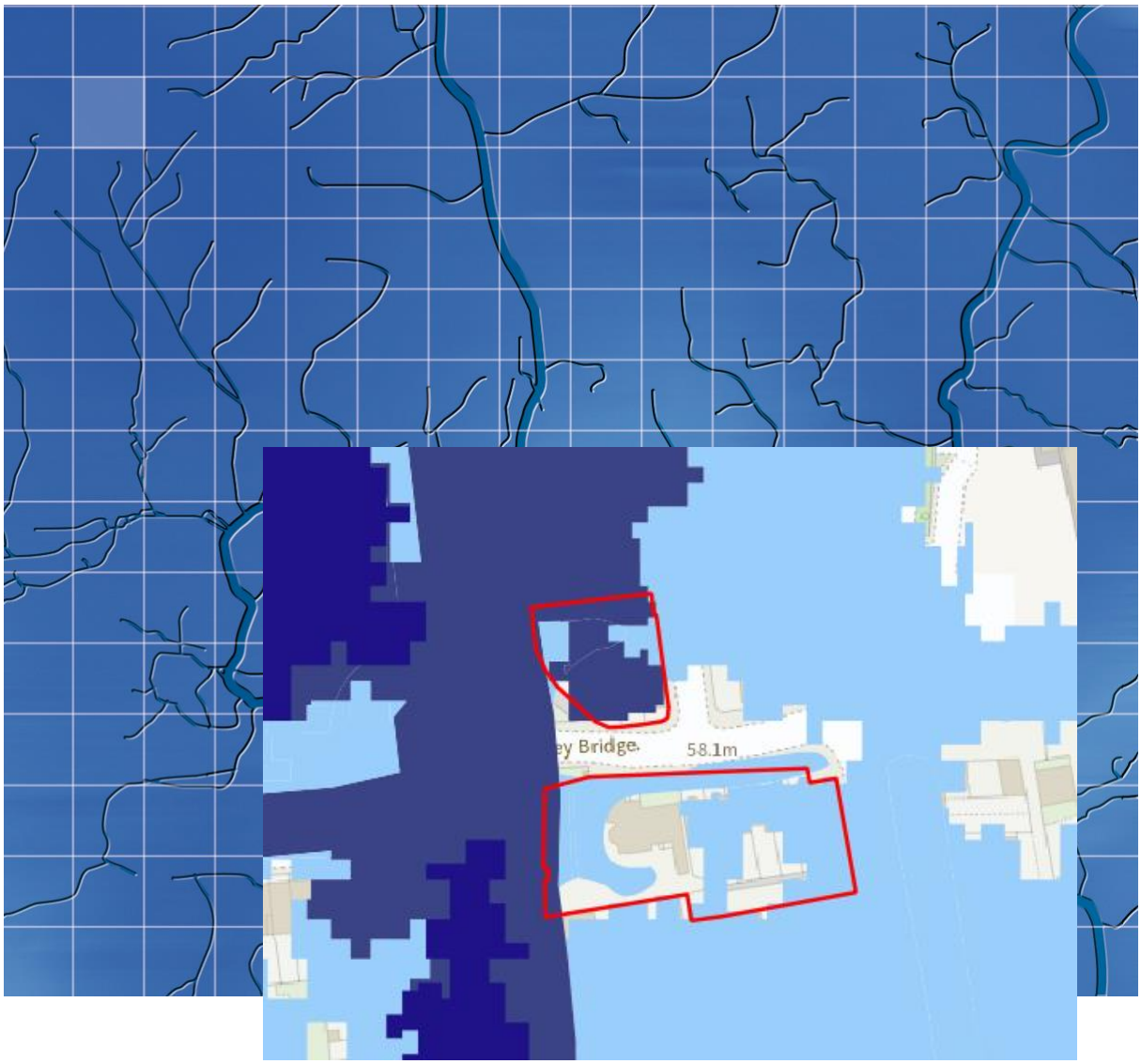
Oxford City Council

October 2025

Botley Road sites around Cripley Road including River Hotel and Westgate Hotel (613, 614, 615)
Level 2 Strategic Flood Risk Assessment



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Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10237

Version	Issue date	Issue status	Prepared By	Approved By
1.0	24/10/2025	Draft	Jasmine Lucas (*Graduate 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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Botley Road sites around Cripley Road including River Hotel and Westgate Hotel (613, 614, 615) Level 2 SFRA

Flood Risk Overview

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

Flood Risk

The site is at risk from fluvial flooding.

The EA Flood Map for Planning shows 23% of the site is located within fluvial Flood Zone 2 and 72% of the site is located in fluvial Flood Zone 3a. The River Thames (2018) 1.0% AEP +26% CC design event results indicate that flood extents are greater within the northern site whereas the maximum flood depth (0.4 m) occurs within the southern site.

The risk of flooding from surface water is low.

The risk of flooding from other sources is moderate as the site is at risk from reservoir flooding.

The overall confidence in the assessment is high due to the use of detailed hydraulic modelling to inform the assessment.

Conclusions and Recommendations

The development proposed is categorised as mixed use including both more and less vulnerable development. As the majority of the site is already developed, it is expected that development at the site will be redevelopment. However, a sequential approach to the siting of development at the site should still be used, prioritising development within the lowest areas of flooding before considering areas with higher flood risk.

Safe access and egress to the site will be heavily reliant on early flood warnings. This should be possible due to the long lead in times to flood events, however it is essential that all households and businesses at the sites sign up for EA flood warnings.

