

Reading Borough Council

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Kenavon Drive & Forbury Business Park (CR13c)

Level 2 Strategic Flood Risk Assessment



WHS

Reading Borough Council

Kenavon Drive & Forbury Business Park (CR13c) Level 2 Strategic Flood Risk Assessment

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For and on behalf of Wallingford HydroSolutions Ltd.

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Kenavon Drive & Forbury Business Park (CR13c) 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 to the site based on the EA's fluvial flood map. However, only a small proportion of the site is located in Flood Zone 2 and none of the site falls within Flood Zones 3a or 3b.

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 flood depths and velocities to be moderate. In this respect fluvial flood risk is considered moderate.

It should be noted that pluvial flooding is also significant at the site. It shows greater extents for the baseline 1.0% AEP and 0.1% AEP events than fluvial flooding. Overall, it has been classified as a moderate risk at this stage. The risk from other sources of flooding is considered to be low.

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

Both residential development and healthcare facilities are *More Vulnerable Development*, whereas open space is classed as *Water Compatible*. In terms of *More Vulnerable Development*, it 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. Water compatible development is permissible in all Flood Zones provided it does not increase flood risk elsewhere.

As none of the site is located in Flood Zone 3a or 3b with most of its area falling in Flood Zone 1 a mixed-use development should be possible. Whilst there is a risk of surface water flooding at the site, it is limited to the north of the site and only inundates 16% of the site in the design event so 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 Kenavon Drive & Forbury Business Park (CR13c) 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 Kenavon Drive & Forbury Business Park (CR13c) site is 2.07 ha in area and located east of central Reading, see Figure 1. It is located between the River Kennet to the south and a railway line to the north.

In the Replacement Local Development Plan (RLDP) it is proposed to be used for mixed use development. The majority of the development will be residential with an area of open space close to the River Kennet and the potential for a primary healthcare facility. Between 320 and 490 dwellings are proposed for the site.

2.2 Topography

Based on 1m LiDAR data, the site slopes slightly from south to north, see Figure 2. The ground levels within the site boundary range from 37.4 to 38.7 m AOD. The average ground level is 38.0 m AOD.

Around the site, there are higher ground levels to the north and west, and lower ground levels to the south and east.

2.3 Nearby Watercourses

The site is located approximately 40 m north of the River Kennet, see Figure 1. At this location the River Kennet flows from southwest to northeast and connects to the Kennet and Avon Canal via a weir. The confluence of the River Kennet and the River Thames is located approximately 540 m northeast of the site. The River Thames flows from west to east through Reading.

