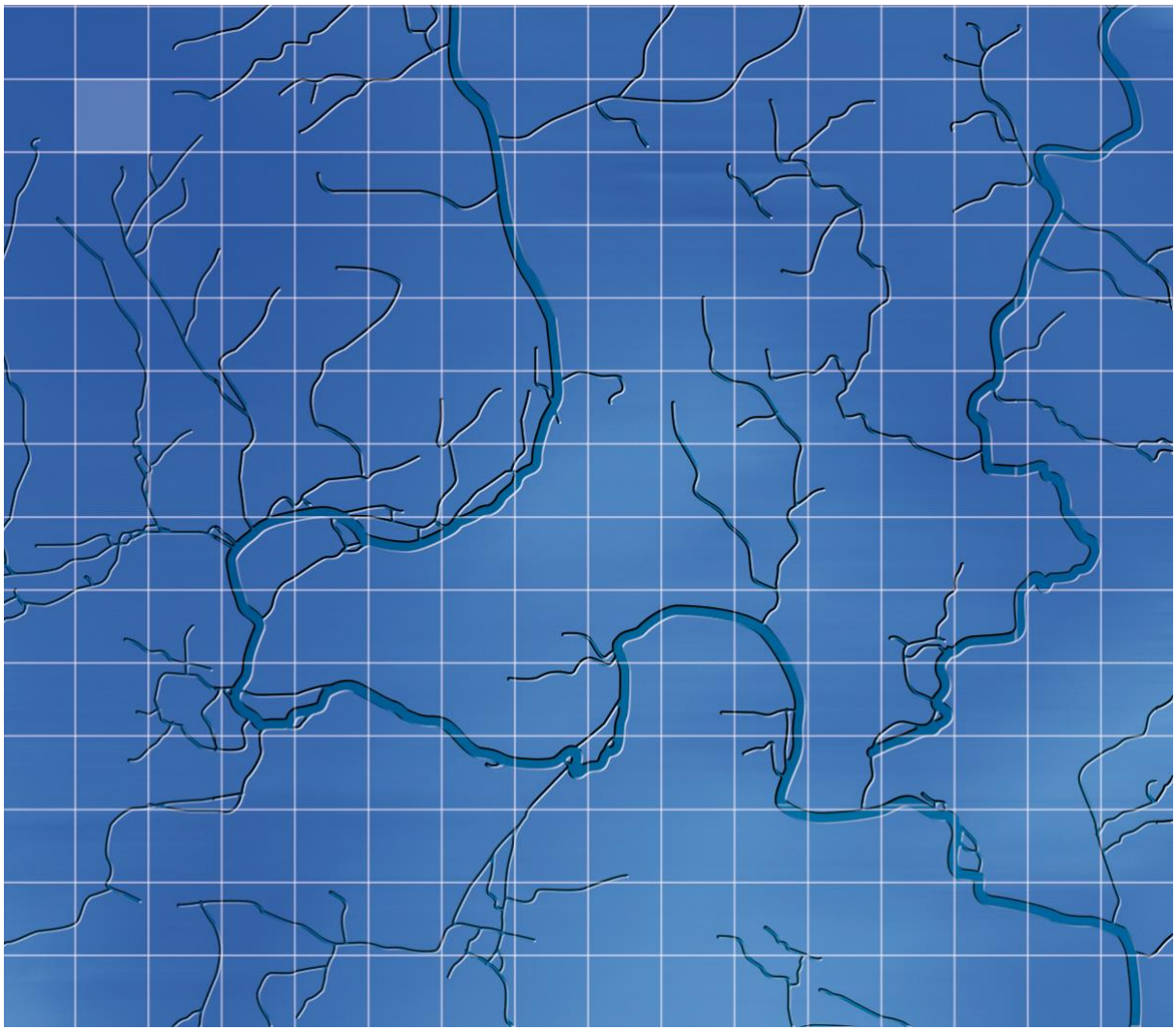
Oxford City Council

October 2025

Land Surrounding St Clements Church (117)

Level 2 Strategic Flood Risk Assessment



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Land Surrounding St Clements Church (117) Level 2 SFRA Flood Risk Overview

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

Flood Risk

The site is at risk from primarily pluvial flood sources.

The EA's surface water flood maps show 0.5% of the site to be inundated during a 3.3% AEP % event, 2.1% is inundated during a 1.0% AEP event, and 6.4% is inundated during a 0.1% AEP event. The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest depths (0.2m-0.3m) and extent of flooding in the southwest of the site.

The EA Flood Map for Planning shows 7.3% of the site is located within Flood Zone 2, 4.7% of the site is located in Flood Zone 3a. None of the site is located in Flood Zone 3b.

The risk from other sources of flooding is considered to be moderate due to reservoir flood risk at the site.

