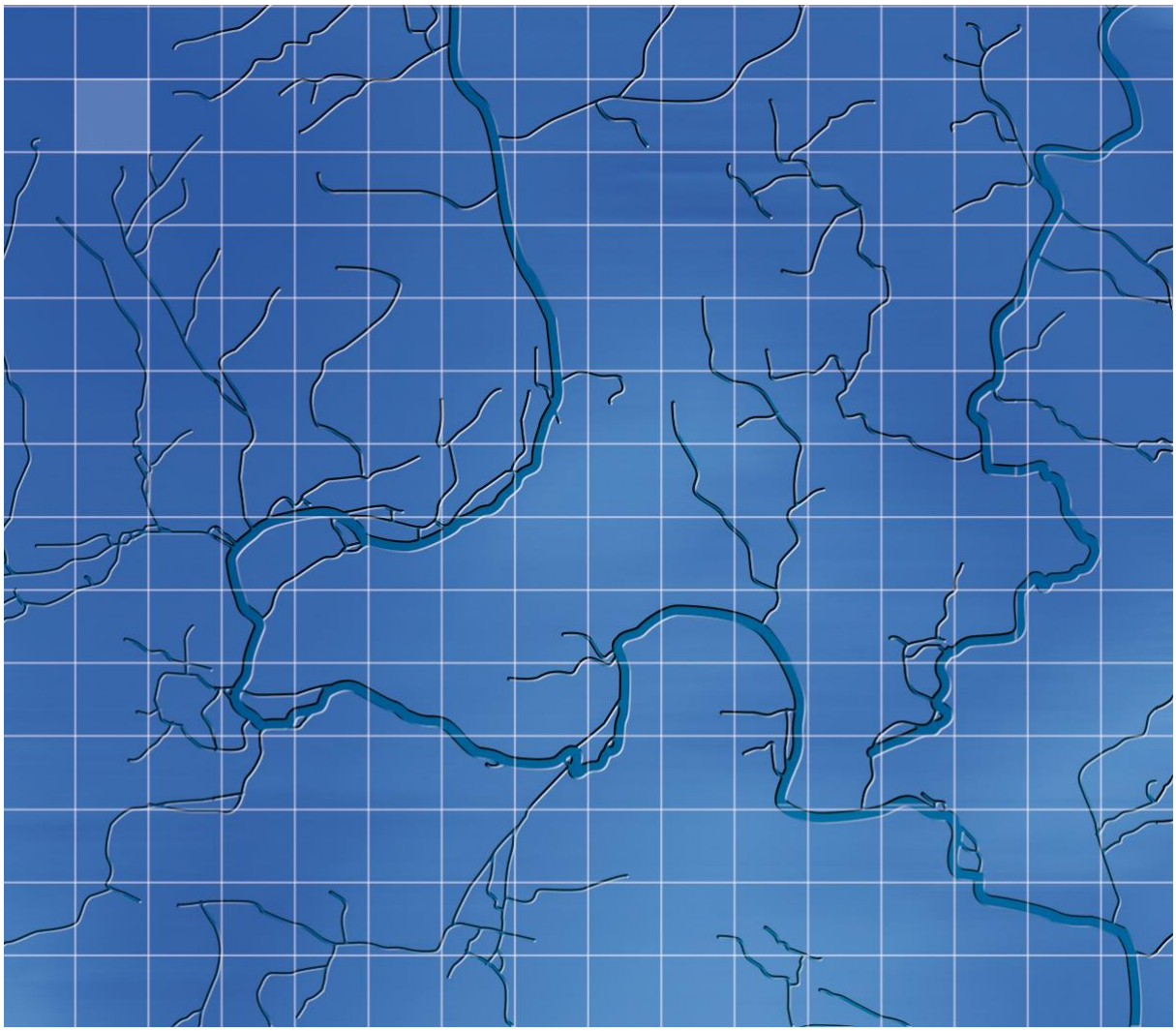
Oxford City Council

January 2026

Oxford City Level 2 Strategic Flood Risk Assessment



Oxford City Council

Oxford City Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10237

Version	Issue date	Issue status	Prepared By	Approved By
2.0	23/01/2026	Draft	Daniel Hamilton (*Principal Consultant*)	Paul Blackman (*Director*)

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.

