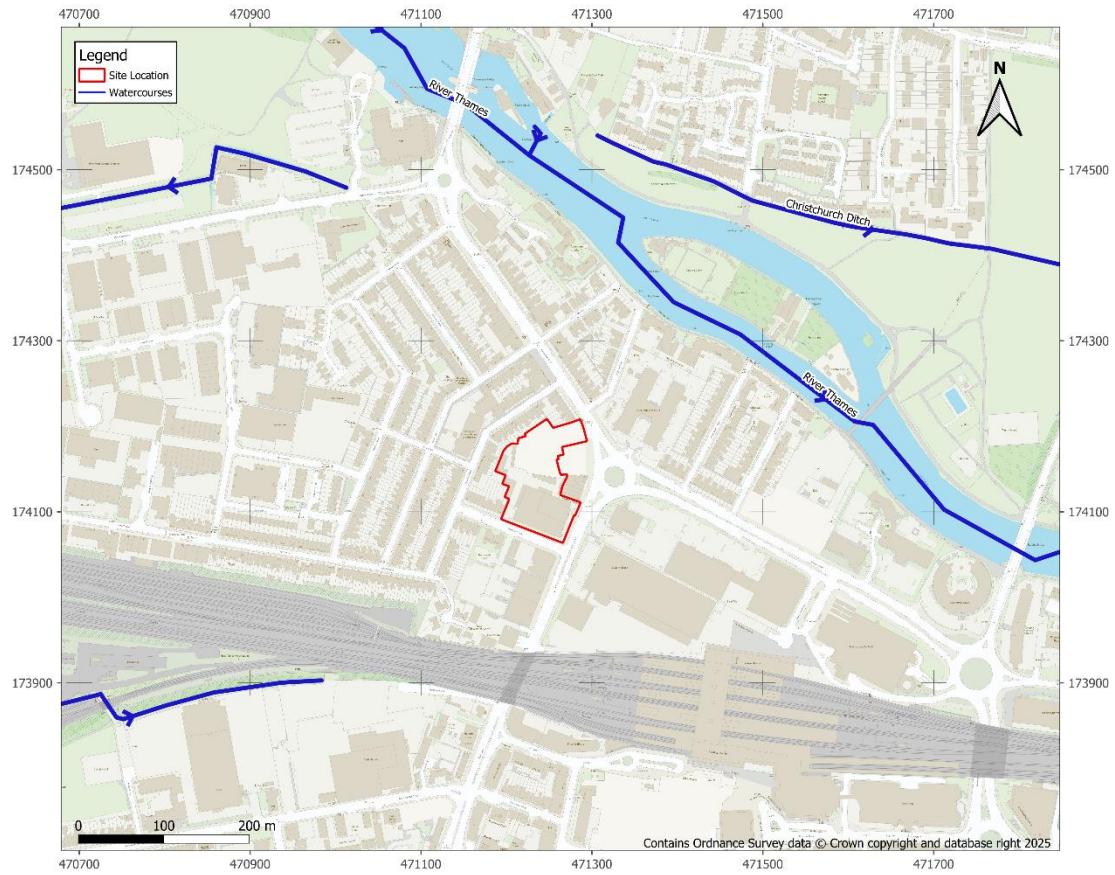


Figure 1 - Site Location

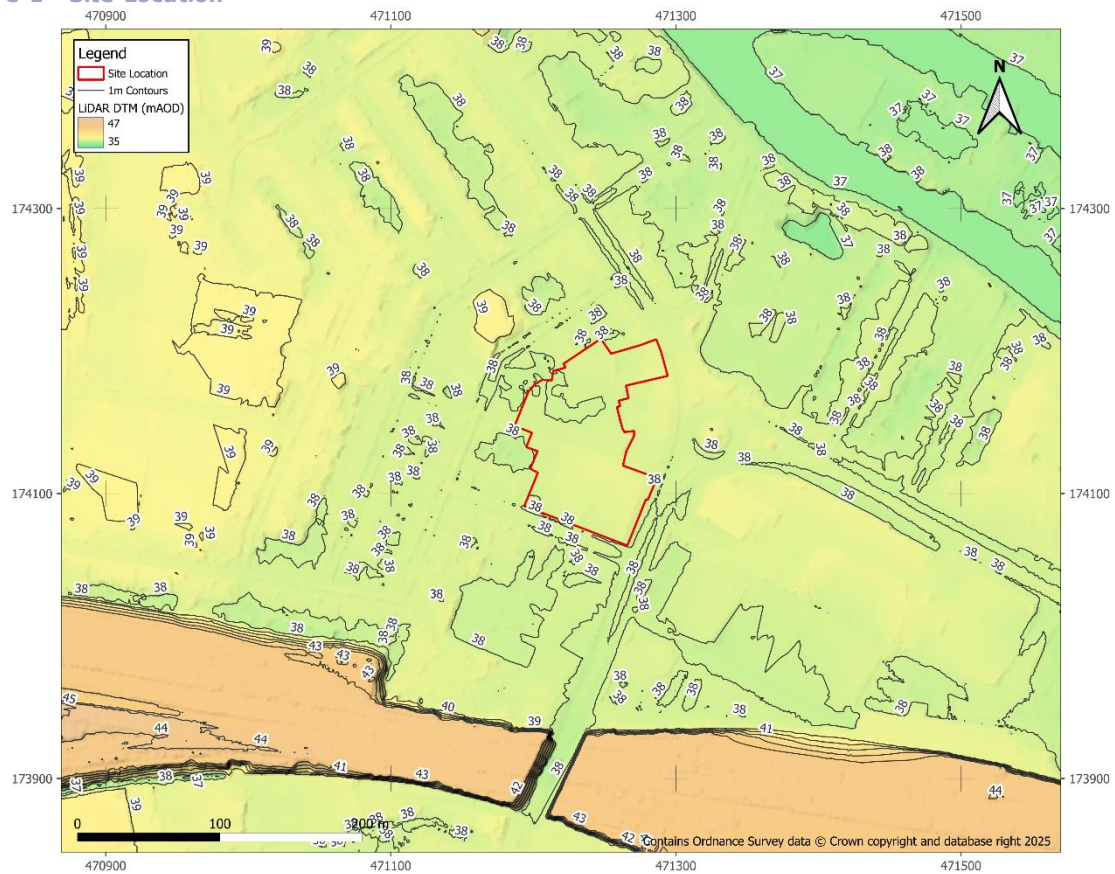


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA does not hold any historic records of flooding at the location of the site. The closest record of flooding is associated with the River Thames exceeding its channel capacity, approximately 130 m northeast of the site. This event occurred in January 2003.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), the entire site is inundated by Flood Zone 2, though no part of the site is located in Flood Zone 3a. 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 88%, see Figure 4. Fluvial flood risk is considered to be moderate 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 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 an area of surface water flooding within the north of the site for all events. In total, 3% of the site is inundated by the 3.3% AEP event, 11% is inundated by the 1.0% AEP event, and 37% is inundated by the 0.1% AEP event, see Figure 5. When accounting for climate change, these proportions increase to 11%, 14%, and 40% respectively, see Figure 6. Overall, the risk of surface water flooding is considered to be moderate.

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 Silt are also present at this site. The underlying soils are acid loamy soils 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.

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 aims 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 and Caversham EA Flood Warning Area.

