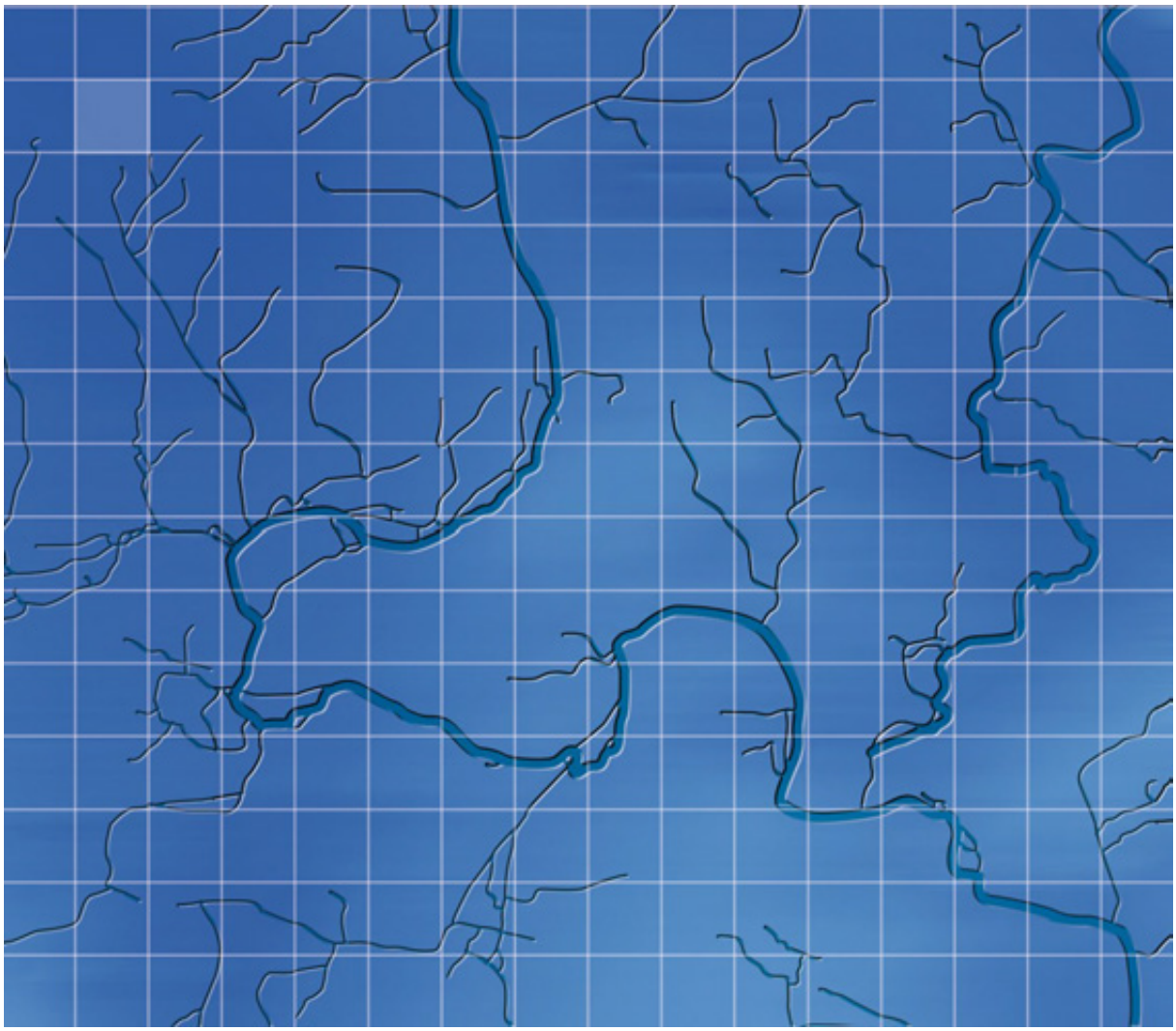
West Oxfordshire District Council

April 2026

West Oxfordshire Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

West Oxfordshire Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Ajani Jacobs (*Consultant*) & Jasmine Lucas *(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.

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 West Oxfordshire District Council (WODC) 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).

West Oxfordshire District Council has carried out a sequential test on potential development areas within its administrative area. The results of which show that a number of these areas may need to be located in Flood Zone 2, Flood Zone 3a and Flood Zone 3b or are at risk from surface water flooding. This has consequently necessitated the preparation of a Level 2 SFRA to provide a more detailed assessment of flood risk at these sites.

West Oxfordshire has not yet fully refined its site allocations. At present, it has identified broad preferred spatial option areas in locations where development is likely to occur. These areas closely correspond to a number of Housing and Economic Land Availability Assessment (HELAA) sites identified in October 2025[3].

The boundaries of the preferred spatial option areas were compared with those of the relevant HELAA sites, and in each case the larger of the two was assessed. This approach was agreed with West Oxfordshire and ensures that all areas with potential for development are taken into account. The locations of the sites assessed are displayed in Figure 1, whilst Table 1 lists the site names, preferred spatial option reference and related HELAA sites.

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, uncertainties that require further review 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.

[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
[3] West Oxfordshire District Council (2025) *West Oxfordshire Local Plan 2043- Housing and Economic Land Availability Assessment (HELAA) 2025* https://westoxon.gov.uk/media/3zel3ghz/housing-and-economic-land-availability-assessment-october-2025.pdf

Table 1- Level 2 SFRA Sites

Preferred Spatial Option	Related HELAA Sites	Site	Preferred Spatial Option or HELAA Site Assessed
B	CUR 008	Land west of Downs Road, Witney	HELAA
C	WIT 001	Land south of Witney	HELAA
D	MIN 006	Land west of Witney	HELAA
E	BN 001a (East) BN 001 (Central) SHIL 003 (West)	North of Carterton	HELAA
F	BN 003	Northeast of Carterton	HELAA
G	BN 006	Northeast of Carterton (Brize Norton)	HELAA (BN006) used to assess areas G and H.
H	BN 006	East of Brize Norton	
I	ALV 002	Land at West Carterton	HELAA
K	HAN 001	Land southwest of Hanborough Station	HELAA
L	BAM 005 BAM 007	East of Bampton	HELAA
P	CHAR 006	Land east of Fawler Road	HELAA
Q	DUCK 002	South of Ducklington	Preferred Spatial Option
R	KING 005	Kingham Station	Preferred Spatial Option
U	TACK 003	Rousham Road, Tackley	Preferred Spatial Option
V	ENS 001	Enstone Airfield	Preferred Spatial Option
W	WIT 010 WIT 011	Welch Way, Witney	Preferred Spatial Option

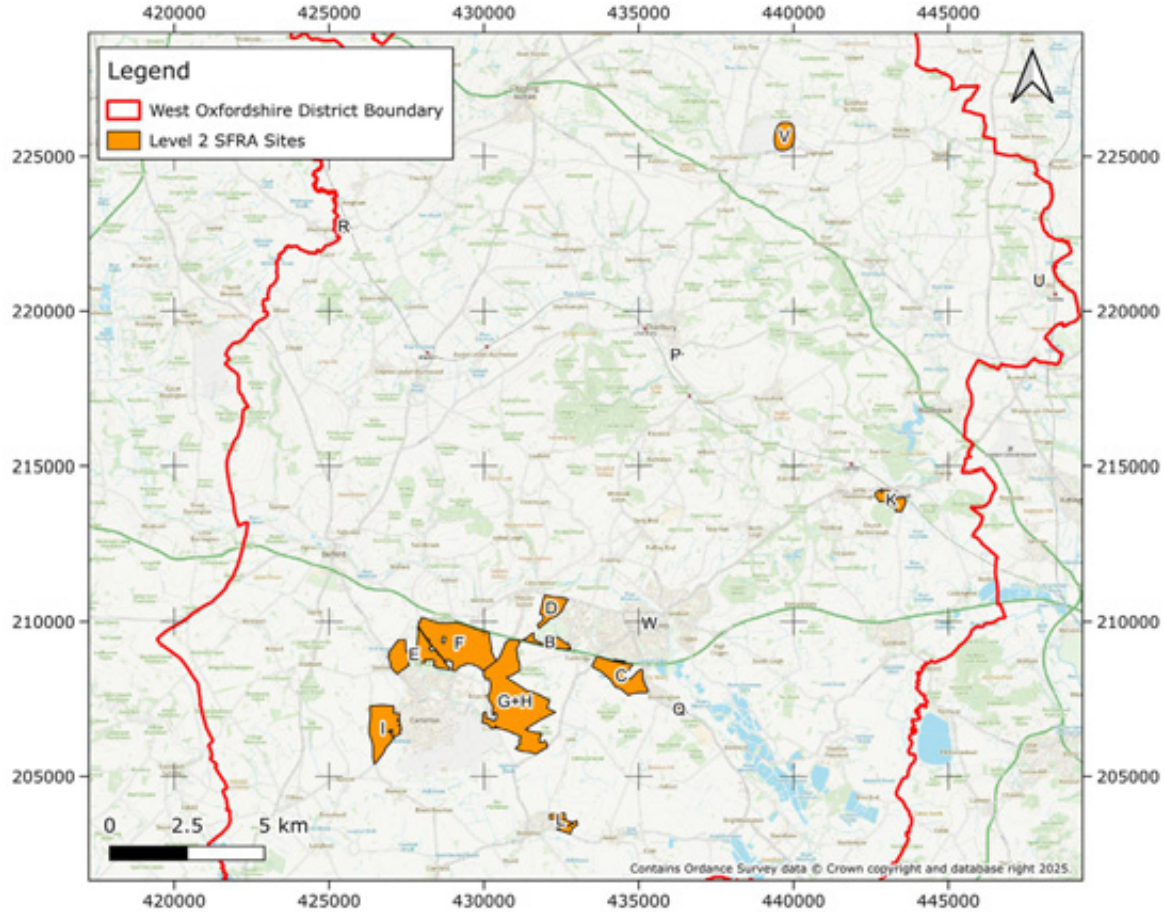


Figure 1- Site Locations Plan

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 West Oxfordshire 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 Maps for Planning[4, 5] – to quantify baseline (Flood Zone 3a & Flood Zone 2) and climate change (1.0% AEP + CC & 0.1% AEP +CC) fluvial flood extents
- EA 3.3% Defended Flood Extents[6, 7] - to quantify baseline (Flood Zone 3b) and climate change (3.3% AEP + CC) fluvial flood extents.
- Hydraulic modelling data from the Windrush (Worsham to A40) (2014) model[8]
- 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.
- EA Surface Water Flood Maps[9, 10] – to quantify the baseline and climate change pluvial flood extents and from ordinary watercourses not captured in the EA Fluvial Flood Maps.
- Risk of flooding from Surface Water (RoFSW) Depth data – to obtain depth information for sites at significant pluvial flood risk and/or at risk from ordinary watercourses not captured in the EA Fluvial Flood Maps.
- EA Reservoir Flood Mapping[11, 12] – to quantify reservoir flood extents in a wet and dry day scenario
- EA Historical Flood Map[13] and Recorded Flood Outlines[14] – to review historical flood events at or in the vicinity of sites.
- EA Flood Defence Structures[15] – to assess existing formal and informal flood defences present at or in the vicinity of sites.

---

[4] EA (2026) *Flood Map for Planning– Flood Zones* https://environment.data.gov.uk/dataset/04532375-a198-476e-985e-0579a0a11b47
[5] EA (2026) *Flood Map for Planning – Climate Change Extents (defended and undefended)* https://environment.data.gov.uk/dataset/610d6830-0637-4f5b-b6ce-61f5fa5635d3
[6] EA (2026) *Flood Map for Planning – 3.3% AEP defended (present day)* https://environment.data.gov.uk/dataset/56fb30ae-f20d-490a-9149-a94f3e640261
[7] EA (2026) *Flood Map for Planning – 3.3% AEP defended (Climate Change)* https://environment.data.gov.uk/dataset/b9418b89-aa59-4153-91dd-470f473152dd
[8] EA (2014) *Windrush (Worsham to A40) Products 5-7*
[9] EA (2026) *Risk of Flooding from Surface Water* https://environment.data.gov.uk/dataset/b5aaa28d-6eb9-460e-8d6f-43caa71fbe0e
[10] EA (2026) *Risk of Flooding from Surface Water – Climate Change 1 https://environment.data.gov.uk/dataset/e5b38de2-99b3-44ee-b10c-b244926878ef*
[11] EA (2026) *Reservoir Flood Extents - Wet Day (National)* https://environment.data.gov.uk/dataset/d81646cf-37e5-4e71-bbcf-b7d5b9ca3a1c
[12] EA (2026) *Reservoir Flood Extents - Dry Day (National) https://environment.data.gov.uk/dataset/c66ee97f-49d2-454e-9a19-d48a47bd22ad*
[13] EA (2026) *Historic Flood Map,* https://www.data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map
[14] EA (2026) *Recorded Flood Outlines,* https://www.data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines
[15] EA (2026) 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

- EA Flood Warning Areas[16] – to identify areas where flood warnings are available.
- 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.

Additional flood modelling data held for West Oxfordshire but not used due to site locations include:

- Hydraulic modelling data for the Chil Brook (2014) model[19]
- Hydraulic modelling data from the Clanfield Brook (2007) model[20]
- Hydraulic modelling data from the Evenlode Wychwoods (2013) model[21]
- Hydraulic modelling data from the Hailey Road Drain (Witney) (2014) model[22]
- Hydraulic modelling data from the Thames (MRL to St Johns) (2014) model[23]
- Hydraulic modelling data from the Thames (Shifford to Eynsham & Windrush A40 to Thames Confluence) (2011) model[24]
- Hydraulic modelling data from the Thames (St Johns to Shifford) (2011) model[25]

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.

Note, in some cases the surface water flood mapping has been used to assess flood risk from ordinary watercourses not captured in the EA's fluvial mapping. The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, some watercourses not accounted for within the fluvial models may not be removed by this 'drainage sump' and thereby are captured by the surface water flood maps. In this regard the flooding by the mapping may be both fluvial (river overtopping) and pluvial (overland flow) in origin. Where this is the case, the site reports have assessed whether the surface water mapping acts as a reasonable proxy to assess fluvial flood risk from the watercourses it captures.

[16] EA (2025) *Flood Warning Areas,* https://environment.data.gov.uk/dataset/87e5d78f-d465-11e4-9343-f0def148f590
[17] BGS (2026) *BGS Geology Viewer*, https://geologyviewer.bgs.ac.uk/
[18] Cranfield Soil and Agrifood Institute (2026) *Soilscapes map*, http://www.landis.org.uk/soilscapes/
[19] [19] EA (2014) *Chil Brook Products 5-7*
[20] EA (2007) *Clanfield Brook Products 5-7*
[21] EA (2013) *Evenlode Wychwoods Products 5-7*
[22] EA (2014) *Hailey Road Drain (Witney) Products 5-7*
[23] EA (2014) *Thames (MRL to St Johns) Products 5-7*
[24] EA (2011) *Thames (Shifford to Eynsham & Windrush A40 to Thames Confluence) Products 5-7*
[25] EA (2011) *Thames (St Johns to Shifford) Products 5-7*

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 national modelling and if available detailed modelling data to evaluate:

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

Detailed modelling data is available for the River Thames and its tributaries, River Windrush, River Evenlode, Chil Brook and Clanfeld Brook, however, only one site is located within these extents. Detailed fluvial modelling data of the River Windrush has been used to inform the Level 2 assessment for the Welch Way (Reference: W) site. The site is located within the Cotswolds management catchment however the model results predate the latest climate change allowances, with the Windrush model applying the old allowances for the Thames River Basin of 15%, 25%, 35% and 70% for the 1.0% AEP event.

The current allowances for the Cotswolds management catchment are 30% and 43% for the central and higher allowances, respectively. Therefore, the model results for the 35% climate change allowances have been used as a proxy for the 30% central allowance, and the 70% allowance as a conservative proxy for the higher central 43% allowance.

For sites outside these model domains, the RoFRS depth data for the 1.0% AEP + Climate Change event has been used.

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 considers overall confidence in the assessment considering the flood risk data available, before assessing the development proposed against 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 (pre-development) flood levels. From this information, a qualitative assessment of potential offsite impacts and compensatory storage requirements is undertaken. It should be noted that at all of the sites assessed ground raising is not thought to be required.

The site assessments also include guidance for the preparation of site specific FRAs, including key guidance and legislation to be considered, information about the use of SuDS and any other actions required at the planning stage considering the overall flood risk at the site and any uncertainties identified by the level 2 site assessment.

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.

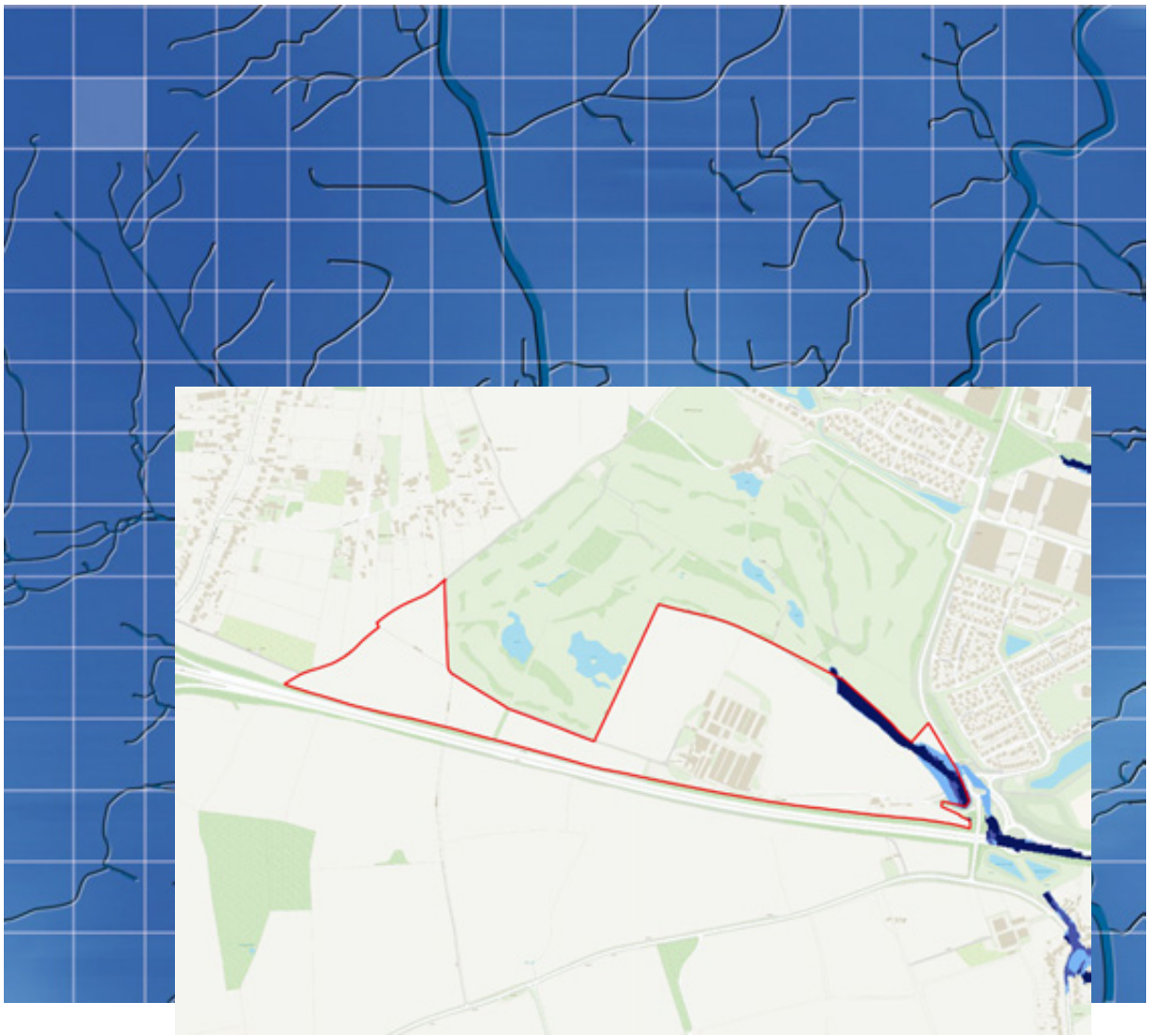
Appendix 1 – Site Specific Assessments

West Oxfordshire District Council

April 2026

Land West of Downs Road (B)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land West of Downs Road (B)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Lloyd Prytherch (*Graduate Consultant*)	Joel Leyshon-Jones (*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.

Registered Office Stables 4 Howbery Business Park, Benson Lane, Wallingford, England, OX10 8BA

www.hydrosolutions.co.uk

Land West of Downs Road (B) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

The site is at risk from primarily fluvial sources.

Overall, fluvial flood flooding is considered to be low. The EA Flood Map for Planning shows 4.2% of the site is located within Flood Zone 2, 3.0% is located in Flood Zone 3a and 2.6% is located within Flood Zone 3b. The depth mapping for the 1.0% AEP + CC event, shows flooding is limited to the northeastern corner of the site near Elm Bank Ditch. Inundation depths are highest close to the watercourses (0.6 - 0.9m) and fall moving away (between 0.2 - 0.3 m). Depths most commonly are less than 0.2m.

Pluvial flood risk is considered to be low across the majority of the site and is limited to a small area in the west of the site and around existing buildings in the centre of the site.

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 low. Despite the fact that the EA's latest national scale modelling has informed the assessment of flood risk, recently developed road infrastructure in the vicinity of the site has likely changed fluvial flood risk since the modelling was completed.

Conclusions and Recommendations

The development proposed is employment, which is categorised as *Less Vulnerable Development*. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, Less Vulnerable Development is permissible in both Flood Zone 2 and 3a. It is not permissible in Flood Zone 3b.

Most of the site is located within Flood Zone 1 (95.6%) when including an allowance for climate change and surface water flood risk also only effects a small proportion (<5%) of the site. In this regard, it should be possible to locate all infrastructure outside of the fluvial and pluvial flood zones. However, it is noted that there is uncertainty in the fluvial flood zones given new road infrastructure in the east of the site which the latest national mapping predates. This infrastructure is not expected to lead to a significant increase in fluvial flood risk, however this should be verified by a site-specific FRA with potential development of a detailed hydraulic model.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land West of Downs Road (Reference: B) 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 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

The Land West of Downs Road (B) site is 33.2-ha to the west of Witney, see Figure 1. The A40 runs adjacent to the site's southern boundary, with Downs Road located to the east of the site. Witney Lakes Golf Resort borders the site to the north. The site is largely open agricultural land, however the site also covers Peashell Farm, farm buildings and an associated commercial area.

In the emerging local plan, the proposed development at the site is for 4-ha of employment land, 1-ha has been proposed for Class E use, commercial offices, businesses and services and 3-ha has been proposed for B2/B8 use, industrial, storage and distribution.

2.2 Topography

Based on 1m LiDAR data, the eastern part of the site has a gentle southeasterly slope, whilst the west of the site has a gentle southerly slope, falling to lower ground associated with the A40 and Downs Road. The ground levels within the site boundary range from 92.6m to 111.8m AOD, see Figure 2. The average ground level is 103.8m AOD.

2.3 Nearby Watercourses

Several drainage ditches are located to the north of the site. These are generally associated with the Witney Lakes Golf course to the north of the site. This includes the Elm Bank Ditch running along the site's northeastern boundary. Colwell Brook is located approximately 0.4km north of the site on the outer edge of the golf course, it flows in a southeasterly direction towards Witney, see Figure 1.

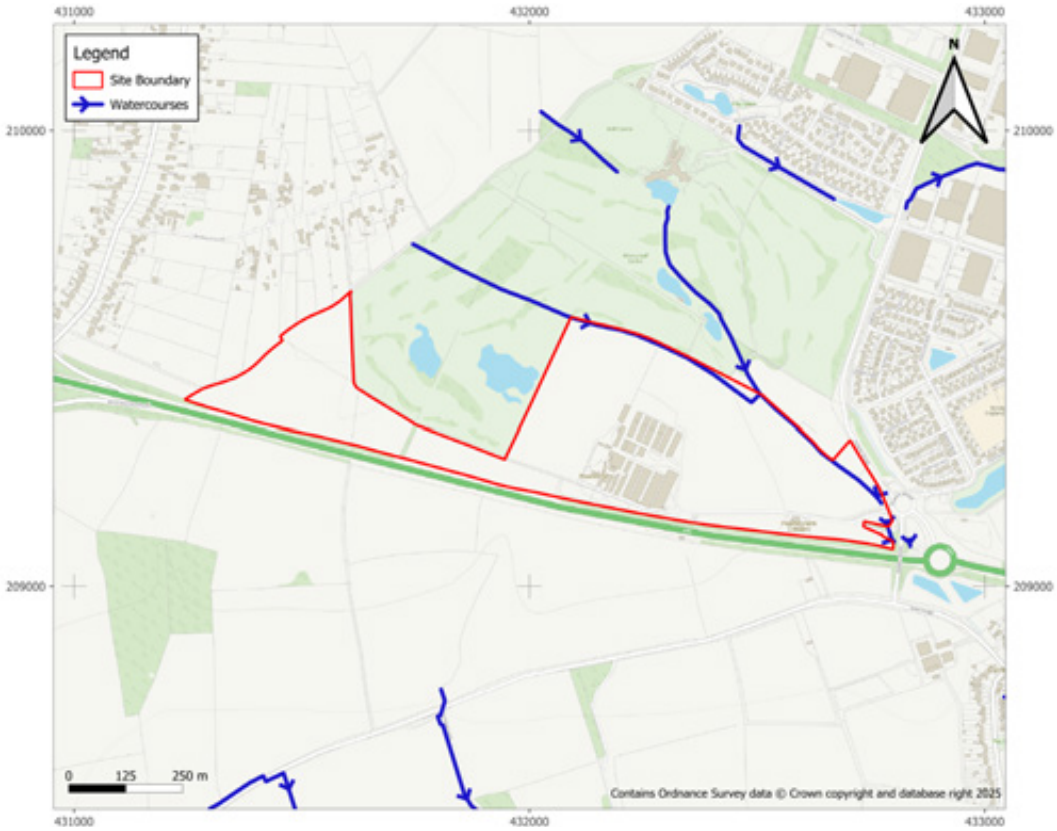


Figure 1 - Site Location

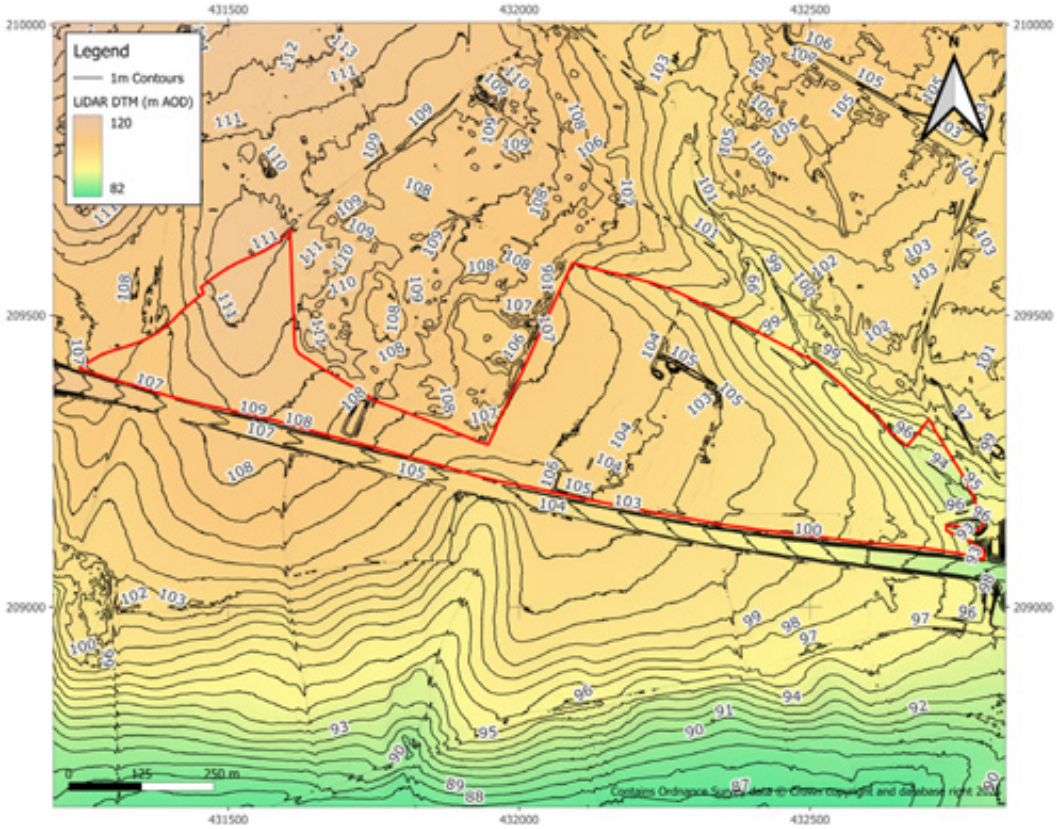


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding within or in the vicinity of at the site. The nearest extent of historic flooding is located 1.5km north of the site. It occurred in summer 2007 and was associated with the River Windrush.

3.2 Fluvial Flood Risk

In the Flood Map for Planning (FMfP), 4.2% of the site is located within Flood Zone 2 (0.1% AEP), and 3.0% is located within Flood Zone 3a (1.0% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. This extent shows 2.6% of the site to be located within Flood Zone 3b. All flooding at this site is associated with Elm Bank ditch flowing from higher ground to the north of the site, see Figure 3.

The EA climate change fluvial outputs for the 3.3% AEP defended, the 1.0% AEP and 0.1% AEP undefended events have also been assessed, with the proportion of the site within the flood extents increasing marginally to 2.9%, 4.0% and 4.4% respectively, see Figure 4.

Overall fluvial flood risk is considered to be low across the majority of the site. However, there is a risk from the Elm Bank ditch in northeastern part of the site which is assessed in greater detail in section 4.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area. Several attenuation basins are located adjacent to the site, they are associated with highway drainage. They are not considered to offer any flood risk benefit to the site due to being located downstream.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 0.8% of the site is inundated in the 3.3% AEP event, 1.4% is inundated in the 1.0% AEP event and 3.5% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 1.2% in the 3.3% AEP event, 1.9% in the 1.0% AEP event and 4.4% in the 0.1% AEP, see Figure 6.

In general, the surface water extents follow topography with water pooling along parts of the Elm Bank ditch, adjacent to existing building in the south of the site and in a depression in the far east of the site.

Overall, the risk of surface water flooding is considered to be low. It affects only a small proportion of the site and, for the 1.0% AEP plus climate change design event, the extent of inundation is approximately half that predicted under the fluvial scenario. However, high risk areas do effect parts of the site not impacted by fluvial flood risk so is considered in more detail in section 4.

3.5 Groundwater Flooding

The majority of the site is underlain by the Cornbrash Formation, a limestone bedrock. The Cornbrash Formation is expected to permit moderate amounts of infiltration and is classified as a secondary A Aquifer. No superficial deposits are mapped at the site. The overlying soils are shallow and lime-rich; these are expected to be freely draining.

Based on the data available the risk of groundwater flooding is considered moderate as it is likely that the water table could be mobile. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 7. The nearest extent of reservoir flooding is over 5km south of the site.

3.7 Flood Warning Service

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

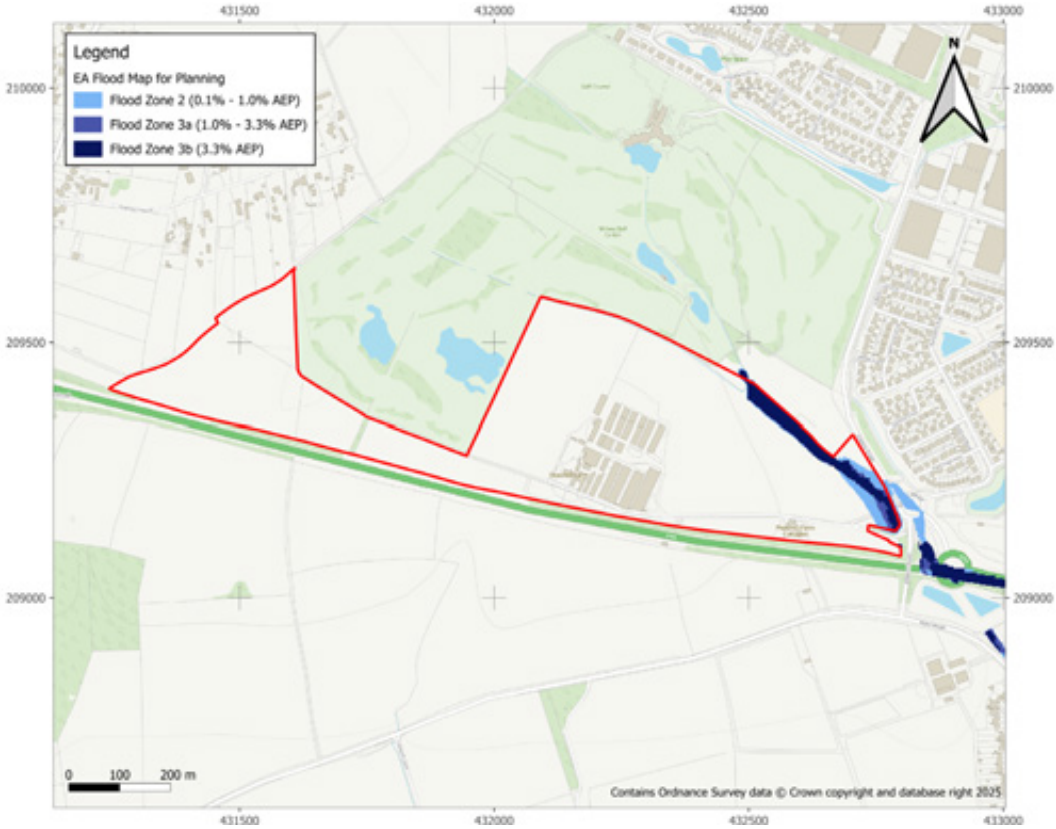


Figure 3 - Fluvial Flood Map

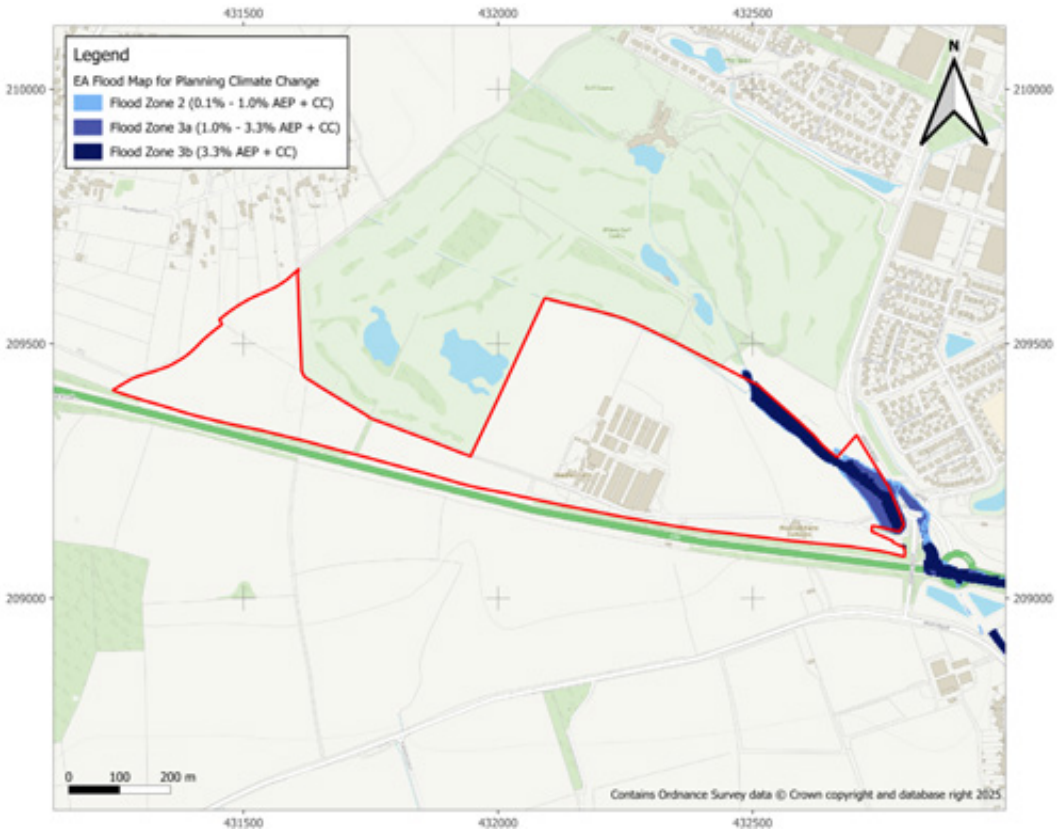


Figure 4 – Fluvial Climate Change Flood Map

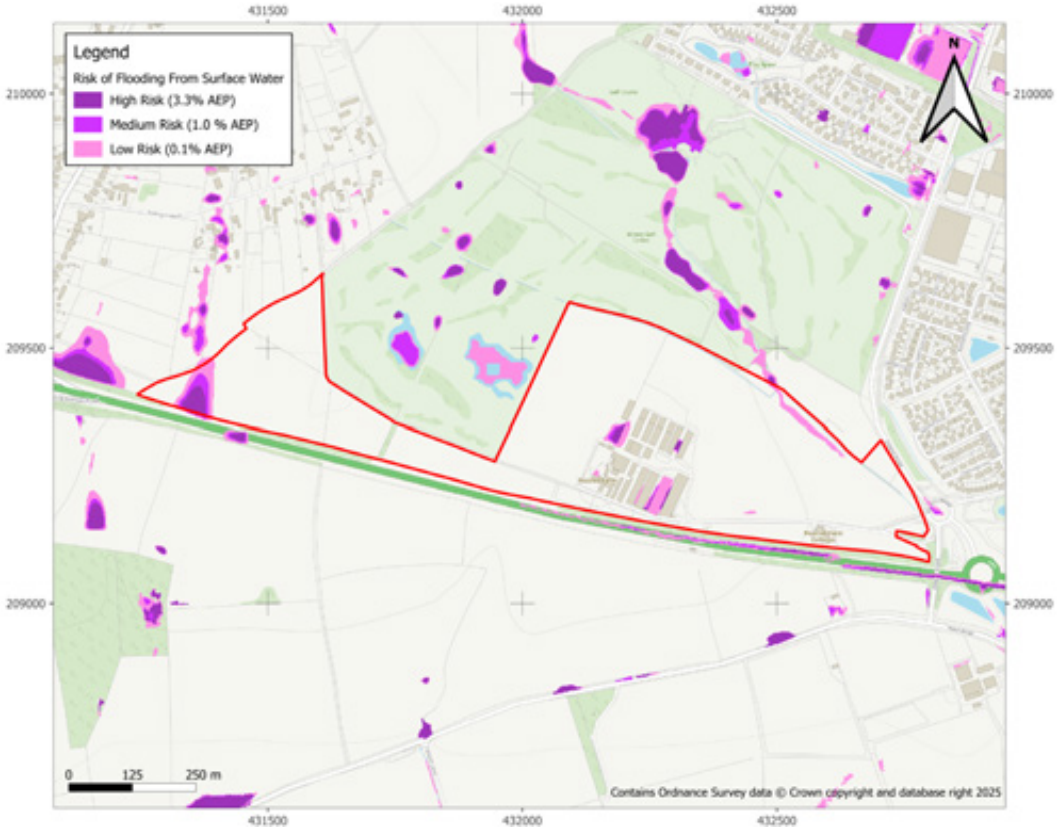


Figure 5 – Surface Water Flood Map

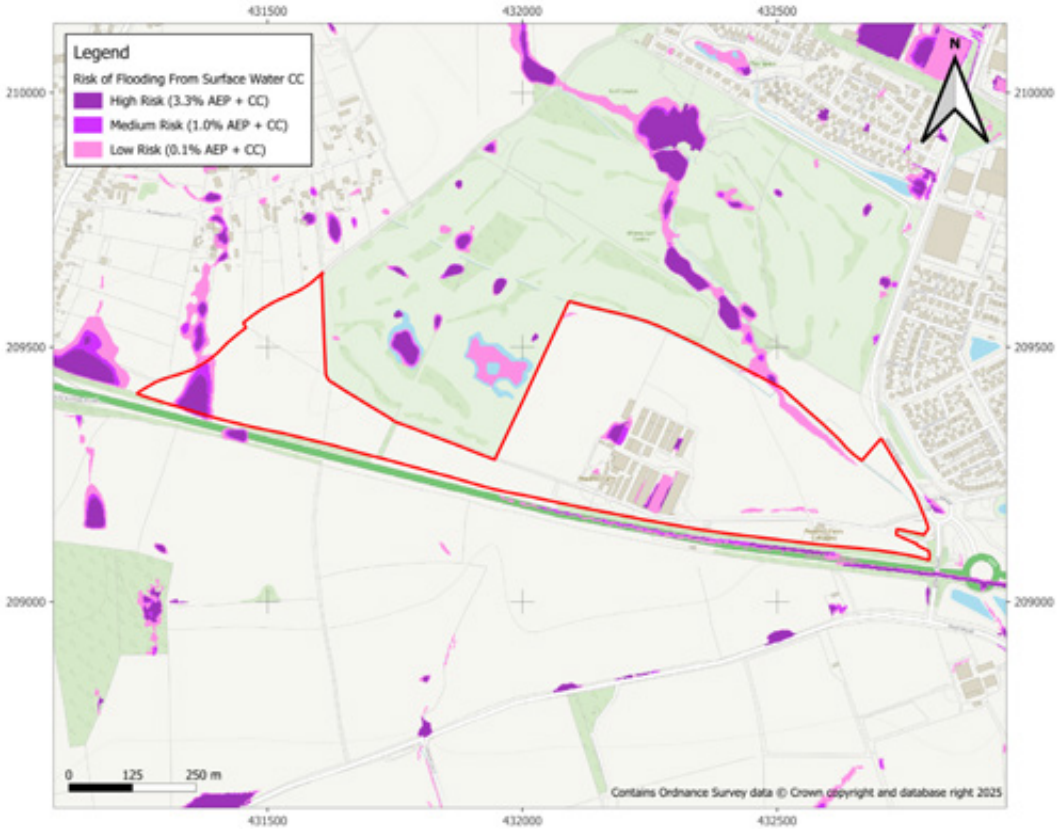


Figure 6 - Surface Water Climate Change Flood Map

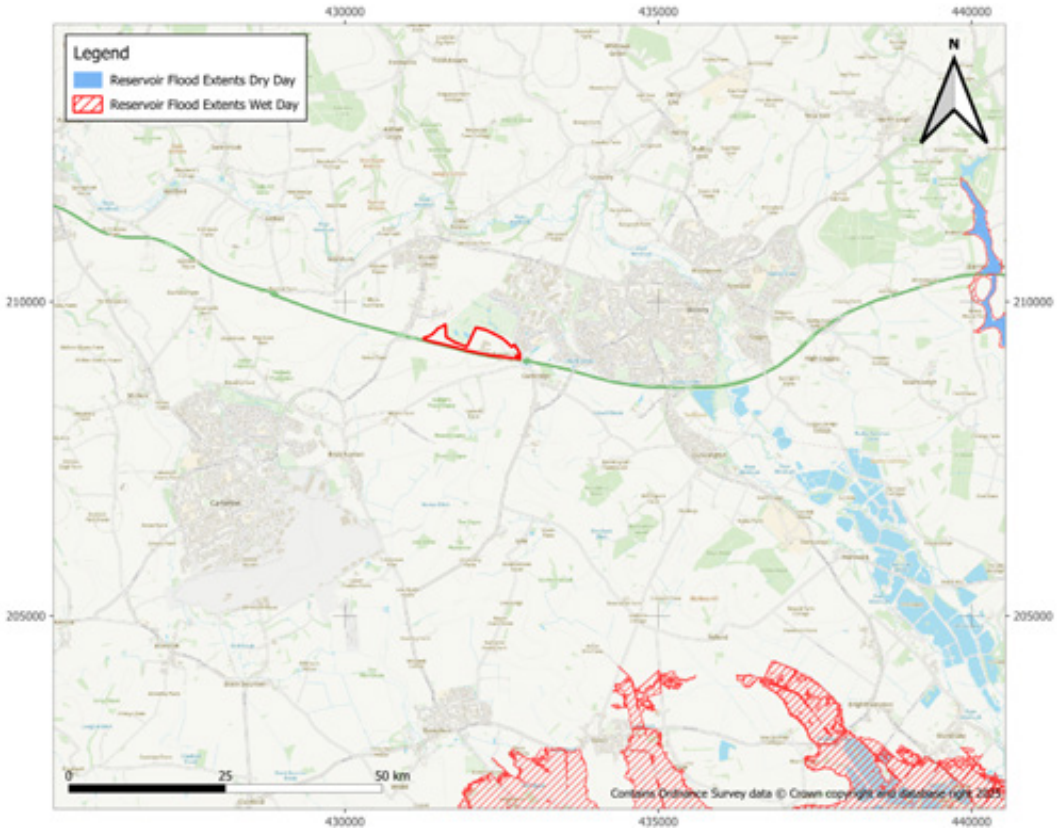


Figure 7 - Reservoir Flood Risk

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism to the site is considered to be fluvial in origin, however there are parts of the site unaffected by fluvial flooding which are at high risk of pluvial flooding. Therefore, the flood risk generated by both mechanisms is quantitively assessed in more detail below.

4.2 Flood Risk Metrics

The Risk of Flooding from Rivers and Sea (RoFRS) depth data for the 100-yr plus climate change design event was assessed to attain further detail on fluvial flooding. It should be noted that the latest available RoFRS and FMfP are likely based on outdated LiDAR data. It appears that the extents from both datasets fail to account for a road crossing entering from the east of the site, with flood extents not influenced by its presence. This road is understood to have been recently built to serve existing development on the site.

The RoFRS depth mapping across the site (see Figure 8) shows flooding is limited to the northeastern boundary of the site, in the floodplain of Elm Bank ditch. Flood depths outside the ditch channel are less than 0.2m. In the lower topography in the far east of the site, flood water backs up against Downs Road, with depths potentially up to 0.9m within the site. The remainder of the site remains flood free during the 100-yr plus climate change fluvial flood event. It is possible that flooding would persist in this area when considering the most up to date topography data, with the area of inundation moving slightly north along the ditch as water backs up against the new access road before it is able to reach Downs Road. It should be noted that the national mapping in most cases does not accurately represent culvert structures, there are culverts located along the site access road, Downs Road, and the A40 which could convey excess floodwater away from the site and possibly reduce the depths shown.

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.

Figure 9 shows the greatest flood depths are located within an isolated area of pooling in the far west of the site. In this location, excess surface runoff ponds in an area of lower topography against the embankment of the A40, with flood depths estimated to be between 0.6-0.9m. Elsewhere across the site, flood depths are generally 0.3m.

It should be noted that the climate change allowances used in the RoFRS and RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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). It should be noted that the fluvial FMfP extents consider the 2080s epoch (2070-2125), however do not come with associated depth data.

4.3 Access and Egress

Current access to the site is available via Downs Road at the east of the site. Access is available from here to the A40, which is a key strategic route. Pedestrian access is also possible via a bridleway which runs from Minster Lovell to the west of the site.

During the design flood event the main access track to Downs Road becomes inundated for approximately 25m, between the site and a nearby roundabout, see Figure 10. As mentioned above, it should be noted that the current national mapping does likely not represent the new road and any culverts associated with this. As such there is uncertainty associated with the flood risk in this area.

Given that the new road has been approved through planning and already serves existing development, it is assumed that flood risk is manageable. However, a site-specific FRA should examine this in greater detail, including the potential development of a hydraulic model to reflect the latest road infrastructure. This would help determine the rate at which flooding may occur, as well as the associated hazard both on site and along access routes.

Any access and egress routes identified at this stage should be reassessed once the development layout, final access points, and applicable climate change allowances are confirmed. Internal routes across the site should also be reviewed and finalised in line with the development layout.