Registered Office Stables 4, Howbery Business Park, Wallingford, OX10 8BA
www.hydrosolutions.co.uk

Contents

1 Introduction

Wallingford HydroSolutions (WHS) Ltd has been commissioned by Oxford City Council (OCC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) in accordance with the National Planning Policy Framework (NPPF)[1], Planning Practice Guidance (PPG)[2] and associated guidance from the Environment Agency (EA).

Oxford City Council has carried out a sequential test of sites within its administrative area. The results of which show that a number of sites may need to be located in Flood Zone 2, Flood Zone 3a and Flood Zone 3b. Table 1 list the full names of the site assessed and their locations are displayed in Figure 1.

This Level 2 SFRA includes a detailed assessment of flooding at each of the sites based on available model data, flood defence information, surface water flood mapping, historical flood data, geological data, reservoir flood mapping and flood warning areas. The assessments also include guidance for the preparation of site-specific Flood Risk Assessments (FRAs), including information about the use of SuDS and the need for mitigation measures. From this information the appropriateness of development on the sites and likelihood of passing the Exception Test (where required) has been determined.

This document details the methodology applied; the specific site assessments are provided in Appendix 1 which include the results of the flood risk analysis along with the conclusions and recommendations reached for each of the sites.

The EA have raised concerns on several other sites not considered for level 2 assessment. Appendix 2 provides justification on why these sites did not require a level 2 SFRA.

Table 1- Level 2 SFRA Sites

SHLAA Reference*	Site
008a	Bertie Place Recreation Ground
11	Canalside Land, Jericho
14	Templars Square
16	Cowley Marsh Depot
028a	Kassam Stadium
028b	Overflow carpark at Kassam Stadium site
028c	Ozone Leisure Complex & Minchery Farmhouse
70	Island Site
76	Oxpens
81	Worcester Street Car Park and Public House
117	Land surrounding St Clement's Church
389	Land at Meadow Lane
516	474 Cowley Road
586	Osney Mead
588	Oxford Science Park
613, 614, 615	Botley Road sites around Cripley Road including River Hotel and Westgate Hotel
616	St Thomas and Osney Warehouse
624	Land south of Frideswide Square

** Note, the SFRA refers to SHLAA reference, the final local plan reference for these sites will likely differ.*

[1] Ministry of Housing Communities & Local government (2024) National Planning Policy Framework https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf
[2] UK Government (2025) Planning practice guidance- Flood risk and coastal change https://www.gov.uk/guidance/flood-risk-and-coastal-change

