

# Nuffield Sites

Ref	SPCW6
Primary Flood Zone	Flood Zone 1
Vulnerability Classification	Mixed (More vulnerable and Less vulnerable)

## Site Details

<b>Site Location:</b>	<b>X:</b>	450756	<b>Address:</b> Hythe Bridge Street, OX1 2EP
	<b>Y:</b>	206302	
<b>Site Area:</b>	1.41 ha		<b>Additional Information:</b> The site is comprised of three sites (labelled 1-3 in the fluvial flood map overpage). These are currently mixed use, consisting of a car park, hotel and residential areas.
<b>Proposed Function:</b>	Mixed		
<b>Ground Level Range (m AOD):</b>	56.573m-59.098m		

## Fluvial Flood Risk

	1 in 100 Yr (+26%)	1 in 100 Yr (+84% CC)
<b>Percentage Inundated (%)</b>	50%	63%
<b>Average Flood Depth (m)</b>	0.17m (Max -2.37 m)	0.30m (Max - 2.64m)
<b>Average Velocity (m/s)</b>	0.05m/s (Max - 0.37m/s)	0.09m/s (Max - 0.77m/s)
<b>Speed of Onset (hrs)</b>	42 hrs	12 hrs

**Summary:** The site is at moderate risk of fluvial flooding, with a significant proportion of the site lying within Flood Zone 2 and in Flood Zones 3a and 3b (see fluvial flood map overpage). When accounting for climate change, for the design 100-year (+26% climate change) event, 50% of the site is modelled to be inundated. Flooding is largely observed across the two sites located west of the Castle Mill stream (sites 1-2), the site to the east (site 3) is mostly flood free in the design event. Where flooding is observed, the hazard map for this event (see hazard map) shows the hazard rating to be mostly low with some pockets indicating *Danger for most* particularly within site 1. Whilst the extent and hazard is greater for the extreme climate change scenario, given the proposed development this scenario should not be relevant. A small section of site 3 which lies closest to the Castle Mill stream is within the historical flood map, this was from a flood event in 1979.

## Defence Infrastructure

<b>Description:</b>	No flood defence infrastructure
<b>Owner:</b>	N/A
<b>Standard of Protection:</b>	N/A
<b>Condition:</b>	N/A

**Potential Access & Egress Route:** The proposed access and egress route is to head east via Hythe Bridge St, before joining St Giles. Travel from this point would likely be towards low-risk areas in North Oxford (see access/egress map overpage).

**Flood Risk:** The initial parts of the route are shown to be within Flood Zone 2 and Flood Zone 3a and 3b as the route crosses the Castle Mill stream. The hazard rating is generally low at the start of the route which suggests that water is both shallow and slow moving. However, there are pockets of greater hazard (danger for most). For these reasons early warning will be essential. It should be noted, that the River Thames catchment is dominated by chalk, it has relatively slow river response times to storm events, being groundwater, rather than surface water dominated. This increases the time taken for inundation which should allow for both adequate warnings and preparation in an extreme flood event. Most of the eastern site is also in Flood Zone 1 so should provide safe refuge during an extreme flood event.

## Pluvial & Other Sources of Flood Risk

The risk of pluvial flooding has been assessed using the EA surface water flood maps (see pluvial flood map overpage). Parts of the site are shown to be at medium to high risk of pluvial flooding. In most of these areas the principal flood mechanism is thought to be fluvial. The flood maps use a DTM to simulate runoff, meaning that water gravitates to low points, such as streams. The flooding appears to originate from the Castle Mill Stream and shows similar extents to the fluvial flood map. Where flooding is considered to be pluvial in origin, it is predominantly limited to the road network to the south of the site which is not currently proposed for access.

The underlying geology at the site comprises loamy and clayey floodplain soils with naturally high groundwater underlain by sedimentary bedrock in the form of Mudstone. In this regard, groundwater flood risk is considered to be moderate.

The EA's Flood Risk from Reservoirs Map shows all the sites to be at risk during the wet-day scenario, with site 1 also at risk in the dry-day scenario. Reservoir failure is a rare event with a very low probability of occurrence, so this risk is not considered a significant barrier to development at the site. Based on the LLFA's flood incident data, there have been no recent historical flood incidents recorded close to the site.

## FRA Implications, SuDS & Exception Test

Hydraulic modelling of the River Thames and its associated tributaries has indicated that the site is at moderate risk of fluvial flooding. A significant proportion of the site lies in Flood Zone 2 and in Flood Zones 3a and 3b. A mixed development with both housing (more vulnerable) and employment (less vulnerable) infrastructure is proposed. The latter is permissible within Flood Zones 2 and 3a, more vulnerable infrastructure is permissible in Flood Zone 2, but must pass an Exception Test as specified in the latest NPPF if located in Flood Zone 3a. Neither is permissible in Flood Zone 3b under any circumstances. When accounting for climate change, 50% of the site is at risk during the design 100-year (+26% Climate change) event.

