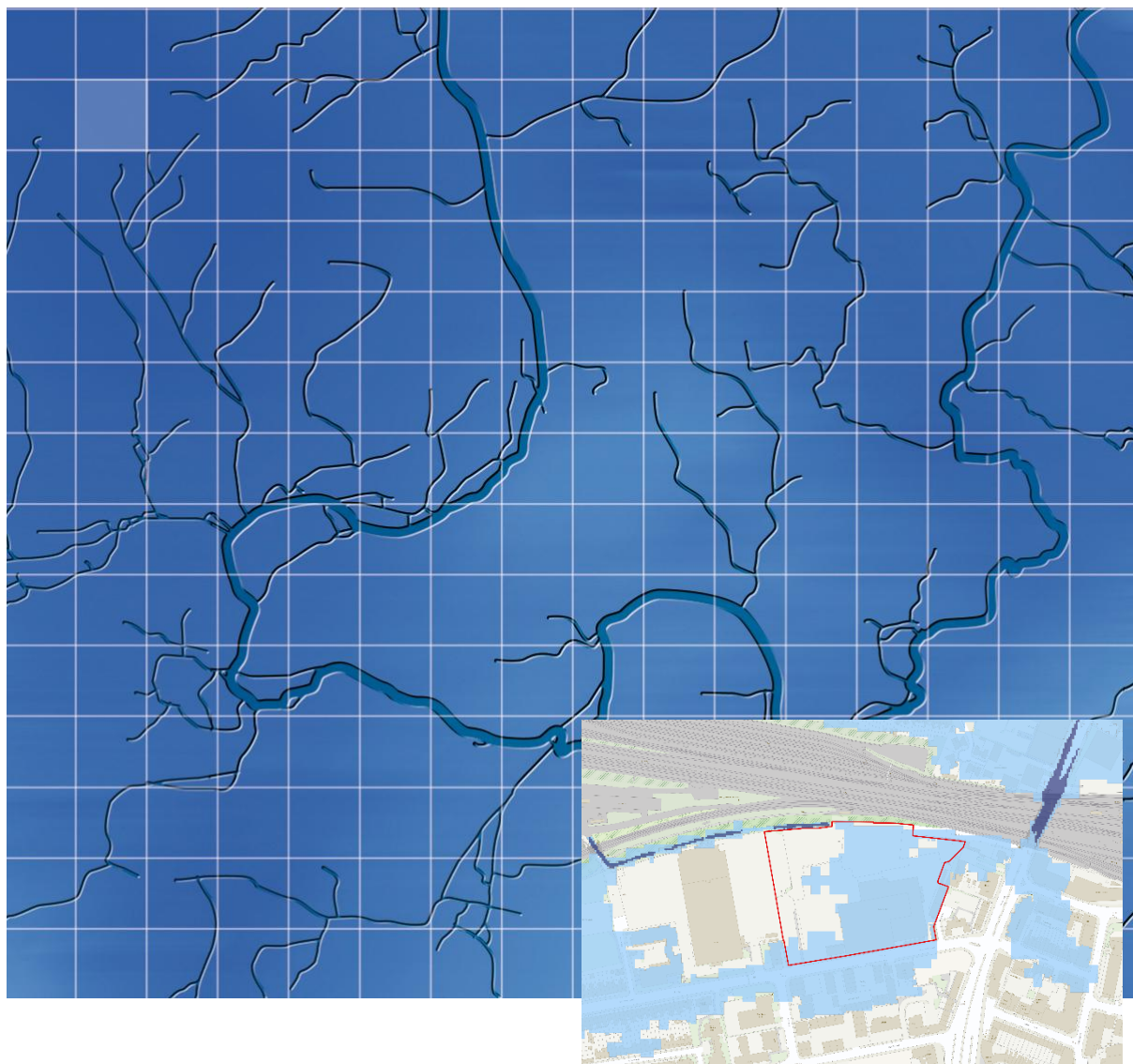


Reading Borough Council

May 2025

Cattle Market (CR12a)

Level 2 Strategic Flood Risk Assessment



WHS

Reading Borough Council

Cattle Market (CR12a) Level 2 Strategic Flood Risk Assessment

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For and on behalf of Wallingford HydroSolutions Ltd.

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Cattle Market (CR12a) 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

Fluvial flooding represents the greatest risk. Flood Zone 3 is not present within the site boundary, however 66% of the site is within Flood Zone 2. The flood extent was assessed using the Thames model (Pangbourne to Sonning) (2021), which shows 37% of the site to be inundated in the design 1.0% AEP plus climate change event.

