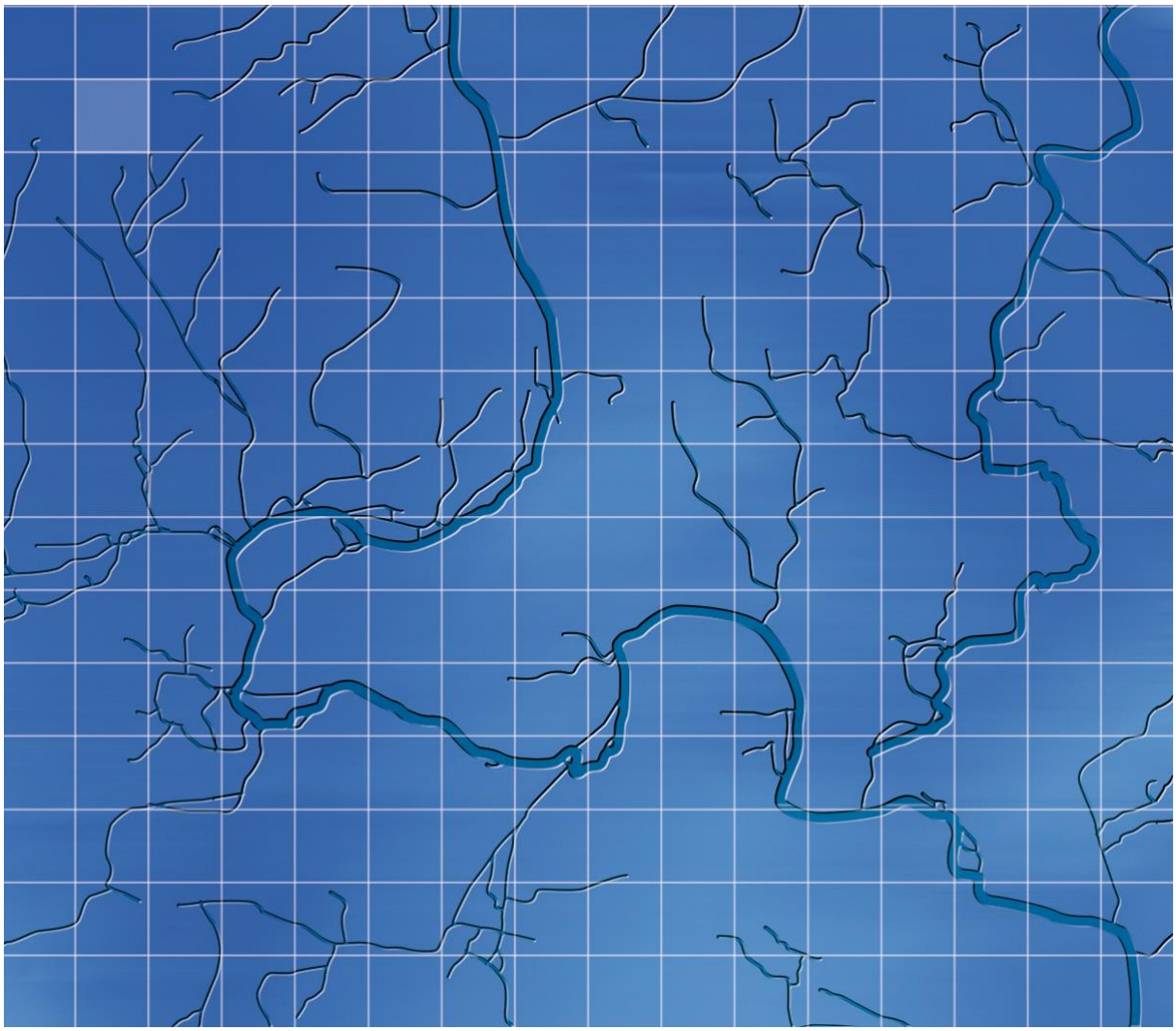
Oxford City Council

October 2025

Kassam Stadium (028a)

Level 2 Strategic Flood Risk Assessment



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Kassam Stadium (028a) Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10237

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1.0	17/10/2025	Draft	Tirion Lewis (*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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Kassam Stadium (028a) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

The site is at risk of flooding from primarily pluvial sources.

The EA's surface water flood maps show 3.5% of the site to be inundated during a 3.3% AEP % event, 7.2% is inundated during a 1.0% AEP event, and 17.7% is inundated during a 0.1% AEP event. The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest depths and extent of flooding is located in and around Kassam Stadium.

The EA Flood Map for Planning shows 4.9% of the site is located within Flood Zone 2 and 1.7% of the site is located in fluvial Flood Zone 3a. Overall fluvial flood risk is considered to be low.

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

The overall confidence in the assessment is moderate. This is based on the fact that the EA's latest national scale modelling has informed the assessment of flood risk.

