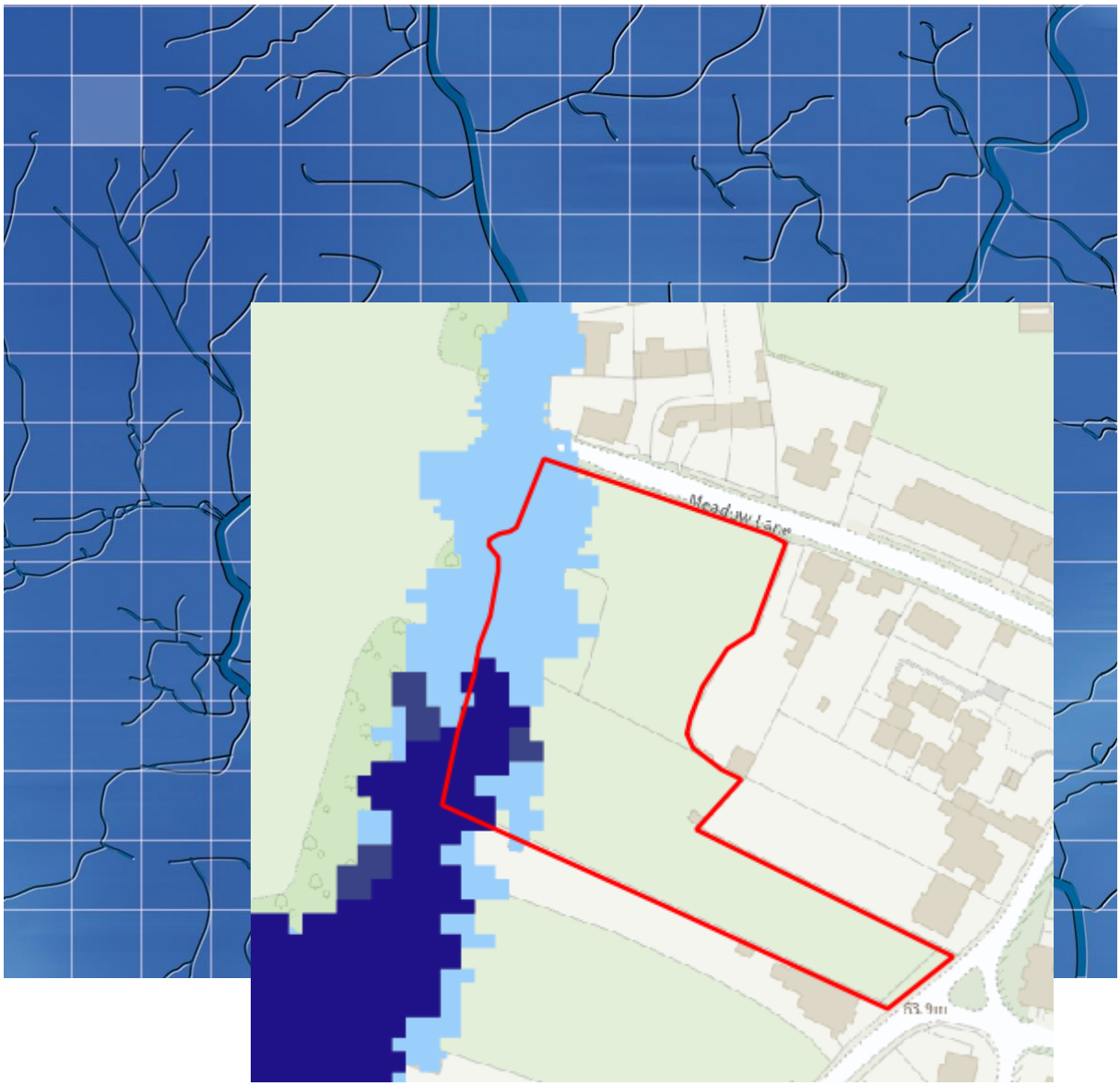
Oxford City Council

January 2026

Land at Meadow Lane (389)

Level 2 Strategic Flood Risk Assessment



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Land at Meadow Lane (389) Level 2 Strategic Flood Risk Assessment

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WHS10237

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1.1	23/01/2026	Draft	Lloyd Prytherch (*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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Land at Meadow Lane (389) 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 EA Flood Map for Planning shows 25.6% of the site is located within Flood Zone 2 (0.1% AEP), and 7.3% is located within Flood Zone 3a (1.0% AEP).

The River Thames Model (2018, re-run in 2023) 1.0% AEP + 26% CC design event extent covers 8.1% of the site area. Depths in the areas of inundation are generally less than 0.4 m, however in some areas exceed 0.5 m. The design flood level at the site is 55.91 m AOD. Overall fluvial flood risk is considered to be moderate.

The risk from surface water flooding is considered to be low.

The risk from other sources of flooding is considered to be moderate due to the potential for groundwater flooding.

The overall confidence in the assessment is high as a detailed hydraulic model has been used to inform the assessment of fluvial flood risk.

Conclusions and Recommendations

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 residential development. 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. More vulnerable development is not permissible in Flood Zone 3b.

Given that Flood Zone 3b inundates a small proportion of the site (5.8%), it should be possible to locate infrastructure outside of its extent. It should also be possible to locate development outside of the design flood extent to avoid the need for ground raising and compensatory storage.

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 Land at Meadow Lane (reference: 389) 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

Land at Meadow Lane (389) is a 0.96 ha site compromising two fields located in a suburban area in the south of Oxford, see Figure 1. Current land use at the site is for grazing animals., known locally as Horse Fields.