Kenavon Drive & Forbury Business Park (CR13c) Level 2 SFRA

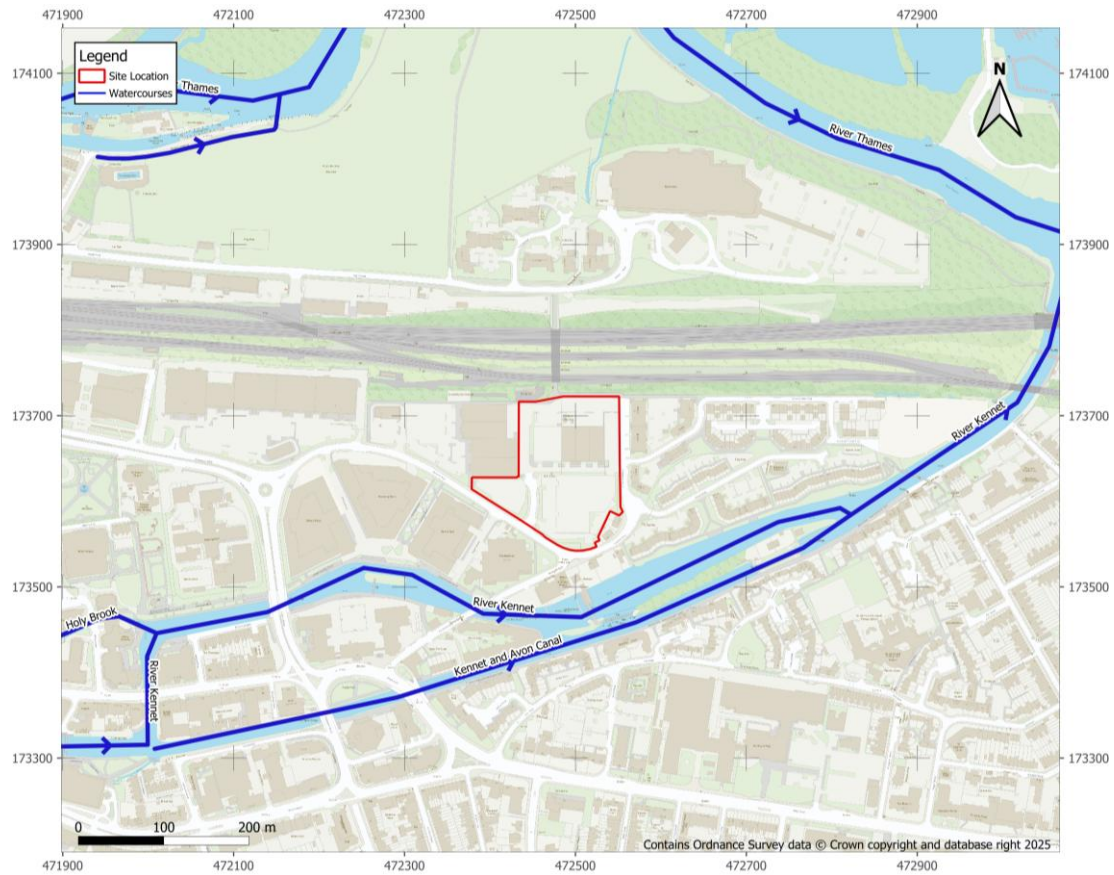


Figure 1 - Site Location

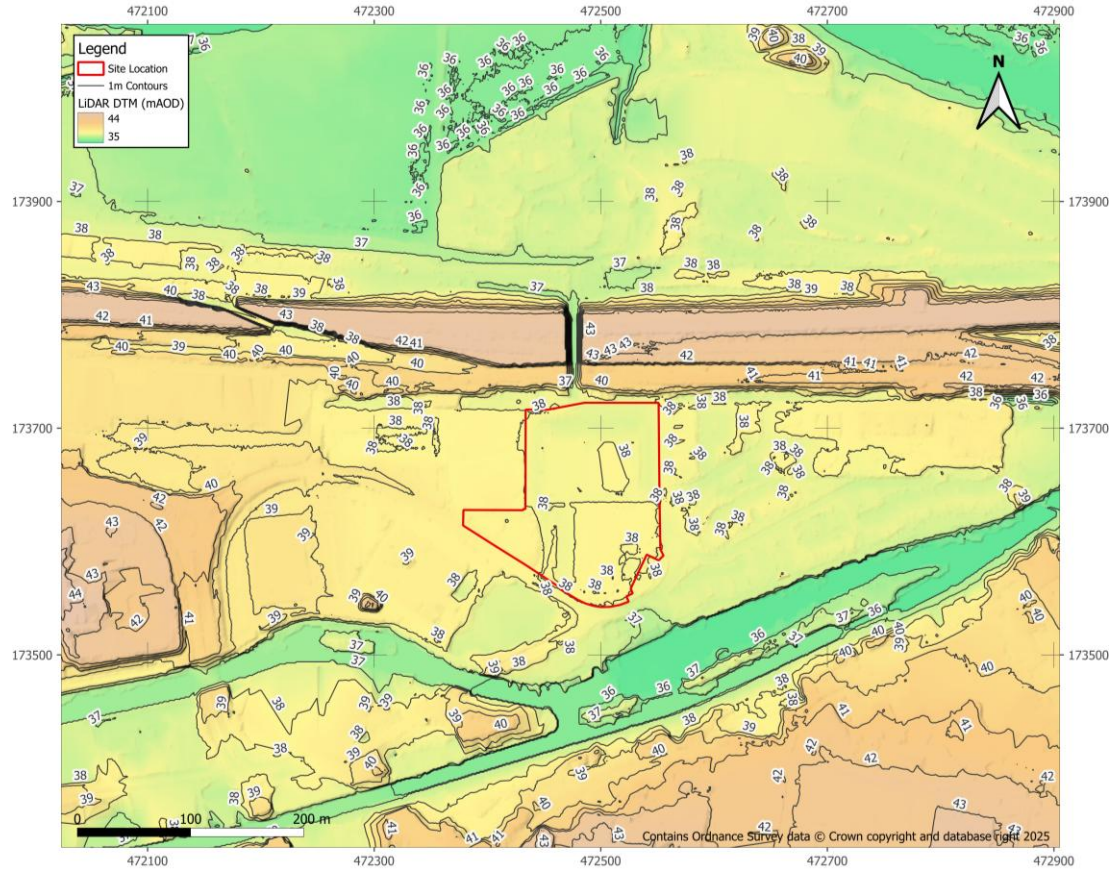


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding within the site. The closest record of flooding is associated with the River Kennet located approximately 40 m south of the site, along the banks of the River Kennet.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 9% of the site is located within Flood Zone 2, and no part 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 proportion of the site located in Flood Zone 2 increases to 89% and 1% of the site is located within 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 surface water flood risk predominantly in the north of the site. In total 6% of the site is inundated during the 