The site may face significant barriers given that a large proportion falls within the design flood extent (1.0% AEP + 26% Climate Change event). More vulnerable development located in its extent will need to be raised above the design flood level and compensatory storage may need to be provided to offset any 3rd party flood risk impacts if the development footprint exceeds the existing site footprint.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by Oxford City Council (OCC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Botley Road sites around Cripley Road including River Hotel and Westgate Hotel (references: 613, 614, 615) 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

Botley Road sites around Cripley Road including River Hotel and Westgate Hotel (613, 614, 615) are a sites located to the north and south of Botley Road west of Oxford City Centre with a total site area of 0.34 ha, see Figure 1. Land use at the site is currently mixed residential and commercial. A hotel covers a large proportion of the site area.

Proposed development at the site is residential with the potential for retail use on the ground floor. Approximately 20 dwellings are proposed for the sites.

2.2 Topography

LiDAR data indicates the northern site is relatively flat whilst the southern site shows a slight gradient from east to west, see Figure 2. A slight topographic depression is also present within the east of the southern site.

The ground levels across both sites range from 56.8 to 58.9 m AOD. Both the minimum and maximum ground levels occur within the southern site. The average ground level in the northern site is approximately 57.3 m AOD whilst the average ground level in the southern site is approximately 57.6 m AOD.

2.3 Nearby Watercourses

Both sites are bordered to the west by the River Thames, see Figure 1. The Osney Stream diverges from the River Thames just downstream of Osney Bridge and adjacent to the two sites.

