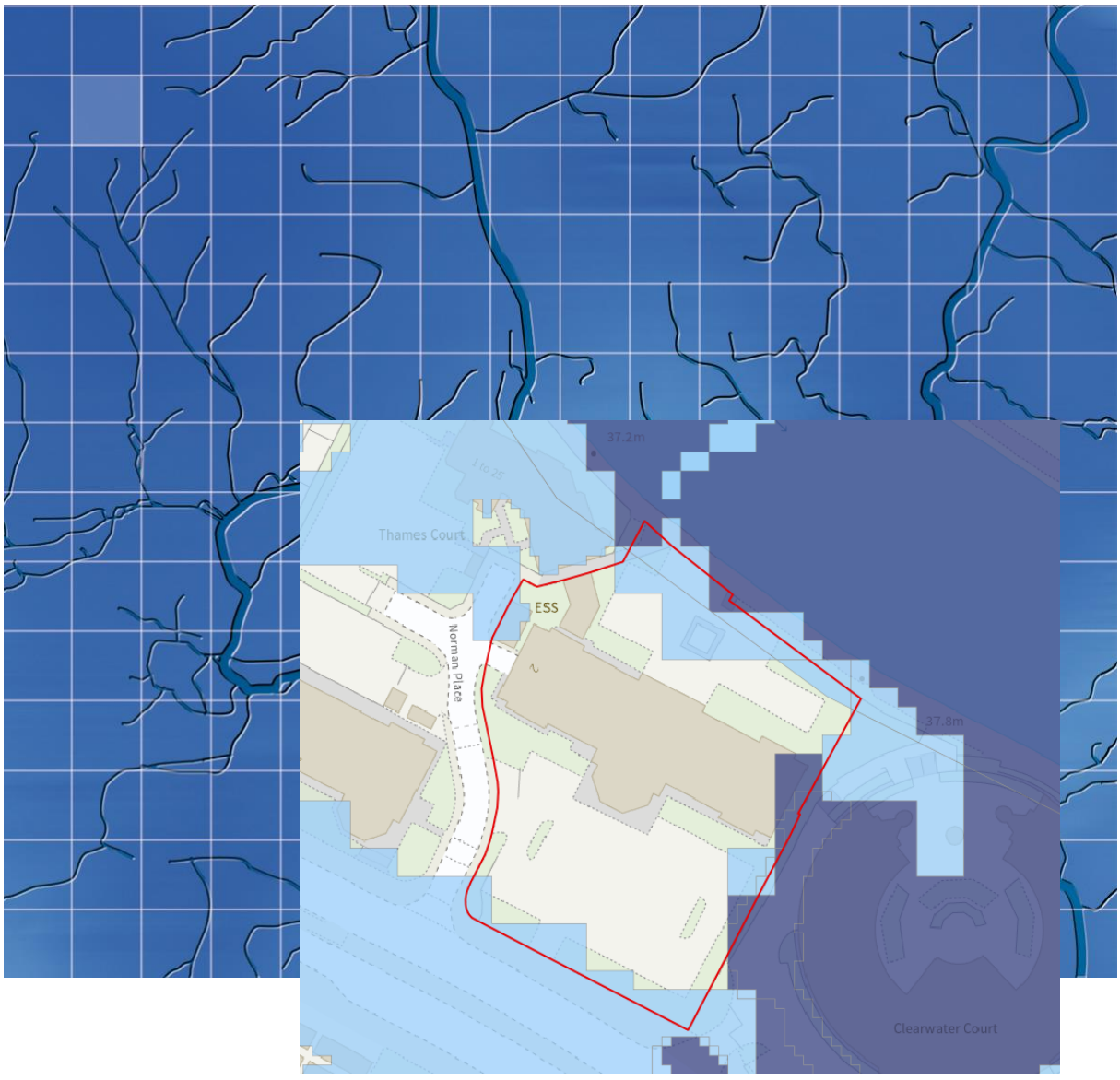
Reading Borough Council

May 2025

2 Norman Place (CR14v)

Level 2 Strategic Flood Risk Assessment



Reading Borough Council

2 Norman Place (CR14v) Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10135

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1.0	02/05/25	Draft	Jasmine Lucas (*Graduate Consultant*)	Daniel Hamilton (*Principal Consultant*)

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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2 Norman Place (CR14v) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the greatest risk to the site, with 22% of the site located within Flood Zone 2. Only 4% of the site is located in 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 shows the limited areas that are at risk during the design event have variable hazard ratings from *low* to *danger for most*. In this respect fluvial flood risk is considered 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.

As only a small proportion of the site is located in Flood Zone 3a with the majority of its area falling in Flood Zone 1 a residential development should be possible. However, it should be noted that access routes to and from the site are located within Flood Zone 2 and the design flood extent. The site is located in a flood warning area and given that it remains mostly flood free for the design and 0.1% AEP events safe refuge could be an option for some site users. Therefore provision of a Flood Evacuation Plan (FEP) is recommended at the planning stage.