3.3% AEP event, 11% is inundated during the 1.0% AEP event, and 20% is inundated during the 0.1% AEP event, see Figure 5. When considering the effects of climate change, these proportions increase to 9%, 14% and 23% respectively, see Figure 6.

Overall, surface water flood risk 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 Alluvium are also present at this site, these are also expected to be freely draining. The underlying soils are loamy and clayey floodplain soils which are naturally wet.

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 between two rivers, 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 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 not located within an EA Flood Warning Area.

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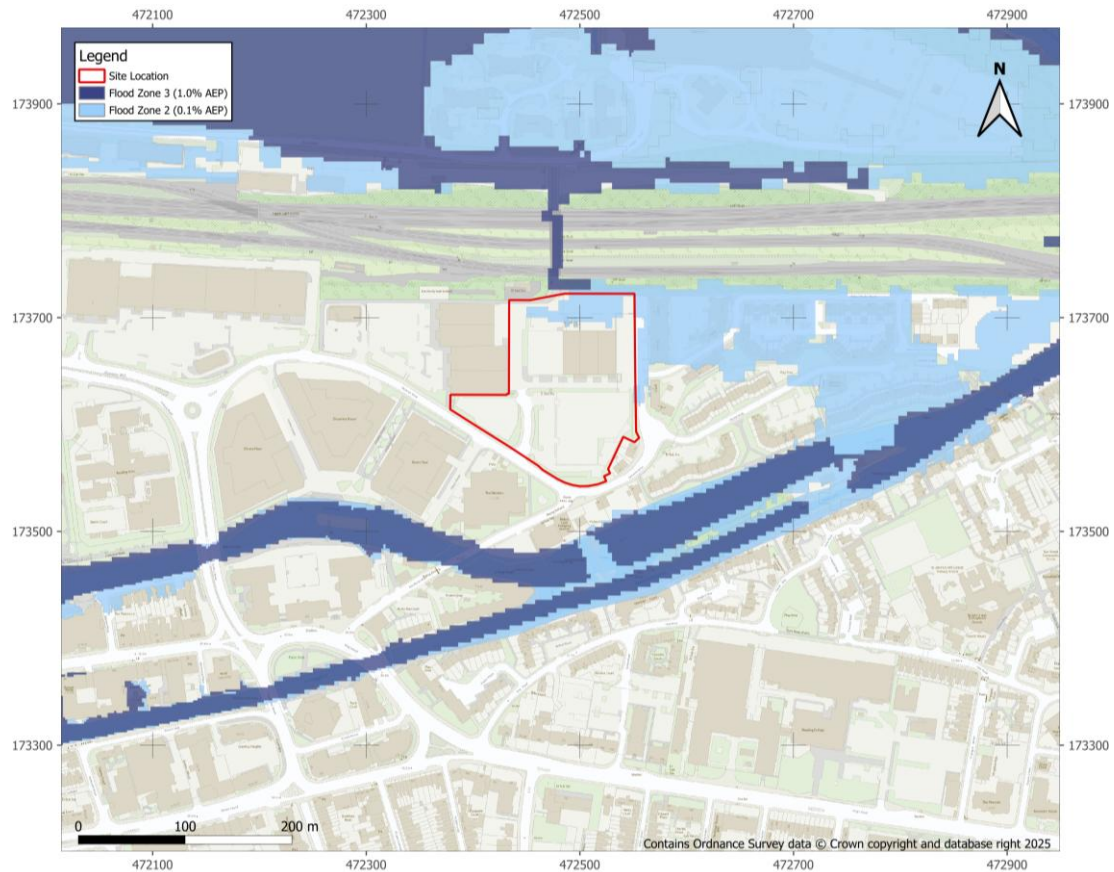