Proposed development at the site consists of 29 residential dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes from east to west towards a tributary of the Thames which flows adjacent to the west of the site, see Figure 2. The ground levels within the site boundary range from 55.0 to 65.0 m AOD. The average ground level is approximately 58.0 m AOD.

2.3 Nearby Watercourses

A small unnamed tributary runs the length of the site's western boundary, see Figure 1. The River Thames is located approximately 200m to the west of the site.

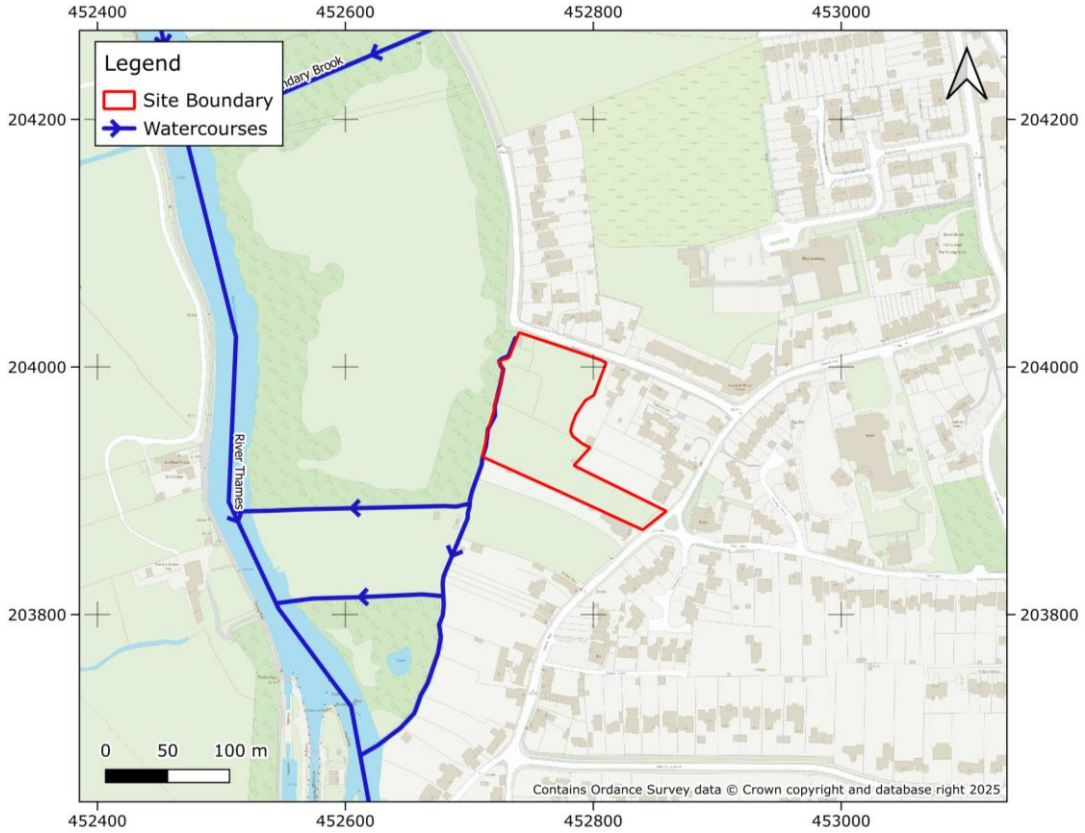

Figure 1 - Site Location

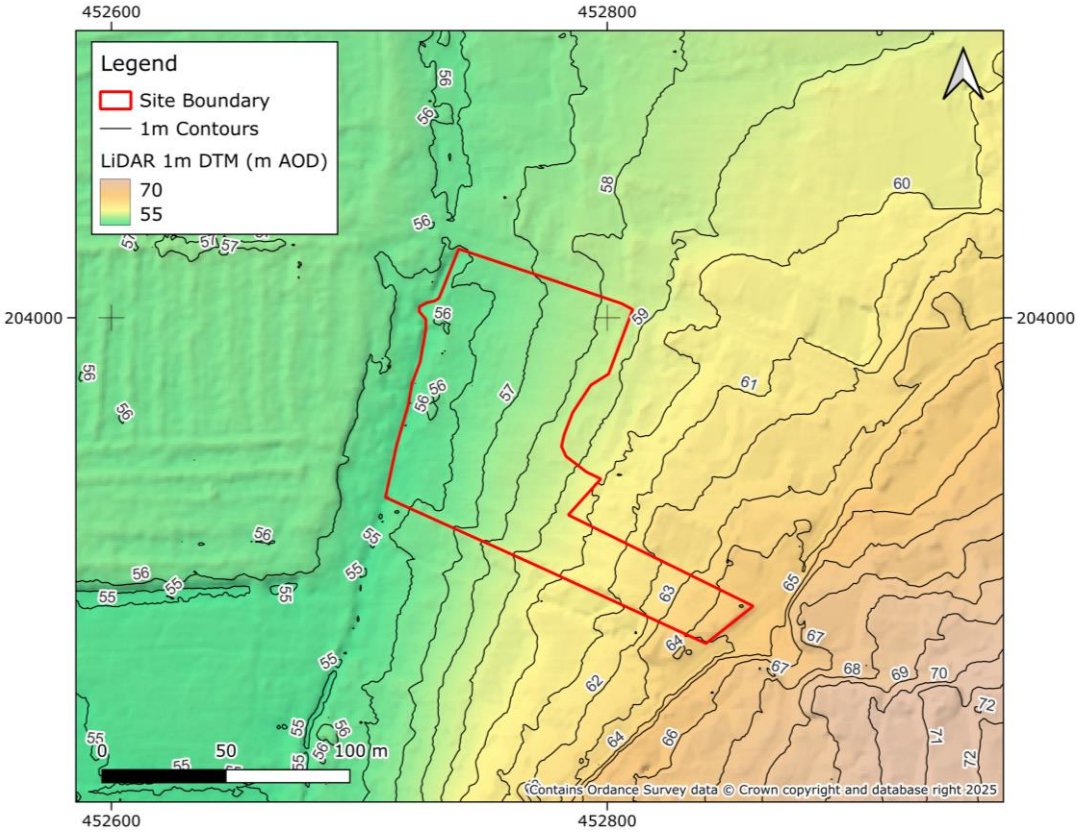

Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has one record of historical flooding immediately adjacent to the site across Meadow Lane Nature Park and Oriel Meadows, this occurred in 1947 and affected a very small portion of the site in its west, see Figure 3.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 25.6% of the site is located within Flood Zone 2 (0.1% AEP), and 7.3% is located within Flood Zone 3a (1% AEP), see Figure 4. Viewing the River Thames 2018 model results for the 3.3% AEP event, 5.8% of the site is located within Flood Zone 3b.

The FMfP climate change outputs have also been assessed, 36.2% of the site is within Flood Zone 2 (0.1% AEP) and 19.5% of the site inundated by Flood Zone 3 (1.0% AEP), see Figure 5. The River Thames (2018) undefended 3.3% AEP + 26% Climate Change extent equivalent to Flood Zone 3b with climate change, indicates approximately 6.9% of the site is expected to be inundated.

Fluvial flood risk is considered to be moderate and is assessed in more detail in section 4.

3.3 Flood Defence Infrastructure