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 2 Norman Place (CR14v) 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

2 Norman Place (CR14v) is a 0.55 ha site located in central Reading along the southern bank of the River Thames, see Figure 1. It is approximately 140 m from Reading train station and located in an urban area

In the Replacement Local Development Plan (RLDP) it is proposed for residential development, consisting of 130-190 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site is relatively flat. Areas of lower ground levels surround the site to the north, south, and east. These are related to the River Thames and Vastern Road, see Figure 2. The ground levels within the site boundary range from 37.1 to 38.9 m AOD. The average ground level is approximately 38.5 m AOD.

2.3 Nearby Watercourses

The site is located directly adjacent to the River Thames along its southern bank, see Figure 1.

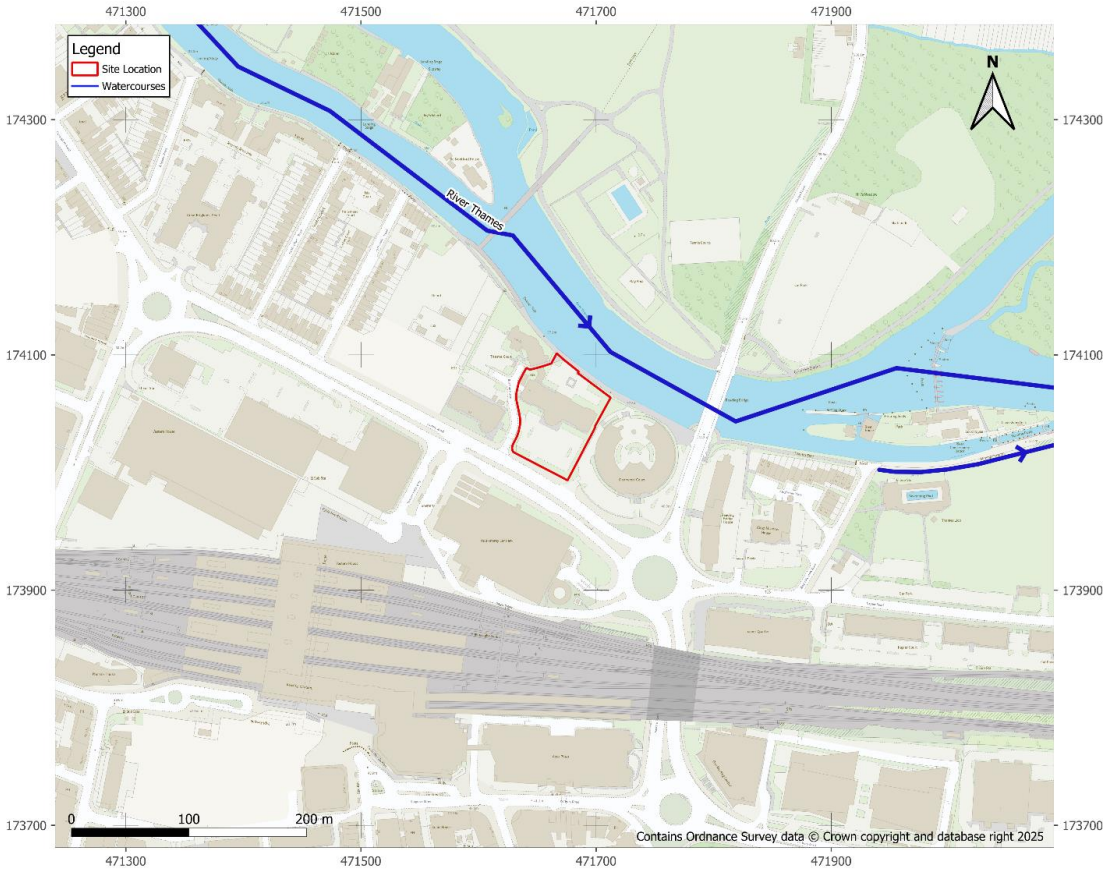

Figure 1 - Site Location

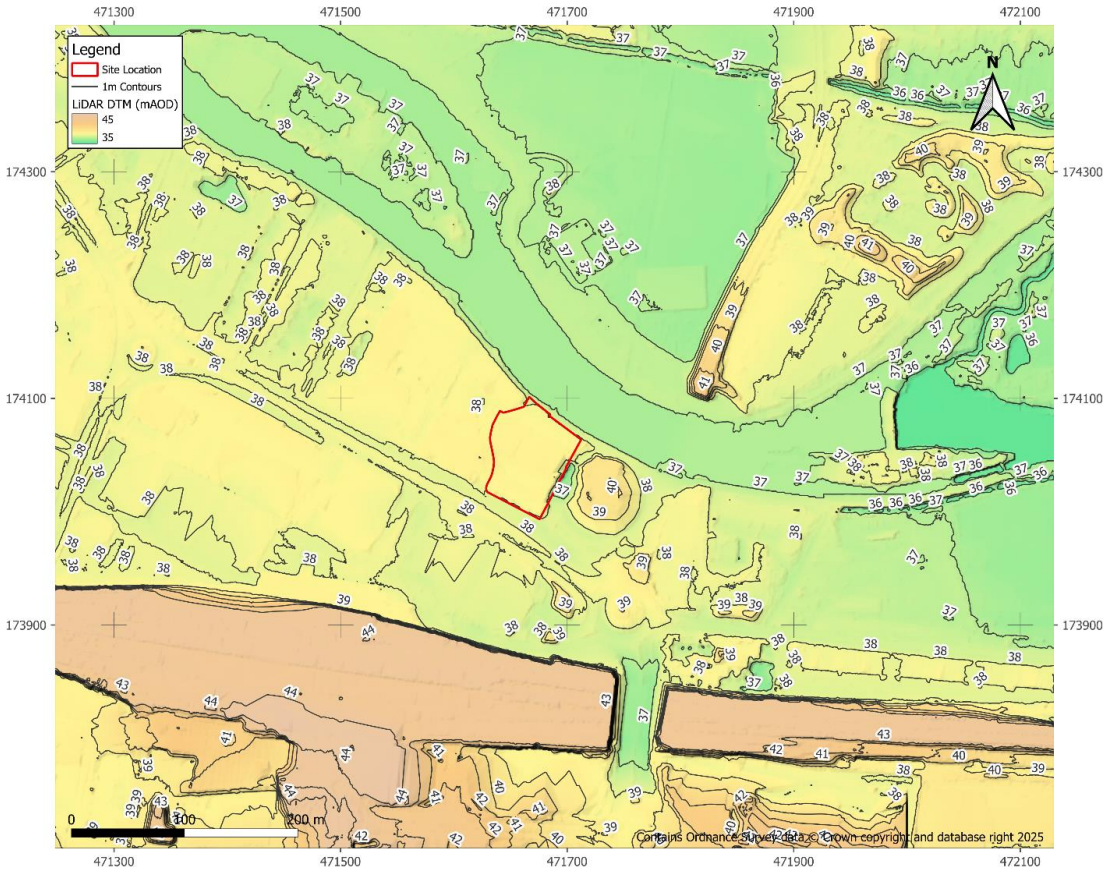

Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has one record of historical flooding at the site. This occurred in December 2000 and was associated with theRiver Thames.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 22% of the site is located within Flood Zone 2, and 4% is located within Flood Zone 3a. Viewing the model results for the 3.3% AEP event, no part of the site is located within 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, with the entire site located within Flood Zone 2 and the proportion of the site located in Flood Zone 3a increasing to 18%, 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 no part of the site to be inundated during a 3.3% AEP event, 3% is inundated during a 1.0% AEP event, and 6% is inundated during a 0.1% AEP event, see Figure 5. The area at risk is associated with a shallow depression in the topography within the car park of the existing building, and where the site borders the lower ground level of an adjacent building.

When considering the effects of climate change, the proportion of the site at risk for each event increases to 3%, 4%, and 6% respectively. Overall, the surface water flood risk to the site is 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 Silt are also present at this site, these are also expected to be freely draining. 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. However, given the site's location adjacent to 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 and Caversham EA Flood Warning Area.

