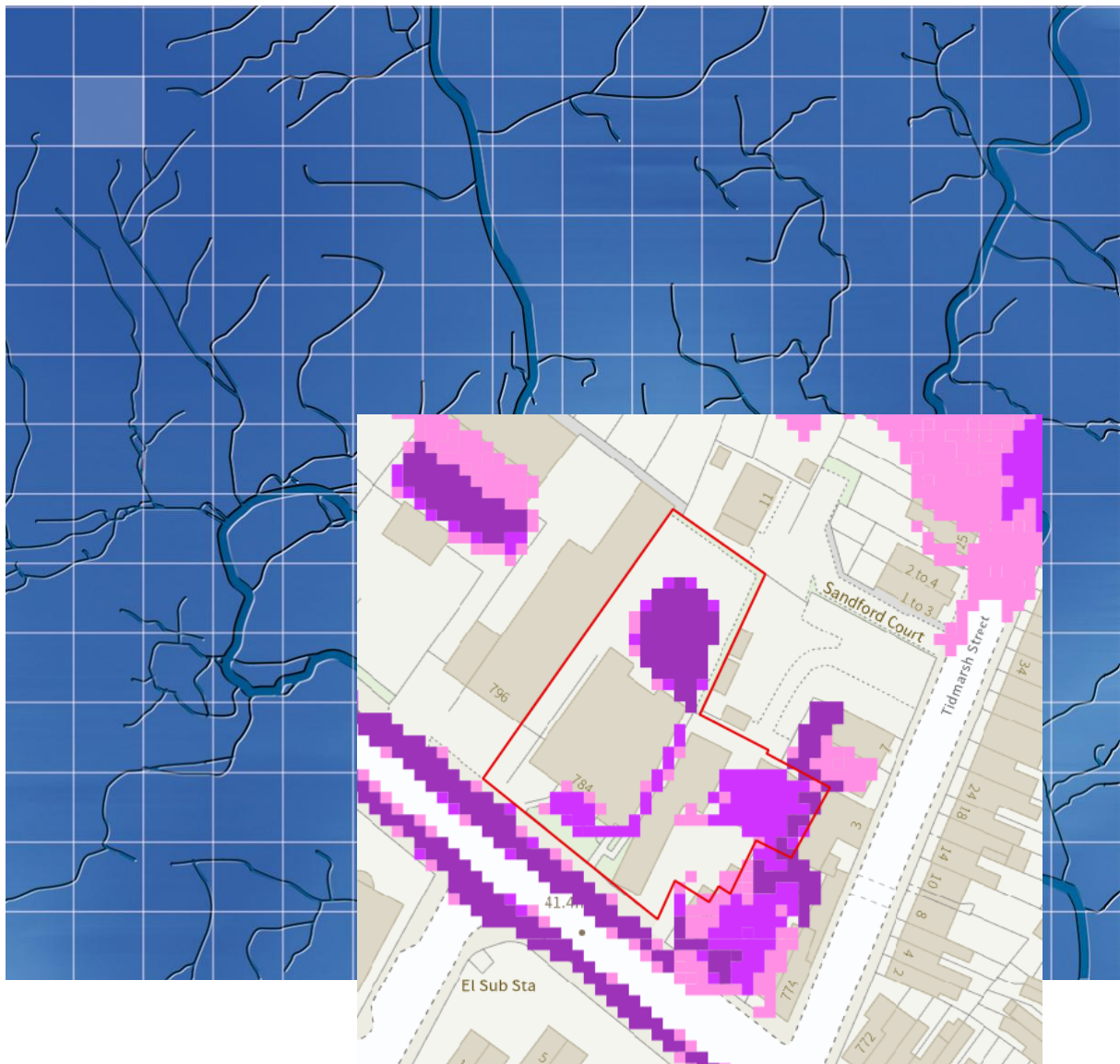


Reading Borough Council

May 2025

# 784-794 Oxford Road (WR3k)

## Level 2 Strategic Flood Risk Assessment



## Reading Borough Council

### 784-794 Oxford Road (WR3k) Level 2 Strategic Flood Risk Assessment

#### Document issue details

WHS10135

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For and on behalf of Wallingford HydroSolutions Ltd.

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## 784-794 Oxford Road (WR3k) Level 2 SFRA

### Flood Risk Overview

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

#### Flood Risk

Pluvial flood risk represents the greatest risk of flooding to the site, however fluvial flood risk is also present with 17% of the site located in Flood Zone 2.

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 for the design 1.0% AEP plus climate change event were further assessed and show speed of onset to be slow on the site and flood depths to be low.

