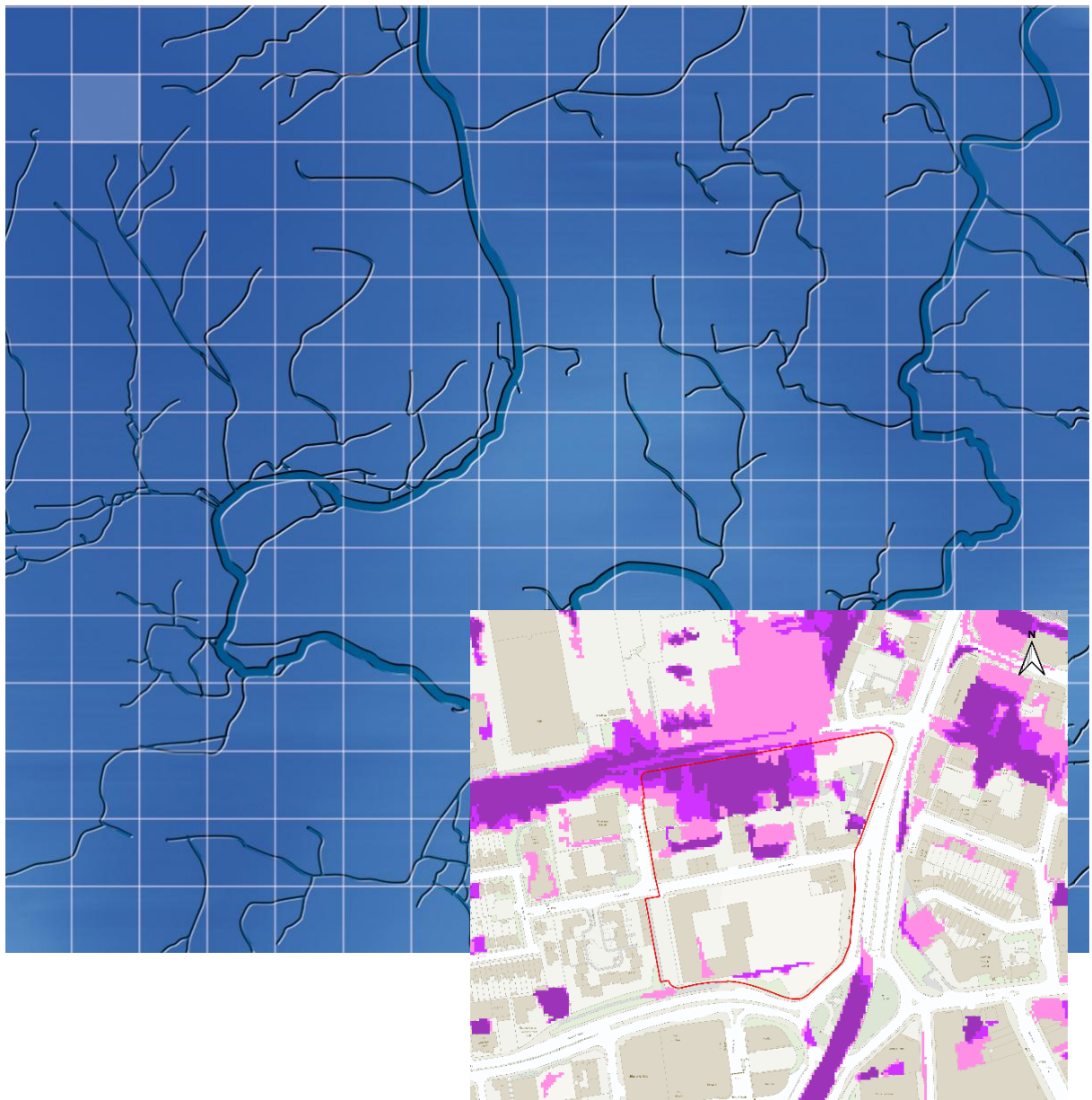


Reading Borough Council

May 2025

Great Knollys Street and Weldale Street (CR12b)

Level 2 Strategic Flood Risk Assessment



WHS

Reading Borough Council

Great Knollys Street and Weldale Street (CR12b) Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10135

Version	Issue date	Issue status	Prepared By	Approved By
1.0	13/05/2025	Draft	Joseph Bentley (Consultant)	Paul Blackman (Director)

For and on behalf of Wallingford HydroSolutions Ltd.

This report has been prepared by WHS with all reasonable skill, care and diligence within the terms of the Contract with the client and taking account of both the resources allocated to it by agreement with the client and the data that was available to us. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of any nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



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.



Registered Office Maclean Building, Benson Lane, Wallingford OX10 8BB
www.hydrosolutions.co.uk

Great Knollys Street and Weldale Street (CR12b) 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

Surface water flooding represents the greatest risk within the site boundary. During the design 1.0% AEP plus climate change event 20% of the site is inundated.