The risk from surface water flooding is considered to be moderate. During the 1.0% AEP plus climate change event, 13% of the site is inundated.

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

The overall confidence in the assessment is moderate. Detailed modelling is available in the vicinity of the site, however there are discontinuities in the EA fluvial climate change extents 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 this regard, a new residential development at the site will be permissible given that the site lies completely outside of Flood Zone 3a. To ensure the development will be safe for its lifetime climate change does need to be considered and infrastructure may need to be raised above the design flood level of 38.3 m AOD.

Contents

1	Introduction	1
1.1	Background	1
1.2	Assessment of Flood Risk	1
1.3	Report Structure	1
2	Site Description	2
2.1	General Location Plan	2
2.2	Topography	2
2.3	Nearby Watercourses	2
3	Flood Risk	4
3.1	Historical Flooding	4
3.2	Fluvial Flood Risk	4
3.3	Flood Defence Infrastructure	4
3.4	Surface Water Flood Risk	4
3.5	Groundwater Flooding	4
3.6	Reservoir Flood Risk	4
3.7	Flood Warning Service	4
4	Detailed Review of Primary Flood Risk	8
4.1	Primary Flood Risk	8
4.2	Flood Risk Metrics	8
4.3	Access and egress	8
5	Development Viability and FRA recommendations	10
5.1	Development Categorisation	10
5.2	Scale of Development	10
5.3	Sequential Approach	10
5.4	Other Site-Specific Considerations	10

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 Cattle Market (CR12a) 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 have 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 Soilsclapes. 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 Cattle Market (CR12a) site is 2.46ha in area and is located in an urbanised area in central Reading, approximately 300m southwest of Reading train station, see Figure 1.

In the Replacement Local Development Plan (RLDP) it is proposed to be used for residential development in the form of 560-840 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site is relatively flat. The site is in a shallow basin, with higher ground surrounding the site in all directions. This higher ground is a railway embankment to the north and natural higher ground to the south, see Figure 2. The ground levels within the site boundary range from 37.8 to 40.1 m AOD. The average ground level is 38.4m AOD.

2.3 Nearby Watercourses

The nearest watercourse is unnamed and is located directly northwest of the site boundary. The watercourse runs from west to east and is likely culverted for large sections before joining the River Thames. The River Thames is situated approximately 550m northeast of the site. The River Thames runs from west to east at this location. The Holy Brook is approximately 650m to the southeast of the site. Figure 1 shows the location of these watercourses.