The national pluvial flood maps show 28% of the site to be at risk during the design 1.0% AEP plus climate change event. For the most part flood depths are limited to less than 0.2m.

The risk from other sources is considered to be moderate.

The overall confidence in the assessment is moderate. Whilst detailed modelling is available, national scale mapping has been used to inform the assessment of pluvial flooding which is considered the primary flood risk mechanism at 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 terms of fluvial flood risk, a new residential development at the site will be permissible given that the site lies completely outside of Flood Zone 3a, with only a small amount of the site inundated during the design event when considering climate change. It should be noted that the risk of surface water flooding at the site is greater, it inundates 28% of the site in the design event. The implications for the development should be manageable however it will need to be considered when placing infrastructure. Development of a bespoke hydraulic model should be considered to support a site-specific FRA at the site.

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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 784-794 Oxford Road (WR3k) 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**

784-794 Oxford Road (WR3k) is a 0.22 ha site located in a suburban area in the west of Reading, see Figure 1.

In the Replacement Local Development Plan (RLDP) it is proposed to be used for residential development consisting of 18-26 dwellings.

### **2.2 Topography**

Based on 1m LiDAR data, the site slopes slightly from southwest to northeast, see Figure 2. Ground levels in the surrounding area also follow this pattern. The ground levels within the site boundary range from 39.2 to 42.6 m AOD with the average ground level being 39.9 m AOD.

### **2.3 Nearby Watercourses**

The site is located approximately 600 m southeast of the River Thames, see Figure 1. A small unnamed tributary of the Thames is located approximately 1 km northeast of the site.



## 784-794 Oxford Road (WR3k) Level 2 SFRA



Figure 1 - Site Location

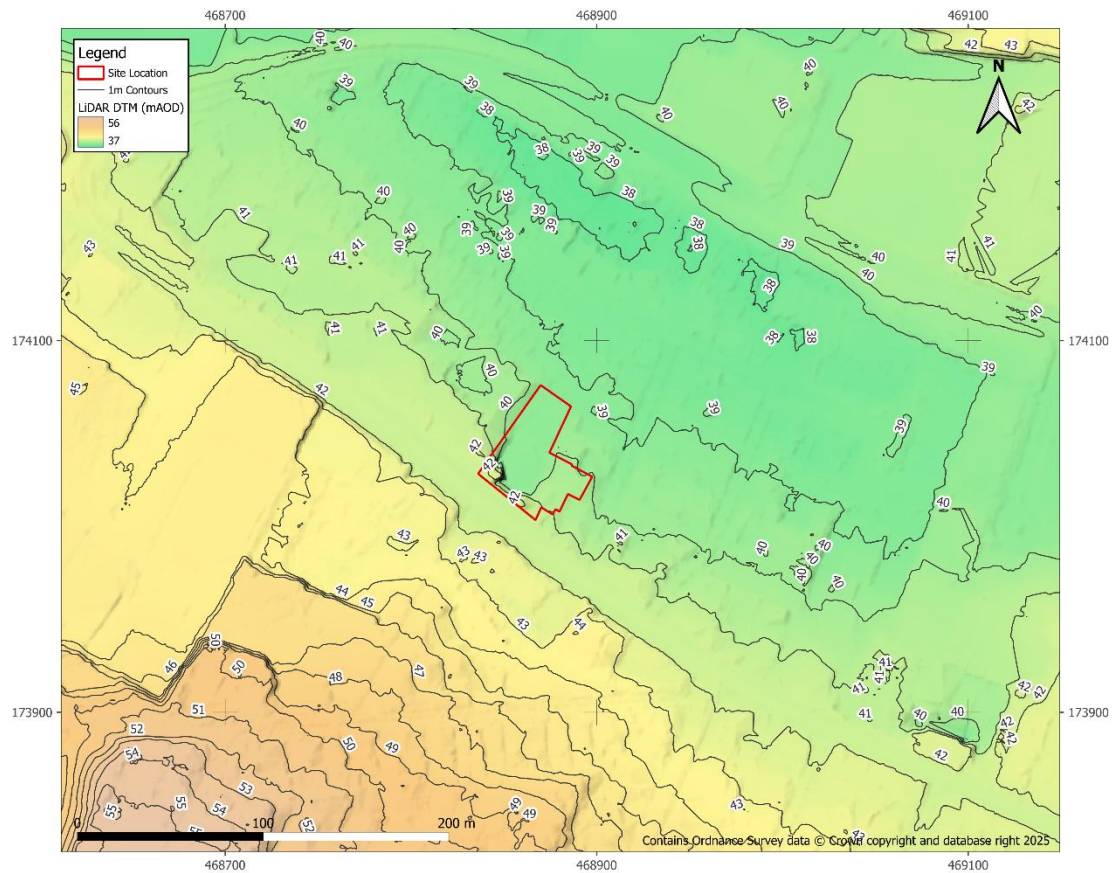


Figure 2 – Topography

### **3 Flood Risk**

#### **3.1 Historical Flooding**

The EA has no record of historic flooding at the location of the site. The closest record of flooding is approximately 220 m northwest of the site and occurred in March 1947 due to the River Thames exceeding its channel capacity.