The overall confidence in the assessment is moderate. This is based on the fact that the River Thames model has informed the assessment of flood risk.

Conclusions and Recommendations

The development proposed is residential categorised as *More 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.

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. A sequential approach should still be followed with development sited to avoid high risk areas in the southwest of the site.

Provided this approach is followed it should be possible to locate all infrastructure outside of flood risk areas. A site specific FRA will need to assess site access in more detail.

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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 Surrounding St Clements Church (reference: 117) 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 Surrounding St Clements Church (117) is a 2.31 ha site located at the base of Headington Hill in east Oxford. The current land use at the site comprises a church in the south of the site and outbuildings in the north of the site belonging to Magdalen college, see Figure 1.

Proposed development at the site is residential housing with a desired capacity of 45 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes from east to west towards the River Cherwell, see Figure 2. The ground levels within the site boundary range from 55.0 m to 64.4 m AOD. The average ground level is approximately 60.3 m AOD.

2.3 Nearby Watercourses

The River Cherwell in the location of the site is made up of a western, central and eastern branch. The eastern branch runs along the western boundary of the site and flows from north to south, see Figure 1. There are two drainage channels in the vicinity of the site which connect the eastern branch to the central branch.

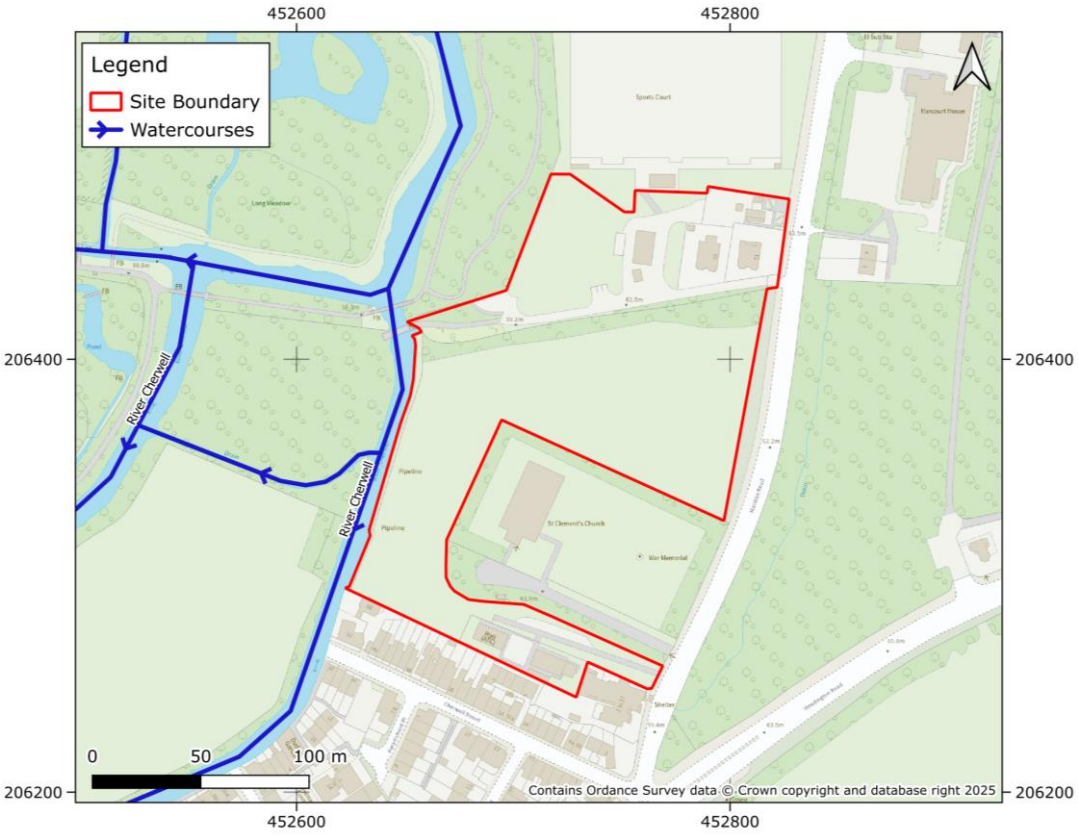

Figure 1 - Site Location

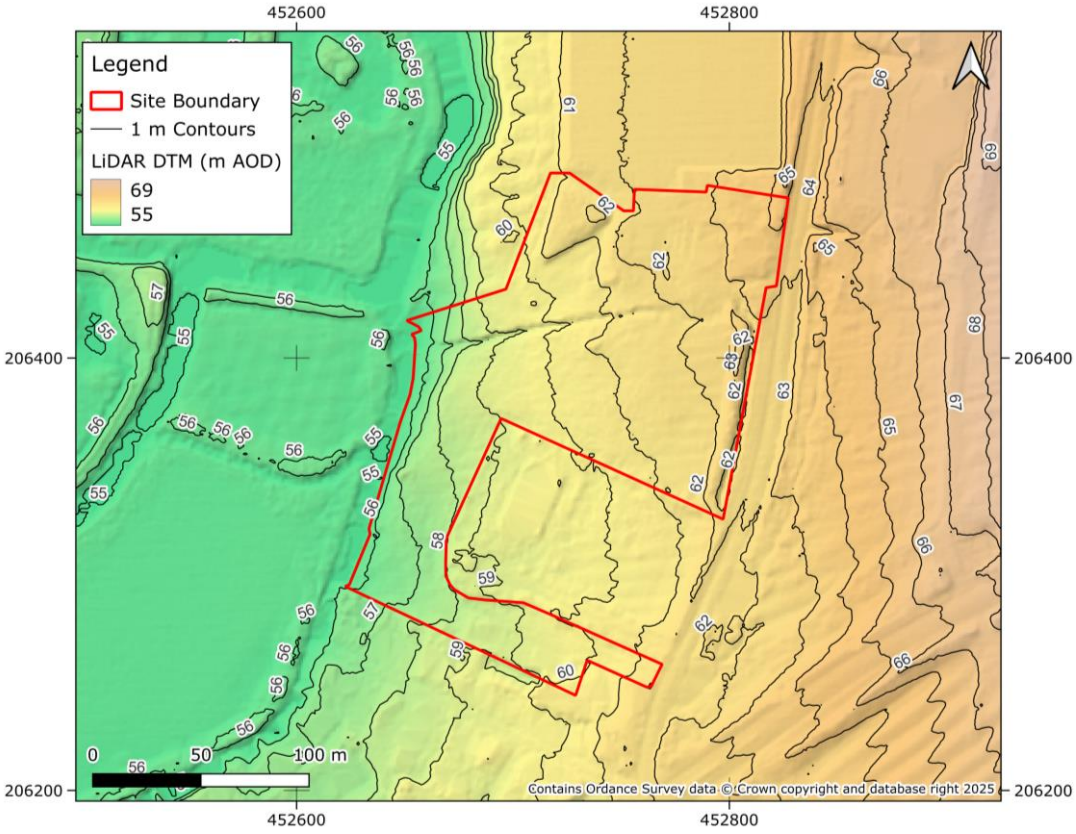

Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has four records of historical flooding events at the site. The events took place in March 1947, April 1998, January 2003 and July 2007. Figure 3 shows the greatest extent from these events. All the historic floods were associated with the River Cherwell.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfp), 7.3% of the site is located within Flood Zone 2 (0.1% AEP), and 4.7% is located within Flood Zone 3a (1.0% AEP). Viewing the River Thames 2018 model results for the undefended 3.3.% AEP event, none of the site is located within Flood Zone 3b. The areas at risk at risk are located in the west of the site adjacent to the River Cherwell, see Figure 4.