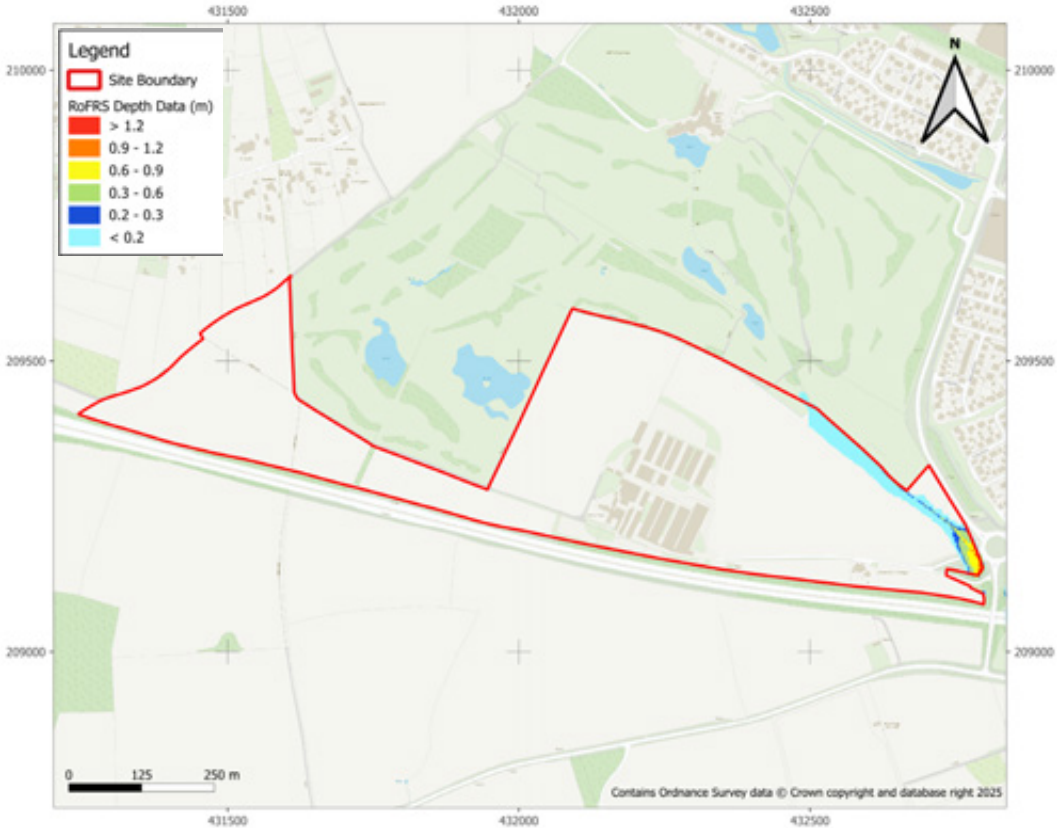


Figure 8 – RoFRS Depth Data for 1.0% AEP + Climate Change Event

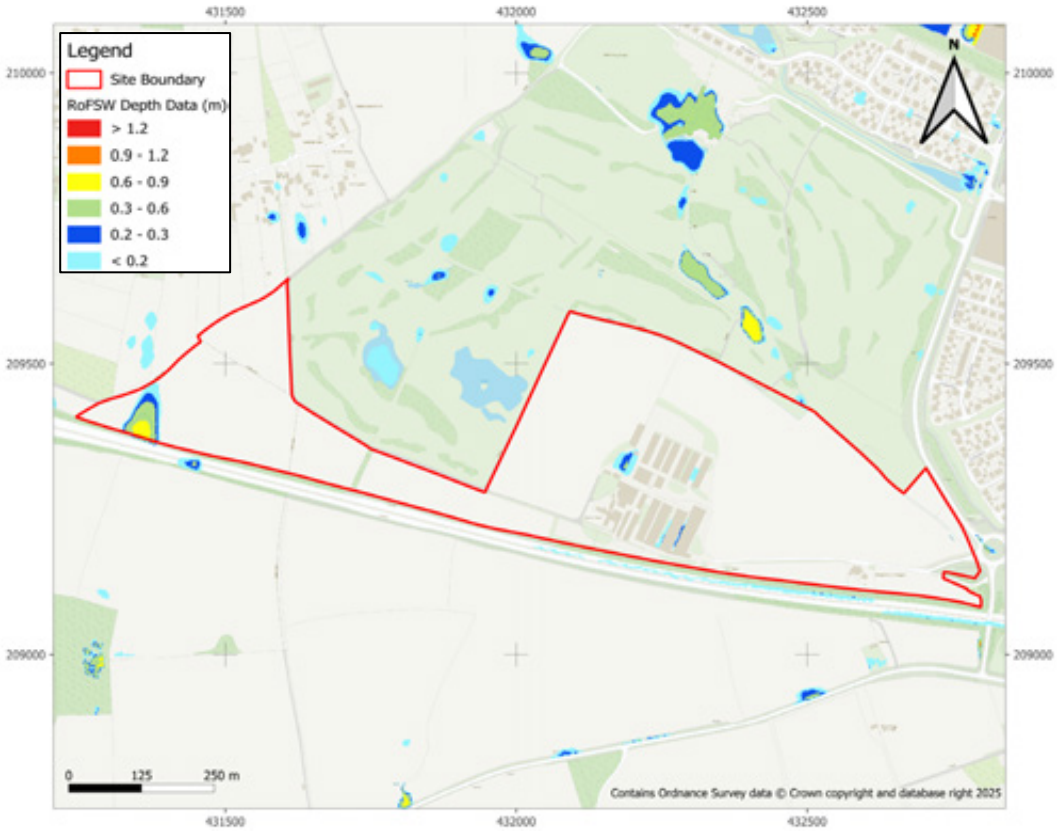


Figure 9 – RoFSW Depth Data for 1.0% AEP + Climate Change Event

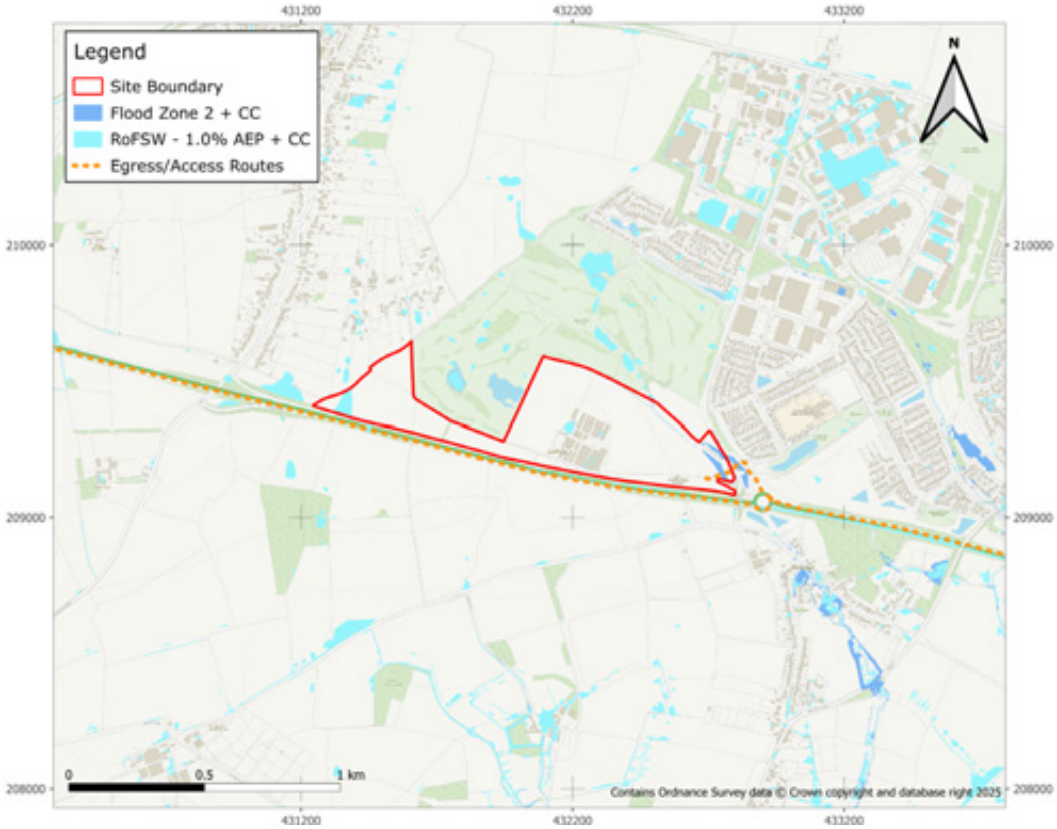


Figure 10 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is employment, which is categorised as *Less Vulnerable Development*. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, Less Vulnerable Development is permissible in both Flood Zone 2 and 3a. It is not permissible in Flood Zone 3b.

The majority of the site is located within Flood Zone 1 (95.6%) when including an allowance for climate change and surface water flood risk also only effects a small proportion (<5%) of the site. In this regard, it should be possible to locate all infrastructure outside of the fluvial and pluvial flood zones. However, it should be noted that there is uncertainty in the fluvial flood zones given new road infrastructure in the east of the site which the latest national mapping predates. This infrastructure is not expected to lead to a significant increase in fluvial flood risk, however this should be verified by a site-specific FRA with potential development of a detailed hydraulic model. This should also confirm that safe access and egress to the site is possible.

5.2 Scale of Development

The total site area is currently 39.2ha; allocated for 4ha of employment land. When combining the climate change extents of both the surface water and fluvial flood maps, 36.1 ha of the site remains outside of all flood zones. This should allow for all buildings associated with the development to be located outside of flood risk areas. However, this may need to be verified by a site-specific FRA and potential development of a hydraulic model given the uncertainties in fluvial flood risk in the east of the site.

5.3 Sequential Approach

Whilst Less Vulnerable Development is permissible in Flood Zone 2 and 3a, it is still 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. Note, surface water flood risk is limited at the site, however it should also be used to inform the development layout with development located outside of high-risk areas if possible. If required, ancillary infrastructure such as car parks and green spaces located could be located in higher flood risk areas to allow for buildings to be sited in lower risk areas. This is under 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

As mentioned, there is some uncertainty in the delineation of fluvial flood zones, as the latest national mapping predates the construction of new road infrastructure to the east of the site. While this infrastructure is not expected to significantly increase fluvial flood risk, this assumption should be verified through a site-specific FRA, potentially supported by the development of a detailed hydraulic model. Any modelling requirements should be confirmed with the EA.

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.

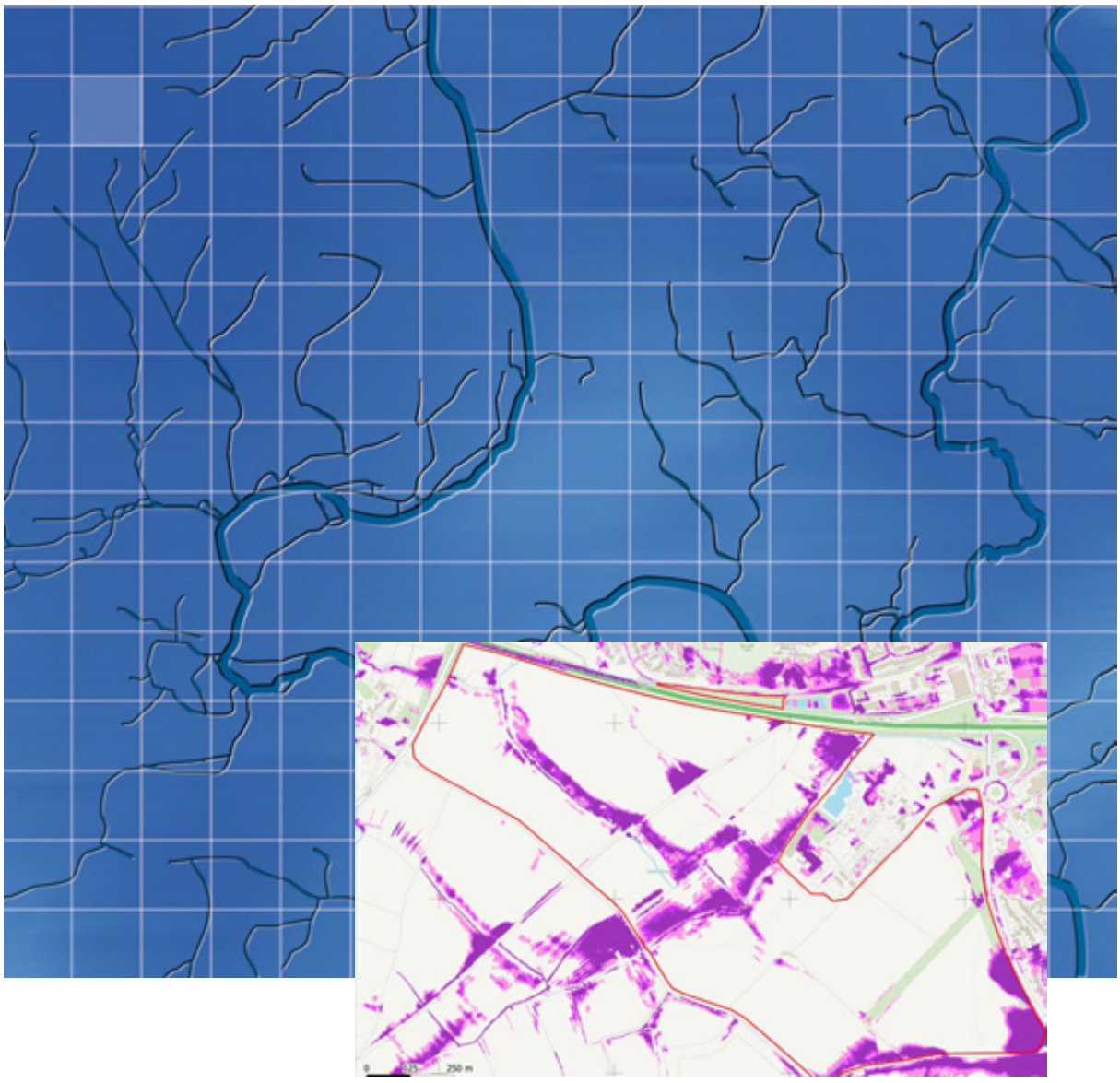
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site has moderate permeability, therefore the use of infiltration SuDS solutions 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.

West Oxfordshire District Council

April 2026

Land at South Witney (C)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land at South Witney (C)

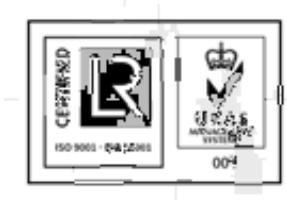
Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Tirion Lewis (*Graduate 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

Land at South Witney (C) Level 2 SFRA

Flood Risk Overview

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

Flood Risk

The site is at risk from fluvial flooding with 11.0% of the site shown to be within the fluvial flood zones. The majority of this extent is associated with the Colwell Brook which runs across the centre of the southern land parcel.

The Risk of Flooding from Rivers and Seas (RoFRS) depth data shows the greatest flood depth (0.6m-0.9m) is located within the Colwell Brook where it runs along the eastern boundary of the southern land parcel. Outside of this, flood depths are predominantly 0.3 m or below. Overall, fluvial flood risk to the site is considered to be moderate.

The site is also at risk from pluvial flooding with 16.8% of the site shown to be within the pluvial flood zones. The majority of this extent is associated with the Colwell Brook and an area of low topography in the southeastern corner of the southern parcel.

The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest flood depth (>1.2m) is located within the area of low topography in the southeastern corner of the site. Outside of this, flood depths are predominantly 0.3m or below. Overall, pluvial flood risk to the site is considered to be moderate.

The risk from other sources of flooding is considered to be low.

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, due to a detailed flood model not being available at the site. The fluvial mapping also shows some inconsistencies when climate change is considered.

Conclusions and Recommendations

The development proposed is 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.

The majority of the site is in Flood Zone 1 (including climate change), therefore most infrastructure can be located outside fluvial risk areas. Although some surface water flood risk exists, mainly along watercourses, most of the site is unaffected. However, potential constraints, particularly to site access and the potential requirement for bridge crossings will need to be addressed in a site-specific Flood Risk Assessment (FRA).

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) of Land at South Witney (Reference: C) 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 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

The Land at South Witney (C) site is 107.9ha in area located south of Witney and west of Ducklington. The site is spilt across two land parcels, a smaller land parcel to the north of the A40 (0.7ha) and a larger land parcel to the south of the A40 (107.2ha), see Figure 1. The parcel to the south is located on agricultural land and the northern parcel is located on woodland. The parcels are bordered by residential developments to the north and east, with agricultural land to the south and the west. The site is also located adjacent to the Witney Sewage Treatment Works.

The site has been allocated for residential development, with a capacity for between 600 to 800 dwellings.

2.2 Topography

Based on 1m LiDAR data, the northern land parcel contains a small ridge running east to west across the site. The southern land parcel slopes towards the Colwell Brook which runs northwest to southeast across the site, there is also an area of lower topography in the southeastern corner of the parcel. The ground levels across both land parcels range from 77.5 to 88.9m AOD, see Figure 2. The average ground level is 81.6m AOD.

2.3 Nearby Watercourses

The main watercourse within the site is the Colwell Brook, Figure 1. The Colwell Brook bifurcates upstream of the site, one branch runs across the southern boundary of the northern parcel. The second branch of the watercourse runs from northwest to southeast across the centre of the southern parcel and southwest to northeast along the eastern site boundary. There is also a small unnamed watercourse 15m south of the southern parcel which is thought to drain to the Colwekk Brook.

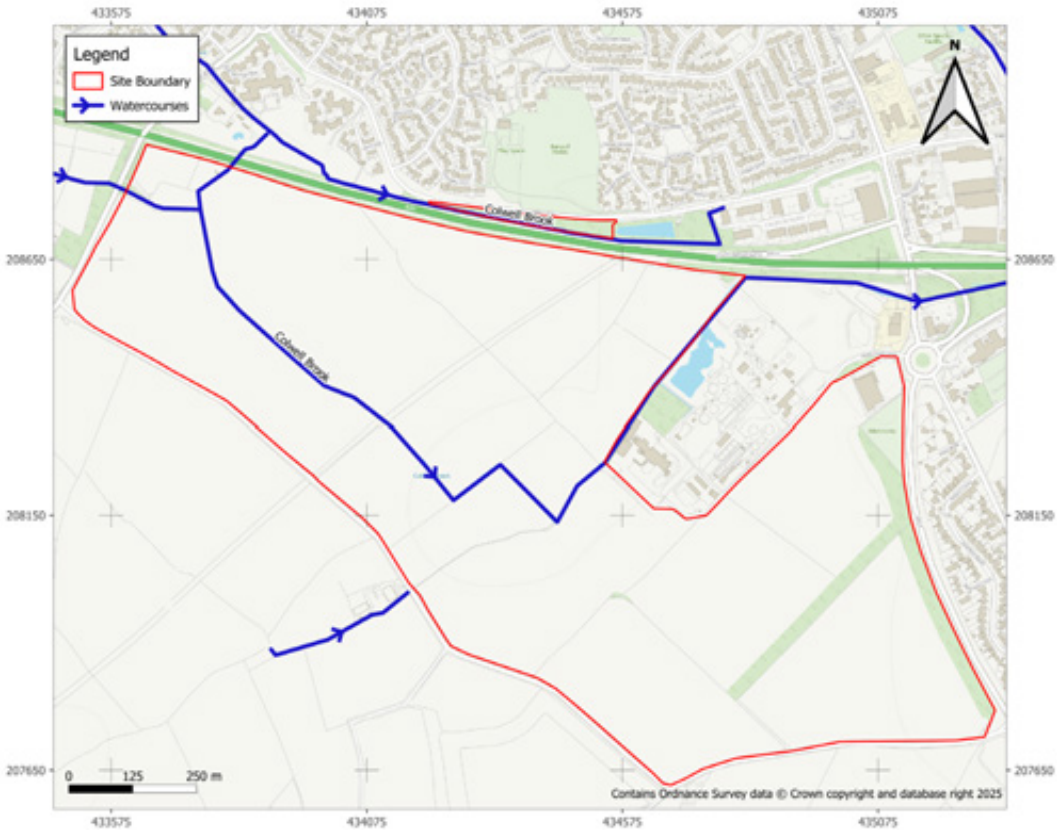


Figure 1 - Site Location

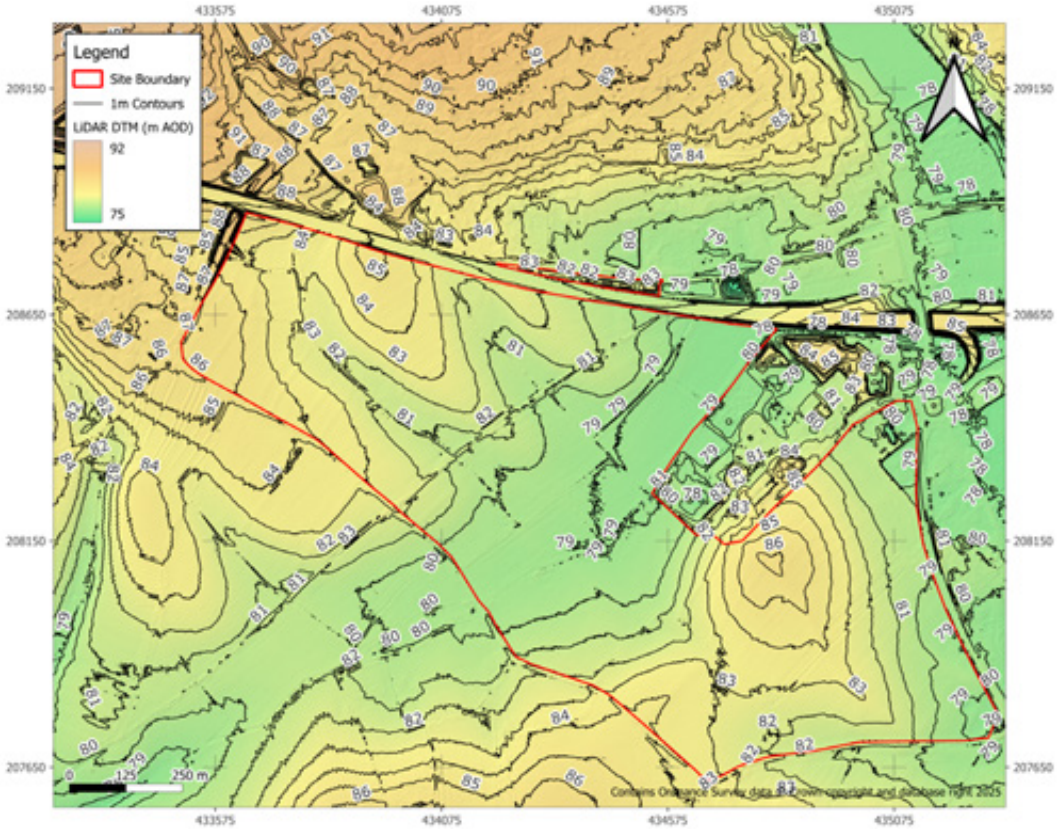


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest flood recorded flood event is located 10m north of the northern parcel and is associated with surface water flooding in 2007, there are also records of flooding 220m east of the southern parcel which were associated with overtopping of the River Windrush in 2020 and 2021.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP) dataset, 11.0% of the site is located within Flood Zone 2 (0.1% AEP), and 6.1% is located within Flood Zone 3a (1.0% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. Th defended 3.3% extent shows 5.0% of the site to be located within Flood Zone 3b. Most of the flooding at this site is associated with the Colwell Brook and is informed by national flood models, see Figure 3.

The EA climate change fluvial outputs for the 0.1% AEP and 1.0% AEP undefended events have also been assessed. Counterintuitively, the proportion of flooding at the site reduces to 9.4% and 7.3% respectively. The climate change outputs appear to be incomplete with no flooding shown along parts of the Colwell Brook. The defended 3.3% climate change extent has also been reviewed, it does show an increase relative to the baseline with the proportion of the site affected increasing to 5.7%, see Figure 4. The inconsistencies in the fluvial flood mapping at the site is thought to be due to the use of different modelling techniques being used to derive the main FMfP Flood Zones (i.e. Flood Zone 2 and 3a) and other fluvial flood risk layers (i.e. 3.3% defended extents & climate change extents).

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

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 6.6% of the site is inundated in the 3.3% AEP event, 9.3% is inundated in the 1.0% AEP event and 14.3% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 8.3% in the 3.3% AEP event, 11.2% in the 1.0% AEP event and 16.8% in the 0.1% AEP, see Figure 6.

Overall, the risk of surface water flooding is considered to be moderate at this stage, with some of the flooding shown associated with the Colwell Brook and possibly fluvial in origin. Flooding is also present in an area of low topography in the southeast of the southern parcel.

3.5 Groundwater Flooding

The majority of the site is underlain by mudstone, which is expected to permit low amounts of infiltration. A small section of the northwestern corner is underlain by interbedded sands and silts, this is expected to permit moderate amounts of infiltration. Superficial deposits are found in sections across the site, these include alluvium and fluvial sedimentary deposits, consisting of clays, silts, sands and gravels.

The majority of the overlying soils on the site are base-rich loamy and clayey soils within impeded drainage. In the east of the site there are loamy clay soils with slightly impeded drainage and freely draining lime-rich loamy soils.

Based on the data available the risk of groundwater flooding is likely to be low across the majority of the site, however, may be higher in more freely draining areas. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, the closest area at risk from reservoir flooding being approximately 3.5km south of the site, see Figure 7.

3.7 Flood Warning Service

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

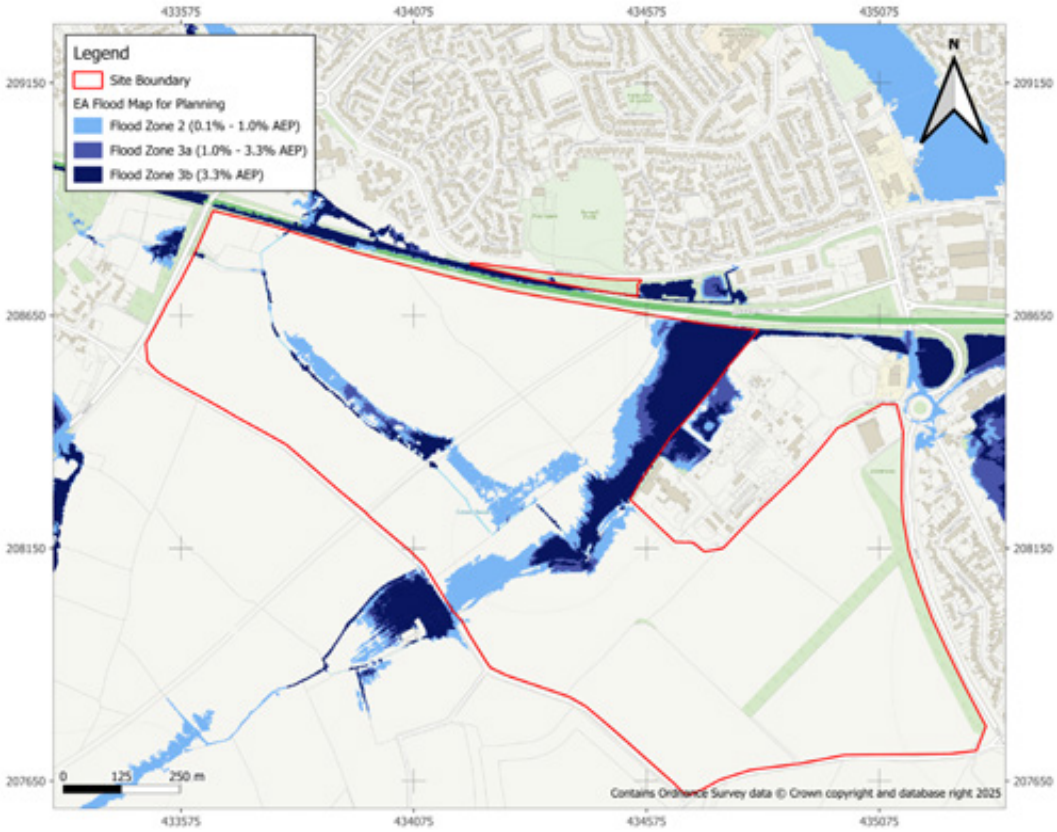


Figure 3 - Fluvial Flood Map

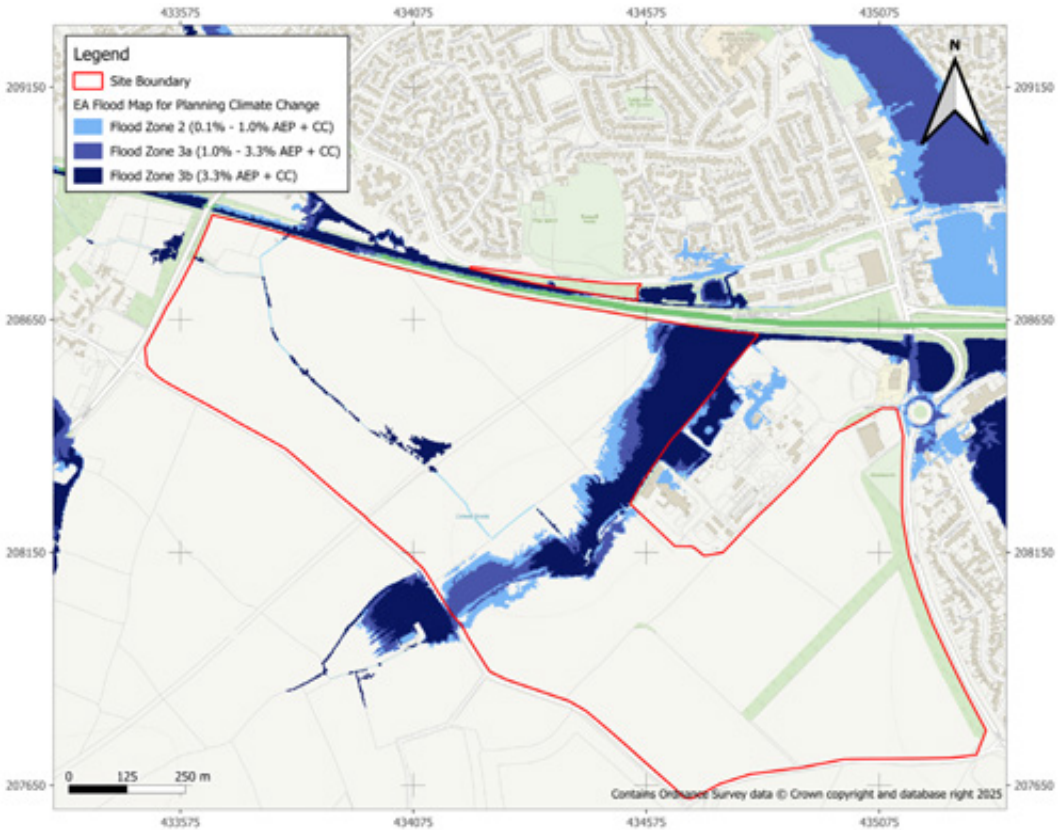


Figure 4 – Fluvial Climate Change Flood Map

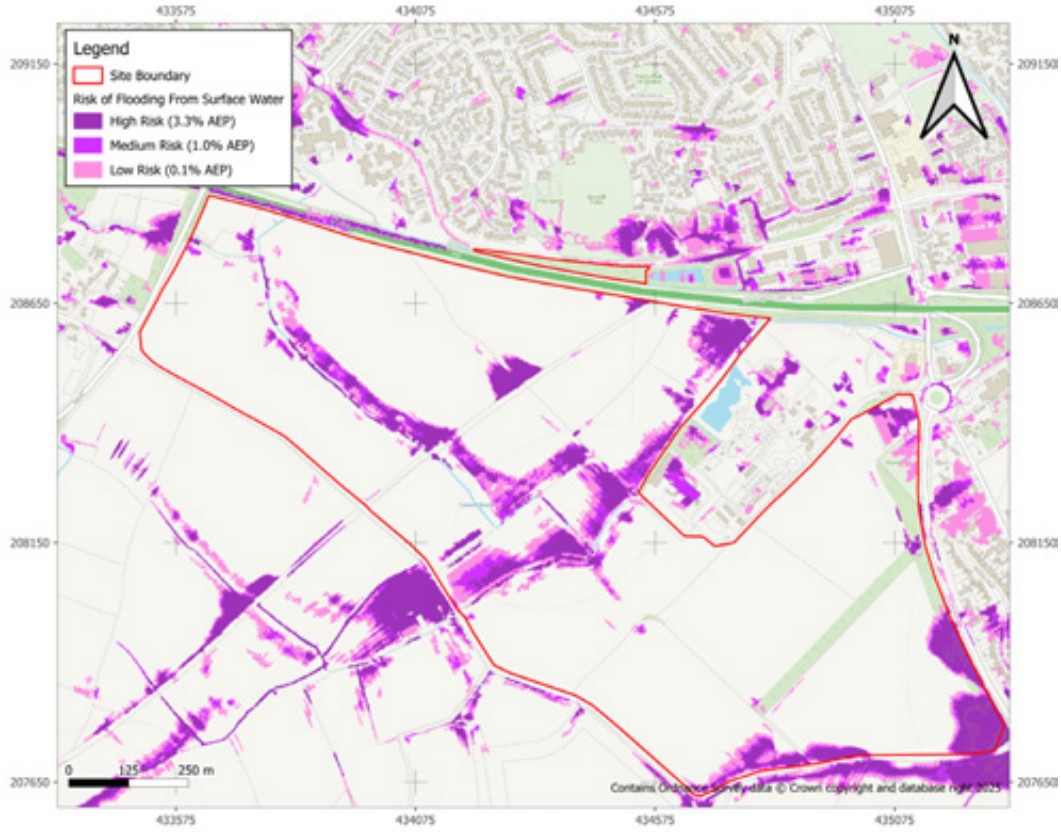


Figure 5 – Surface Water Flood Map

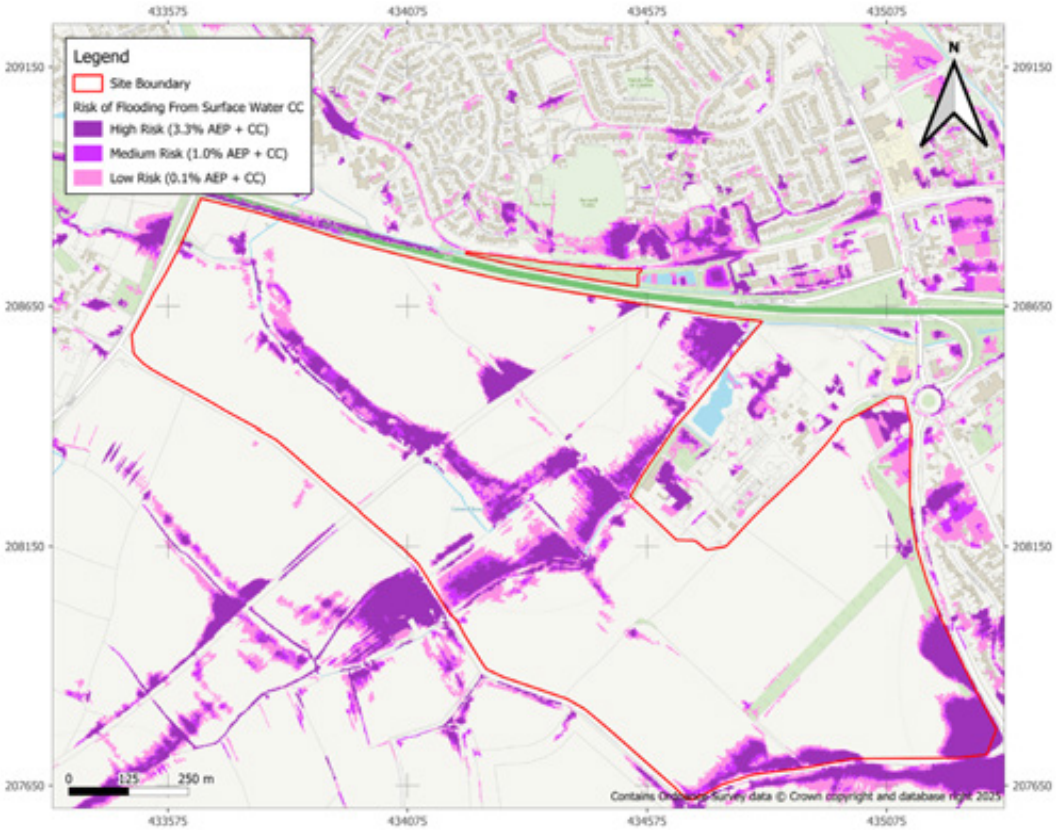


Figure 6 -Surface Water Climate Change Flood Map

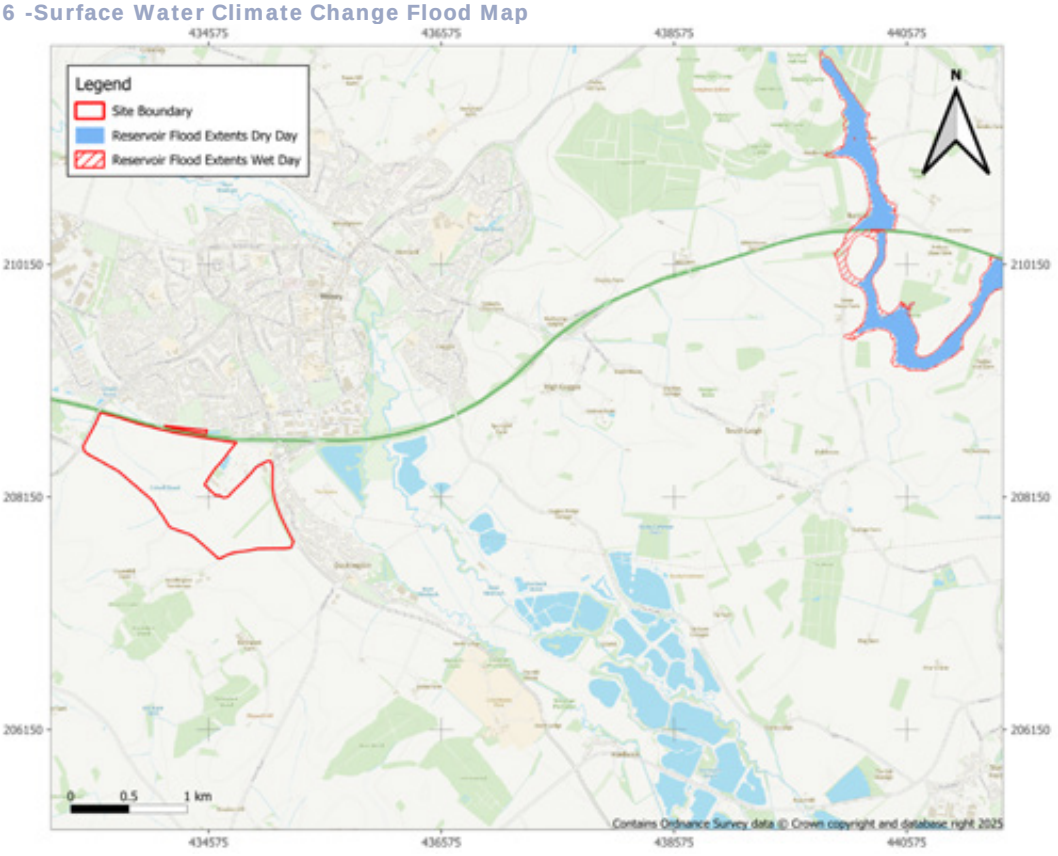


Figure 7 Reservoir Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The site is at risk from both pluvial and fluvial flooding based on the mapping available. Therefore, the flood risk generated by both mechanisms 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 is more widespread across the site than fluvial flooding, although it is thought that the fluvial mapping may underrepresent flooding from the Colwell Brook in the west of the southern land parcel. The mapping shows the majority of surface water flooding on the site to follow the river channels of the Colwell Brook. However, the greatest flood depth is recorded in a topographical depression in the southeast of the site where depths of 1.2m or greater at modelled. Flood depths across the rest of the site are predominantly 0.3m or less.

Depth data is not available for the fluvial climate change extents reviewed in section 3.2; these extents consider the 2080s epoch (2070-2125). However, depth data is available from the national mapping from the Risk of Flooding from Rivers and Sea (RoFRS) dataset. The climate change allowances used in RoFRS are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow increases. The RoFRS extents are very similar to the extents applying the 2080s allowances, which as mentioned in section 3.2 show a reduction in extent relative to the baseline extents for Flood Zone 2 and 3a.

RoFRS depth mapping across the site, see Figure 9, shows flooding to be limited to the centre of the southern site, running north to south along the Colwell Brook. For the most part flood depths are less than 0.3m, with the exception of the northeastern corner of the site where depths reach up to 0.6m-0.9m. Given the relative flatness of the floodplain flow velocities are expected to be limited, which should in turn reduce flood hazard.

It should be noted that the climate change allowances used in the RoFSW and RoFRS extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

There are assumed to be several access routes available to the sites, with main access to the site being available via the A40.

Due to the risk of both fluvial and pluvial flooding to the site and surrounding areas, the best route from the southern land parcel is considered to be via Ducklington Lane (A415) heading north (see Figure 10), this route avoids areas at risk of fluvial flooding in the design 1.0% AEP + CC event and is at minimal risk from the design 1.0% AEP + CC pluvial event, with depths along the route being less than 0.2m. From the northern land parcel, the best egress route is considered to be via Thorney Leys heading west, this route avoids areas at risk of fluvial flooding (1.0% AEP + CC) and is at minimal risk from pluvial flooding (1.0% AEP + CC), with depths along the route being less than 0.2m.

Whilst this risk of both fluvial and surface water flooding is generally considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across

the site once the development layout is known. In particular the Colwell Brook may present potential barriers to onsite transit and bridges may be required in some locations (see section 5).

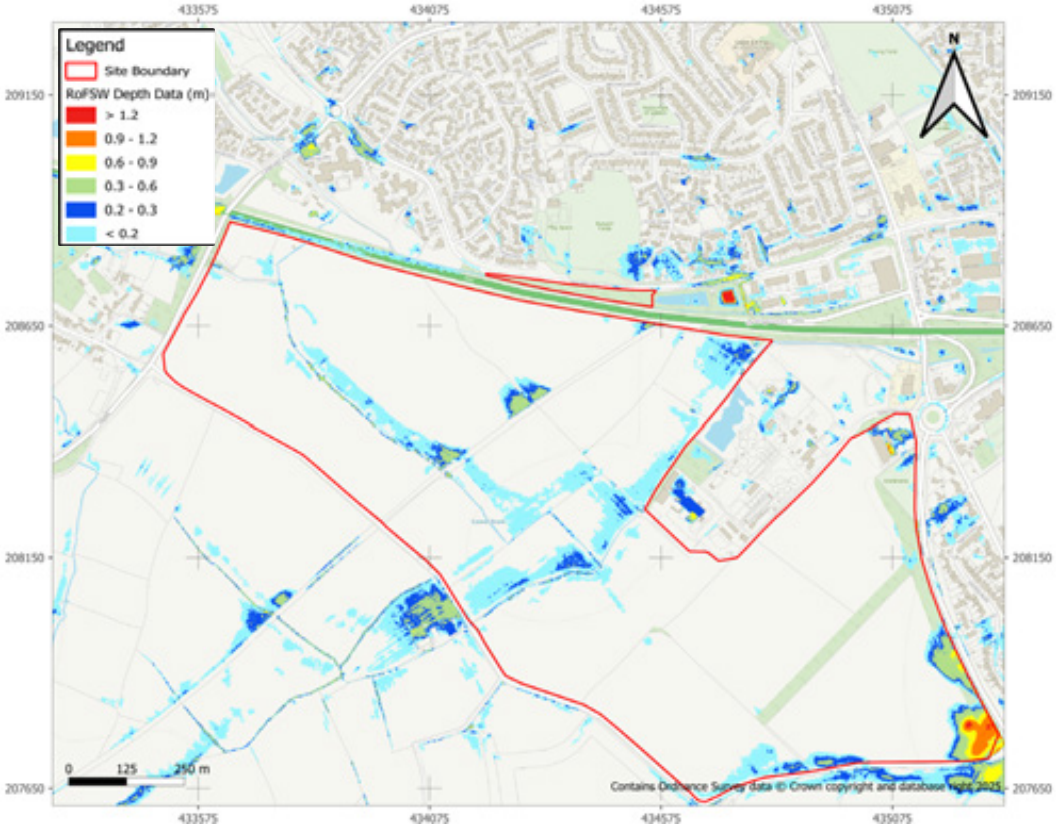


Figure 8 RoFSW Depth Data for 1.0 % AEP + Climate Change Event

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

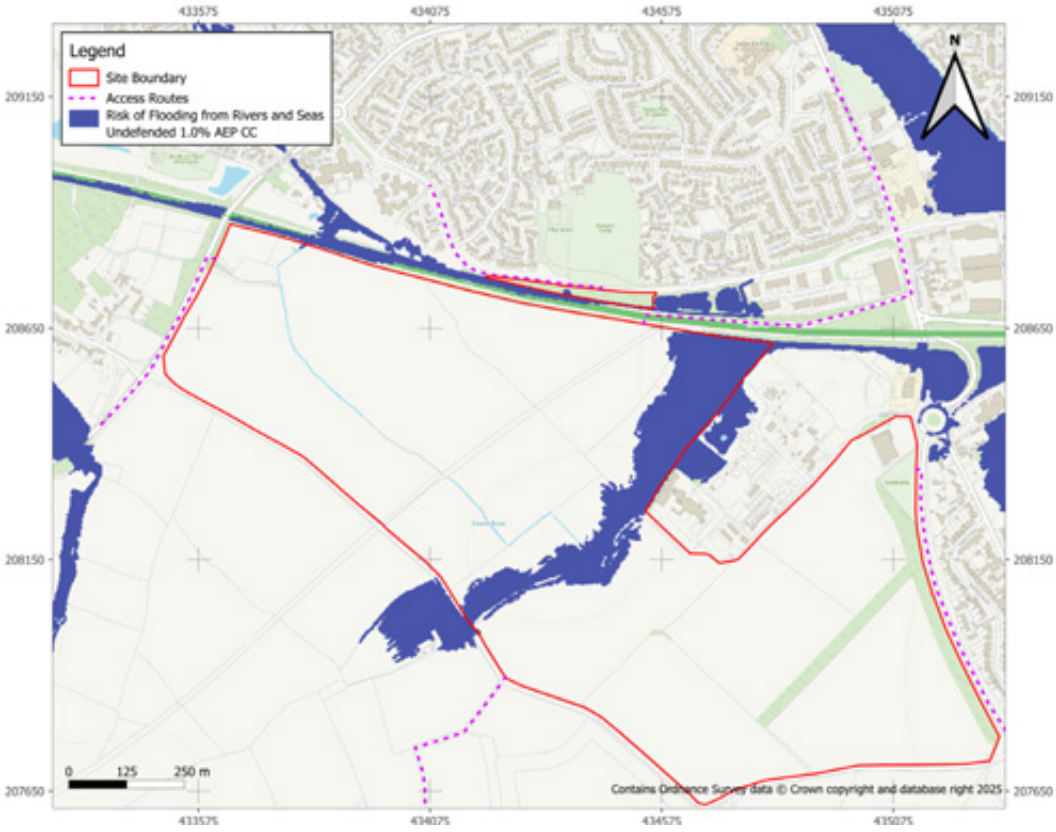


Figure 10 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is 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. More Vulnerable Development 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. The design should ensure that areas of the site that may be located within Flood Zone 3b in the future after climate change are avoided.

As only a small proportion of the site is located in Flood Zone 3a with the majority of its area falling in Flood Zone 1 when considering fluvial flood risk a residential development should be possible.

It should also be recognised that pluvial flood risk at the site is also significant in some areas. The risk is not particularly widespread with most of the site lying outside of these extents. Therefore, provided a sequential approach is taken when considering pluvial flood risk it should be possible to locate infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 107.9 ha, allocated for 600 to 800 dwellings. Assuming medium density housing (60 dwellings per hectare) the maximum proposed number of dwellings (800) would require 13.3 ha of land.

When factoring in both pluvial and fluvial flood risk 79.7 ha of the site remains flood free, meaning that it should be possible to locate all development outside of flood risk areas. This is provided there are no constraints (non-flood related) which require development to be located in at-risk areas. At this stage there are not considered to be any such constraints. This is except for any necessary watercourse crossings which should be clear span bridges set at least 600mm above the design flood level (see section 5.4 for more details).

5.3 Sequential Approach

Whilst both More Vulnerable Development Development is permissible in Flood Zone 2, it is still 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.

As surface water flood risk is also present across the site, both flood extents should be used to guide infrastructure at the site to the areas of lowest flood risk considering the impacts of climate change. If required ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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 fluvial and surface water flood risk a site-specific FRA should consider in more detail how quickly both occur 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.

Furthermore, as only national scale modelling is available at the site, if development is proposed within the flood extents, detailed modelling may be required during a site-specific FRA to better inform design flood levels and finished flood levels at the site. It should also

be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125).

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 variable permeability, therefore the use of infiltration SuDS solutions may be possible in some areas. It is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates, this will confirm where infiltration may be viable. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

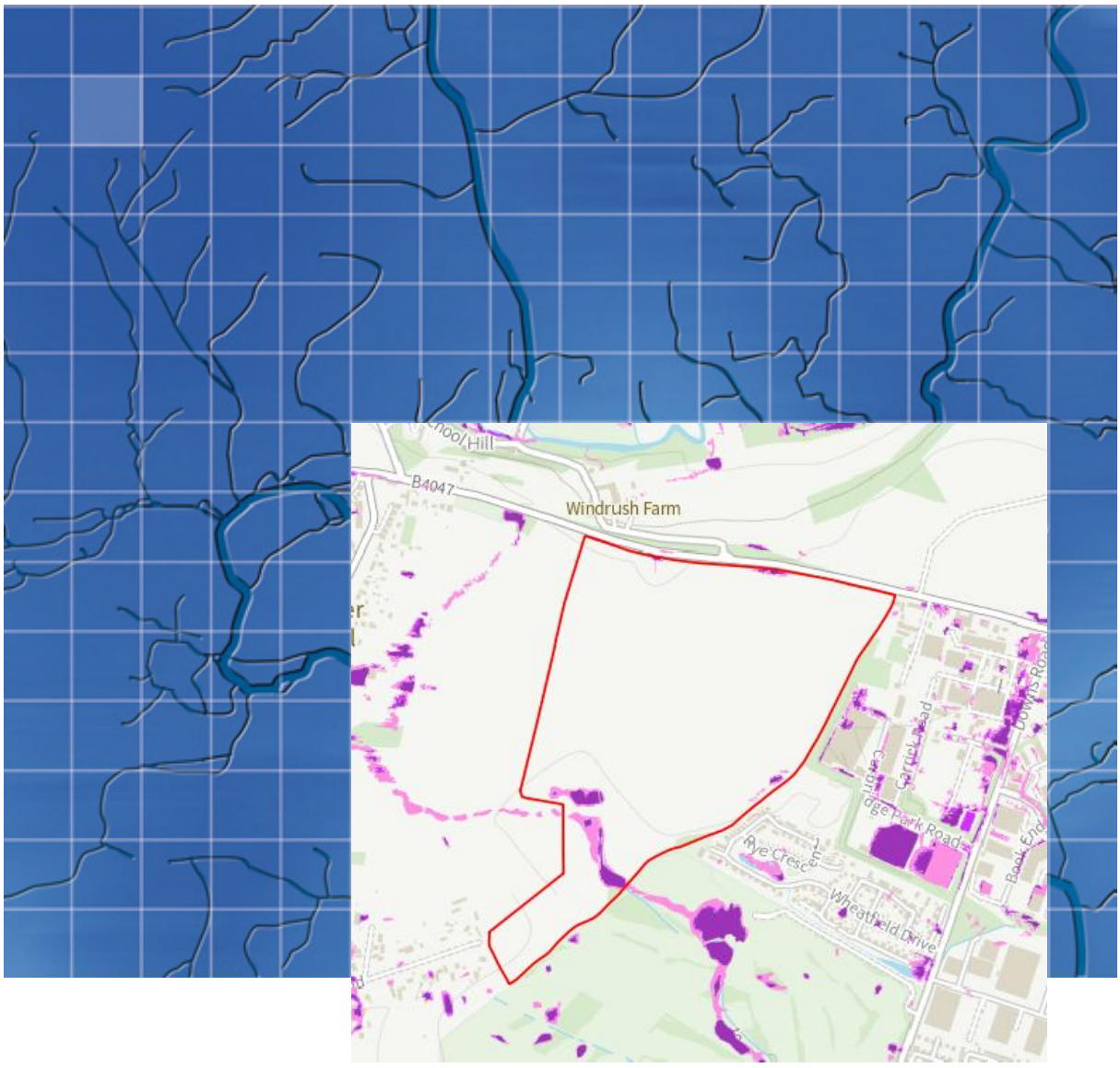
Aforementioned, parts of the site are divided by watercourses, and so it is likely that bridges may be required to be located in flood zone areas in order to link parts of the site together. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level. A site-specific FRA should investigate the requirement for bridges and their design, with modelling likely to be required for any works in flood risk areas.