#### **3.2 Fluvial Flood Risk**

In the existing Flood Map for Planning (FMfP), 17% of the site is located within Flood Zone 2. No part of the site is located within 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 area of the site located within Flood Zone 2 increases to 67%, however the site remains outside of Flood Zone 3a, 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 map shows 12% of the site is inundated by the 3.3% AEP event, 25% is inundated in the 1.0% AEP event and 29% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportion of the site at risk increases to 24%, 28%, and 56% respectively, see Figure 6.

Overall, the risk of surface water flooding is considered to be moderate and 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. It is expected to permit high amounts of infiltration. Superficial deposits of Taplow gravel and Head 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.

#### **3.6 Reservoir Flood Risk**

The FMfP shows that the majority of the 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 partially located within the River Thames at Reading and Caversham EA Flood Warning area.



## 784-794 Oxford Road (WR3k) Level 2 SFRA

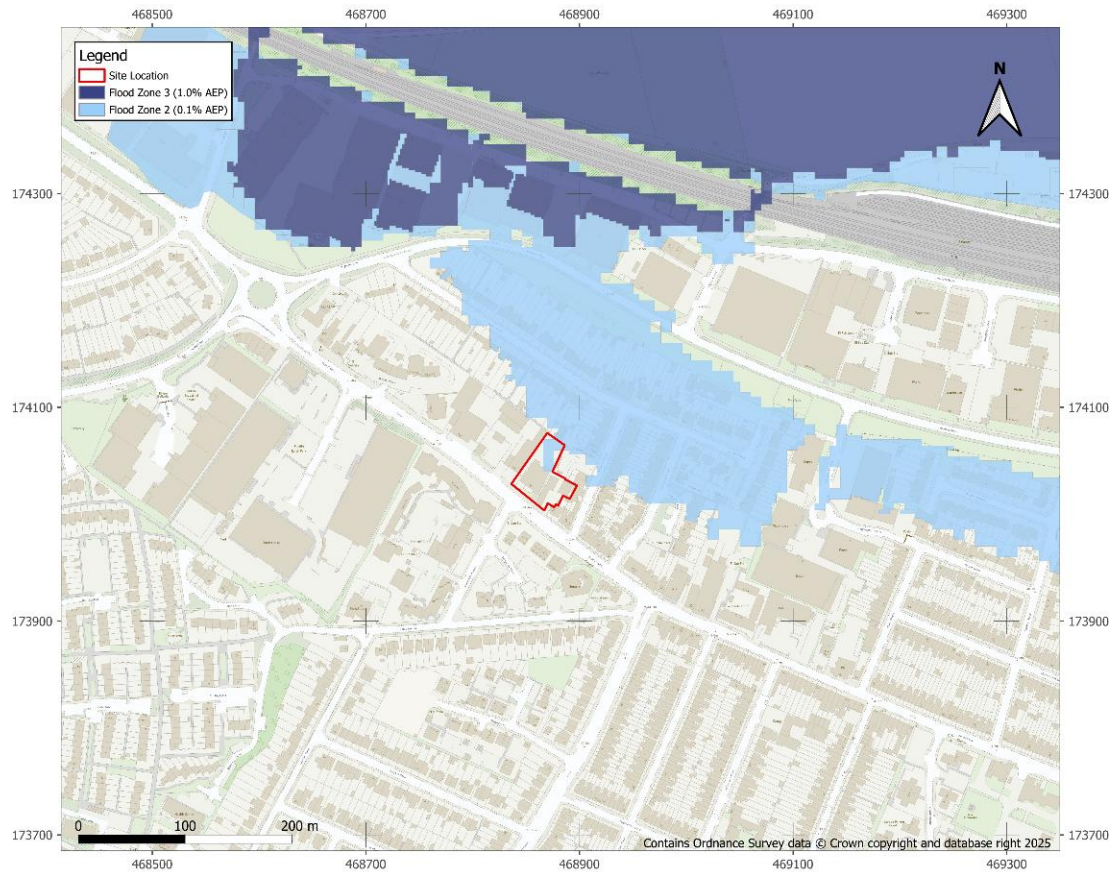