The FMfP climate change outputs have also been assessed, counterintuitively they show a reduction in flood extents with 4.5% of the site located within Flood Zone 2 (0.1%), and none of the site located within Flood Zone 3a (1.0% AEP). The reason for this disparity is thought to be due to the baseline extents for Flood Zone 2 using the historical flood extents in addition to modelling data and representation of the river channel in the baseline Flood Zone 3a extents. In terms of the Flood Zone 3b extent (River Thames 2018 3.3% AEP + 26% Climate Change), this increases but remains outside of the site boundary. It has a very similar extent to the Flood Zone 3a with climate change, see Figure 5.

Overall, the fluvial flood risk at the site is considered to be low.

3.3 Flood Defence Infrastructure

No flood defence infrastructure is located on or near the site. The site is not located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 0.5% of the site to be inundated during a 3.3% AEP % event, 2.1% is inundated during a 1.0% AEP event, and 6.4% is inundated during a 0.1% AEP event, see Figure 6. Surface water flooding tends to affect the southwestern edge of the site.

When considering the effects of climate change, the proportion of the site at risk for each event increases to 0.7%, 4.1%, and 7.8% respectively, see Figure 7.

Overall, the surface water flood risk to the site is considered to be low, however it is the considered the primary flood risk so is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by a bedrock comprised of mudstone in the form of the Oxford Clay Formation and West Walton Formation. The bedrock is expected to permit low amounts of infiltration. In terms of superficial deposits, alluvium deposits associated with the River Cherwell's floodplain are found along the western edge of the site. These deposits contain clay, silt, sand and gravel and are expected to have variable permeabilities. The underlying soils at the site are seasonally wet slightly acid with base-rich loamy and clayey soils with impeded drainage and slow permeability.