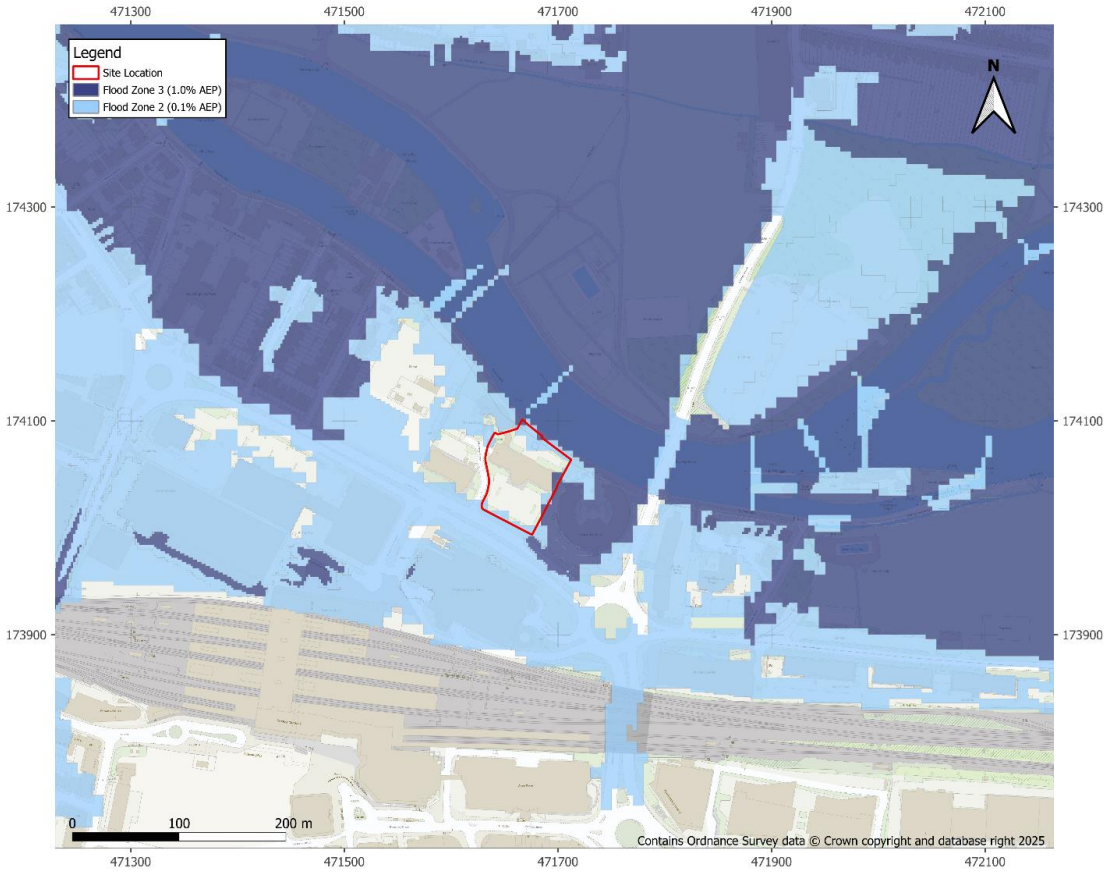

Figure 3 - Fluvial Flood Map

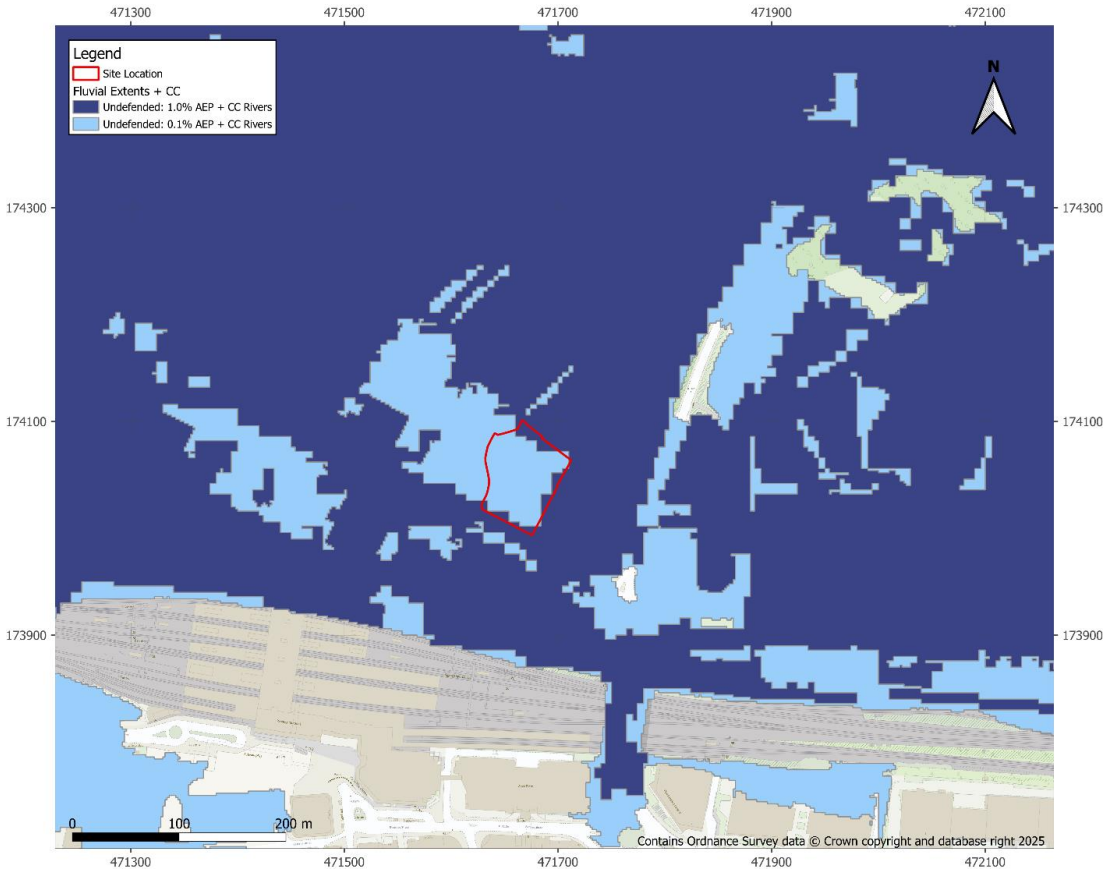

Figure 4 – Fluvial Climate Change Flood Map

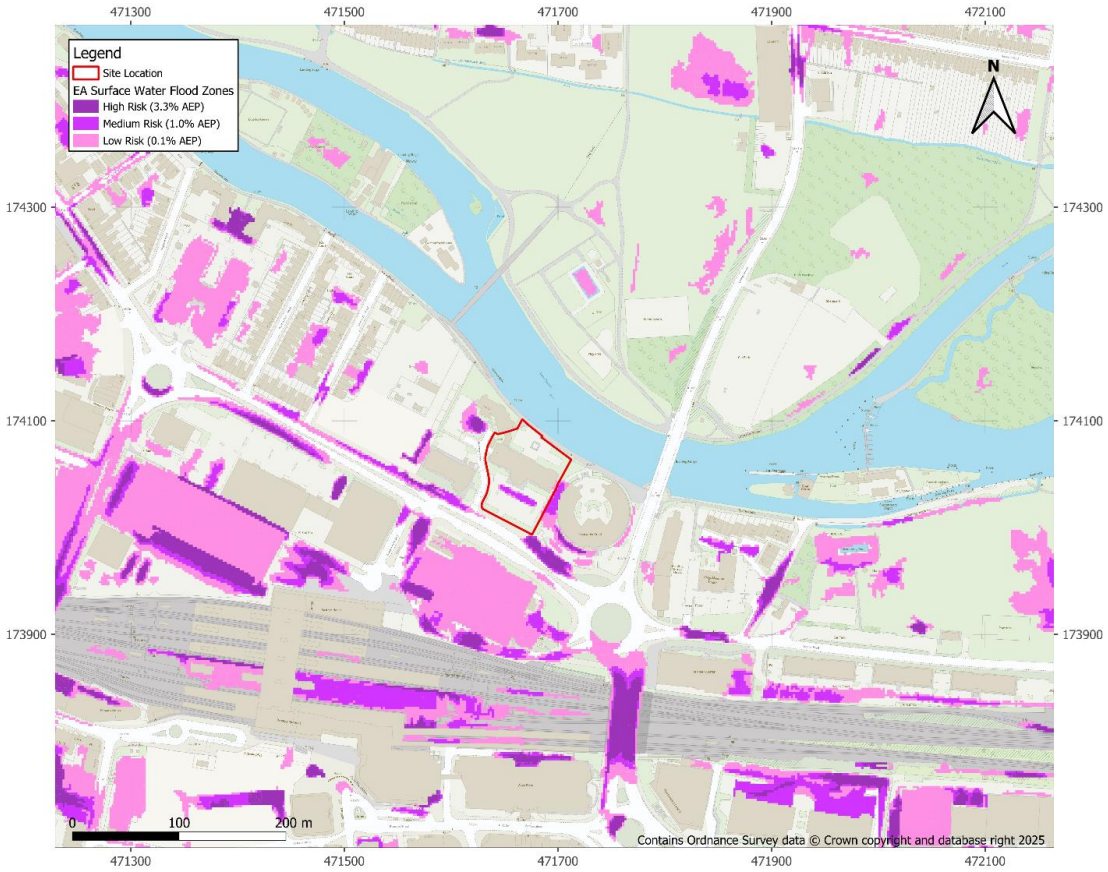

Figure 5 – Surface Water Flood Map

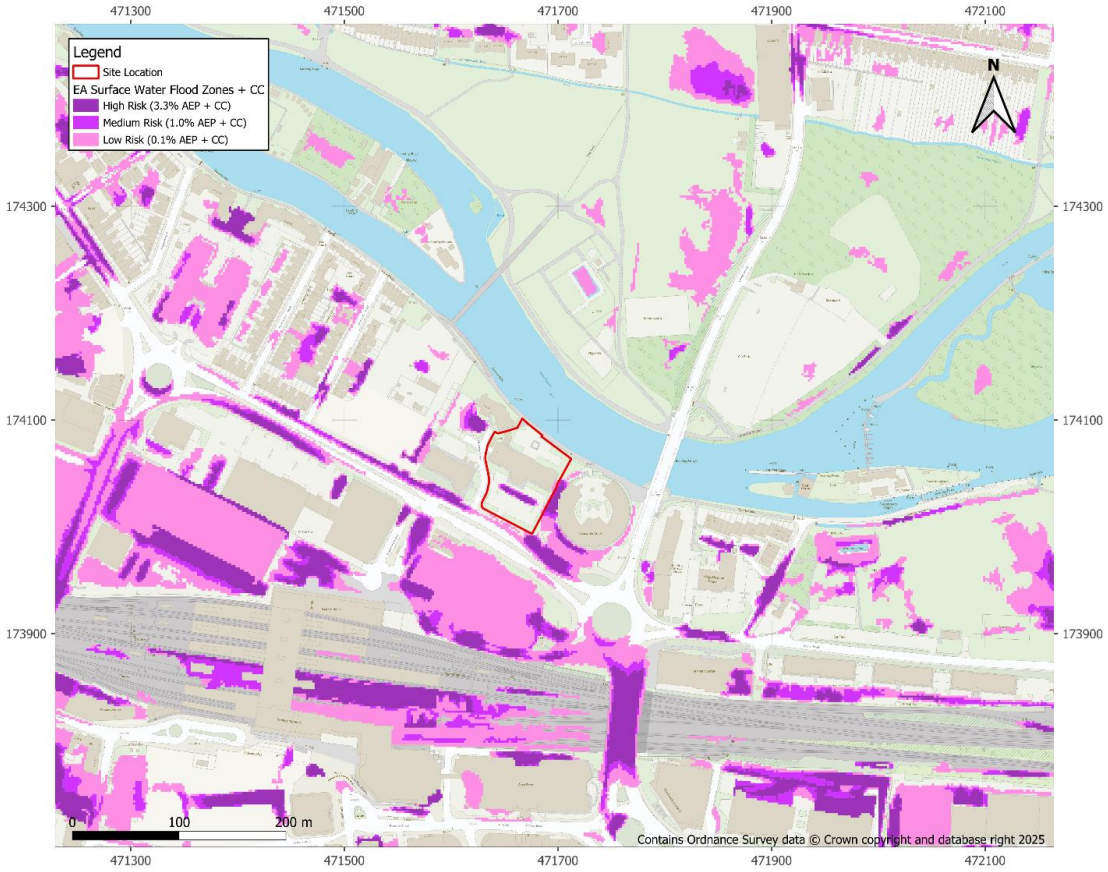

Figure 6 -Surface Water Climate Change Flood Map

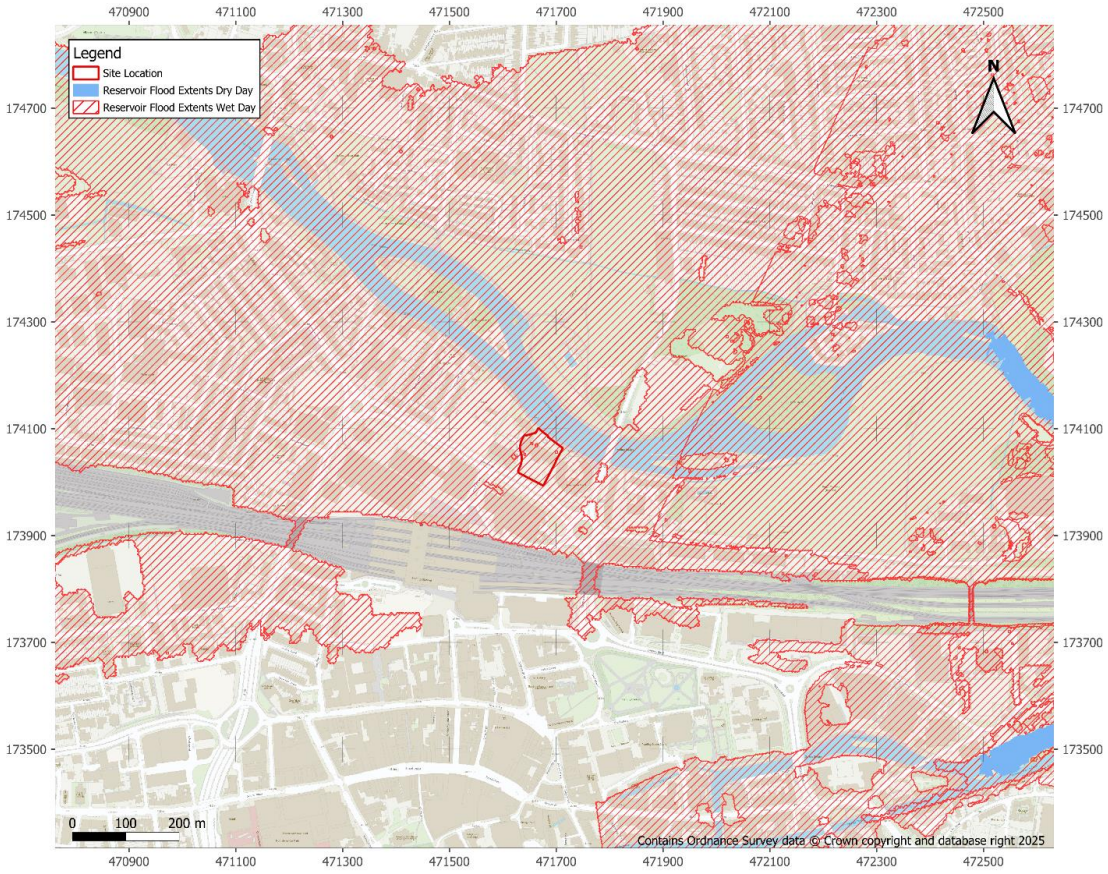

Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

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) informs the latest FMfP in this location and 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 38.2 m AOD, lower