West Oxfordshire District Council

April 2026

Land west of Witney, south of Downs Road (D)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land west of Witney, south of Downs Road (D)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	Draft	Jasmine Lucas (*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.

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

Land west of Witney, south of Downs Road (D) 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

Pluvial flood risk represents the greatest risk of flooding to the site with 1.5% inundated during a 1.0% AEP plus climate change pluvial event. Surface water flood risk primarily being associated with a surface water flow route in the south of the site.

For the design 1.0% AEP plus climate change pluvial event, the Risk of Flooding from Surface Water (RoFSW) depth data shows the maximum flood depth within the site is 0.9-1.2 m located in an isolated area adjacent to Burford Road in the northeast of the site; however, flood depths across the remainder of the site are predominantly 0.3 m or below. Overall surface water flood risk is considered to be low.

The risk from fluvial flooding is considered to be low, as the site is located entirely within Flood Zone 1.

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 because national scale modelling has been used to inform the assessment.

Conclusions and Recommendations

The development proposed is residential categorised as *More Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located along a potential surface water flow path in the south of the site draining to a small watercourse. As the majority of the site lies outside of these extents, it should be possible to locate all infrastructure outside of these areas.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land west of Witney, south of Downs Road (Reference: D) 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 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

The Land west of Witney, south of Downs Road (D) is a 51.4 ha site located to the west of Witney and east of Minster Lovell, see Figure 1. Current land use at the site is agricultural bordered by industrial and residential land uses to the east and Burford Road to the north. Witney Golf Centre is located to the southeast of the site.

Within the emerging local plan, the site is allocated for 600-800 residential dwellings.

2.2 Topography

Based on 1m LiDAR data, the northern section of the site slopes northwards towards the floodplain of the River Windrush whereas the rest of the site slopes to the southeast towards the Colwell Brook. The ground levels within the site boundary range from 105.7 to 117.4 m AOD, see Figure 2. The average ground level is approximately 112 m AOD.

2.3 Nearby Watercourses

A small headwater drain of the Colwell Brook is located within the southeast of the site, see Figure 1, with several of other small headwater drains of the Colwell Brook located southeast of the site within and adjacent to the Witney Golf Centre. The Colwell Brook is located approximately 625 m southeast of the site.

The River Windrush is located approximately 275 m north of the site, flowing from west to east. Several smaller tributaries and side channels are also present along this reach of the River Windrush.

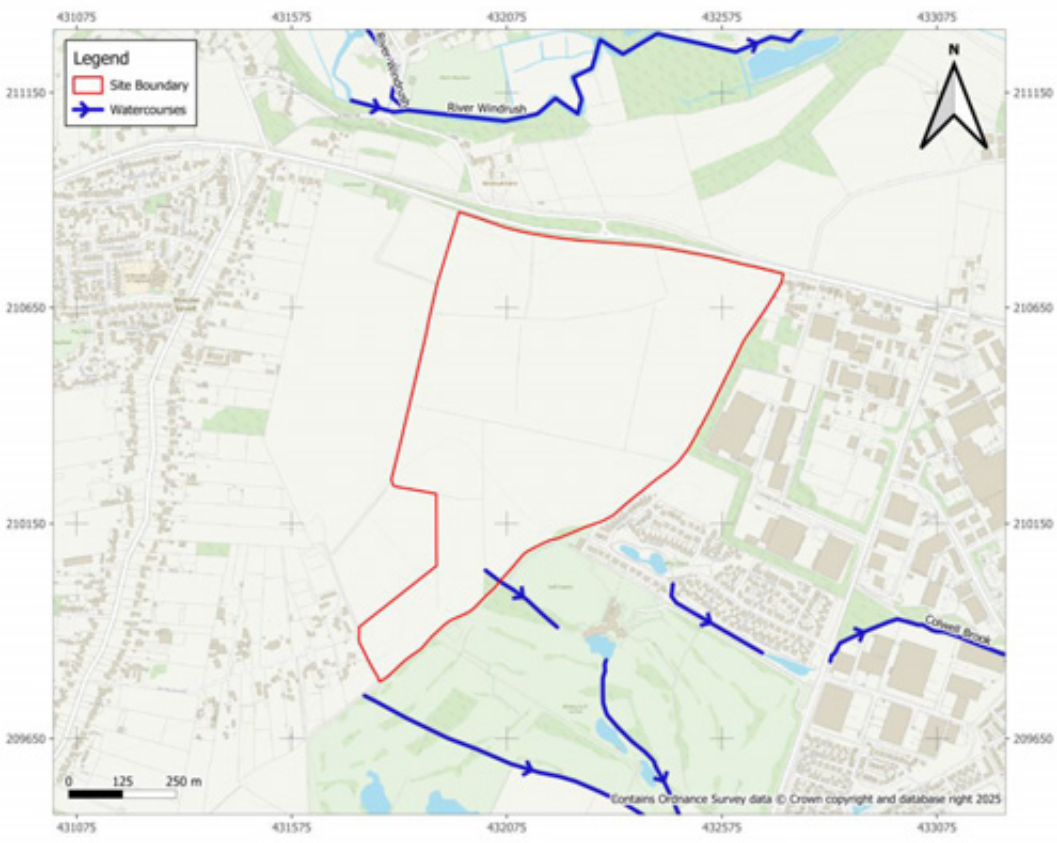


Figure 1 - Site Location

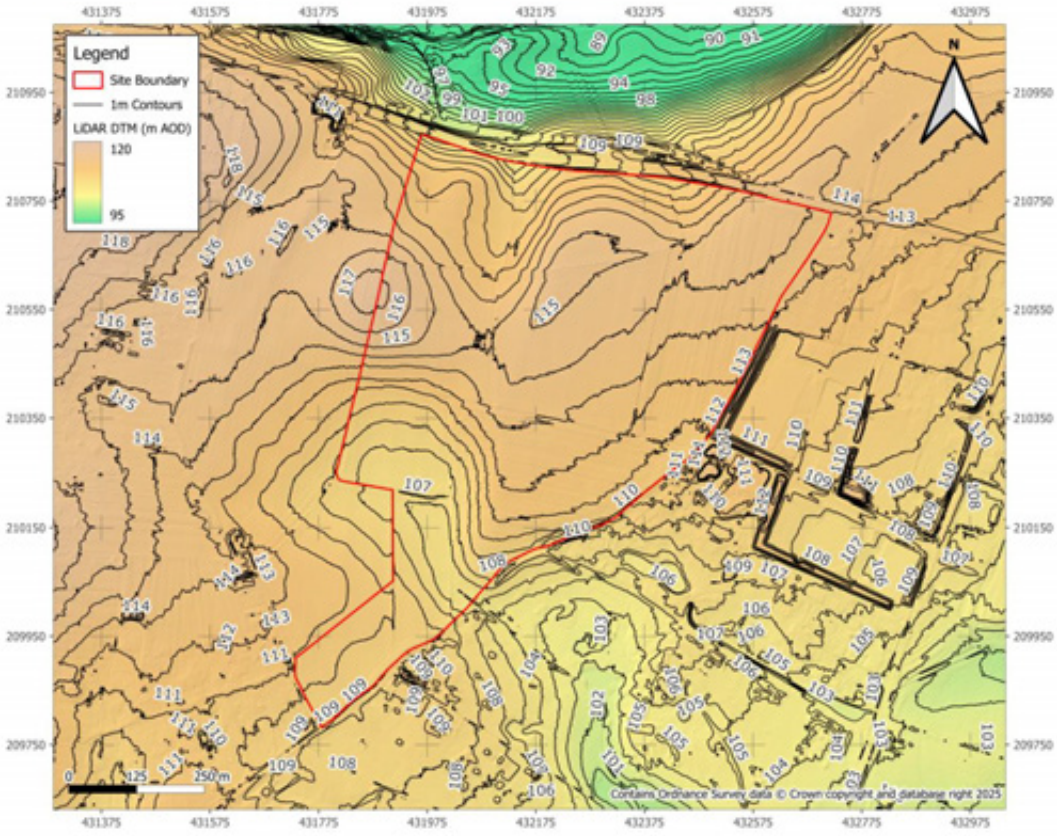


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest record of flooding is located approximately 280 m north of the site. It occurred in July 2007 and was associated with overtopping of the River Windrush.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) dataset indicates that the whole site is located within Flood Zone 1, defined as land with a less than 0.1% annual probability of flooding, see Figure 3.

Based on the FMfP climate change dataset, the site remains within Flood Zone 1 when considering an allowance for climate change, see Figure 4.

Fluvial flood risk is considered to be low.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 1.0% of the site is inundated during the 3.3% AEP event, 1.2% is inundated during the 1.0% AEP event and 2.1% is inundated during the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 1.2% in the 3.3% AEP event, 1.5% in the 1.0% AEP event and 2.9% in the 0.1% AEP, see Figure 6.

Overall, the risk of surface water flooding is considered to be low though it is greater than the fluvial risk and mostly concentrated along an overland flow route in the south of the site. Therefore, the residual risk associated with this flow route is assessed in more detail below in Section 4.

3.5 Groundwater Flooding

The site is underlain by a combination of limestone and mudstone bedrocks with no recorded superficial deposits. The limestone bedrock is expected to be reasonably permeable whereas the mudstone bedrock is expected to permit low amounts of infiltration. These geologies are overlaid by freely draining shallow lime-rich soils.

Based on the data available the risk of groundwater flooding is considered variable, with a higher risk associated with the areas underlain by limestone bedrock where the water table is likely to be mobile. More data is required at the planning stage to confirm the risk level and the distribution of risk across the site.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 7.

3.7 Flood Warning Service

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

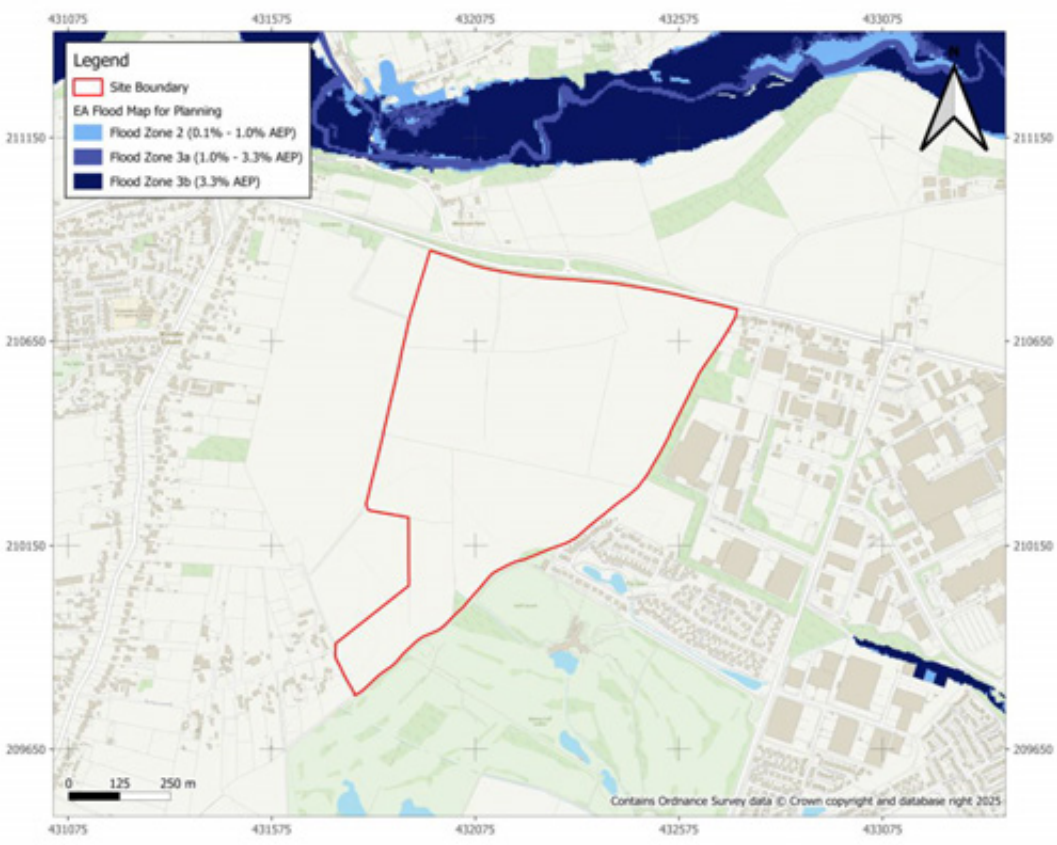


Figure 3 - Fluvial Flood Map

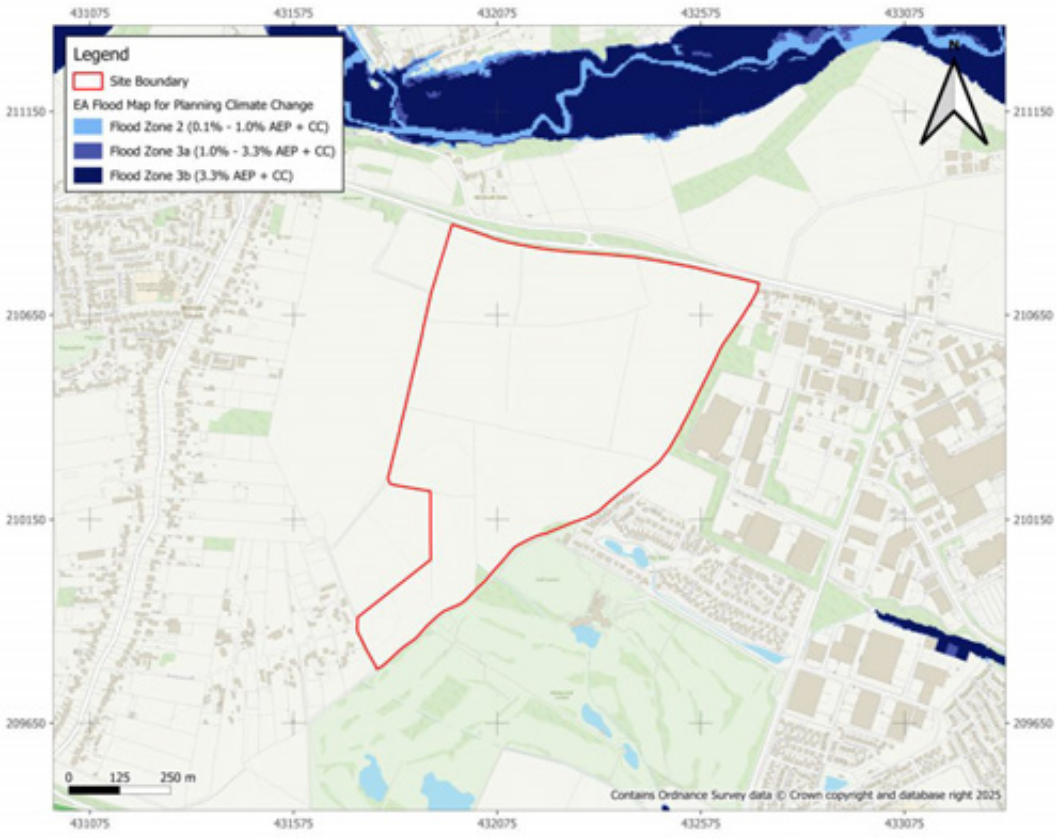


Figure 4 – Fluvial Climate Change Flood Map

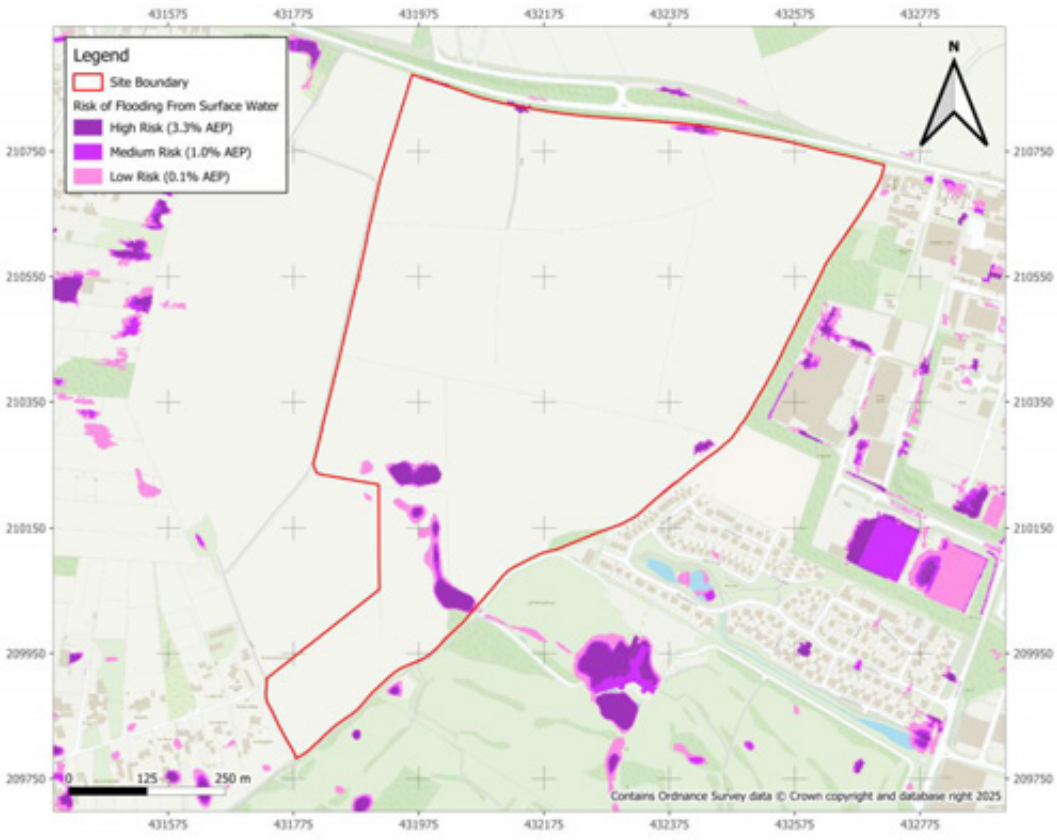


Figure 5 – Surface Water Flood Map

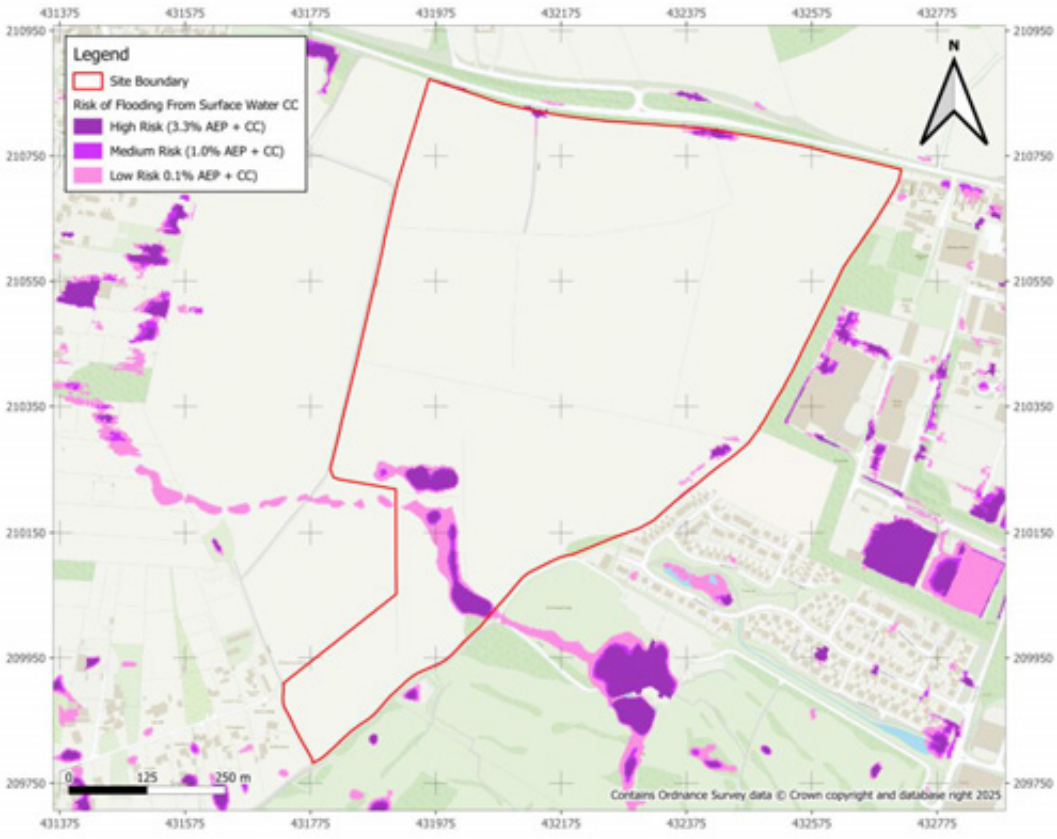


Figure 6 -Surface Water Climate Change Flood Map

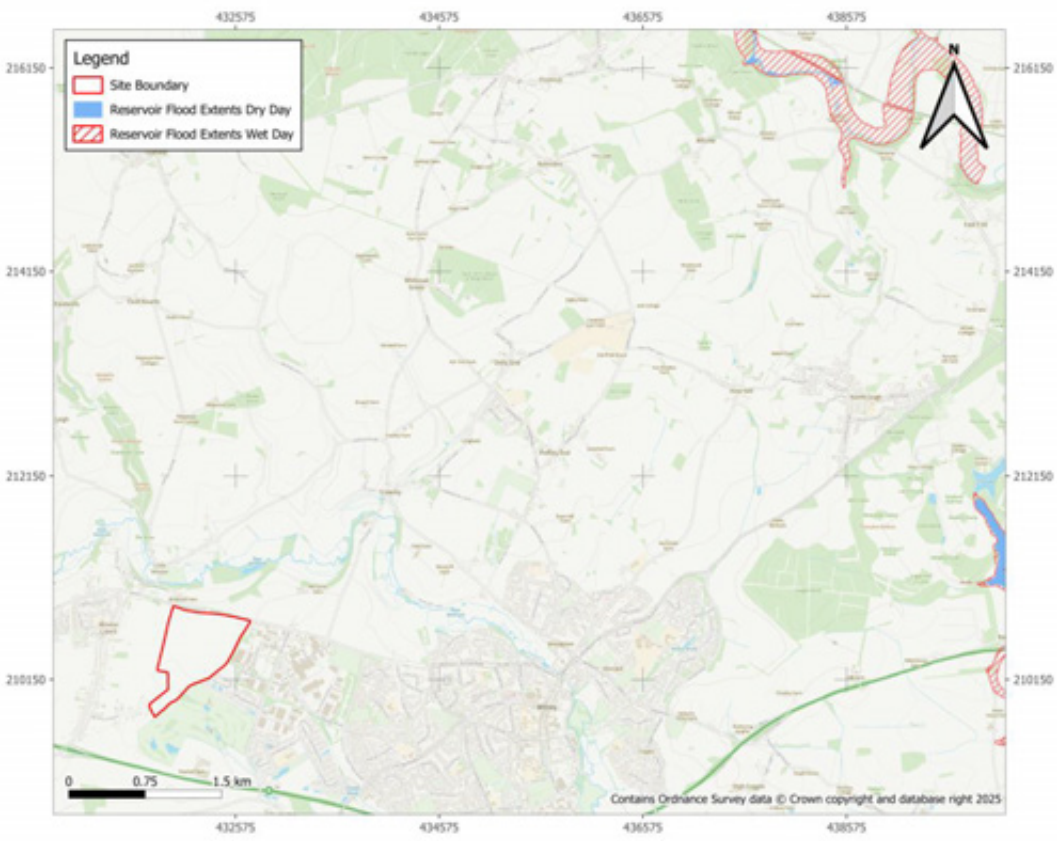


Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is pluvial.

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 is limited to several small areas within the site, notably a potential flow path in the southern portion of the site, one small area in the east and two areas adjacent to Burford Road in the north of the site. The maximum flood depth within the site is 0.9-1.2 m located in an isolated area adjacent to Burford Road in the northeast of the site; however, flood depths across the remainder of the site are predominantly 0.3 m or below. The area of surface water flood risk in the south of the site is located within a topographic valley, draining to the small watercourse which drains to the Colwell Brook present in this location.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is assumed to be available from Burford Road to the north. Due to the risk of fluvial flooding associated with the River Windrush in Witney to the east, the best access and egress route is suggested to follow Burford Road to the west to its junction with the A40, see Figure 9. This route remains outside of all fluvial flood extents, however during the 1.0% AEP +CC pluvial design event a small area of surface water flooding is present along Burford Road within Minster Lovell. The maximum flood depth along the route is 0.3 m. Two small areas of surface water flood risk are also present along the northern boundary of the site.

As the site remains predominantly flood free during the design event, residents would also be able to remain on site.

Whilst the risk of both fluvial and surface water flooding is generally considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known.

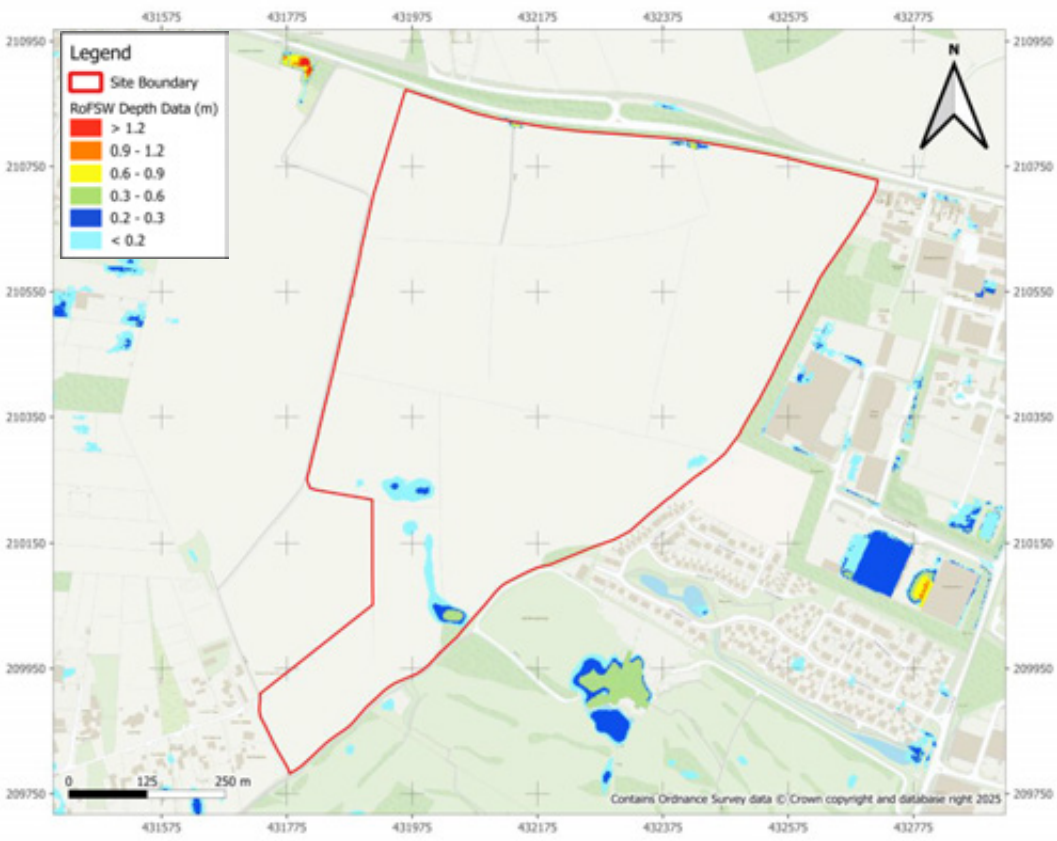


Figure 8 – RoFSW Depth Data for 1.0% AEP + Climate Change Event

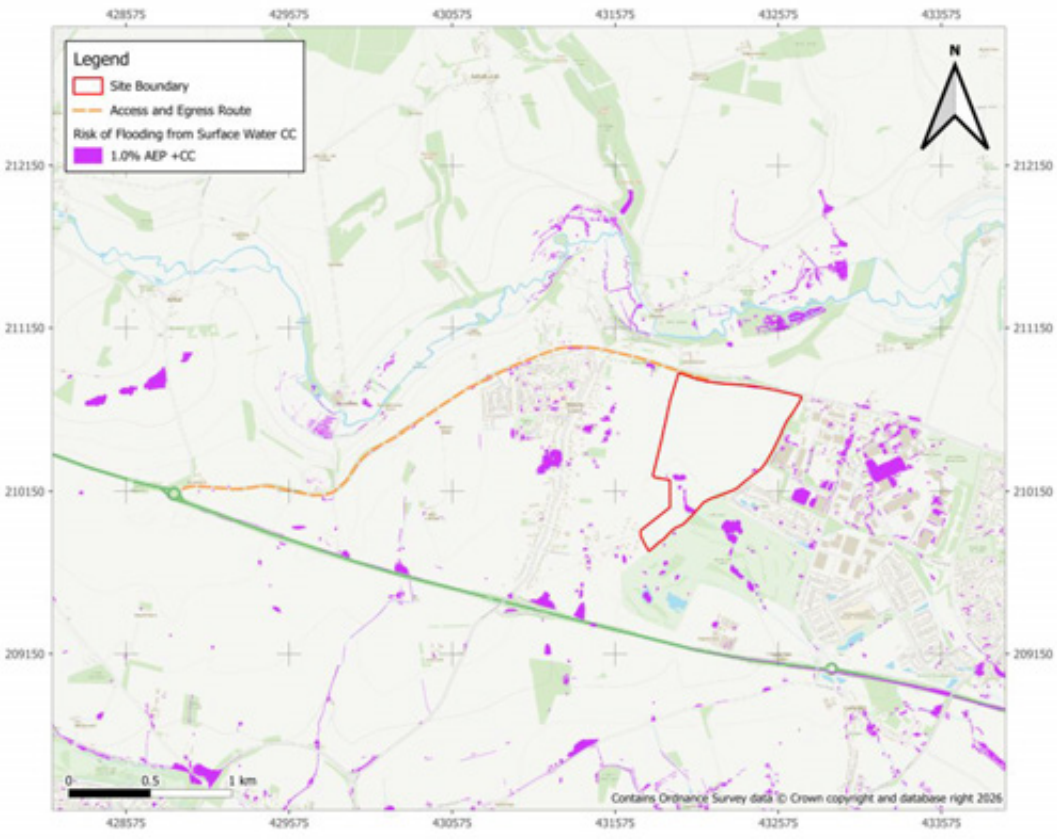


Figure 9 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential categorised as *More Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located along a potential surface water flow path in the south of the site draining to a small watercourse. As the majority of the site lies outside of these extents, it should be possible to locate all infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 51.4 ha, allocated for 600-800 dwellings. Assuming medium density housing (60 dwelling per hectare), 600-800 dwellings would require 10.0-13.3 ha of land. As the whole site is located within Flood Zone 1, development should be guided by the surface water flood risk at the site. The 1.0% AEP +CC design event inundates 1.5% of the site which indicates that 50.6 ha of land at the site remains flood free during the design event. Ultimately flood risk prevents no barrier to the scale of development at the site.

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 the whole site is located within Flood Zone 1 in the FMfP, the surface water flood maps should be used to ensure development is prioritised in areas of lower flood risk. If required, ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under the assumption that it does not increase flood risk elsewhere and is designed to be appropriately resistant and resilient to flooding. The layout of the development should avoid locating infrastructure within the potential overland flow route in the south of the site to avoid altering natural flow paths wherever possible. Given the scale of development, 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.

It should be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125). Site-specific pluvial modelling may be required to better define flood risk depending on the final development layout.

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 is varied with both more permeable limestones and less permeable mudstones. Therefore, whilst 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. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land north of Brize Norton and Carterton – Foxbury Farm (BN 003)

Level 2 Strategic Flood Risk Assessment

West Oxfordshire District Council

Land north of Brize Norton and Carterton – Foxbury Farm (BN 003)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Lloyd Prytherch (*Graduate Consultant*)	Joel Leyshon-Jones (*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.

Registered Office Stables 4 Howbery Business Park, Benson Lane, Wallingford, England, OX10 8BA

www.hydrosolutions.co.uk

Land north of Brize Norton and Carterton – Foxbury Farm (BN 003) 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

Pluvial flood risk represents the greatest risk of flooding to the site with 0.7% of the site inundated during a 1.0% AEP +CC event. The majority of this extent is associated with areas of lower topography and a drainage ditch that runs through the site.

Inundations depths vary, they are between 0.3 – 1.2m in one area but are generally less than 0.3m across the majority of the site. The pluvial flood risk to the majority of the site is therefore considered low.

The risk of fluvial flooding is considered to be low as the entire site is located in Flood Zone 1.

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 moderate. This is based on the fact that the EA's latest national scale modelling has informed the assessment of surface water flood risk.

Conclusions and Recommendations

The development proposed is residential and categorised as *More Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is located exclusively in Flood Zone 1, parts of the site are at flood risk based on the EA's surface water modelling extents. The risk is not widespread and provided a sequential approach is followed, it should be also possible to locate infrastructure outside of these areas.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land north of Brize Norton and Carterton – Foxbury Farm (BN 003) (Reference: F) 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 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

The Land north of Brize Norton and Carterton – Foxbury Farm (BN 003) (F) site is 255.4ha to the northeast of Carterton, see Figure 1. The northern boundary of the site is bordered by the A40, with Burford Road located along the southwest boundary. The southeast of the site is bordered by Brize Norton road, with the village of Brize Norton located beyond this. Current land use at the site is predominantly agricultural.

Within the emerging local plan, the site is allocated for 1500 – 2500 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes gently from highest ground along the northern boundary, to lower ground in the south towards Brize Norton. The ground levels within the site boundary range from 90.9 to 130.3m AOD, see Figure 2. The average ground level is 112.8m AOD.

2.3 Nearby Watercourses

A small tributary of Highmoor Brook enters the northeastern boundary of the site, flowing south through the site. Several further small drainage ditches are located to the southwest of the site, these generally flow southeasterly and into Highmoor Brook around the village of Brize Norton. The River Windrush is located in the valley to the north of the site, located approximately 1km from the site's northern boundary.

Figure 1 shows the location of these watercourses.

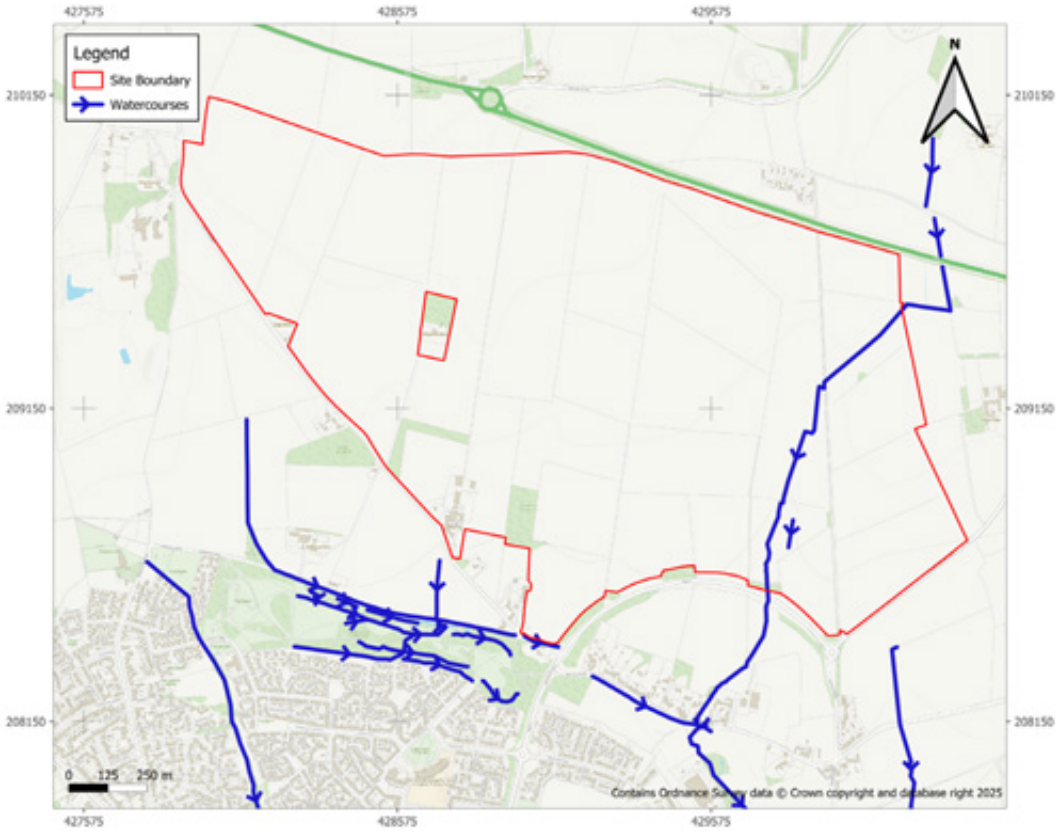


Figure 1 - Site Location

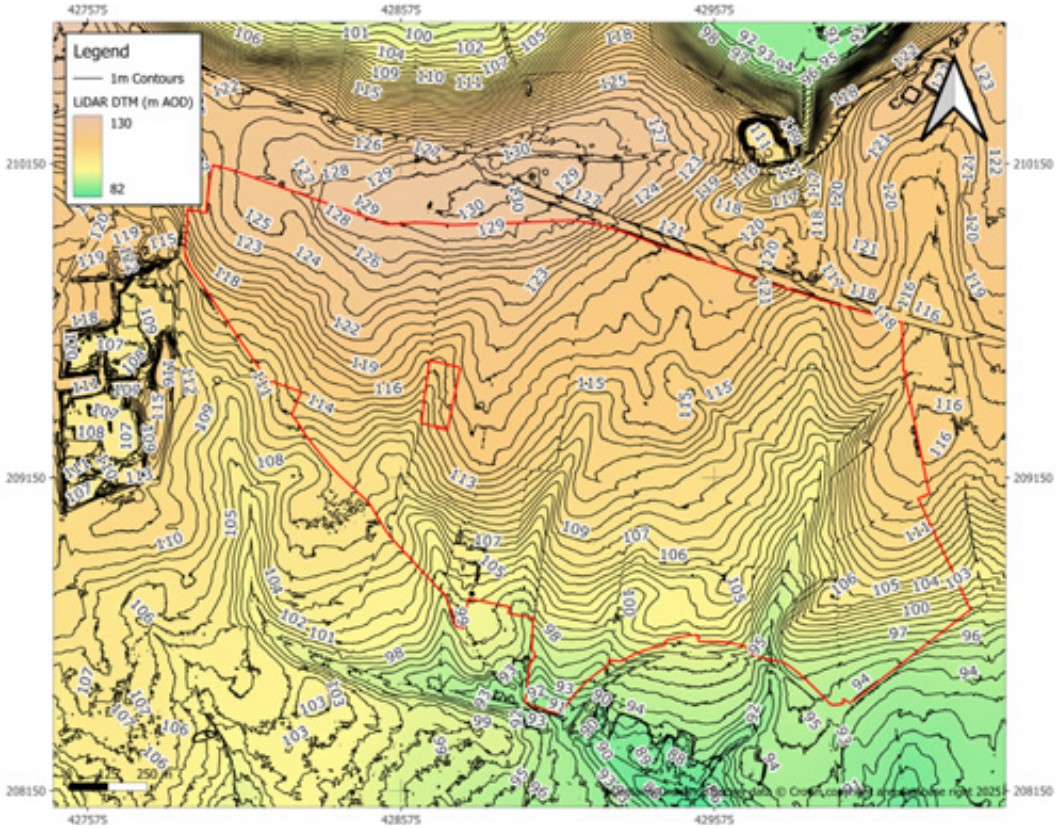


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding within the site. The closest record of flooding is located along Burford Road to the south of the site. The pluvial event occurred in July 2007, associated with local drainage and surface water of the road surface becoming overwhelmed.

3.2 Fluvial Flood Risk

In the risk of flooding from rivers and sea (RoFRS) dataset, the entire site is located in Flood Zone 1, defined as having less than a 0.1% chance of fluvial flooding annually, see Figure 3. The nearest extent of Flood Zone 2 and 3 within the catchment is approximately 0.9km south of the site in the village of Brize Norton. Large areas of the River Windrush valley north of the site are located in Flood Zone 3b.

The climate change outputs for this dataset have also been assessed, with the entire site remaining in Flood Zone 1, see Figure 4.

Based on the FMfP the risk of fluvial flooding is considered to be low; however it should be noted that the FMfP does not capture flood risk from the watercourse which runs through the site, these are captured by the EA's surface water flood maps (see section 3.4).

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 0.4% of the site is inundated in the 3.3% AEP event, 0.6% is inundated in the 1.0% AEP event and 1.0% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 0.5% in the 3.3% AEP event, 0.7% in the 1.0% AEP event and 1.4% in the 0.1% AEP, see Figure 6.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, there is a smaller watercourse across the site which is not accounted for within the fluvial models and therefore is represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map may be both fluvial (river overtopping) and pluvial (overland flow) in origin.

Overall, the risk of surface water flooding is considered to be low at this stage. However, it is greater than the risk shown in the fluvial flood map so is considered in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by various bedrock formations, with the Forest Marble Formation present across most of the site. The majority of these formations are limestone which is expected to be permit moderate to high levels of infiltration. In the north of the site where mudstone is the dominant permeability is expected to be lower. No superficial deposits are noted within the site. The overlying soils are shallow, lime rich; these are expected to be freely draining.

Based on the data available, the risk of groundwater flooding is considered moderate in parts of the site underlain by limestone, this risk may be lower in parts of the site underlain by mudstone. More data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 7. The nearest extent of reservoir flood risk is over 6km south of the site along the River Thames.

3.7 Flood Warning Service

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

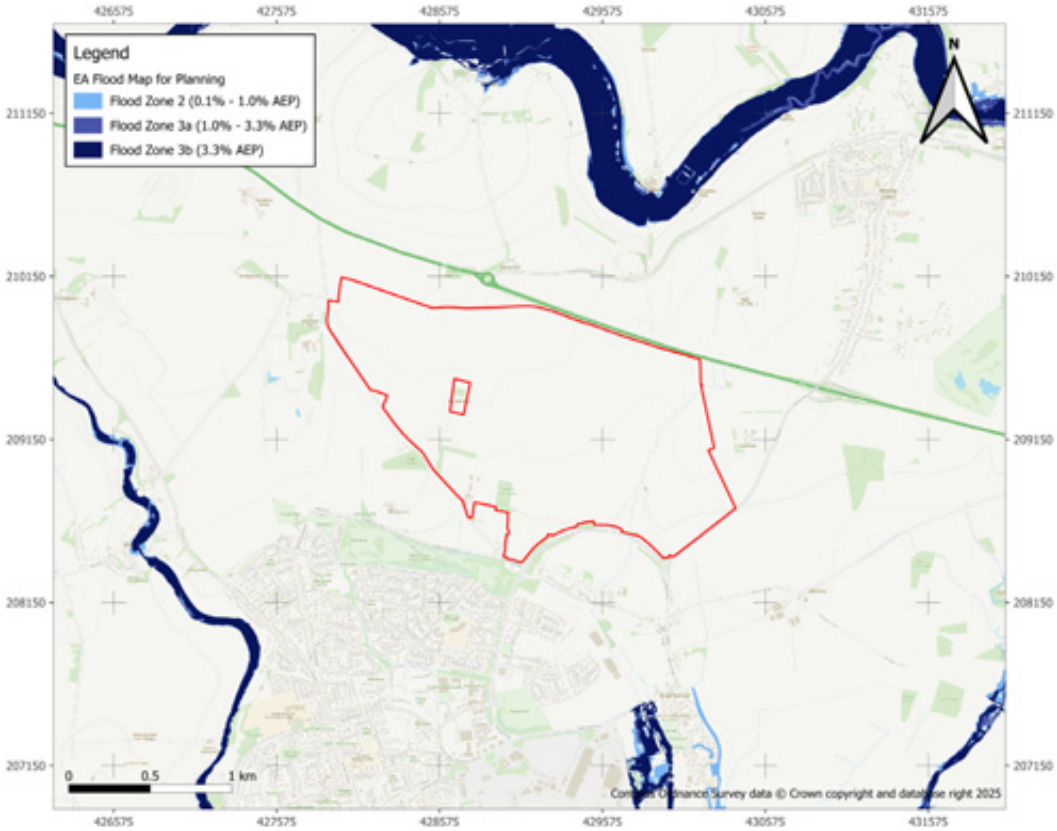


Figure 3 - Fluvial Flood Map

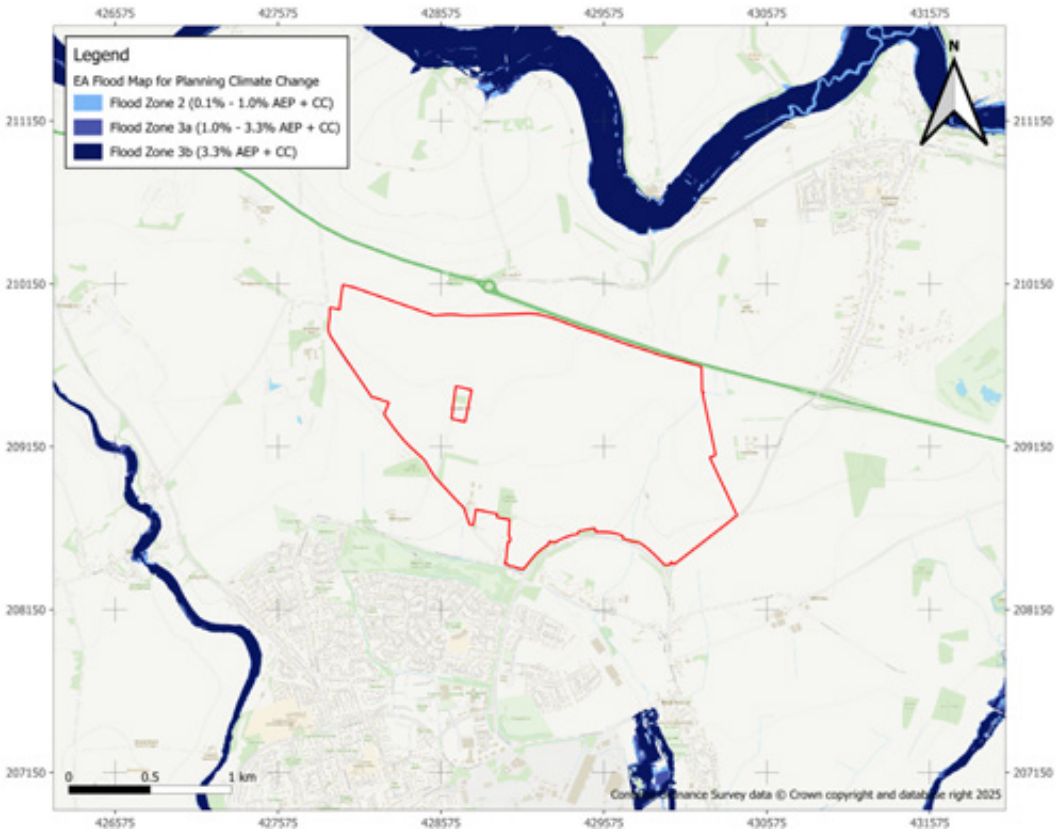


Figure 4 – Fluvial Climate Change Flood Map

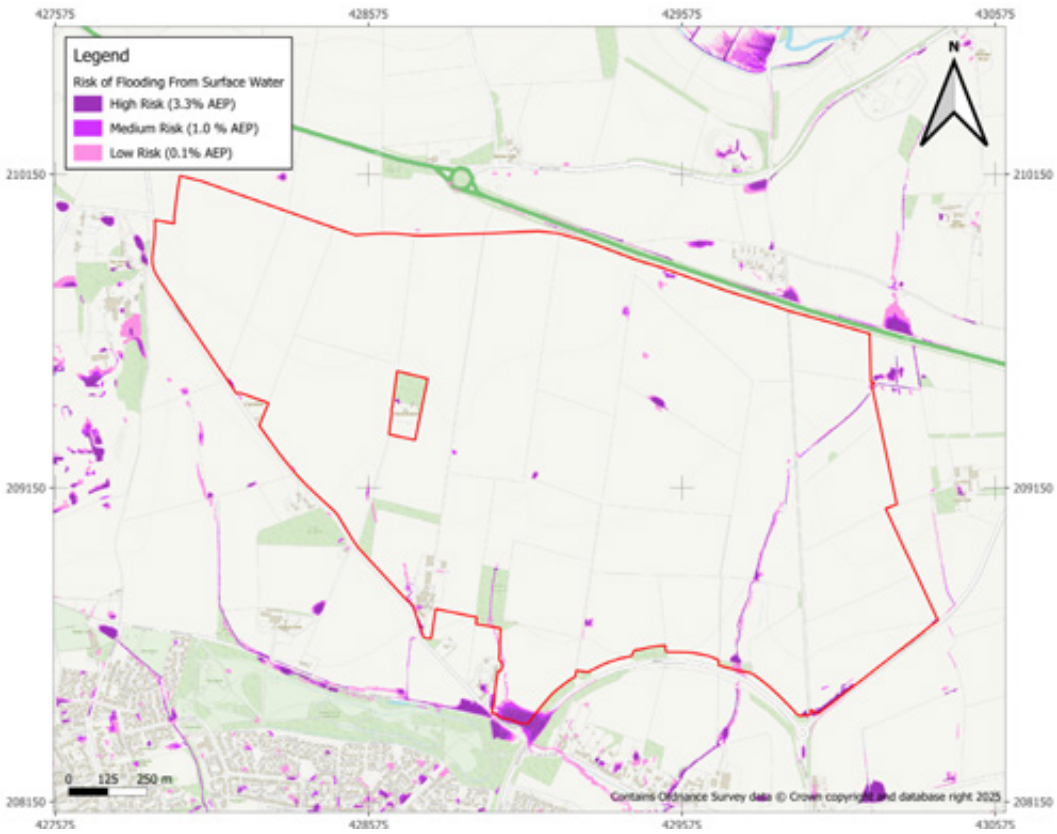


Figure 5 – Surface Water Flood Map

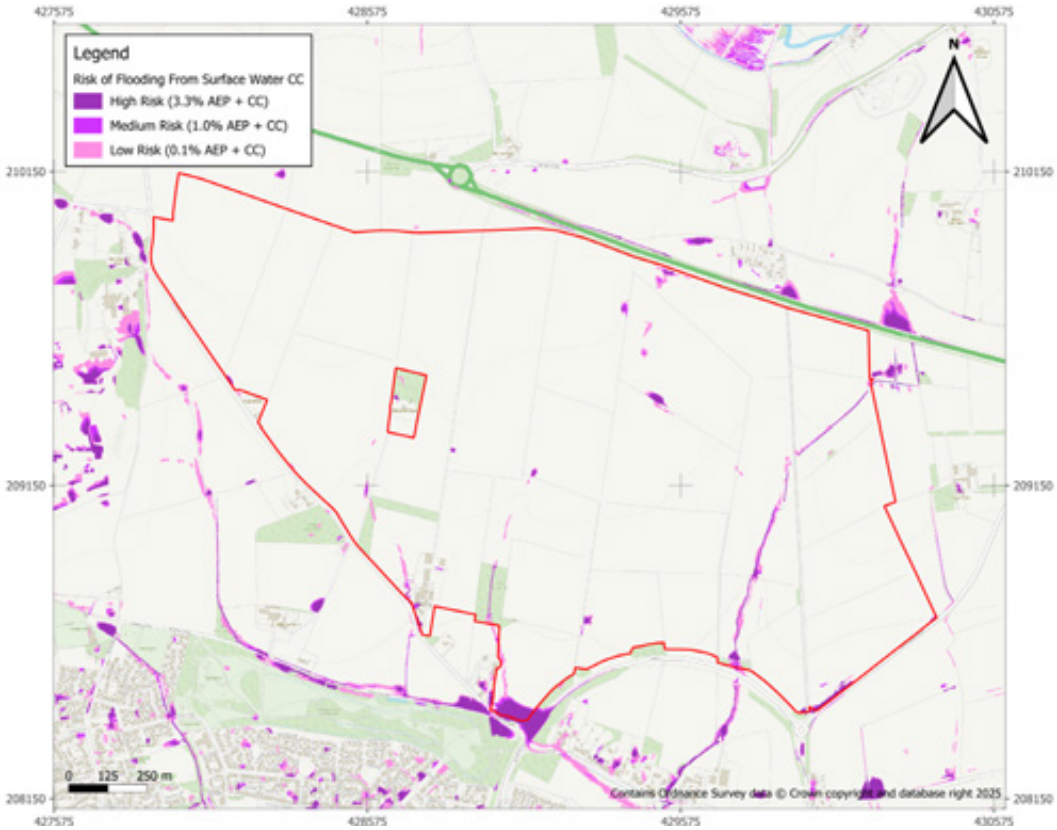


Figure 6 -Surface Water Climate Change Flood Map

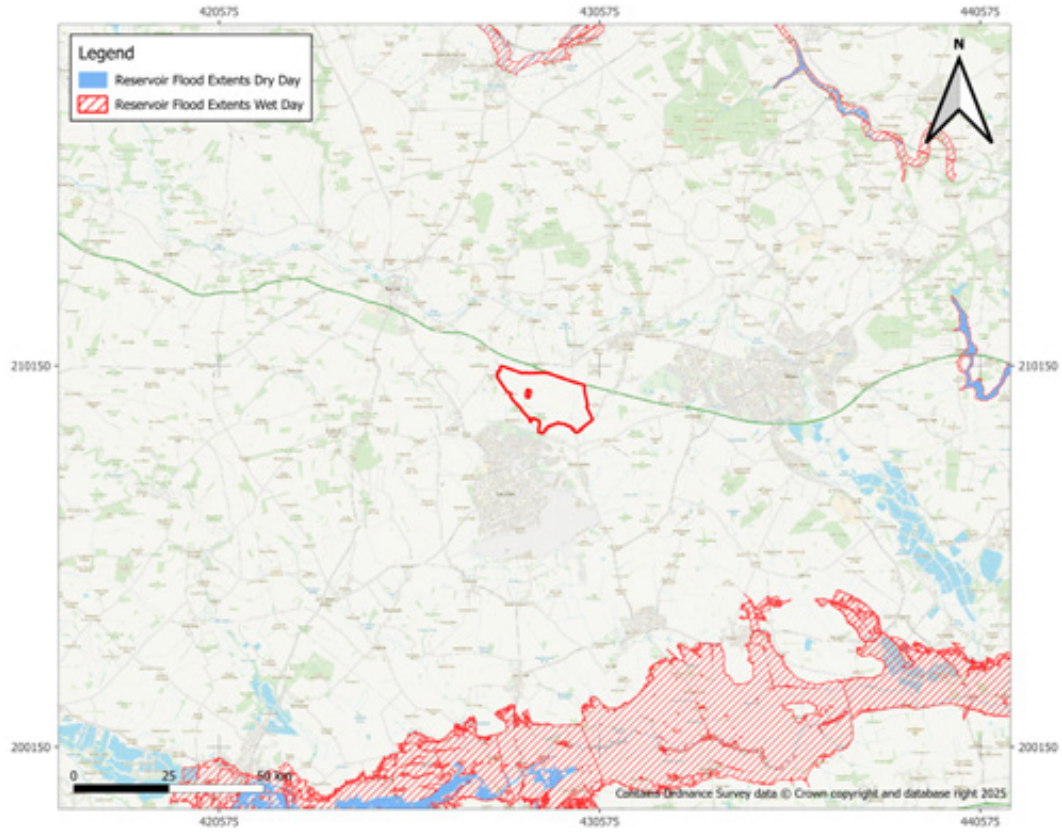


Figure 7 - Reservoir Failure Flood Map

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.