Based on the geology at the site there is a low risk of groundwater flooding, however more data is required at the planning stage to confirm this. If groundwater flooding does occur given the proximity to the River Cherwell it is expected to be heavily correlated with fluvial flooding.

3.6 Reservoir Flood Risk

The FMfP shows that the west of the site is at risk from reservoir flooding during both a wet and dry day scenario, see Figure 8. 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 located partially within the River Cherwell at Oxford Flood warning area.

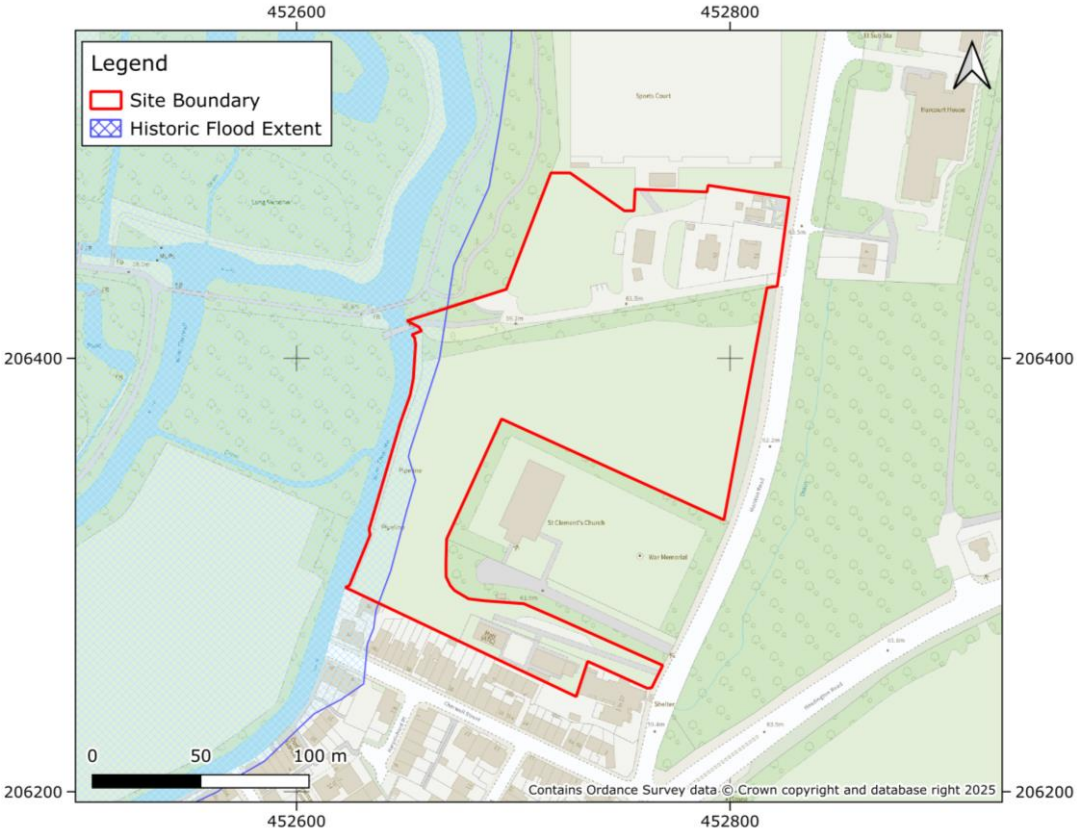

Figure 3 - Recorded Flood Outlines

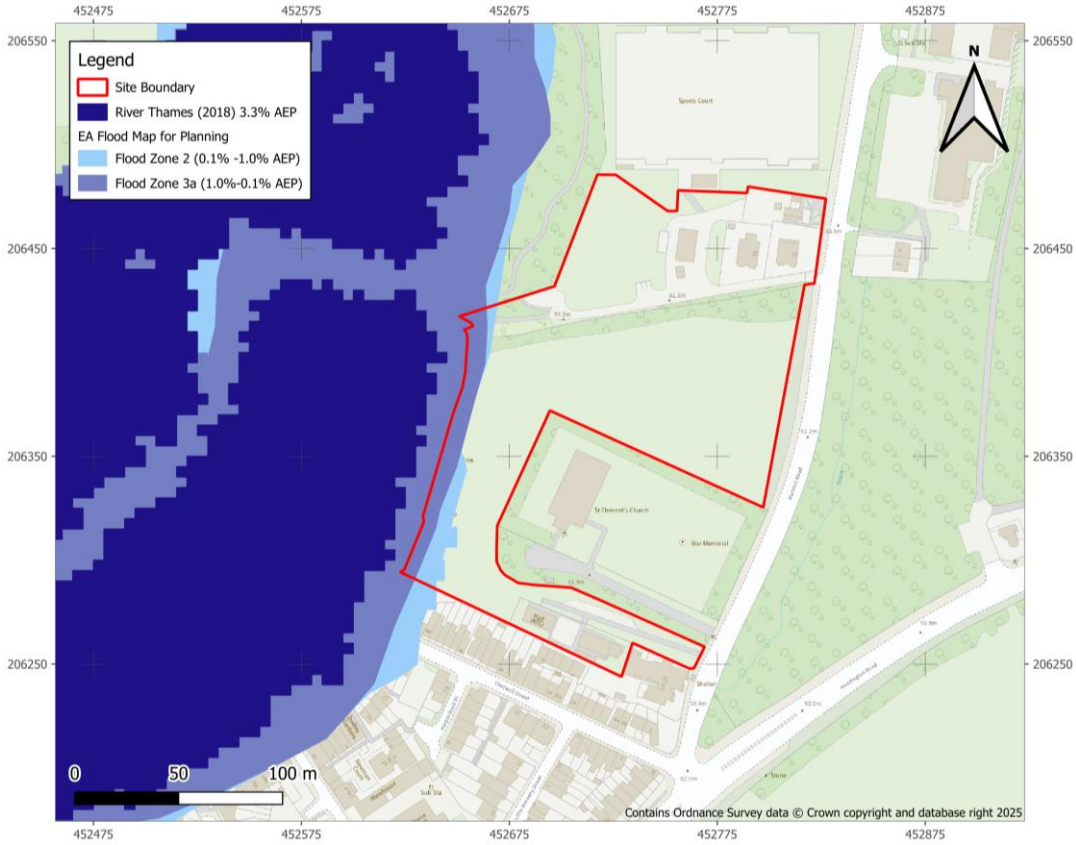

Figure 4 - Fluvial Flood Map