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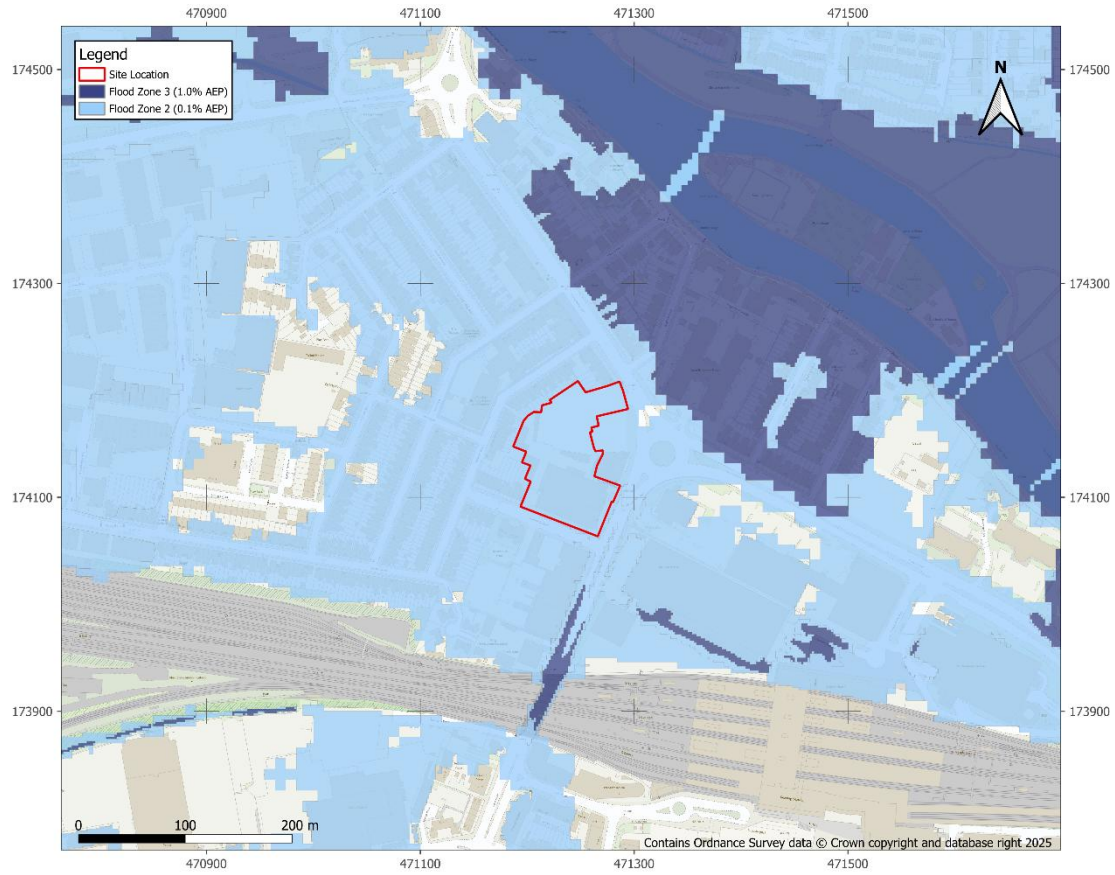