The depth mapping (see Figure 8) shows two main flood risk mechanisms to the site. In the east of the site, surface water follows the course of a drainage ditch into the site from the A40 to the north. This flooding is considered fluvial in origin. Depths are generally 0.3-0.6m within the ditch.

Overall, the surface water flood mapping is considered a reasonable proxy of flood risk from the ditch. Topographical data shows the watercourses to be very flat with limited catchment areas, so the extents shown are not thought to be significantly underestimated. During the planning stage a site-specific FRA should assess the risk of flooding from these watercourses in greater detail.

In the southernmost part of the site adjacent to Burford Road, a large area of surface water pooling occurs against the embankment of the road, as surface water runoff drains from higher ground to the north. Mapping indicates drainage channels and a culvert downstream of this location. Depths generally range from 0.2 - 0.9m in this location but reach over 1.2m in some places.

Elsewhere across the site, further isolated areas of surface water flood risk are present, but depths generally do not exceed 0.3m and are associated with areas of lower topography.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. The datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is available via Burford Road along the southwestern boundary, and the B4477/Brize Norton Road to the south and southeast (see Figure 9). During an extreme fluvial flood event (0.1% AEP + CC) both roads generally remain flood free, allowing access and egress to the site. However, the junction of the two roads is at risk during the design pluvial event where a section of around 100m is inundated. 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.

In terms of onward travel, site users can access the A40, with onward egress possible to Burford to the west and Witney to the east. Although these routes generally remain flood free, some areas of isolated surface water pooling occur, with depths up to 0.3m. Egress is also possible south to Carterton, however more flood risk is present along this route, with large areas of surface water pooling along Monohan Way into Carterton.

It should be noted that these 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 and assess in more detail the nature of the flood risk to determine how quickly it occurs and the degree of hazard.

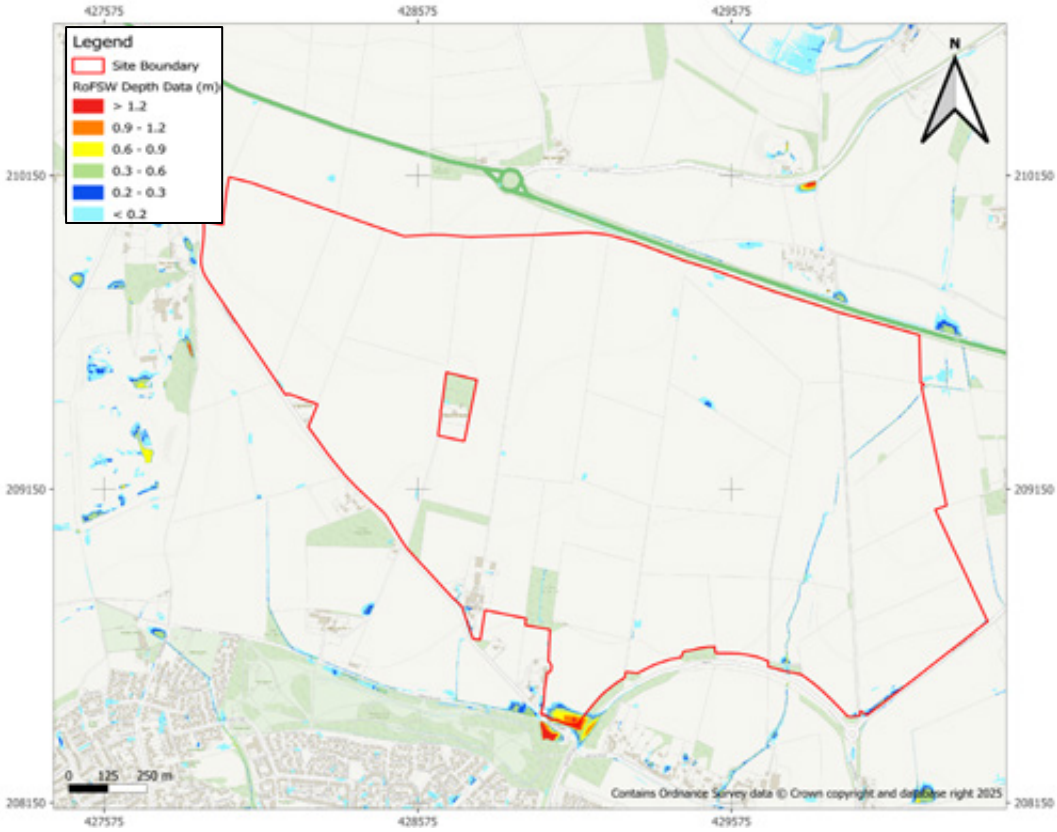


Figure 8 – RoFSW Depth Data for 1.0 % AEP + Climate Change Event

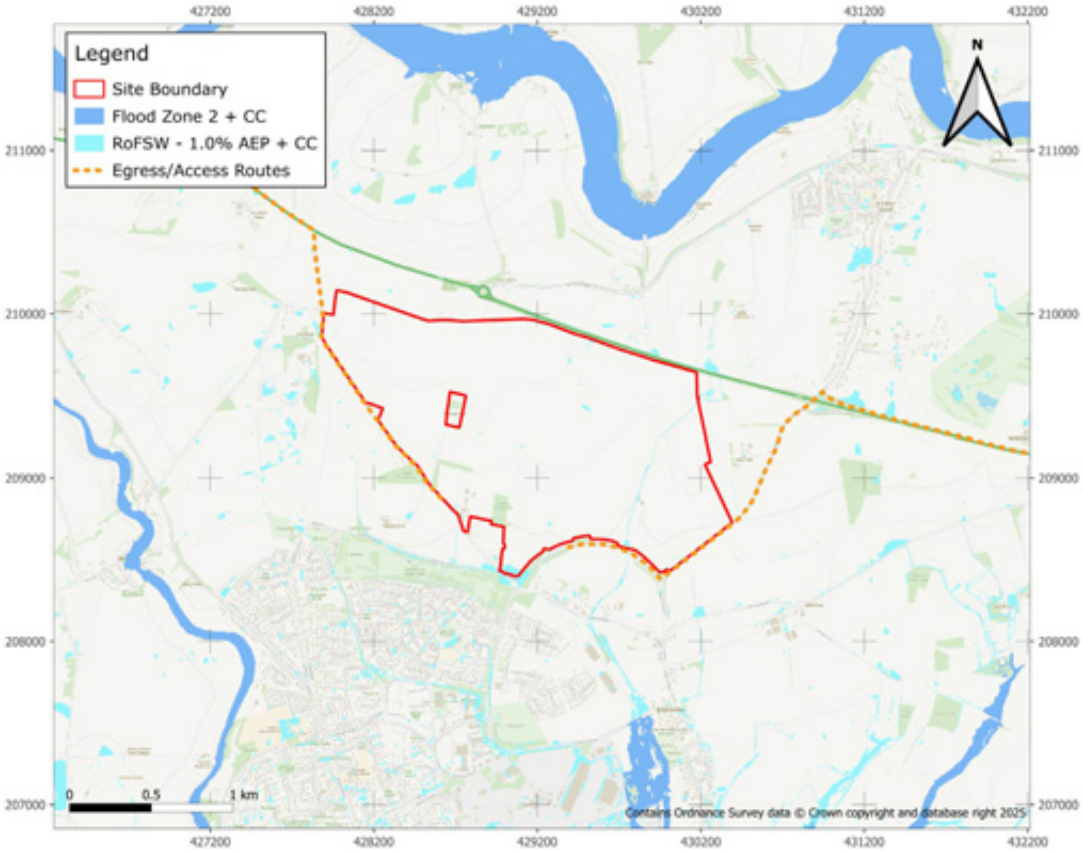


Figure 9 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential and categorised as *More Vulnerable Development*. It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is located exclusively in Flood Zone 1, parts of the site are at flood risk based on the EA's surface water modelling extents. The risk is not widespread and provided a sequential approach is followed, it should be also possible to locate infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 255.4ha; allocated for 1500–2500 dwellings. Assuming medium density housing (60 dwelling per hectare), 1500 dwellings would require 25 ha of land and 41.7ha for 2500 dwellings. The site is located in Flood Zone 1 when considering climate change. Approximately 1.4% of the site is inundated during the design 1.0% AEP + CC pluvial event, indicating 251.8 ha of the site remains flood free. This should mean that all infrastructure can be sited outside of areas of flood risk, this is provided there are no constraints (non-flood related) which require development to be located in at-risk areas.

5.3 Sequential Approach

As the site is located in fluvial Flood Zone 1, the surface water flood maps should be used to ensure development is prioritised in areas of lower flood risk.

If required ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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.

Furthermore, as only national scale modelling is available at the site, if development is proposed within the flood extents, detailed modelling may be required during a site-specific FRA to better inform design flood levels and finished flood levels at the site. It should also be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125).

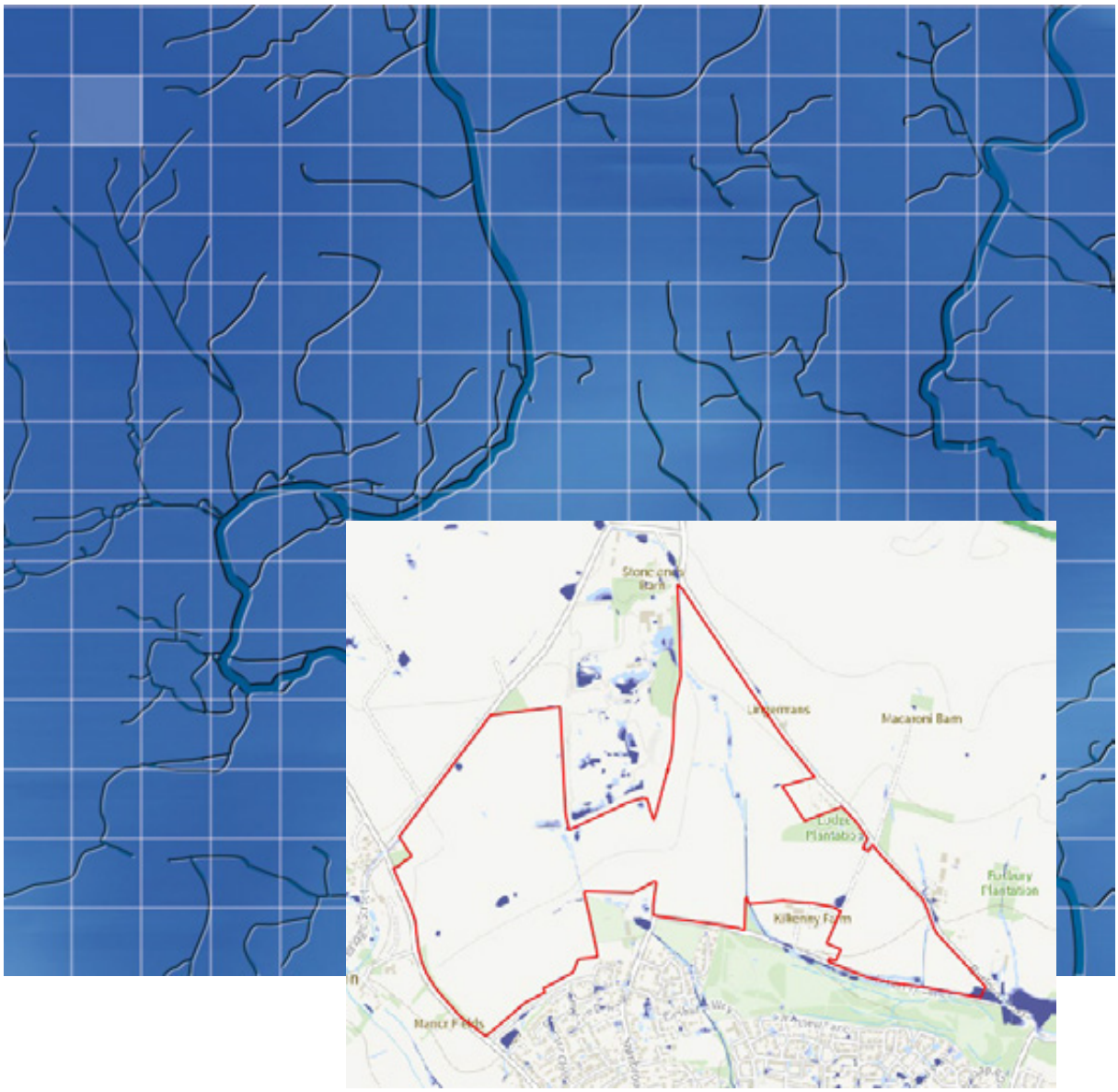
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site is varied with freely draining soils and high bedrock permeability in some locations. 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. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Kilkenny Farm (E)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Kilkenny Farm (E)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Tirion Lewis (*Graduate 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

Kilkenny Farm (E) 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

Pluvial flood risk represents the greatest risk of flooding with 1.0% of the site inundated during a 1.0% AEP + CC design event, with surface water flood risk being associated primarily with drainage channels in the southeast of the site.

The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest flood depth (0.6 m-0.9 m) associated with a topographical depression in the northwest of the site and the most easterly drain in the southeast of the site. However, the majority of flood depths across the site are 0.2m or less. Overall, the risk of pluvial flooding is considered to be low.

The risk from fluvial flooding is considered to be low, as the site is located entirely within Flood Zone 1.

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 because national scale surface water modelling has been used to inform the assessment.

Conclusions and Recommendations

The development proposed is residential categorised as More Vulnerable Development. It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, small parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located within drainage channels in the southeast of the site. Provided a sequential approach is followed, it should be possible to locate infrastructure outside of these areas.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Kilkenny Farm (Reference: E) 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 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

The Kilkenny Farm (E) site is 114.6 ha, located to the north of Carterton and to the east of Shilton, see Figure 1. Current land use at the site is agricultural. The site is bordered by a limestone quarry to the north, residential buildings to the west and south and agricultural land to the west.

The site has been allocated for residential development, with a proposed capacity of 700-800 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes westwards towards the Shill Brook and south-eastwards towards a drainage channel. The ground levels within the site boundary range from 92.8m AOD to 119.3m AOD, see Figure 2. The average ground level is approximately 108.9m AOD.

2.3 Nearby Watercourses

There are two drainage channels, running north to south, located in the southeast of the site, which connect to drainage channels within Kilkenny Lane Country Park that run from west to east, see Figure 1. The closest major watercourse to the site is the Shill Brook, located approximately 145m west of the site running from north to south.

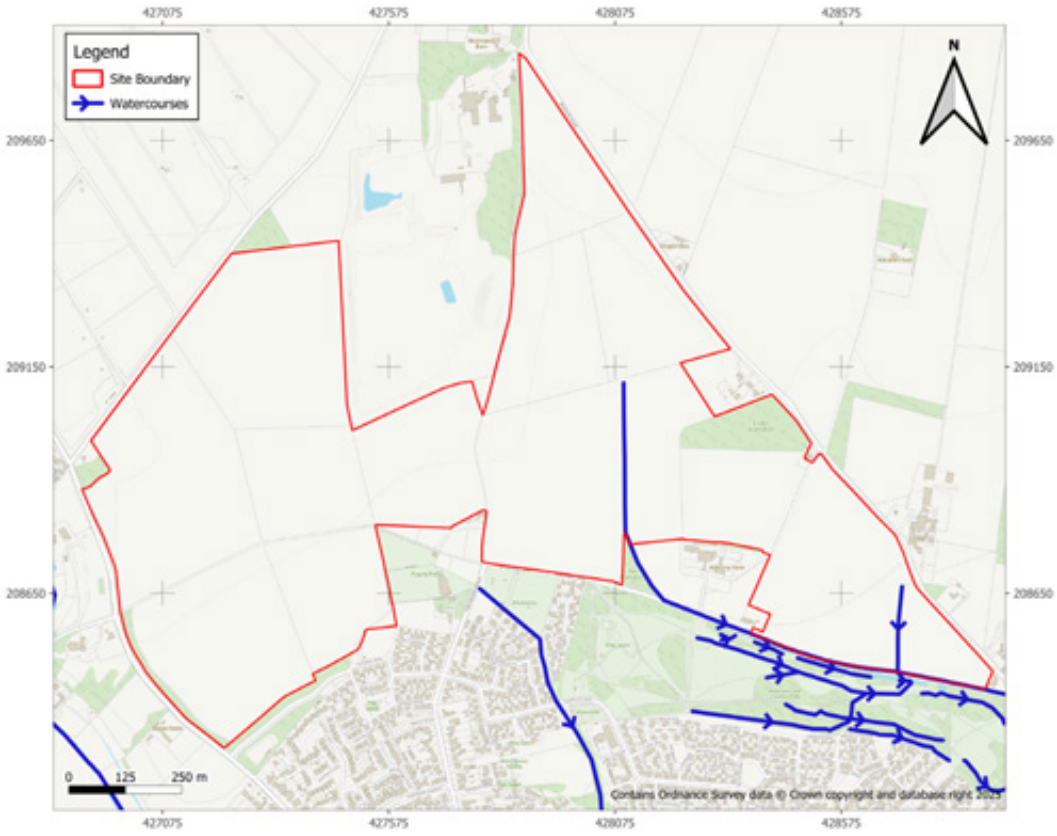


Figure 1 - Site Location

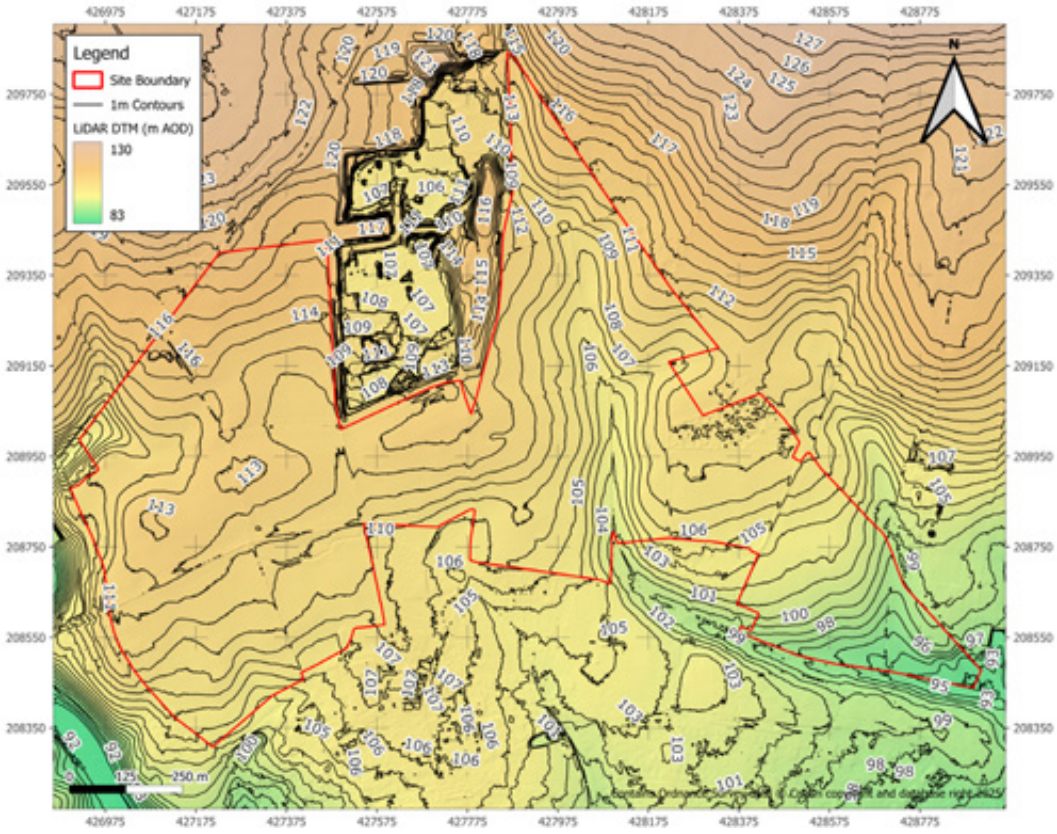


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

There is one record of historical flooding at the site, located in the southeastern corner of the site, the event occurred in 2007 and was associated with surface water flooding. Another historic flood event was recorded nearby to the site, approximately 170m west of the site, and was associated with the channel capacity of the Shill Brook being exceeded.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) dataset indicates that the whole site is located within Flood Zone 1, defined as land with a less than 0.1% annual probability of flooding, see Figure 3.

Based on the FMfP climate change dataset, the site remains within Flood Zone 1 when considering an allowance for climate change, see Figure 4.

Based on the FMfP the risk of fluvial flooding is considered to be low; however it should be noted that the FMfP does not capture flood risk from the two drains in the southeast of the site, these are captured by the EA's surface water flood maps (see section 3.4).

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it 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 is inundated during the 3.3% AEP event, 0.8% is inundated during the 1.0% AEP event and 1.6% is inundated during the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 0.7% in the 3.3% AEP event, 1.0% in the 1.0% AEP event and 2.4% in the 0.1% AEP, see Figure 6.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, there are smaller watercourses across the site which are not accounted for within the fluvial models and therefore are represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map most notably along the two small drains in the southeast of the site may be both fluvial (river overtopping) and pluvial (overland flow) in origin.

The risk of surface water flooding across the site is considered to be low, however it is greater than fluvial flooding. Therefore its residual risk is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by interbedded limestones and mudstones of the Forest Marble Formation, which are expected to have variable permeabilities. Limestone typically has moderate to high permeability with mudstones being generally impermeable. There are no superficial deposits present at the site. The overlying soils are freely draining shallow lime-rich loamy soils.

Based on the data available the risk of groundwater flooding is considered moderate, due to the site having freely draining soils and limestone bedrock in some places. However, more data is required at the planning stage to confirm the risk level and its distribution across the site.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, with the site being located approximately 7.5km northwest of an area at risk of reservoir flooding in the wet day scenario, 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

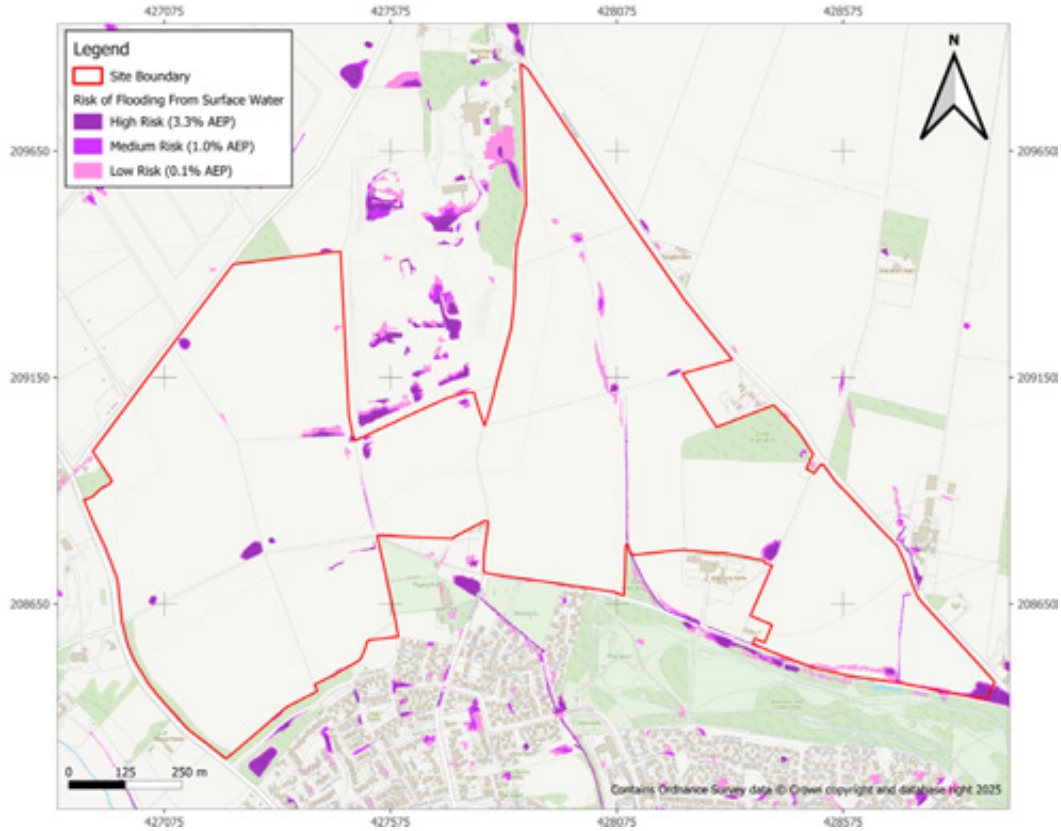


Figure 5 – Surface Water Flood Map

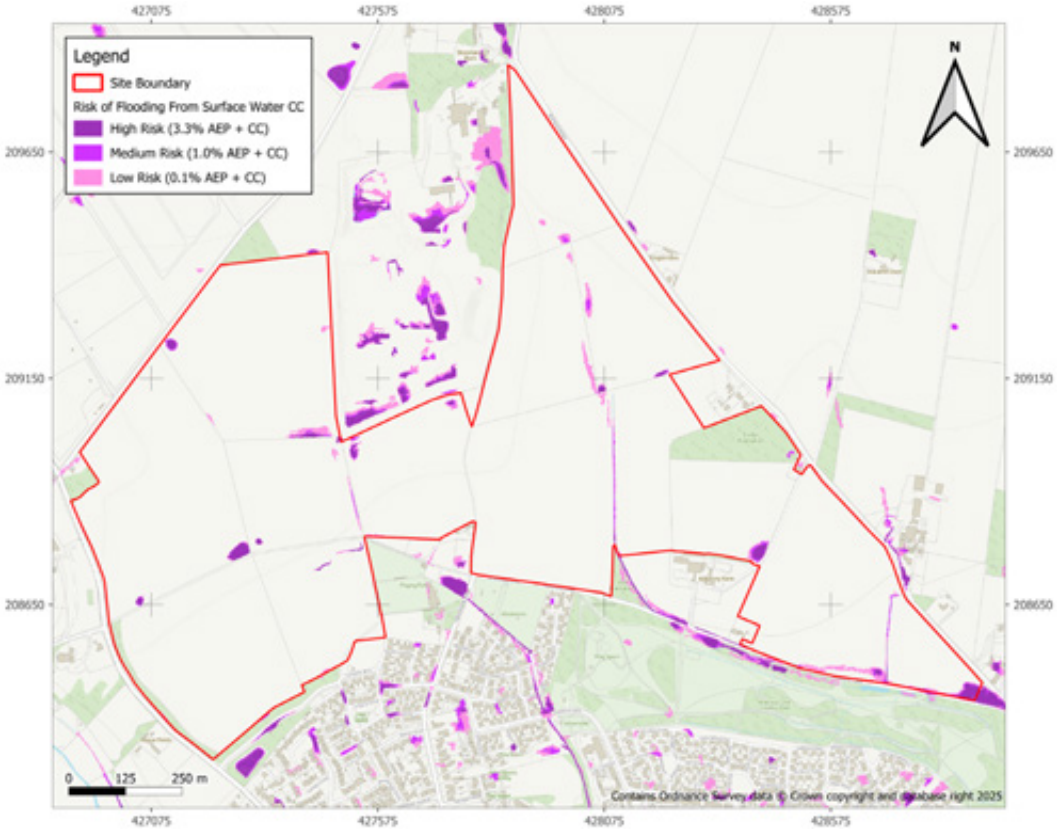


Figure 6 -Surface Water Climate Change Flood Map

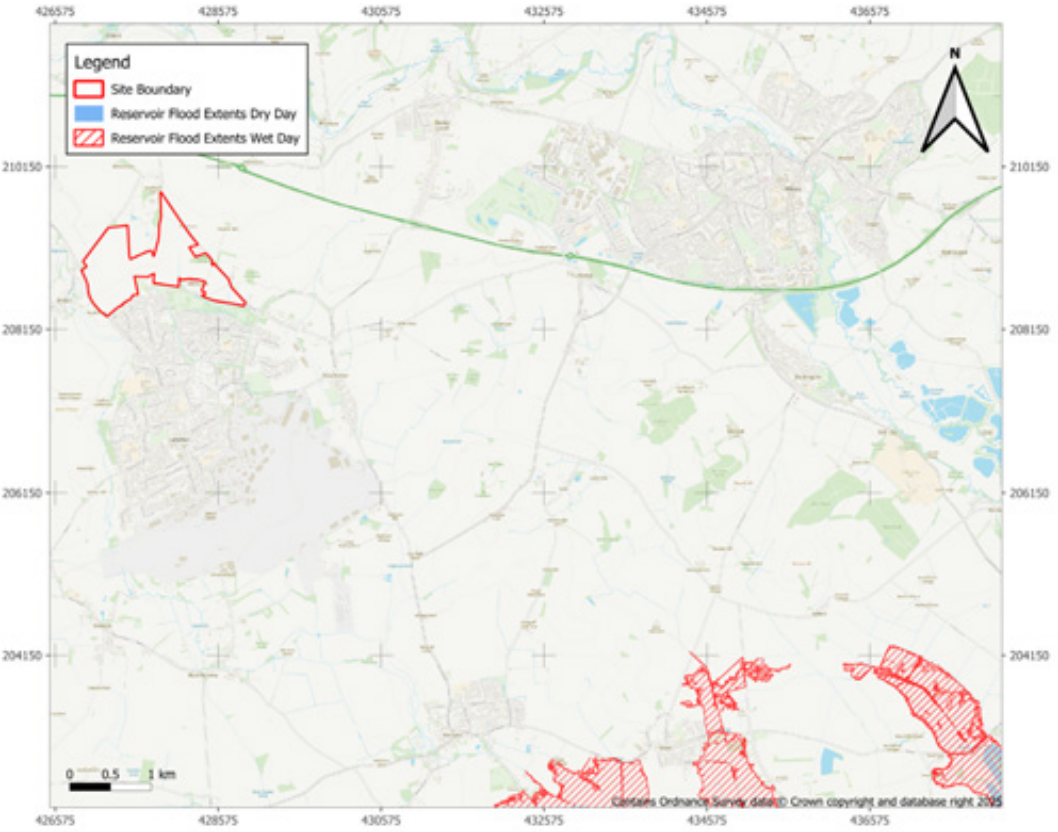


Figure 7 Reservoir Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is pluvial.

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 the majority of surface water flooding to be located in the southeast of the site with some flooding associated with the two drains in this location. There are some smaller areas of surface water flooding across the site in areas of lower topography. The maximum flood depth within the site is 0.3m-0.6m associated with a topographical depression in the northwest of the site and the most easterly drain in the southeast of the site. However, the majority of flood depths across the site are 0.2m or less.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Due to the scale of the site, multiple access routes have been assessed, see Figure 9. In the south of the site, access is assumed to be via the B4020 heading south, this route remains outside of both pluvial and fluvial flood zones. In the east of the site access is assumed to be via Burford Road heading north. In the west access is assumed to be via an unnamed road heading north. These roads meet and join the north access route along Burford Road towards the A40, all of these routes remain outside of fluvial and pluvial flood zones.

It should be noted that these 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.

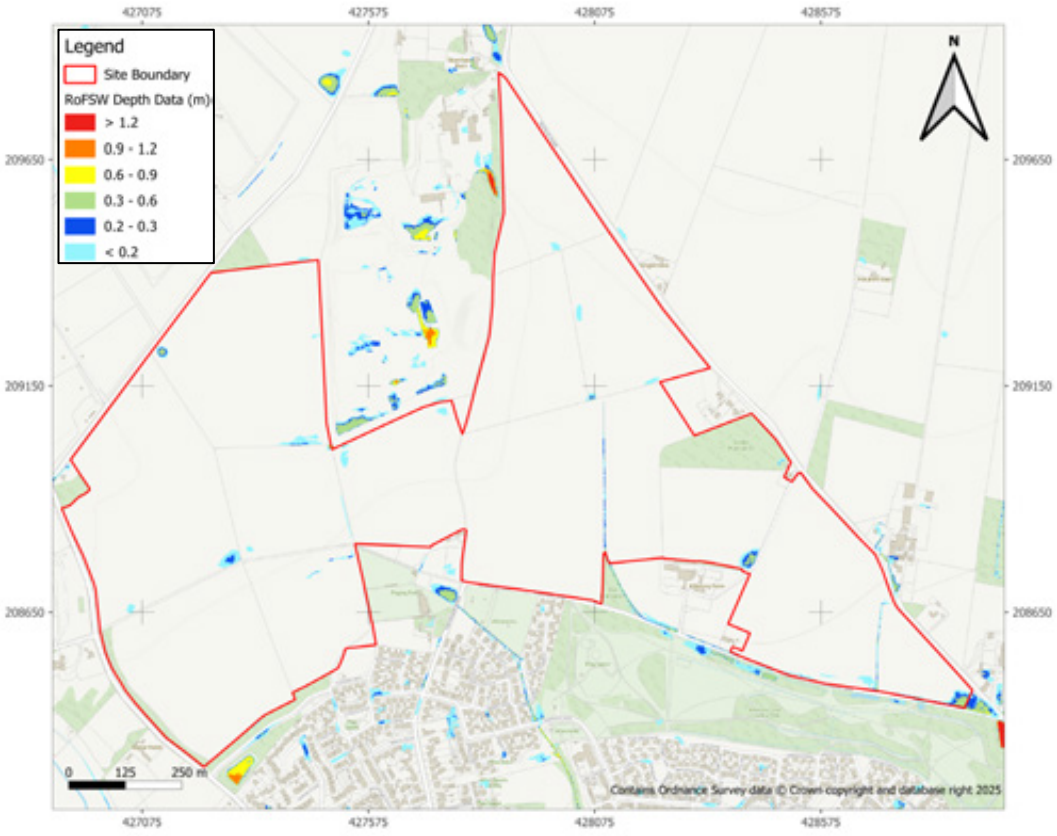


Figure 8 RoFSW Depth Data for 1.0 % AEP + Climate Change Event

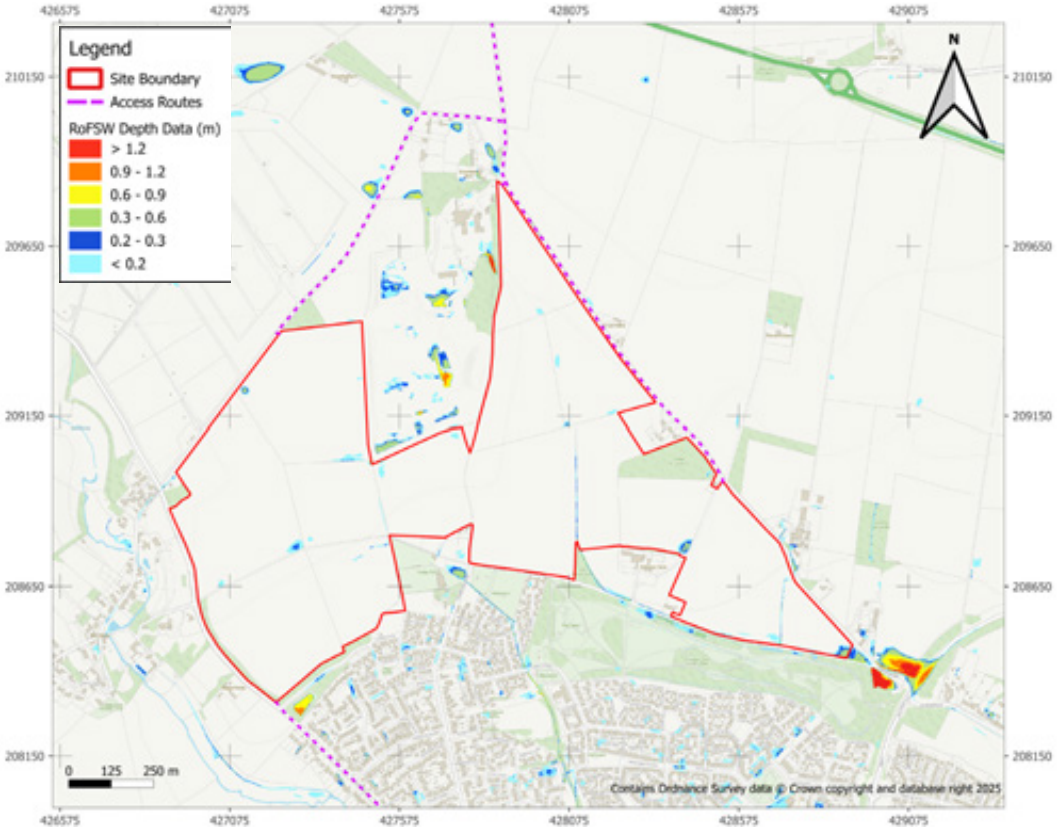


Figure 9 Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential categorised as *More Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, small parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located within drainage channels in the southeast of the site. Provided a sequential approach is followed, it should be possible to locate infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 114.6 ha, allocated for 700 to 800 dwellings. Assuming medium density housing (60 dwellings per hectare) the maximum number of proposed dwellings (800) would require 13.33 ha of land. As the whole site is located within Flood Zone 1, development should be guided by the surface water flood risk at the site. The 1.0% AEP +CC design event inundates 1.0% of the site which indicates that 113.4 ha of land at the site remains flood free during the design event. It should be possible to locate all development outside of flood risk areas. 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 the whole site is located within Flood Zone 1 in the FMfP, the surface water flood maps should be used to ensure development is prioritised in areas of lower flood risk.

If required ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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.

It should be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125). Site-specific pluvial modelling may be required to better define flood risk depending on the final development layout.

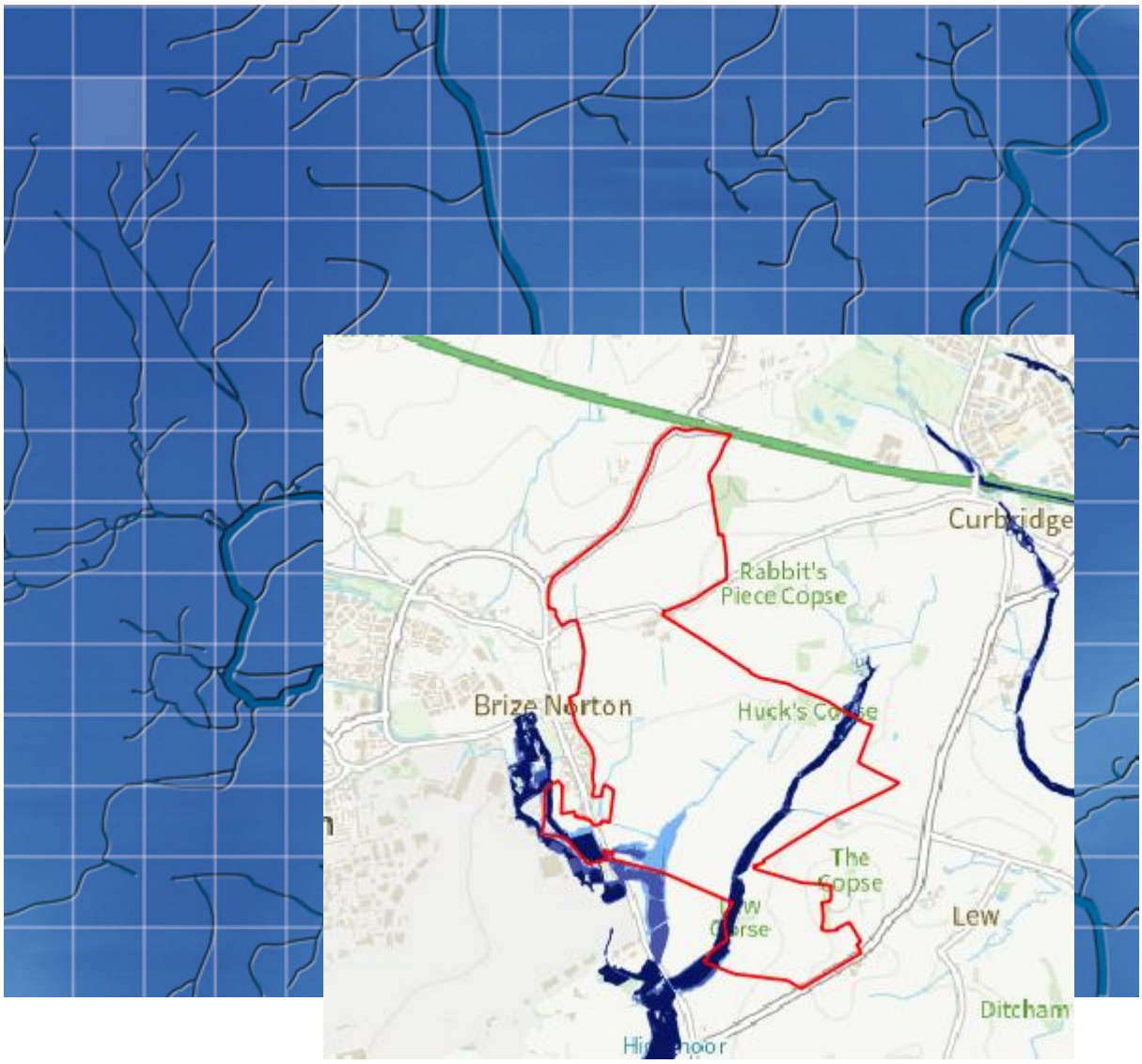
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site is varied with freely draining soils expected and variable bedrock permeability. Therefore, whilst the use of infiltration SuDS solutions may be possible in some areas, it is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land East of Brize Norton (G+H)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land East of Brize Norton (G+H)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	Draft	Jasmine Lucas (*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.

Registered Office Stables 4 Howbery Business Park, Benson Lane, Wallingford, England, OX10 8BA

www.hydrosolutions.co.uk

Land East of Brize Norton (G+H) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

The site is at risk from both fluvial and pluvial sources.

Overall, the risk from fluvial flooding is considered to be moderate being localised to the watercourses present within the site. The EA Flood Map for Planning shows 4.5% of the site is located within the 1.0% AEP +CC design event extent. The depth mapping for the design event, shows flooding is limited mostly to the Norton Ditch in the east and Highmoor Brook in the southwest. Inundations depths vary with the greatest depths (0.6 m) closest to the watercourses, though the majority of the flood depths are 0.3 m or less.

Pluvial flood risk is also associated mainly with the areas around the watercourses at the site with 4.6% of the site located within the 1.0% AEP +CC design event extent. Outside of the watercourse channels, the greatest flood depth is 0.6-0.9 m though flood depths across the rest of the site are predominantly 0.3 m or less. Overall, the surface water flood maps show the flood risk may be both fluvial (river overtopping) and pluvial (overland flow/ponding) in origin.

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

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 proposed mixed-use scheme includes residential (More Vulnerable) and employment (Less Vulnerable) development. A sequential approach prioritises Flood Zone 1. Where this is not possible, More Vulnerable uses are appropriate in Zone 2 and in Zone 3a subject to the Exception Test, while Less Vulnerable uses are suitable in Zones 2 and 3a. Neither is permitted in Zone 3b.

With 93.4% of the site in Flood Zone 1 (including climate change), most infrastructure can be located outside fluvial risk areas. Although some surface water flood risk exists, mainly along watercourses, most of the site is unaffected. However, potential constraints, particularly to site access and the potential requirement for bridge crossings will need to be addressed in a site-specific Flood Risk Assessment (FRA).

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land East of Brize Norton (Reference: G+H) 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 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 East of Brize Norton (G+H) is a 392-ha site located east of the village of Brize Norton and southwest of the town of Witney. The area shown within Figure 1 is the BN 006 HELAA site which encompasses the land identified within the council's preferred spatial option areas G and H. The entire HELAA site has potential for housing and employment development, it is larger than the two spatial options combined but covers a very similar area. Its boundary will be used for this assessment.

Land use across the site is predominantly agricultural with surrounding land also consisting mostly of agricultural fields. However, the residential area of Brize Norton is located directly adjacent to the west of the site, with RAF Brize Norton located to the southwest.

Within the emerging local plan, preferred spatial option G is allocated for employment land (10,000 m^2 Class E and 30,000m^2 Class B2/B8) whilst preferred spatial option H is allocated for residential uses (1500-2500 dwellings). Area G covers the majority of the land in the north of the HELAA site, whilst area H covers the majority of the land in the centre and south of the site.

2.2 Topography

Based on 1m LiDAR data, ground levels at the site generally slope towards the centre with higher land in the north and southeast of the site, see Figure 2. Ground levels range from 72.2m AOD to 115.7m AOD with the average ground level approximately 84m AOD.

2.3 Nearby Watercourses

Several watercourses flow from north to south within the lower part of the site. Norton Ditch is located in the east of the site whilst Highmoor Brook flows through the centre of the site. Several tributaries of the Highmoor Brook are located in the west of the site. The confluence of Norton Ditch and Highmoor Brook is located approximately 275 m southwest of the southern portion of the site, see Figure 1.