There are no flood defences in the immediate site area, however embankments are present along the River Thames 300m to the west of the site. The standard of protection (SOP) offered by this embankment is not currently specified. No part of the site is an area associated with a reduction in risk of flooding from rivers and sea due to defences, and the site is not located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 3.1% of the site to be inundated during a 3.3% AEP event, 5.7% is inundated during a 1.0% AEP event, and 8.5% is inundated during a 0.1% AEP event, see Figure 6. The areas at risk appear to be partly associated with the tributary running along the west of the site and may be fluvial in origin.

When considering the effects of climate change, the proportion of the site at risk for each event increases to 3.8%, 6.8%, and 13.2% respectively, see Figure 7.

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

3.5 Groundwater Flooding

The site is largely underlain by a bedrock of mudstone and siltstone in the form of the West Falton formation. It is expected to permit low amounts of infiltration. An area in the southwest corner of the site is underlain by sandstone. Superficial deposits of sand and gravel in the form of the Northmoor member are present along the site's western boundary; these are expected to have variable permeabilities. The underlying soils along the western boundary of the site are loamy and clayey floodplain soils with naturally high groundwater, with no data available for the remainder of the site.

Based on the data available there may be a moderate risk of groundwater flooding, however more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the western half of the site is at risk from reservoir flooding during the wet day scenario, see Figure 8. During the dry day scenario, this extent is reduced and affects the area closest to the site's western boundary only. 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 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 site is partially located within the River Thames and tributaries at New Botley, New Hinksey, North Hinksey, South Hinksey and Grandpont EA Flood Warning Area.