Figure 3 - Fluvial Flood Map

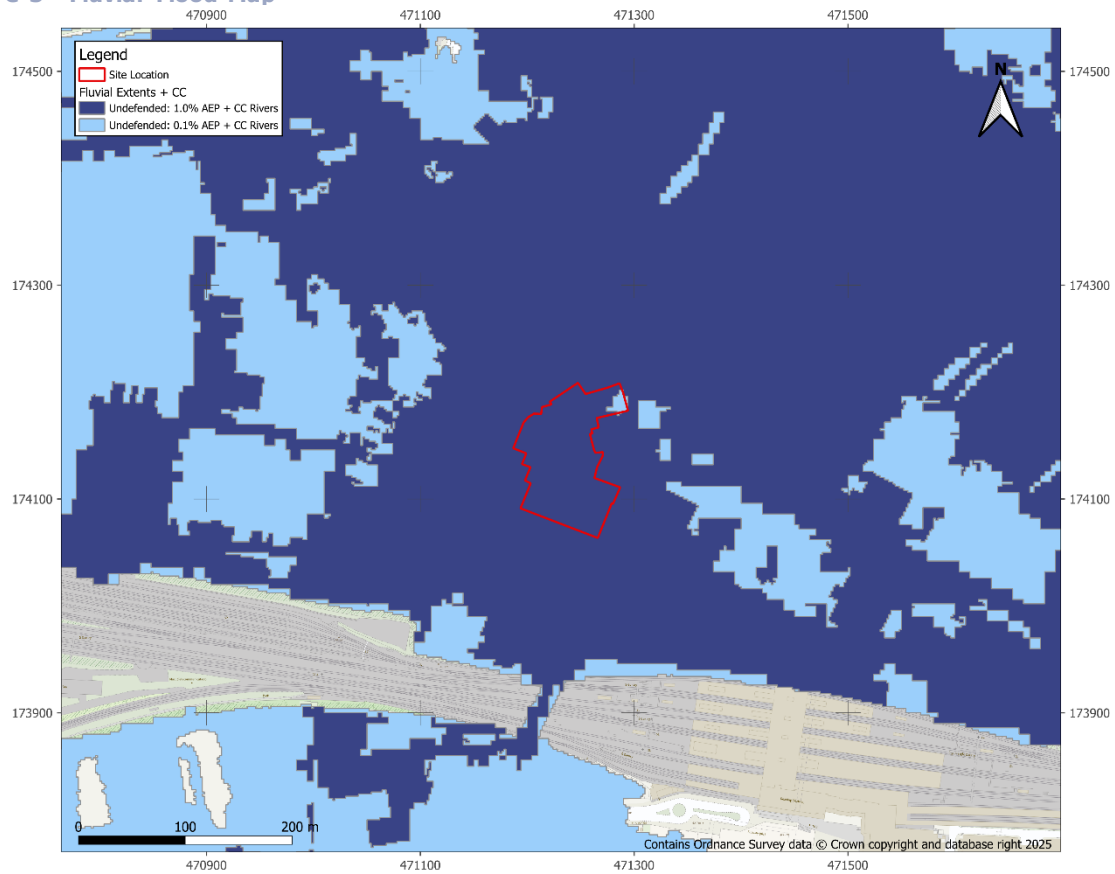


Figure 4 - Fluvial Climate Change Flood Map

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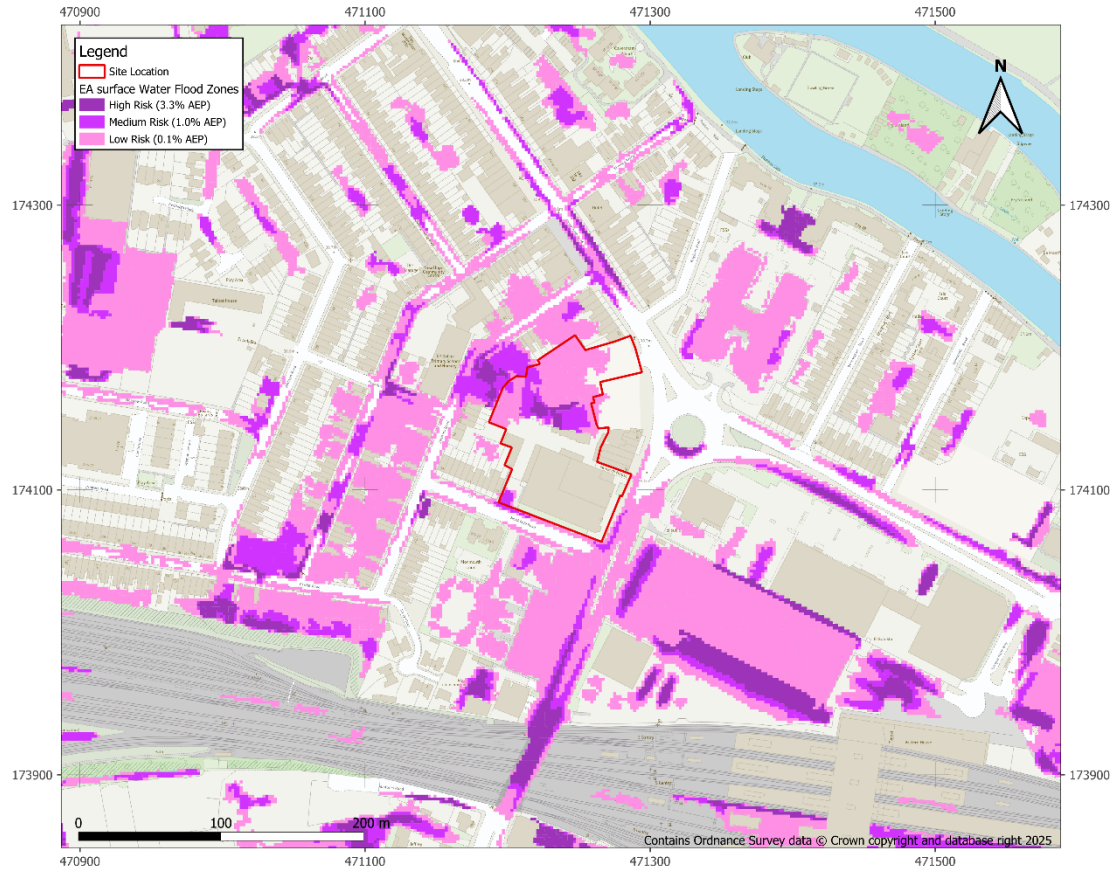