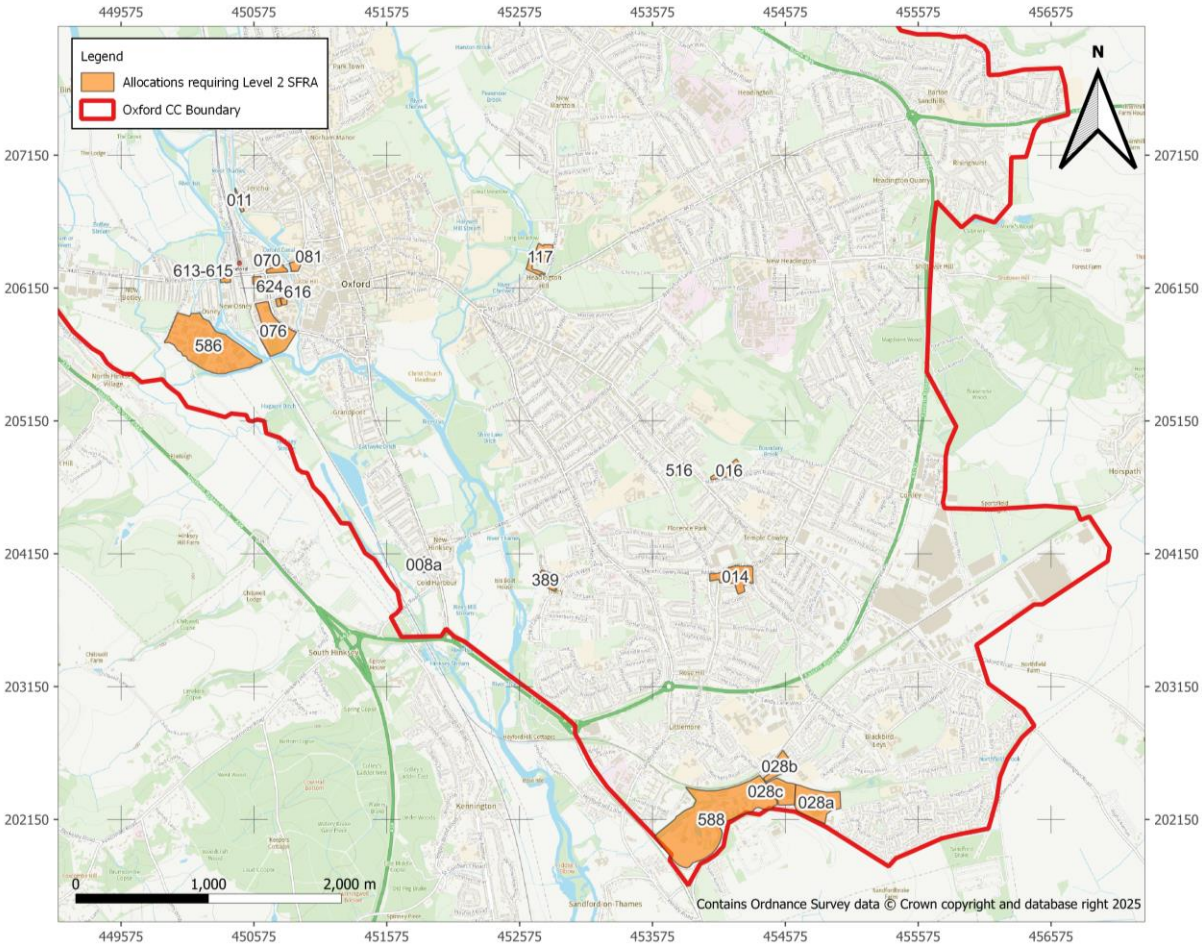


Figure 1- Site Locations Plan

2 Methodology

2.1 Sources of Data

This Level 2 SFRA presents an assessment of the risk of flooding from all relevant sources at each of the sites. To inform this, existing information and model data have been identified and collated for different sources of flooding. Specifically, the latest national and available detailed model data for Oxford City have been incorporated into the site-specific assessments, along with details on flood defences, surface water flooding, groundwater conditions, reservoir flooding and flood warning areas.

The main sources of data used to inform this SFRA include:

- EA Fluvial Flood Map for Planning (FMfP)- Flood Zones [3] [4]– to quantify baseline (Flood Zone 3a & Flood Zone 2) and climate change (1.0% AEP + CC & 0.1% AEP +CC) fluvial flood extents.
- EA Fluvial FMfP 3.3% Defended Flood Extents [5] [6] - to quantify baseline (Flood Zone 3b) and climate change (3.3% AEP + CC) fluvial flood extents.
- Hydraulic modelling data for the River Thames and tributaries (2018[7], 2021[8], 2023[9]) – to assess fluvial flood risk from the River Thames and major tributaries. Data includes depth, velocity and hazard information along with undefended 3.3% AEP extents and defended climate change extents.
- Risk of flooding from Rivers and Seas (ROFRS) Depth data – to obtain depth information at sites at significant fluvial flood risk where no detailed modelling is available (i.e. outside of Thames model extent).
- EA Surface Water Flood Maps[10] [11]– to quantify the baseline and climate change pluvial flood extents.
- Risk of flooding from Surface Water (ROFSW) Depth data – to obtain depth information for sites at significant pluvial flood risk.
- EA Reservoir Flood Mapping[12] [13] – to quantify reservoir flood extents in a wet and dry day scenario
- EA Historical Flood Map[14] and Recorded Flood Outlines[15] – to review historical flood events at or in the vicinity of sites.