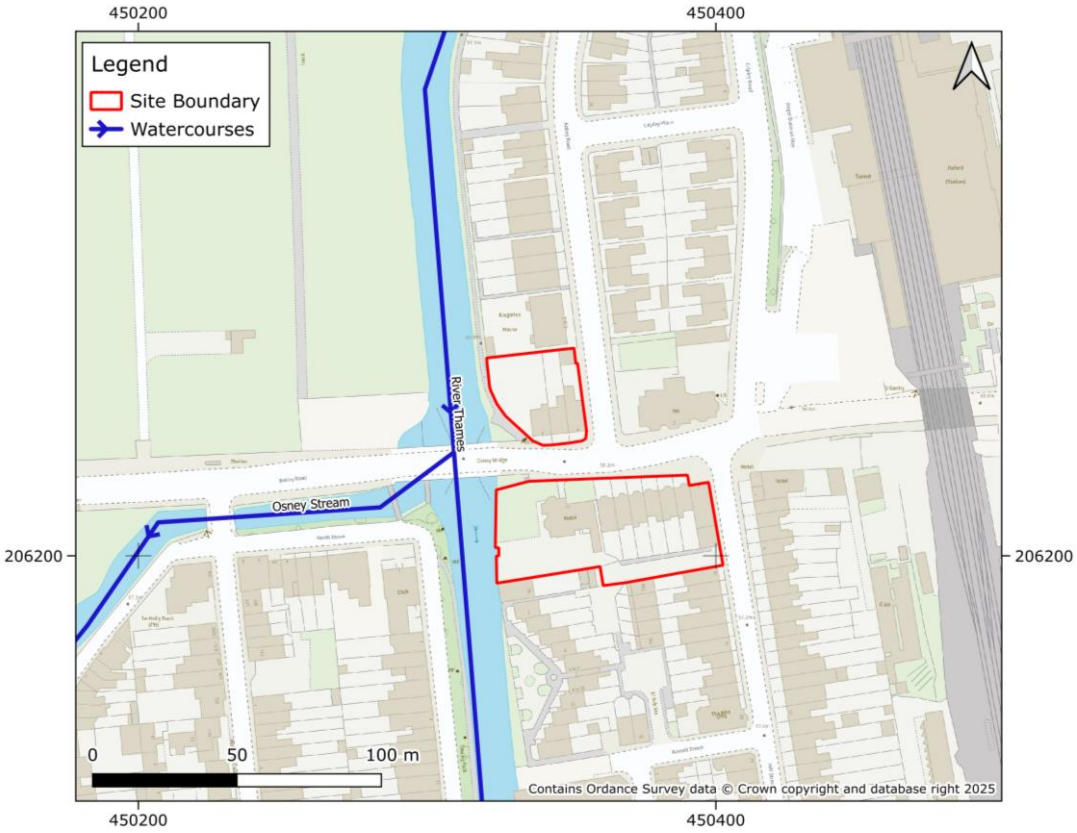

Figure 1 - Site Location

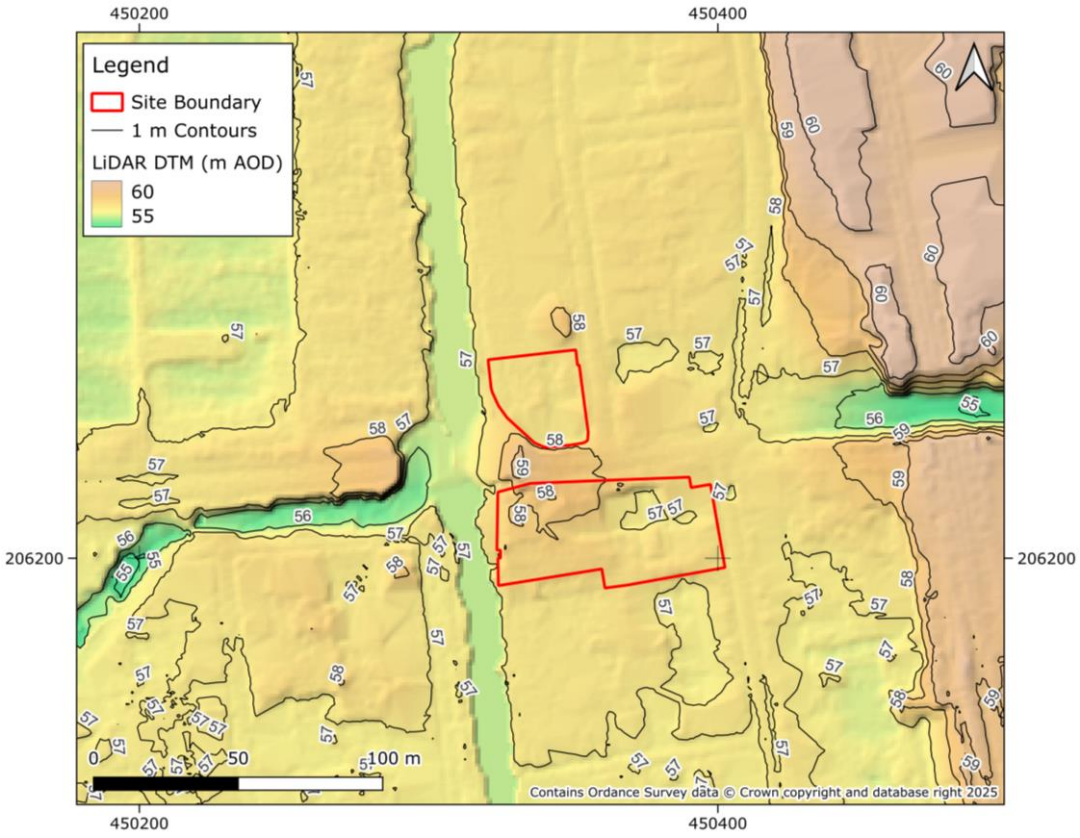

Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has one record of historical flooding affecting both sites (see Figure 3). This occurred in July 2007 and was associated with the River Thames exceeding its channel capacity.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 72% of the total site area is located within Flood Zone 2 (0.1% AEP), and 23% is located within Flood Zone 3a (1% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. This extent shows no part of the site is located within Flood Zone 3b. As can be seen in Figure 4 most of the Flood Zone 3a extent falls within the northern site with only a small proportion of the northern site effected. All fluvial flood risk at the site is associated with the River Thames.

The EA climate change fluvial outputs for the undefended 0.1% AEP and 1.0% AEP extents and defended 3.3% AEP extent have also been assessed, with 23% of the site located within the 3.3% AEP extent, 48% of the site located within the 1.0% AEP extent, and 66% located within the 0.1% AEP extent. Once more flood risk is greatest in the northern site, see Figure 5.

Note, although the EA 3.3% AEP extent considers the defended scenario, the extent is slightly larger than the River Thames (2018) undefended modelled extent and so has been used to guarantee a precautionary approach to assessing flood risk.

Fluvial flood risk is considered to be moderate at the northern site and high at the southern site. It is assessed in more detail in section 4.

3.3 Flood Defence Infrastructure

The southern site benefits from a flood defence wall along the River Thames adjacent to the site boundary. The wall is approximately 200 m in length and has a design standard of protection (SOP) of 25 years. It protects the left bank of the River Thames between Osney Bridge and the southern edge of the Old Oxford Power Station. The northern site does not benefit from flood defence infrastructure.

The sites are not located within an EA Rivers or Seas Flood Storage Area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show no part of the total site area to be inundated during a 3.3% AEP or 1.0% AEP event. During a 0.1% AEP event approximately 5% of the total site area is inundated, this flooding is isolated to the southern site (see Figure 6). When considering the effects of climate change, the proportion of the total site area at risk for each event remains the same at 0%, 0%, and 5% respectively, see Figure 7.

Overall, the surface water flood risk to the site is low.

3.5 Groundwater Flooding

The sites are underlain by a bedrock of mudstone in the form of the Oxford Clay and West Walton formation. It is expected to permit low amounts of infiltration. Superficial deposits of alluvium are also present at the sites. The underlying soils are loamy and clayey floodplain soils with naturally high groundwater.

Based on the data available there is a moderate risk of groundwater flooding, however, due to the proximity of the site to the River Thames, groundwater flooding expected to be heavily correlated with fluvial flooding. More data is required at the planning stage to confirm groundwater flood risk.

3.6 Reservoir Flood Risk

The FMfP shows that the northern site is at risk of reservoir flooding during both the wet and dry day scenarios, whereas the southern site is at risk only during the wet day scenario, see Figure 8. A number of reservoirs are located upstream of the site on the River Thames, though most notably Farmoor Reservoir.

Whilst the sites are 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 aim to make sure that all reservoirs are properly maintained and monitored to detect and repair any problem. If required, the local planning authority (LPA) can consult the local resilience forum for emergency planning advice in relation to reservoir failure.

3.7 Flood Warning Service

The sites are located within the River Thames and tributaries in the Binsey, Osney and Osney Island areas in Oxford, EA Flood Warning Area.

