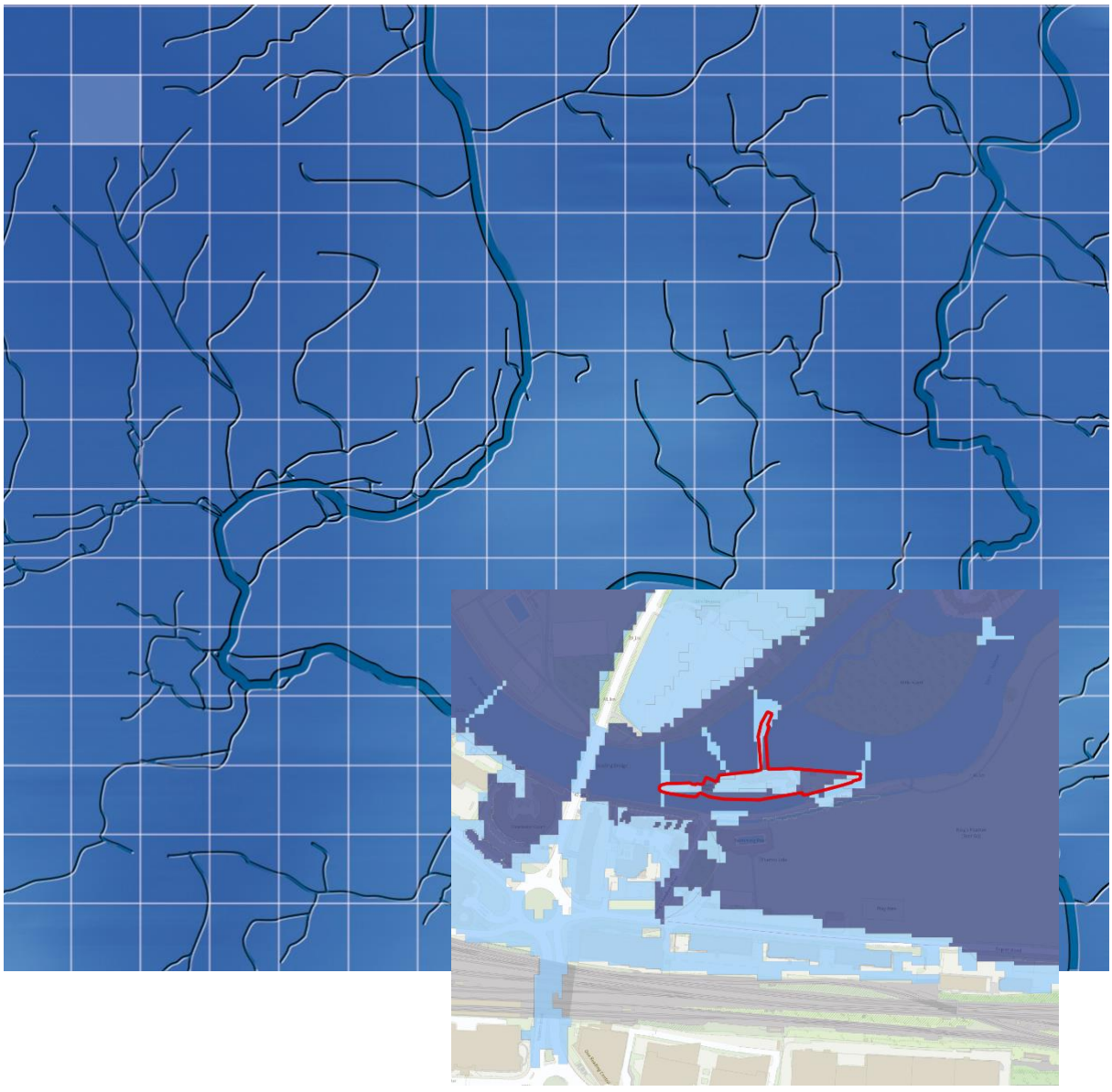
Reading Borough Council

May 2025

Caversham Lock Island (CR14m)

Level 2 Strategic Flood Risk Assessment



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1.0	02/05/25	Draft	Joseph Bentley (*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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Caversham Lock Island (CR14m) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the greatest risk with a significant proportion of the site lying in Flood Zones 2 and 3 based on the EA's fluvial flood map.

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 speed of onset to be very fast on the site and flood depths to be significant in some locations. In this respect fluvial flood risk is considered high.

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 *Water Compatible Development* which is permissible in Flood Zone 3a and Flood Zone 3b. However, any development proposed should not increase flood risk elsewhere. Furthermore, given that the development is earmarked for recreational and tourism purposes there could be an increase in site users, therefore ensuring adequate flood warning and safe access will be vital.