Cattle Market (CR12a) Level 2 SFRA

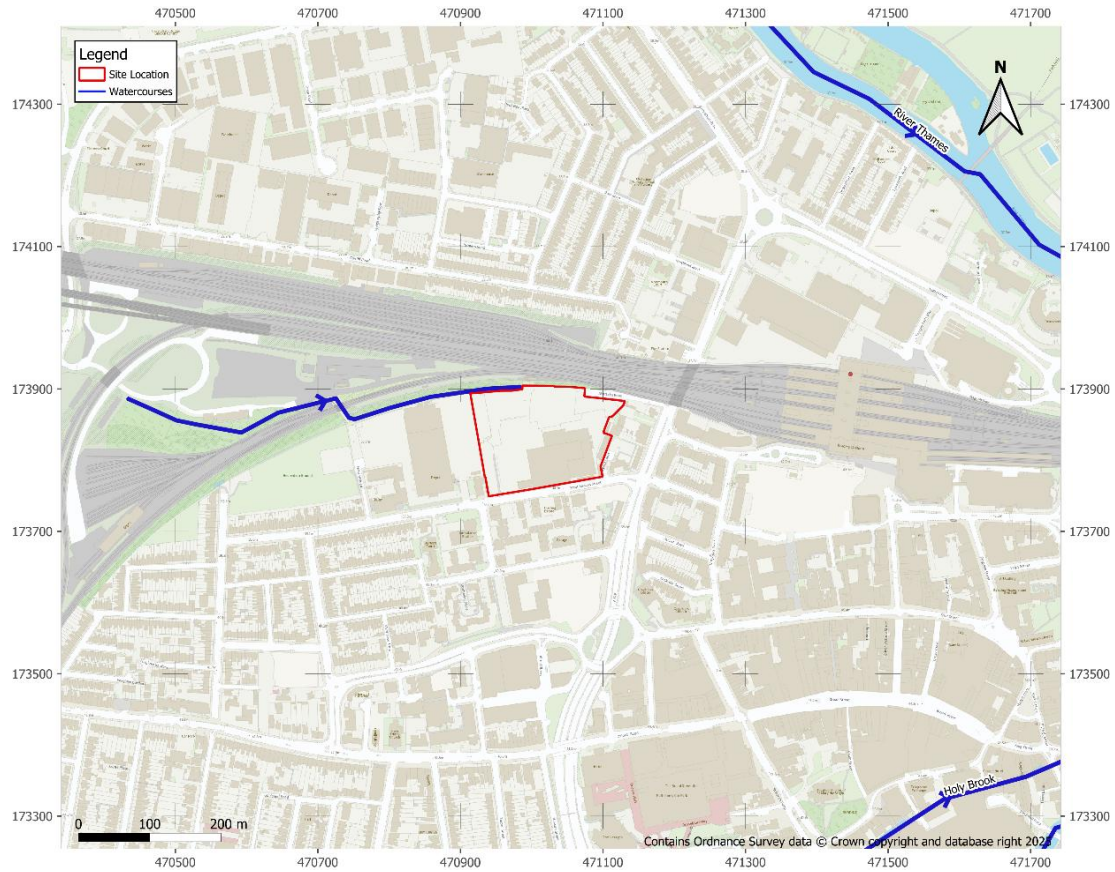


Figure 1 - Site Location

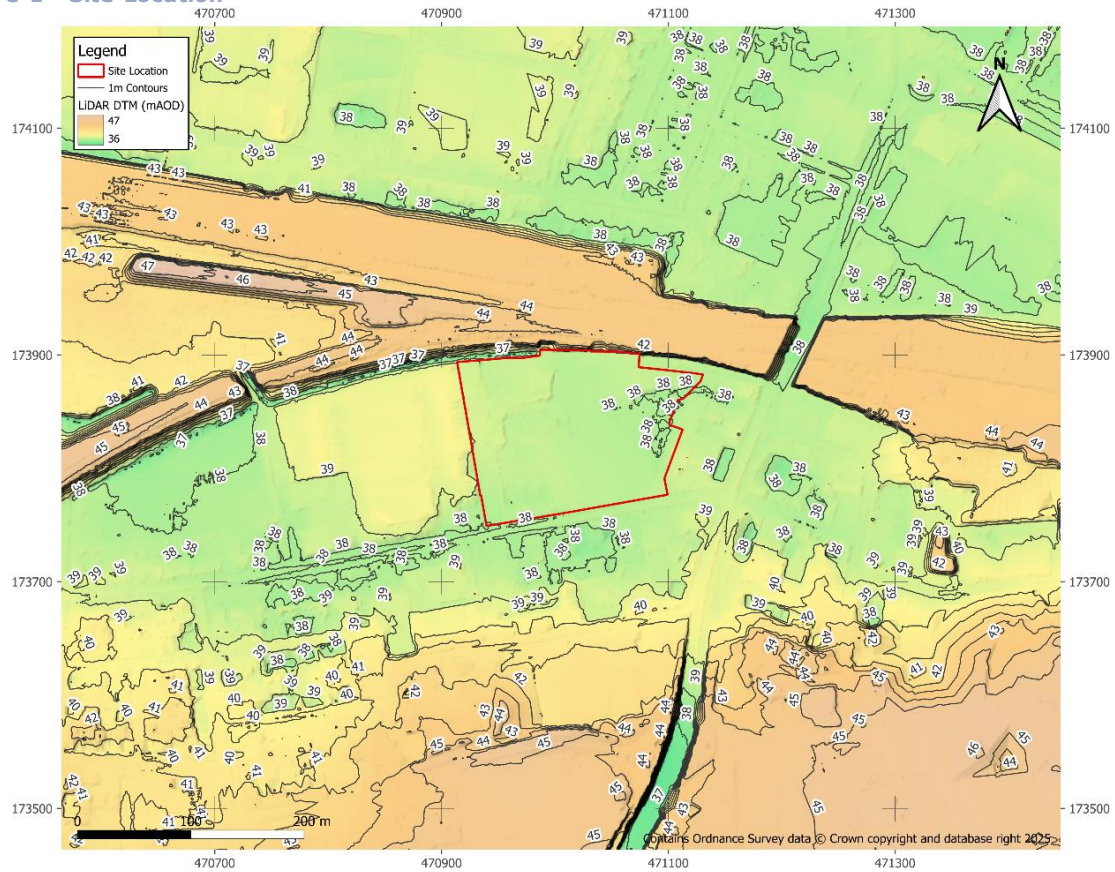


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The nearest historic flood extent is 150m to the northeast, which occurred in March 1947. This flooding was associated with the River Thames.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 66% of the site is inundated by Flood Zone 2 and none of the site is in Flood Zone 3a. Fluvial 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 significantly to 37%, see Figure 4. It should be noted that the EA's climate change extents show a discontinuity in the centre of the site and should be treated with caution.