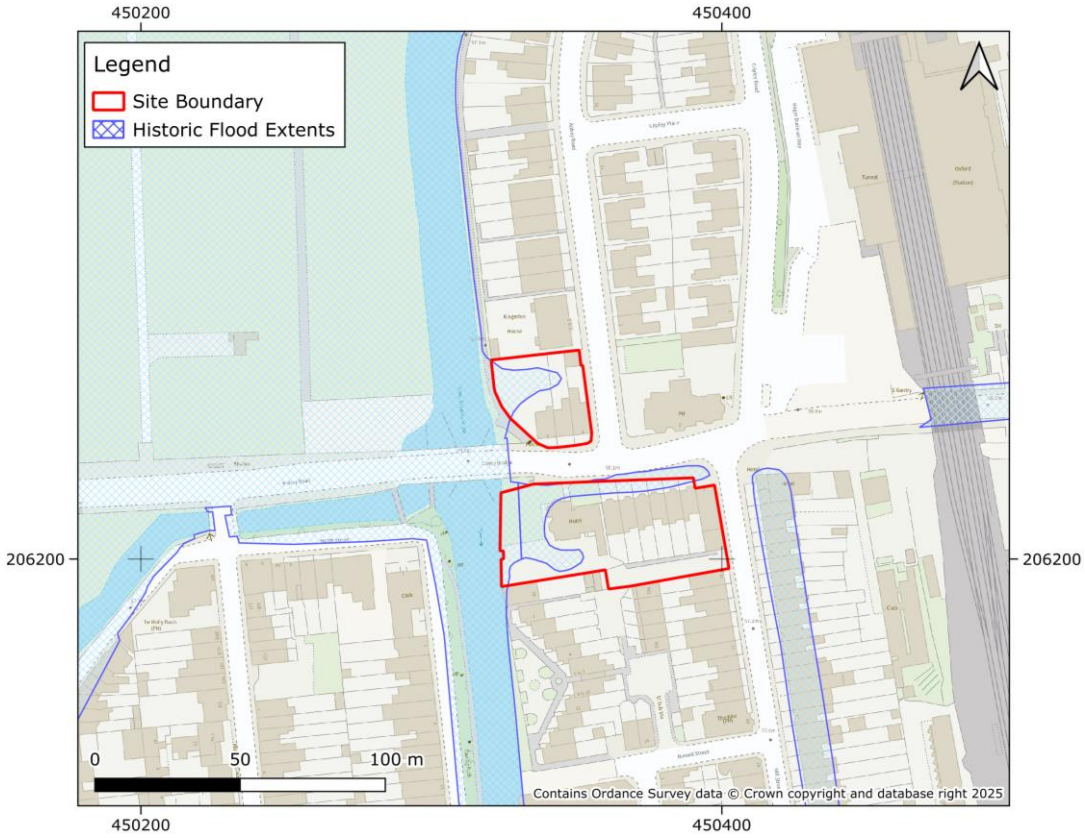

Figure 3 - Recorded Flood Outlines

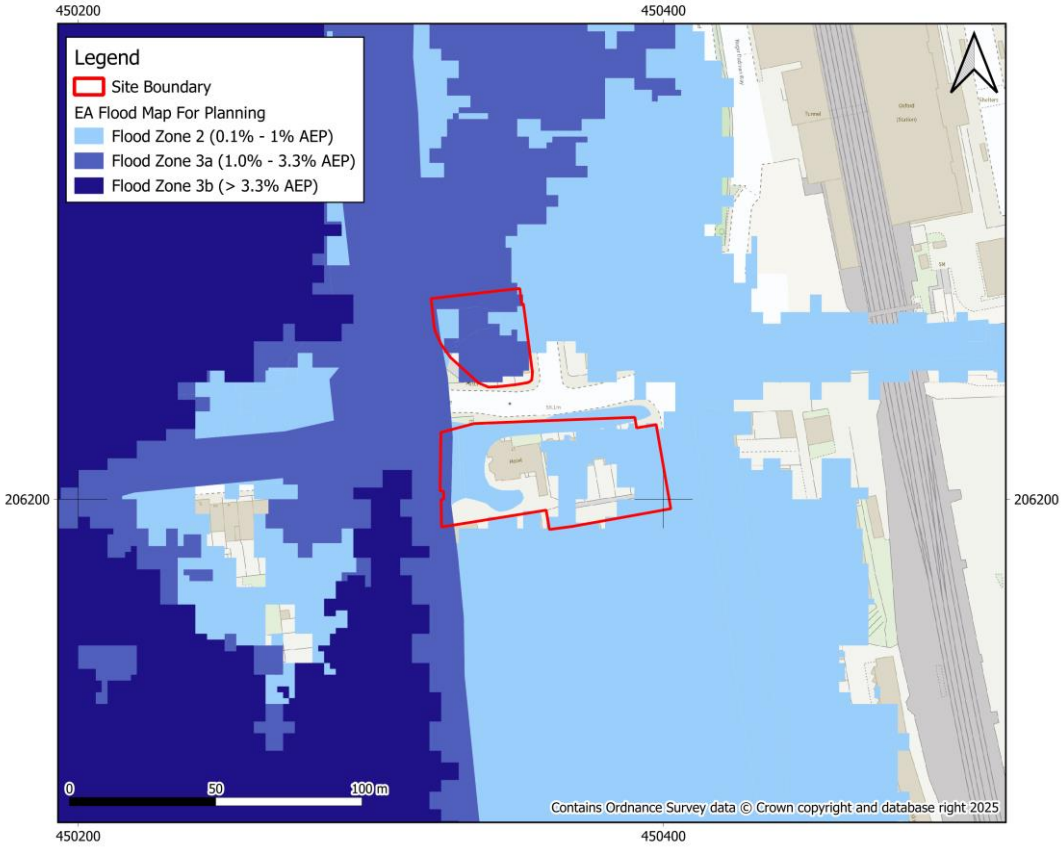

Figure 4 - Fluvial Flood Map

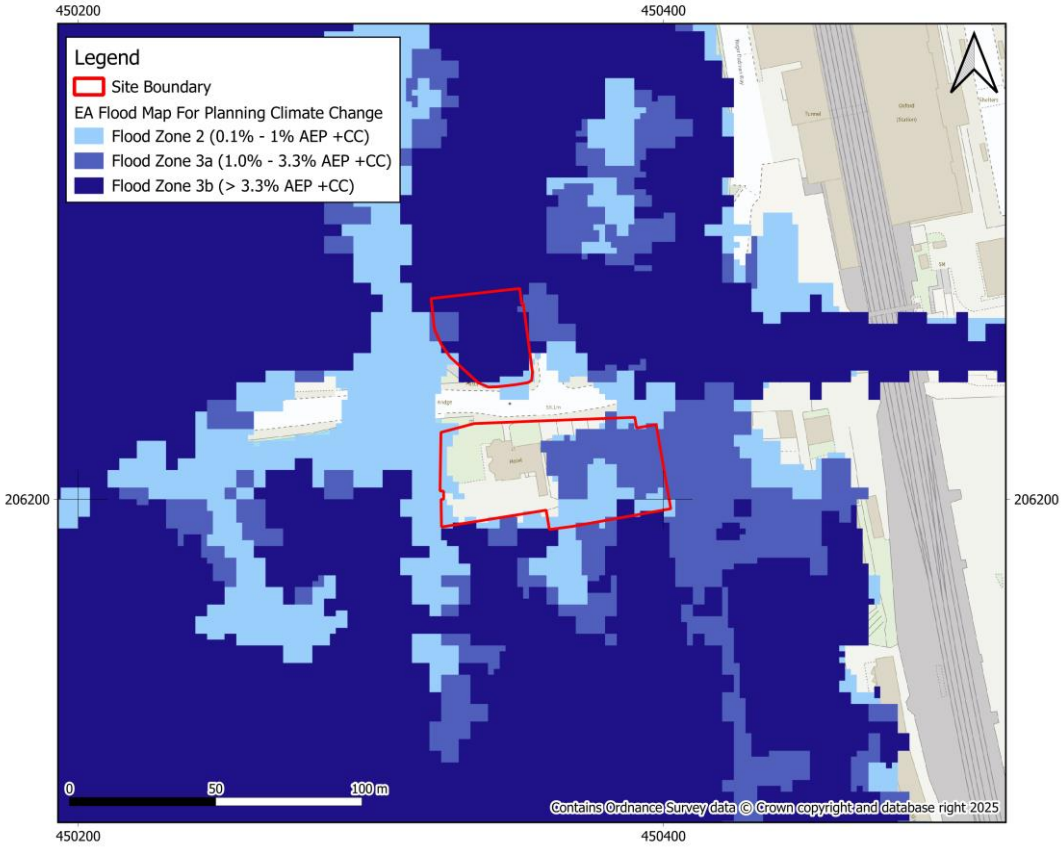

Figure 5 – Fluvial Climate Change Flood Map

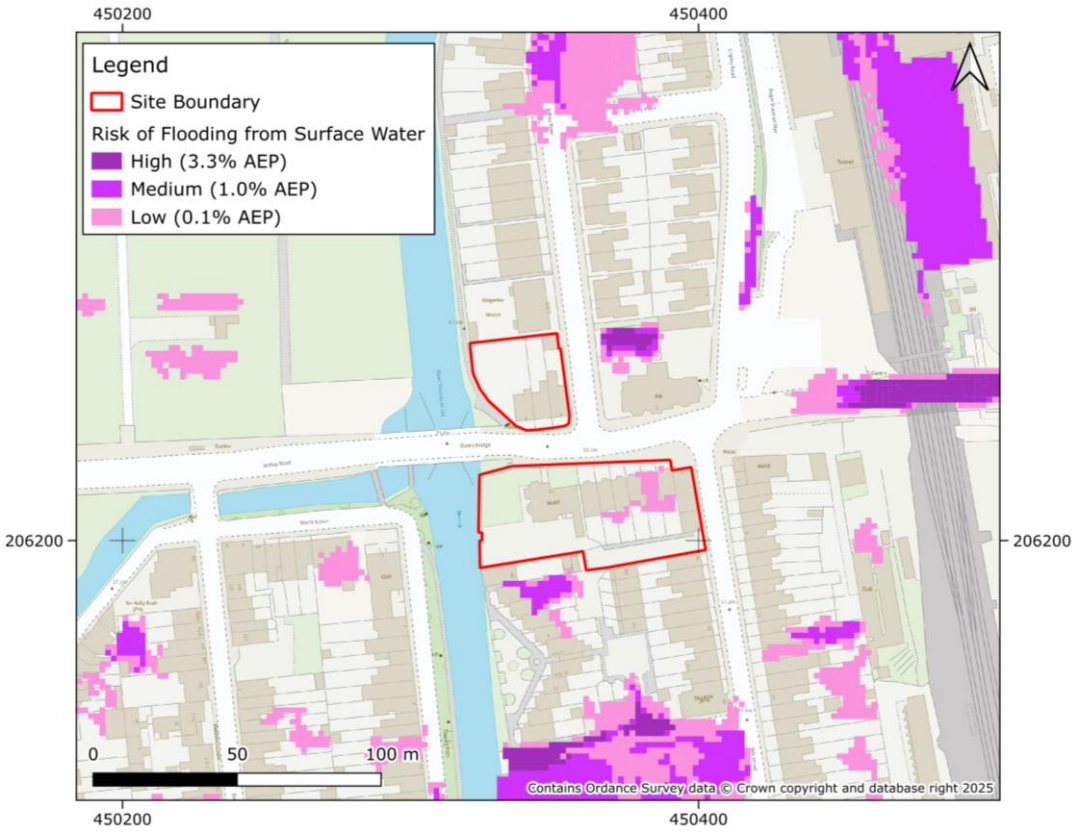

Figure 6 – Surface Water Flood Map

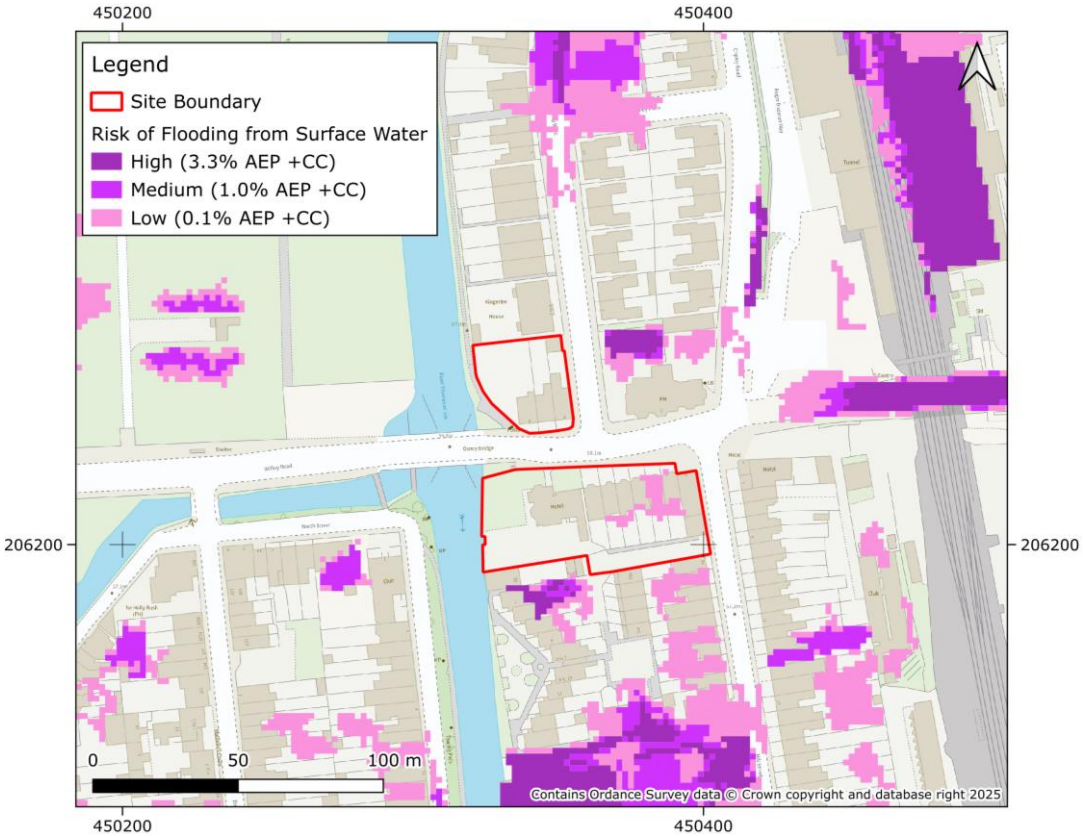