Fluvial flooding only represents a risk to the site during high order return periods. Flood Zone 3 is not present within the site boundary, however 20% of the site is within Flood Zone 2. The flood risk was assessed using the Thames model (Pangbourne to Sonning) (2021), which showed 7% of the site was inundated by the design 1.0% AEP + Climate Change event.

The risk from other sources of flooding 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 20% of the site in the design event. The implications for the development should be manageable given that the flooding is limited to the north of the site however it will need to be considered when placing infrastructure.

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	5
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 Great Knollys Street and Weldale Street (CR12b) site 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, is the 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 Great Knollys Street and Weldale Street (CR12b) site is 3.02ha and is located 350m south west of Reading train station. It is located in the centre of Reading and is currently occupied by employment and residential developments. The surrounding land use is urban, see Figure 1.

In the Replacement Local Development Plan (RLDP) the site is proposed to be used for residential development. Between 260-380 dwellings are proposed at the site.

2.2 Topography

Based on 1m LiDAR data, ground levels within the site slope northwards towards a low point within the site boundary. The site is mostly surrounded by higher ground, see Figure 2. The ground levels within the site boundary range from 37.0 to 45.6m AOD. The average ground level is 40.0m AOD.

2.3 Nearby Watercourses

The nearest watercourse is unnamed, located 160m north of the site boundary. This watercourse runs from west to east and is likely culverted for large sections before joining the River Thames. The River Thames is situated approximately 660m northeast of the site. The River Thames runs from west to east at this location. Approximately 500m to the southeast of the site the Holy Brook, a tributary of the River Kennet. Figure 1 shows the location of these watercourses.