---

[3] EA (2025) *Flood Map for Planning– Flood Zones* https://environment.data.gov.uk/dataset/04532375-a198-476e-985e-0579a0a11b47
[4] EA (2025) *Flood Map for Planning – Climate Change Extents (defended and undefended)* https://environment.data.gov.uk/dataset/610d6830-0637-4f5b-b6ce-61f5fa5635d3
[5] EA (2025) *Flood Map for Planning – 3.3% AEP defended (present day)* https://environment.data.gov.uk/dataset/56fb30ae-f20d-490a-9149-a94f3e640261
[6] EA (2025) *Flood Map for Planning – 3.3% AEP defended (Climate Change)* https://environment.data.gov.uk/dataset/b9418b89-aa59-4153-91dd-470f473152dd
[7] CH2M (2018) *Oxford Baseline Hydraulic Modelling*
[8] Jacobs (2022) *Oxford Flood Alleviation Scheme Modelling*
[9] WHS (2023) *Updated Climate Change (Gloucestershire and the Vale management catchment) Model Runs*
[10] EA (2025) *Risk of Flooding from Surface Water* https://environment.data.gov.uk/dataset/b5aaa28d-6eb9-460e-8d6f-43caa71fbe0e
[11] EA (2025) *Risk of Flooding from Surface Water – Climate Change 1 https://environment.data.gov.uk/dataset/e5b38de2-99b3-44ee-b10c-b244926878ef*
[12] EA (2025) *Reservoir Flood Extents - Wet Day (National)* https://environment.data.gov.uk/dataset/d81646cf-37e5-4e71-bbcf-b7d5b9ca3a1c
[13] EA (2025) *Reservoir Flood Extents - Dry Day (National) https://environment.data.gov.uk/dataset/c66ee97f-49d2-454e-9a19-d48a47bd22ad*
[14] EA (2025) *Historic Flood Map,* https://www.data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map
[15] EA (2025) *Recorded Flood Outlines,* https://www.data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines

- EA flood defence structures[16] – to assess existing formal and informal flood defences present at or in the vicinity of sites.
- British Geological Survey (BGS) geoviewer[17] – To determine local bedrock and its expected permeability informing assessment of groundwater flood risk.
- Soilscapes map[18] – To determine local soil and its expected permeability informing assessment of groundwater flood risk.

At each of the sites assessed a comparison has been made between i). the EA's nationally available FMfP extents and ii). hydraulic modelling data held for the watercourses within Oxford. In many locations the hydraulic modelling data informs the FMfP and the flood extents are identical. However, following the release of the updated National Flood Risk Assessment (NaFRA) in early 2025, there are cases where the new national model replaces or is combined with existing modelling data leading to differences.

The data applied to assess flood risk at each site is detailed in the site reports (see Appendix 1) and a technical note is provided in Appendix 3 which gives reasons why one dataset was favoured over another.

2.2 Assessment of Flood Risk

For each site, all relevant sources of flood risk have been considered. It should be noted that sewer flooding has not been assessed directly. Thames Water has provided DG5 sewer flood incident data, which is presented within the Level 1 SFRA. However, as this dataset is reliant on incident reporting and is provided for broad postcode areas, it was deemed inappropriate to assign a definitive sewer flood risk to individual sites based on this information.

Initially the assessment focuses on flood extent, flood defence, site geology and flood warning information. Based on this initial assessment, the primary flood risk in terms of fluvial or surface water flooding is identified for further assessment. Where both sources are considered significant, fluvial and surface water flood risks are both examined in greater detail.