In terms of site access, the start of the route is at risk with significant hazard in some sections. Ensuring adequate flood warning will be necessary to ensure the route can be utilised. A site-specific FRA should look into this in more detail.

The pluvial flood risk at the site is considered to be low, the flooding shown by the EA surface water flood maps appears to be mostly fluvial in origin. The drainage strategy for the proposed development should be suitably designed to manage additional runoff arising from the development and ensure that pluvial flood risk at the site and to third party land is not increased.

In assessing and demonstrating the viability of any SuDS solution for the site, a site-specific FRA should follow the Non-statutory technical standards for SuDS. The geology at the site consists of loamy and clayey floodplain soils with naturally high groundwater in this regard the use of infiltration SuDS solutions is likely to 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 sewer will also need considering as part of a site-specific FRA.

Overall, a mixed-use development at the site should be achievable, with a large proportion of the site lying outside of Flood Zone 3a however barriers do exist. A sequential approach should be implemented prioritising more vulnerable residential development in Flood Zone 1 and Flood Zone 2 where possible (e.g. site 3). Less vulnerable employment development is also preferred in these zones however can be located in Flood Zone 3a (without the need for the Exception Test) if more space is required for residential uses. No development (unless water compatible development) is permissible in Flood Zone 3b.

Development may need to be set at a floor level to provide an appropriate freeboard above the flood level for the 100-year (+26% climate change) design event, estimated at 57.29 m AOD for site 1 and 57.59 m AOD for sites 2-3. Large areas of sites 1 and 2 are sited below these levels, so ground raising may be significant here. A site-specific FRA should confirm any requirements with the EA including the need to provide compensatory storage and assess 3<sup>rd</sup> party impacts if ground raising is implemented.

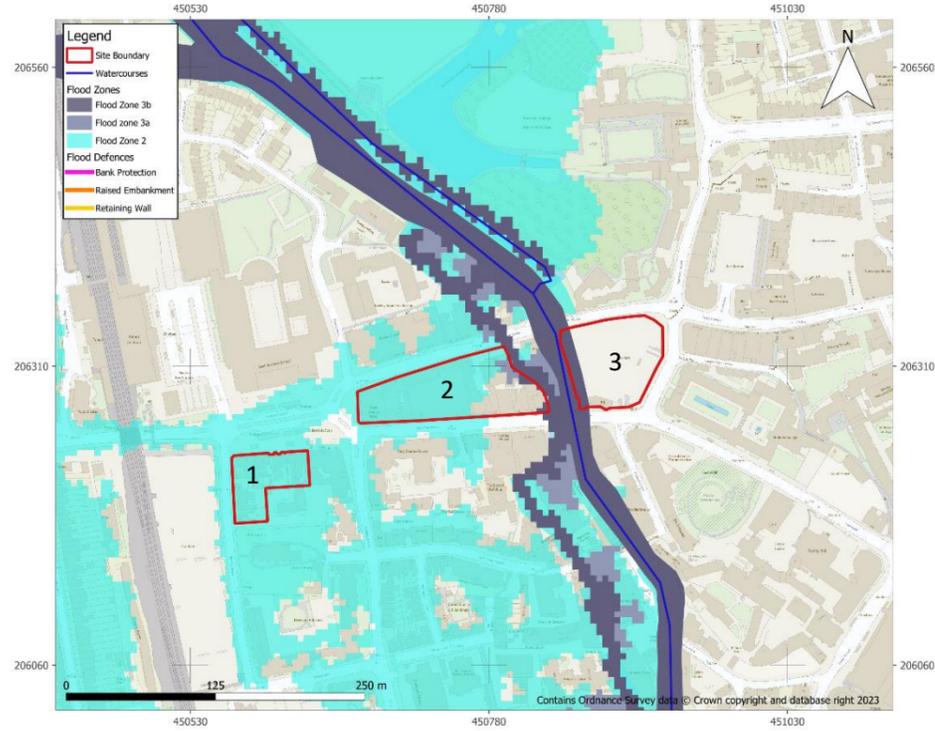
<b>Fluvial Hazard</b>	<b>Moderate Risk</b>
<b>Pluvial Hazard</b>	<b>Low Risk</b>
<b>Developable</b>	<b>Proposed development appropriate in most areas. A sequential approach to development is advised. There are barriers related to potential ground raising at some of the sites</b>