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 also not within an area associated with a reduction in risk of flooding from rivers and sea due to defences. The site is not within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood map shows some pooling within the site boundary. In total, 3% of the site is inundated in the 3.3% AEP event, 9% 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 proportions increase to 7% in the 3.3% AEP event, 13% in the 1.0% AEP event and 48% in the 0.1% AEP, 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 chalk bedrock in the form of the Seaford Chalk and Newhaven Chalk Formations. 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 freely draining slightly acid loamy soils, these are 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 risk.

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 problems.

3.7 Flood Warning Service

The site is partially located within the River Thames at Reading and Caversham flood warning area.

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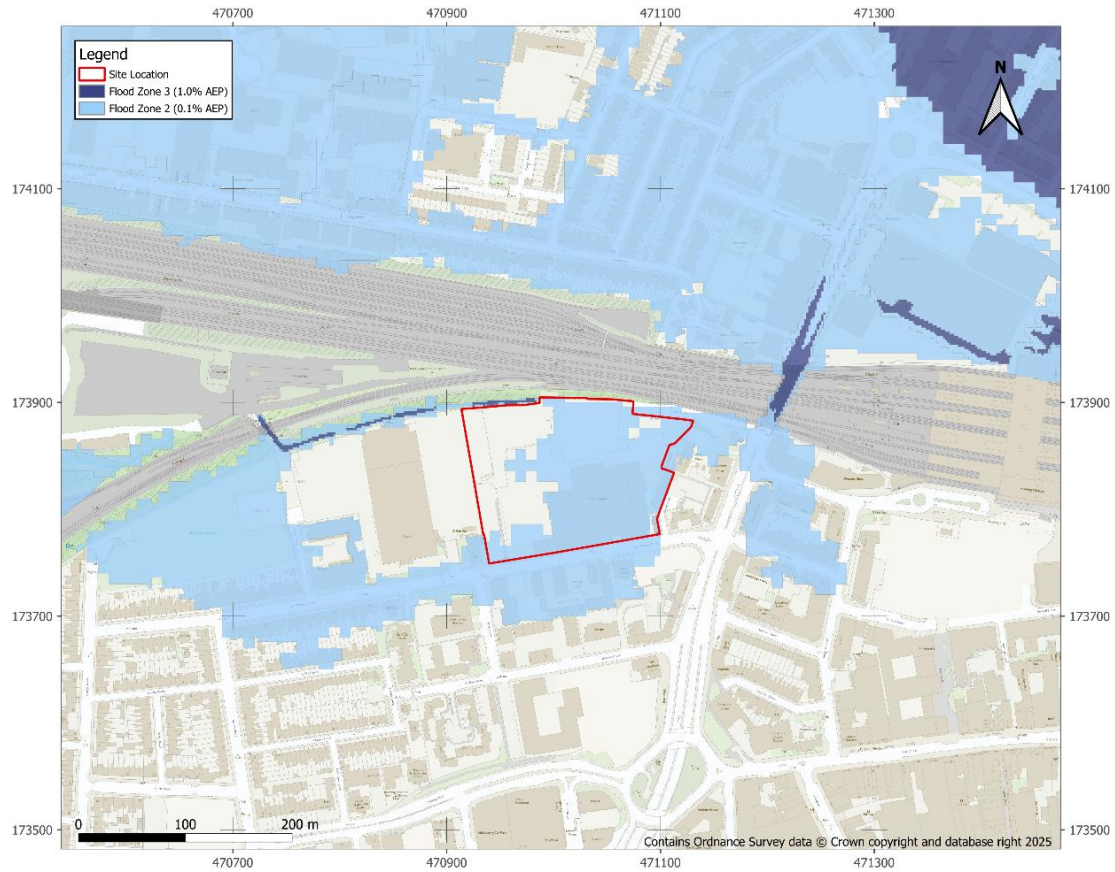