Great Knollys Street and Weldale Street (CR12b) Level 2 SFRA

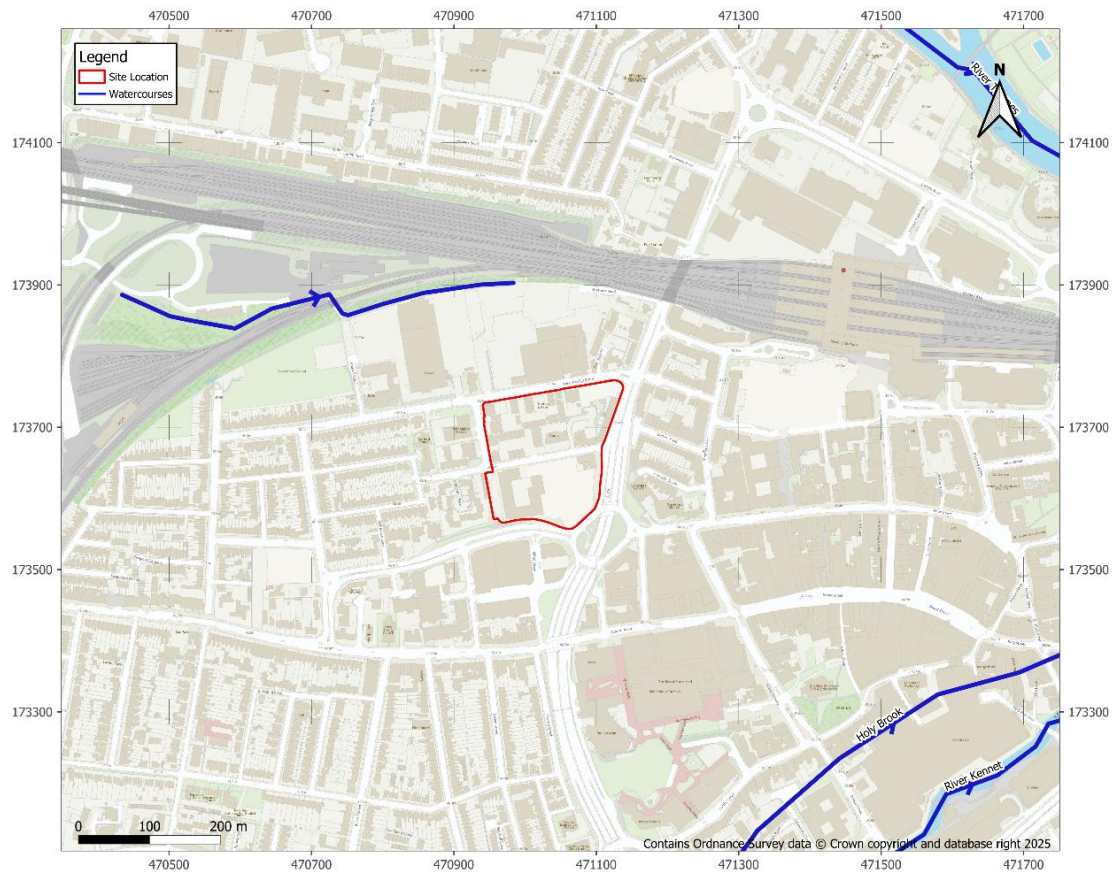


Figure 1 - Site Location

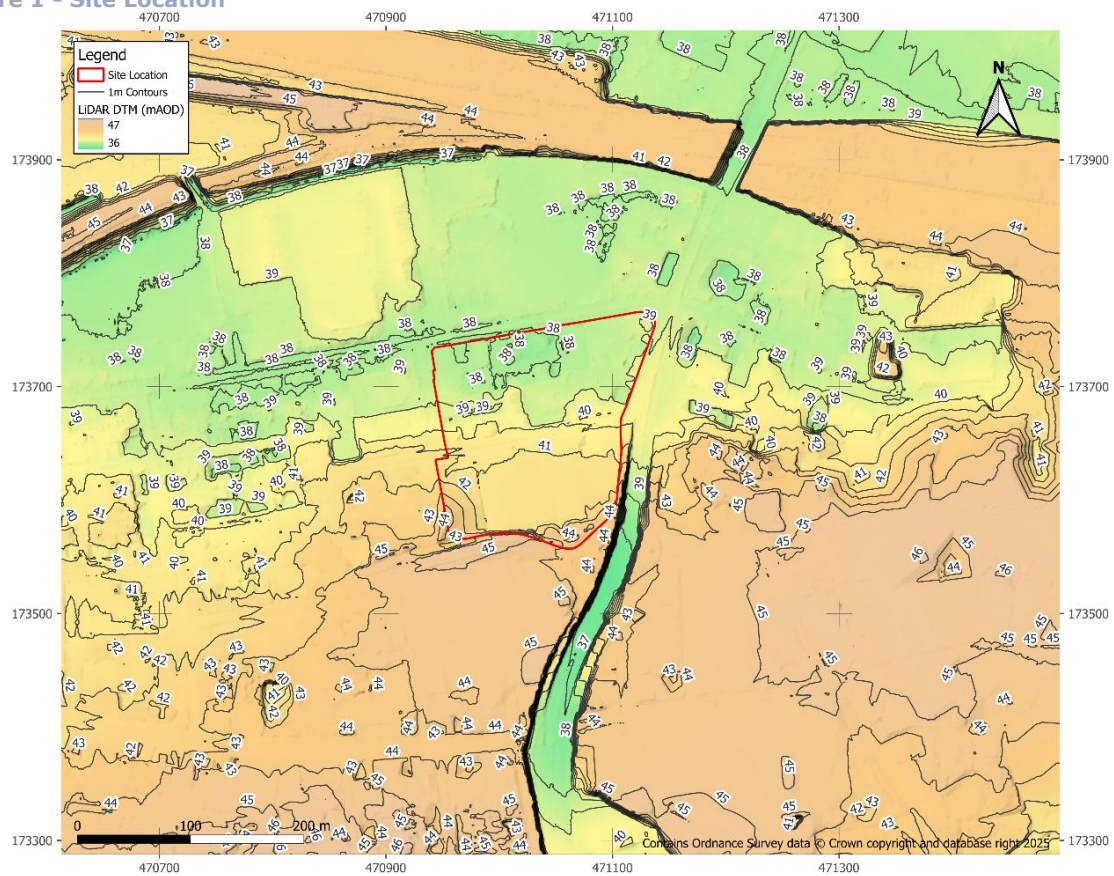


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no records of historic flooding at the site.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 20% of the site is inundated by Flood Zone 2, with none of the site inundated by 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 within Flood Zones 2 and 3a increase to 45% and 4% respectively, see Figure 4. It is noted that the EA's Flood Zone 3 climate change extents are discontinuous at this location and the extents should be viewed 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 located in 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 extensive pooling within the site boundary, centred around a topographical low point in the north of the site. The surface water flood maps show that 5% of the site is inundated in the 3.3% AEP event, 14% is inundated in the 1.0% AEP event and 24% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions increase to 12%, 20% and 27% respectively, see Figure 6.

The risk of surface water flooding is considered to be moderate, further detail on surface water flood risk can be found in section 4.

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 and gravel are also present at this site, these are also expected to be freely draining. The underlying soils are freely draining slightly acid loamy soils.

Based on the data available the water table at the site could be mobile, translating to a moderate to high risk of groundwater flooding. More data is required at the planning stage to confirm groundwater flood risk at the site.

3.6 Reservoir Flood Risk

The FMfP shows that 47% of the site is inundated during the wet day scenario, however none of the site is inundated 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.