Figure 5 – Fluvial Climate Change Flood Map

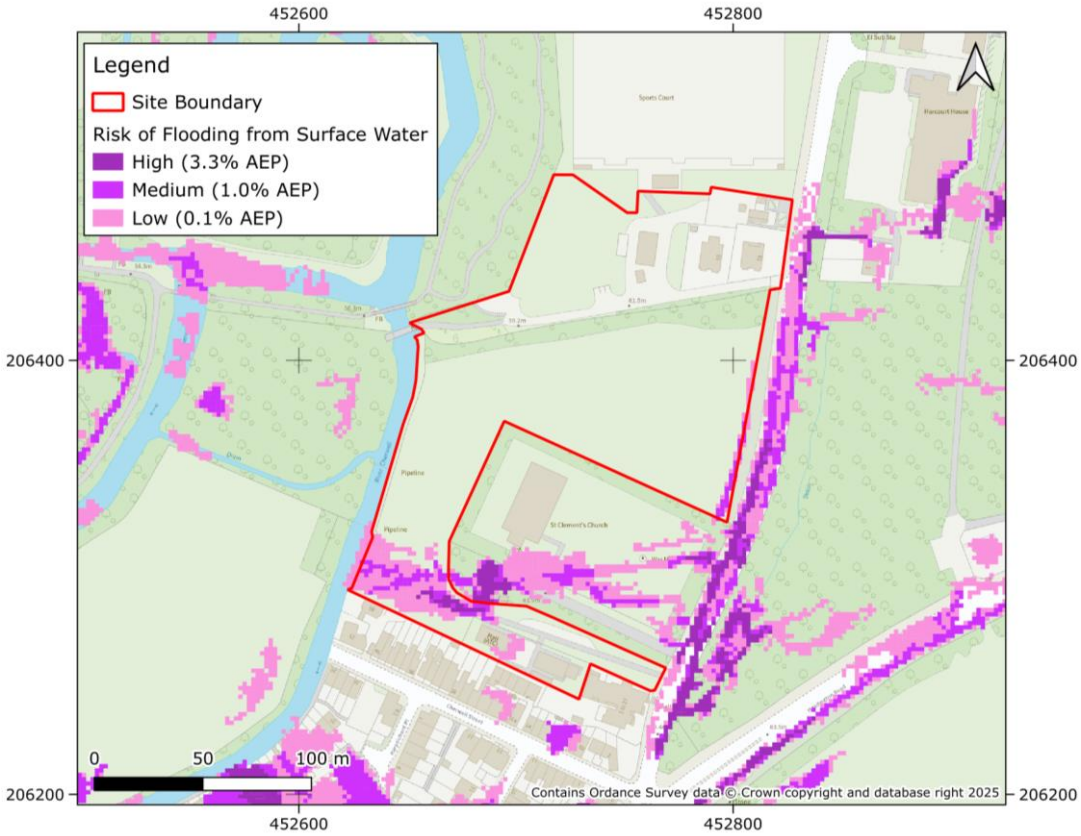

Figure 6 – Surface Water Flood Map

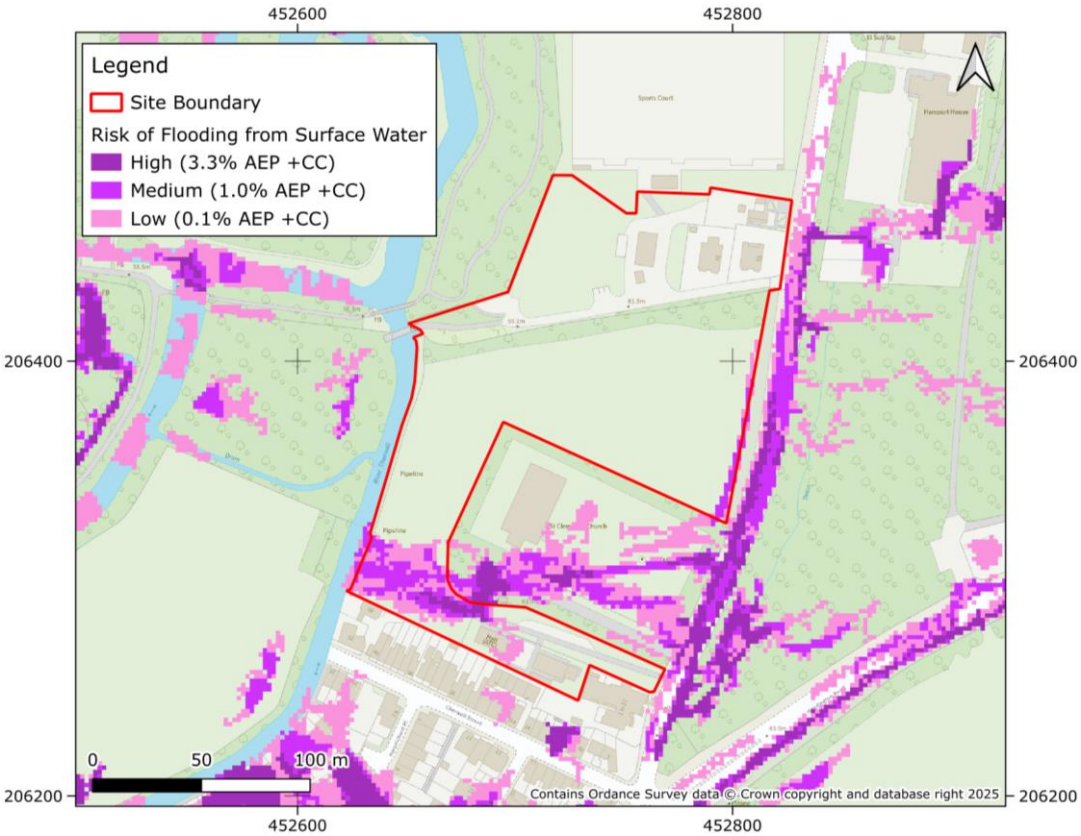

Figure 7 -Surface Water Climate Change Flood Map

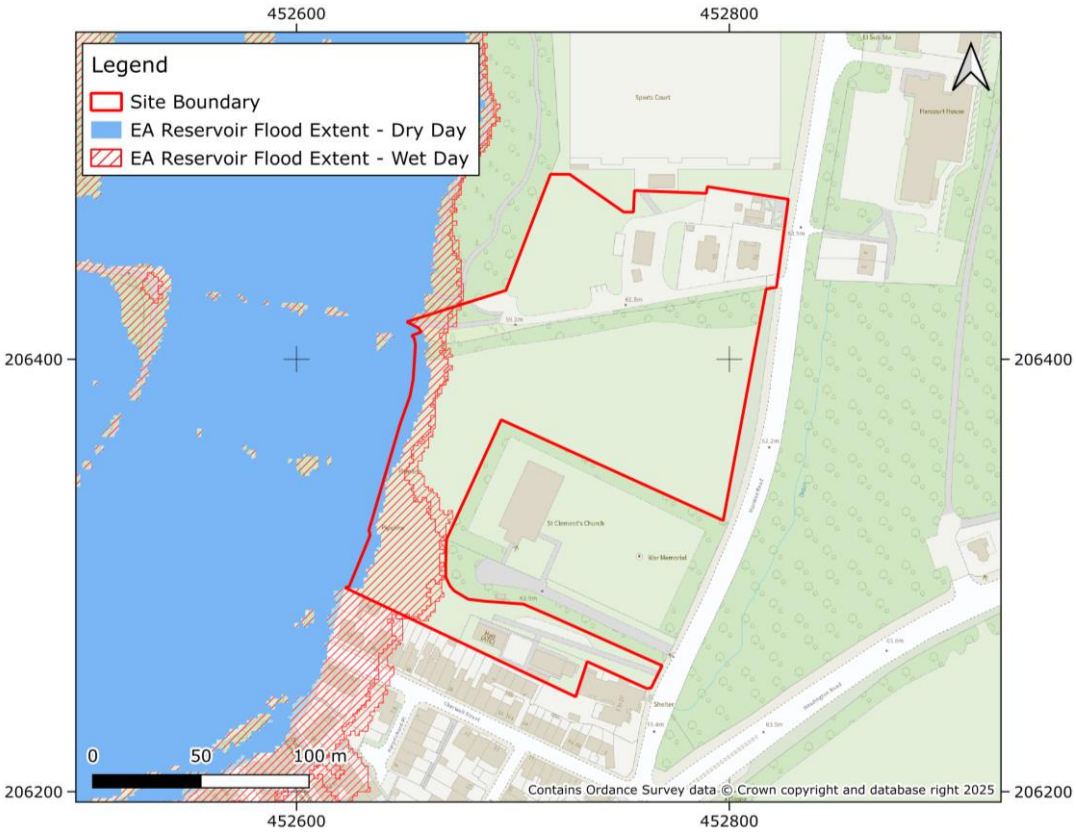

Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

Pluvial flooding is the primary flood risk mechanism at the site and is 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.

During this event, inundation is limited to the southwestern corner of the site and a small section along the eastern boundary. Overall, 4.1% of the total site area is inundated, see Figure 9. Inundation depths are generally less than 0.2m, with some areas reaching up to 0.3m. Surface water flooding at site likely originates due to runoff from Marston Road located east of the site.

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

Vehicular access to the site should be available to the north via Marston Road which can be accessed from the north and the south of the site via the pre-existing road network. Figure 10 shows that the potential routes. The route lies entirely within Flood Zone 1 so fluvial flooding is not a significant concern. Based on the pluvial flood extents southward travel is recommended to avoid high risk areas to the north.

Despite the generally low hazard along the route early flood warning should still be heeded to ensure that the access route can be utilised before surface water inundates the southwestern portion of the site and floodwater from the River Cherwell inundates the western portion of the site.

The River Cherwell's response to rainfall can be flashy, due to the impervious clay soils in its catchment. The site does benefit from being located within an EA Flood Warning Area and is also in the downstream reaches of the Cherwell giving potentially more time for evacuation.

In terms of pluvial flooding speed of onset values could be very fast, however it is noted that depths are generally not greater than 0.2m in the design event so it should be manageable.

Once the development layout is known, a site-specific FRA should also 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.