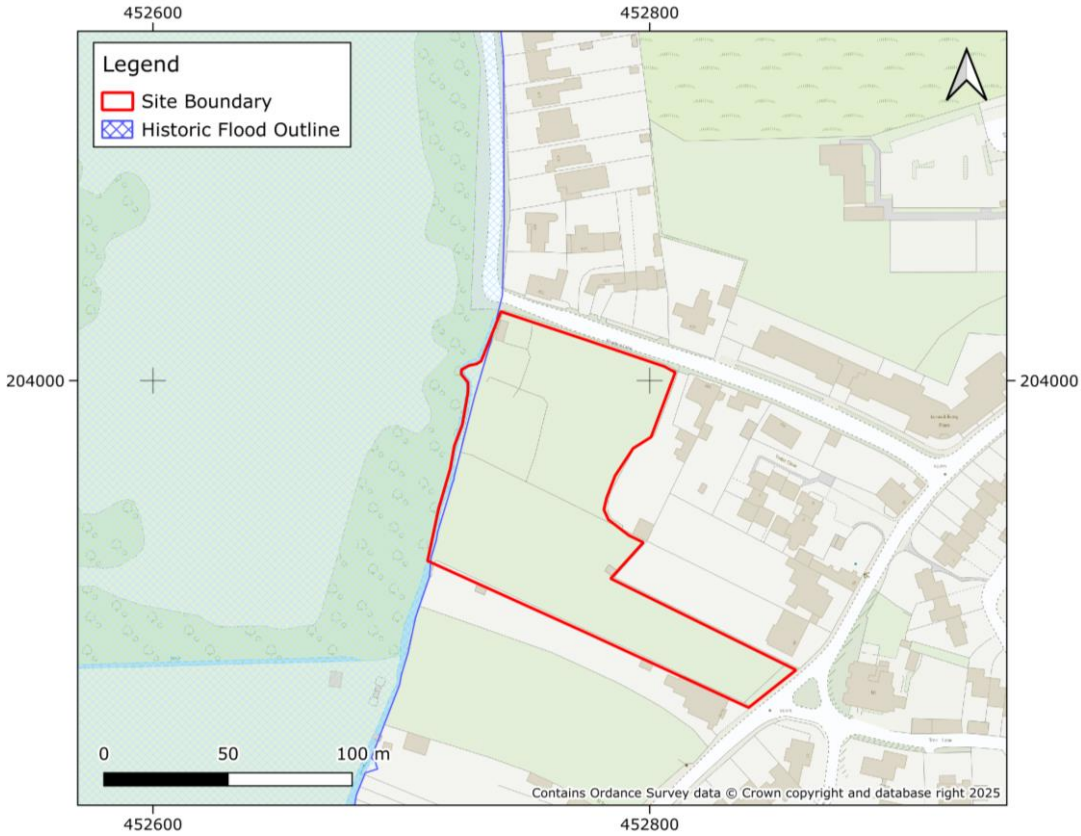

Figure 3 - Recorded Flood Outlines

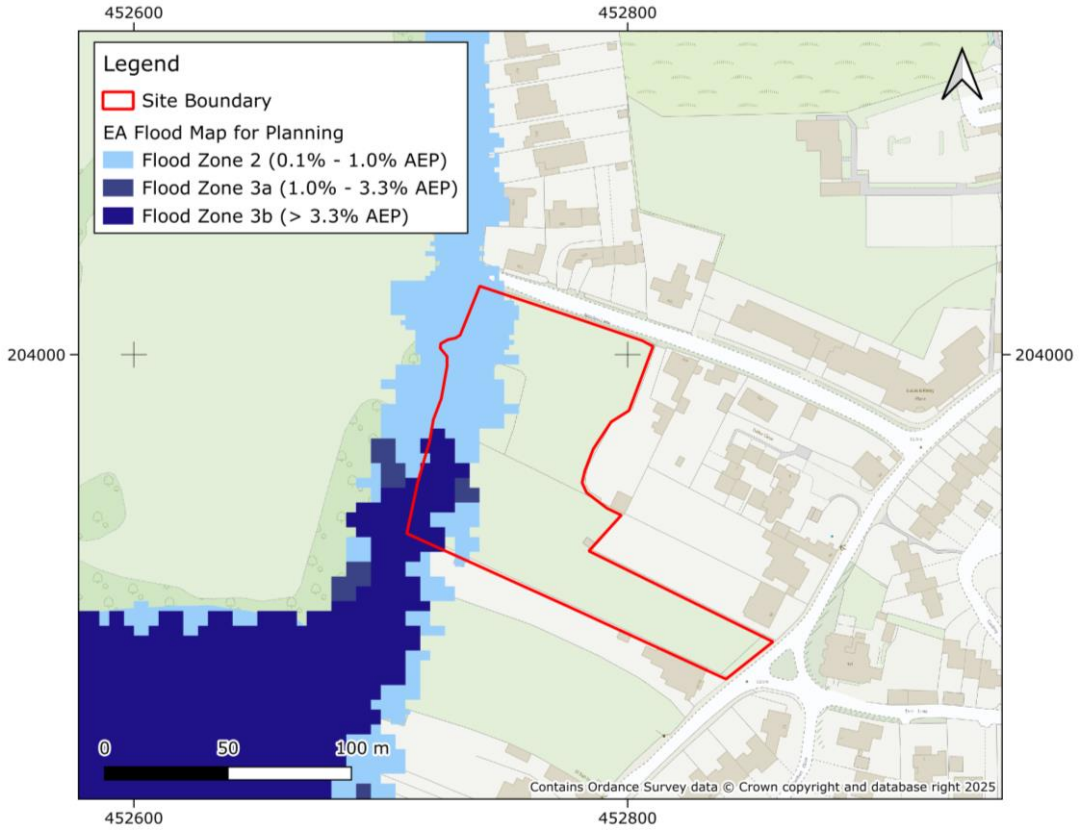

Figure 4 - Fluvial Flood Map

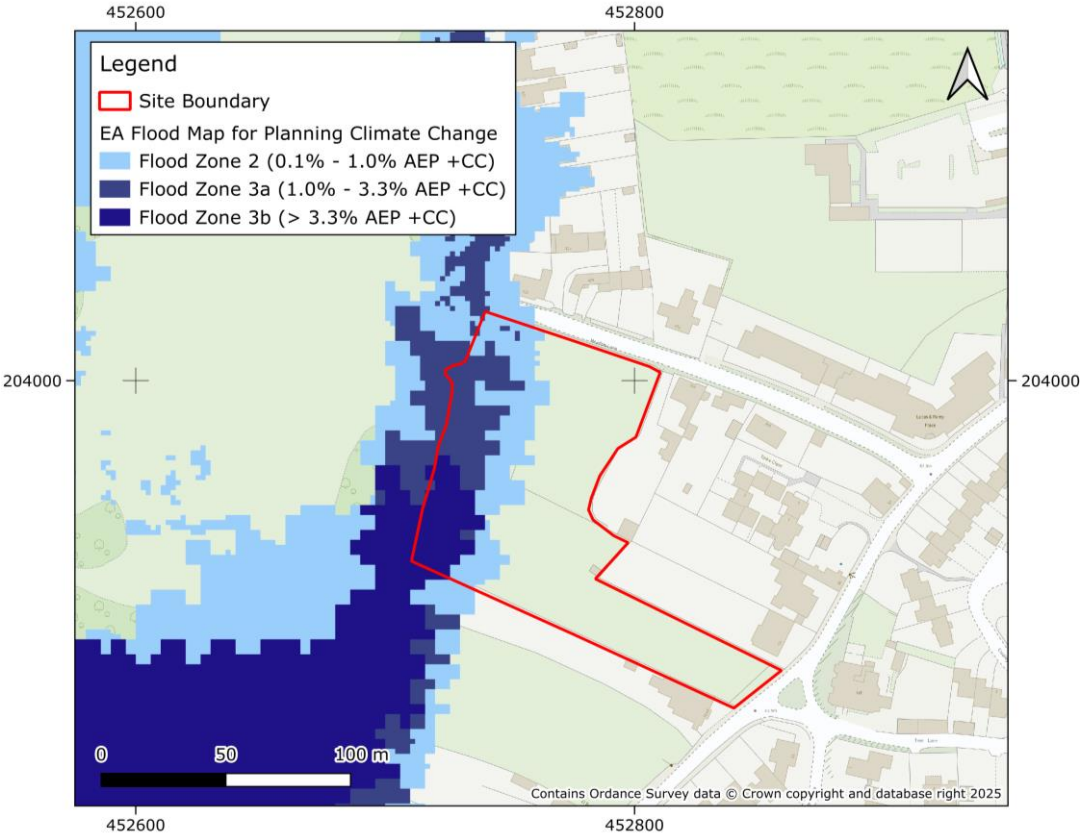

Figure 5 – Fluvial Climate Change Flood Map

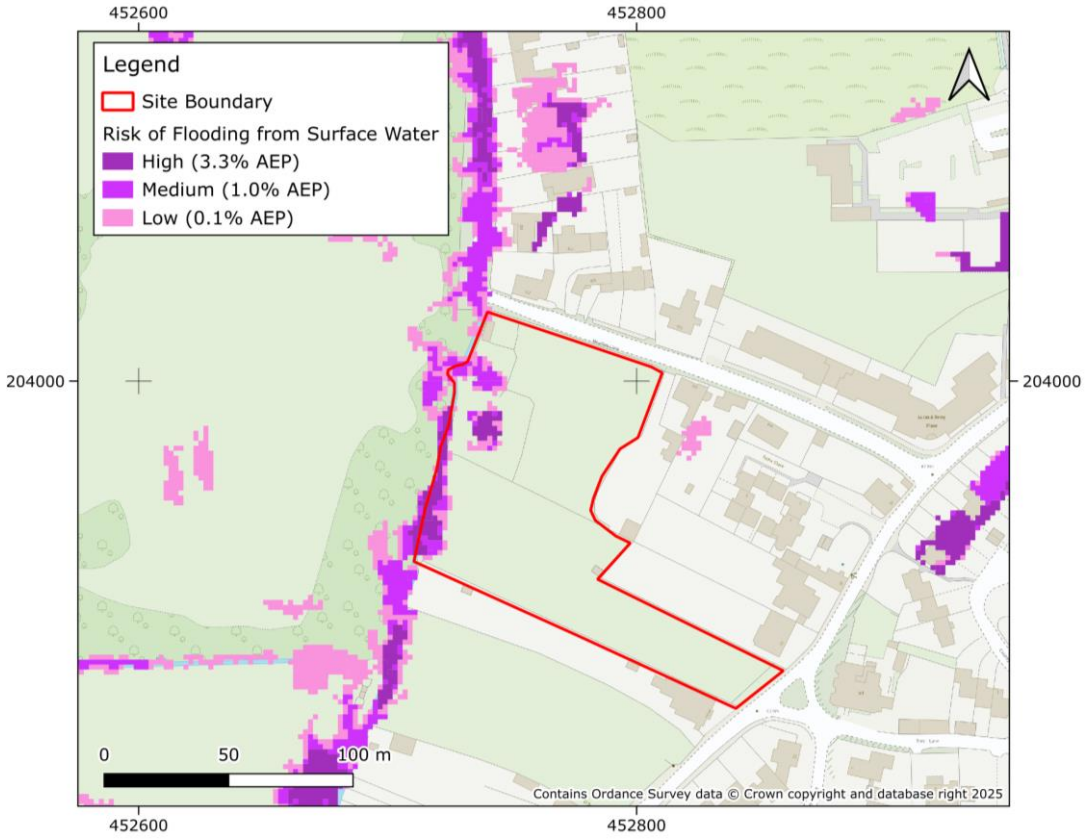

Figure 6 – Surface Water Flood Map

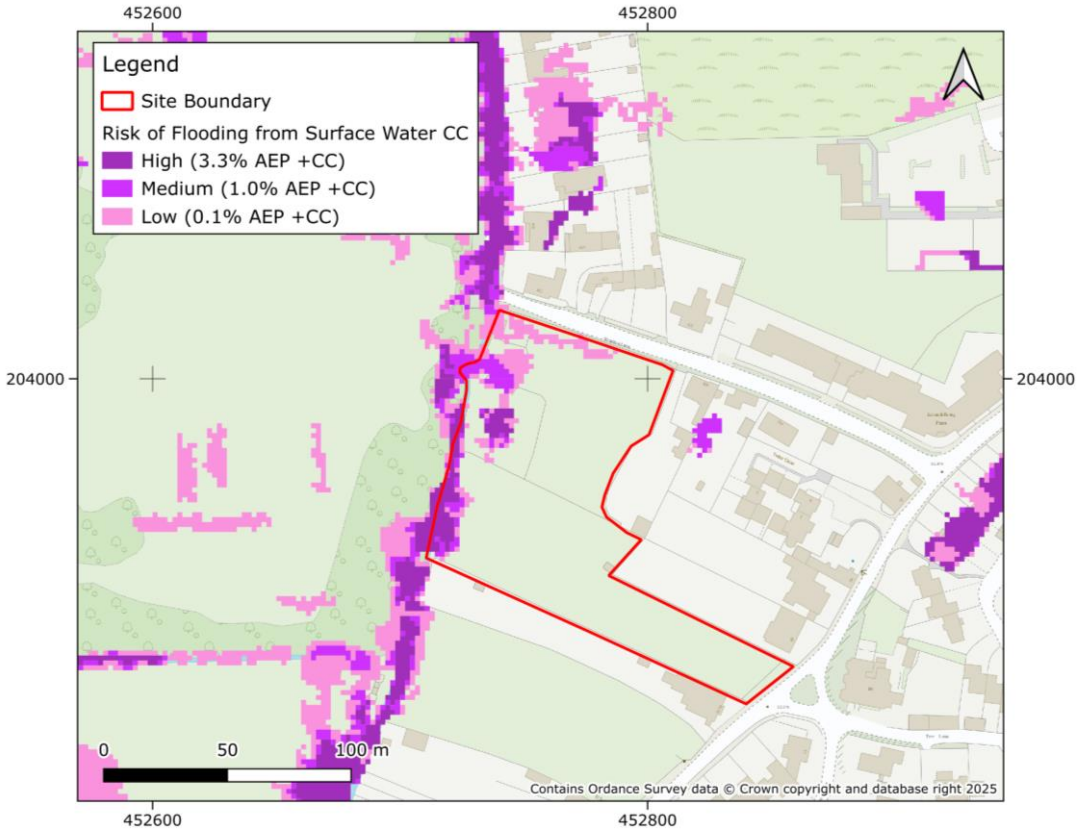

Figure 7 - Surface Water Climate Change Flood Map

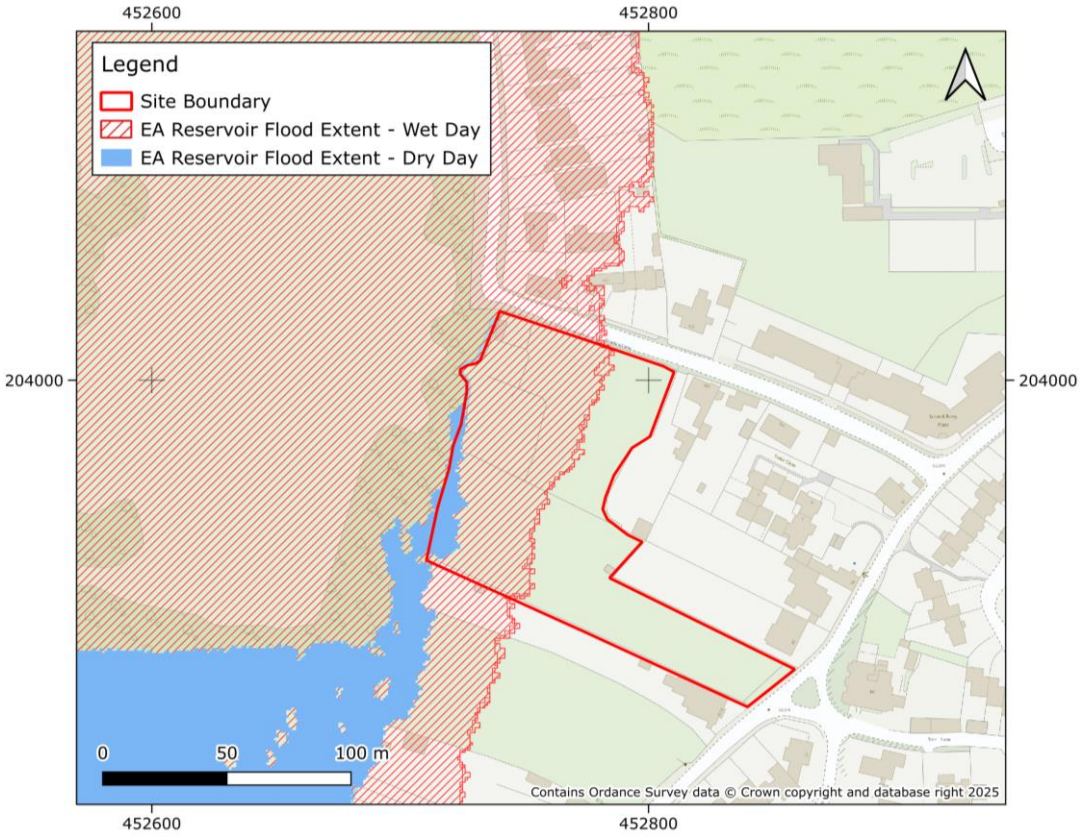

Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

Fluvial flooding is the primary flood risk mechanism at the site and is 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 first assessed to attain further detail on fluvial flooding. The modelled scenario considers the presence of flood defences unlike the FMfP data, although the impact at this site is minimal.