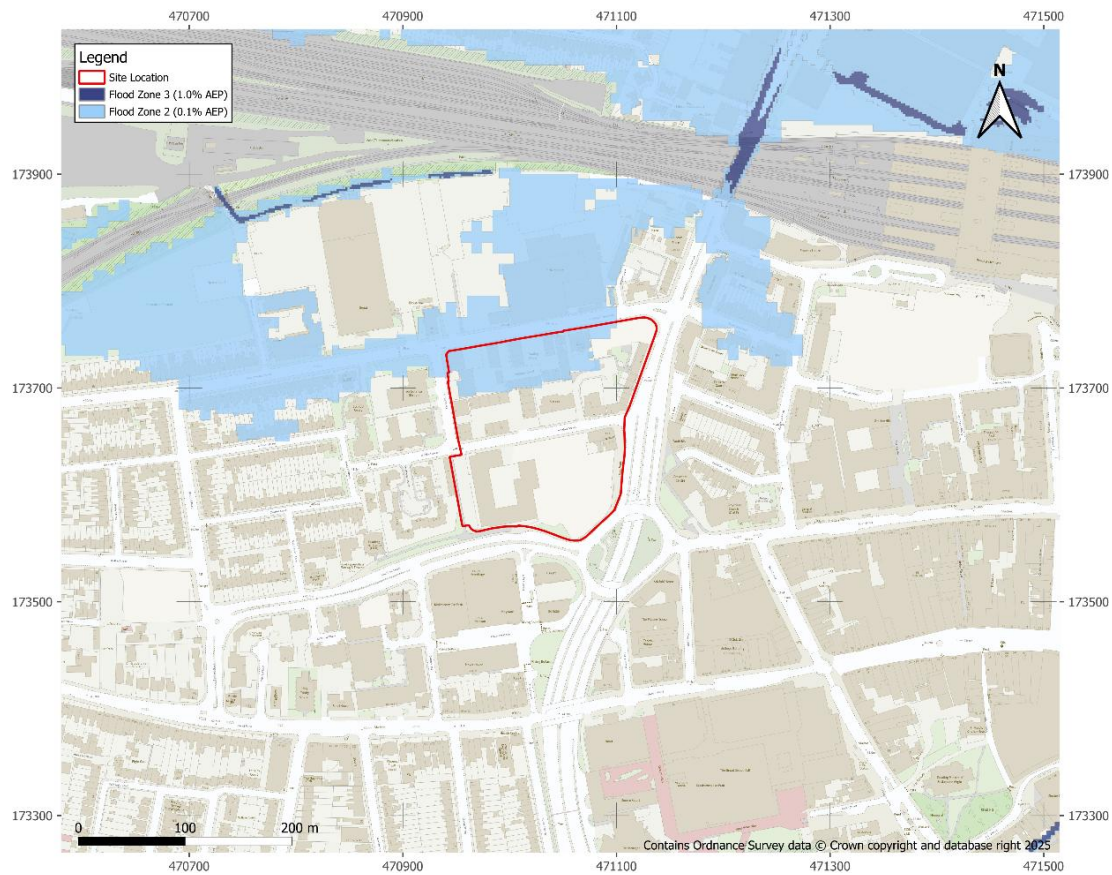


Figure 3 - Fluvial Flood Map

Great Knollys Street and Weldale Street (CR12b) Level 2 SFRA

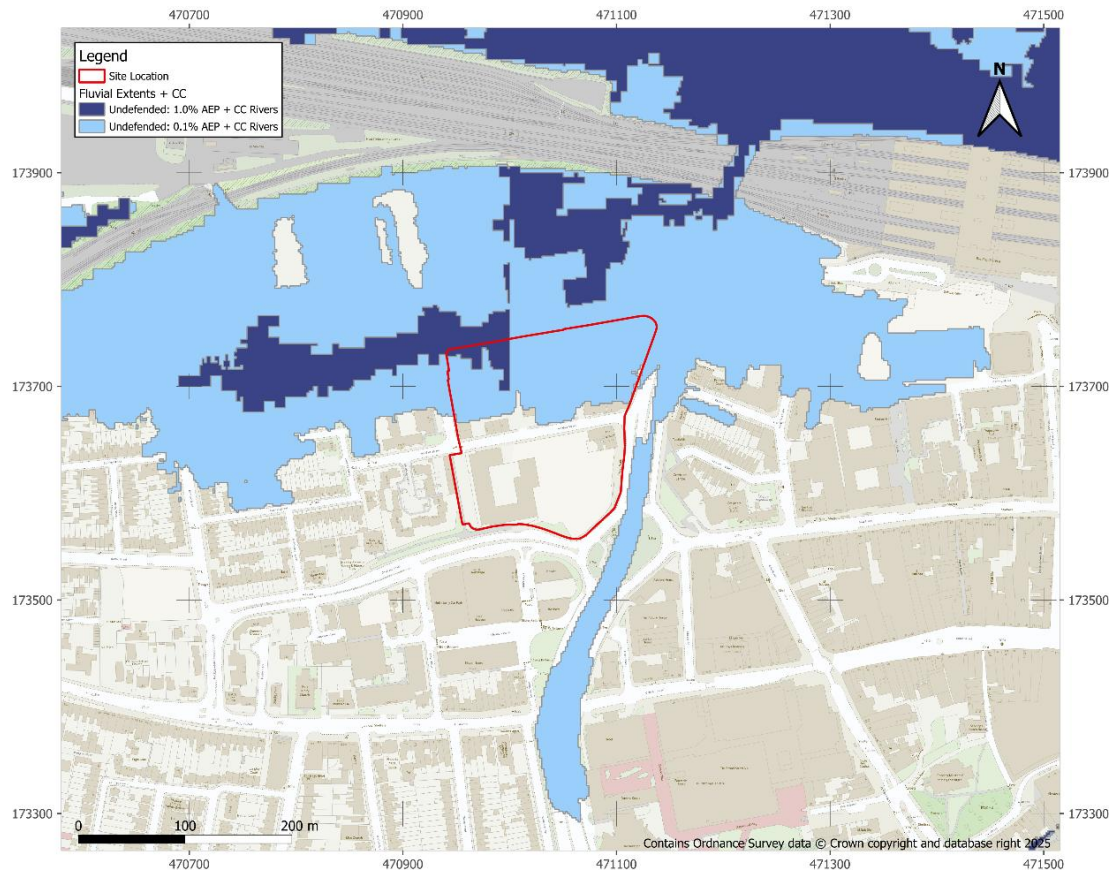


Figure 4 – Fluvial Climate Change Flood Map

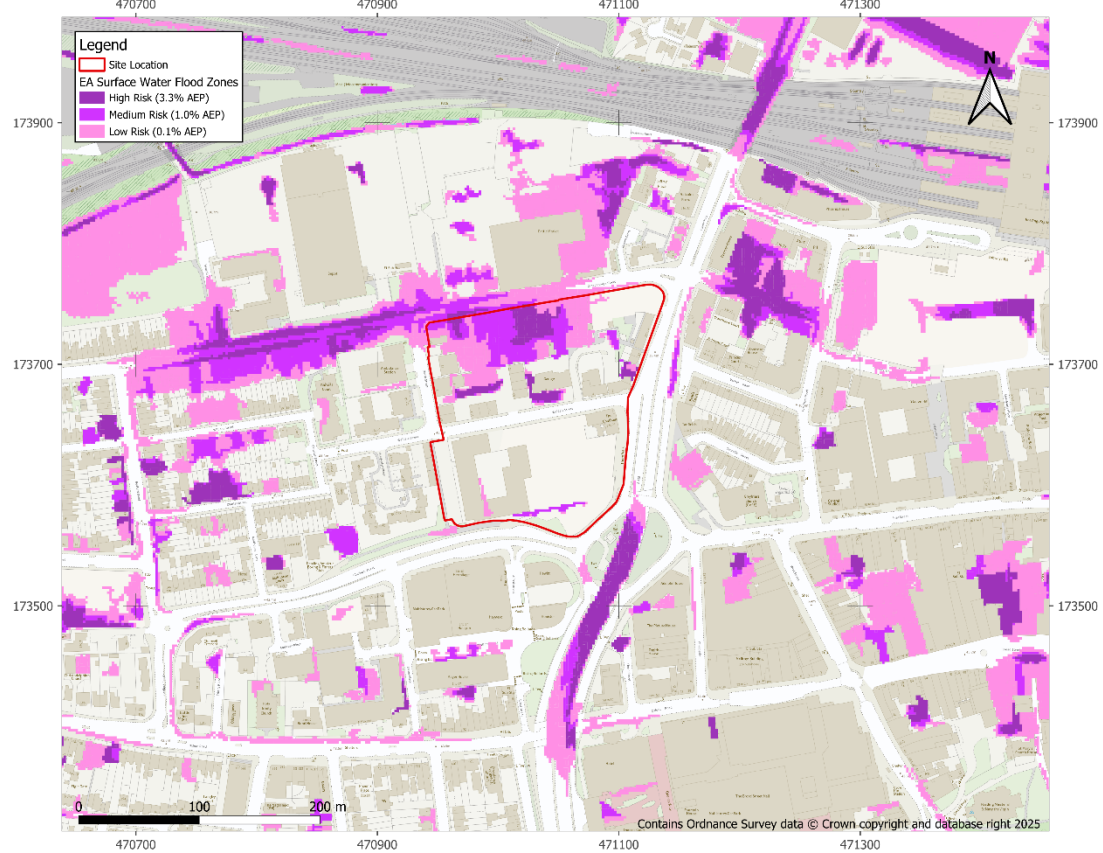


Figure 5 – Surface Water Flood Map

Great Knollys Street and Weldale Street (CR12b) Level 2 SFRA

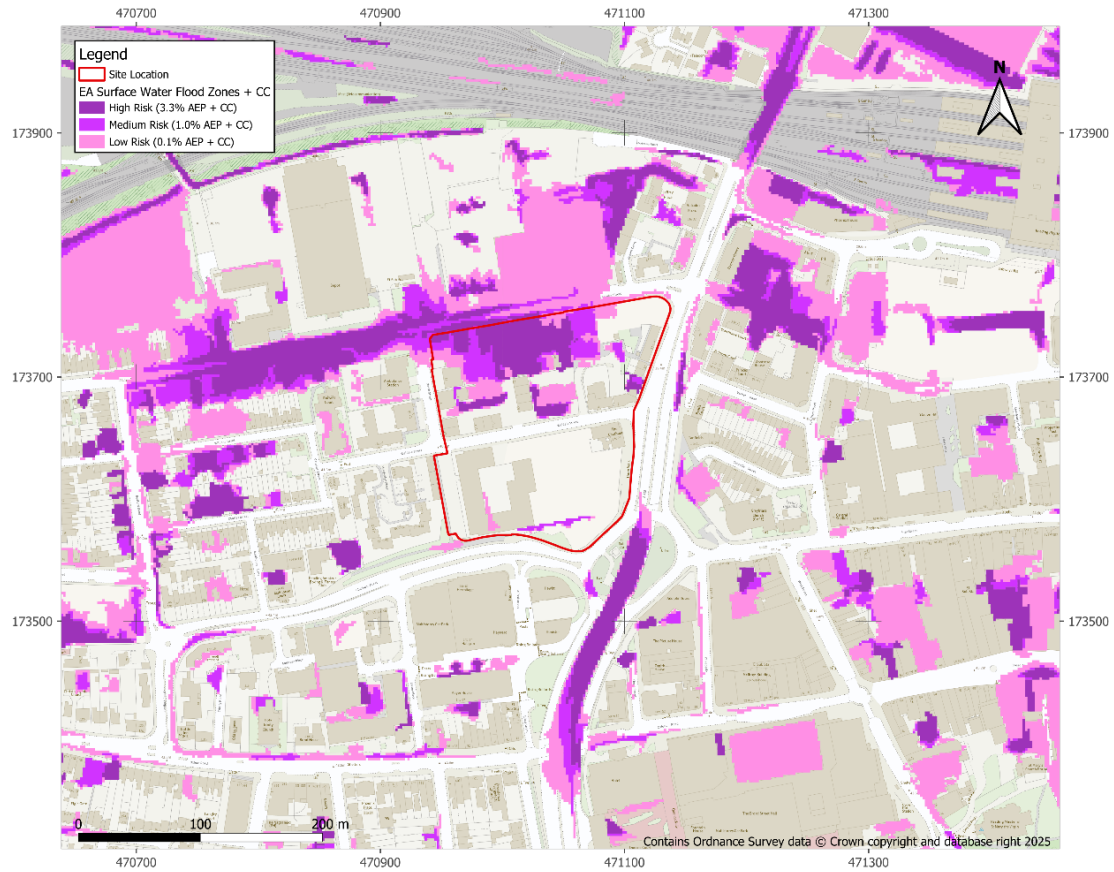


Figure 6 -Surface Water Climate Change Flood Map

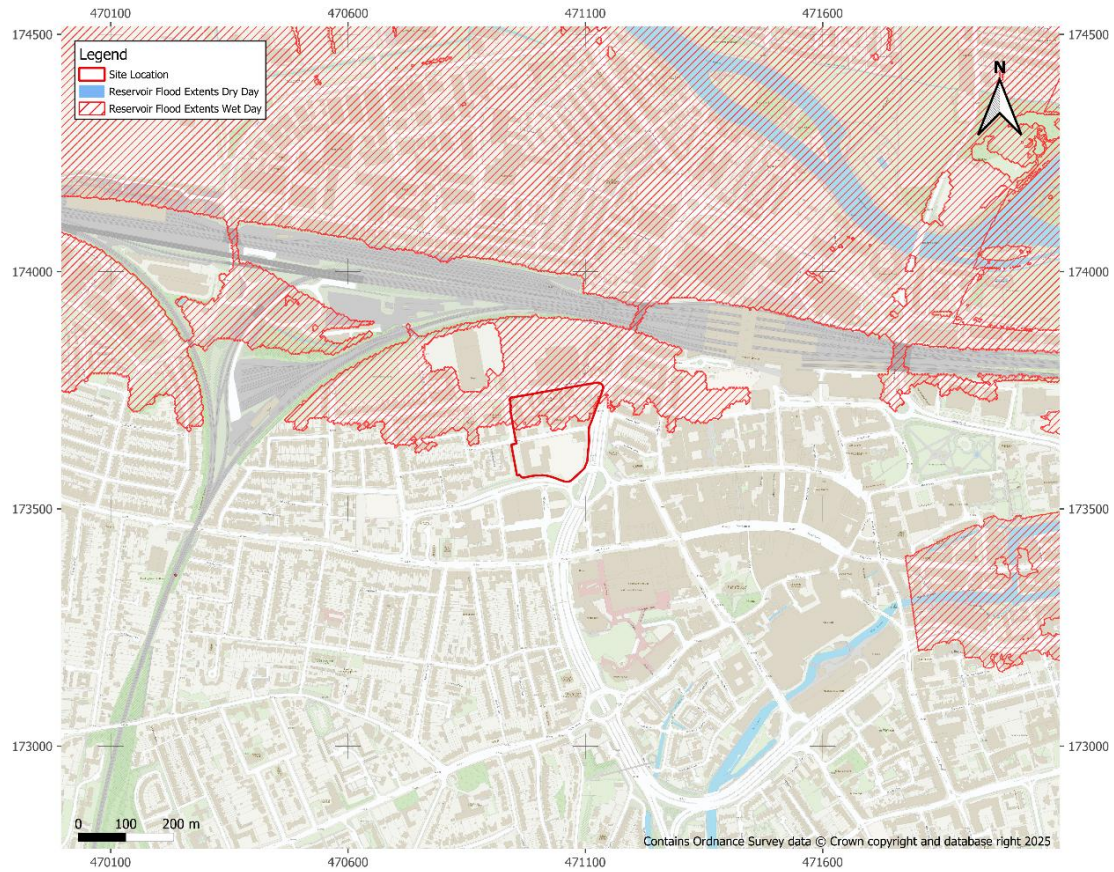


Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