Figure 7 -Surface Water Climate Change Flood Map

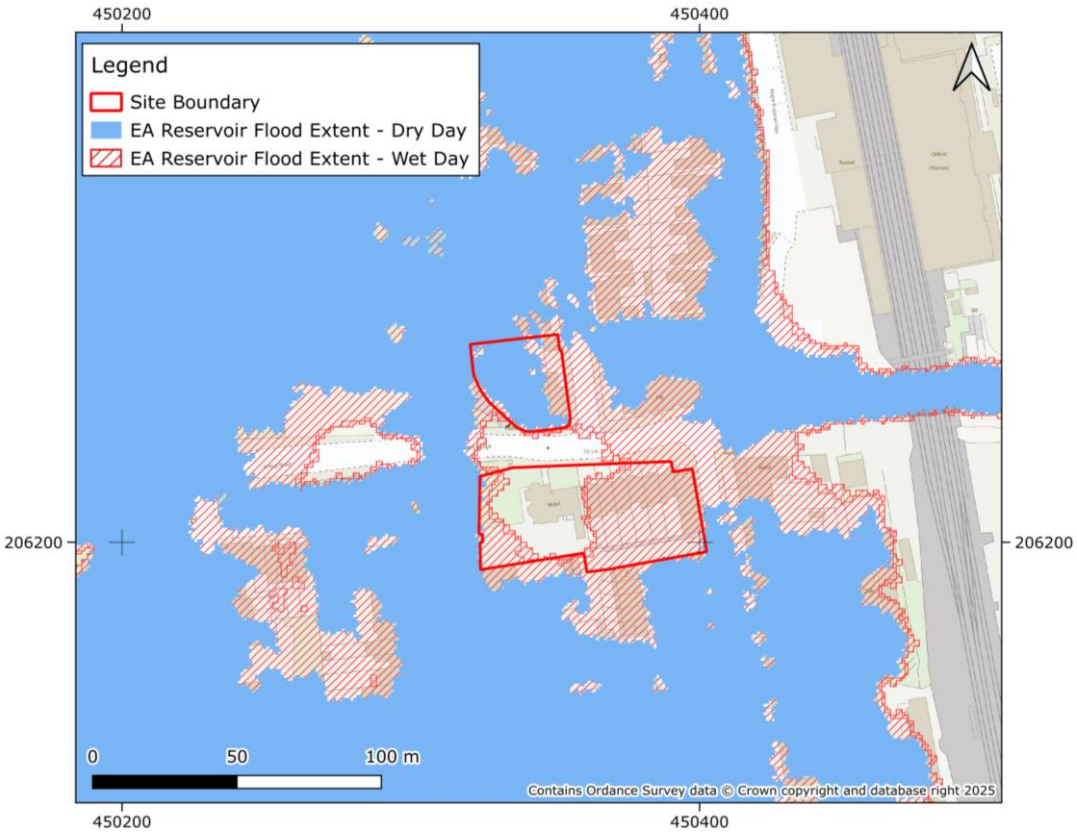

Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism to the site is fluvial in origin. This is quantitively assessed in more detail below.

4.2 Flood Risk Metrics

The River Thames Model (2018) was re-run as part of the previous SFRA for Oxford City in 2023. This was to obtain results applying the latest climate change allowances.

Depth data for the 100-yr plus central (26%) climate change design event is assessed to attain further detail on fluvial flooding. The modelled scenario considers the presence of flood defences unlike the FMfP data, although the impact for the design event is minimal given that the defences close to the southern site have a design SOP of only 25-years.