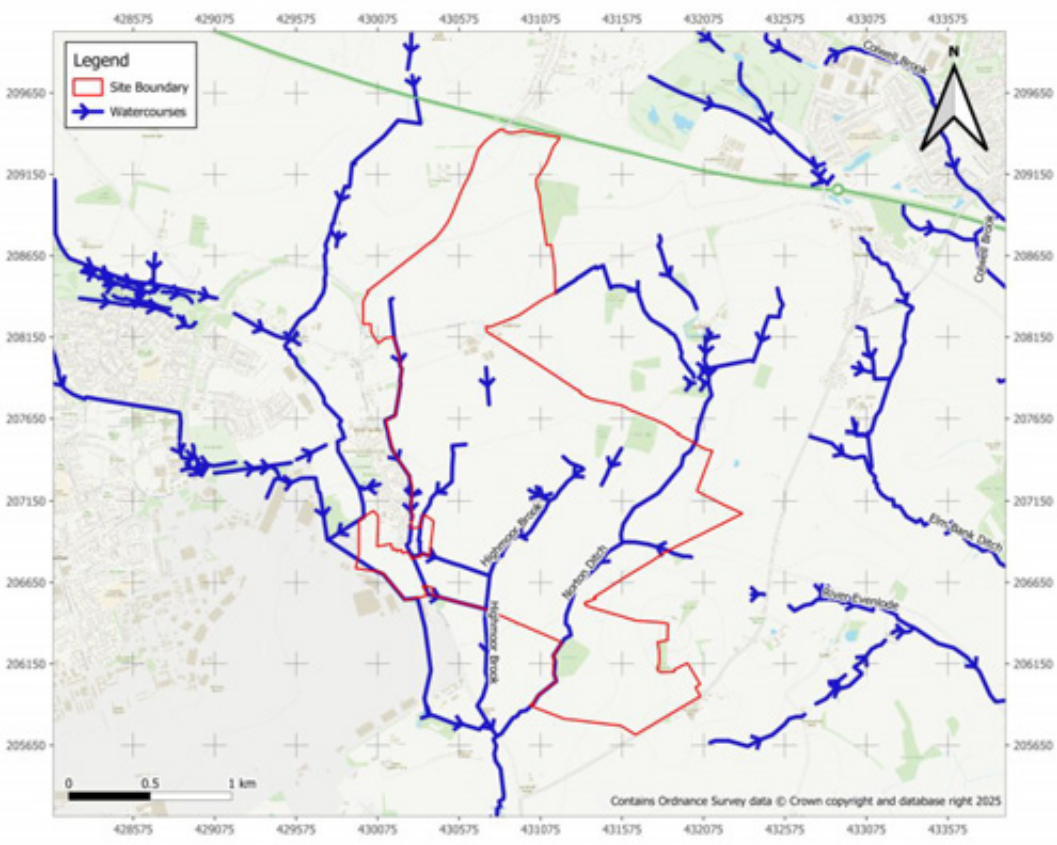


Figure 1 - Site Location

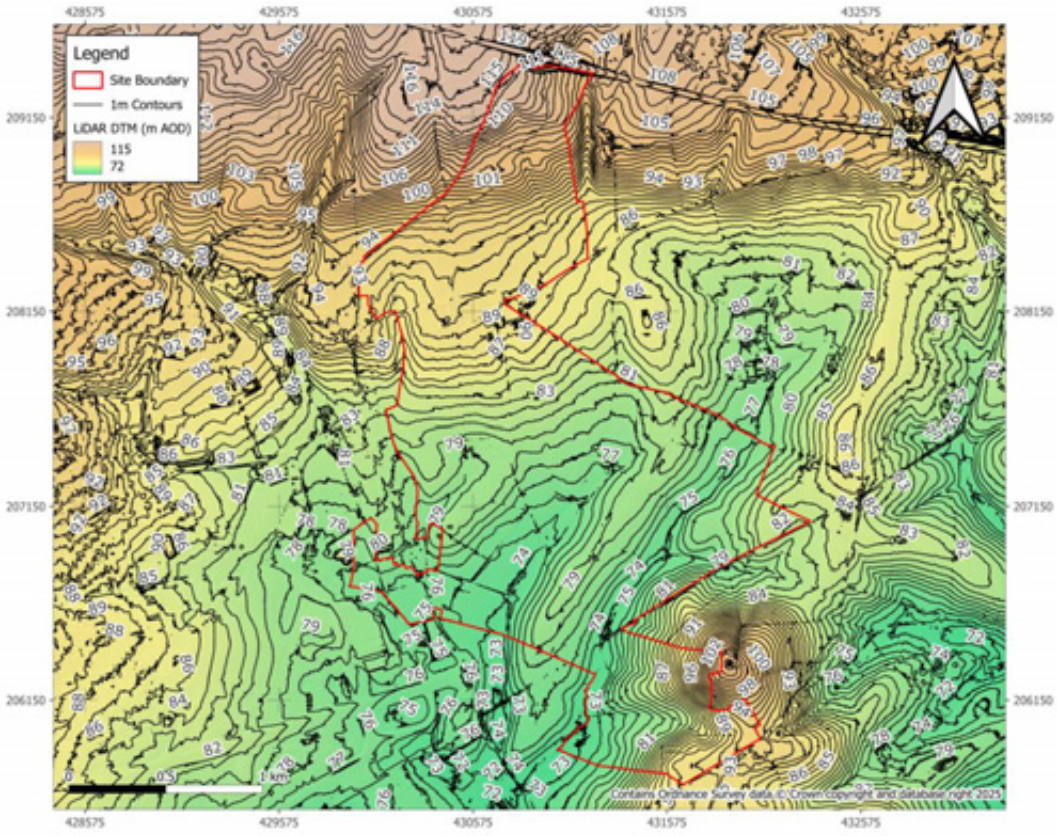


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has one record of flooding at the site associated with a tributary of the Highmoor Brook that runs along the western boundary of the site, see Figure 3. This event occurred in July 2007 and the recorded flood outline inundates less than 1% of the site area.

3.2 Fluvial Flood Risk

In the EA Flood Map for Planning (FMfP) dataset, 5.5% of the site is located in Flood Zone 2 (0.1% AEP) and 3.8% is located in Flood Zone 3a (1.0% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. Viewing the extents for this event, 3.2% of the site is located in Flood Zone 3b. This area of flood risk is predominantly associated with the Norton Ditch and partially associated with Highmoor Brook, see Figure 4. It is anticipated that the majority of the flood risk associated with the Highmoor Brook is displayed within the Risk of Flooding from Surface Water dataset.

The EA Flood Map for Planning Climate Change dataset has also been assessed. During the 0.1% AEP +CC event 6.6% of the site is inundated whilst 4.5% is inundated during the 1.0% AEP +CC event, and 3.7% is inundated during the defended 3.3% AEP +CC event, see Figure 5.

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

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 2.7% of the site is inundated in the 3.3% AEP event, 3.8% is inundated in the 1.0% AEP event and 6.8% is inundated in the 0.1% AEP event, see Figure 6. When accounting for climate change the proportions moderately increase to 3.2% in the 3.3% AEP event, 4.6% in the 1.0% AEP event and 8.6% in the 0.1% AEP, see Figure 7.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, there are smaller watercourses across the site which are not accounted for within the fluvial models and therefore are represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map may be both fluvial (river overtopping) and pluvial (overland flow) in origin. Both Figure 6 and Figure 7 shows the majority of the surface water extents to follow the watercourses running through the site with channelised flows.

Overall, the risk of surface water flooding is considered to be moderate and is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by a range of bedrock formations consisting of Mudstone in the south of the site and Limestone in the South, Sandstone and Siltstone formations are also present. These bedrock formations represent a range of potential permeabilities, with the limestones in the north of the site expected to be highly permeable and the mudstones in the south relatively impermeable, sandstone and siltstone typically exhibit moderate permeability. In terms of superficial deposits, small areas of alluvium are present along the Norton Ditch and

Highmoor Brook with additional sand and gravel deposits in the southwest of the site. Landis Soilscapes mapping indicates the north of the site has freely draining shallow lime-rich soils, whereas the south of the site has slowly permeable seasonally wet loamy and clayey soils with impeded drainage.

Based on the data available the risk of groundwater flooding is considered spatially variable across the site with a higher risk in the north of the site given that the water table is likely to be mobile. However, more data is required at the planning stage to confirm this. In the parts of the site close to the Norton Ditch or Highmoor Brook, groundwater flooding could be heavily correlated with fluvial flooding.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 8.

3.7 Flood Warning Service

Parts of the site are located within the Shill Brook at Carterton and Bampton EA Flood Warning Area.

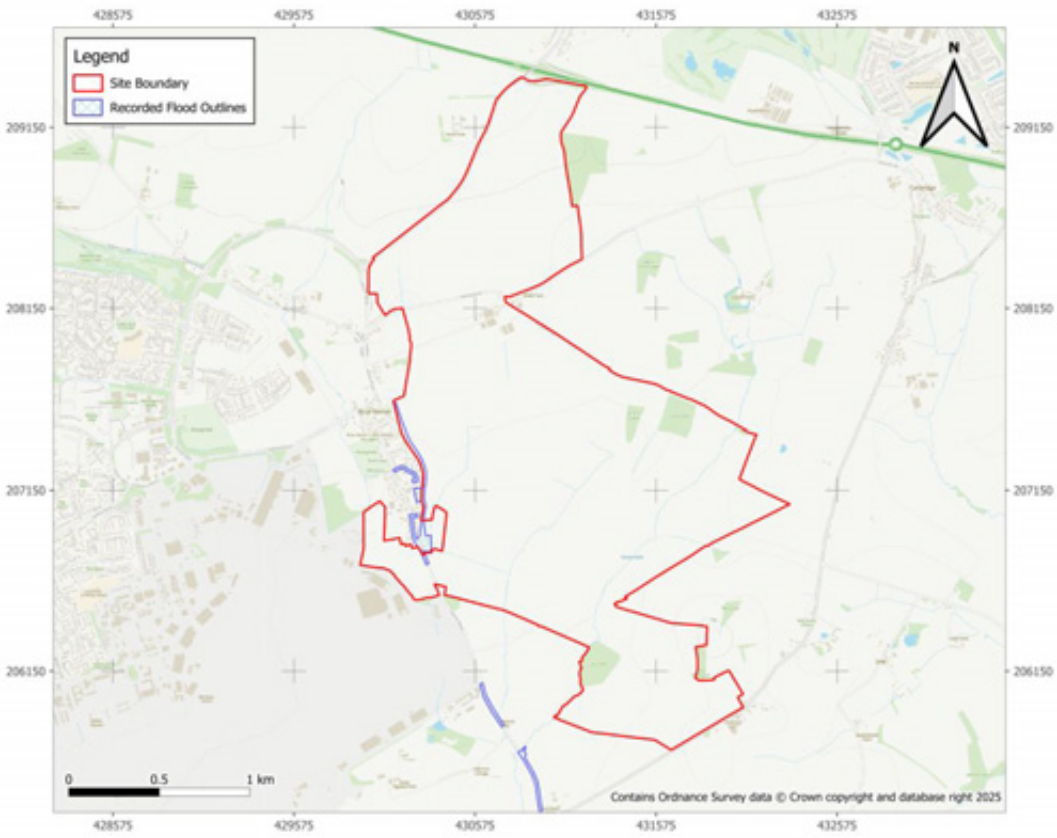


Figure 3 - Recorded Flood Outlines

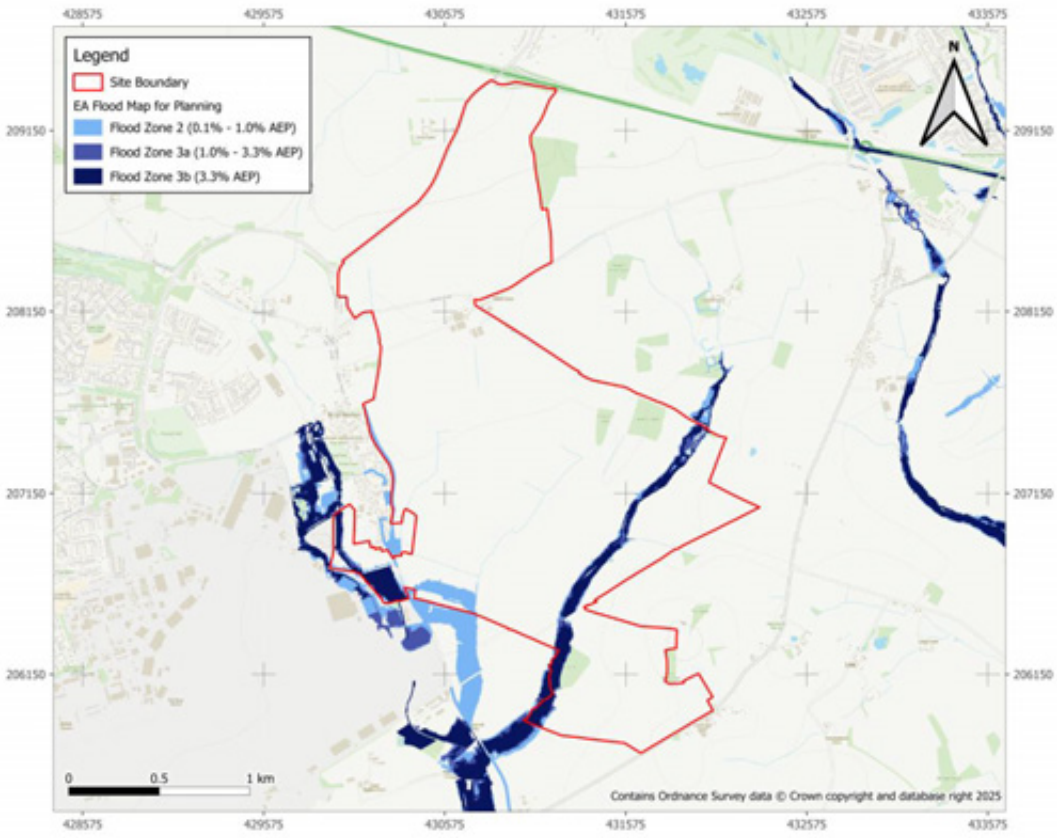


Figure 4 - Fluvial Flood Map

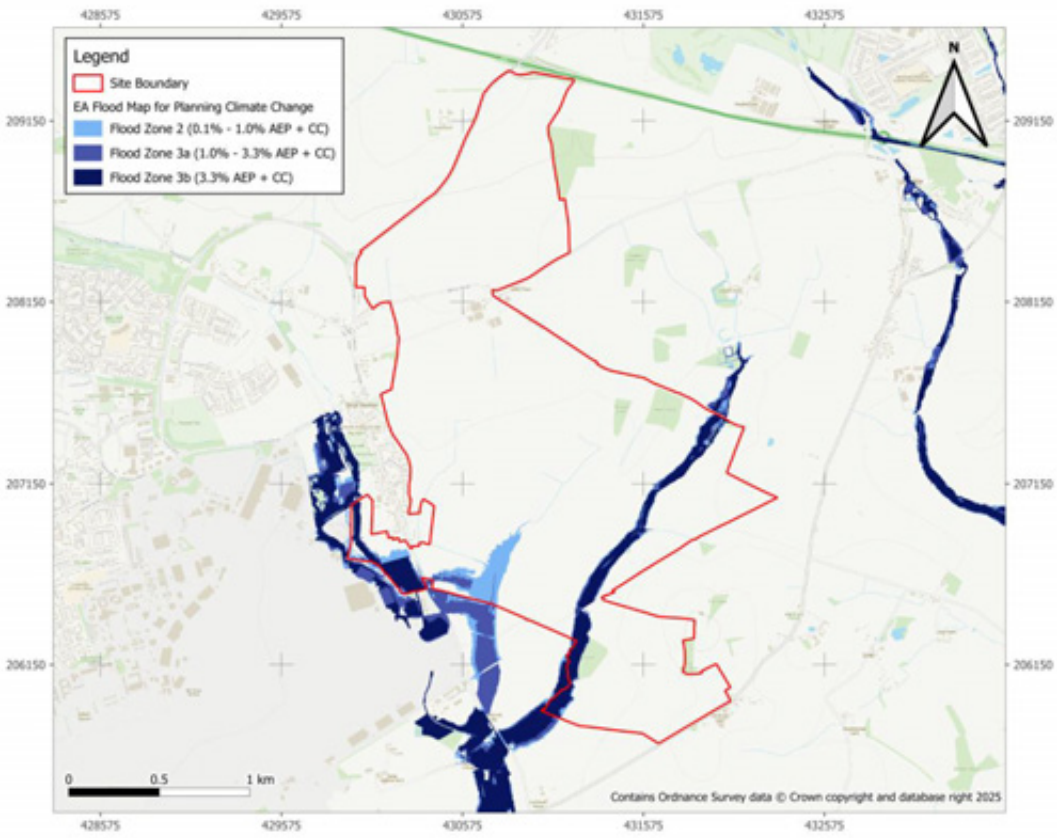


Figure 5 – Fluvial Climate Change Flood Map

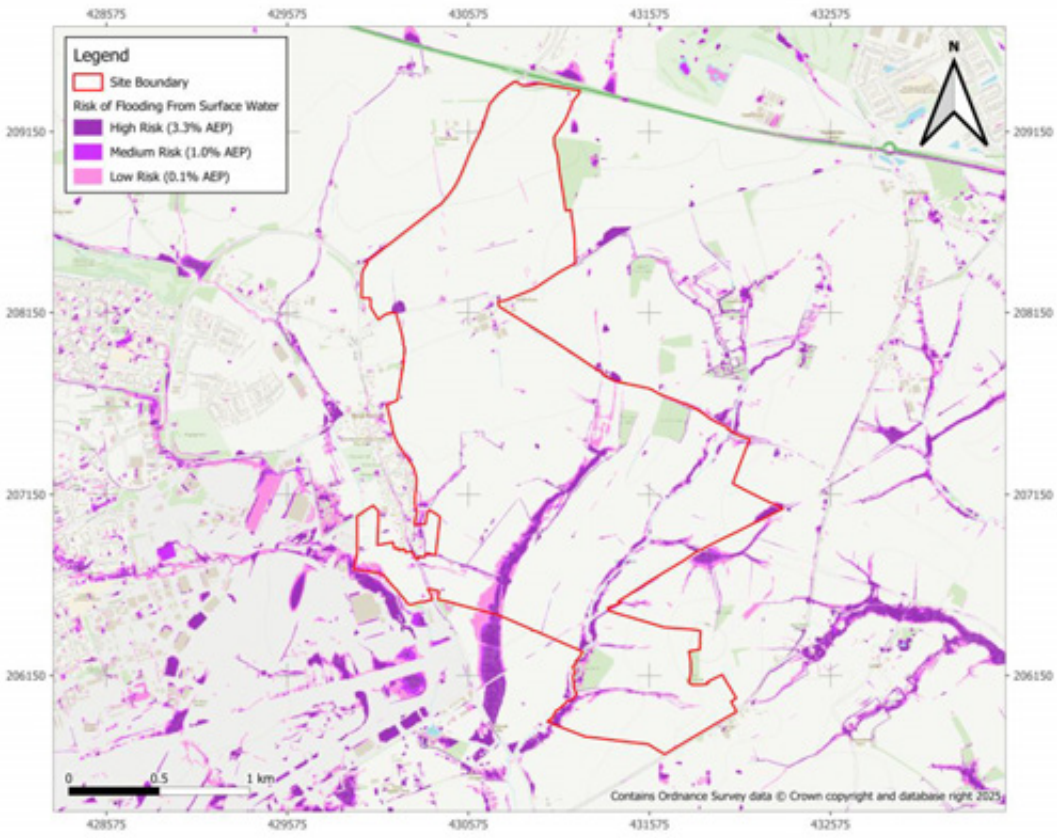


Figure 6 – Surface Water Flood Map

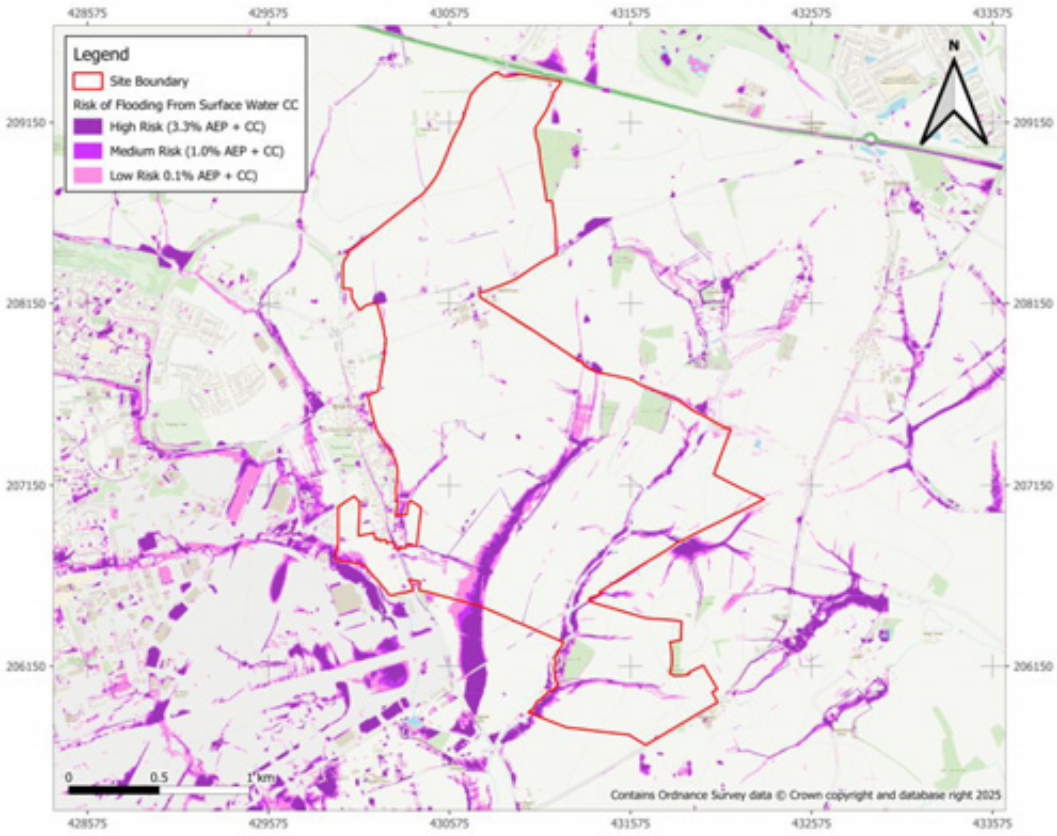


Figure 7 -Surface Water Climate Change Flood Map

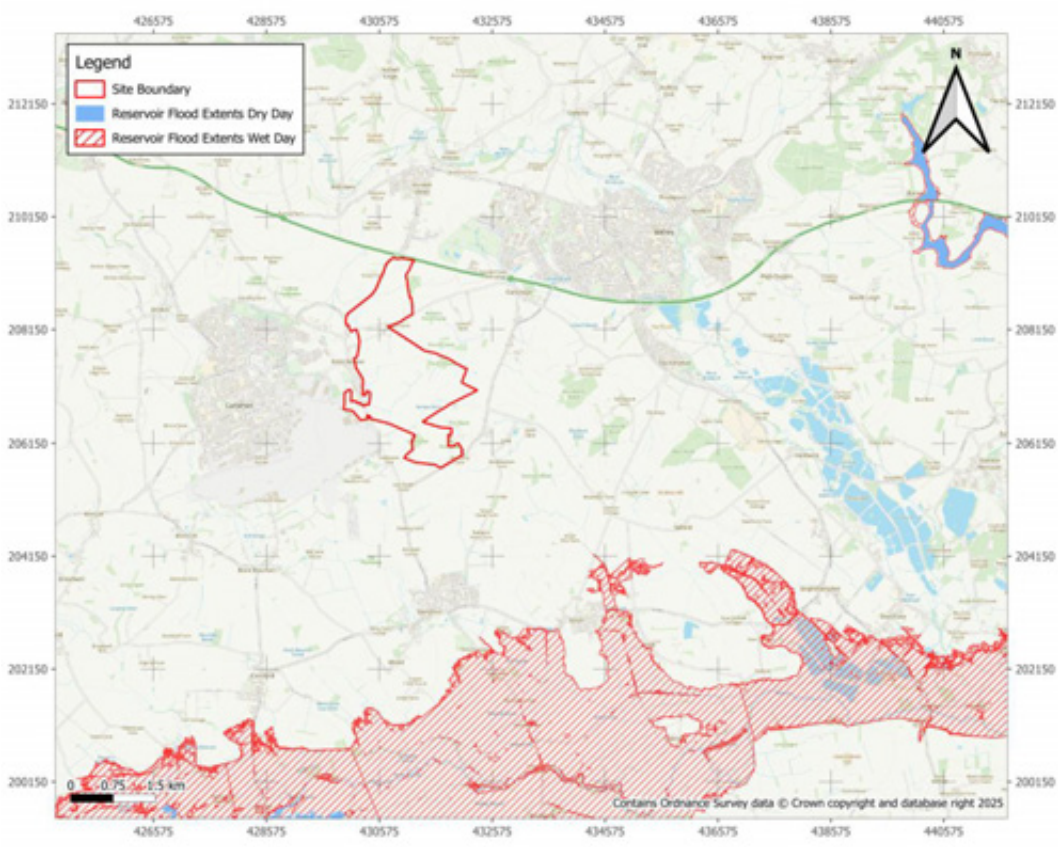


Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism across the majority of the site is pluvial in origin though fluvial flood risk is the more dominant mechanism within the east of the site. Therefore, the flood risk generated by both mechanisms are quantitively assessed in more detail below. It should be noted that the pluvial flood mapping is expected to show flood risk related to both surface water and fluvial sources.

4.2 Flood Risk Metrics

Depth data is not available for the fluvial climate change extents reviewed in section 3.2; these extents consider the 2080s epoch (2070-2125). However, depth data is available from the national mapping from the Risk of Flooding from Rivers and Sea (RoFRS) dataset. The climate change allowances used in RoFRS are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow increases. The RoFRS extents are very similar to the extents applying the 2080s allowances, therefore are considered suitable for the purposes of this SFRA. However, it should be noted that given the expected lifetime of the development, a site-specific FRA will need to consider the climate change impacts for the 2080's epoch (2075-2125). It should be noted that one area close to the Highmoor Brook in the southwest of the site shows to be inundated in Figure 5 but is not included within the depth data shown in Figure 9.

The depth mapping across the site shows flooding is limited to the southern portion of the site. The Norton Ditch and the surrounding land in the east of the site is affected, along with the Highmoor Brook and land in the southwest of the site. Outside of the watercourse channels directly, the maximum flood depth for the 1.0% AEP +CC design event is 0.3-0.6 m located just upstream of where the Norton Ditch is understood to be culverted beneath a small farm track. It is unclear whether the national modelling represents this culvert, if not the culvert may provide additional conveyance potentially reducing flood depths in this location. Flood depths across the rest of the site floodplain are less 0.3 m with the majority of flood waters less than 0.2 m.

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 10) shows surface water flooding at the site predominantly follows the locations of the watercourse channels with the greatest flood depths (0.9-1.2m) located within the channels of the Highmoor Brook and its tributaries. Outside of the watercourse channels, the greatest flood depth is 0.6-0.9 m located where the watercourse in the north of the site is culverted beneath Witney Road. It is unclear whether the national modelling represents this culvert, if not the culvert may provide additional conveyance potentially reducing flood depths in this location. Flood depths across the rest of the site are predominantly 0.3 m or less. Overall, the surface water flood maps show flow paths from north to south, though this may be both fluvial (river overtopping) and pluvial (overland flow/ponding) in origin. It is currently assumed that the surface water flood maps provide a good proxy for fluvial flooding from the small watercourses across the site as the flood extents clearly follow the watercourse channels and appear to be proportionate with the level of flood risk expected for the size of their catchments.

It should be noted that the climate change allowances used in the RoFSW extents are also based on the 2050's epoch (2041-2069) and reflect the median estimate of rainfall increases. The dataset is designed to be suitable for short-medium term decisions. 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

Due to the size of the site, access is possible from several points. One southern (A4095) and one northern (Witney Road) access point have been highlighted below in Figure 11. During the 1.0% AEP +CC design fluvial event, both roads remain predominantly flood free.

Site users in the south should follow the A4095 northeast towards the village of Curbridge where access is possible onto the A40. This route avoids the flood risk extents associated with the River Thames to the southeast and River Windrush to the east of the site. However, it should be noted that a small section of the route within Curbridge is inundated by the design fluvial event. Site users in the north should follow Witney Road west towards Carterton. From here they should join the Burford Road travelling northwest which provides access to the A40. No part of this route is inundated by the design fluvial event.

Areas of surface water flood risk are present across both routes, with the greatest risk located along the route from the northern section of the site at the junction between the Burford Road and the B4477. The maximum depth along the route at this location is 0.3 m, associated with a depression in the local topography. Along the route from the southern area of the site, the greatest flood depth is also 0.3 m located on Well Lane in the village of Curbridge.

Whilst the risk of both fluvial and surface water flooding is generally considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known.

As parts of the site, particularly those in the south, are divided by watercourses, it is likely that bridges may be required to link parts of the site together. These may be required to be located in Flood Zone areas. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level. A site-specific FRA should investigate the requirement for bridges and their design, with modelling likely to be required for any works in flood risk areas.

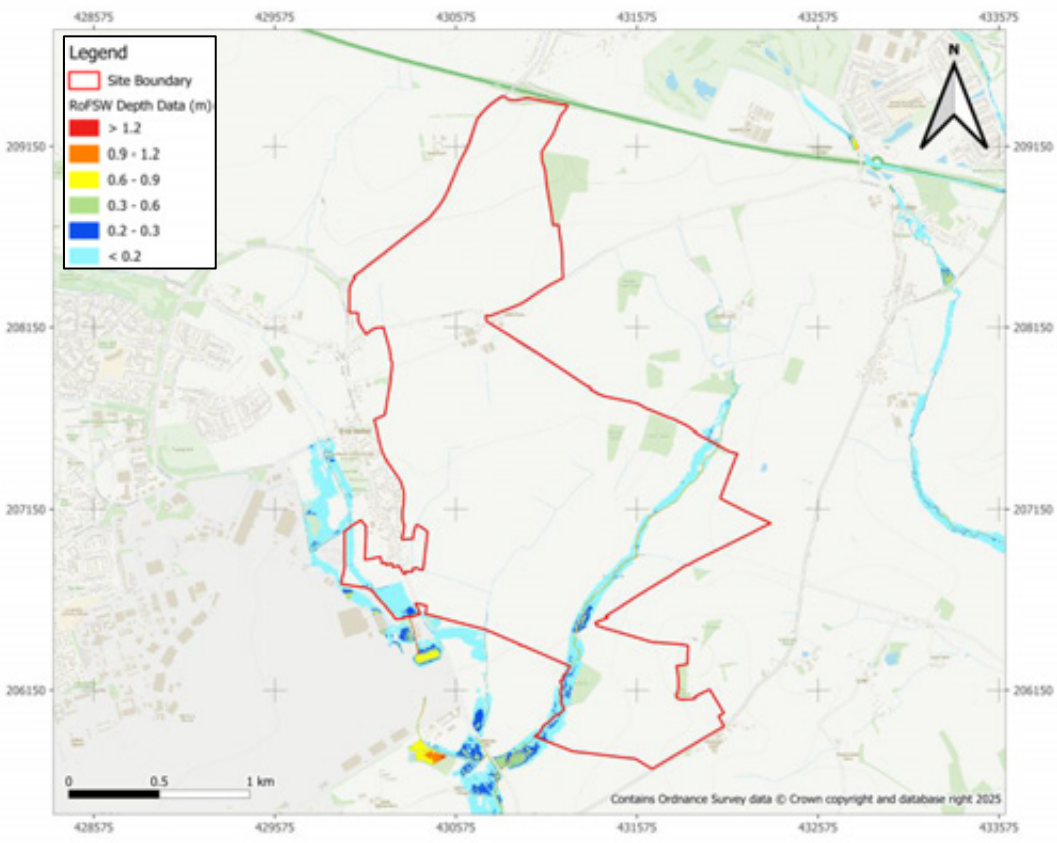


Figure 9 – RoFRS Depth Data for 1.0 % AEP + Climate Change Event

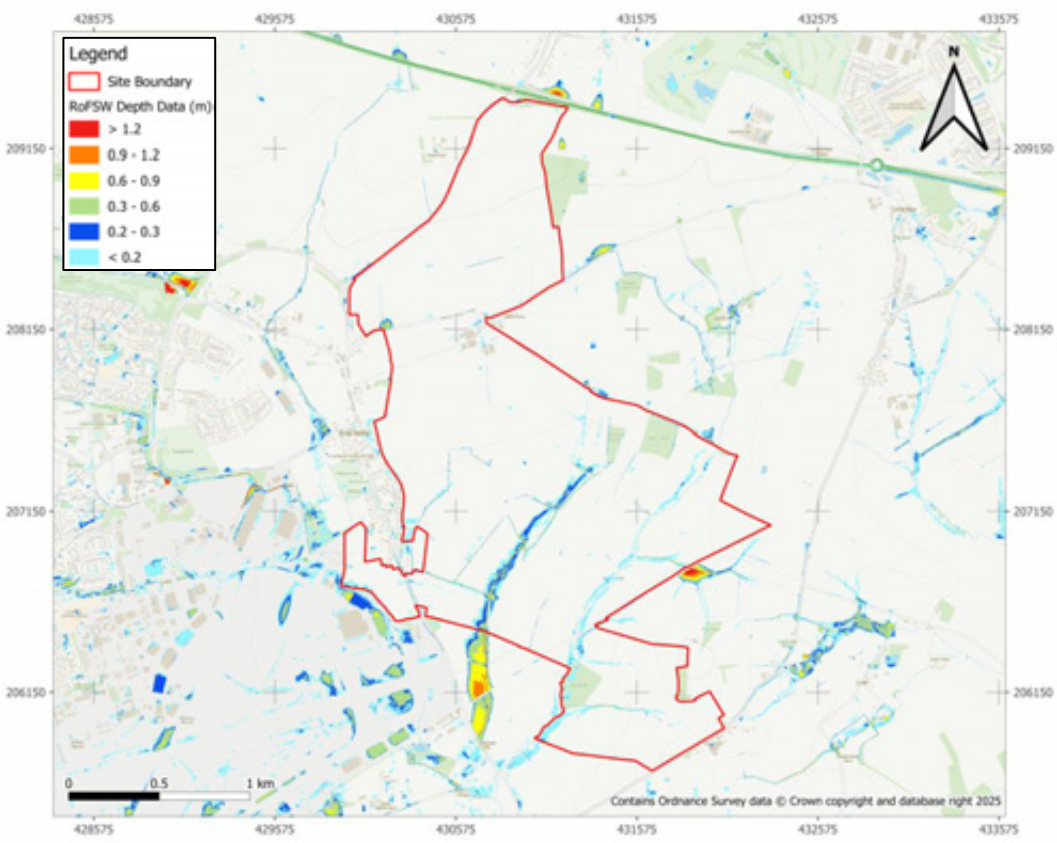


Figure 10 - RoFSW Depth Data for 1.0 % AEP + Climate Change Event

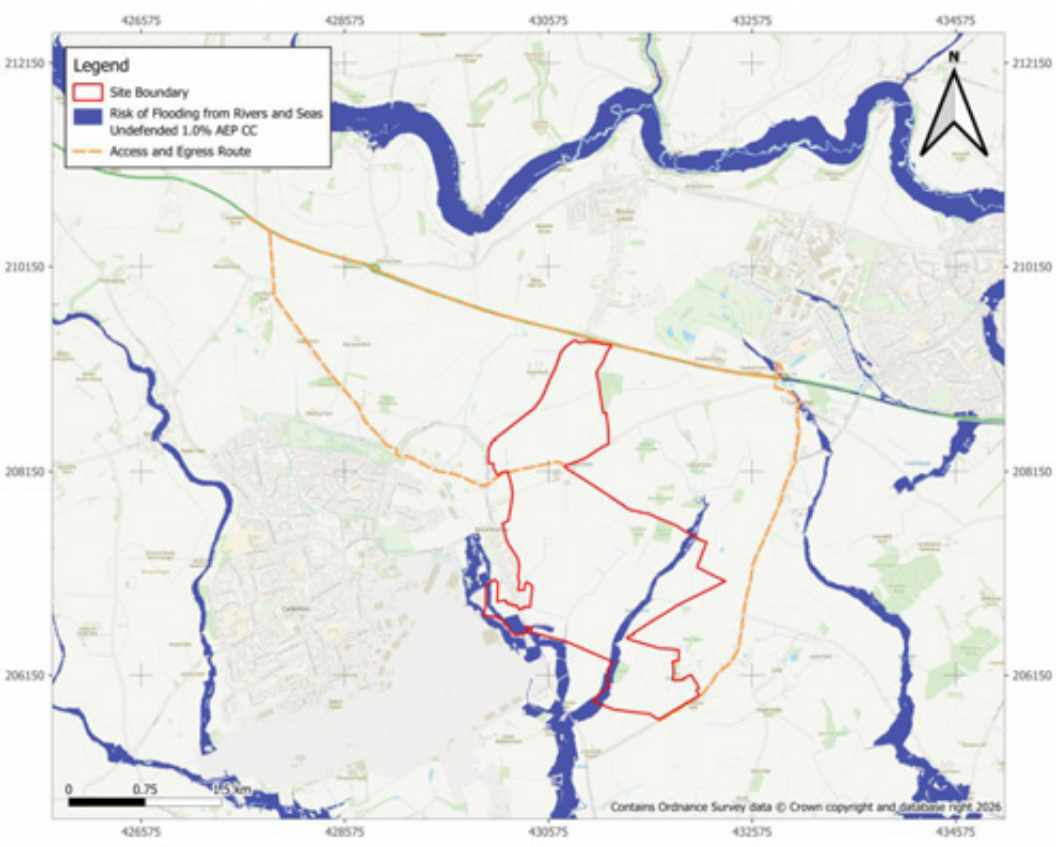


Figure 11 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is mixed use with residential development categorised as *More Vulnerable Development* and employment development categorised as *Less Vulnerable Development*. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More Vulnerable Development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a, whereas Less Vulnerable Development is permissible in both Flood Zone 2 and 3a. Neither development category is permissible in Flood Zone 3b.

Given that the majority of the site is located within Flood Zone 1 (93.4%) when including an allowance for climate change), it should be possible to locate all infrastructure outside of the fluvial flood zones. However, it should also be noted that areas of significant surface water flood risk are also present at the site, though these are also predominantly associated with the watercourses across the site. Most of the site lies outside of these extents and it should be possible to locate a large amount of infrastructure outside of these areas, though constraints may remain with regard to both fluvial and surface water flood risk to site access which will need to be explored as part of a site-specific FRA.

5.2 Scale of Development

The total site area is currently 392 ha; allocated for 1500-2500 dwellings and 4 ha of employment land. Assuming medium density housing (60 dwelling per hectare), 1500-2500 dwellings would require 25 - 41.7 ha of land. When combining the climate change extents of both the surface water and fluvial flood maps, 345 ha of the site remains outside of all flood zones. This should allow for all buildings associated with the development to be located outside of flood risk areas. However, given the spatial distribution of the watercourses particularly in the south of the site, bridge crossings may be required to link some infrastructure.

5.3 Sequential Approach

Whilst both More Vulnerable Development and Less Vulnerable Development are permissible in Flood Zone 2, it is still 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.

As surface water flood risk is also present across the site, both flood extents should be used to guide infrastructure at the site to the areas of lowest flood risk considering the impacts of climate change. If required employment infrastructure and ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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.

Furthermore, as only national scale modelling is available at the site, if development is proposed within the flood extents, detailed modelling may be required during a site-specific

FRA to better inform design flood levels and finished flood levels at the site. It should also be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125).

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 variable permeability, therefore the use of infiltration SuDS solutions may be possible in some areas. It is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates, this will confirm where infiltration may be viable. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

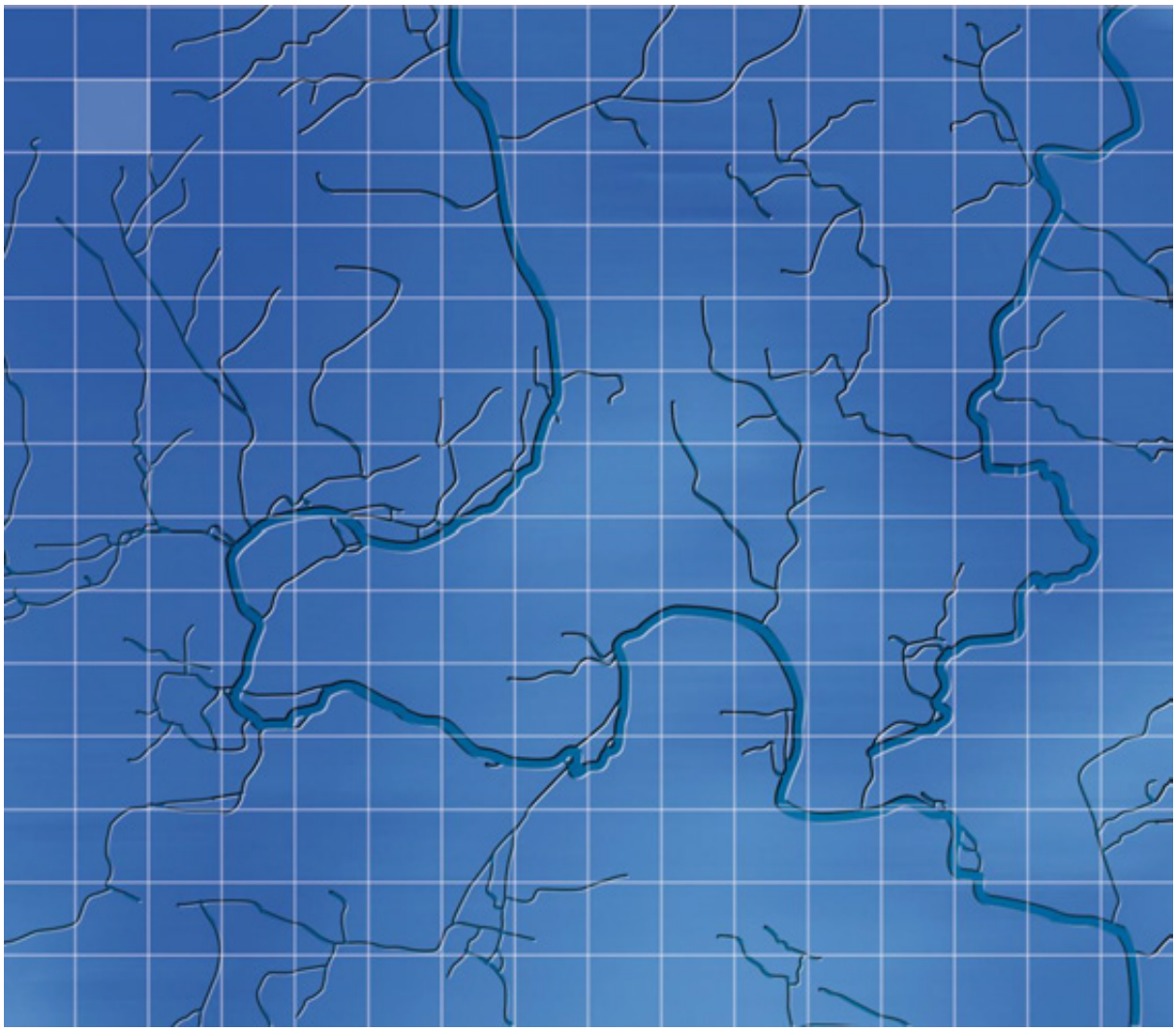
Aforementioned, parts of the site are divided by watercourses, and so it is likely that bridges may be required to be located in flood zone areas in order to link parts of the site together. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level. A site-specific FRA should investigate the requirement for bridges and their design, with modelling likely to be required for any works in flood risk areas.

West Oxfordshire District Council

April 2026

Land West of Carterton (I)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land West of Carterton (I)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	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.

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

Land West of Carterton (I) Level 2 SFRA

Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the greatest risk of flooding to the site with 3.1% of the site inundated during the design 1.0% AEP plus Climate Change fluvial event. Overall fluvial flood risk is considered moderate being localised to the east of the site following the Shill Brook.

The Risk of Flooding from Rivers and Sea (RoFRS) depth data shows that for the 1.0% AEP plus Climate Change event, outside of the Shill Brook flood depths on site tend to be less than 0.3m.

The risk from pluvial flooding is considered to be moderate, affecting 1.9% of the site in the design 1.0% AEP plus Climate Change pluvial event. Whilst surface water flooding only effects a small proportion of the total site area, it is associated with an overland flow route running north to south across the centre of the site which could affect development layout.

The risk from other sources of flooding is considered to be moderate.

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 pluvial and fluvial flood risk.

Conclusions and Recommendations

Overall, the site is considered to be developable. It should be possible to locate all more vulnerable infrastructure in Flood Zone 1 and outside of the design pluvial and fluvial flood extents, thus ensuring that the site passes the exception test.

However, this site is divided by an overland flow route and the Shill Brook, and so bridges may be required to be located in flood zone areas in order to link parts of the site together. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land West of Carterton (Reference: I) 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 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

The Land West of Carterton (I) site is 125.37ha in area located west of Carterton and south of Shilton, see Figure 1. The site is located on agricultural land and is bordered by residential development to the east, agricultural land to the north and west and the RAF Brize Norton Airfield to the south.

The site has been allocated for residential development, with a proposed capacity of 600 to 1000 dwellings.

2.2 Topography

Based on 1m LiDAR data, the Land West of Carterton slopes towards the Shill Brook in the east of the site. The ground levels within the site boundary range from 84.6 m AOD to 104.9 m AOD, see Figure 2. The average ground level is 95.3 m AOD.

2.3 Nearby Watercourses

The Shill Brook runs from north to south in the east of site, see Figure 1. A tributary of the Shill Brook also runs from north to south, joining the Shill Brook 900m south of the site

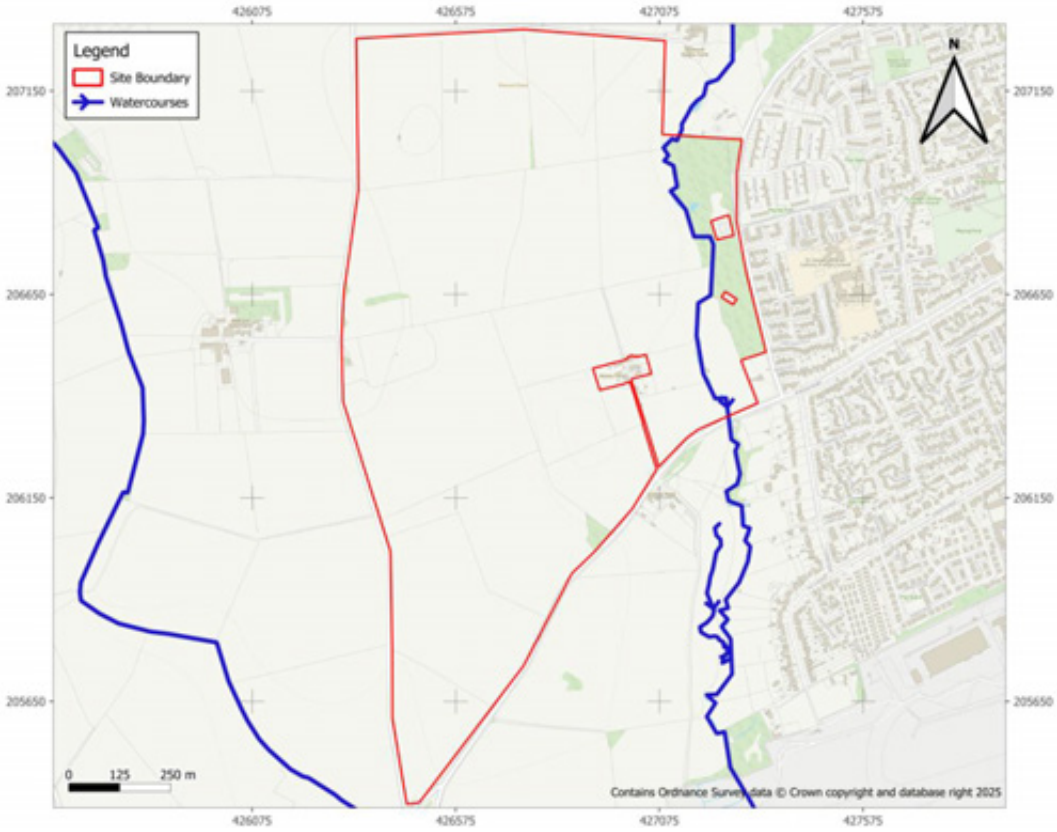


Figure 1 - Site Location

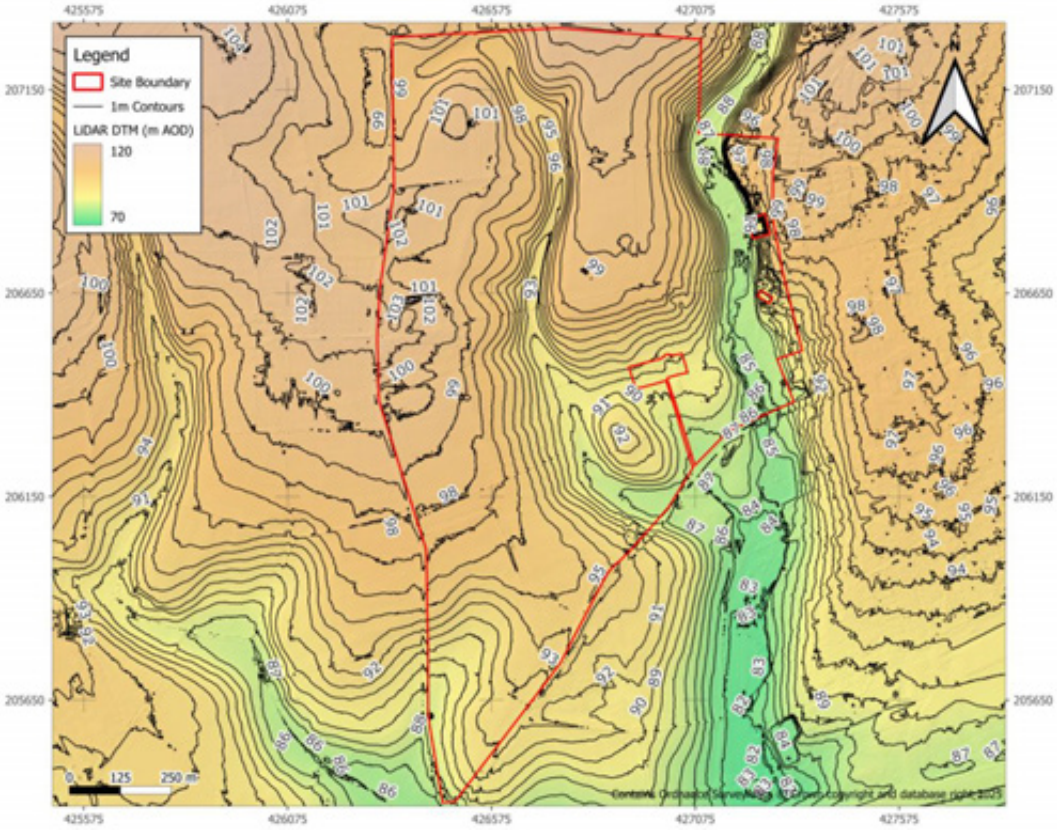


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest recorded flood event is approximately 190m south of the site, it occurred in 1993 and was associated with the channel capacity of the Shill Brook being exceeded.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 3.3% of the site is located within Flood Zone 2 (0.1% AEP), and 2.9% is located within Flood Zone 3a (1.0% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. This extent shows 2.1% of the site to be located within Flood Zone 3b. All flooding at this site is associated with the Shill Brook, see Figure 3.