The depth mapping for the design event (see Figure 9) shows flooding is most severe in the areas of lower topography in the southwest corner of the site, adjacent to the watercourse. In total 8.1% of the site is inundated during the design event. The maximum flood depth within the site is 0.69m along the site's western boundary, with depths generally between 0.2 – 0.5m within the site. The design flood level for the 1.0% AEP + 26% CC event is 55.91 m AOD, below the average ground level at the site based on LIDAR (58.0 m AOD).

As part of this site lies in Flood Zone 3b, the River Thames Model (2018) depth data for the 100-yr plus higher central (41%) climate change design event (re-run in 2023) was assessed to attain further detail on fluvial flooding. Once more, the modelled scenario considers the presence and condition of flood defences unlike the FMfP data.

Generally, the inundation reaches further north towards Meadow Lane and also into the western half of the site (see Figure 10) The depth mapping shows an increase in flood extents with 26.7% of the site inundated. Flood depths across the site are generally below 0.5m, however along the site's western boundary they tend to be above 0.7m. The maximum flood depth within the site is 0.85m, again located along the site's western boundary. The design flood level within the site for the 1.0% AEP +41% CC design event is 56.07 m AOD, below the average ground level on site based on LIDAR (58.0 m AOD).

4.3 Access and egress

Given the pre-existing road network within the site, access and egress to the majority of the site should be possible along Meadow Lane to the north of the site and Church Lane to the southeast.