The depth mapping (see Figure 9) shows flooding during the design event is limited mostly to the northern site and the eastern portion of the southern site. The maximum flood depth across both sites is 0.41 m and occurs in the northeast of the southern site. Within the northern site, the maximum flood depth is 0.33 m. Though the maximum depth is greater within the southern site, the average depth of flooding is greater within the northern site. Despite this, the average flood depth remains less than 0.2 m for both sites. The modelled outputs indicate that flood waters originate from the River Thames to the north of the sites. The design flood level is 57.5 m AOD which is above the average ground level for the northern site (57.3 m AOD) and slightly below the average ground level for the southern site (57.6 m AOD).

4.3 Access and egress

Both sites are accessed mainly by Botley Road, with additional access via Abbey Road for the northern site and Mill Street for the southern site. The route with the least area of flood risk is preferred, see Figure 10.

During an extreme flood event, the preferred route is to travel east along Botley Road beneath the rail line and towards Hythe Bridge Street. From here, site users can travel north towards the flood free areas of Oxford. Parts of the route fall within Flood Zone 3a and 3b and the area below the rail line has modelled flood depths in excess of 2 m during the design 1.0% AEP +26% CC event. This area has a hazard rating of danger to most.

Flood warnings will be essential for safe access and egress to the sites, ideally ensuring that the route identified can be utilised before the onset of flooding. The sites are located within the River Thames and tributaries in the Binsey, Osney and Osney Island areas in Oxford, EA Flood Warning Area and so it is essential that all households and businesses within the sites sign up to receive flood warnings from the Environment Agency.

The River Thames catchment is dominated by chalk and has a relatively slow river response times to storm events, being groundwater, rather than surface water dominated. This increases the time taken for inundation and for adequate warnings and preparation in an extreme flood event. The results of the River Thames (2018) 1.0% AEP +26% CC design event indicate that the speed of onset for the event is relatively slow, with inundation of the preferred route beginning after approximately 100 hours.

It should also be noted that areas of high surface water flood risk are present along both routes. 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.

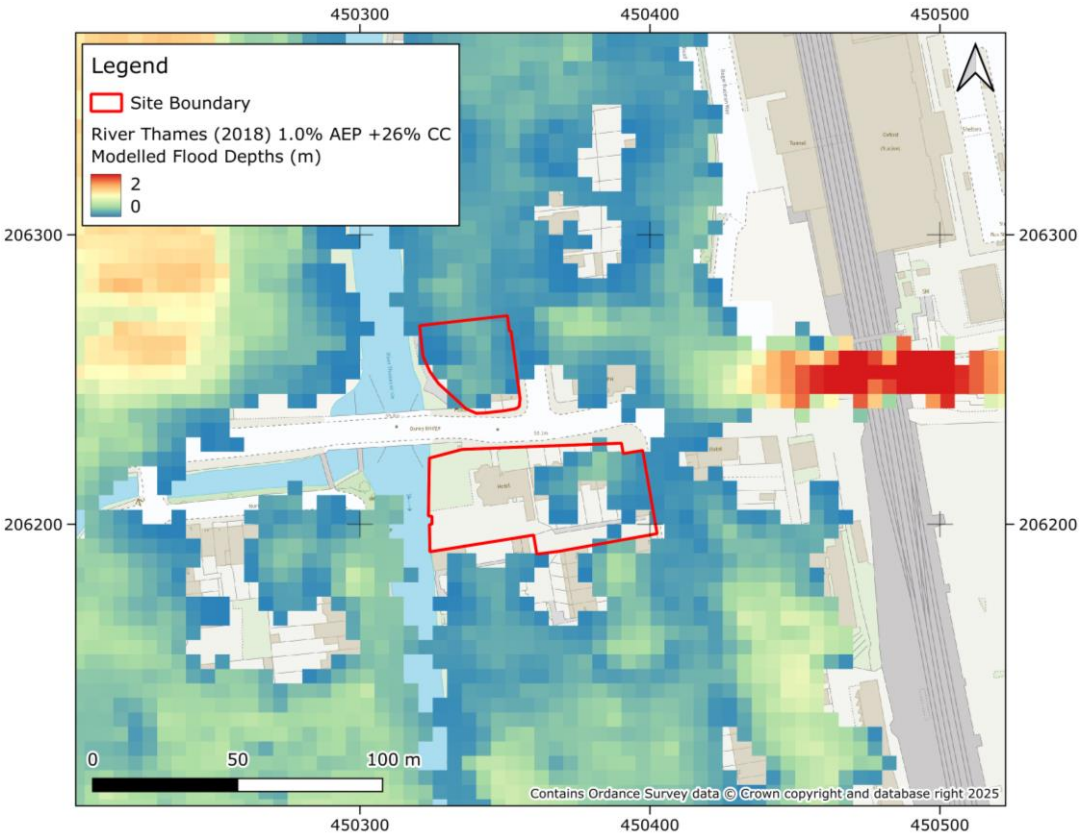

Figure 9 – River Thames (2018) 1.0% AEP +CC Modelled Flood Depths (m)