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 Caversham Lock Island (CR14m) 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

The Caversham Lock Island (CR14m) site is 0.50ha and is located on an island in the River Thames, approximately 500m to the northeast of Reading Station. It is located in a suburban area in central Reading, see Figure 1.

In the Replacement Local Development Plan (RLDP) it is proposed to be used for water-compatible development in the form of recreation.

2.2 Topography

Based on 1m LiDAR data, the site is relatively flat. Because the site is an island, it is surrounded by lower ground. The ground levels within the site boundary range from 35.3 to 38.8m AOD. The average ground level is 37.5m AOD.

2.3 Nearby Watercourses

The site is sited on an island in the River Thames. The River Thames runs from west to east at this location. There is also an unnamed ordinary watercourse which confluences with the River Thames, 50m downstream of the site. Figure 1 shows the location of these watercourses.

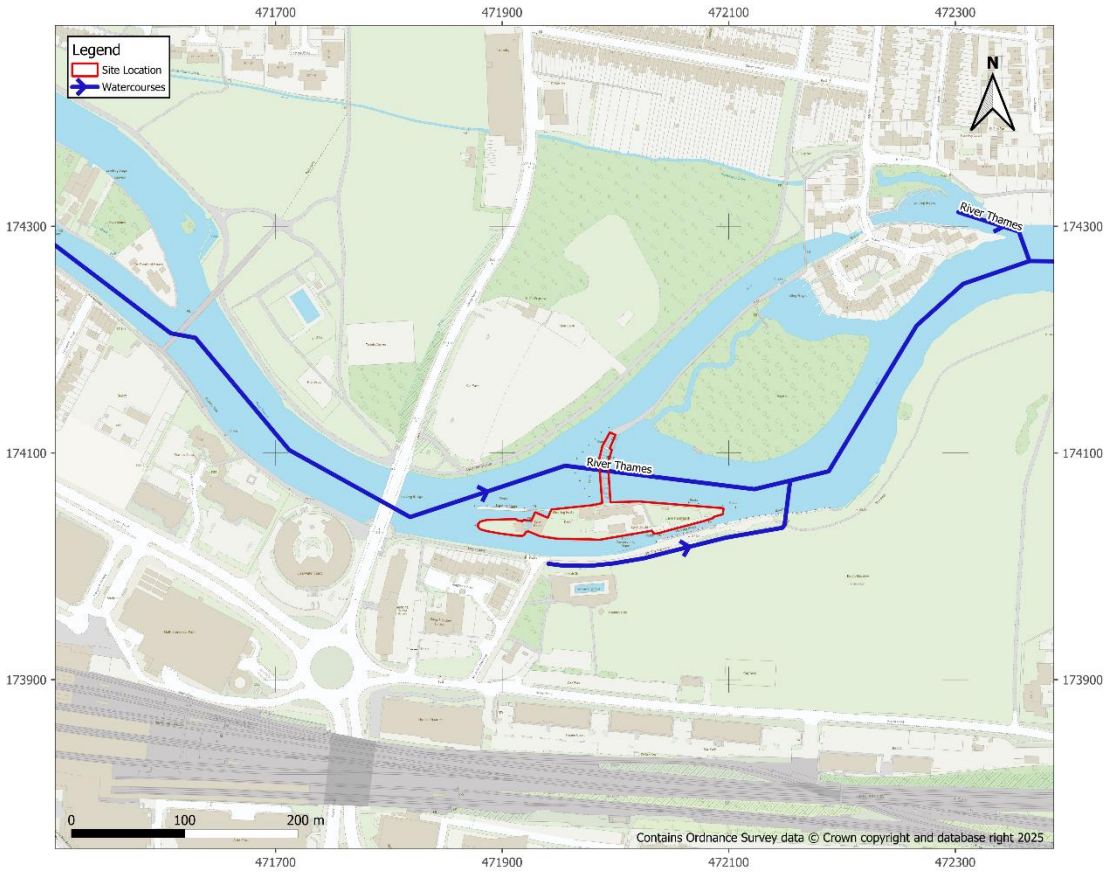

Figure 1 - Site Location

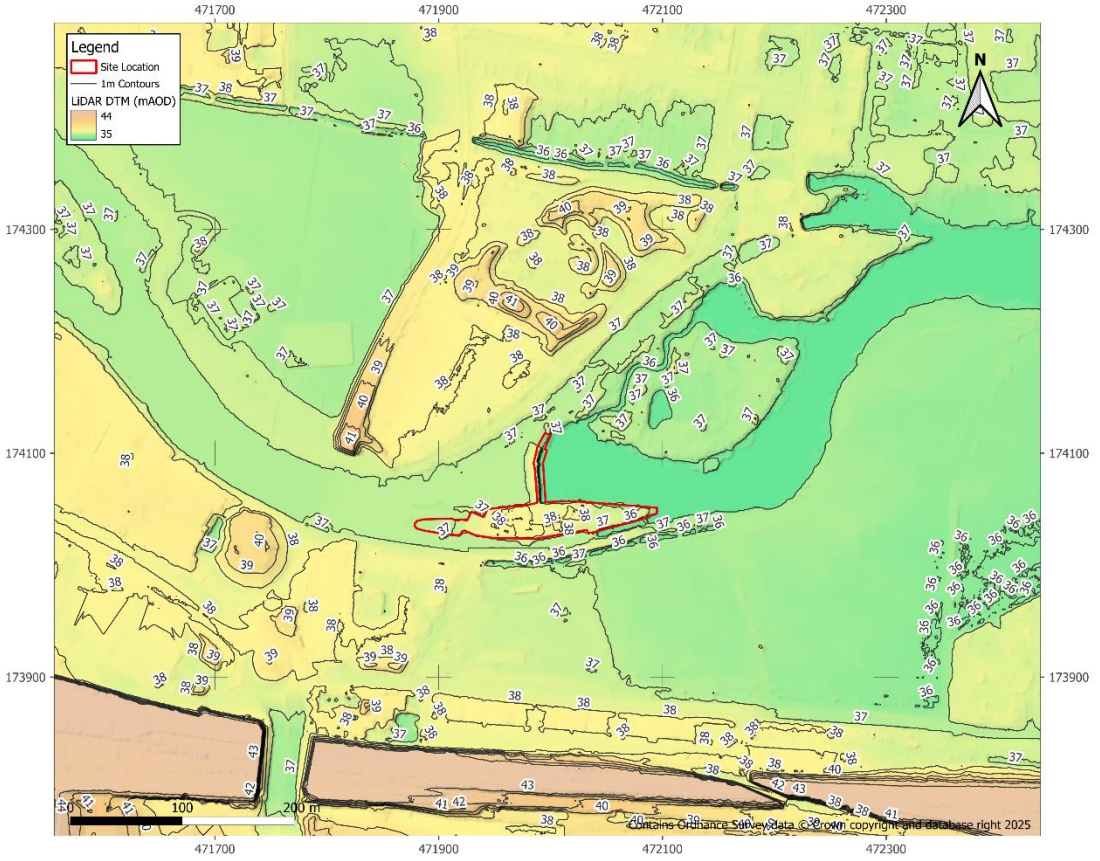

Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has several records of historic flooding at the site. There are five events recorded in the EA database at this location. These events occurred in March 1947, August 1977, December 2000, January 2003 and July 2007. All five were associated with flooding of the River Thames.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), the entire site is inundated by Flood Zone 2, with 42% of the site located in Flood Zone 3a. Viewing the model results for the 3.3% AEP event, 23% of the site is located in 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, the entire site is inundated by Flood Zone 2 and the proportion of the site located in Flood Zone 3a increases to 73%, see Figure 4.

Fluvial flood risk is considered to be high 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 surface water flooding within the red line boundary for the 0.1% AEP event. The nearest area of surface water flooding to the site is a small area of pooling 25m to the south of the site boundary, however this is likely to be fluvial in origin associated with the small unnamed watercourse, see Figure 5. When accounting for climate change the site remains flood free, see Figure 6. Overall, the risk of surface water flooding is considered to be 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 Alluvium 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 within 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 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 located within the River Thames from Scours Lane, Reading to Caversham Lakes EA Flood Warning Area.