Figure 3 - Fluvial Flood Map

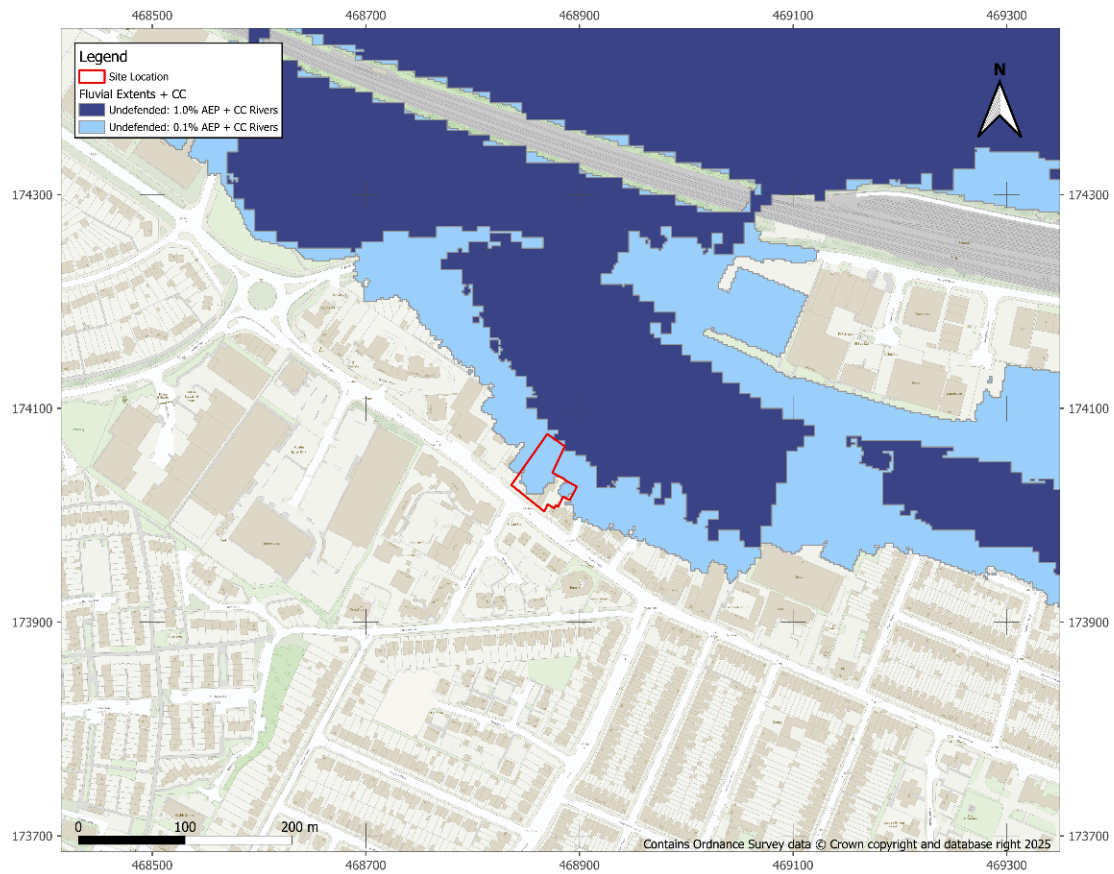


Figure 4 - Fluvial Climate Change Flood Map

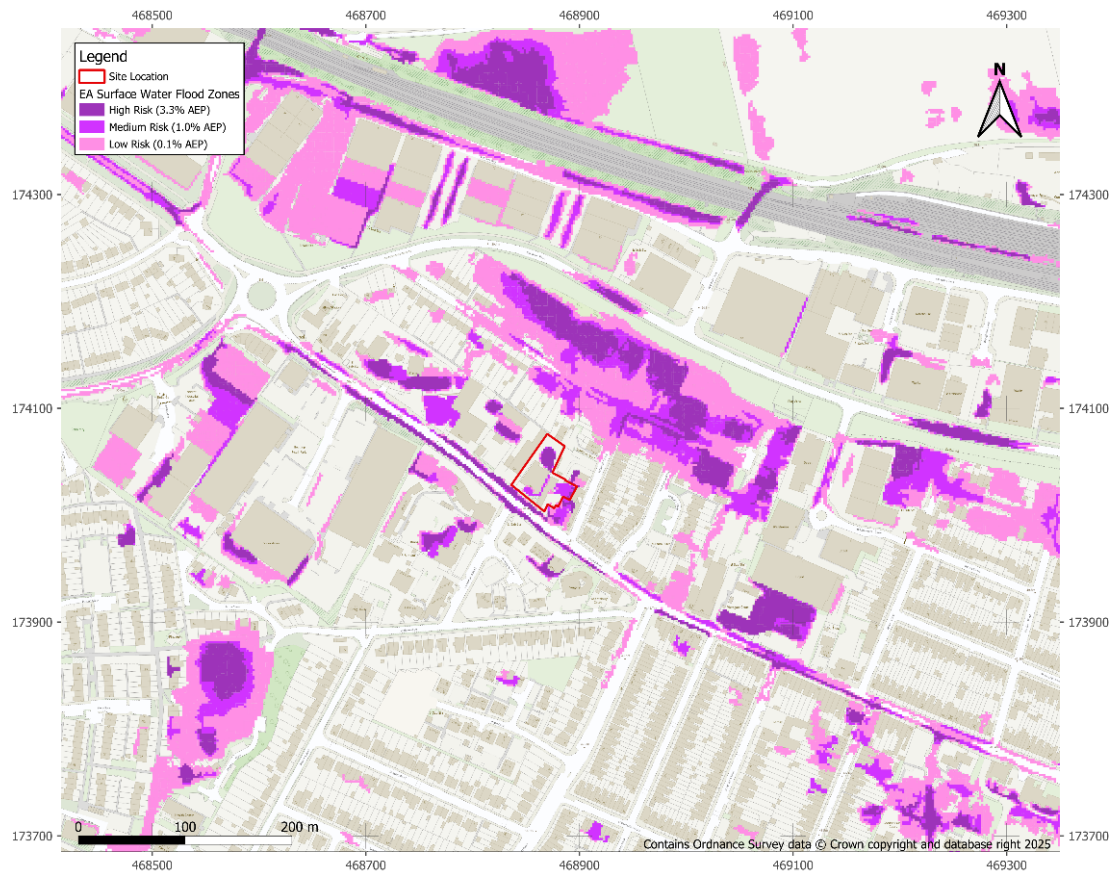


Figure 5 – Surface Water Flood Map

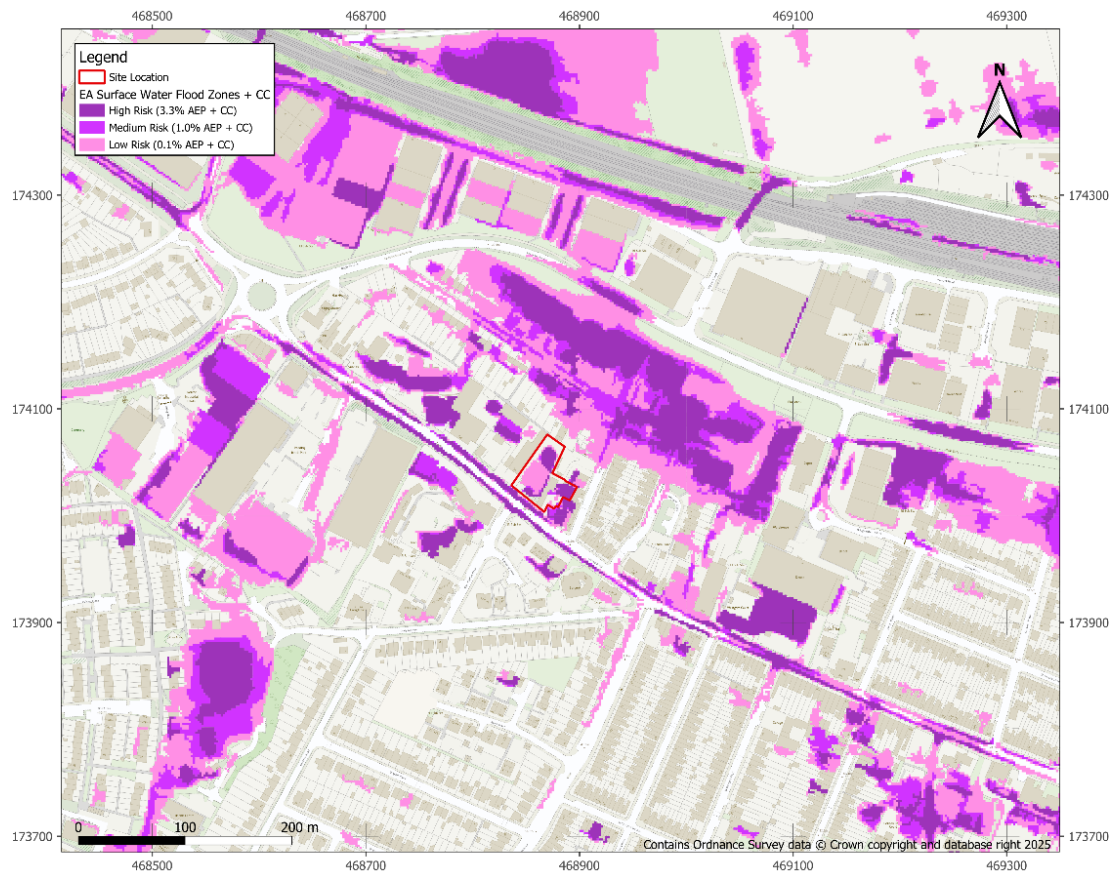


Figure 6 -Surface Water Climate Change Flood Map



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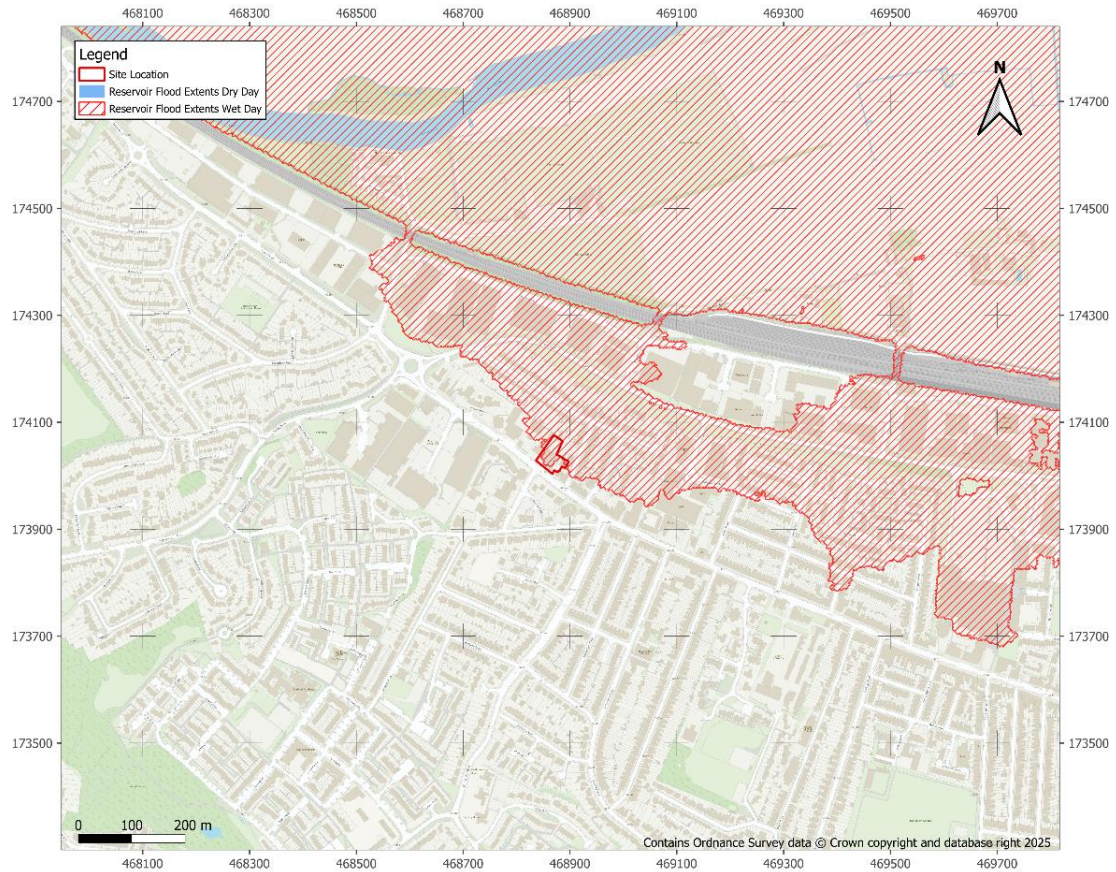


Figure 7 - Reservoir Failure Flood Map

## 4 Detailed Review of Primary Flood Risk

### 4.1 Primary Flood Risk

Surface water flooding is considered to be the primary flood risk mechanism at the site, however the level of risk due to fluvial flooding is only slightly lower. Therefore, as a precautionary approach both are assessed in more detail for the design event 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 1.0% AEP + 31% climate change design event, the maximum flood level at the site is 39.2 m AOD, however less than 1% of the site area is inundated by flood waters. The hazard map for this event (see Figure 8) shows the site has a low hazard rating indicating low velocities and depths. Table 1 shows the flood risk metrics associated with the design event.