Conclusions and Recommendations

The development proposed is mixed, including retail, residential, community and commercial uses. Residential development is categorised as *More Vulnerable Development*, while the other uses are categorised as *Less Vulnerable Development*. 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 design must ensure that areas of the site that may be located within Flood Zone 3b in the future are avoided altogether.

In terms of fluvial flood risk it should be possible to locate all infrastructure in Flood Zone 1. Pluvial flooding is present at the site but it is limited to isolated areas and comes partly as a result of the existing infrastructure at the site (i.e. a football stadium). A sequential approach should still be followed with development sited to avoid high risk areas.

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 Kassam Stadium (reference: 28a) 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

Kassam Stadium (028a) is a 6.50 ha site located in the south of Blackbird Leys, see Figure 1. Current land use at the site is a football stadium and car parks.

Proposed development at the site is mixed, including retail, residential, community and commercial uses. The residential capacity for the development is 290 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes very gently towards the Northfield Brook to the north of the site, see Figure 2. The ground levels within the site boundary range from 57.7m to 63.6m AOD. The average ground level is approximately 61.3m AOD.

2.3 Nearby Watercourses

Northfield Brook, a small tributary of the River Thames, flows from east to west along the northern boundary of the site. A small unnamed stream runs southeast to northwest approximately 70m south of the site, see Figure 1.