The EA FMfP Climate Change dataset shows that a marginal increase in flood extents for the events assessed. For the 0.1% AEP and 1.0% AEP undefended events the proportions increase to 3.8% and 3.1% respectively. For the 3.3% AEP defended event, the proportion increases to 2.8%, see Figure 4.

Fluvial flood risk is considered to be moderate, with flood risk being solely associated with the Shill Brook in the east of the site. The risk of fluvial flooding is considered moderate and is assessed in more detail in section 4.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 1.1% of the site is inundated in the 3.3% AEP event, 1.5% is inundated in the 1.0% AEP event and 2.8% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 1.3% in the 3.3% AEP event, 1.9% in the 1.0% AEP event and 3.9% in the 0.1% AEP, see Figure 6.

Whilst surface water flooding only effects a small proportion of the total site area, it is associated with an overland flow route running north to south across the centre of the site which could affect development layout. Therefore overall, the risk of surface water flooding is considered moderate and is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by interbedded limestones and mudstones, which are expected to permit variable amounts of infiltration. The mudstones are expected to permit low amounts of infiltration however; the limestones are expected to permit moderate to high amounts of infiltration.

Superficial deposits are also recorded at the site, consisting of alluvium (clays, silts, sands and gravels) which follows the direction of the Shill Brook. The overlying soils across the site are shallow lime-rich loamy soils that are freely draining.

Overall, based on the data available the risk of groundwater flooding is considered moderate. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, with the site being located approximately 4.5km northwest of an area at risk of reservoir flooding, see Figure 7 .

3.7 Flood Warning Service

The site is located within the 'Shill Brook at Carterton and Bampton' Flood Warning Area in the east of the site, see Figure 8.

Figure 3 - Fluvial Flood Map

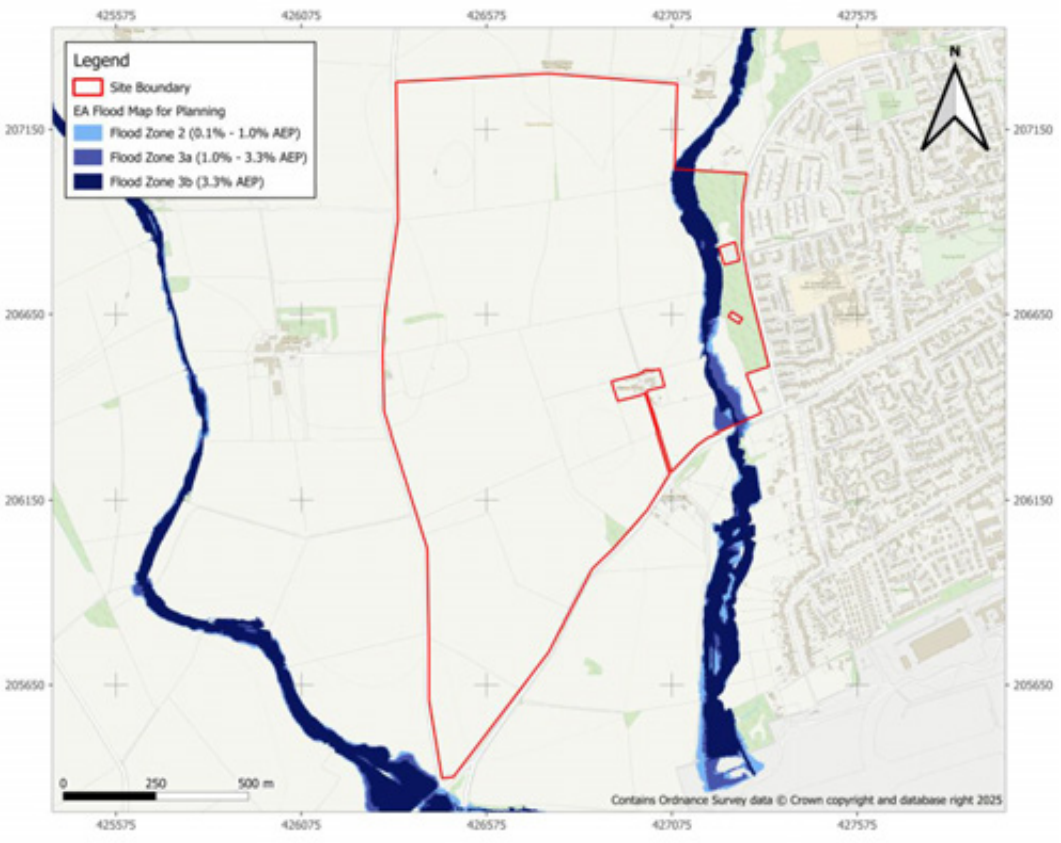


Figure 4 – Fluvial Climate Change Flood Map

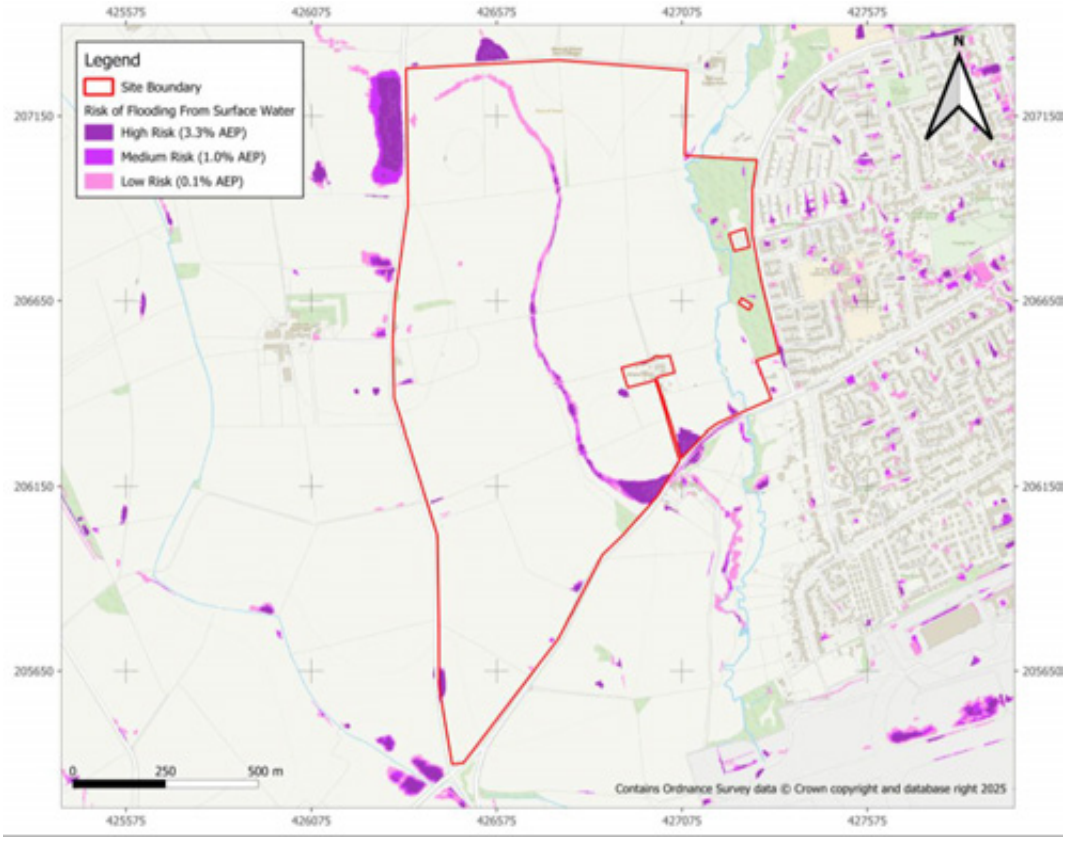


Figure 5 – Surface Water Flood Map

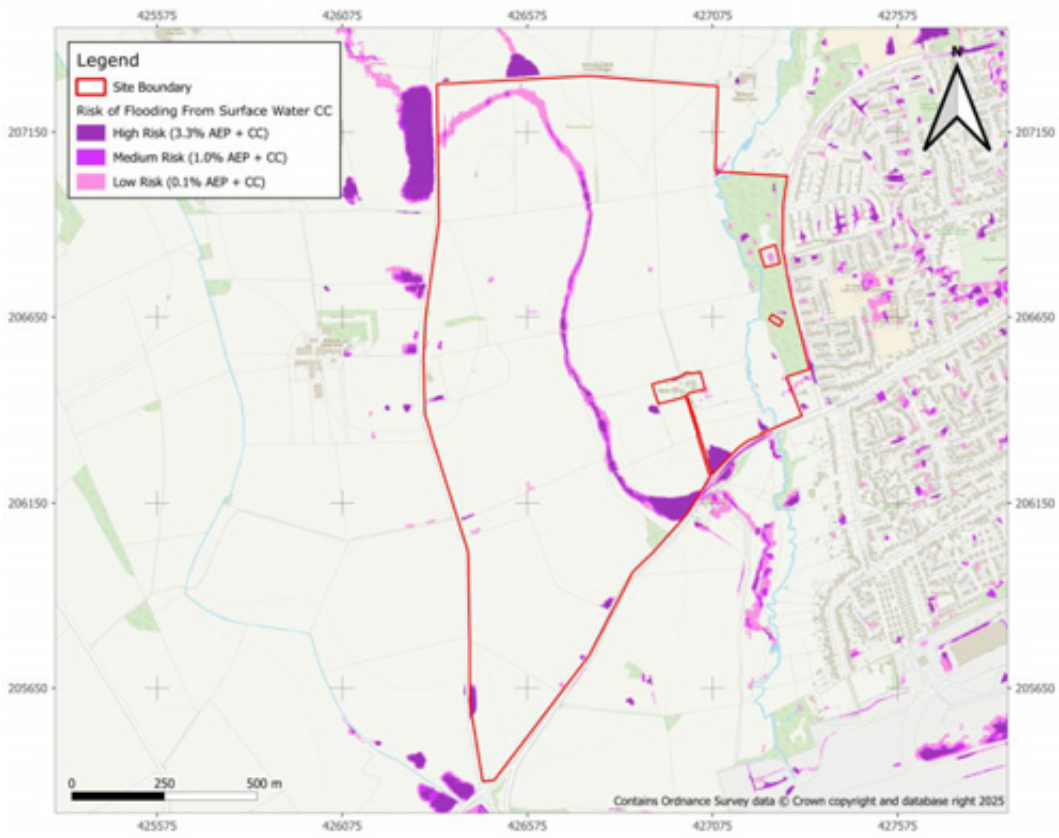


Figure 6 -Surface Water Climate Change Flood Map

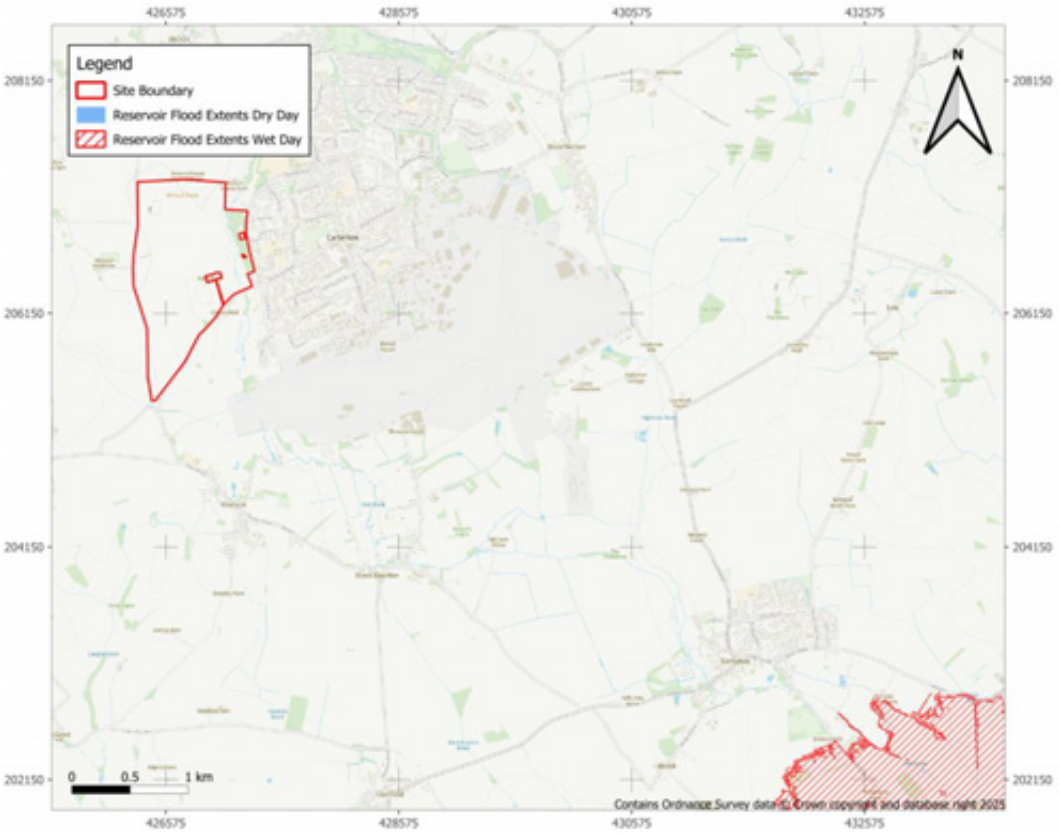


Figure 7 Reservoir Flood Risk

Figure 8 – Flood Warning Service Area Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

Fluvial flooding is the primary flood risk mechanism in the east of the site. Pluvial flood risk is also present, characterised by a flow route across the centre of the site. Therefore, the flood risk generated by both mechanisms are quantitively assessed in more detail below.

4.2 Flood Risk Metrics

Depth data is not available for the fluvial climate change extents reviewed in section3.2 these extents consider the 2080s epoch (2070-2125). However, depth data is available from the national mapping from the Risk of Flooding from Rivers and Sea (RoFRS) dataset. The climate change allowances used in RoFRS are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow increases. The RoFRS extents are very similar to the extents applying the 2080s allowances, therefore are considered suitable for the purposes of this SFRA. However, it should be noted that if the expected lifetime of the development is greater than 45-years, a site-specific FRA will need to consider the climate change impacts for the 2080's epoch (2075-2125).

RoFRS depth mapping across the site, see Figure 9, shows flooding to be limited to the east of the site along the Shill Brook. Flood depths range from less than 0.2m to greater than 1.2m. Depths of between 0.9m to more than 1.2m tend to be associated with depths within the Shill Brook and a small pond. Most depths outside the river channel are less than 0.3m. Given the relative flatness of the site and surrounding area flow velocities are expected to be limited, in turn reducing flood hazard.

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 10) shows surface water flooding at the site predominantly follows a flow path running across the centre of the site. The greatest flood depth is 0.6-0.9m located where the surface water flow path pools behind the B4477 on the site's southern boundary. Flood depths across the rest of the site are predominantly 0.2m or less.

It should be noted that the climate change allowances used in the RoFSW extents are also based on the 2050's epoch (2041-2069) and reflect the median estimate of rainfall increases. The dataset is designed to be suitable for short-medium term decisions. 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

Due to the size of the site, access is possible from several points. One northern and two southern access routes are shown in Figure 11. During the 1.0% AEP +CC design fluvial event, both roads remain predominantly flood free.

Site users to the north should follow the unnamed road north towards the village of Bradwell where access is possible onto the A361, this route avoids areas at risk of fluvial flooding. Site users in the south should follow the B4477 heading east towards Carterton, it should be noted that a section of the route is inundated by the design fluvial event to a depth of 0.2m or less. Site users can also follow the B4477 west towards Alvescot avoiding areas at risk of fluvial flooding.

Areas of surface water flood risk are present across the southern access routes, with the greatest risk located along the B4477 heading west towards Carterton. The maximum depth along the route at this location is 0.3m associated with a depression in the local topography.

Whilst the risk of both fluvial and surface water flooding is generally considered manageable, a site-specific FRA should reassess the route considering the development

layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known. In particular the Shill Brook and surface water flow route present potential barriers to onsite transit and bridges may be required (see section 5).

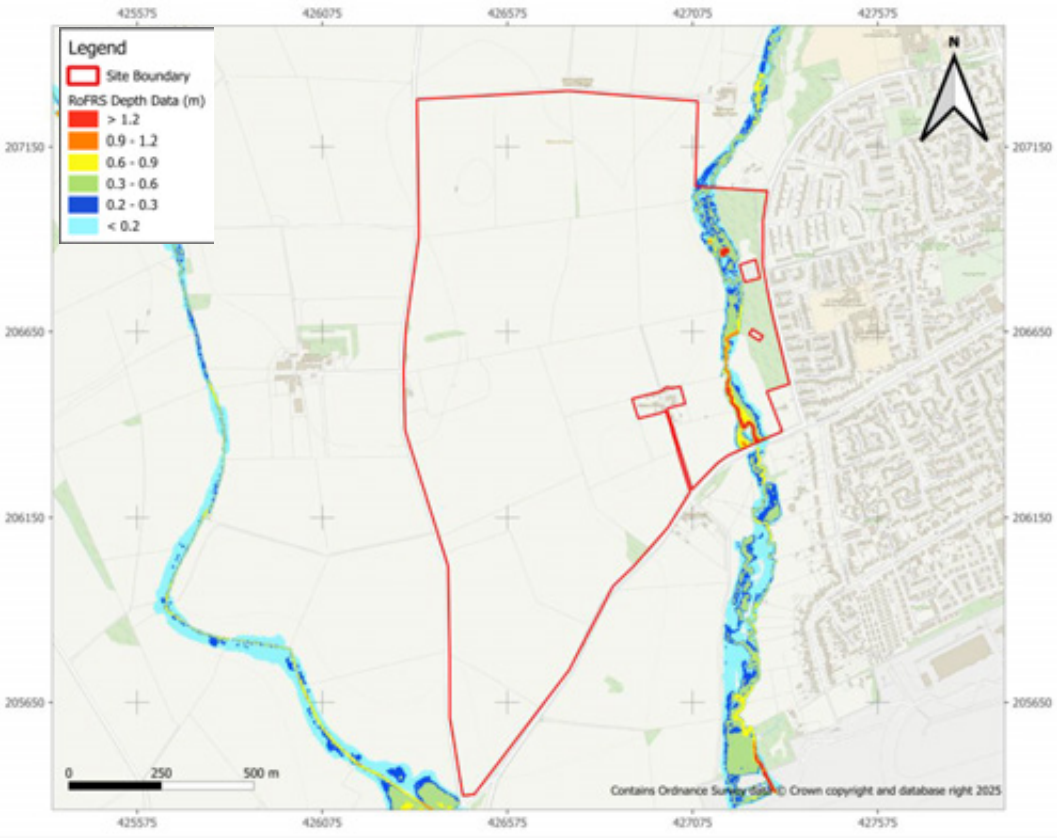


Figure 9 RoFRS Depth Data for 1.0% AEP + Climate Change Event

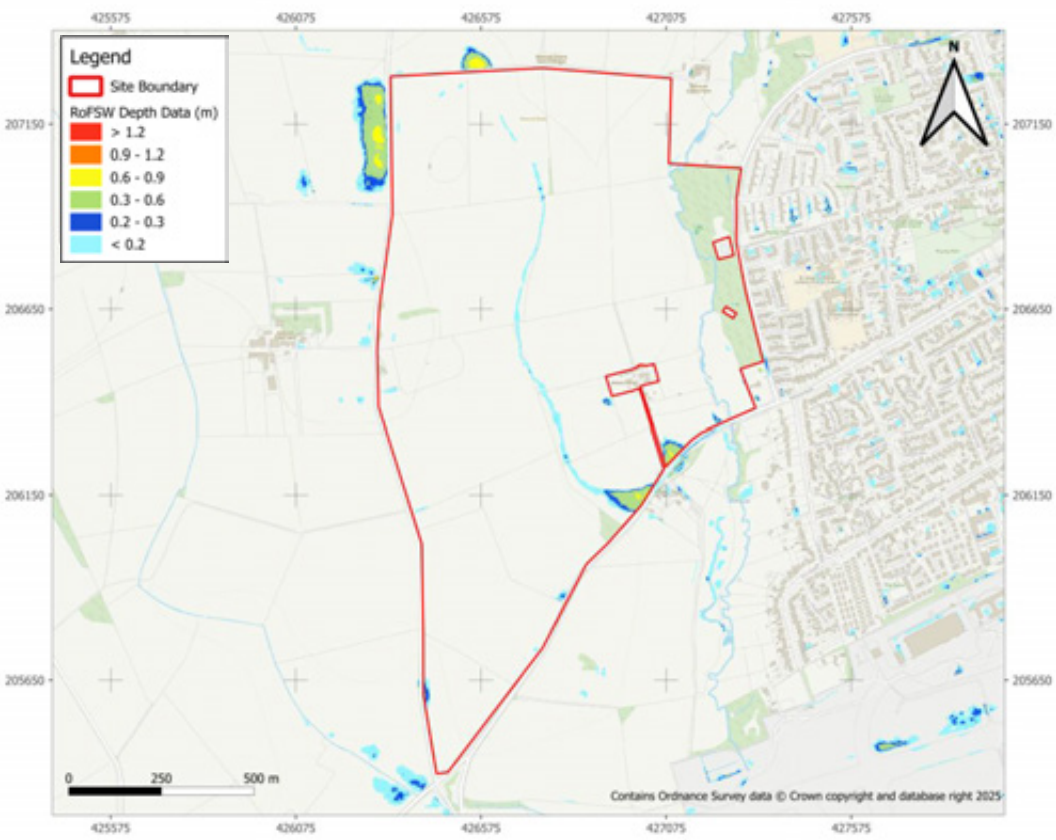


Figure 10 - RoFSW Depth Data 1.0% AEP + Climate Change Event

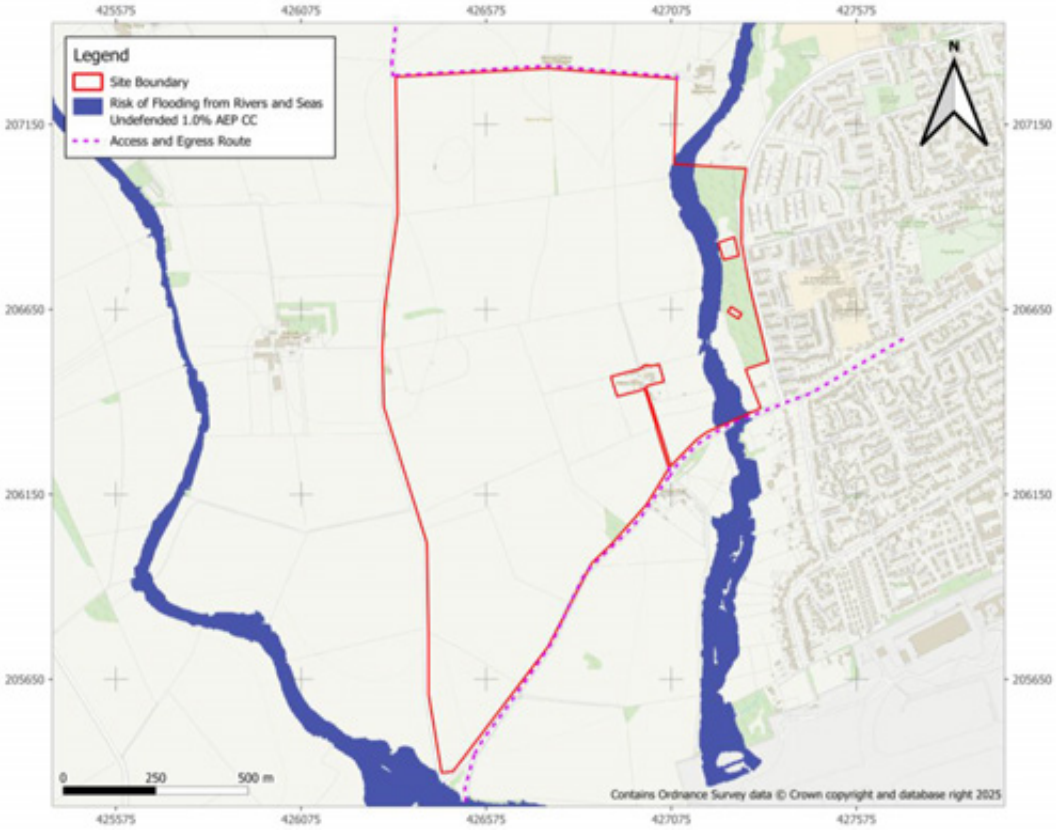


Figure 11 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is for housing which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, more vulnerable development 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.

The current extents for Flood Zone 2 should allow for all infrastructure to be located in Flood Zone 1. Almost all fluvial flood risk is located in the east of the site along the Shill Brook, if a significant amount of the proposed allocation is sited there, the development may face constraints. Parts of the site are also at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located along a surface water flow path which runs through the site's centre. As most of the site lies outside areas at risk of surface water flooding, it should be possible to locate a large amount of infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 125.37 ha, allocated for 600 to 1,000 residential dwellings. Assuming medium density housing (60 dwellings per hectare), the maximum proposed number of dwellings (1,000) would require 16.6 ha of land. In total only 7.7% of the site (combined 0.1% AEP plus climate change fluvial & pluvial extent) translating to 9.65-ha lies within the flood risk areas. Therefore, it should be possible to locate all housing infrastructure outside of these areas. This is provided there are no constraints (non-flood related) which require development to be located in at-risk areas. At this stage there are not considered to be any such constraints. This is except for any necessary watercourse crossings which should be clear span bridges set at least 600mm above the design flood level (see section 5.4 for more details).

5.3 Sequential Approach

Whilst both More Vulnerable Development is permissible in Flood Zone 2, it is still 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.

As surface water flood risk is also present across the site, both flood extents should be used to guide infrastructure at the site to the areas of lowest flood risk considering the impacts of climate change. If required ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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

Overall, the site is considered to be developable. It should be possible to locate all more vulnerable infrastructure in Flood Zone 1 and outside of the design pluvial and fluvial flood extents, thus ensuring that the site passes the exception test.

However, this site is divided by an overland flow route and the Shill Brook, and so it is likely that bridges may be required to be located in flood zone areas in order to link parts of the site together. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level. A site-specific FRA should investigate the requirement for bridges and their design, with modelling likely to be required for any works in flood risk areas.

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.

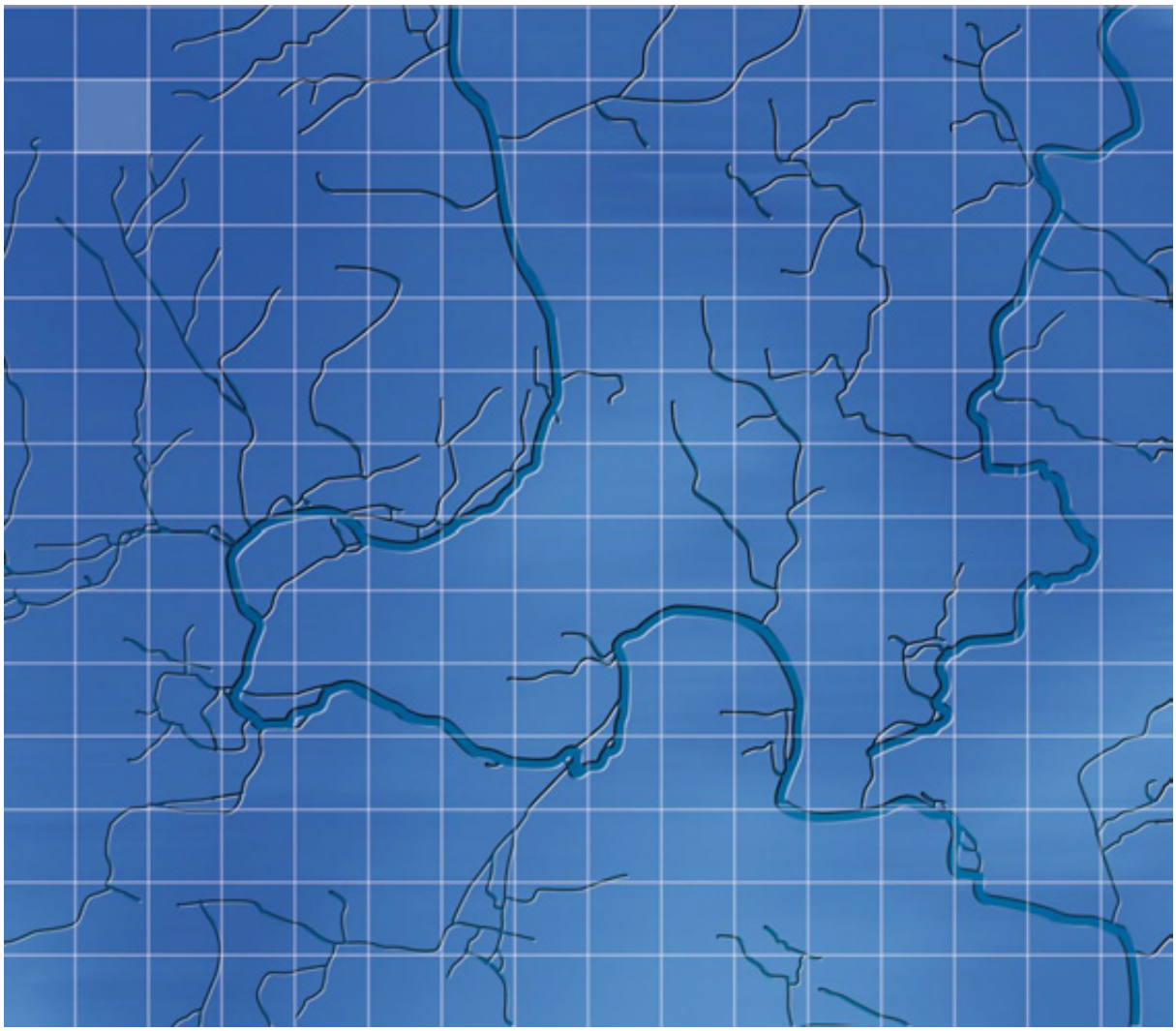
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The site is underlain by mudstones and limestones and the permeability at the site is variable. The use of infiltration SuDS solutions may be possible; however, it is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land at Hanborough Station (K)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land at Hanborough Station (K)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	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.

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

Land at Hanborough Station (K) 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 not at risk from fluvial sources; however, based on available surface water mapping pluvial flood risk is present. This effects 3.3% of the site in the design 1.0% AEP + CC event and is mainly associated with a flow route present along a watercourse in the north of the site, in addition to topographical depressions around the site.

Flood depths are greatest in the topographical depressions, where depths of 0.3-0.6m are modelled, elsewhere the majority of flood depths across the site are modelled to be 0.3m or less. Overall pluvial flood risk at the site is considered to be low given that it is limited to a small proportion of the total site area.

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 at the site is residential which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the areas of surface water flood risk should be used to sequentially place development within the site, to avoid flood risk areas and affecting the existing drainage channel.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land at Hanborough Station (Reference: K) 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 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

The Land at Hanborough Station (K) is a 34.8 ha site located to the east of Long Hanborough and west of Bladon, see Figure 1. Current land use at the site is agricultural, the site is bordered by residential developments to the north, agricultural land to west and east with the Pinsley Woodland to the south.

The site has been allocated for residential development, with a proposed capacity of 300 dwellings.

2.2 Topography

Based on 1m LiDAR data, the southern portion of the site generally slopes eastwards towards the floodplain of the River Evenlode. In the north, the site slopes towards a drainage channel within the site. The ground levels within the site boundary range from 68.6m AOD to 99.0m AOD, see Figure 2. The average ground level is approximately 80.2m AOD.

2.3 Nearby Watercourses

A drainage channel runs from west to east across the northern section of the site before heading in a southeasterly direction along the site boundary, see Figure 1. Another small drainage channel runs west to east approximately 40m south of the site it joins the nearest main watercourses, the River Evenlode. The River Evenlode is located approximately 155m east of the site and flows from north to south.

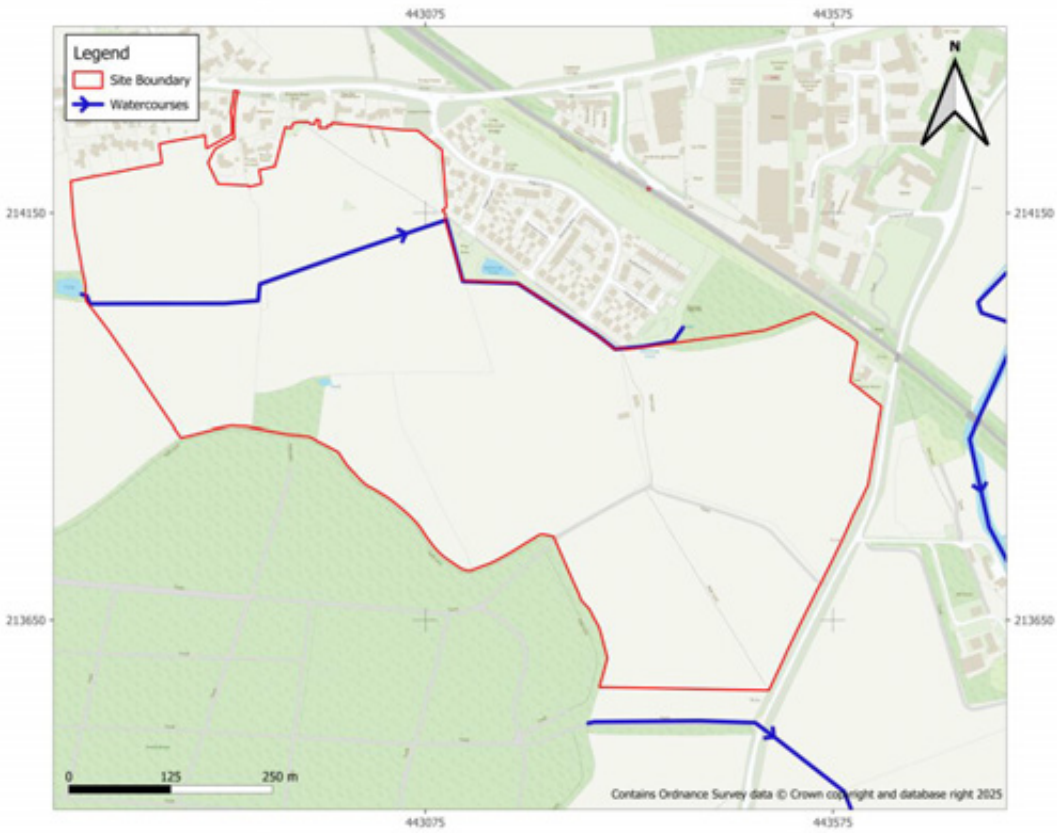


Figure 1 - Site Location

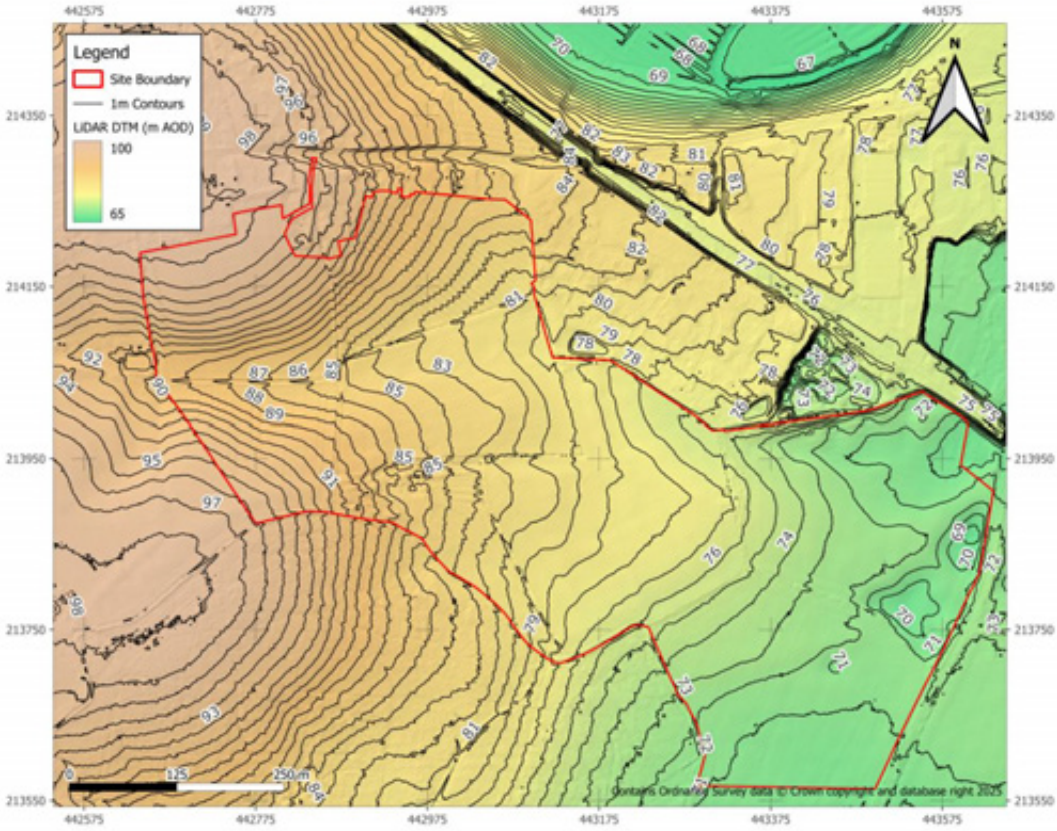


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest record of flooding is located approximately 695m northwest of the site. It occurred in April 1998 and was associated channel capacity of the River Evenlode being exceeded.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) shows the whole site is located within Flood Zone 1, see Figure 3. When considering the EA's FMfP climate change extents the whole site remains within Flood Zone 1, see Figure 4. Therefore, fluvial risk is considered to be low.

It should be noted that the fluvial maps do not capture flood risk from the drainage channel running through the site, this is assessed in more detail in section 3.4.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 2.0% of the site is inundated during the 3.3% AEP event, 2.6% is inundated during the 1.0% AEP event and 4.3% is inundated during the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 2.3% in the 3.3% AEP event, 3.3% in the 1.0% AEP event and 5.2% in the 0.1% AEP, see Figure 6.

The areas at risk of pluvial flooding are located in topographical low points and along the drainage channel in the north of the site. The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, the drainage channel is not accounted for within the fluvial models and therefore is represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map may be both fluvial (river overtopping) and pluvial (overland flow) in origin.

Overall, the risk of surface water flooding is considered to be low though it is greater than fluvial risk. Therefore, the residual risk associated with this flow route is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by interbedded sedimentary units consisting of mudstones, siltstones, sandstone and limestones. Mudstones are expected to be the least permeable with limestones the most permeable. Superficial deposits are found in the northwestern and southeastern corners of the site and consist of fluvial sand and gravel deposits.

The overlying soils at the site are variable. In the west the soils are freely draining base-rich soils. In the centre of the site the soils are slowly permeable loamy soils and clayey soils with impeded drainage. To the east the soils are freely draining shallow lime-rich soils.

Based on the data available the risk of groundwater flooding is considered variable, with a higher risk associated with the areas underlain by permeable soils and bedrock. More data is required at the planning stage to confirm the risk level and its distribution across the site.

3.6 Reservoir Flood Risk

The FMfP shows a very small section of the site to be at risk from reservoir flooding with approximately 0.2% of the site being inundated during the wet day scenario, none of the

site is at risk during the dry day scenario, see Figure 7. 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.

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

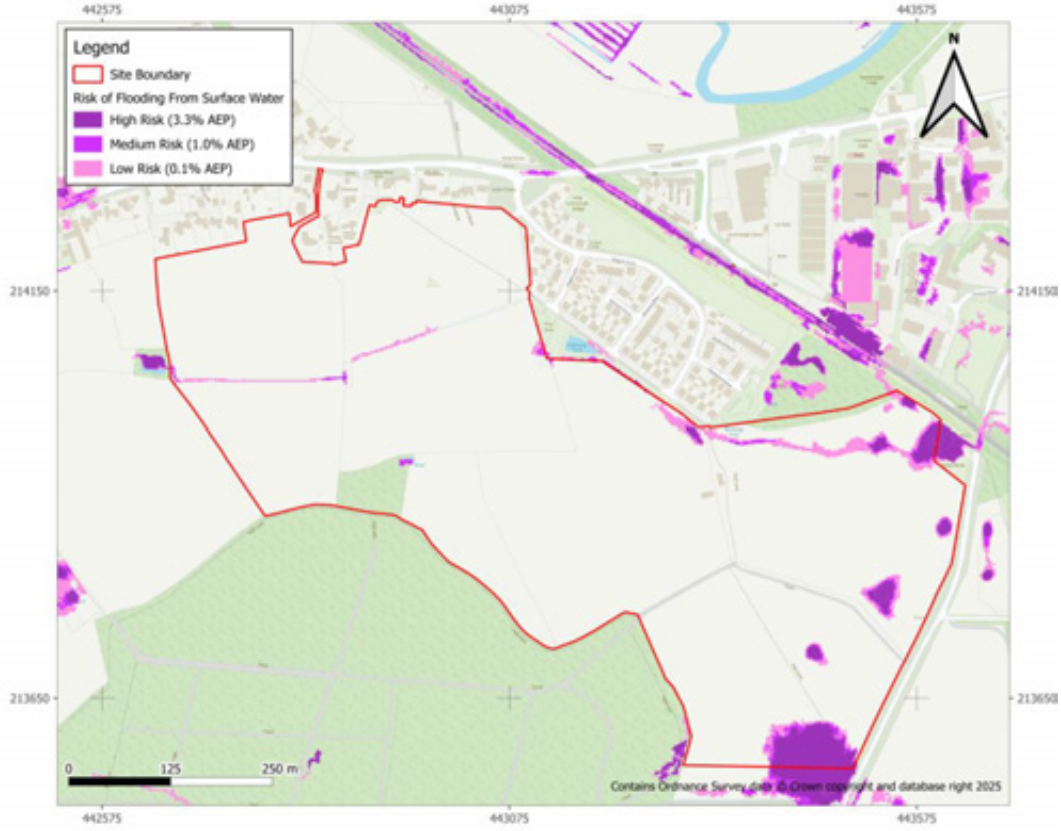


Figure 5 – Surface Water Flood Map

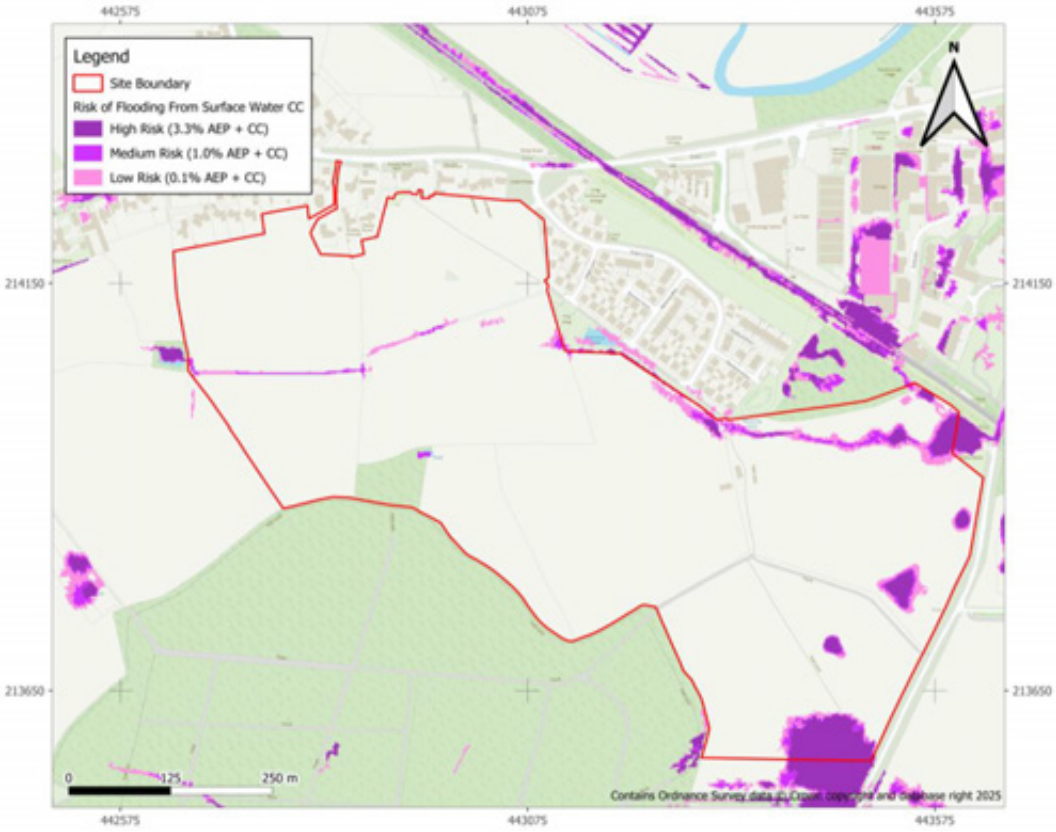


Figure 6 -Surface Water Climate Change Flood Map

Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is pluvial.

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 be concentrated along the drainage channel that runs through the north of the site and along the eastern site boundary. Flooding is also present in several topographical depressions, the most notable being in the southeastern corner of the site. The maximum flood depths within the site are 0.3-0.6m and tend to be located in the topographical depressions. Flood depths across the remainder of the site are predominantly 0.3m or below.

In terms of the drainage channel specifically, based on the surface water extents this watercourse does not pose a significant flood risk to the development. Topographical data shows the watercourse's drainage channel and catchment (defined at the site) to be very small (<0.50 km^2). In this regard, the risk of flooding from this watercourse is expected to be low with the surface water mapping considered to provide a good proxy for assessing fluvial flood risk from the watercourse for the purposes of this SFRA. During the planning stage a site-specific FRA should assess the risk of flooding from this watercourse in greater detail.

It should also be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the west of the site is assumed to be available via Regent Drive and Main Road (A4095), heading east, this route remains outside areas of both fluvial and pluvial flood risk (during the 1.0% AEP +CC design events), see Figure 9. Access to the east of the site is assumed to be available via Lower Road heading south, this route also remains outside areas at risk of fluvial and pluvial flooding.

It should be noted that these 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. In particular depending on the final layout, the drainage channel in the north of the site may present potential barriers to onsite transit and it is likely that bridges may be required (see section 5).

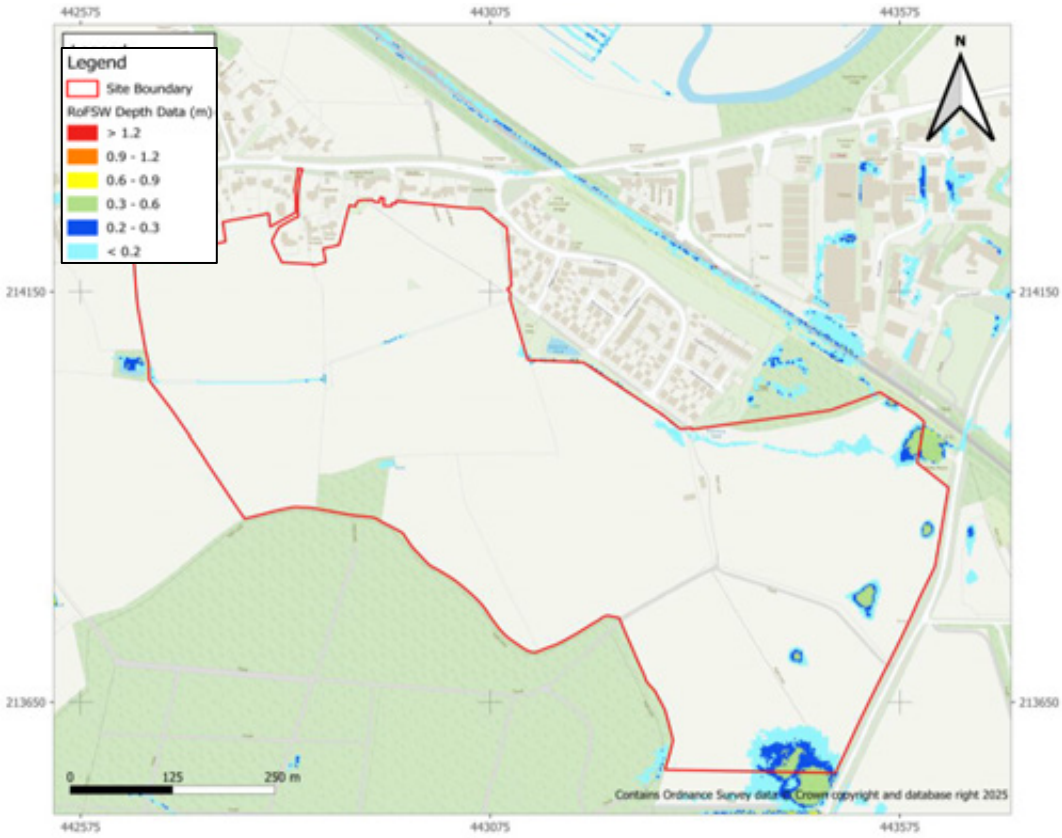


Figure 8 – RoFSW Depth Data for 1.0 % AEP + Climate Change Event

Figure 9 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed at the site is residential which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the areas of surface water flood risk should be used to sequentially place development within the site, to avoid flood risk areas and affecting the existing drainage channel.

5.2 Scale of Development

The total site area is currently 34.84 ha, allocated for 300 dwellings. Assuming medium density housing (60 dwelling per hectare), 300 dwellings would require 5 ha of land. Given no part of the site is located within Flood Zone 2 or 3 and surface water flooding only effects a small portion of the site this scale of development should be possible within the site provided no other non-flood related barriers exist.

5.3 Sequential Approach

As the site lies entirely within Flood Zone 1, surface water flood risk should inform a sequential approach to the development layout. Given that only a small portion of the site is affected by surface water flooding, it should be feasible to locate all development outside these areas. This approach would also avoid disruption to the drainage channel in the north of the site taking into account the potential impacts of climate change.