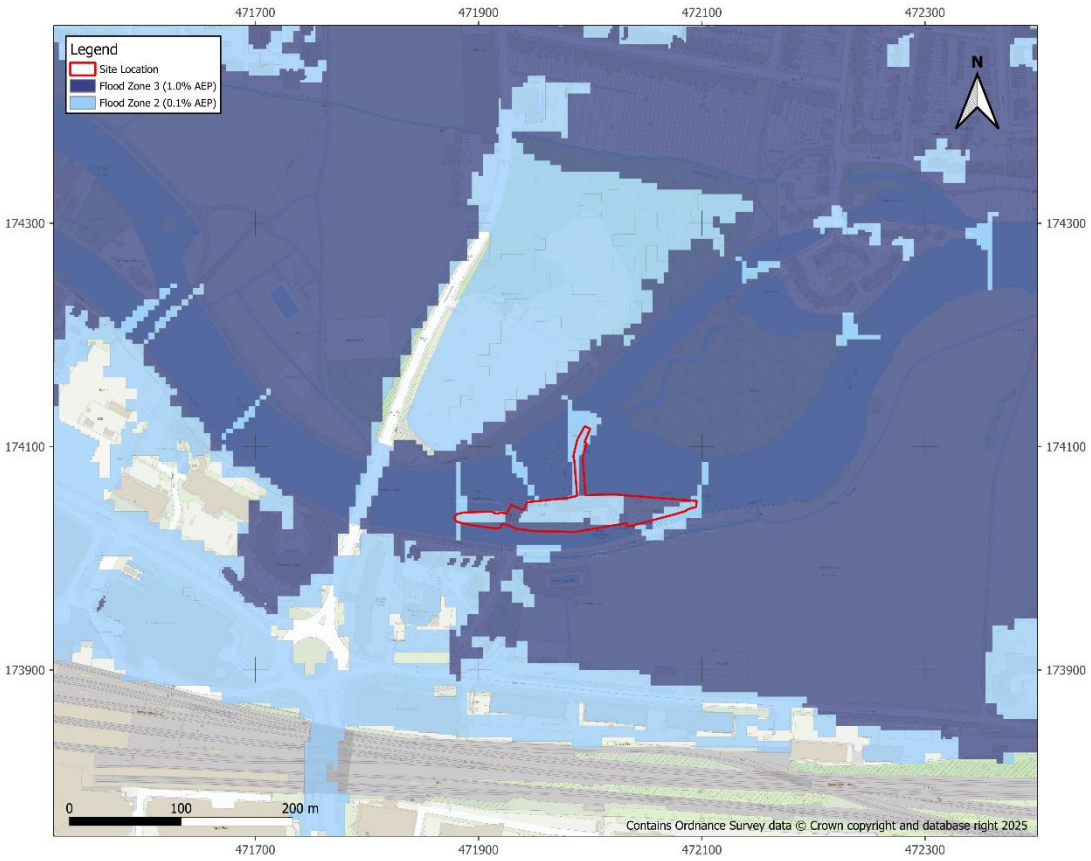

Figure 3 - Fluvial Flood Map

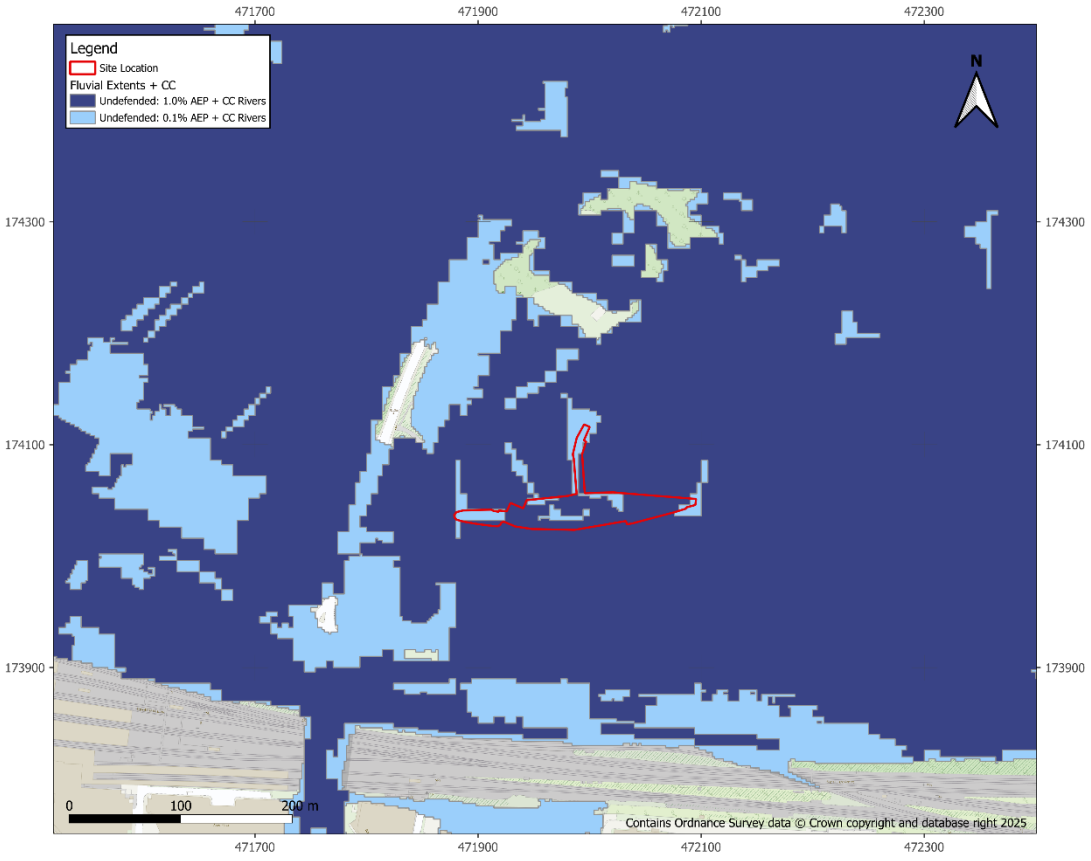

Figure 4 – Fluvial Climate Change Flood Map

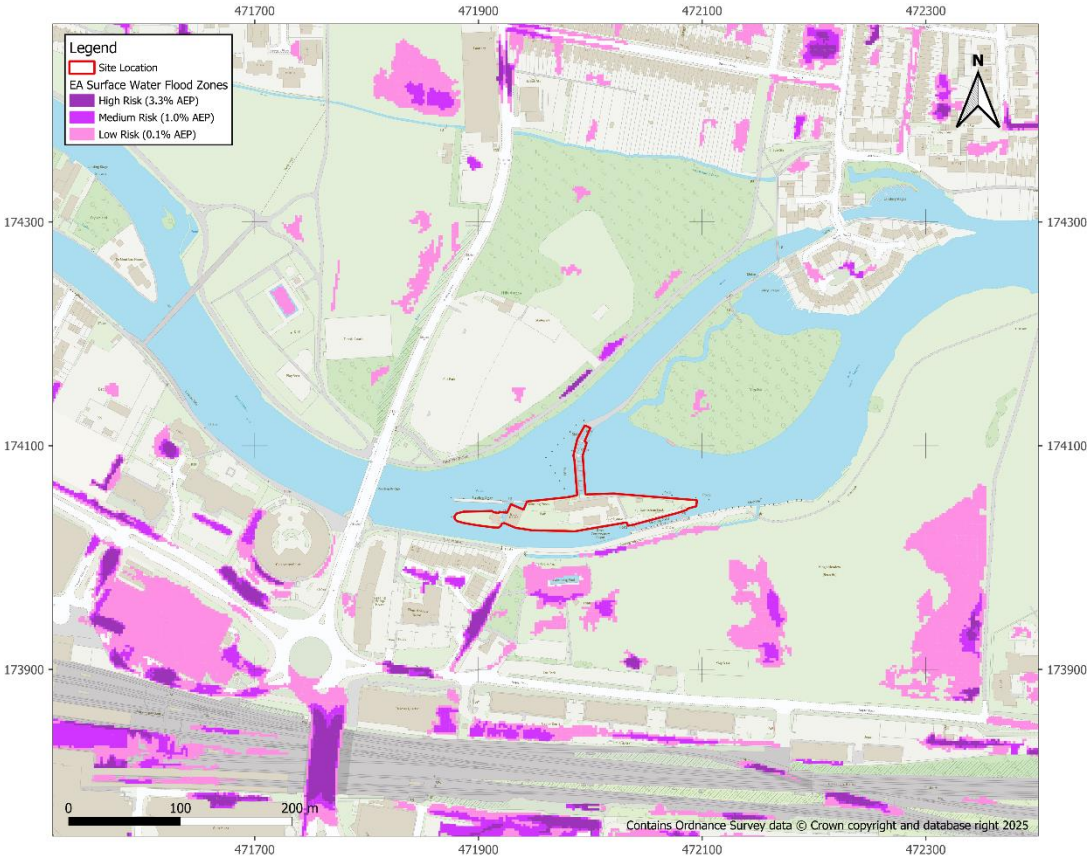

Figure 5 – Surface Water Flood Map

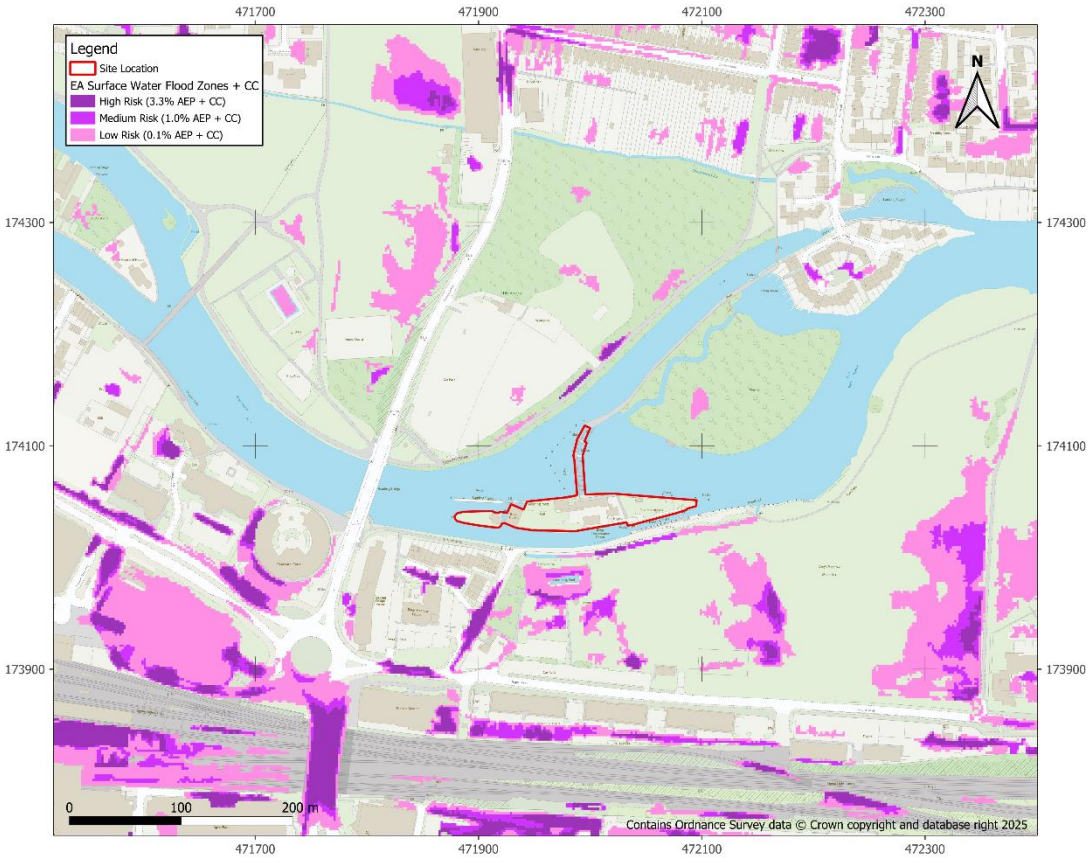

Figure 6 -Surface Water Climate Change Flood Map

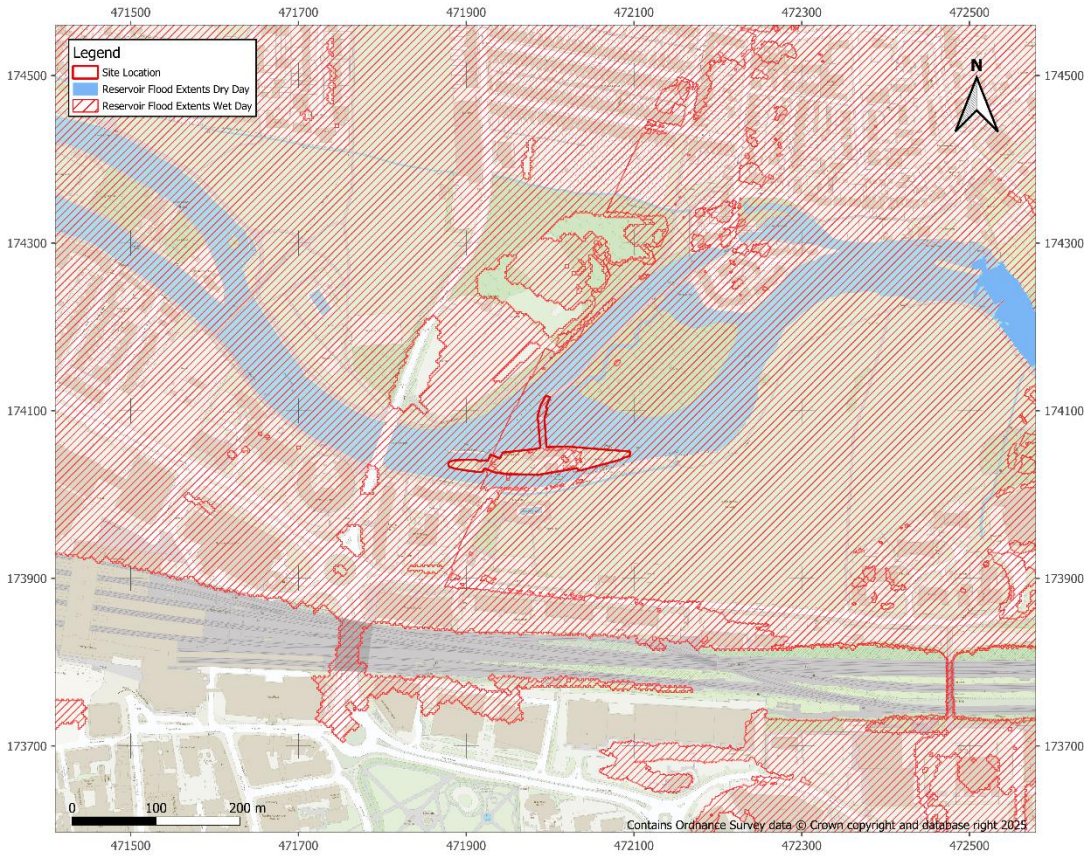

Figure 7 - Reservoir Failure Flood Map

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) 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 38.0 mAOD, significantly higher than the average ground level on the site. The hazard map for this event (see Figure 8) shows that most of the site has a low hazard rating however there are areas of *danger for most* and *danger for all*, indicating higher flood depths and velocities. Given the location of the site within 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 (%)	62%
Average Flood Depth (m)	0.61m (Max- 5.79*m)
Average Velocity (m/s)	0.35m/s (Max – 1.38*m/s)
Speed of Onset (hrs)	<1hr

*Max values are likely associated with the river channel rather than site due to the coarseness of the model grid.

4.3 Access and egress

There is no vehicle access to the site, however pedestrian access is available to the north and to the south. During an extreme flood event, the route to the south is considered the safest option due to lower overall flood hazard, see Figure 9.

Site users would cross the River Thames via the southern route before joining the Thames Path and heading westwards. Vehicular access is available to the Thames Path in this location. Onward travel would likely be to join Kings Meadow Rd to head southwards to lower flood risk areas.

At flood peak the initial part of this route is inundated with Flood Hazard in some locations indicating *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 and the site is located in a flood warning area so this should be possible. However, it is important to note that parts of the route are also 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.