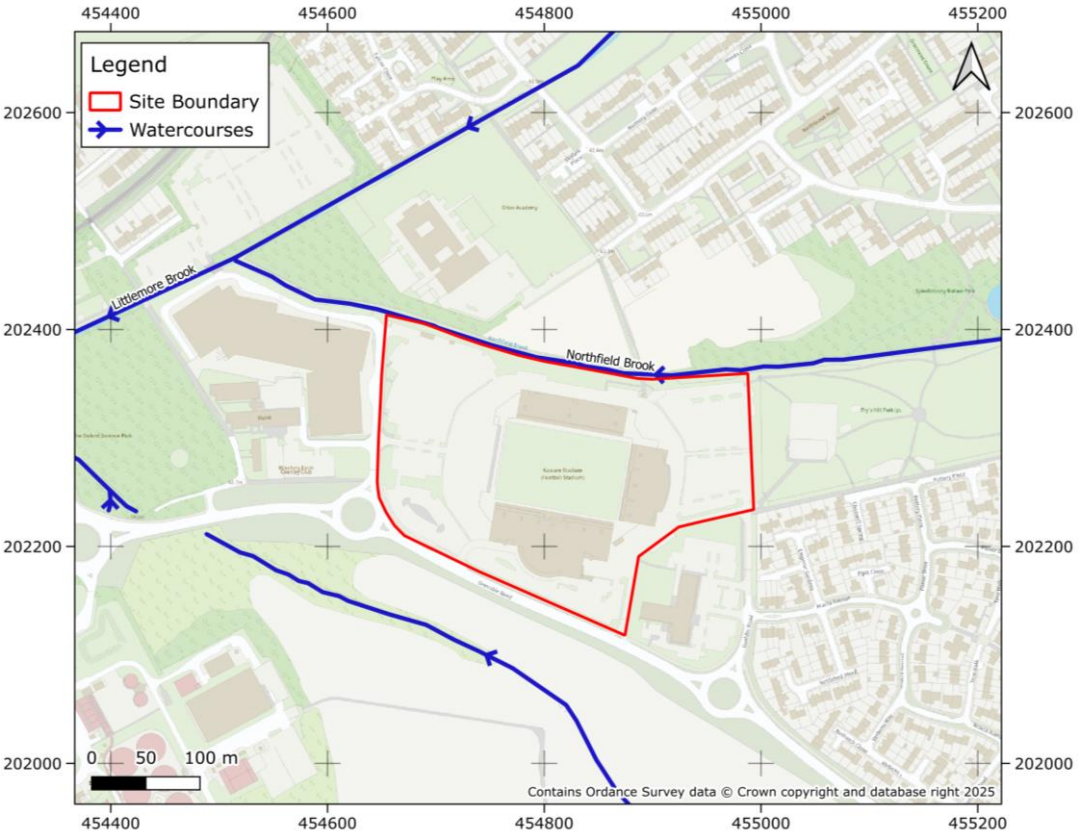

Figure 1 - Site Location

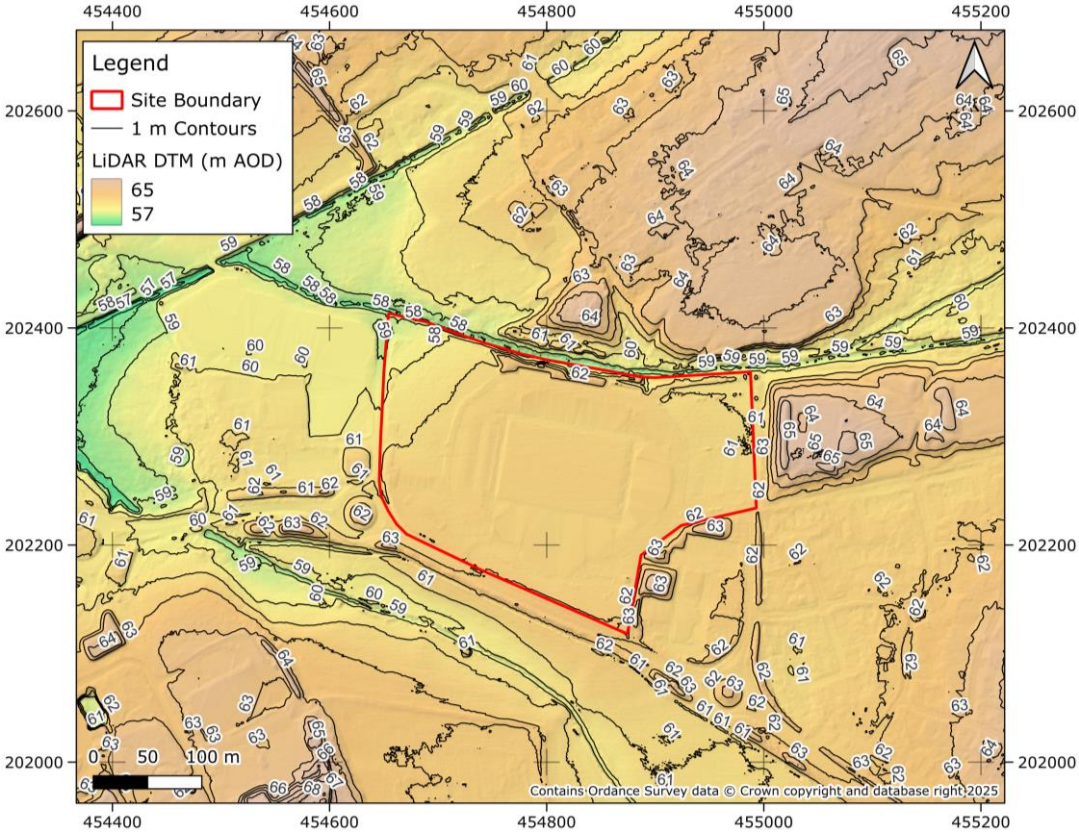

Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

There are no EA historical records of flooding on or near the site.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 4.9% of the site is located within Flood Zone 2 (0.1% AEP), and 1.7% is located within Flood Zone 3a (1% AEP), see Figure 3. These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. This extent shows 1.7% of the site to be located within Flood Zone 3b.

The EA climate change fluvial outputs for the 0.1% AEP and 1.0% AEP undefended extents have also been assessed, these show 6.1% of the site inundated during the 0.1% AEP event and 5.1% of the site inundated during the 1.0% AEP event. The climate change extent for the 3.3% AEP defended event was also assessed, the same proportion of the site is inundated (1.7%) as in the baseline scenario, see Figure 4.

Fluvial flood risk is considered to be low.

3.3 Flood Defence Infrastructure

The site is not located in an area with flood defence infrastructure.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 3.5% of the site to be inundated during a 3.3% AEP event, 7.2% is inundated during a 1.0% AEP event, and 17.7% is inundated during a 0.1% AEP event, see Figure 5. The surface water flooding is mainly concentrated around Kassam Stadium, particularly the southern section.

When considering the effects of climate change, the proportion of the site at risk for each event increases to 6.3%, 8.6%, and 19.8% respectively, see Figure 6.

Overall, the surface water flood risk to the site is moderate and is assessed in more detail in Section 4.

3.5 Groundwater Flooding

The site is underlain by a bedrock of sandstone in the form of the Beckley Sand Member. It is expected to permit moderate amounts of infiltration. Superficial deposits of alluvium, consisting of clay, silt, sand and gravel are found along with peat at the northern boundary of the site. These are associated with the Littlemore Brook. The underlying soils are freely draining slightly acidic loamy soils.

Based on the data available the water table is expected to be mobile meaning that 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 site is not located within a reservoir flood risk area, see Figure 7.

3.7 Flood Warning Service

The site is not located within an EA Flood Warning Area.