# Nuffield Sites

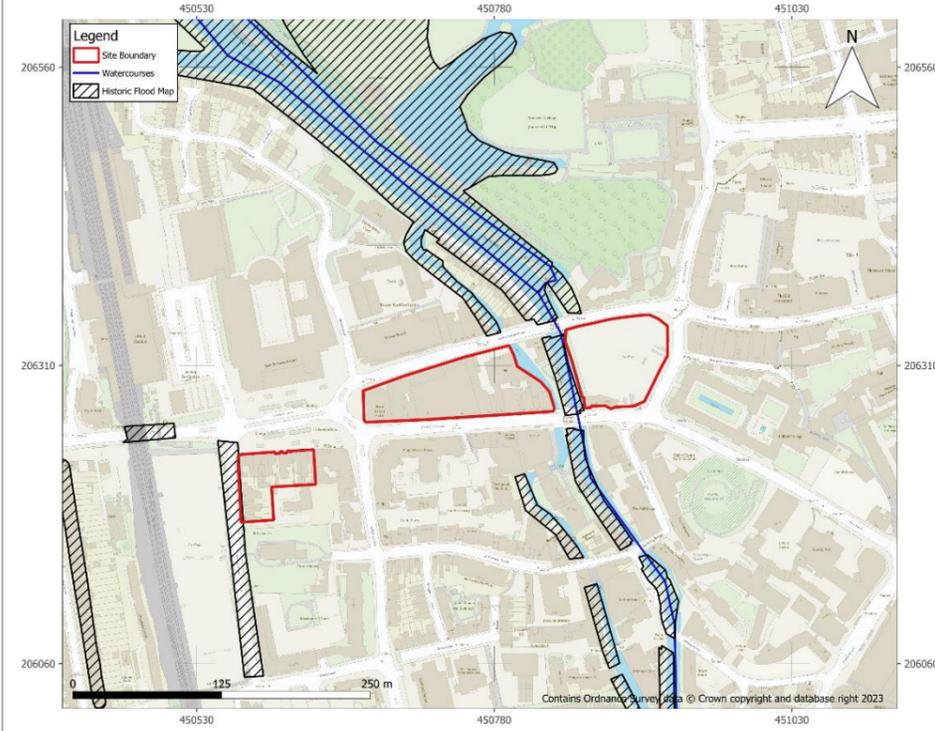
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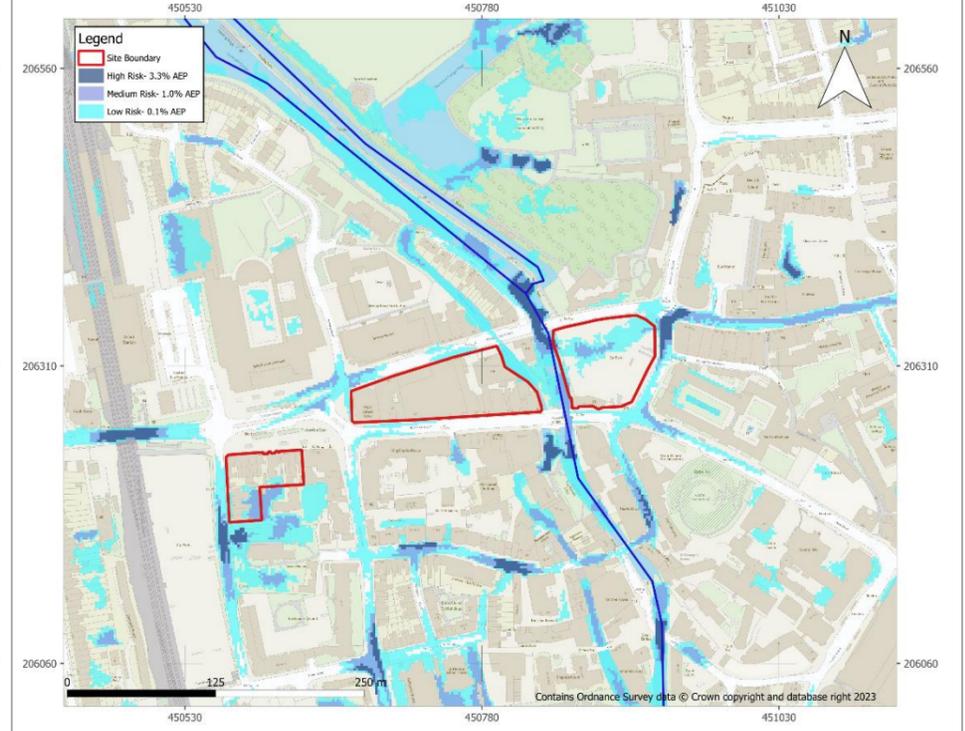
## Fluvial Flood Map