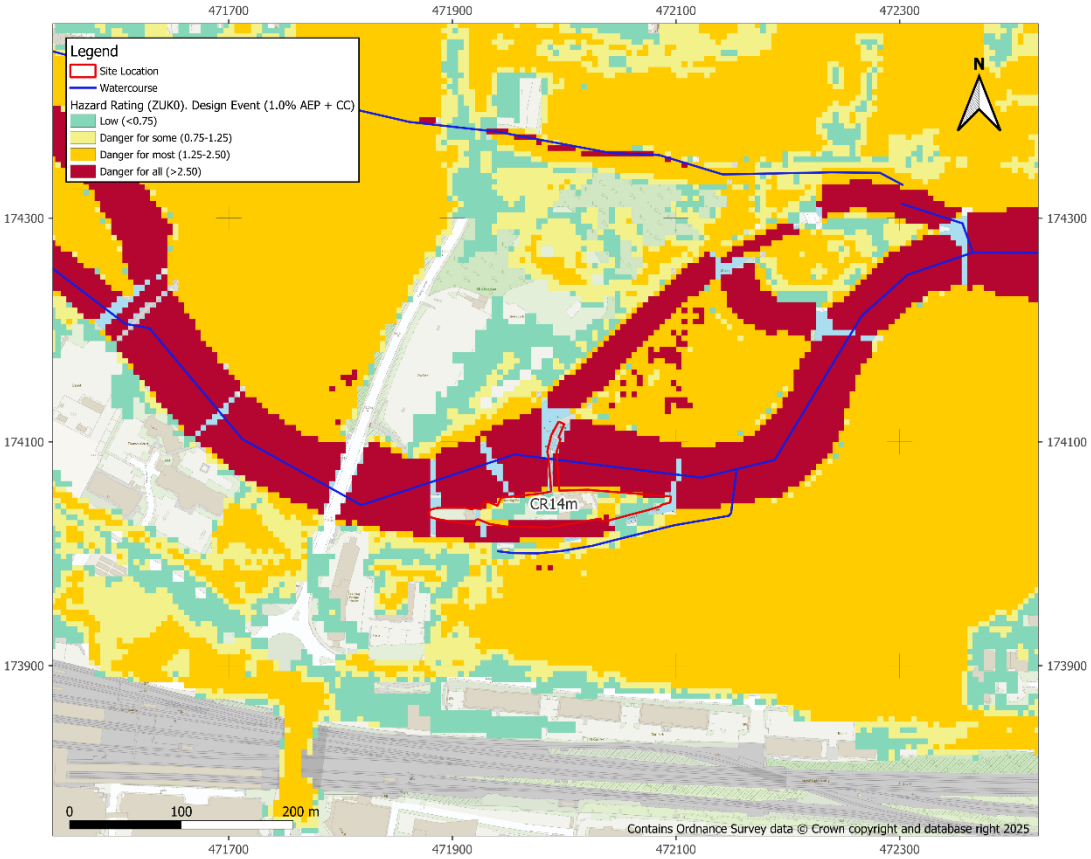

Figure 8 – Flood Hazard Map for the Design Event

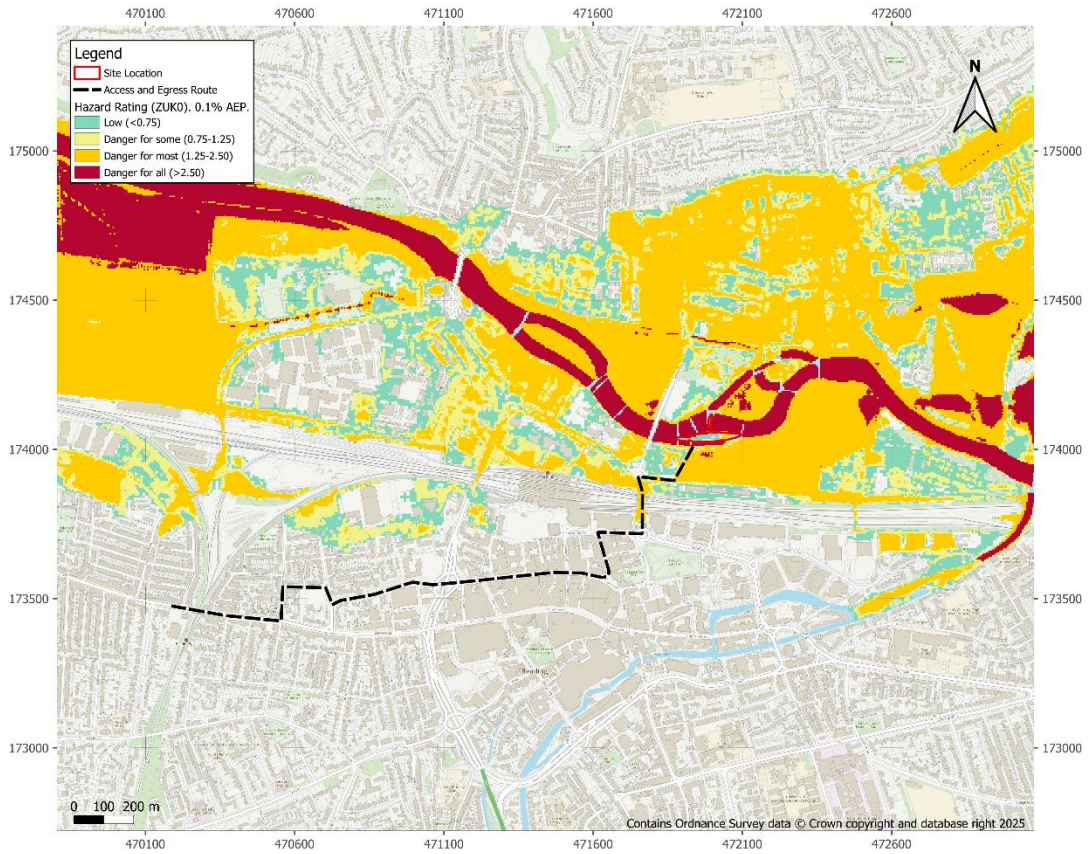

Figure 9 – Access/Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is categorised as *Water Compatible Development* which is permissible in Flood Zone 3a and Flood Zone 3b. However, any development proposed should not increase flood risk elsewhere. Furthermore, given that the development is earmarked for recreational and tourism purposes there could be an increase in site users, therefore ensuring adequate flood warning and safe access will be vital.

5.2 Scale of Development

The total site area is currently 0.50ha; allocated for either leisure, tourism or hydropower. The development is likely to be small in scale (900-1,100m^2). Given the site's location in Flood Zone 3a, if any new infrastructure is proposed it may reduce available floodplain storage. This could cause third party flood risk impacts which a site-specific FRA would need to assess and determine any requirements for compensatory storage. It is noted that there is limited space available on site to provide compensatory storage.

5.3 Sequential Approach

Placement of water compatible development in Flood Zone 3a is permissible however if possible new infrastructure should be located in the far east and/or west of the island which is located solely in Flood Zone 2.

5.4 Other Site-Specific Considerations

There is no surface water flood risk within the site, therefore it should not be a barrier to development. However, parts of the 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 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.

If new infrastructure is proposed it may compromise flood plain storage. Hydraulic modelling may need to be undertaken to assess 3rd party impacts and compensatory storage requirements. A site-specific FRA should confirm any storage and modelling requirements with the EA.