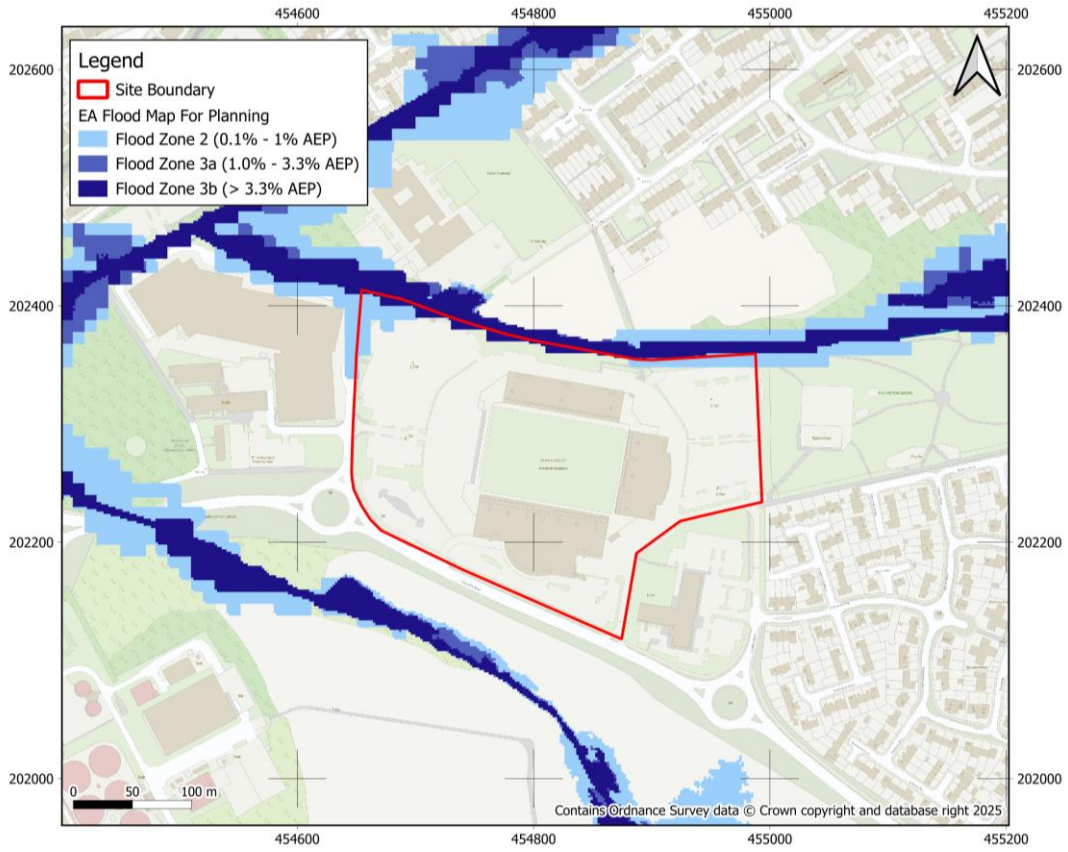

Figure 3 - Fluvial Flood Map

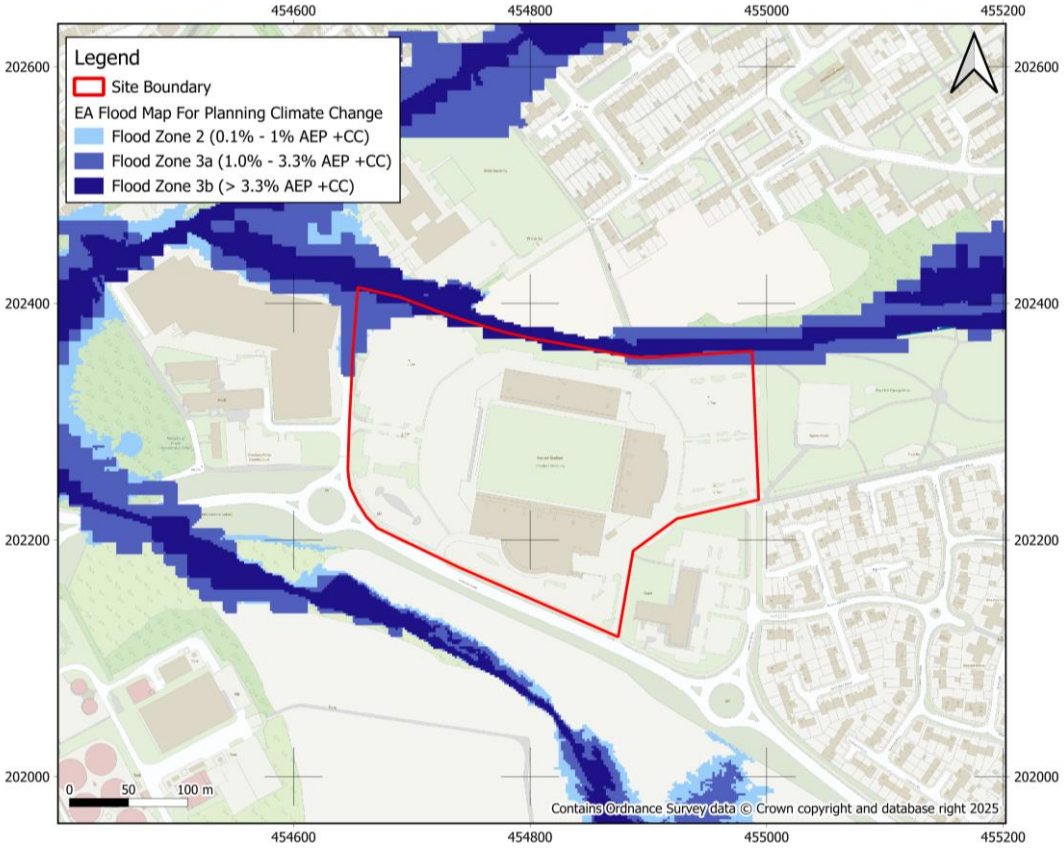

Figure 4 – Fluvial Climate Change Flood Map