Surface water flooding is considered to be the primary flood risk mechanism at the site given that it inundates the greatest proportion of the site for the majority of events. It is noted that fluvial flooding shows the greatest extents for the higher order 0.1% AEP plus Climate Change event. As a precautionary approach both surface water and fluvial flooding are 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 38.0m AOD, significantly lower than the average ground level on the site. The hazard map for this event (see Figure 8) shows that flooding is located to the north of the site boundary. Given the location of the site relative to the River Thames, speed of onset values are slow (155 hrs) and fluvial flood extents are limited to a small proportion of the site to the north. Table 1 shows the flood risk metrics associated with the design event.

Table 1- Flood Risk Metrics

	Design Event 1.0% AEP (+21%)
Percentage Inundated (%)	7%
Average Flood Depth (m)	0.16m (Max- 0.46m)
Average Velocity (m/s)	0.01m/s (Max – 0.17m/s)
Speed of Onset (hrs)	155hr

The EA surface water flood maps plus climate change were assessed for further detail on potential surface water flooding at the site. The current extents are limited to the north of the site and are based on national scale mapping, velocity data is not available however depth banding is available. The EA depth bands indicate that for the majority of the site depths are between 0.2m and 0.3m.

4.3 Access and egress

The recommended access and egress route consists of exiting the site and immediately heading southbound along the A329. No part of this route is within the 0.1% AEP modelled flood extent, see Figure 9. Onward travel would likely continue along the A329. There is surface water flooding present along the A329, the nearest inundated area is 90m along the route. 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.