Figure 5 – Surface Water Flood Map

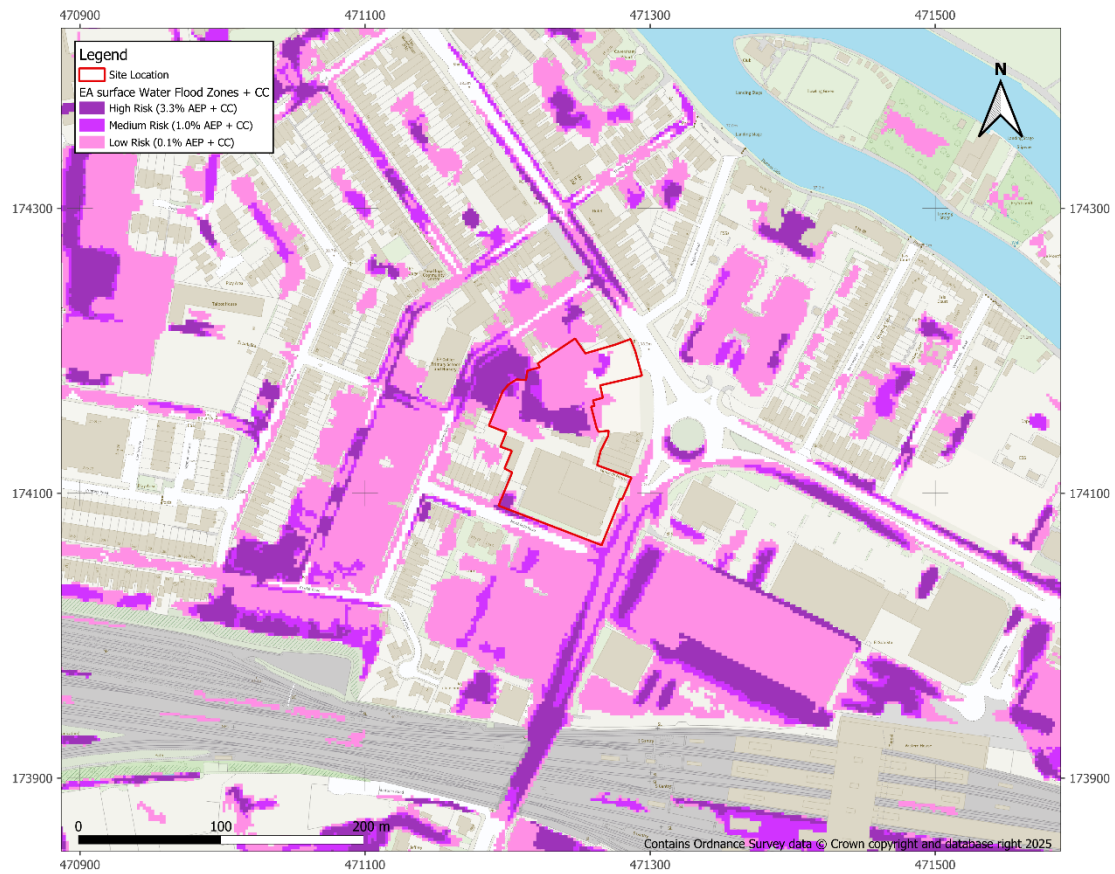


Figure 6 -Surface Water Climate Change Flood Map

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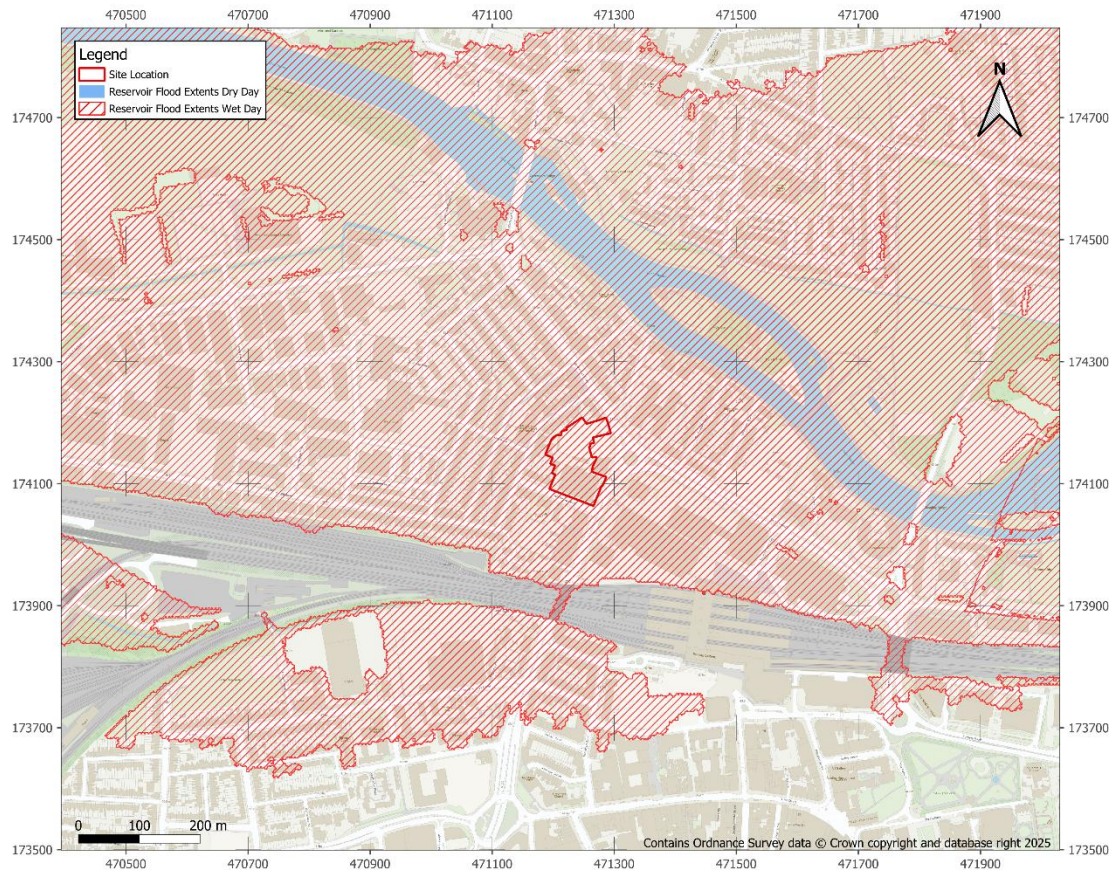


Figure 7 - Reservoir Failure Flood Map

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 quantitatively assessed in more detail below.

4.2 Flood Risk Metrics

The River Thames model (Pangbourne to Sonning) (2021) 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 38.4 m AOD. The hazard map for this event (see Figure 8) shows that most of the site has a *low* hazard rating however there is a small area of *danger for most* in the west of the site, indicating higher flood depths and velocities. 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 (%)	88%
Average Flood Depth (m)	0.24 m (Max- 0.57 m)
Average Velocity (m/s)	0.03 m/s (Max – 0.22 m/s)
Speed of Onset (hrs)	201 hrs

4.3 Access and egress

Vehicle access to the site is currently via Northfield Road to the south and the A4155 to the northeast. Pedestrians can also access the site via Caversham Road to the southeast.

During an extreme flood event, both vehicles and pedestrians should travel east towards the A4155/Caversham Road, see Figure 9. From here, site users should continue south along Caversham Road, passing beneath the rail line, towards the southern areas of the city with lower flood risk.