than the average ground level on the site. The hazard map for this event (see Figure 8) shows the areas of risk around the site have variable hazard ratings from *low* to *danger for most*. Flood depths are greatest along the eastern boundary whilst flow velocities are greatest along Vastern Road to the south. Given the location of the site relative to the River Thames, speed of onset values are very fast (<1-hr). 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 (%)	11%
Average Flood Depth (m)	0.1 m (Max - 0.8 m)
Average Velocity (m/s)	0.2 m/s (Max – 0.42 m/s)
Speed of Onset (hrs)	<1hr

4.3 Access and egress

Current vehicle access to the site is via Norman Place along the eastern boundary of the site. Pedestrians can also access the site via Vastern Road to the south. During an extreme flood event, the best route of egress, following the lowest hazard route, would be to follow Vastern Road west from the site. Site users should then continue south on the A329 below the railway line to the flood free area in the south of Reading, see Figure 9.

The majority of this route is inundated by Flood Zone 2 (0.1% AEP) and during the design event. Flood Hazard in some locations indicates *danger for most*. Therefore, providing adequate flood warning to site users will be vital. In general, the River Thames in this location is slow responding, however it should be noted that the site borders its southern bank so speed of onset values are very fast. The site is located in a flood warning area and given that it remains mostly flood free for the design and 0.1% AEP events safe refuge could be an option for some site users.

It is also important to note that the crossing beneath the railway line is 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.