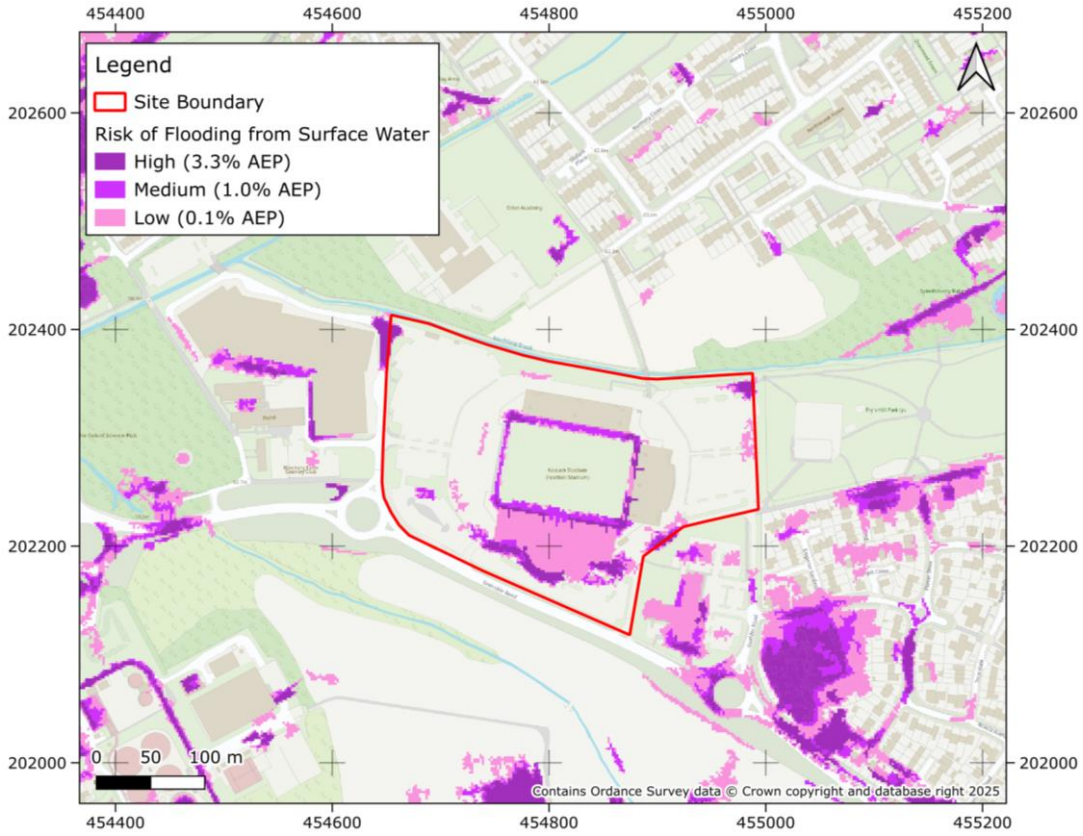

Figure 5 – Surface Water Flood Map

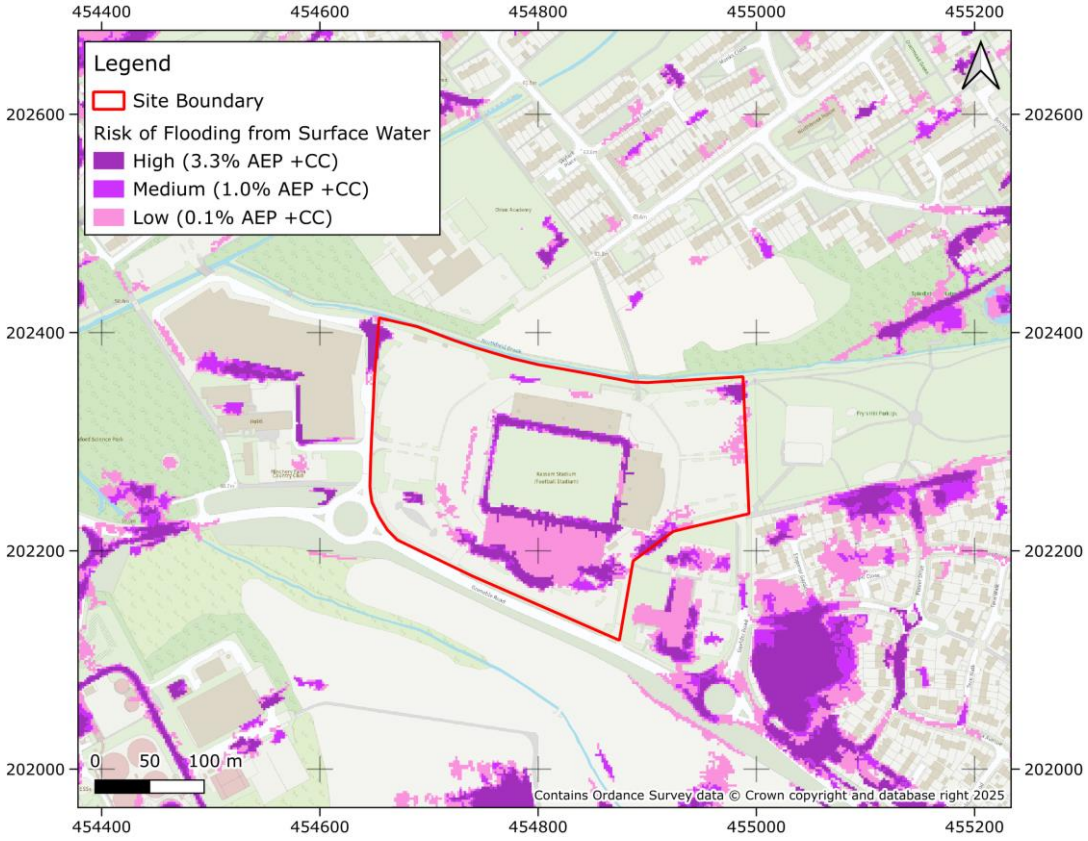

Figure 6 -Surface Water Climate Change Flood Map

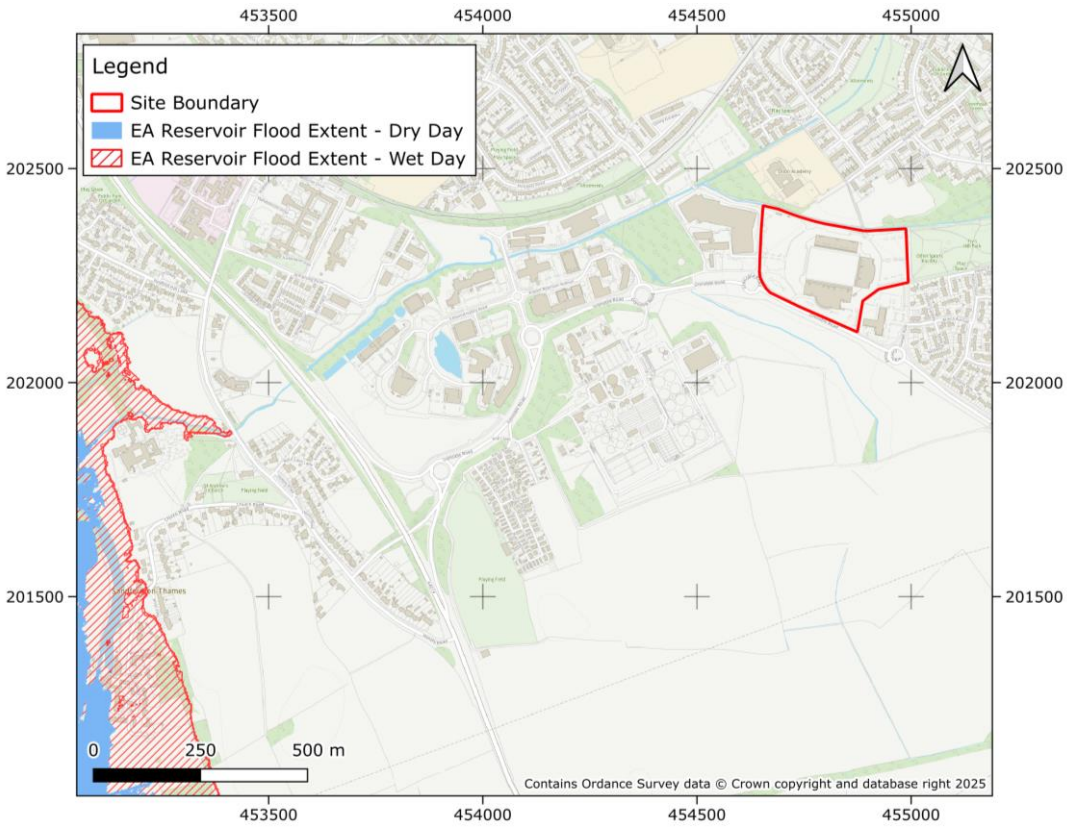

Figure 7 -Reservoir Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk to the site is pluvial flooding. This is quantitively assessed in more detail below.