Due to rising topography away from the site to the south and east, several options for egress which avoid the design flood extents and Flood Zones 2 and 3 should be possible during an emergency. The best route of access/egress following main roads would be to follow Meadow Lane east from the site, onwards travel would then likely be via Church Way/Rose Hill, where through access onto the Eastern Bypass is possible. This route does not travel through inundated land and is considered hazard free during the design fluvial even (see Figure 11)

Whilst the route lies outside of the design flood change extent, there is some pluvial flood risk along the route. 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.

It should be noted that the site is not currently wholly located within an EA Flood Warning Area. However, area immediately west of the site is located within a flood warning area and so this Flood Warning should be considered when assessing the need for evacuation from the site.

Once the development layout is known, a site-specific FRA should consider onsite routes across the site and any infrastructure required to reach the proposed access route. The proposed route should also be reassessed in a site-specific FRA when all access points to the site are known, to ensure the route with the lowest hazard remains the same.

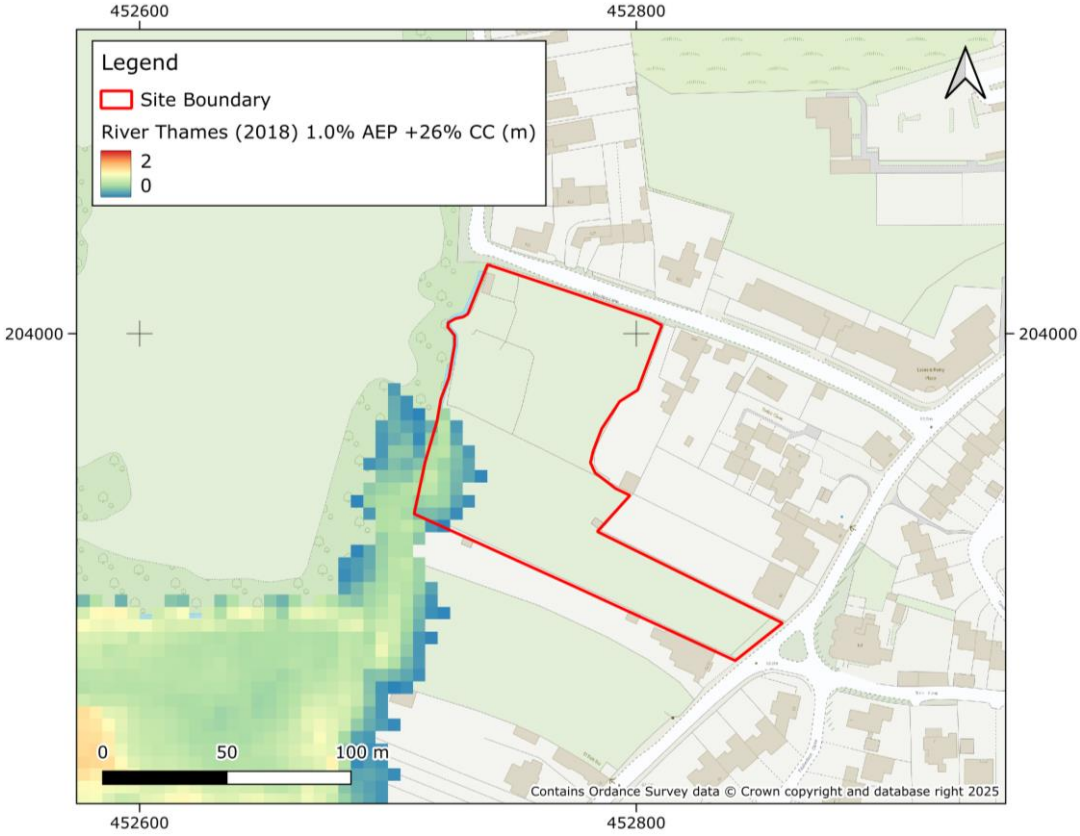

Figure 9 – River Thames (2018) 1.0% AEP + 26% CC Modelled Flood Depths (m)