Figure 3 - Fluvial Flood Map

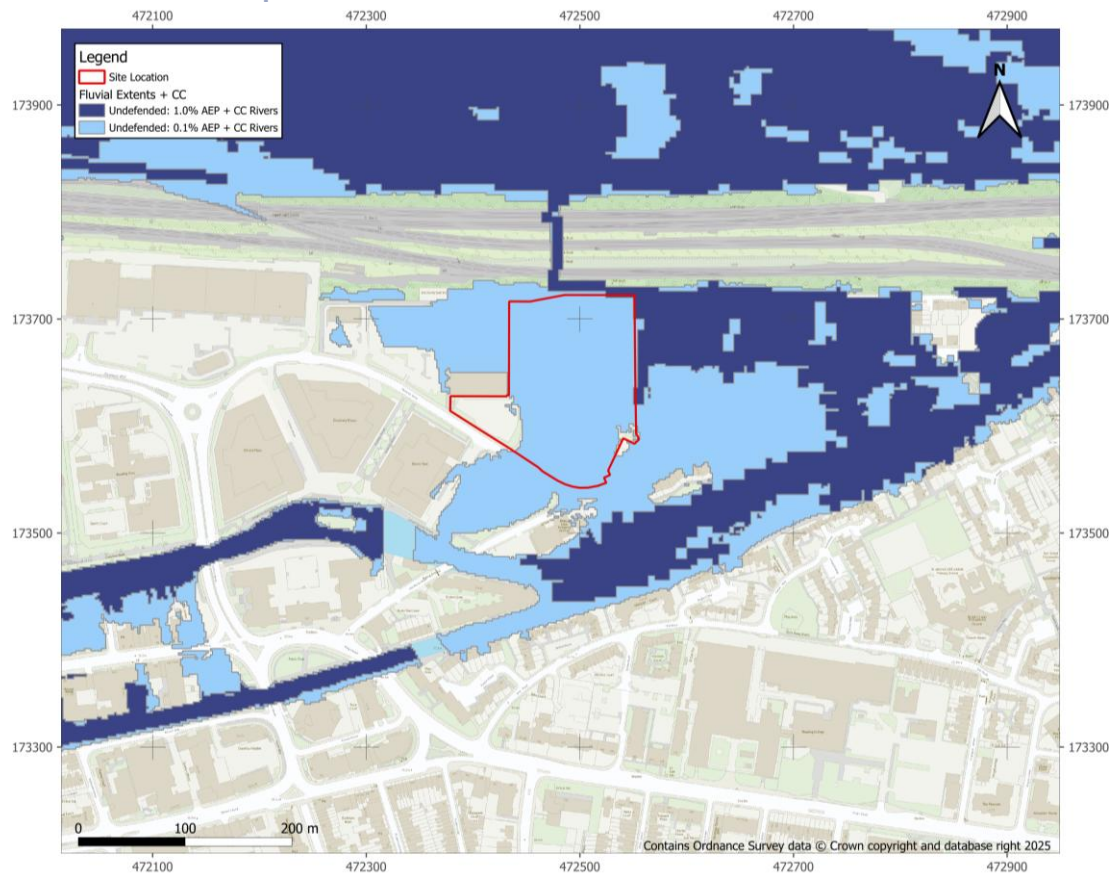


Figure 4 - Fluvial Climate Change Flood Map