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. It is expected that all infrastructure can be located outside of flood risk areas, however depending on the final development layout bridges may be required to cross the drainage channel in the north of the site to link infrastructure. It is recommended that these bridges be clear span bridges with their soffits set to achieve an appropriate freeboard (at least 600-mm) above the design flood level. A site-specific FRA should investigate the requirement for bridges and their design, with modelling likely to be required for any works in flood risk areas.

It should be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125). Site-specific pluvial modelling may be required to better define flood risk depending on the final development layout.

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 site is underlain by variable bedrock and soils, the use of infiltration SuDS solutions may be possible in some locations. It is recommended that a geotechnical investigation is undertaken at this site to

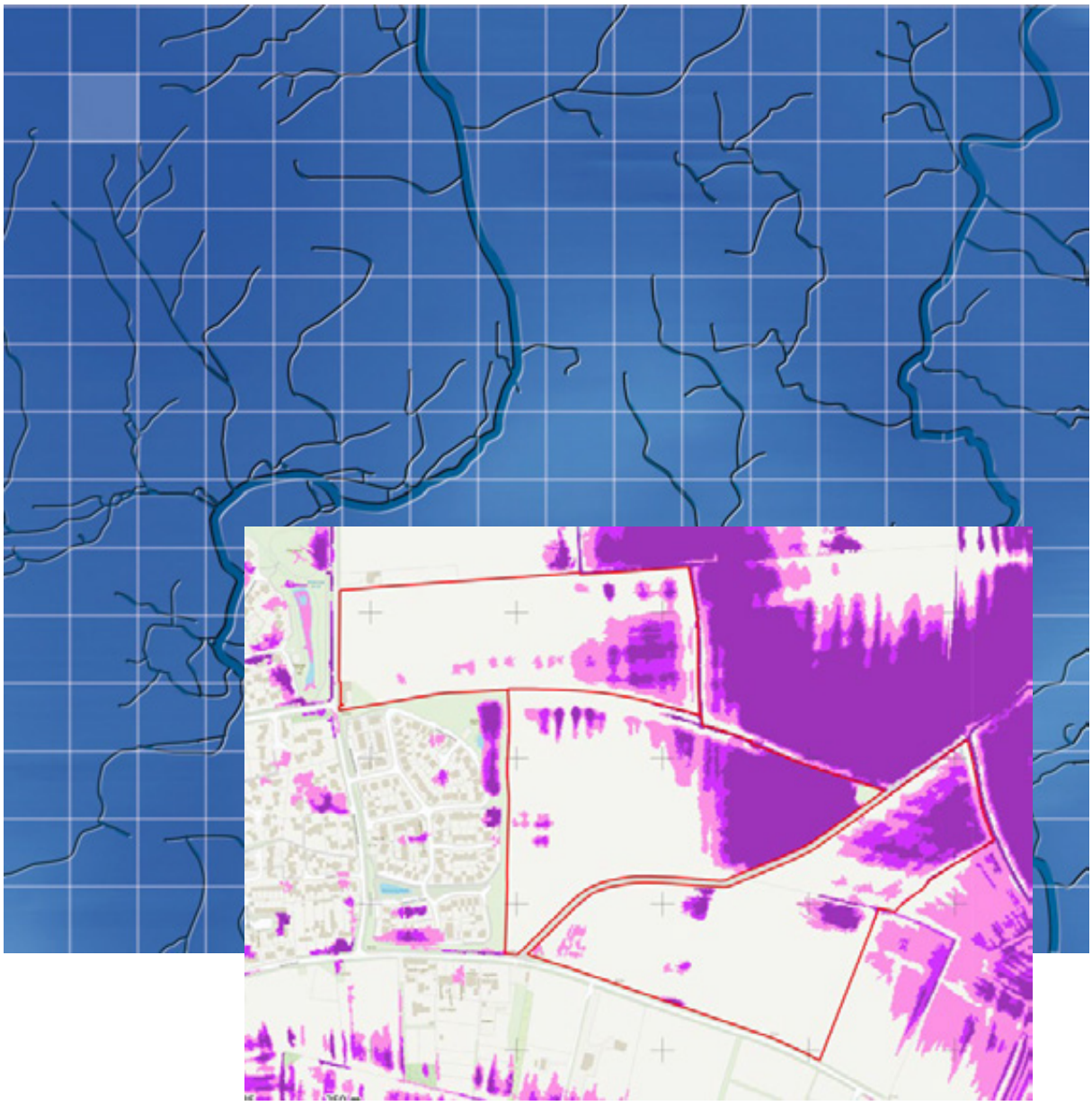
obtain further information relating to infiltration rates. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land East of Mount Owen Road and North of Aston Road (L)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land East of Mount Owen Road and North of Aston Road (L)

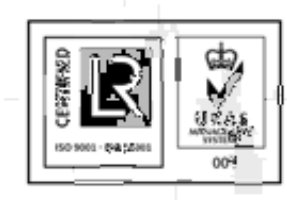
Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Tirion Lewis (*Graduate 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

Land East of Mount Owen Road and North of Aston Road (L) 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

Pluvial flood risk represents the greatest risk of flooding to the site with 18.3% of the site inundated during a 1.0% AEP +CC event. The majority of this extent is associated with areas of lower topography and drainage channels that border the site.

The Risk of Flooding from Surface Water (RoFSW) depth data shows depths are generally between less than 0.2m to 0.6m, with some areas reaching up to 0.9-1.2m, however these depths are exclusively seen in the drainage channels that border the site.

The risk of fluvial flooding is considered to be low as the entire site is located in Flood Zone 1.

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 moderate. This is based on the fact that the EA's latest national scale modelling has informed the assessment of surface water flood risk.

Conclusions and Recommendations

The development proposed is residential and categorised as *More Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at flood risk based on the EA's surface water modelling extents. The risk is primarily located in the east of the land parcels. Provided a sequential approach is followed, it should be possible to locate infrastructure outside of these areas.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land East of Mount Owen Road and Land North of Aston Road (Reference: L) 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 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

The Land East of Mount Owen Road and Land North of Aston Road (L) site is 28.7ha in area located east of Bampton and west of Aston. The site is spilt across three land parcels, Land East of Mount Owen Road relates to the northern land parcel, whereas Land North of Aston Road relates to the two southern land parcels, see Figure 1. The parcels are located on agricultural land, existing residential development lies to the west with agricultural land in all other directions.

The site has been allocated for residential development, with a capacity for 150 dwellings.

2.2 Topography

Based on 1m LiDAR data both sites are flat. The Land East of Mount Owen Road land parcel slopes towards a field drain running along the northern and western boundary of the site. The Land North of Aston Road land parcels slope towards a field drain to the north of the site and the Aston Ditch to the east of the site. The ground levels across the entire site range from 66.0m to 70.2m AOD, see Figure 2. The average ground level is 67.3m AOD.

2.3 Nearby Watercourses

Watercourses near the Land East of Mount Owen Road include field drains that run west to east along the northern and southern boundaries of the land parcel and a field drain that runs from north to south along the eastern boundary.

Watercourses near the Land North of Aston Road include a field drain that runs along the northern boundary, from northwest to southeast, and the Aston Ditch which runs from north to south along the eastern boundary, see Figure 1.

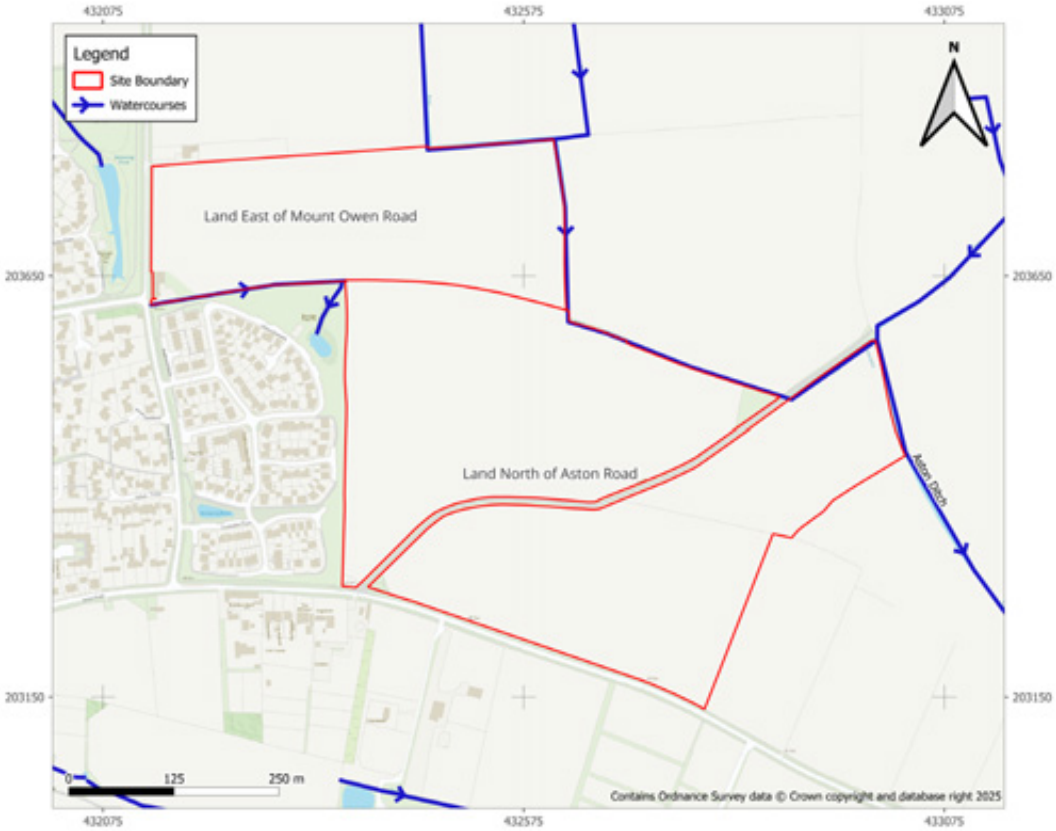


Figure 1 - Site Location

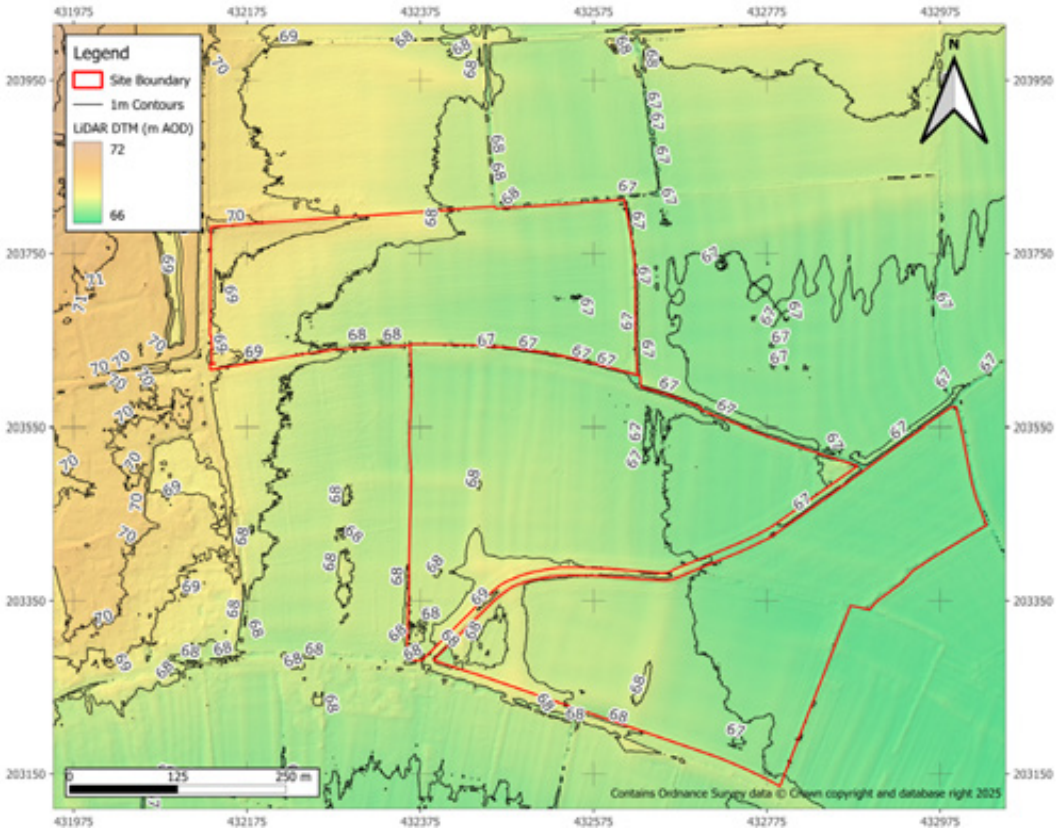


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest recorded flood events are located 165m southeast and 230m south of the site. These recorded floods occurred in September 1992 and March 1947 and were associated with surface water and the overtopping of the nearby Shill Brook respectively.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) dataset indicates that the whole site is located within Flood Zone 1, defined as land with a less than 0.1% annual probability of flooding, see Figure 3.

Based on the FMfP climate change dataset, the site remains within Flood Zone 1 when considering an allowance for climate change, see Figure 4.

Based on the FMfP the risk of fluvial flooding is considered to be low; however it should be noted that the FMfP does not capture flood risk from the watercourses bordering parts of the site, these are captured by the EA's surface water flood maps (see section 3.4).

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 9.2% of the site is inundated in the 3.3% AEP event, 14.6% is inundated in the 1.0% AEP event and 22.5% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 12.7% in the 3.3% AEP event, 18.3% in the 1.0% AEP event and 28.4% in the 0.1% AEP, see Figure 6.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, there are smaller watercourses across the site which are not accounted for within the fluvial models and therefore are represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map may be both fluvial (river overtopping) and pluvial (overland flow) in origin. This is likely to be the case close to the watercourses north and east of the site

Overall, the risk of surface water flooding is considered to be moderate at this stage and is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain entirely by mudstone, which is expected to have limited permeability. Superficial deposits on the site mainly consist of alluvium and fluvial sands and gravels in the south and west. The overlying soils are predominantly lime-rich loamy soils with a small section of loamy soils with naturally high groundwater in the east; these are both expected to be freely draining.

Based on the data available the risk of groundwater flooding is considered moderate, largely based on the freely draining nature of the overlying soils which permit a mobile water table. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, with the site being located approximately 280m north of an area at risk of reservoir flooding, see Figure 7.

3.7 Flood Warning Service

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

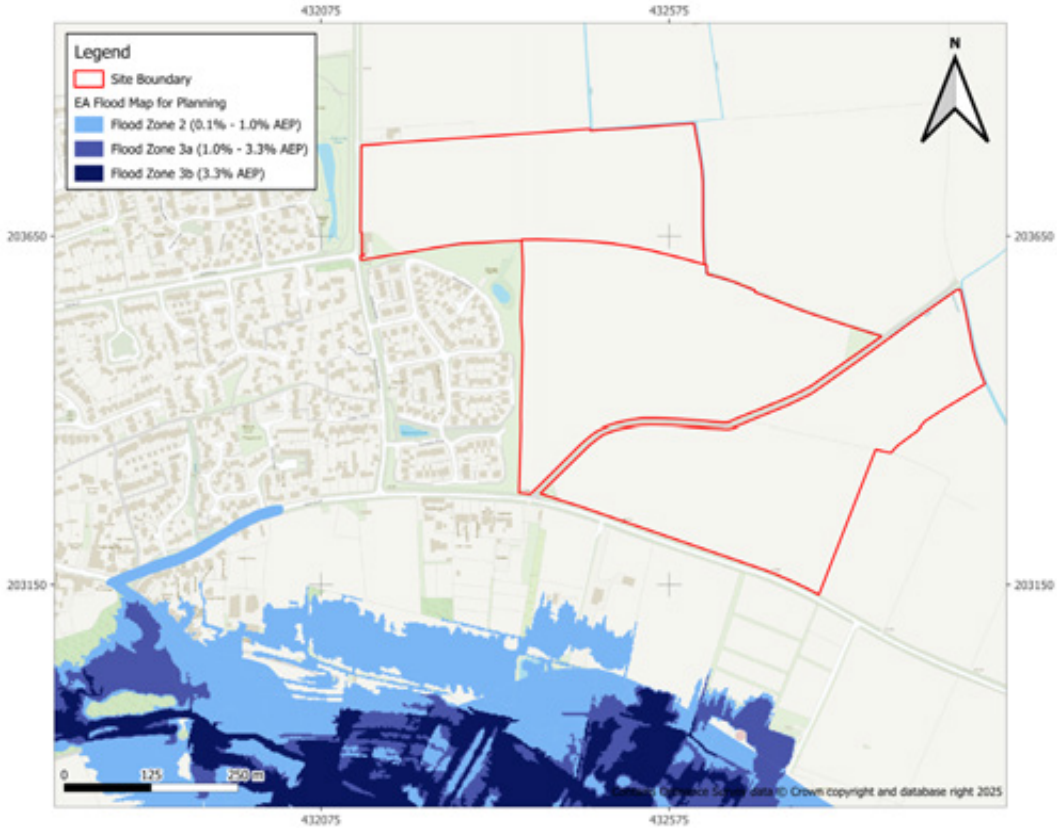


Figure 3 - Fluvial Flood Map

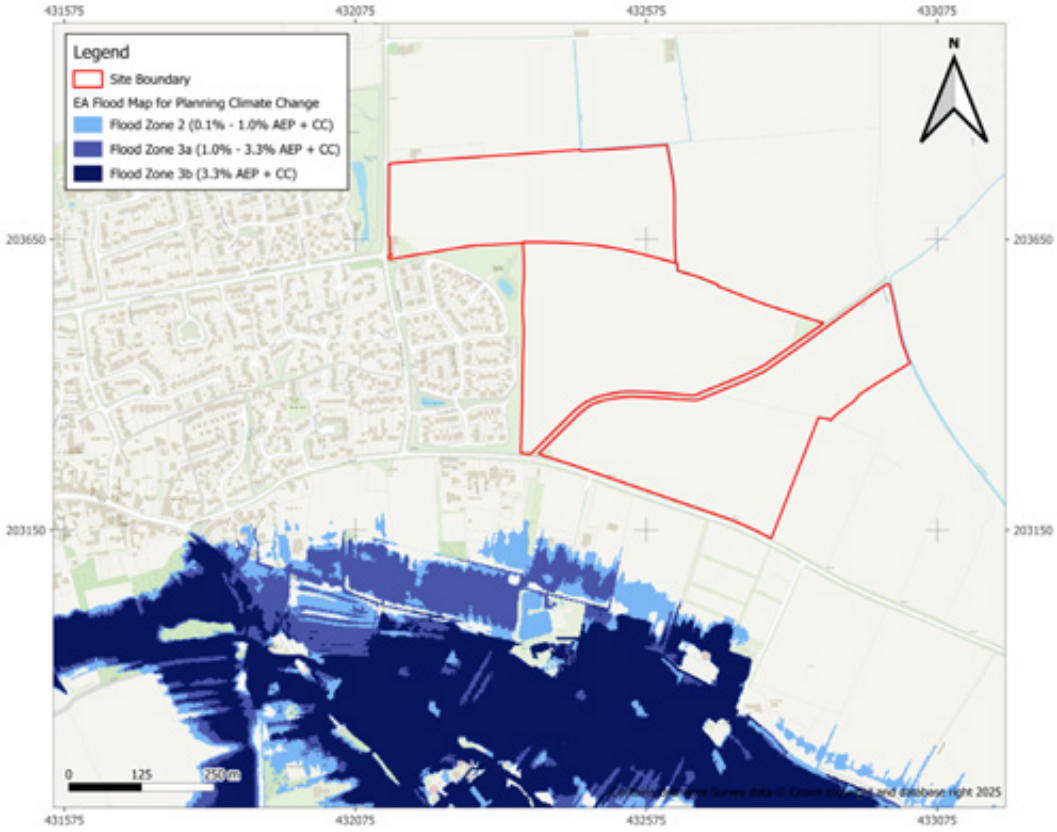


Figure 4 – Fluvial Climate Change Flood Map

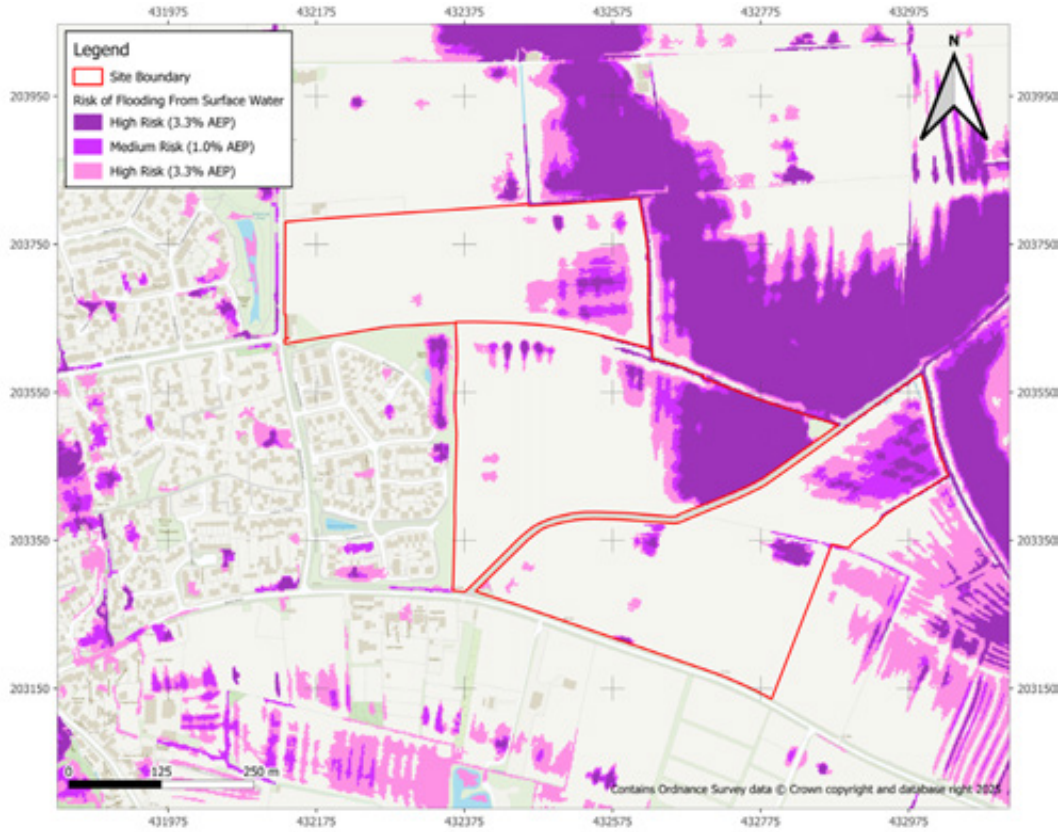


Figure 5 – Surface Water Flood Map

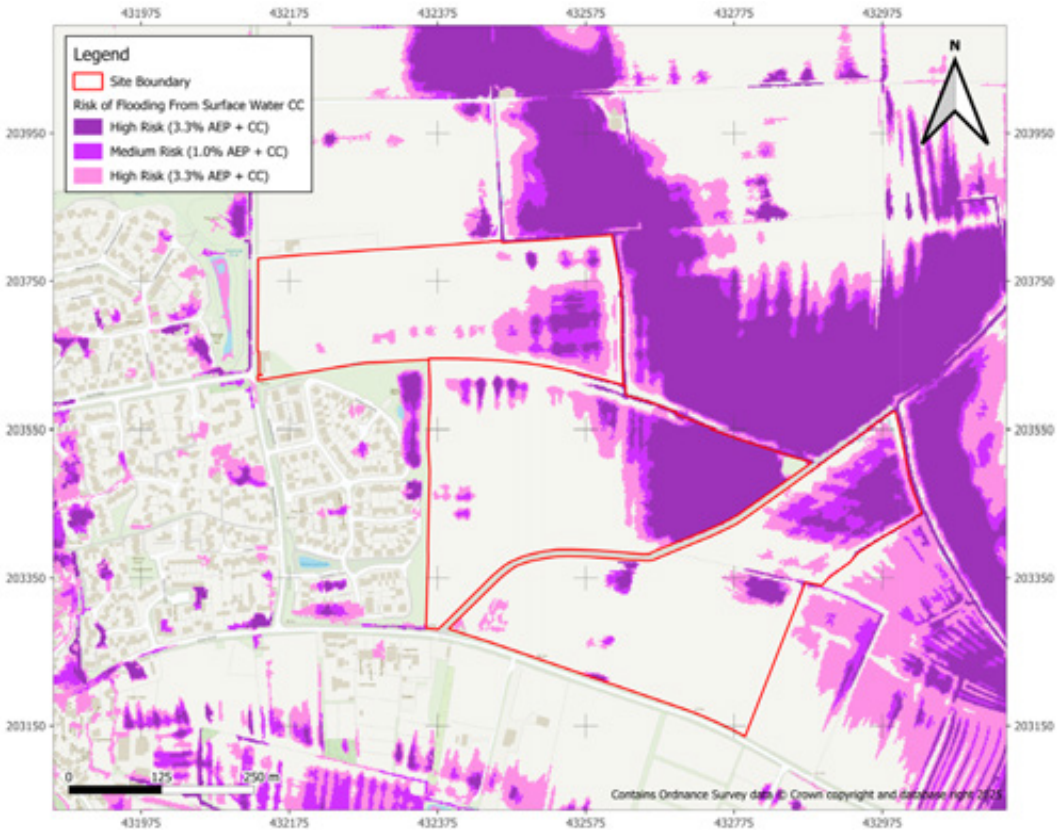


Figure 6 -Surface Water Climate Change Flood Map

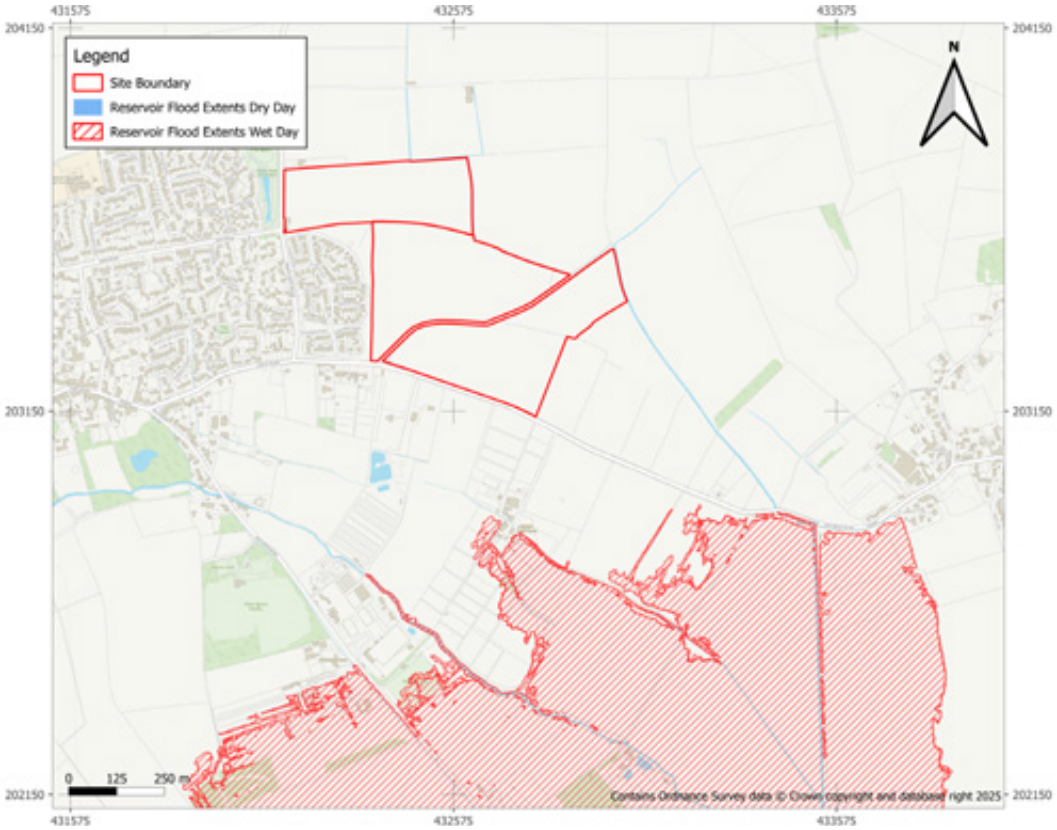


Figure 7 - Reservoir Failure Flood Map

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, the inundation is mainly limited to the east of the three land parcels. Overall, 18.3% of the total site area is inundated, see Figure 8.

Flooding is most prominent in the two Land North of Aston Road land parcels. The highest flood depths (0.9m-1.2m) are associated with the channels of the field drain that runs along the northern boundary of the northern parcel and the Aston Ditch which runs along the eastern boundary of the southern parcel. Outside of the drainage channels, depth are mostly between 0.2-0.6m. The site is very flat, so flow velocities are expected to be slow limiting flood hazard.

Overall, the surface water flood mapping is considered a reasonable proxy of flood risk from the watercourses closest to the site. Topographical data shows the watercourses to be very flat with limited catchment areas, so the extents shown are not thought to be underestimated. During the planning stage a site-specific FRA should assess the risk of flooding from these watercourses in greater detail.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the Land East of Mount Owen Road parcel is available via New Road to the northwest and Mount Owen Road to the southwest. During an extreme pluvial flood (0.1% AEP +CC) event both roads remain clear for the majority of the routes identified, see Figure 9. Access to the Land North of Aston Road parcels is available via an unnamed road that runs between the parcels and the B4449 along the southern boundary of the site. During an extreme flood (0.1% AEP +CC) event both roads remain outside areas at risk of flooding allowing access and egress to the site.

It should be noted that these 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 and assess in more detail the nature of the flood risk to determine how quickly it occurs and the degree of hazard.

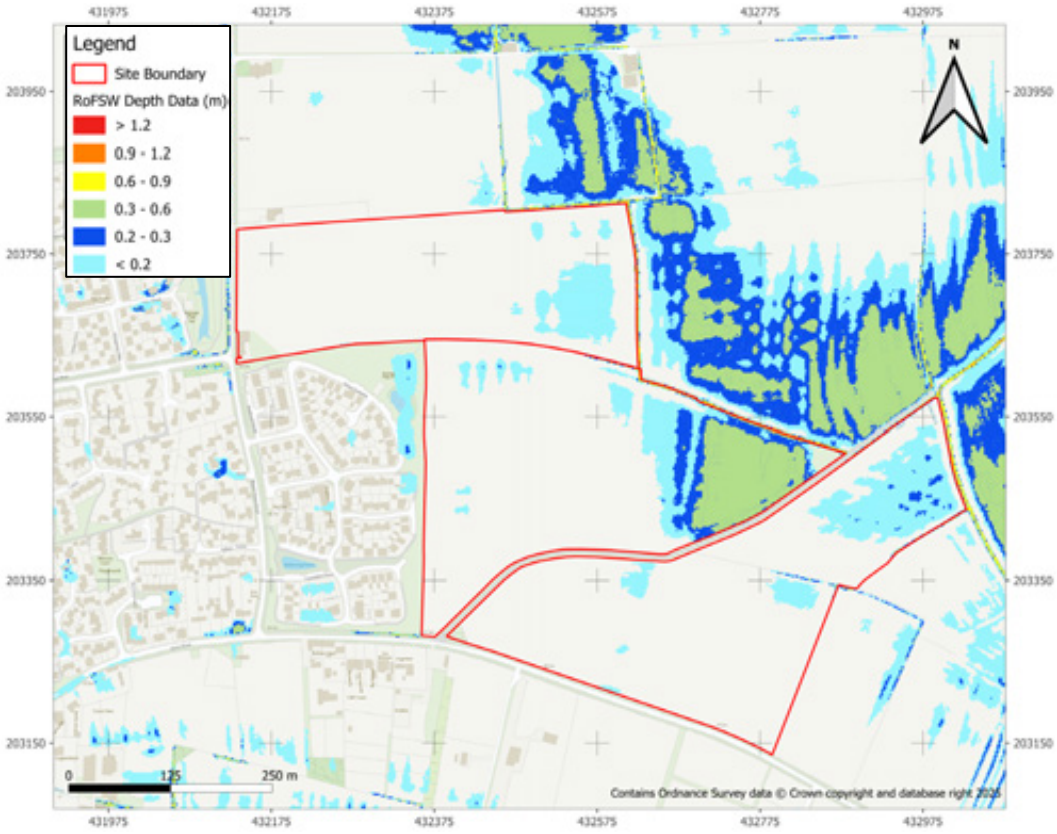


Figure 8 RoFSW Depth Data for 1.0% AEP + Climate Change Event

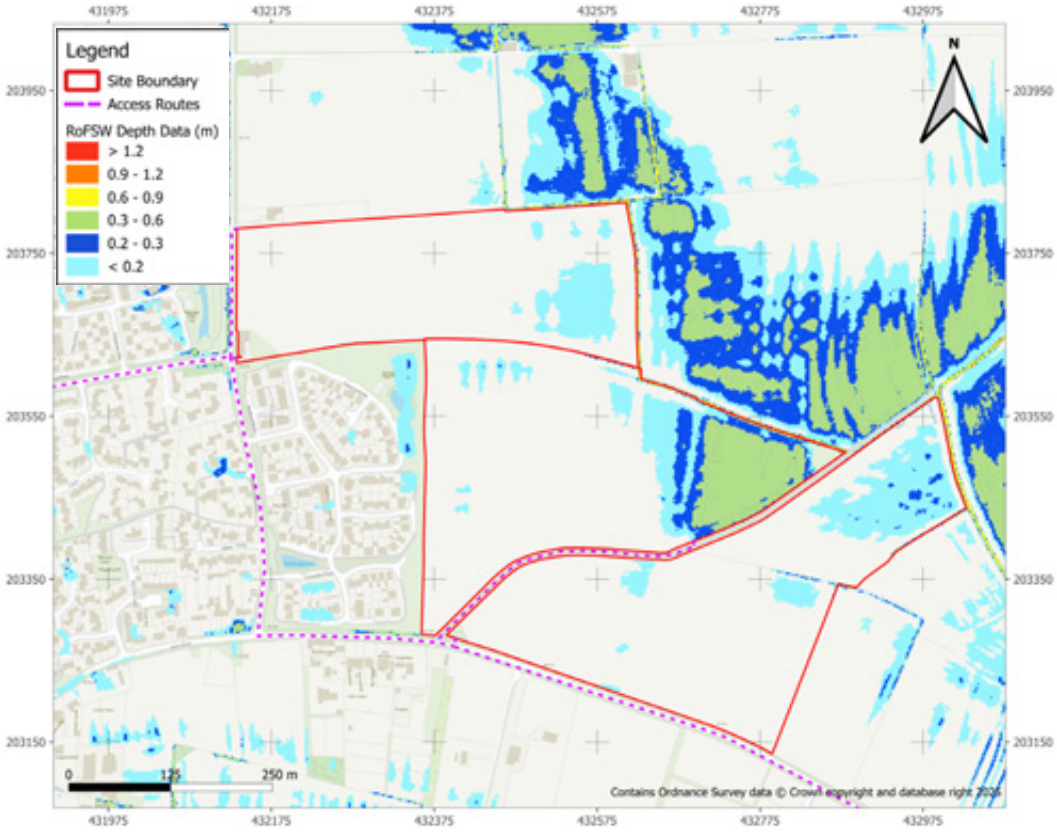


Figure 9 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential and categorised as *More Vulnerable Development*. It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at flood risk based on the EA's surface water modelling extents. The risk is primarily located in the east of the land parcels. Provided a sequential approach is followed, it should be possible to locate infrastructure outside of these areas.

5.2 Scale of Development

The total site area is currently 28.7 ha, allocated for 150 residential dwellings. Assuming medium density housing (60 dwellings per hectare) 150 dwellings would require 2.5ha of land. As the whole site is located within Flood Zone 1, development should be guided by the surface water flood risk at the site. The 1.0% AEP +CC design event inundates 18.3% of the site which indicates that 23.4 ha of land at the site remains flood free during the design event. It should be possible to locate all development outside of flood risk areas. 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 the whole site is located within Flood Zone 1 in the FMfP, the surface water flood maps should be used to ensure development is prioritised in areas of lower flood risk.

If required ancillary infrastructure such as car parks and green spaces could be located in higher flood risk areas to allow residential properties to be sited in lower risk areas. This is under 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.

Furthermore, as only national scale modelling is available at the site, if development is proposed within the flood extents, detailed modelling may be required during a site-specific FRA to better inform design flood levels and finished flood levels at the site. It should also be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125).

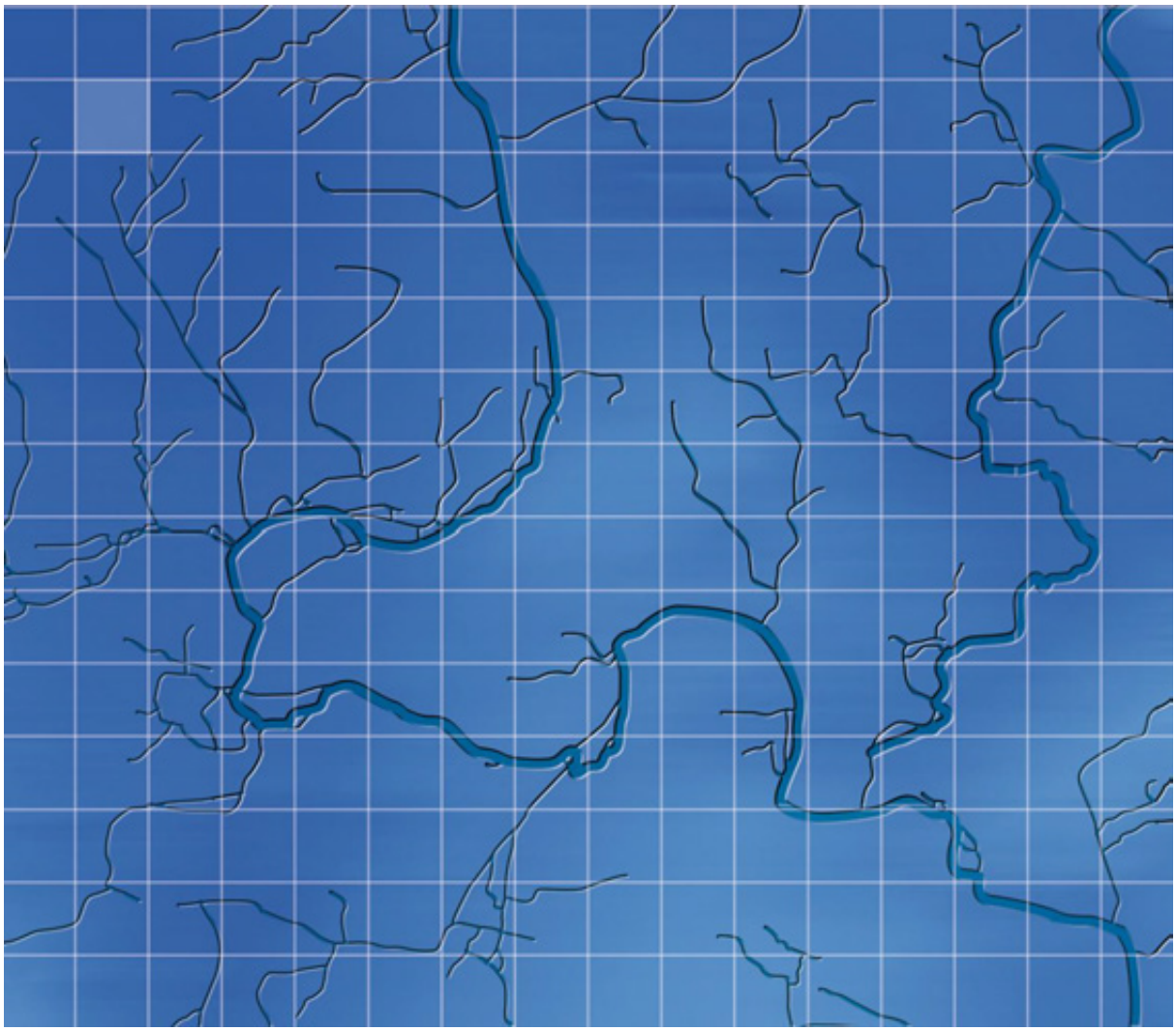
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site is varied with freely draining soils and limited bedrock permeability. Therefore, whilst the use of infiltration SuDS solutions may be possible in some locations, it is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land East of Fawler Road (P)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land East of Fawler Road (P)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	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.

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

Land East of Fawler Road (P) 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 not at risk from fluvial sources; however based on available surface water mapping pluvial flood risk is present. This effects 2.3% of the site in the design 1.0% AEP + CC event and is mainly associated with a flow route present along a ditch in the centre of the site.

Flood depths are greatest in a topographical depression on the western site boundary, where depths of 0.9-1.2m are modelled, elsewhere the majority of flood depths across the site are modelled to be 0.3m or less. Overall pluvial flood risk at the site is considered to be low given that it is limited to a small area in the centre of the site.

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 at the site is residential which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid altering the existing flow route.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land East of Fawler Road (Reference: P) 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 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 East of Fawler Road (P) is a 5.4 ha site located south of Charlbury and to the north of Fawler, see Figure 1. Current land use at the site is agricultural. The site is bordered by residential buildings to the north, and agricultural land to the south, east and west.

The site has been allocated for residential development, with a proposed capacity of 40 dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes south-westwards towards the floodplain of the River Evenlode. A small ditch runs from north to west across the site. The ground levels with the site boundary range from 99.9m AOD to 126.4m AOD, see Figure 2. The average ground level is approximately 110.9m AOD.

2.3 Nearby Watercourses

There are no watercourses within the site boundary, however there is a drainage ditch which may convey flows during heavy rainfall. The nearest formal watercourse is the River Evenlode which is a main river. It is located approximately 260m west of the site and runs from north to south, see Figure 1.

Figure 1 - Site Location

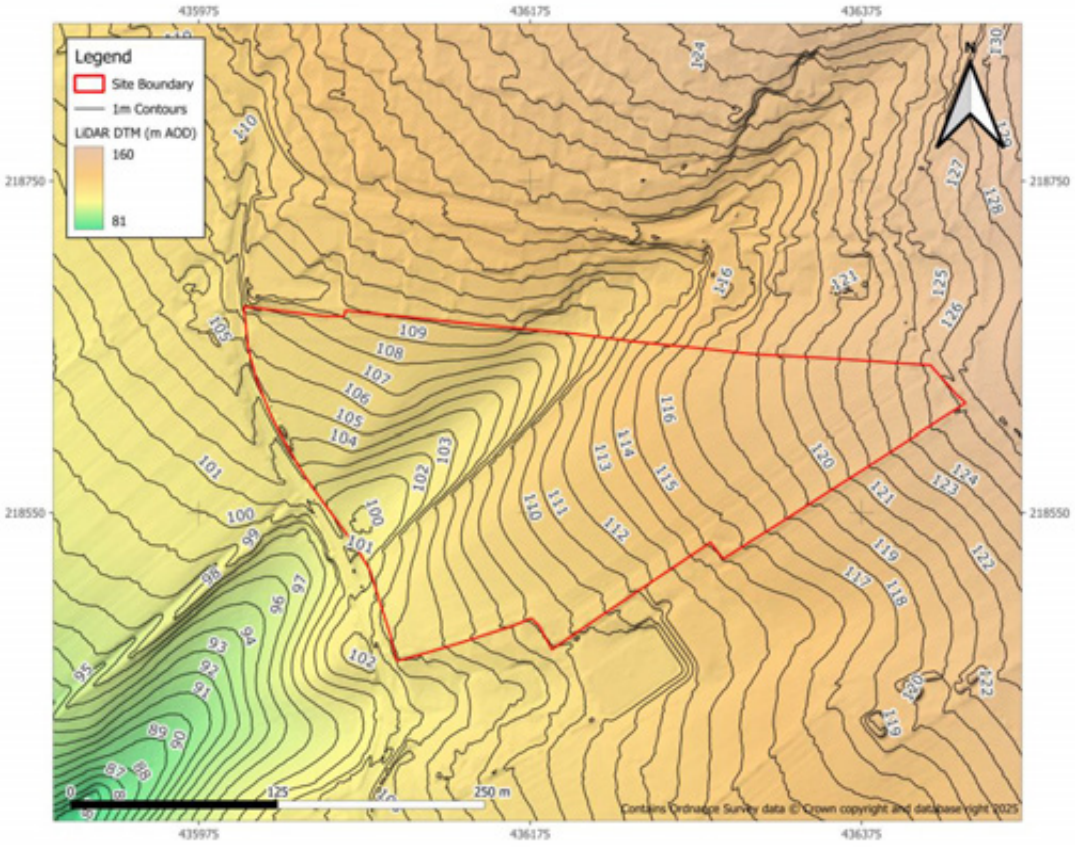


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

There are no records of historical flooding at the site, the nearest recorded flood event occurred in 1998 approximately 240m west of the site and was associated with the channel capacity of the River Evenlode being exceeded.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) shows the whole site is located within Flood Zone 1, see Figure 3. When considering the EA's FMfP climate change extents the whole site remains within Flood Zone 1, see Figure 4. Therefore, the risk of fluvial flooding is considered to be low.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 1.2% of the site is inundated during the 3.3% AEP event, 1.9% is inundated during the 1.0% AEP event and 3.3% is inundated during the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 1.8% in the 3.3% AEP event, 2.3% in the 1.0% AEP event and 4.5% in the 0.1% AEP, see Figure 6.

Overall, the risk of surface water flooding is considered to be low though it is greater than the fluvial risk and mostly concentrated along an overland flow route which runs through the centre of the site. Therefore, the residual risk associated with this flow route is assessed in more detail below in section 4.

3.5 Groundwater Flooding

The site is underlain entirely by limestone which is expected to have moderate to high permeability. No superficial deposits are recorded at the site. The overlying soils are freely draining shallow lime-rich loamy soils.

Based on the available data, the risk of groundwater flooding at the site is likely to be moderate given that the water table is likely mobile. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, with the site being located approximately 240m east of an area at risk of reservoir flooding, 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

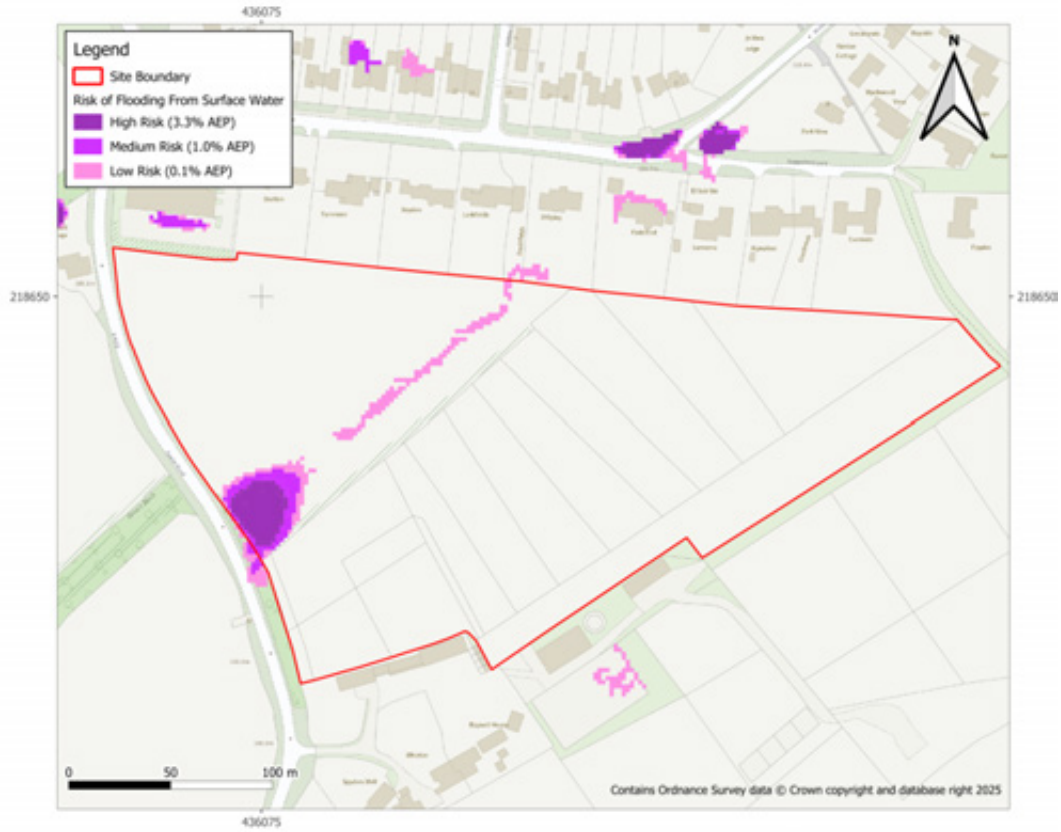


Figure 5 – Surface Water Flood Map

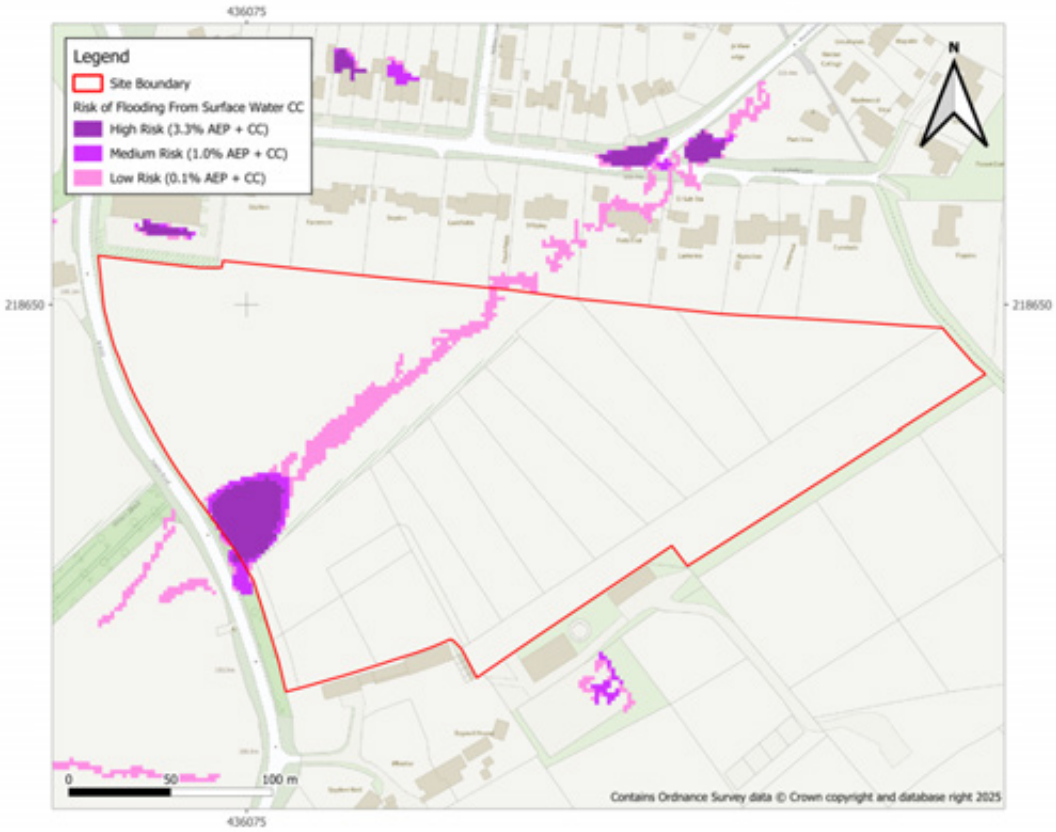


Figure 6 -Surface Water Climate Change Flood Map

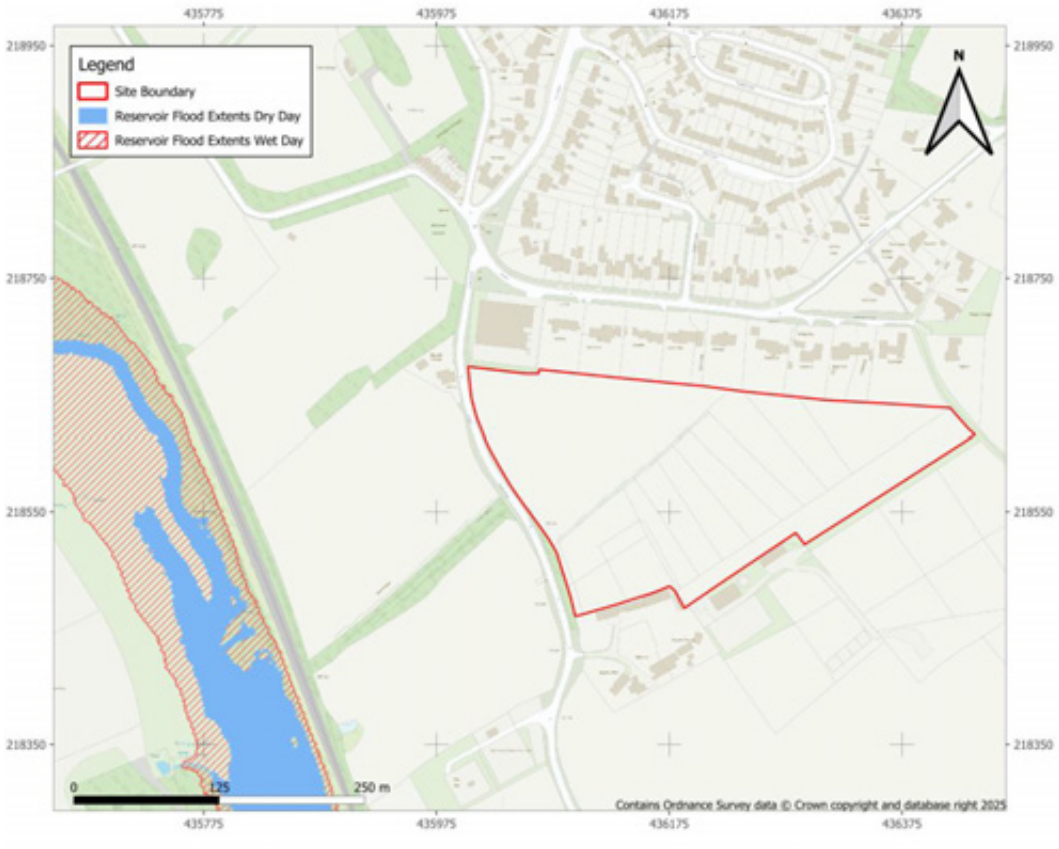


Figure 7 Reservoir Flood Risk Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is pluvial.