Figure 3 - Fluvial Flood Map

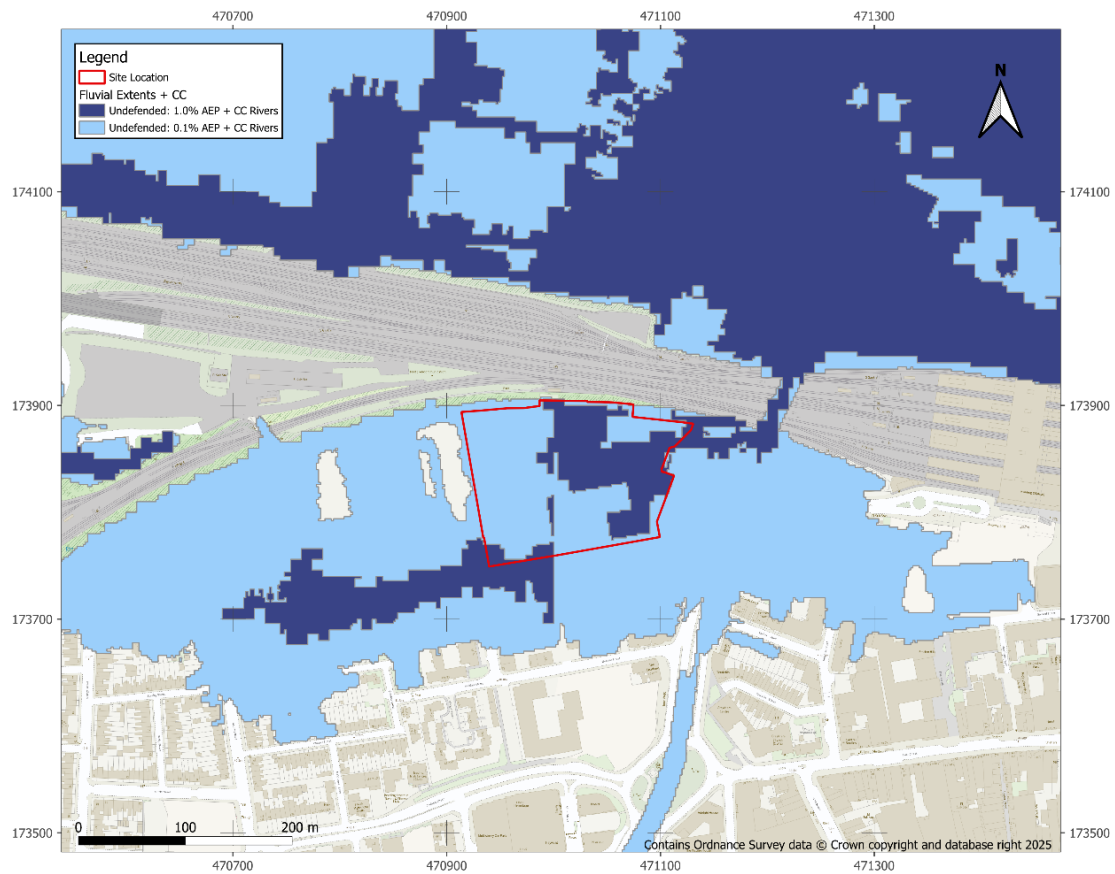


Figure 4 - Fluvial Climate Change Flood Map

Cattle Market (CR12a) Level 2 SFRA



Figure 5 – Surface Water Flood Map

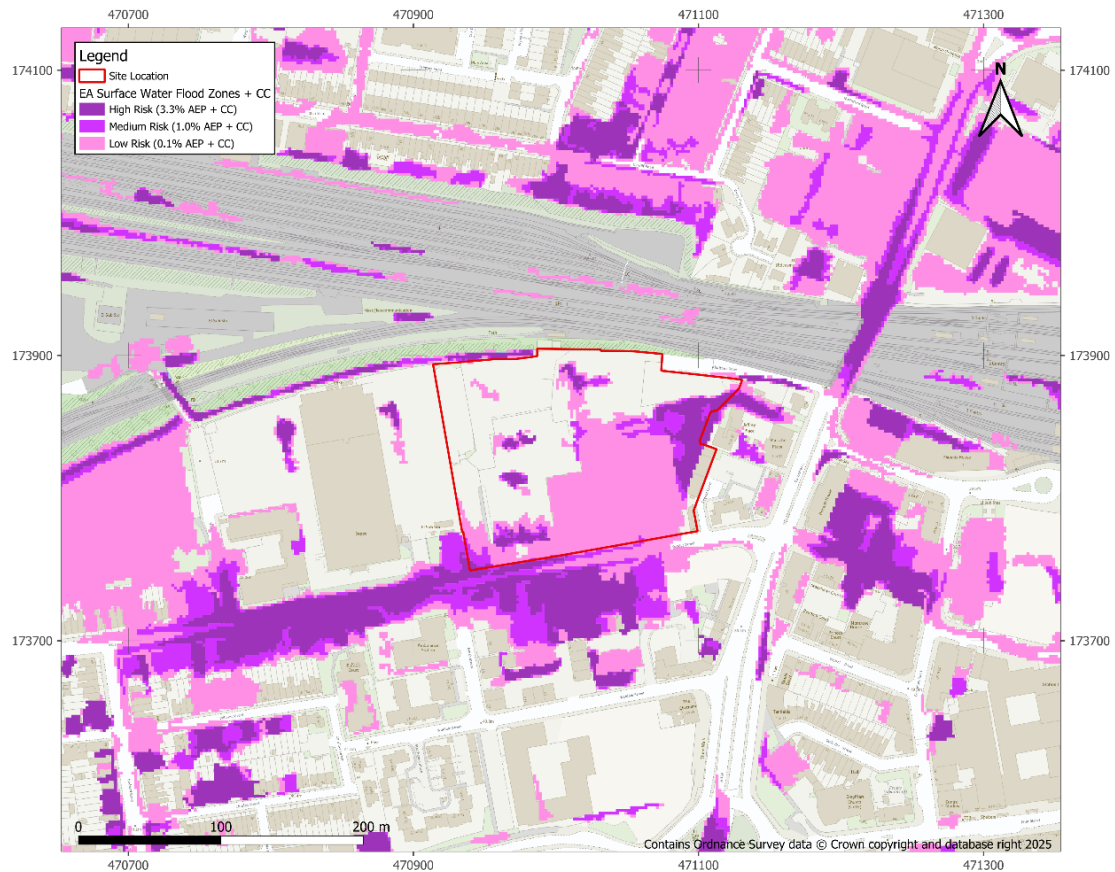


Figure 6 -Surface Water Climate Change Flood Map

Cattle Market (CR12a) Level 2 SFRA

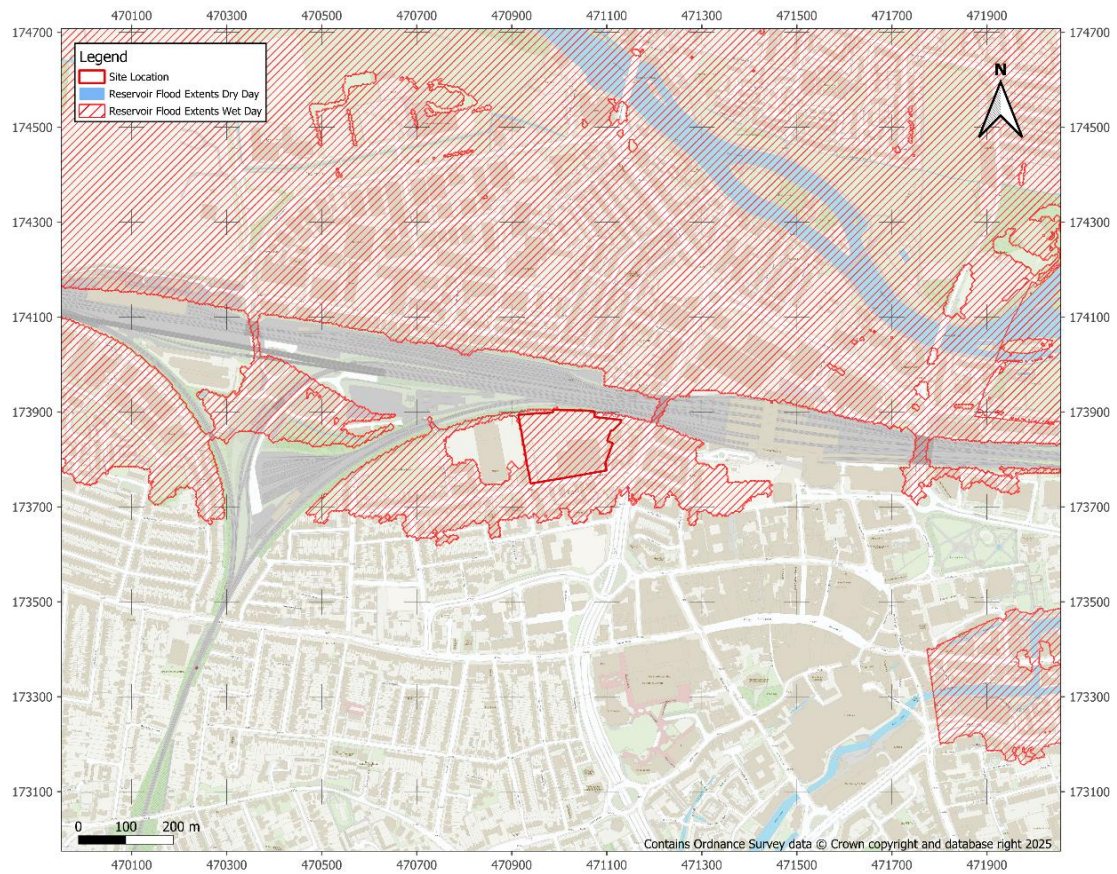


Figure 7 - Reservoir Failure Flood Map

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) 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 38.3m AOD, which is lower than the average ground level on site. The hazard map for this event (see Figure 8) shows that the flood risk at the site has a *low* or a *danger to some* hazard rating. This is likely due to the low average flood depth (0.17 m) and low average velocity (0.01 m/s). 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 (%)	37%
Average Flood Depth (m)	0.17m (Max – 0.44m)
Average Velocity (m/s)	0.01m/s (Max – 0.27m/s)
Speed of Onset (hrs)	155hrs

4.3 Access and egress

The suggested access and egress route consists of exiting the site and immediately heading southbound along the A329. No part of this route is within the Flood Zone 2 or the design flood extent, see Figure 9. Onward travel would likely continue southwards along the A329, see Figure 9.

Whilst much of the land south of the site lies in Flood Zone 1, it is important to note that parts of the A329 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.

To ensure the access route can be utilised before the site 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 and has relatively slow river response times to storm events, being groundwater, rather than surface water dominated. This increases the time taken for inundation and therefore provides more time for adequate warnings and preparation in an extreme flood event. This is reflected by the relatively slow speed of onset values at the site.