Flood Hazard for the 0.1% AEP event indicates *danger to Most* in some locations along the route, notably beneath the railway line, see Figure 9. Therefore, providing adequate flood warning to site users will be vital. In general, the River Thames in this location is slow responding and the site is located in a flood warning area so adequate flood warning is possible. However, it is important to note that parts of the route are also at surface water flood risk, this risk is covered in more detail in the other site-specific considerations section. 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.

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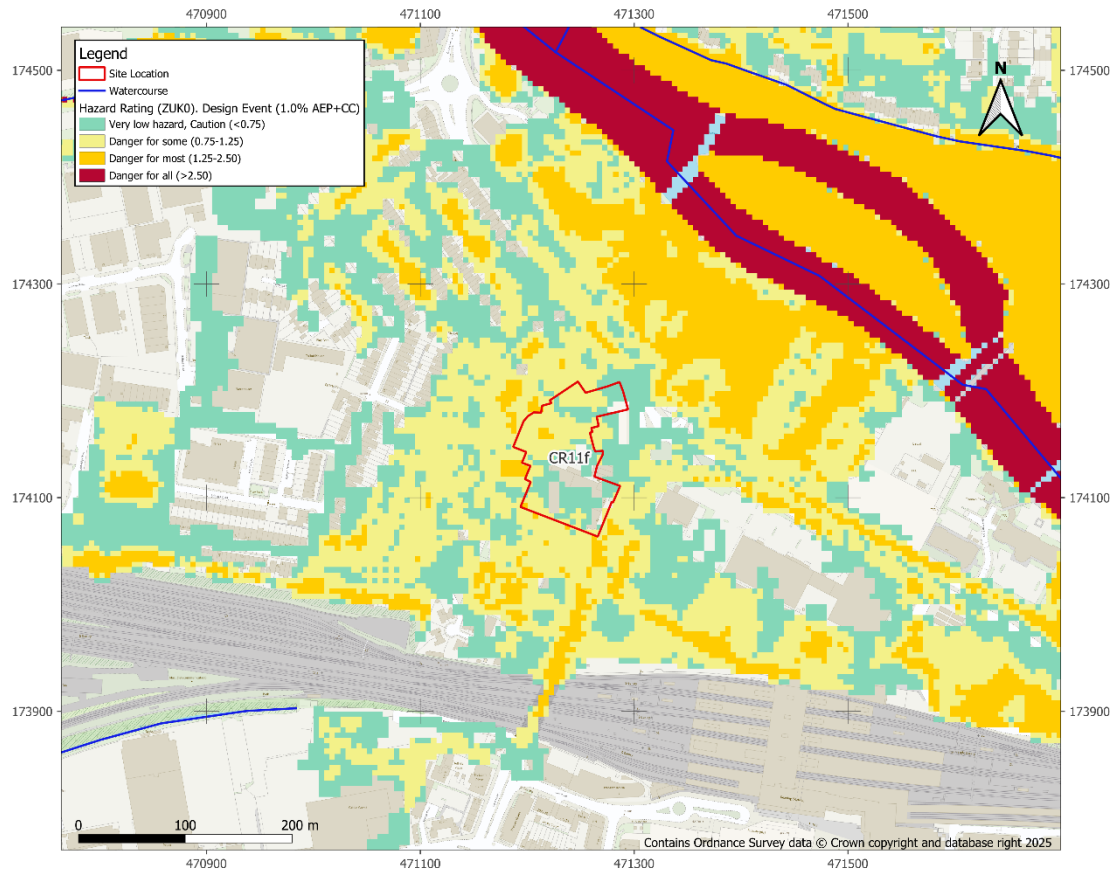