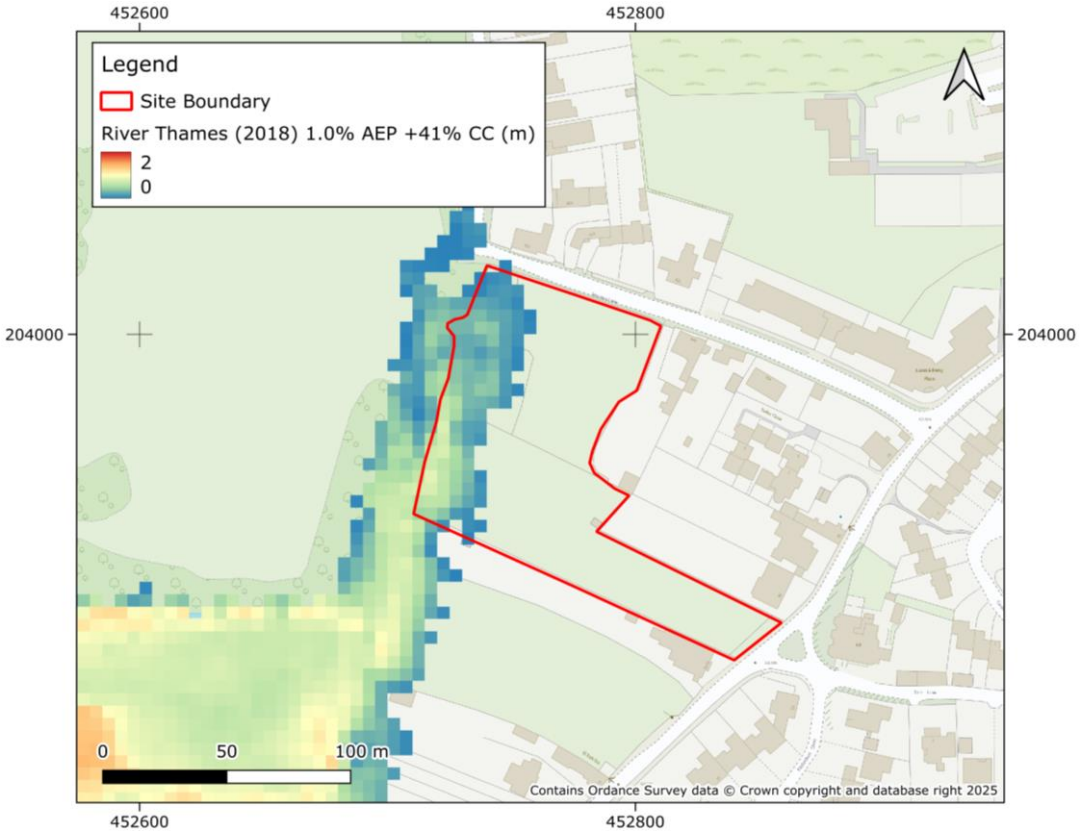

Figure 10 - River Thames (2018) 1.0% AEP + 41% CC Modelled Flood Depths (m)

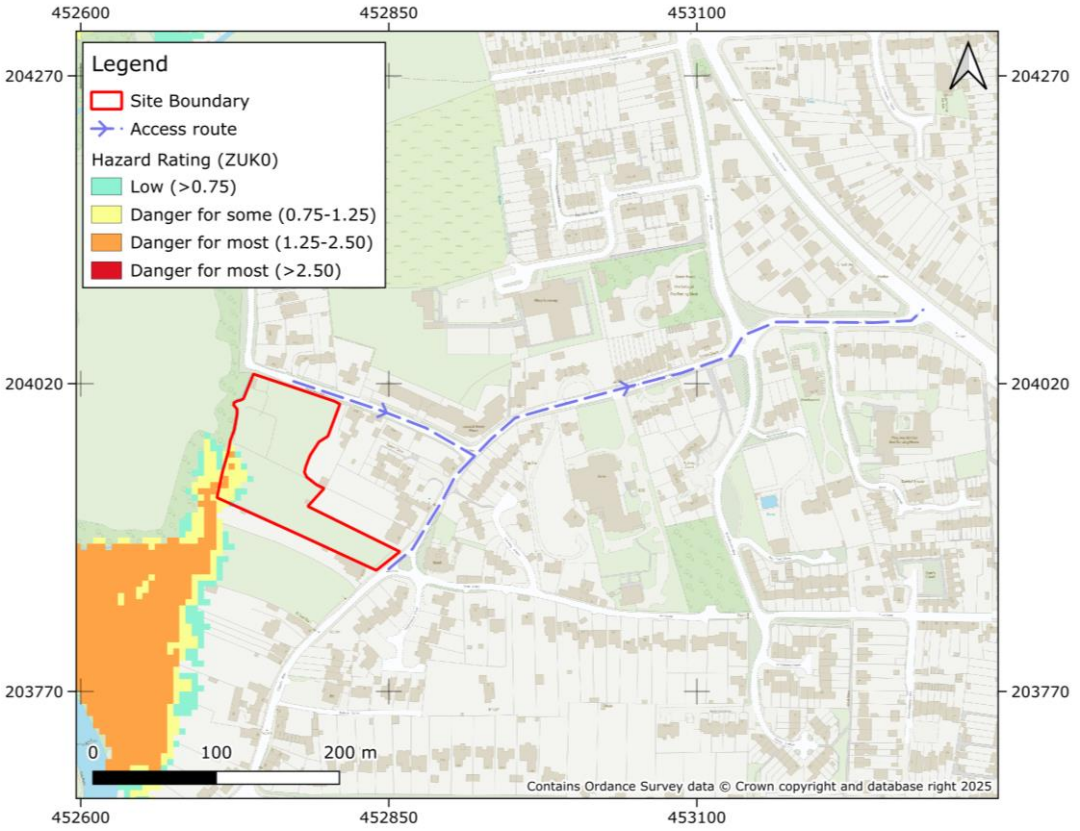

Figure 11 - Access/Egress Routes

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 residential development. 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. More vulnerable development is not permissible in Flood Zone 3b.

Given that Flood Zone 3b inundates a small proportion of the site (5.8%), it should be possible to locate infrastructure outside of its extent. It should also be possible to locate development outside of the design flood extent to avoid the need for ground raising and compensatory storage.

5.2 Scale of Development

The total site area is currently 0.96 ha; allocated for residential redevelopment. At the site, 29 residential dwellings are proposed. If assuming medium density housing (60 dwellings per hectare) 18 dwellings would require 0.48 ha.

In total approximately 36% or 0.32 ha of land lies within the fluvial flood zones when accounting for climate change. The at-risk areas are mainly concentrated in the west of the site. It should therefore be possible to locate all infrastructure in Flood Zone 1. This is provided there are no constraints (non-flood related) which require development to be located in at-risk areas.

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. 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 and is designed to be appropriately resistant and resilient to flooding.

Note, surface water flood risk is also present in smaller areas across the site. Therefore, it should be used alongside the fluvial flood extents to inform the development layout with high-risk areas avoided if possible.

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 55.91 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. However as mentioned it should be possible to locate all development outside of the design extent.

A site-specific FRA should consider in more detail the nature of the surface water flood risk in more detail 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 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 parts of the site being in the wet and 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.