Cattle Market (CR12a) Level 2 SFRA

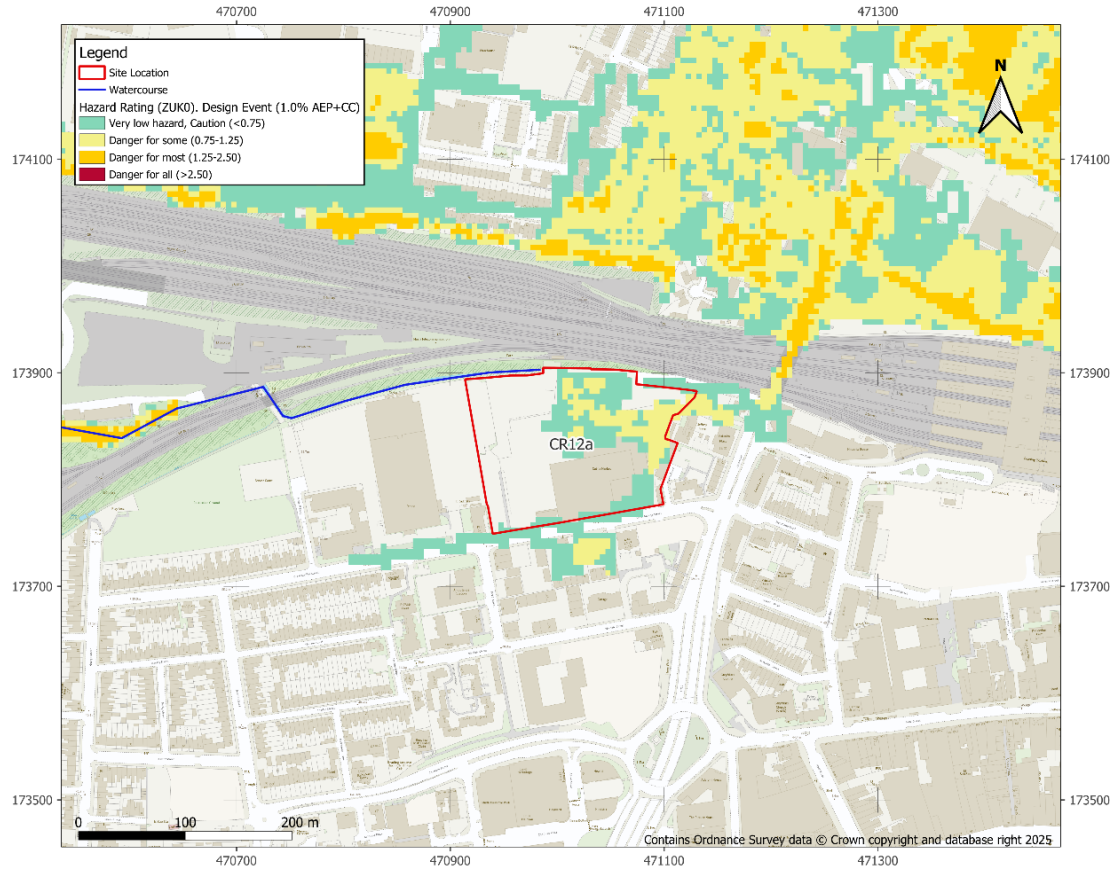


Figure 8 - Flood Hazard Map for the Design Event

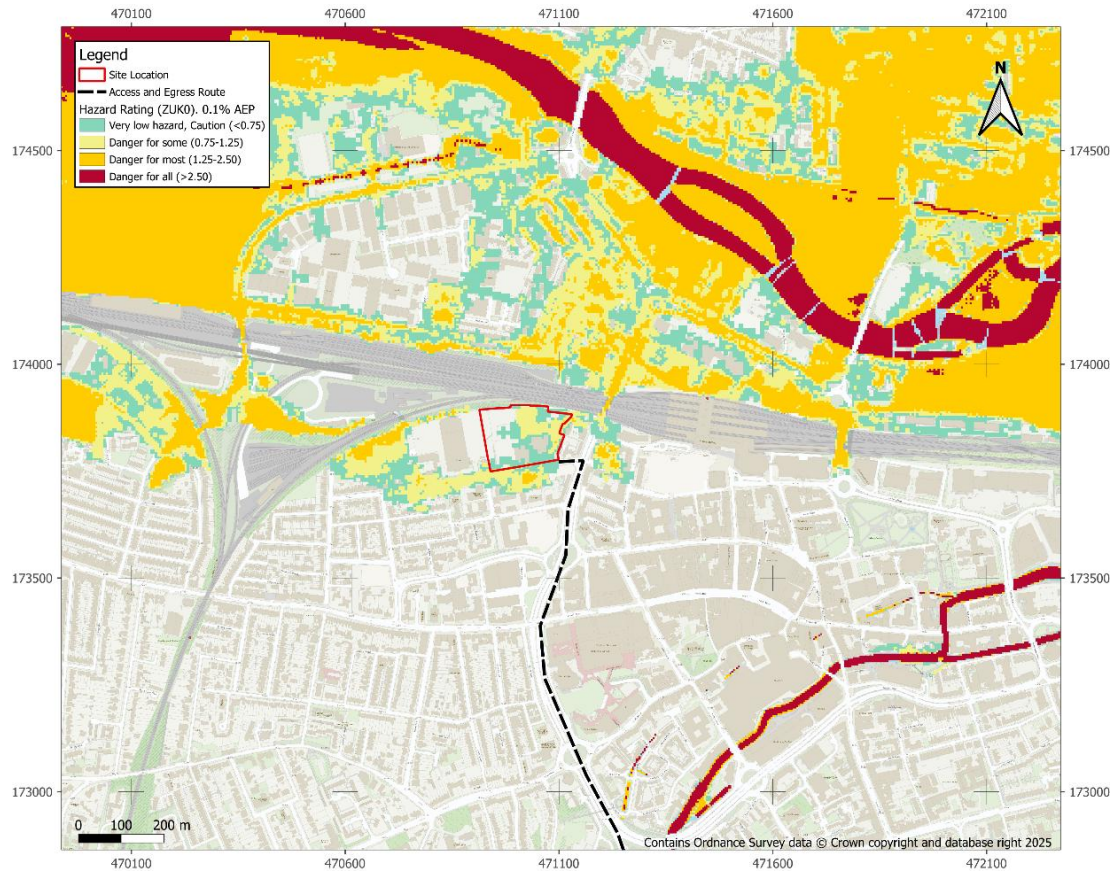


Figure 9 - Access/Egress Routes

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 this regard, a new residential development at the site will be permissible given that the site lies completely outside of Flood Zone 3a. To ensure the development will be safe for its lifetime climate change does need to be considered and infrastructure may need to be raised above the design flood level of 38.3 m AOD.

5.2 Scale of Development

The total site area is currently 2.46ha; allocated for between 560-840 dwellings. Given the size of the site, it is assumed that the development will either be high density housing or utilise multistorey flats. If infrastructure is located within the design flood extent, raising may be required, 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

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

Parts of the proposed 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 because it is near the River Thames, 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. 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.