Great Knollys Street and Weldale Street (CR12b) Level 2 SFRA

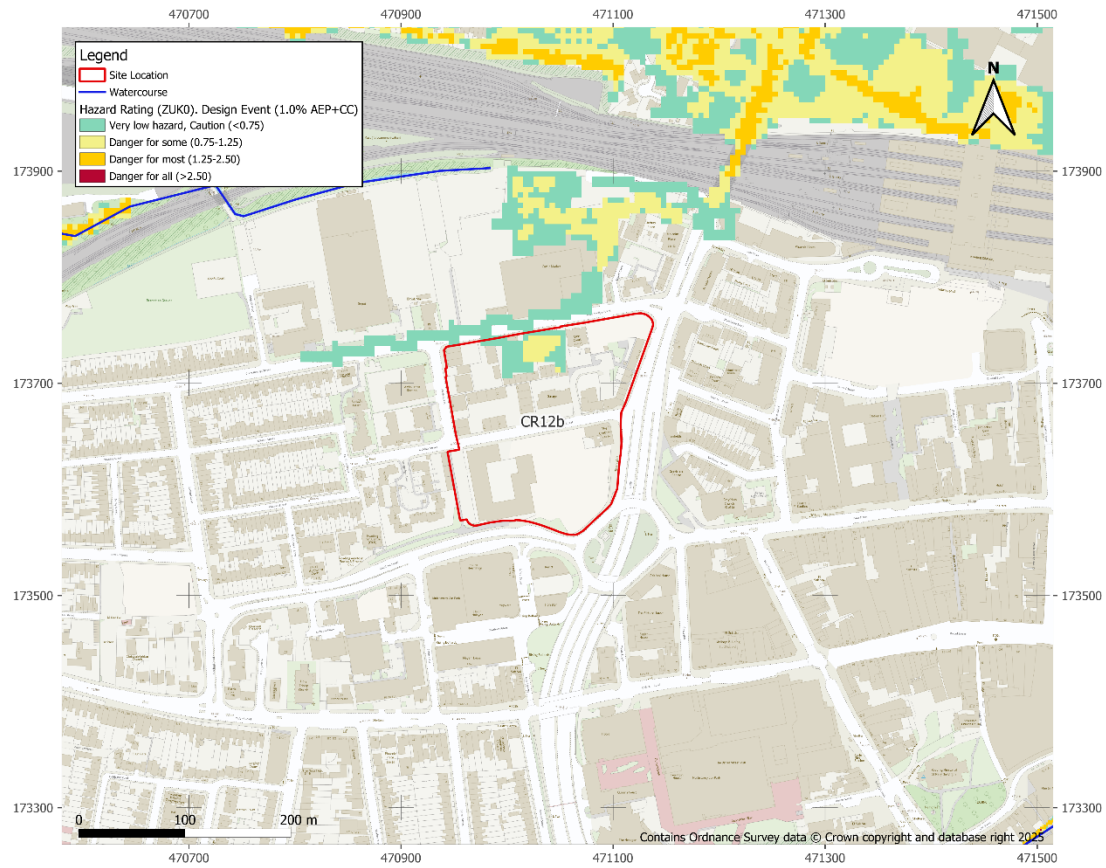


Figure 8 – Flood Hazard Map for the Design Event

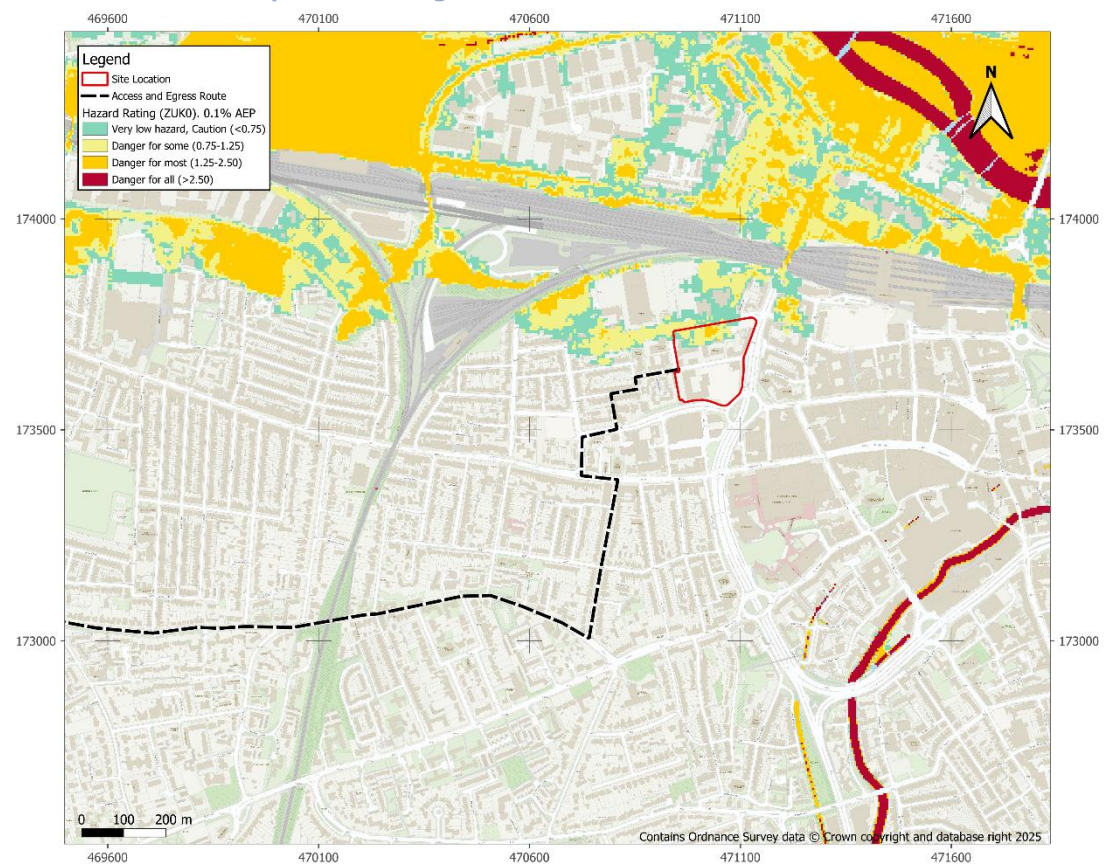


Figure 9 – Access/Egress Routes

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 20% of the site in the design event. The implications for the development should be manageable given that the flooding is limited to the north of the site however it will need to be considered when placing infrastructure.

5.2 Scale of Development

The total site area is 3.02ha; allocated for between 260-380 dwellings. The scale of development at the site should be achievable however given that 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.

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 moderate. 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 as there is some uncertainty in the national scale mapping given the urban setting of the site. This may involve development of a bespoke hydraulic model for the 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 Thames 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.