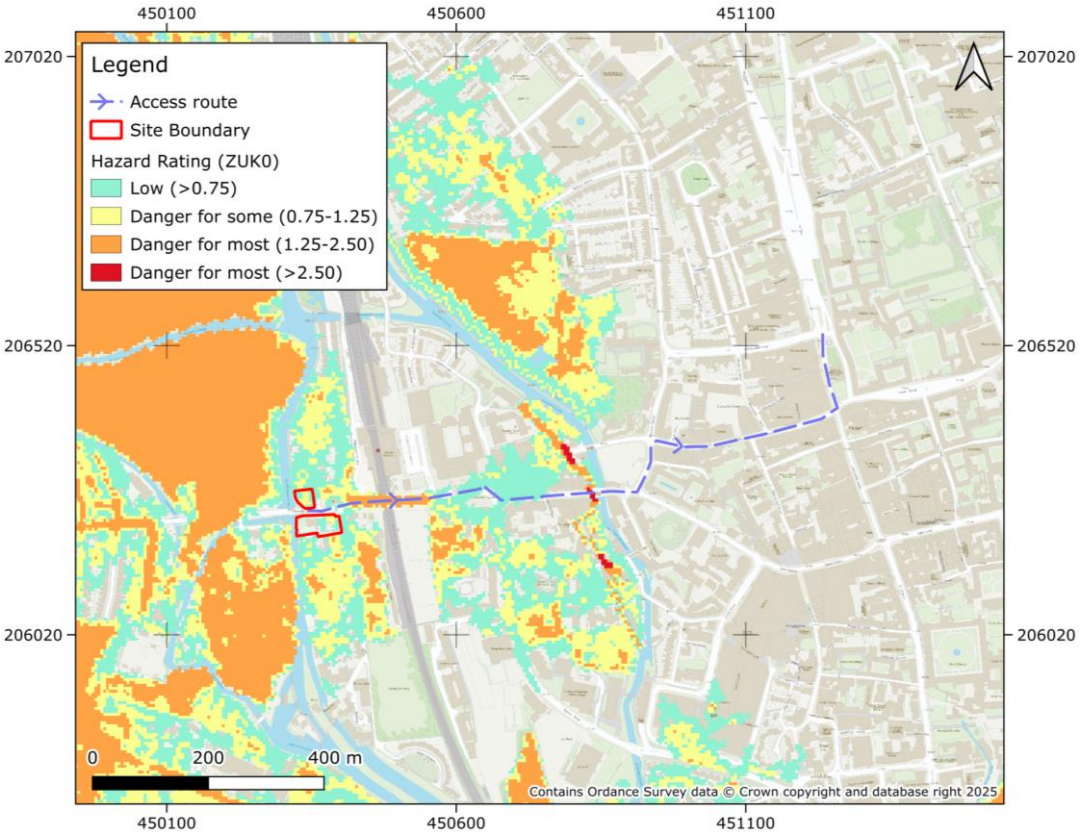

Figure 10 – Access/Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

A sequential approach to the siting of the development should be used, with development prioritised first within Flood Zone 1 prior to consideration of any siting within Flood Zone 2 or 3a.

The proposed development at the site is a housing led, with the potential for mixed-use developments on the ground floors. Residential areas are classed 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. Less vulnerable uses are permissible in Flood Zone 2 and 3a without the need to pass an exception test. Both types of development are not permissible in Flood Zone 3b.

Land use at the site is currently mixed residential and commercial so overall there will be no change in development vulnerability at the site overall, however, there may be a change in the distribution/amount of different development categories.

No part of the sites is inundated by Flood Zone 3b either now or in the future. However, a large proportion of the site falls within the design flood extent (1.0% AEP + 26% Climate Change event). Development located in its extent will need to be raised above the design flood level. Existing development is already present at the site which will displace a volume of floodwater, if the new development exceeds this volume due to raising compensatory storage will be required.

5.2 Scale of Development

The total site area is currently 0.34 ha, allocated for residential redevelopment. At the site, 20 residential dwellings are proposed. If assuming medium density housing (60 dwellings per hectare) 20 dwellings would require 0.33 ha.

As much of the site is covered by existing development, it is assumed that the majority of the proposed development will be re-development. Any additional development within the site should be located within the lowest area of flood risk.

As a large area of the site is at risk during the 1.0% AEP +26% CC design event, any redevelopment at the site located within this area will need to incorporate an appropriate finished floor levels (FFL) to provide a minimum 300 mm freeboard above the design flood level of 57.5 m AOD. Note if the volume of floodwater displaced by the development exceeds the current site, compensatory storage will be required which may compromise the amount of space available for development.

5.3 Sequential Approach

It is important that a sequential approach is implemented at the site, prioritising development in Flood Zone 1 wherever possible, followed by Flood Zone 2 and then Flood Zone 3a. As already stated, no development should be located in Flood Zone 3b. If required more vulnerable housing development should be prioritised in lower flood risk areas with less vulnerable infrastructure (i.e. employment land, car parks and open spaces) located in higher flood risk areas if required. This is on the assumption that it does not increase flood risk elsewhere when considering the design flood event and is designed to be appropriately resistant and resilient to flooding.

5.4 Other Site-Specific Considerations

Development will need to be set at a floor level to provide an appropriate freeboard (typically 300mm minimum) above the design flood level of 57.5 m AOD for the defended 1.0% AEP (plus central climate change allowance) design event. If ground raising is implemented

within the design flood extents, modelling will need to be undertaken to assess 3rd party impacts and compensatory storage requirements. A site-specific FRA should confirm any modelling requirements with the EA to assess 3rd party impacts, including the need for breach analysis to further assess the protection provided by the flood defences in the vicinity of the site and confirm the finished floor levels (FFLs).

Areas of flood risk surround the site to the east, with no completely flood free egress options. A route with low hazard has been identified during the design event. However given there is no advance flood warning provision for the site, a site-specific FRA should consider the evacuation requirements before the design event and a more extreme fluvial or pluvial event taking account of the site layout and advice to sought from the emergency services, including Oxford City Council's emergency planner.

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 national standards for SuDS and any relevant Local Authority Local Plan policies. It is noted that the existing site is comprised of hard standing so there is potential for the site to offer a significant betterment on existing rates. The geology at the site has low permeability and this combined with soils which have naturally high groundwater, means the effectiveness of infiltration SuDS solutions may be limited. 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.

Due to the site being in the wet day and partially within the dry day reservoir failure inundation extent, any development in this area could affect the reservoirs risk designation, design category and how it is operated with potential cost implications for developers. However, it is noted that the quantum of development is very small in comparison to the existing development in Oxford already lying within the reservoir flood extents so any change in designation is assumed to be unlikely.