**Table 1- Flood Risk Metrics**

	<b>Design Event 1.0% AEP +31% CC</b>
Percentage Inundated (%)	<1%
Average Flood Depth (m)	0.05 m (Max - 0.11 m)
Average Velocity (m/s)	0.00 m/s (Max - 0.005 m/s)
Speed of Onset (hrs)	244 hrs

In terms of pluvial flooding, during the 1.0% AEP + Climate Change event, 28% of the site is inundated. The current extents are based on national scale mapping, velocity data is not available however depth banding is available. For the area inundated during the design event the depth banding is mostly below 0.2m depth, this is with the exception of a isolated area to the south of an existing building on the site, where flood depths exceed 1.0m. Based on surface topography, the adjacent Oxford Road has slightly raised ground levels compared to the site. This may result in surface water building up along the northern site boundary fence line. However, the site is bordered by a number properties along the western, northern, and eastern boundaries. Therefore, surface water flow routes in such locations could be complex and may not be captured by the assumptions in the national scale mapping.

### 4.3 Access and egress

All access to the site is via Oxford Road to the southwest. During all modelled fluvial design events this road remains flood free. However, Oxford Road is at pluvial flood risk during the design event. Therefore, site users should continue southwest along Constitution Road which is in Flood Zone 1 and has a very low risk of surface water flooding, see Figure 9.