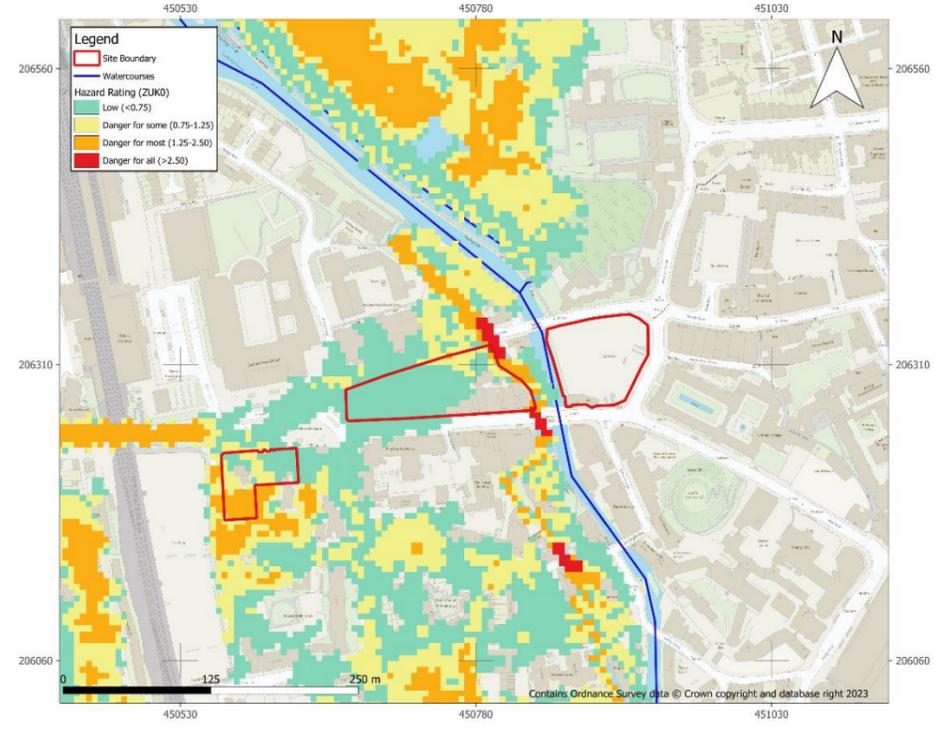
## Historical Flood Map



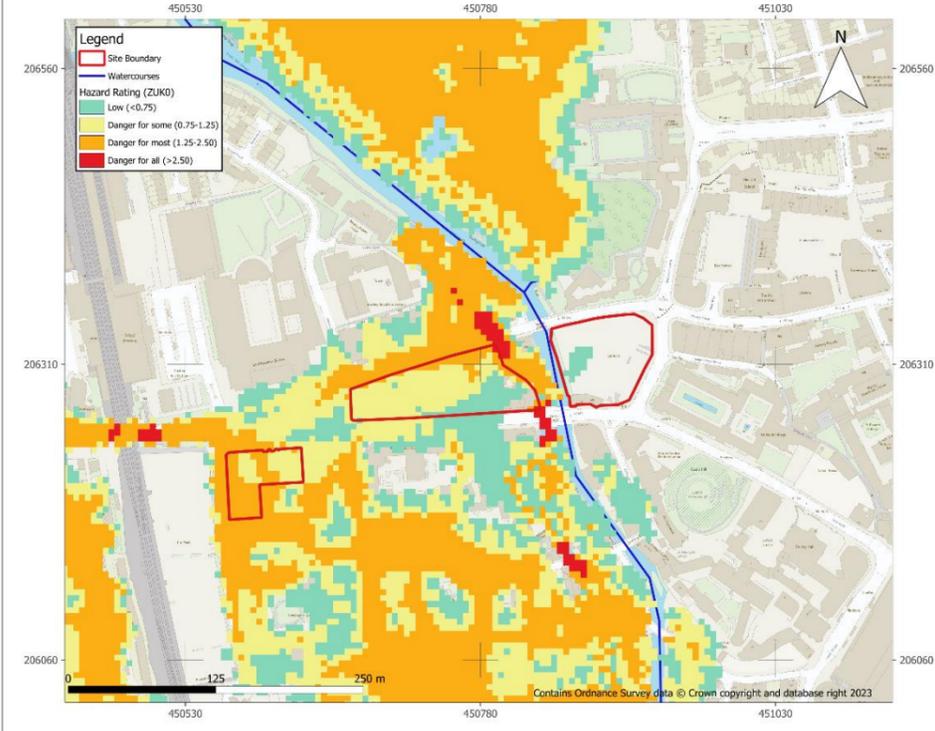
## Pluvial Flood Map



## Hazard Map (100 Yr + 26% Climate Change)



## Hazard Map (100 Yr + 84% Climate Change)



## Access/Egress Routes