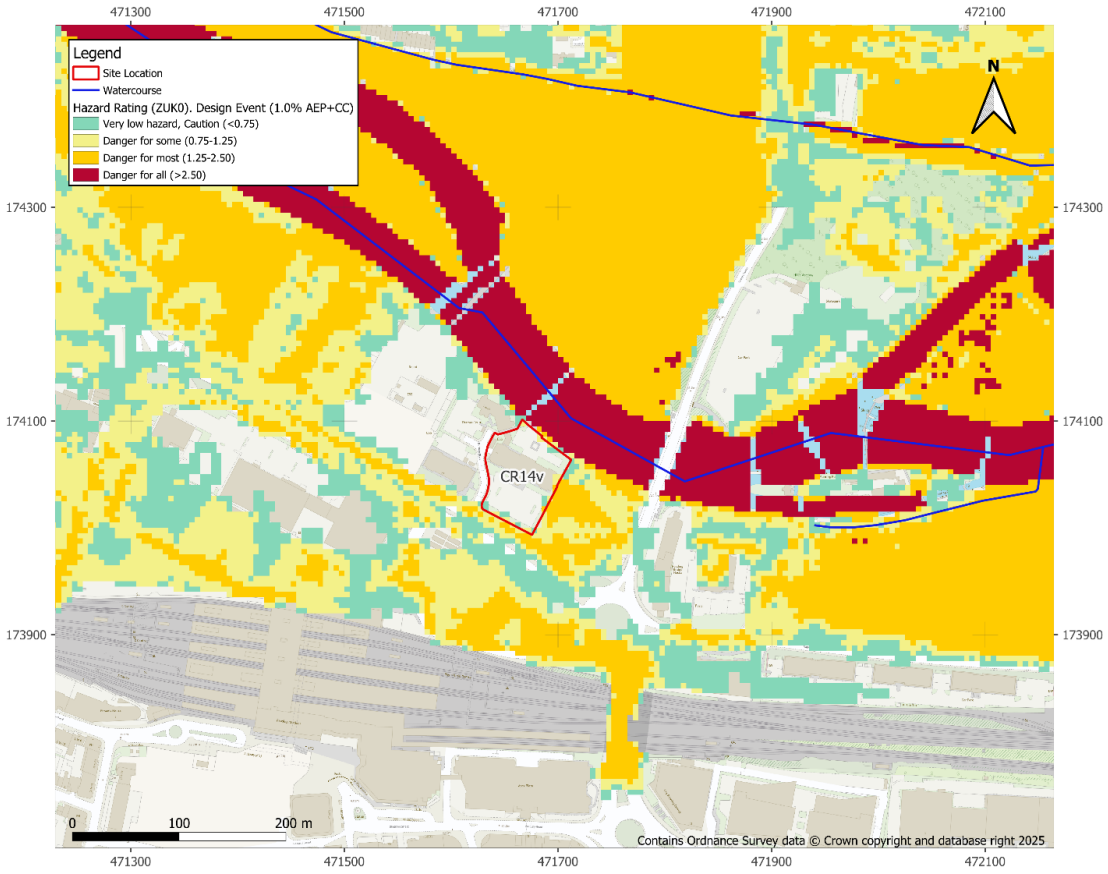

Figure 8 – Flood Hazard Map for the Design Event

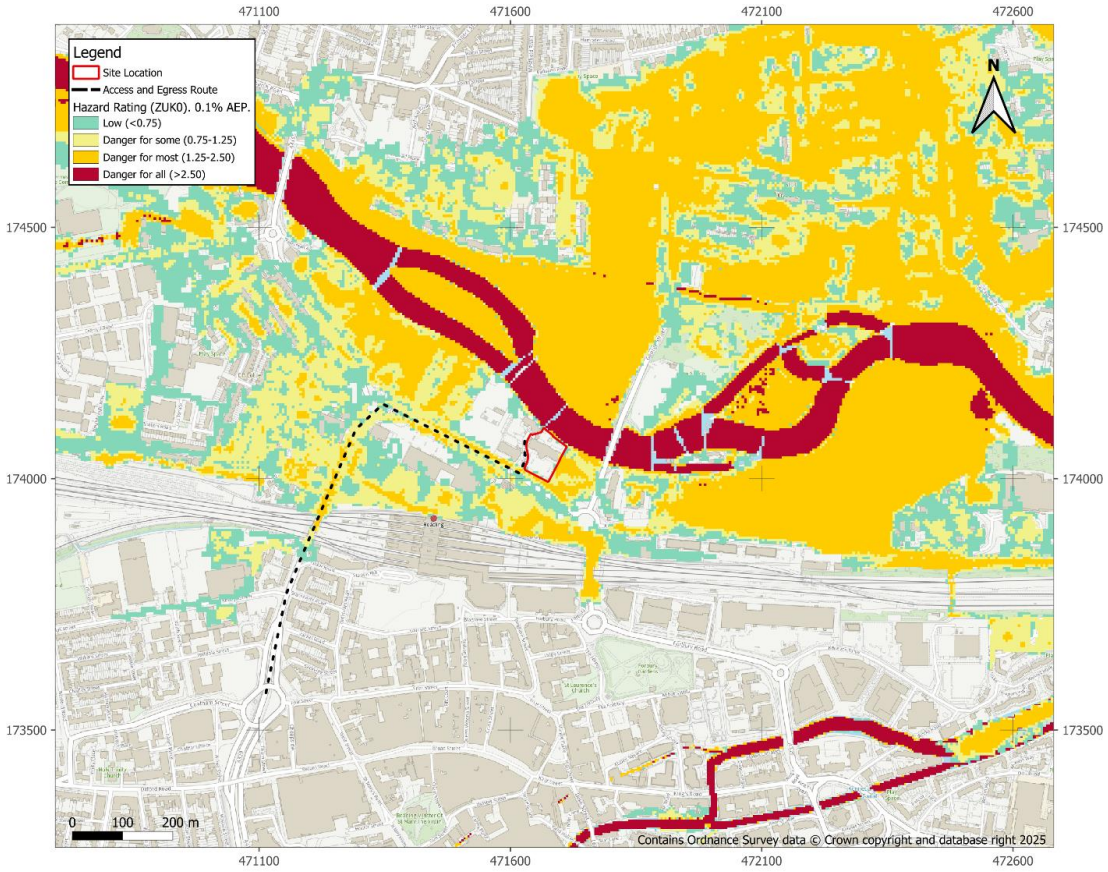

Figure 9 – Access/Egress Routes

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.

As only a small proportion of the site is located in Flood Zone 3a with the majority of its area falling in Flood Zone 1 a residential development should be possible. However, it should be noted that access routes to and from the site are located within Flood Zone 2 and the design flood extent, therefore provision of a Flood Evacuation Plan (FEP) is recommended at the planning stage.

5.2 Scale of Development

The total site area is currently 0.55 ha; allocated for 130-190 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 small area lying within the modelled design flood extent. This should in turn reduce the need for compensatory storage which could compromise the land available for development.

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 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.

5.4 Other Site-Specific Considerations

Areas of surface water flood risk are present within the car park of the existing development and along the access route. 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. Given both the fluvial and surface water flood risk to the site access route, as already mentioned provision of a FEP is recommended.

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 managed and 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, 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.