This detailed assessment considers the characteristics of the design flood event (i.e. the 1.0% Annual Exceedance Probability (AEP) event plus climate change). The assessment includes the use of relevant modelling data to evaluate:

- The speed of onset
- Flood depth
- Flood velocity
- Overall flood hazard (ZUK0) and potential impacts
- Access and Egress

For sites at risk of fluvial flooding from the River Thames and its tributaries (including the River Cherwell and the backwaters through Oxford City Centre), the River Thames and Tributaries model has been used. Model outputs for the 1.0% AEP plus 26% climate change event have informed the assessment. Where sites are partially located within Flood Zone 3b, the higher central allowance event (1.0% AEP plus 41% climate change) has also been evaluated.

[16] EA (2025) AIMS Spatial Flood Defences (inc. standardised attributes) https://www.data.gov.uk/dataset/cc76738e-fc17-49f9-a216-977c61858dda/aims-spatial-flood-defences-inc-standardised-attributes
[17] BGS (2025) *BGS Geology Viewer*, https://geologyviewer.bgs.ac.uk/
[18] Cranfield Soil and Agrifood Institute (2025) *Soilscapes map*, http://www.landis.org.uk/soilscapes/

For sites outside the River Thames and Tributaries model domain, namely those affected by the Boundary Brook, Northfield Brook, and Littlemore Brook, the RoFRS depth data for the 1.0% AEP + Climate Change event has been used. Although detailed models exist for these watercourses, they are over a decade old and were deemed not to meet the standard required to inform the latest Flood Modelling for Planning (FMfP) update (January 2025).

For sites at risk of pluvial flooding, RoFSW depth data for the 1.0% AEP + Climate Change event has been used, as no detailed surface water modelling currently exists in the vicinity of the sites assessed.

It should be noted that the climate change allowances used in both the RoFSW and RoFRS are based on the 2050's epoch (2041-2069) and reflect the median estimate of rainfall and peak flow increases respectively. 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).

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 NPPF's flood risk vulnerability and flood zone compatibility classifications shown in Table 2. Flood hazard during the design flood event is also considered in relation to the scale of development proposed. In this context, any mitigative actions required to meet the Exception Test (see section 2.4). are outlined including ground raising and compensatory storage.

Table 2- Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	x	Exception Test required	✓	✓
Zone 3b	Exception Test required	x	x	x	✓

Note, to determine final finished floor levels and the specific volume of compensatory storage required a modelling assessment would be needed incorporating information on the site layout. The layouts for each site are not available at this stage and would typically be determined at the planning stage. Therefore, at this stage the assessment reviews the likely degree of ground raising required (if any) based on the baseline flood levels. From this information a qualitative assessment of potential offsite impacts and compensatory storage requirements is undertaken.

The site assessments also include guidance for the preparation of site specific FRAs, including information about the use of SuDS and any other actions required at the planning stage considering the overall flood risk at the site.

2.3 Exception Test

The NPPF outlines the use of the Exception Test for determining whether a particular development is suitable within areas vulnerable to flooding. The Exception Test is required if a development is:

- Highly vulnerable and in Flood Zone 2
- Essential infrastructure in Flood Zone 3a or 3b
- More vulnerable in Flood Zone 3a

The Exception Test comprises the following two requirements, which the NPPF states must be passed for development to go ahead:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk.
- It must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users without increasing flood risk elsewhere, and where possible, will reduce flood risk overall.

This Level 2 SFRA provides a high-level review of the second part of the Exception Test considering the likelihood of each of the sites passing this element. This has considered i) the safety of future occupants in terms of finished floor levels and safe access/egress, ii) whether the scale of development is appropriate with respect to off site impacts and iii) whether flood risks onsite can be reduced.

The layouts for each site are not available at this stage and would typically be determined at the planning stage. If the sites are allocated, a site-specific FRA will need to be undertaken at the planning application stage to provide a more detailed assessment of flood risk and design mitigation measures where required to ensure that the development is safe for its lifetime.

Appendix 1 – Site Specific Assessments

Appendix 2 – Justification for sites not requiring a Level 2 SFRA

Appendix 3 – Flood Map for Planning and Modelling Data Review