## 784-794 Oxford Road (WR3k) Level 2 SFRA

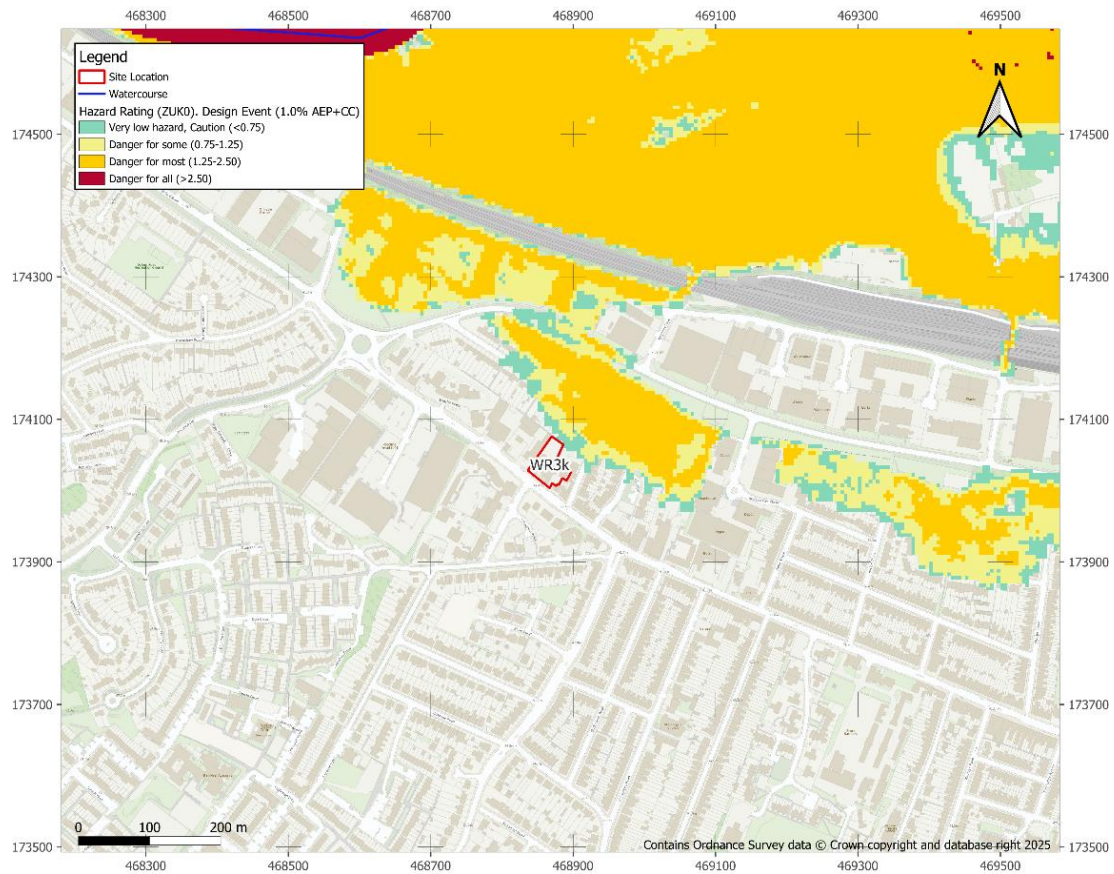


Figure 8 – Flood Hazard Map for the Design Event

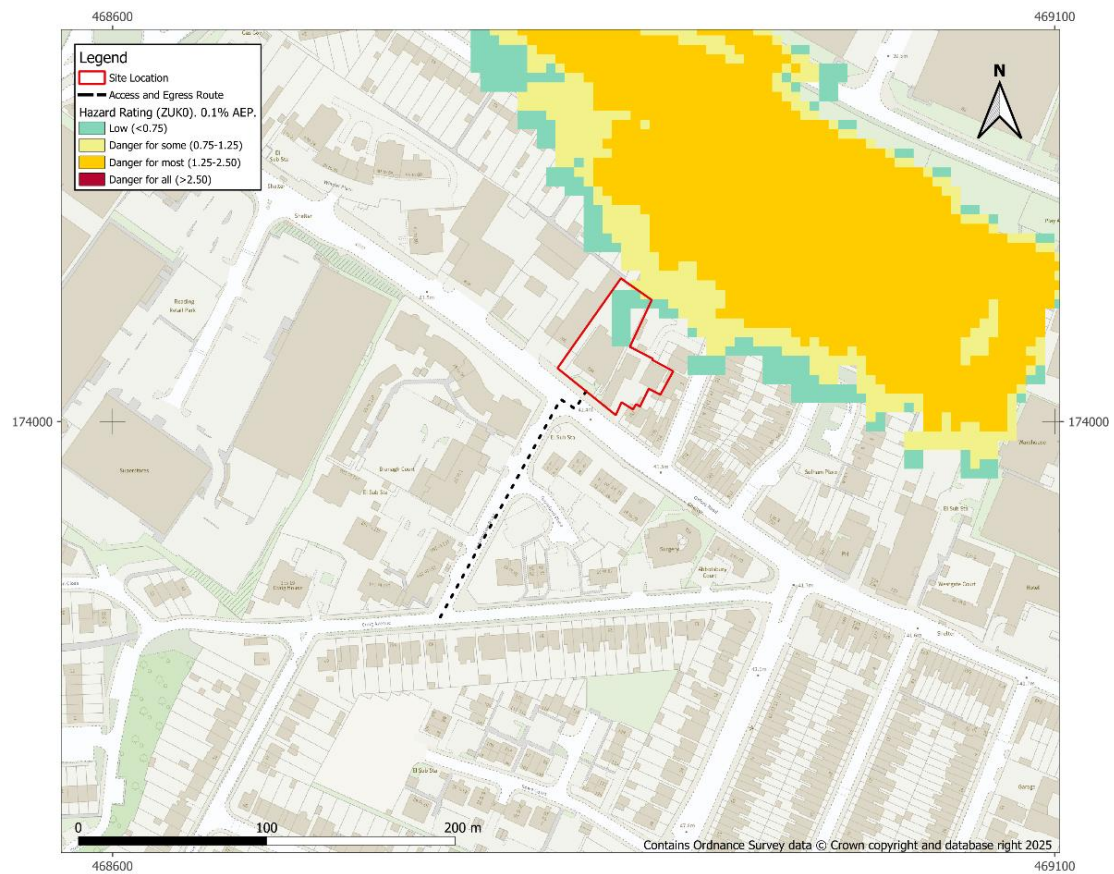


Figure 9 – Access/Egress Routes

## 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 terms of fluvial flood risk, a new residential development at the site will be permissible given that the site lies completely outside of Flood Zone 3a, with only a small amount of the site inundated during the design event when considering climate change. It should be noted that the risk of surface water flooding at the site is greater, it inundates 28% of the site in the design event. The implications for the development should be manageable however it will need to be considered when placing infrastructure. Development of a bespoke hydraulic model should be considered to support a site-specific FRA at the site.

### 5.2 Scale of Development

The total site area is currently 0.22 ha; allocated for 18-26 residential dwellings. Currently a significant proportion of the site is within the surface water flood extents. These will need to be considered when choosing where to locate infrastructure on site. As mentioned above further analysis is recommended to verify the surface water flood extents.

### 5.3 Sequential Approach

A sequential approach should be undertaken using the surface water flood extent prioritising more vulnerable residential development in lower flood risk areas (outside of the design flood extent if possible) 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 surface water climate change extents are used, which more clearly show the graduation in flood risk across the site. The fluvial flood extents should also be considered.

### 5.4 Other Site-Specific Considerations

The pluvial flood risk at the site is considered to be the primary flood risk mechanism at the site and is currently based on national scale mapping. It should not be a significant barrier to development as a large majority of the site is not at risk. However, 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, this may include development of a bespoke hydraulic model. 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.