4.2 Flood Risk Metrics

The Risk of Flooding from Surface Water (RoFSW) depth data for the 100-yr plus climate change design event was assessed to attain further detail on surface water flooding.

The depth mapping (see Figure 8) shows surface water flooding to mainly be concentrated around the stadium and to the south of the site, with approximately 7.8% of the total site area being inundated. The majority of inundation depth are below 0.2m, with some isolated areas being between 0.2-0.3m. It should be noted that some of the areas shown to flood are due to current development on the site. Most notably, flooding is observed around the football pitch where ground levels are lower than the adjacent pitch and stands. If the stadium was removed the nature of flooding in this location would change.

It should be noted that the climate change allowances used in RoFSW are based on the 2050's epoch (2041-2069) and reflect the median estimate of rainfall increases. If the development has a lifetime beyond this time period, a site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125).

4.3 Access and egress

Given the pre-existing road network near the site, access and egress to and from the site should be possible. From the south and west of the site Grenoble Road is a suitable exit, it remains largely flood free in the design pluvial event and is outside of the Northfield Brook's flood extents. It is the main vehicular access route to the site, see Figure 9. The site can also be accessed via Fry's Hill Park to the east of the site. Pedestrian access is available through the park and vehicular access is available along Guelder Road. These routes are also largely flood free in the design pluvial event and avoid the Northfield Brook's flood extents. A pedestrian route via is also available to the north of the site which runs to Knights Rd. It is flood free in the design pluvial event, however does cross the Northfield Brook so should not be utilised in the event of fluvial flooding.

It should be noted that the outlined routes will need to be reassessed in a site-specific FRA considering the development layout and final site access points. The FRA should also consider routes across the site once the development layout is known.