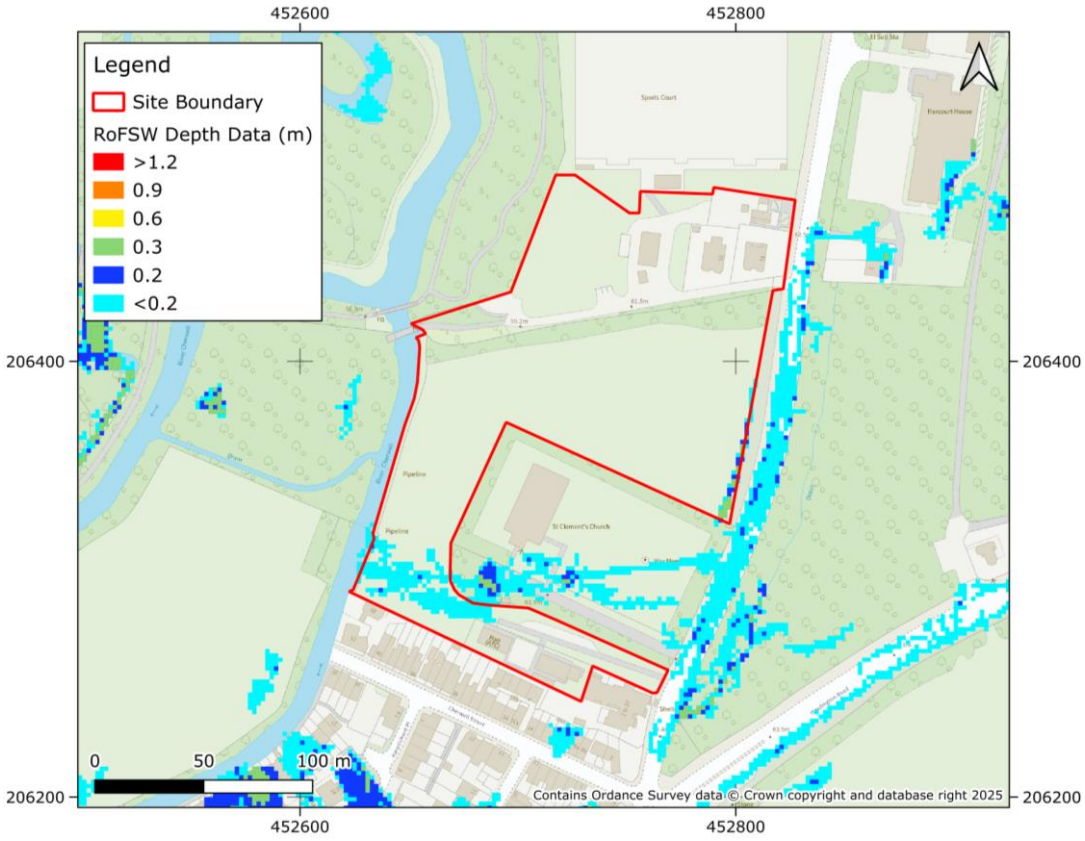

Figure 9 - RoFSW Depth Data for 1.0% AEP + Climate Change Event

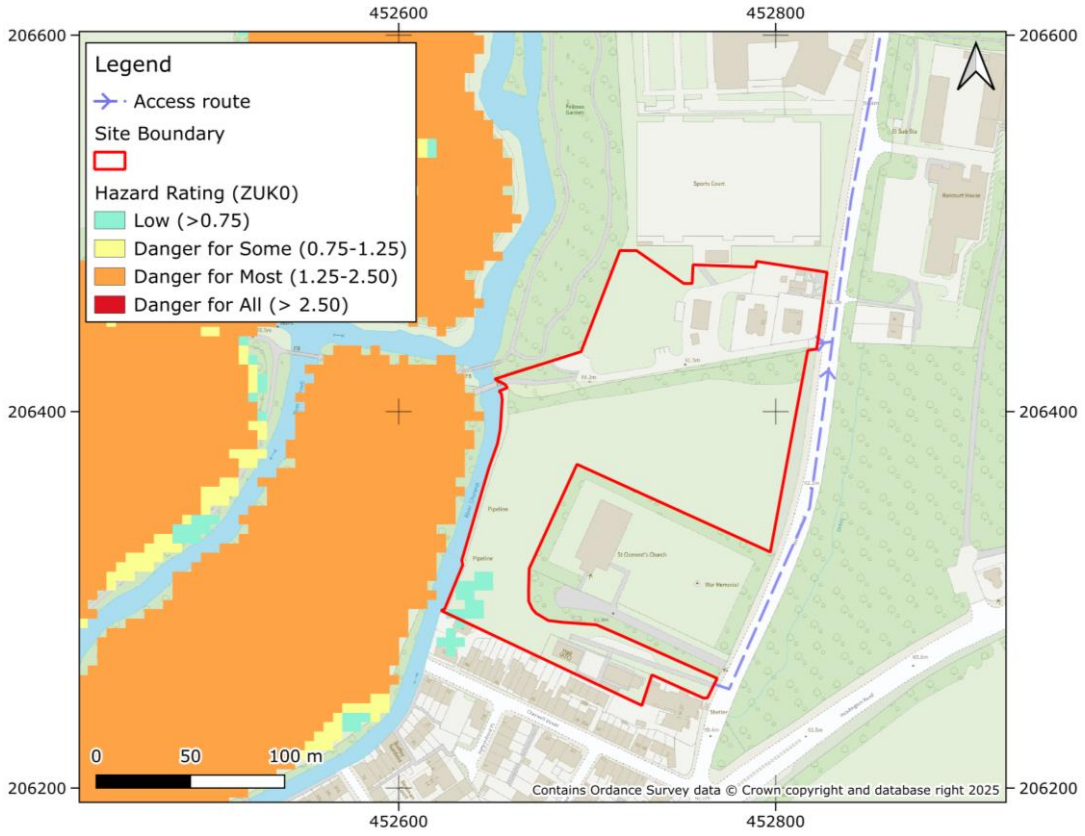

Figure 10 – Access/Egress Routes showing Flood Hazard (ZUK0) for the 1.0% AEP +26% CC Event

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential categorised as *More 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.

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. A sequential approach should still be followed with development sited to avoid high risk areas in the southwest of the site.

5.2 Scale of Development

The total site area is currently 2.31 ha; allocated for 45 dwellings. Assuming medium density housing (60 dwellings per hectare), 45 dwellings would require 0.75 ha of land.

In total approximately 8.5% of the site or 0.2 ha of land lies within the pluvial flood zones when accounting for climate change. The at risk areas are mainly concentrated in the southwest of the site. With this taken into account, it should be possible to locate all infrastructure outside of flood 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. This site is more at risk from pluvial flood risk so these should be used to inform development layout as well. As outlined above it should be possible to locate all infrastructure outside of flood risk areas.

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 low permeability, 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.