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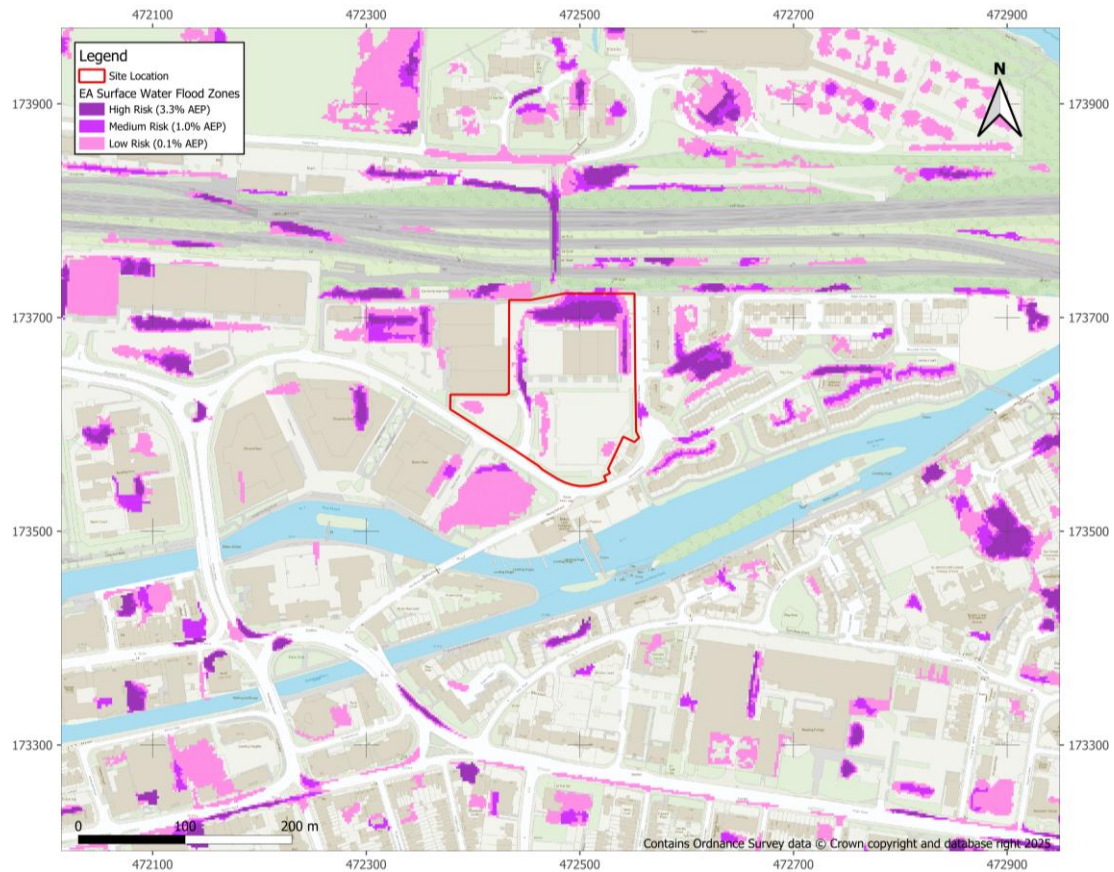