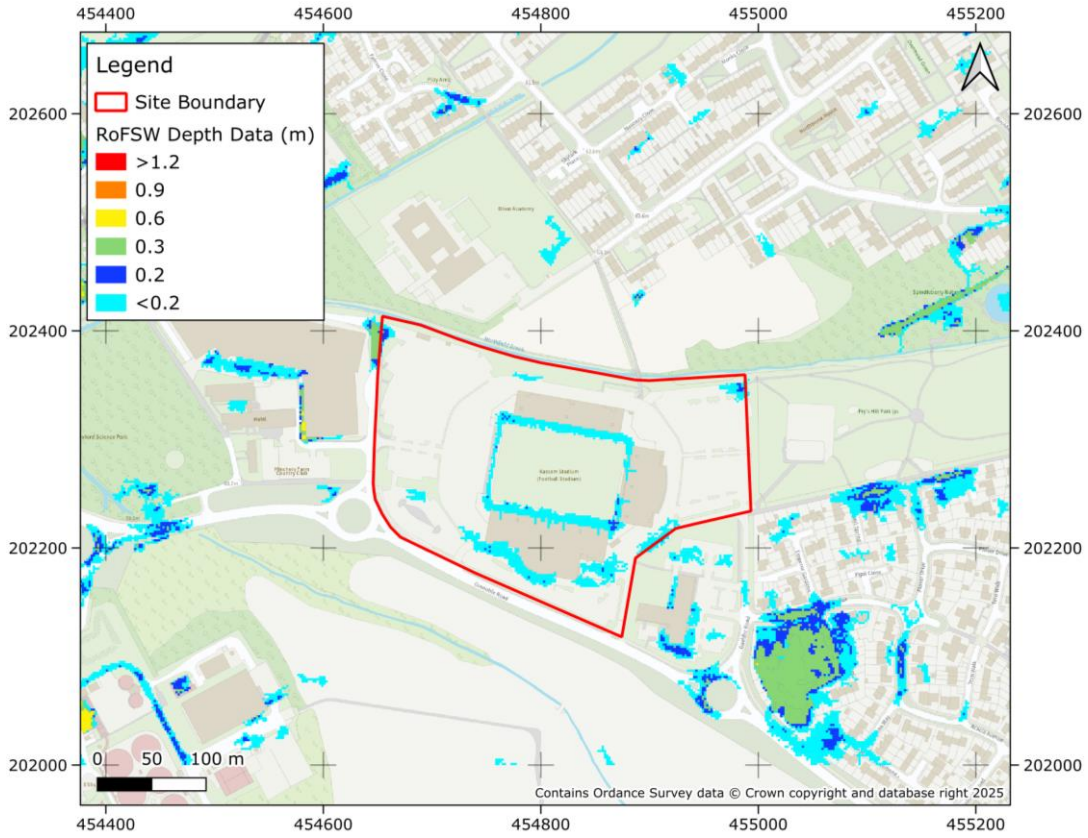

Figure 8 - RoFSW Depth Data for 1.0% AEP + Climate Change Event

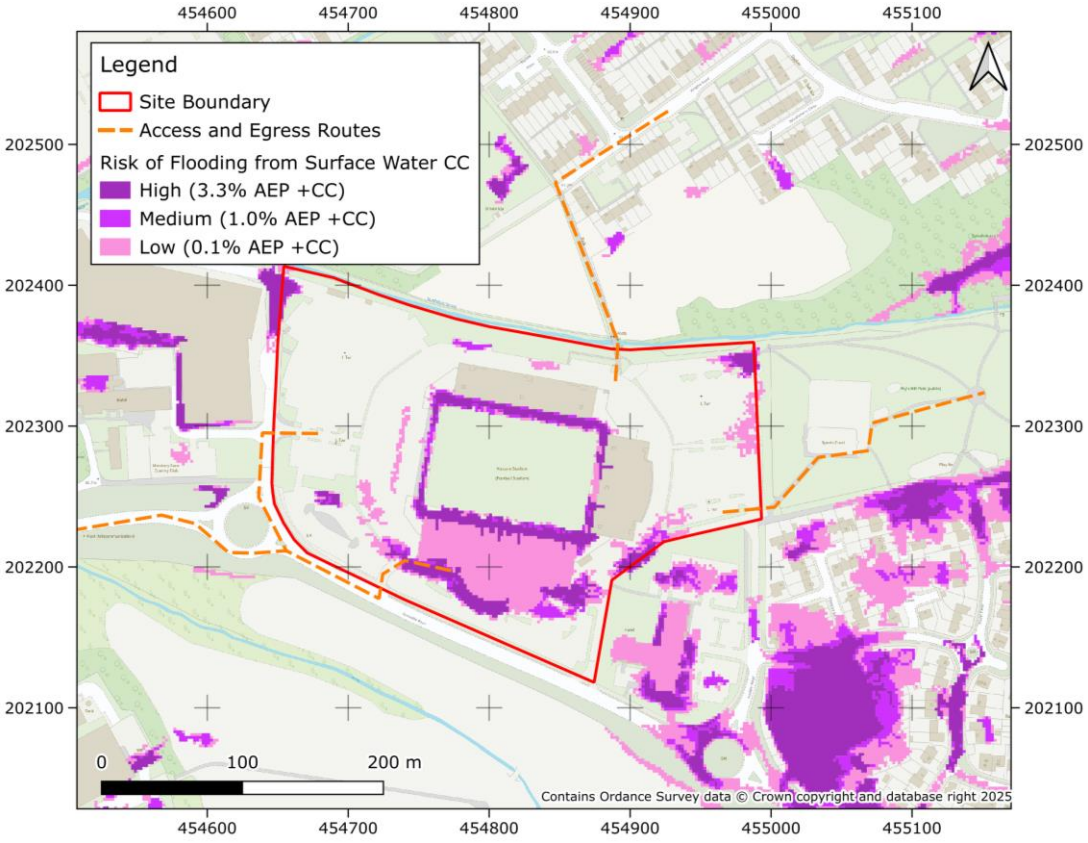

Figure 9 – Access/Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is mixed, including retail, residential, community and commercial uses. Residential development is categorised as *More Vulnerable Development*, while the other uses are categorised as *Less Vulnerable Development*. 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 design must ensure that areas of the site that may be located within Flood Zone 3b in the future are avoided altogether.

In terms of fluvial flood risk it should be possible to locate all infrastructure in Flood Zone 1. Pluvial flooding is present at the site but it is limited to isolated areas and comes partly as a result of the existing infrastructure at the site (i.e. a football stadium). A sequential approach should still be followed with development sited to avoid high risk areas.

5.2 Scale of Development

The total site area is currently 6.50 ha; allocated for 290 dwellings and an unknown area of retail/community/commercial uses. Assuming medium density housing (60 dwellings per hectare), 290 dwellings would require 4.80 ha of land (74% of the site area).

In total approximately 21% of the site or 1.40 ha of land lies with the design 1.0% AEP + CC event, with a large amount of this associated with the Kassam stadium. Therefore, it should be possible to locate more vulnerable residential development outside of this area. As fluvial flooding is isolated to the northern site boundary, it should also be possible to locate more vulnerable development in Flood Zone 1.

As the area of proposed non-residential development is unknown this should be further assessed in a site-specific FRA.

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. This site is more at risk from pluvial flood risk so these should be used to inform development layout as well.

If required more vulnerable housing development should be prioritised in lower flood risk areas with less vulnerable development 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.

5.4 Other Site-Specific Considerations

Whilst this SFRA report has reviewed surface water flood risk a site-specific FRA should consider in more detail how quickly it occurs and the degree of hazard to the site and its access. 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. The geology at the site has moderate permeability, therefore the use of infiltration SuDS solutions may be possible. 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.