Figure 8 – Flood Hazard Map for the Design Event

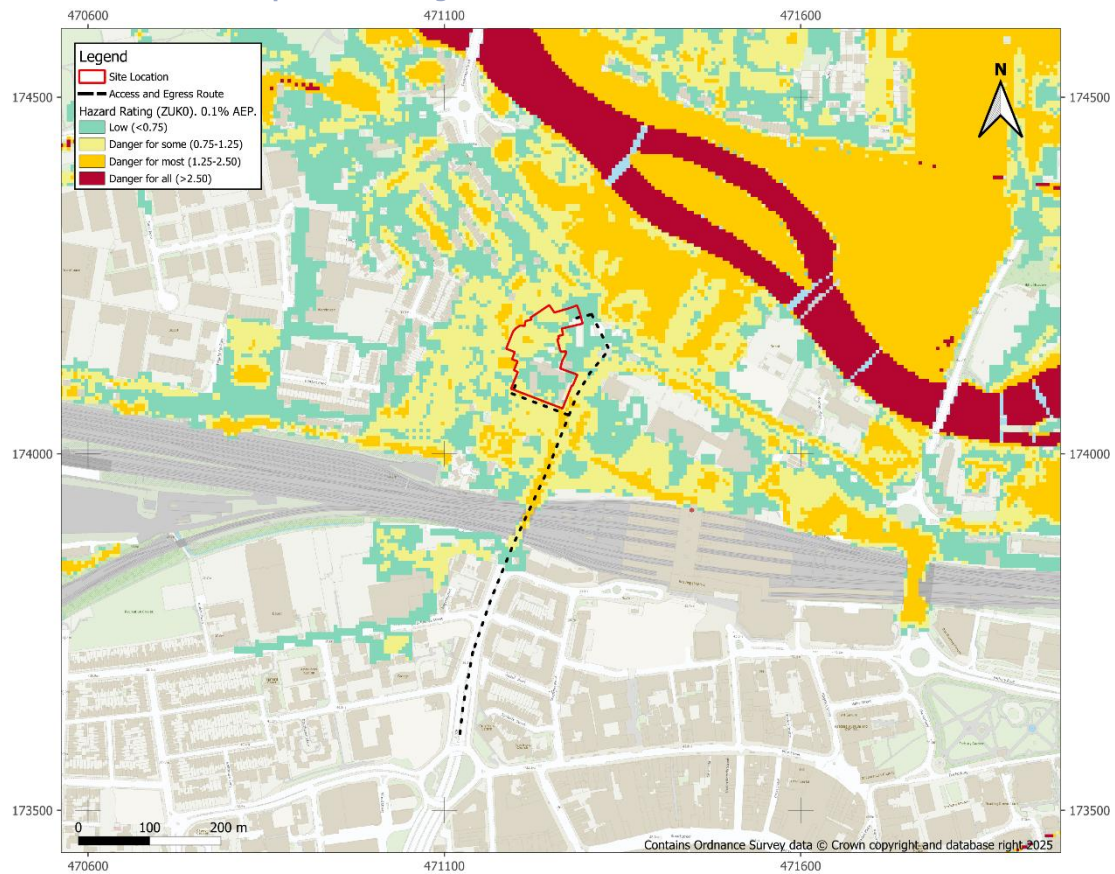


Figure 9 – Access/Egress Routes

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.

None of the site is located in Flood Zone 3a so a residential development should be possible, however there are some barriers. A large proportion of the site is inundated during the design event which takes account of climate change; therefore, a significant amount of infrastructure may need to be raised to ensure it is safe for the development's lifetime. This could in turn compromise floodplain storage which will need to be offset by compensatory storage. Access routes to and from the site are located within Flood Zone 2 and the design flood extent however development is already established in the area and given the slow response time of the Thames this should be manageable.

5.2 Scale of Development

The total site area is currently 0.92 ha; allocated for a change in use to residential including 94-140 dwellings. On-site open space will also be included within the design. The local plan indicates that the density of the development will be lower than that of the Station/River area to the east of the site, however given the size of the site, it is assumed that the development will either be high density housing or utilise multistorey flats. To reduce the impact on floodplain storage, building footprints and infrastructure should be sited outside of the modelled design flood extent wherever possible. This should in turn reduce the need for compensatory storage which could compromise the land available for development.

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

5.3 Sequential Approach

Whilst it should be possible to locate the majority of infrastructure in Flood Zone 1 or 2 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 on the assumption 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 the climate change extents are used, which more clearly show the graduation in flood risk across the site. In addition to fluvial flooding, the surface water flood extents should also be considered.

5.4 Other Site-Specific Considerations

Approximately 37% of the site is at low risk of surface water flooding. Therefore, 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. 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 mobile, 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.