Figure 5 – Surface Water Flood Map

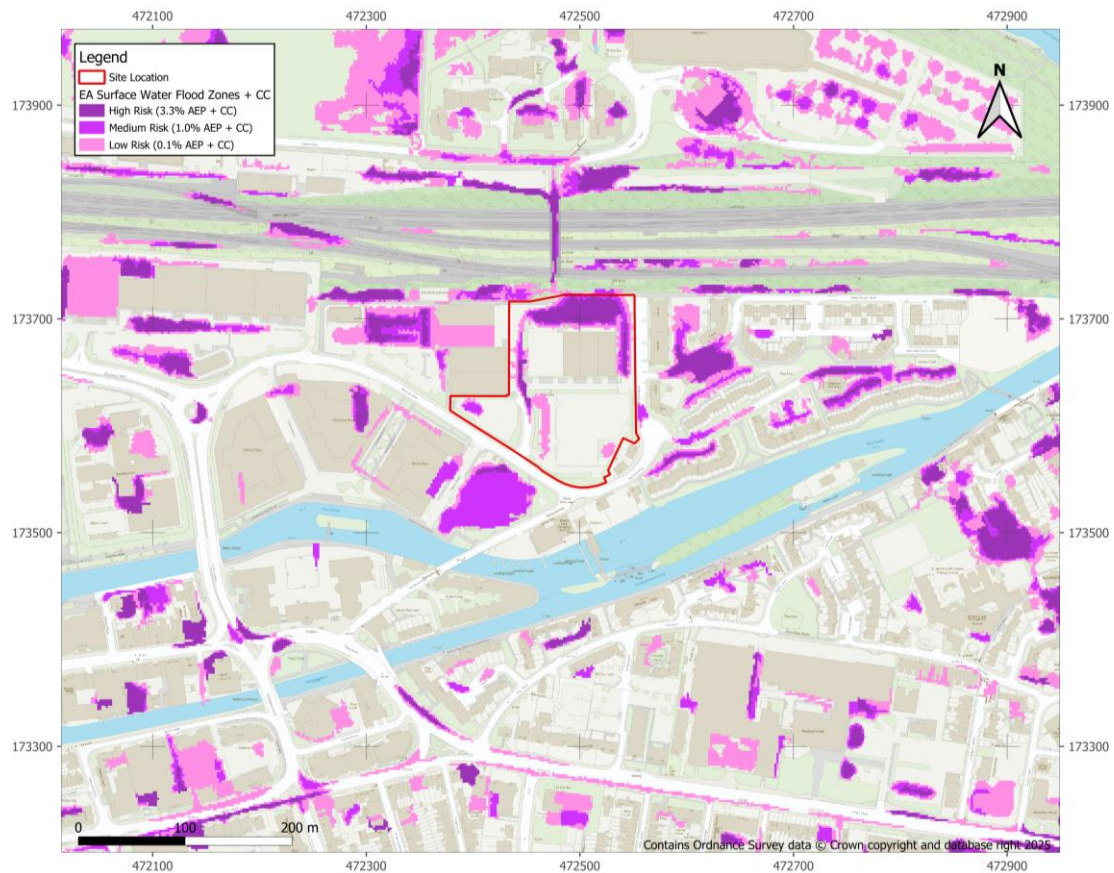


Figure 6 -Surface Water Climate Change Flood Map

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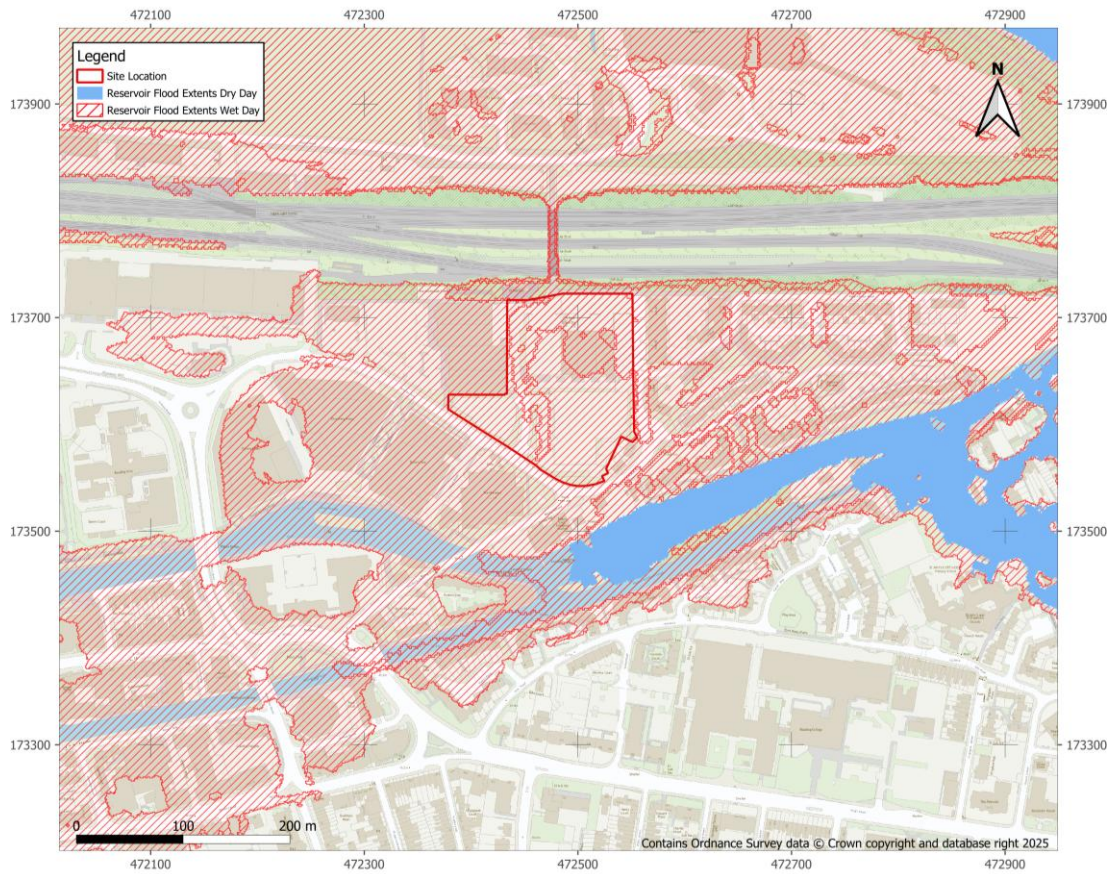


Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

Fluvial flooding is considered to be the primary flood risk mechanism at the site given its location relative to the River Thames and River Kennet. However, it should be noted that pluvial flooding shows the greatest extents for baseline 1.0% AEP and 0.1% AEP events. As a precautionary approach both fluvial and pluvial flooding are 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 37.5 m AOD, 0.5 m lower than the average ground level on the site. The hazard map for this event (see Figure 8) shows that the small portion of the site inundated during the design event has a low hazard rating, indicating low 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 (%)	1%
Average Flood Depth (m)	0.08 m (Max- 0.27 m)
Average Velocity (m/s)	0.03 m/s (Max – 0.19 m/s)
Speed of Onset (hrs)	219 hrs

In terms of pluvial flooding, for the design 100-yr plus climate change event 14% of the site is flooded. The current extents are based on national scale mapping, velocity data is not available however depth banding is available. For the small area inundated during the design event the depth banding is mostly below 0.2m depth, suggesting limited flood depths for the design event. The flooding is limited to the north of the site where ground levels are lower.

4.3 Access and egress

Current vehicle and pedestrian access to the site is via Kenavon Drive in the southwest of the site. During an extreme flood event this access point remains at low flood risk.

Site users would likely travel west along Kenavon Drive before joining Forbury Road and travelling south away from areas at flood risk from the River Thames, see Figure 9. At flood peak, no part of this route is inundated, though caution should be taken when crossing the River Kennet.

It is important to note that parts of the route are at surface water flood risk. 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.

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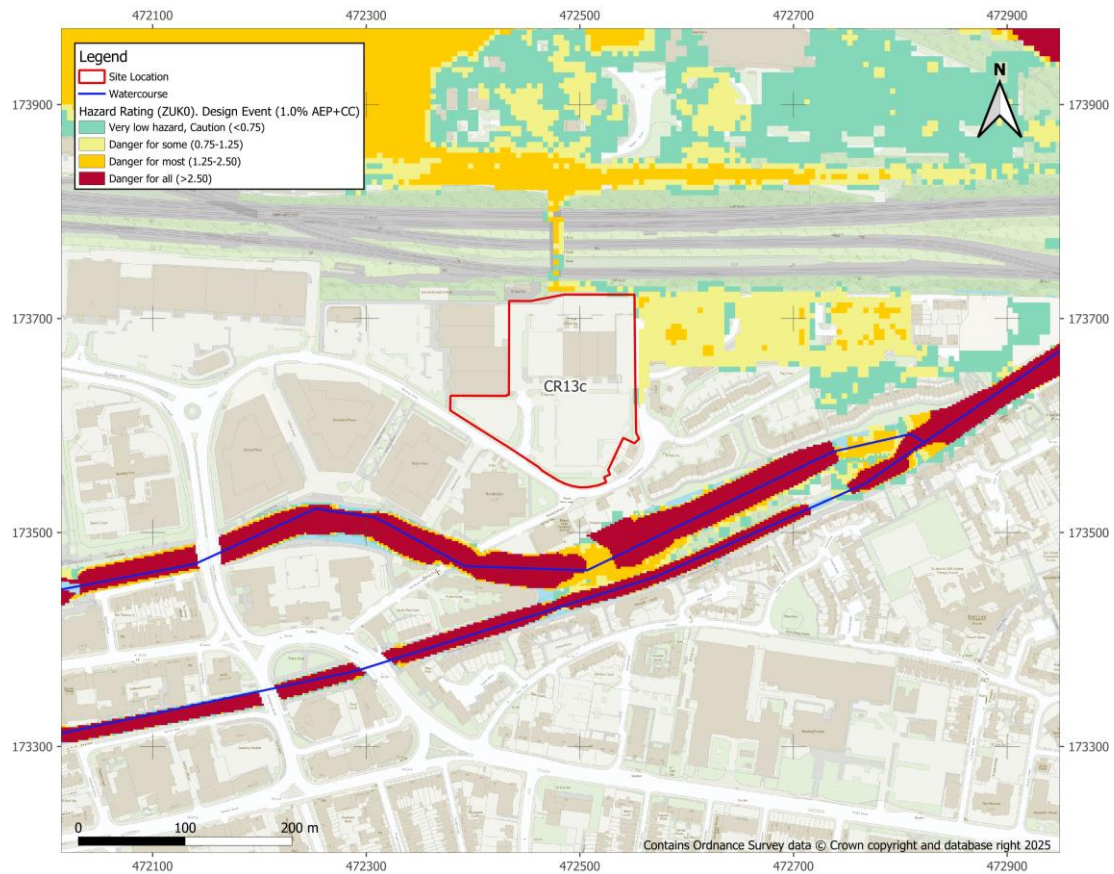


Figure 8 – Flood Hazard Map for the Design Event

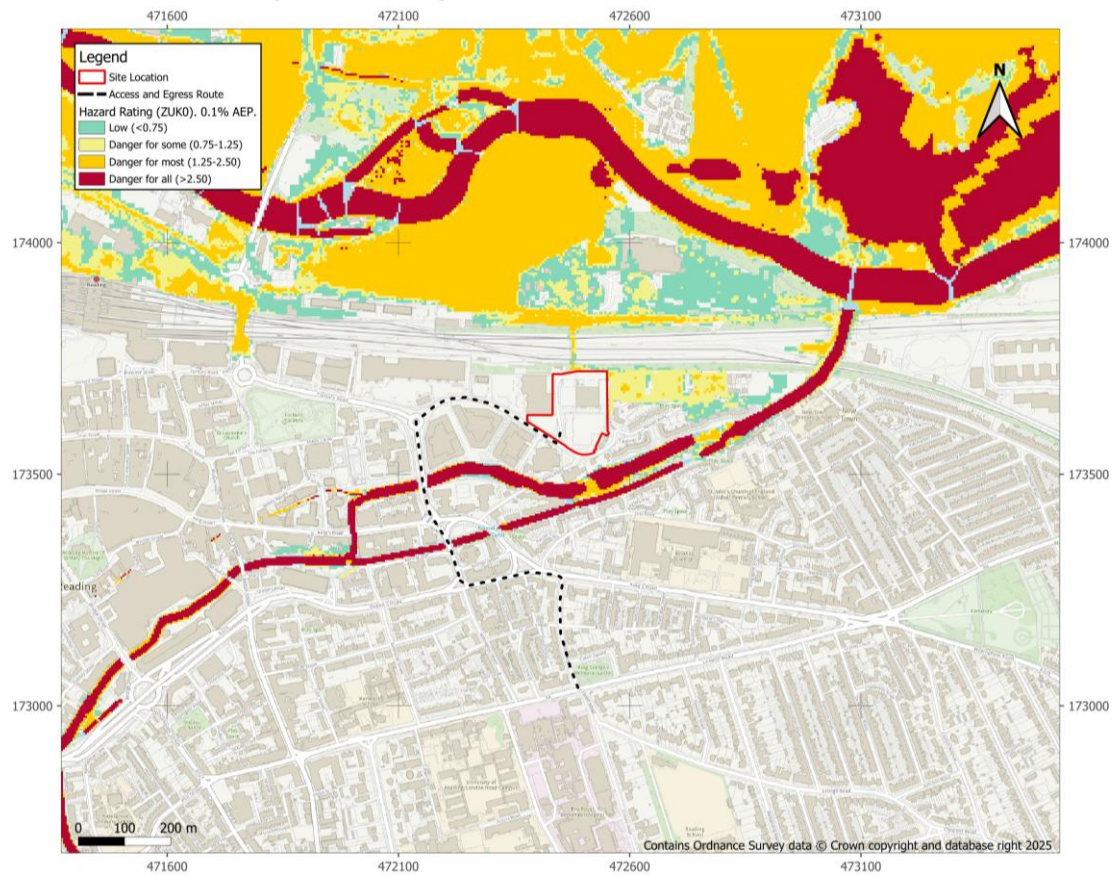


Figure 9 – Access/Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

Both residential development and healthcare facilities are *More Vulnerable Development*, whereas open space is classed as *Water Compatible*. In terms of *More Vulnerable Development*, it 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. Water compatible development is permissible in all Flood Zones provided it does not increase flood risk elsewhere.

As none of the site is located in Flood Zone 3a or 3b with most of its area falling in Flood Zone 1 a mixed-use development should be possible. Whilst there is a risk of surface water flooding at the site, it is limited to the north of the site and only inundates 16% of the site in the design event so should be manageable.

5.2 Scale of Development

The total site area is currently 2.07 ha; allocated for 320-490 residential dwellings, a primary healthcare facility, and open space. Given the scale of the development, it is likely to cover the majority of the site area. To reduce the requirement for ground raising and the subsequent impact on floodplain storage, building footprints and infrastructure should be sited outside of the small area lying within the modelled design flood extent. Surface water flood risk should also be considered in the placement of infrastructure.

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 open 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. In addition to fluvial flooding, the surface water flood extents should also be considered.

5.4 Other Site-Specific Considerations

Parts of the access and egress route are at risk from 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 high and 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.