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 the majority of surface water flooding to be located along and close to the ditch running from northeast to southwest across the site. The mapping shows water to be conveyed via the ditch to a topographical low point at the western site boundary. It is in this location where flood depths are greatest at 0.9-1.2m, elsewhere the majority of flood depths across the site are 0.3m or less.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is assumed to be available via Fawler Road to the west of the site, heading both north and south is possible as the route remains outside of fluvial and pluvial flood zones in both directions, see Figure 9.

It should be noted that these 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.

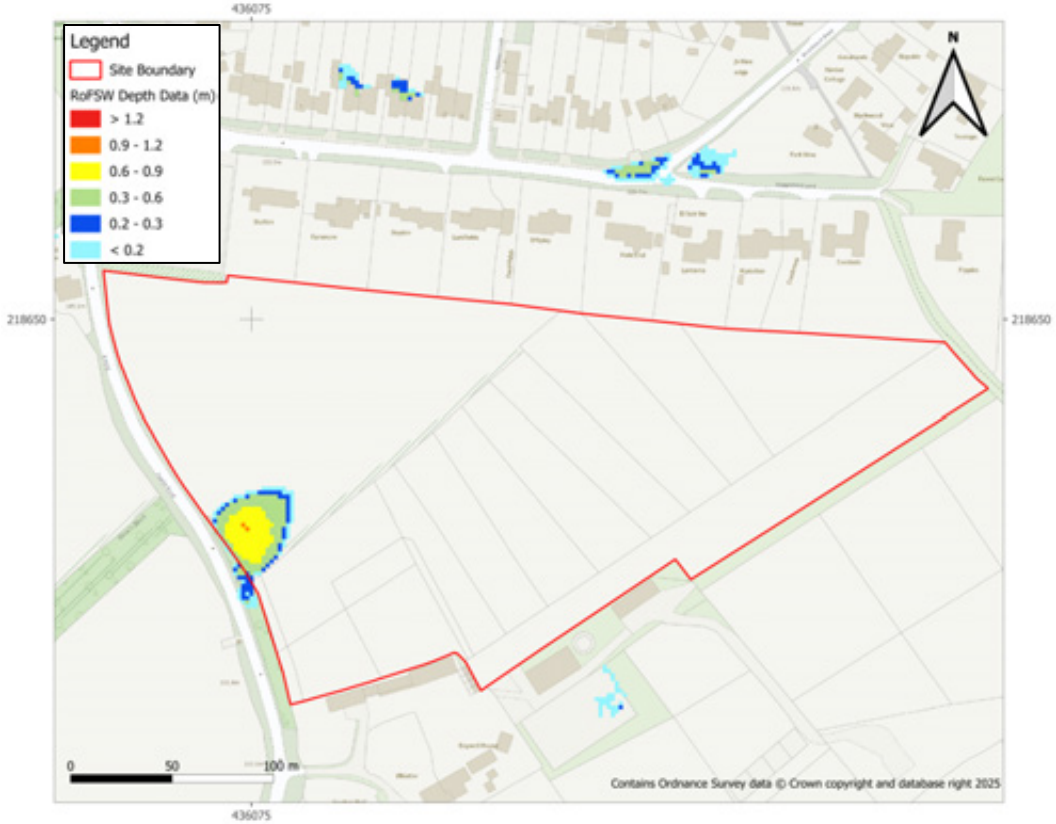


Figure 8 RoFSW Depth Data for 1.0% AEP + Climate Change Event

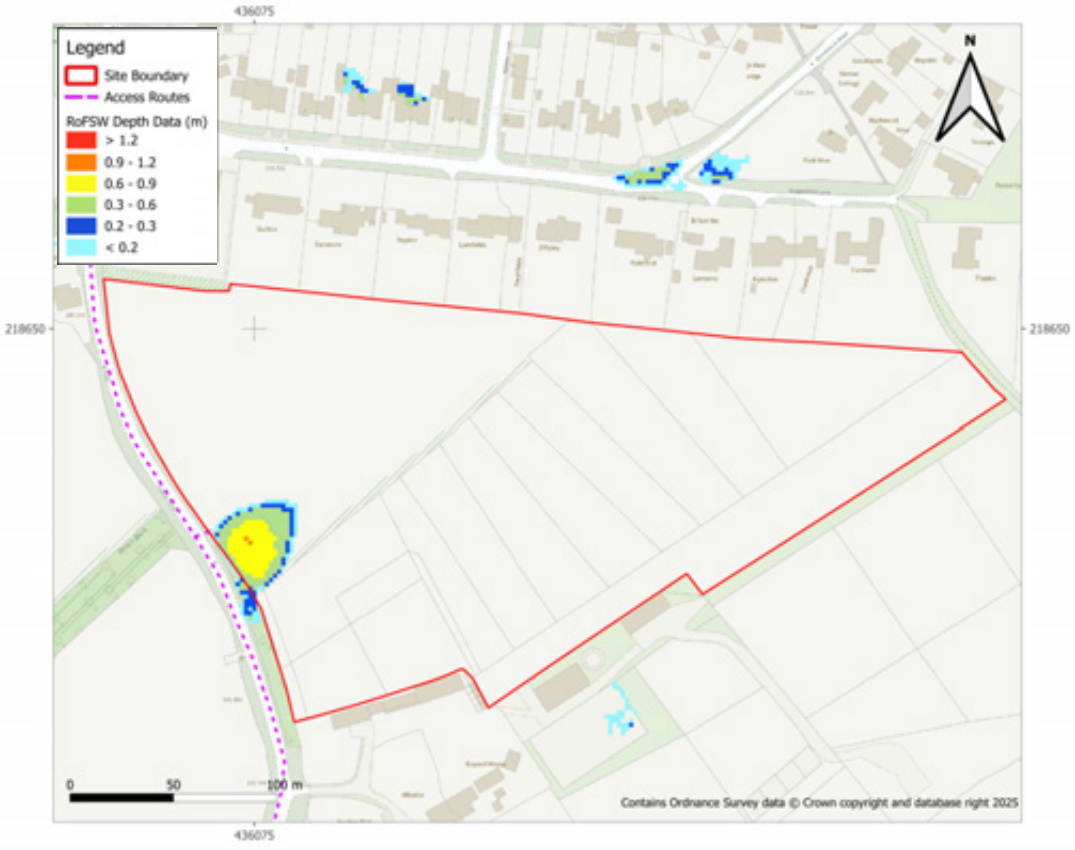


Figure 9 Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed at the site is residential which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid flood risk areas and affecting the existing flow route.

5.2 Scale of Development

The total site area is currently 5.41 ha, allocated for 40 dwellings. Assuming medium density housing (60 dwelling per hectare), 40 dwellings would require 0.67 ha of land. Given no part of the site is located within Flood Zone 2 or 3 and surface water flooding only effects a small portion of the site this scale of development should be possible within the site provided no other non-flood related barriers exist.

5.3 Sequential Approach

As the site lies entirely within Flood Zone 1, surface water flood risk should inform a sequential approach to the development layout. Given that only a small portion of the site is affected by surface water flooding, it should be feasible to locate all development outside these areas. This approach would also avoid disruption to existing surface water flow route, taking into account the potential impacts of climate change.

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.

It should be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125). Site-specific pluvial modelling may be required to better define flood risk depending on the final development layout.

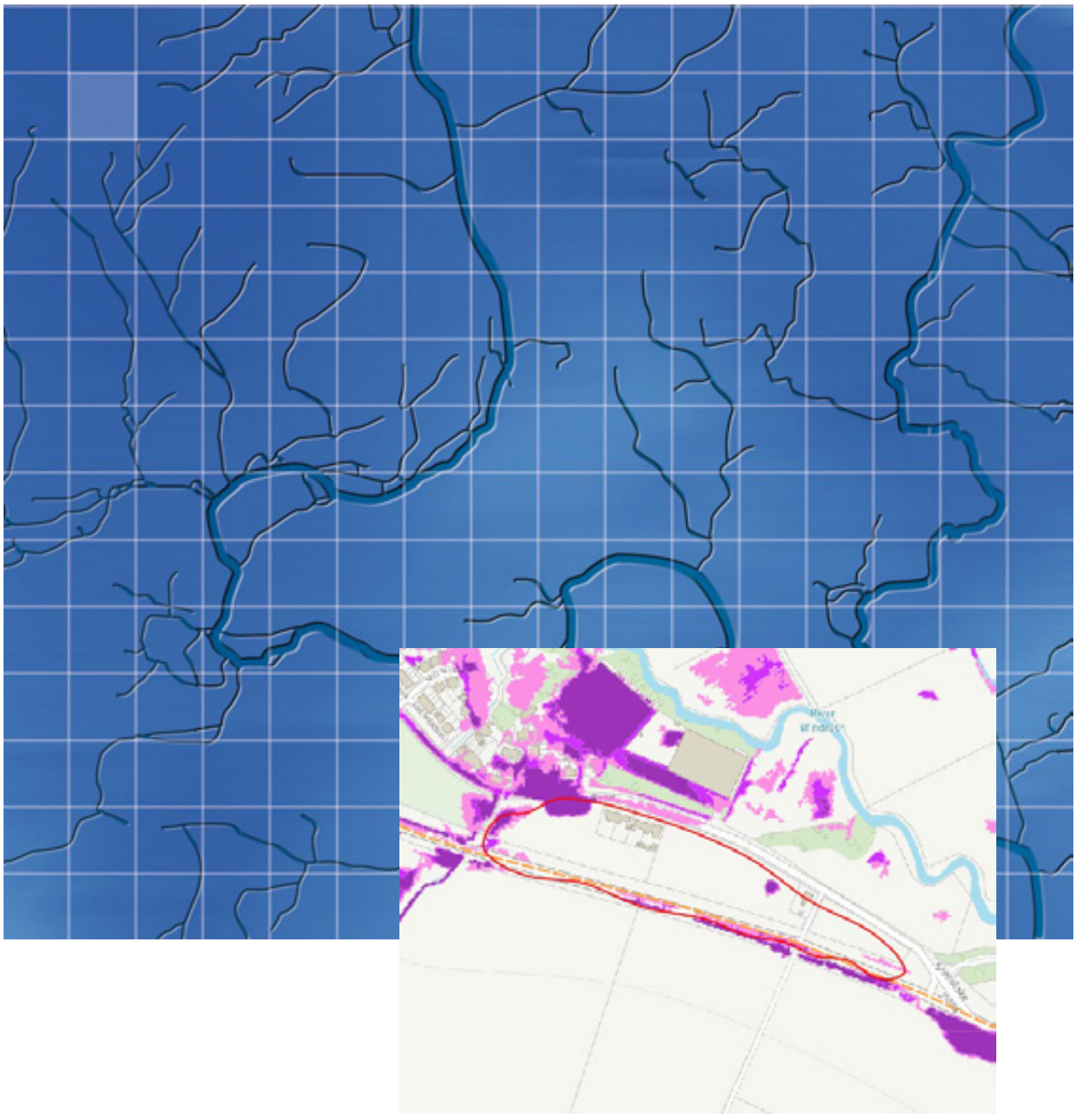
The drainage strategy for the proposed development should be suitably designed to manage additional runoff arising from the development and ensure that surface water flood risk at the site and to third party land is not increased. In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The site is entirely underlain by limestone; 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. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Land to the south of Standlake Road (Q)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land to the South of Standlake Road (Q)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Joseph Bentley (*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.

Registered Office Maclean Building, Benson Lane, Wallingford OX10 8BB
www.hydrosolutions.co.uk

Land to the South of Standlake Road (Q) 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

Pluvial flood risk represents the greatest risk of flooding to the site with 5.5% of the site inundated during the 1.0% +CC pluvial event. Surface water flood risk is associated with surface water pooling in the north west. The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest flood depth (0.3-0.6 m) is in an area of topographic low in the northwest of the site. Outside of this, flood depths are predominantly less than 0.2m. Overall surface water flood risk is considered to be low.

The risk from fluvial flooding is considered to be low, as the site is located entirely within Flood Zone 1.

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 moderate. This is because national scale modelling has been used to inform the assessment.

Conclusions and Recommendations

The development proposed is categorised as *More Vulnerable Development.* A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small proportion of the site is affected by surface water flooding, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid displacing any flood water. A site-specific FRA should also determine any residual risk from the land drain in the west of the site which is not captured in the EA's flood maps.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council (WODC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land to the South of Standlake Road (Reference: Q) 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 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 to the South of Standlake Road (Q) is a 3.29ha site located in the south east of Ducklington. The land use at the site is mostly agricultural land, however there are several residential properties located within the site boundary. The site is bordered by Standlake Road to the north and the A415 to the south, see Figure 1.

In the local plan, the site is allocated for 40 residential dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes from south to north towards the River Windrush. The ground levels within the site boundary range from 76.3m AOD to 78.3m AOD, see Figure 2. The average ground level is 77.3m AOD.

2.3 Nearby Watercourses

The site is located approximately 120m south of the River Windrush, see Figure 1. Within the site boundary there is one field drain, located in the southeast which drains from west to east. Another field drain is located directly adjacent to the western boundary of the site, draining from south to north.

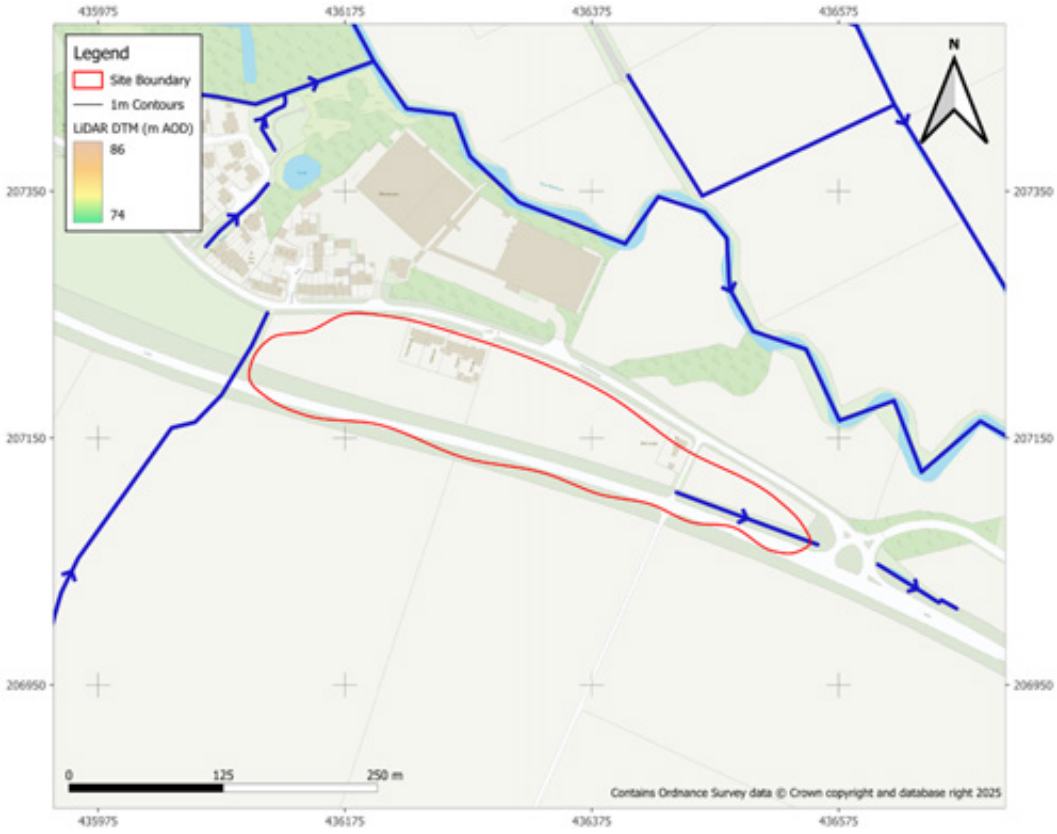


Figure 1 - Site Location

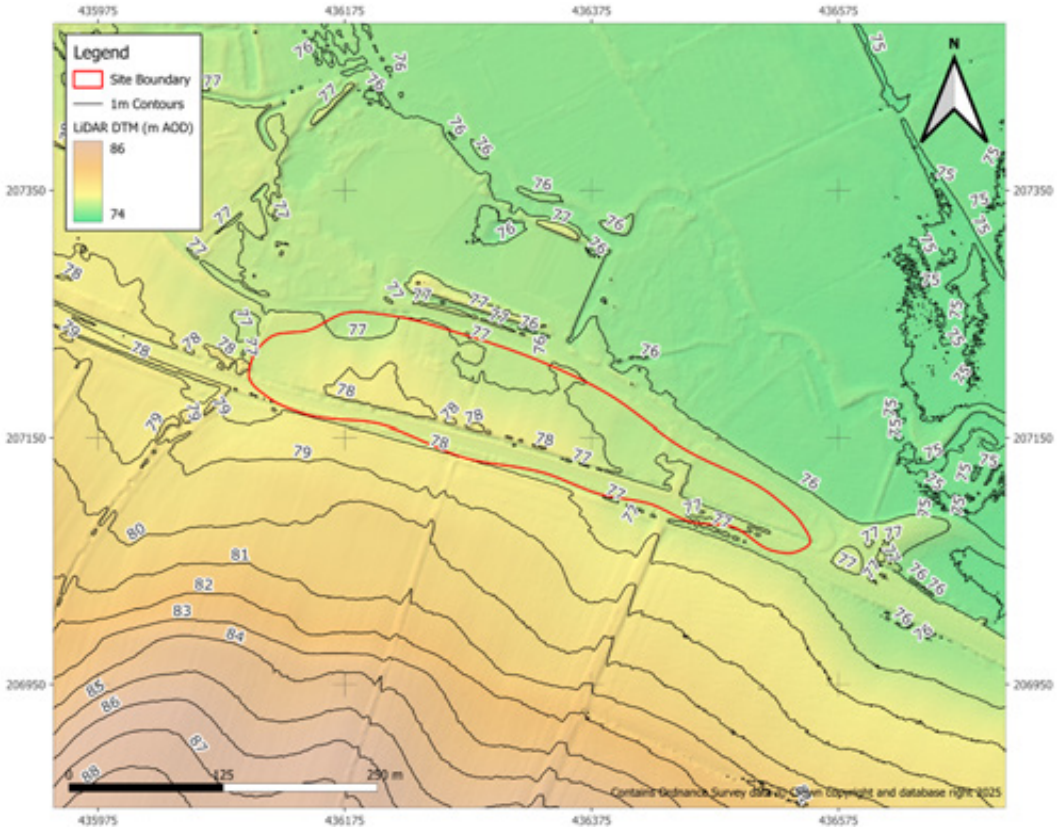


Figure 2 – Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historical flooding at the site. The nearest record of historic flooding is 125m northeast of the site boundary. This flooding occurred in October 1993 and is associated with the River Windrush, see Figure 3. The cause of this flooding was the exceedance of channel capacity.

3.2 Fluvial Flood Risk

In the existing EA Flood Map for Planning (FMfP), the whole site is located within Flood Zone 1, see Figure 4.

The EA's FMfP including climate change extents show that the whole site remains in Flood Zone 1, see Figure 5.

Based on the FMfP the risk of fluvial flooding is considered to be low; however it should be noted that the FMfP does not capture flood risk from the watercourses within the site, these are partly captured by the EA's surface water flood maps (see section 3.4).

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 3.4% of the site to be inundated during a 3.3% AEP event, 4.4% is inundated during a 1.0% AEP event, and 7.5% is inundated during a 0.1% AEP event, see Figure 6. When considering the effects of climate change, the proportion of the site at risk for each event increases to 3.9%, 5.5%, and 10.5% respectively, see Figure 7.

The areas at risk are generally associated with surface water pooling which is occurring at topographic low points in the north west and south east of the site. Some minor flooding is also present along the watercourse which runs along the western site boundary.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, the western watercourse is not accounted for within the fluvial models therefore it remains in the surface water flood map. In this regard the small amount of flooding shown in the west of the site may be both fluvial (river overtopping) and pluvial (overland flow) in origin. Neither the fluvial or surface water mapping show any flood risk associated with the field drain in the east of the site.

Overall, the surface water flood risk to the site is low. Despite the low risk, the surface water flood risk is greater than the fluvial risk and therefore it is assessed in more detail in Section 4.

3.5 Groundwater Flooding

The site is underlain by mudstone which is expected to permit moderate to low levels of infiltration. Superficial deposits of sand and gravel are also present within the site. The overlying soils are described as freely draining lime-rich loamy soils.

Based on the available data, the risk of groundwater flooding at the site is moderate. Using the available data, the freely draining nature of the soils could lead to a mobile water table. However, more data is required at the planning stage to confirm flood risk from groundwater.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 8. The nearest source of reservoir flooding is approximately 3km south of the site, associated with the River Isis.

3.7 Flood Warning Service

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

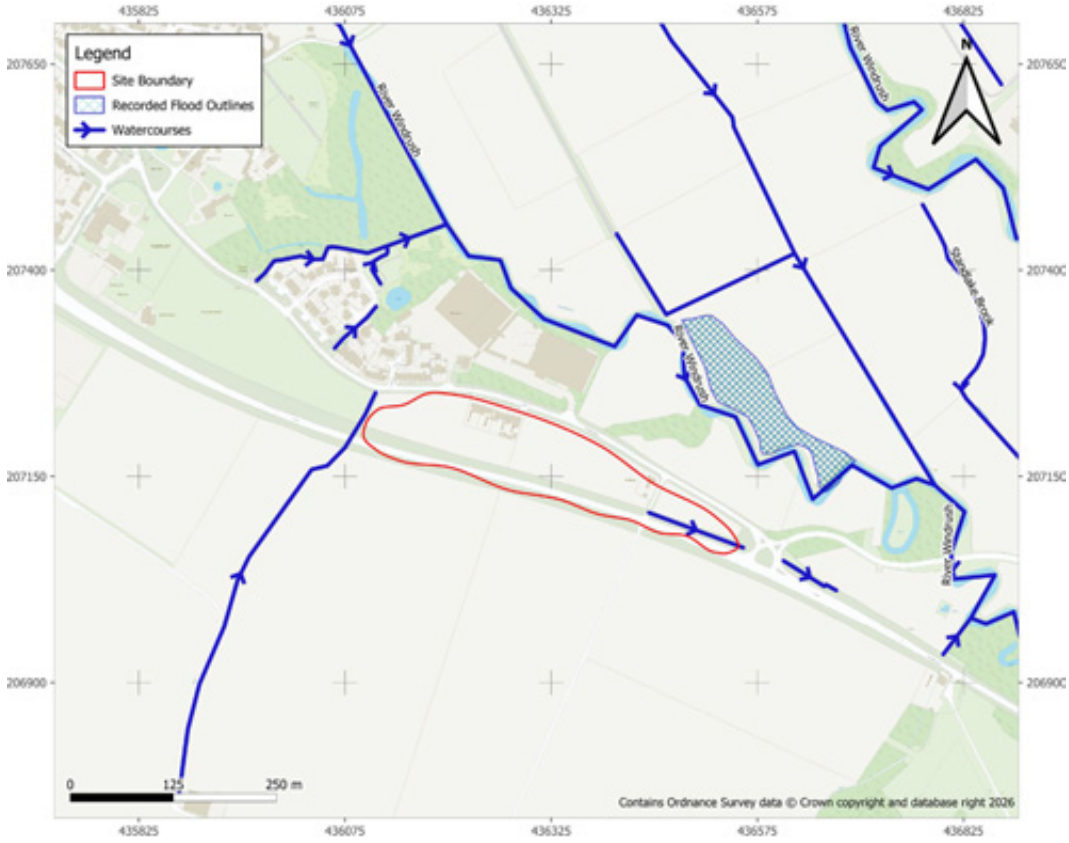


Figure 3 - Recorded Flood Outlines

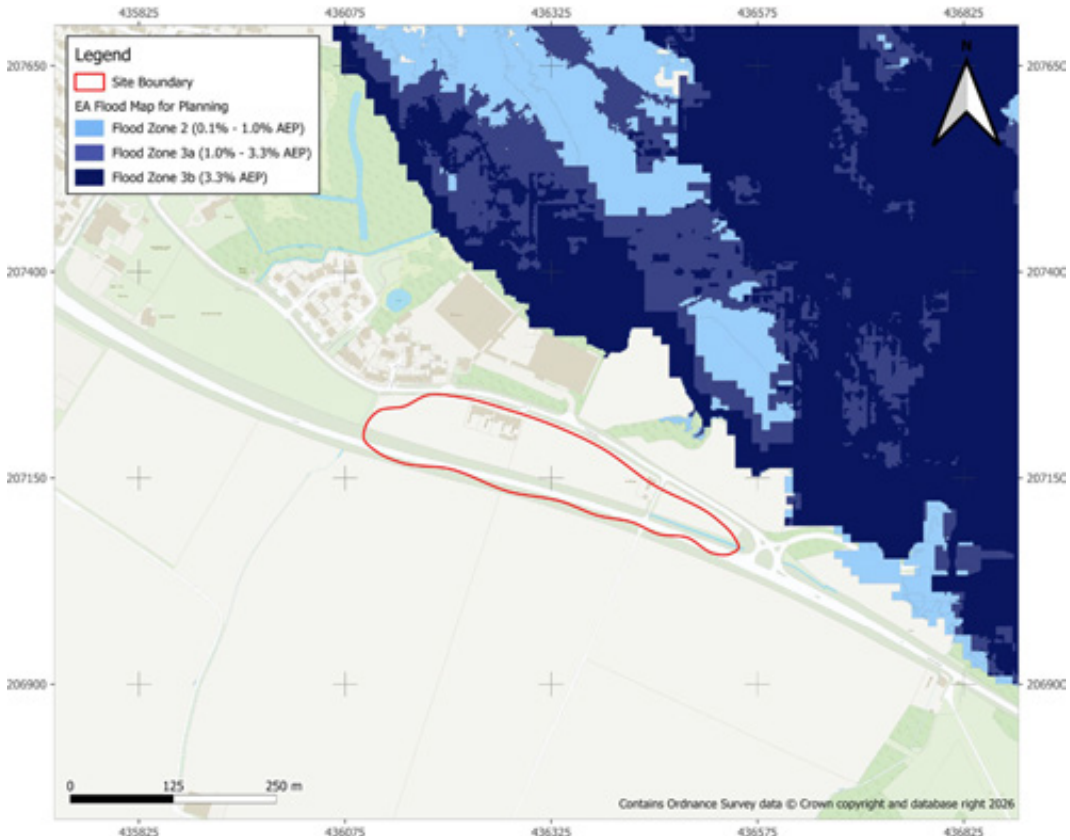


Figure 4 - Fluvial Flood Map

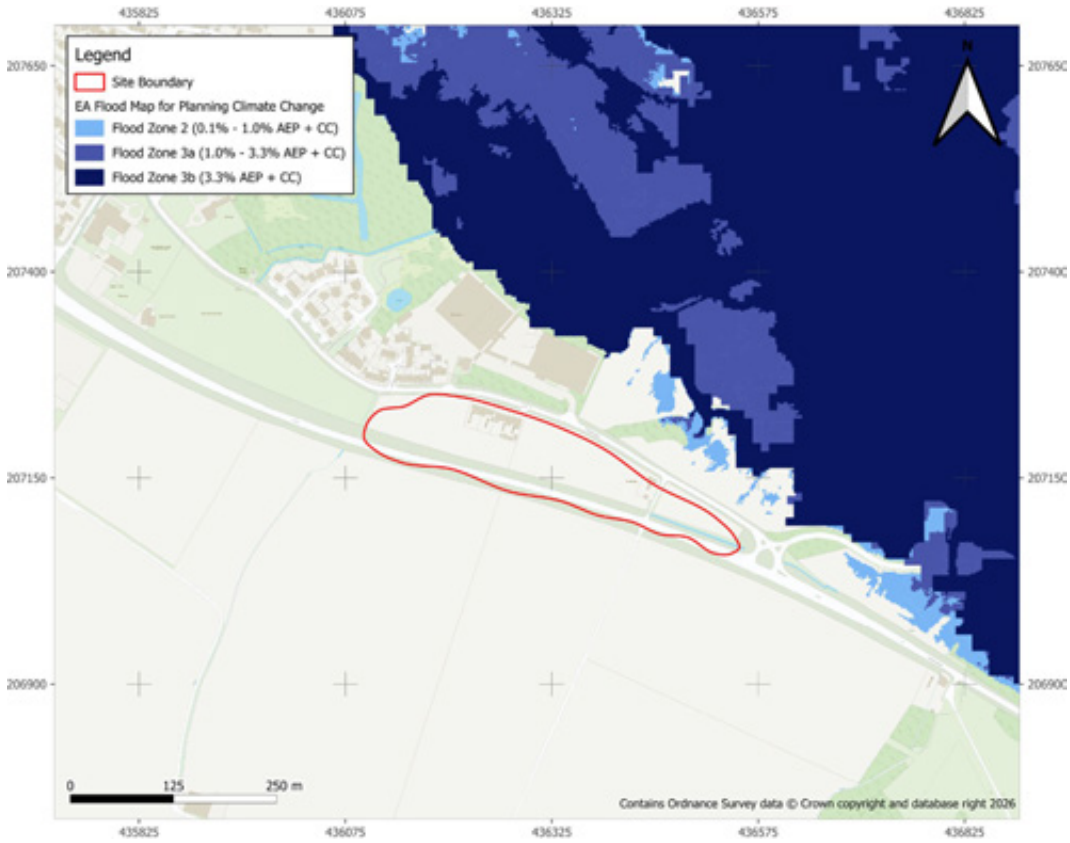


Figure 5 – Fluvial Climate Change Flood Map

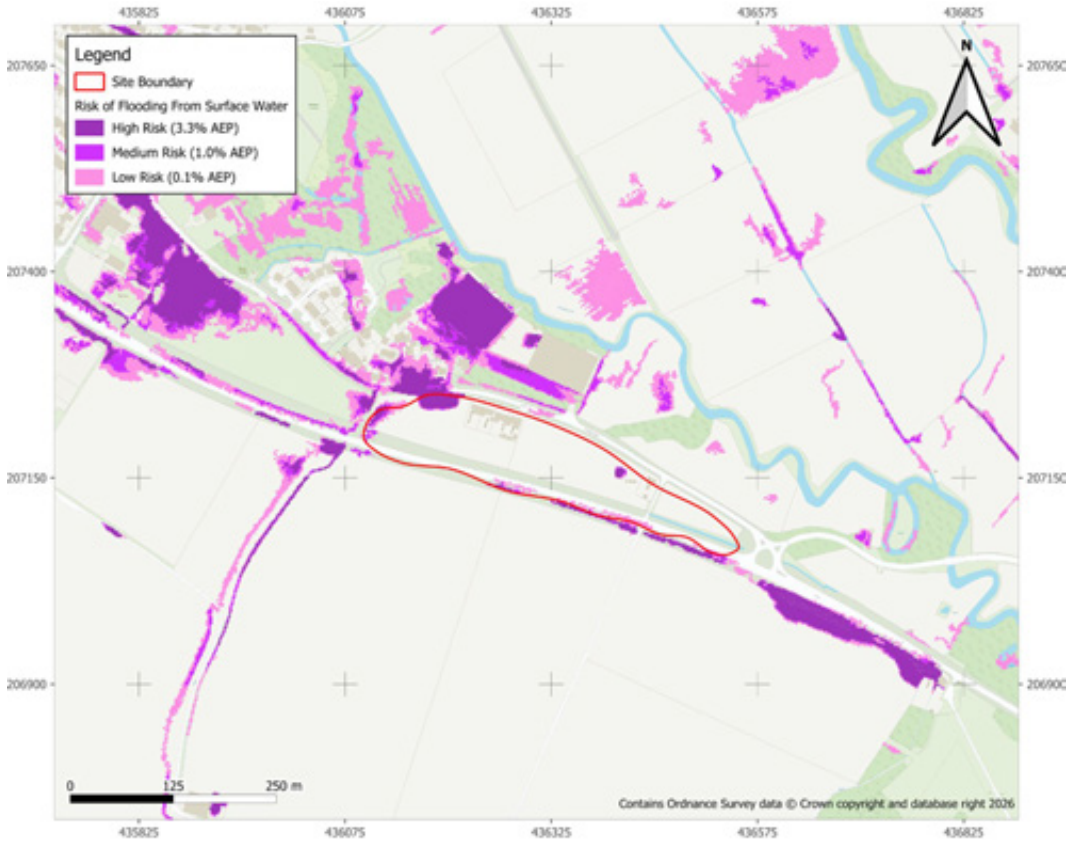


Figure 6 – Surface Water Flood Map

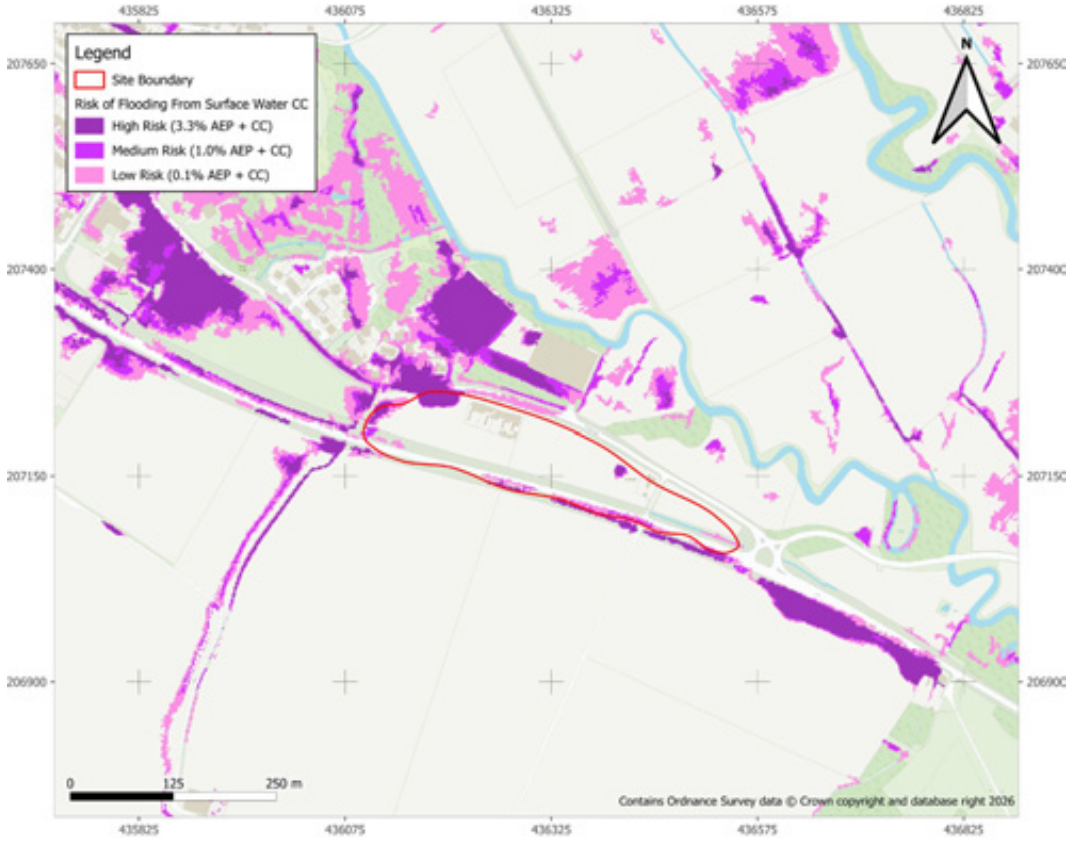


Figure 7 -Surface Water Climate Change Flood Map

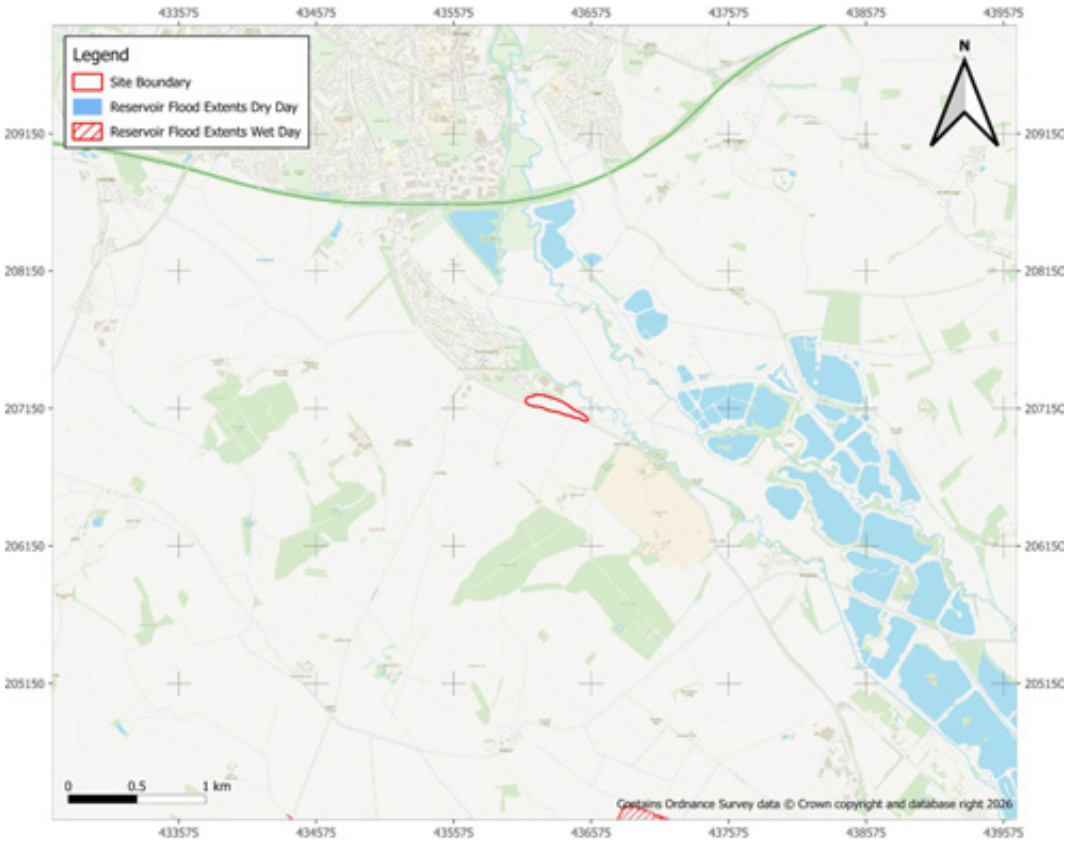


Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The main flood risk mechanism to the site is expected to be pluvial in origin.

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 pluvial flood risk within the site is concentrated in the northwest, a smaller area of pooling is located in the southeast. The depth mapping, Figure 9, shows that the pooling in the northwest is within the 0.3 - 0.6m band. The site is relatively flat and therefore slow velocities are expected. Therefore, the hazard associated with the area is likely to be moderate.

As mentioned in section 3.4 the small amount of flooding shown in the west of the site is likely associated with the watercourse bordering the western site boundary. Overall, the surface water flood mapping is considered a reasonable proxy of flood risk from this watercourses. Topographical data shows the watercourses to be flat with limited catchment area, so the extents shown are not thought to be significantly underestimated. During the planning stage a site-specific FRA should assess the risk of flooding from this watercourse in greater detail. It should also determine any residual risk from the land drain in the west of the site which is not captured in the EA's flood maps.

It should be noted that the climate change allowances used in the RoFRS and RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is available from both east and west using the A415. Because no part of the site is inundated during any fluvial flood event, the preferred access route has been assessed against the Risk of Flooding from Surface Water 1.0% AEP +CC extent.

Figure 10 shows the two proposed access routes to the site. The routes travel using the A415 in both directions. The A415 is largely flood free during the surface water event, aside from some relatively shallow pooling on the road. Both routes remain outside of the fluvial Flood Zones, aside from a small stretch of the A415 prior to joining the A40.

Whilst access to the site 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. The FRA should also consider access points and routes across the site once the development layout is known.

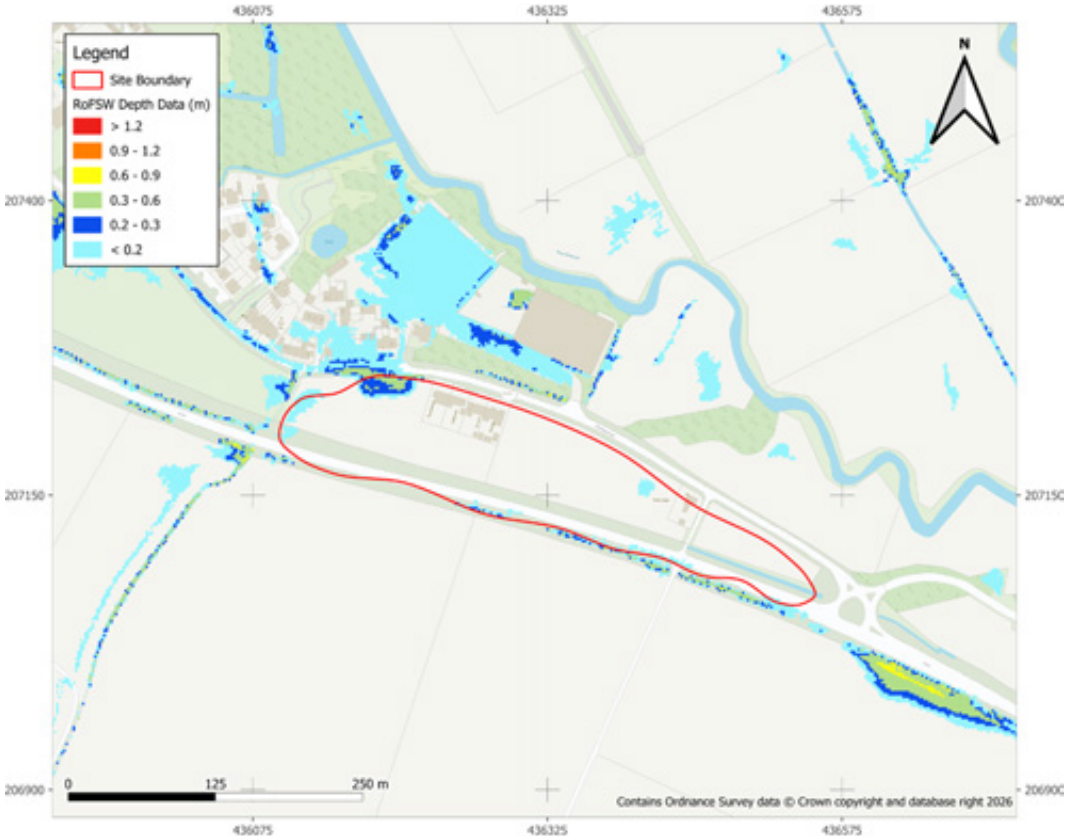


Figure 9 – RoFSW Depth Data for 1.0% AEP + Climate Change Event

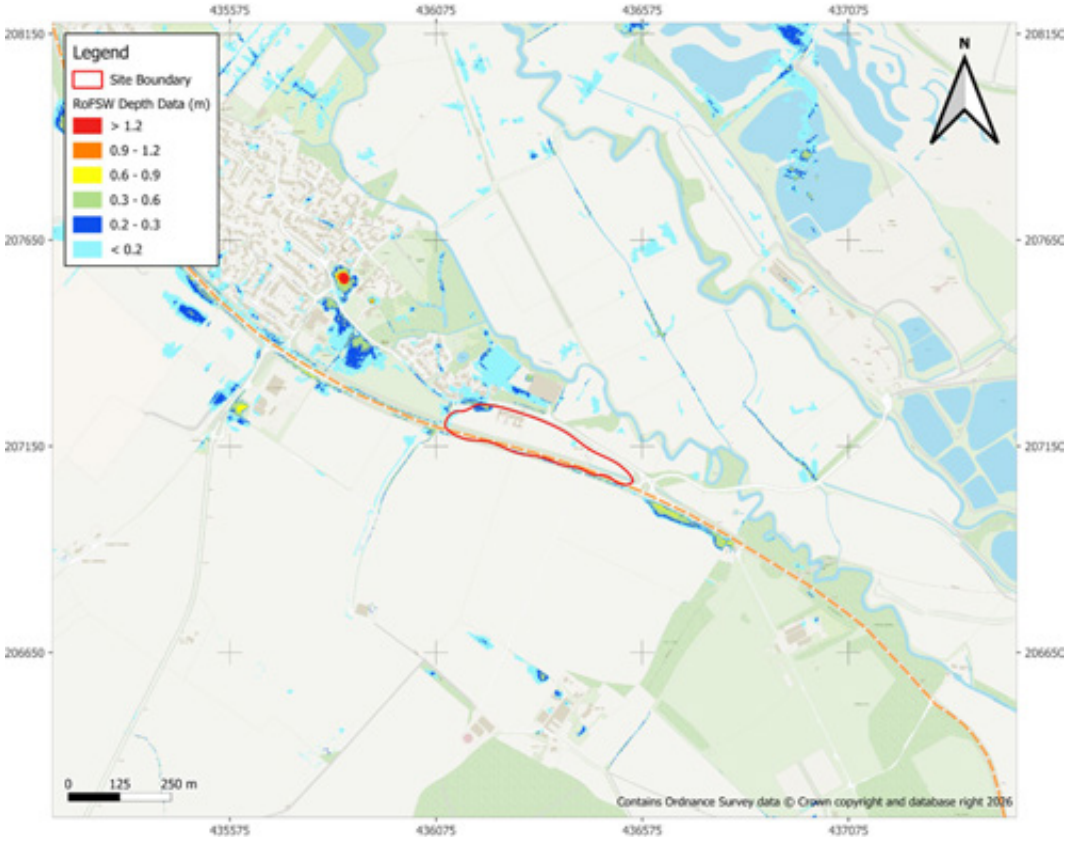


Figure 10 – Access/Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is categorised as *More Vulnerable Development.* A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small proportion of the site is affected by surface water flooding, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid displacing any flood water.

5.2 Scale of Development

The total site area is currently 3.29ha, allocated for 40 residential dwellings. Assuming medium density residential development (60 dwellings per hectare), 40 dwellings would require 0.67ha of land. Given no part of the site is located within Flood Zone 2 or 3 and surface water flooding only effects a small part of the site, this scale of development should be possible.

5.3 Sequential Approach

Whilst More Vulnerable Development is permissible in Flood Zone 2, it is still 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.

As the entire site is located within Flood Zone 1, surface water flood risk should be used to guide the development layout. Although only a small area of the site is affected by surface water flooding, development should avoid existing surface water flood extents with the impacts of climate change considered.

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. It should also determine any residual risk from the land drain in the west of the site which is not captured in the EA's flood maps.

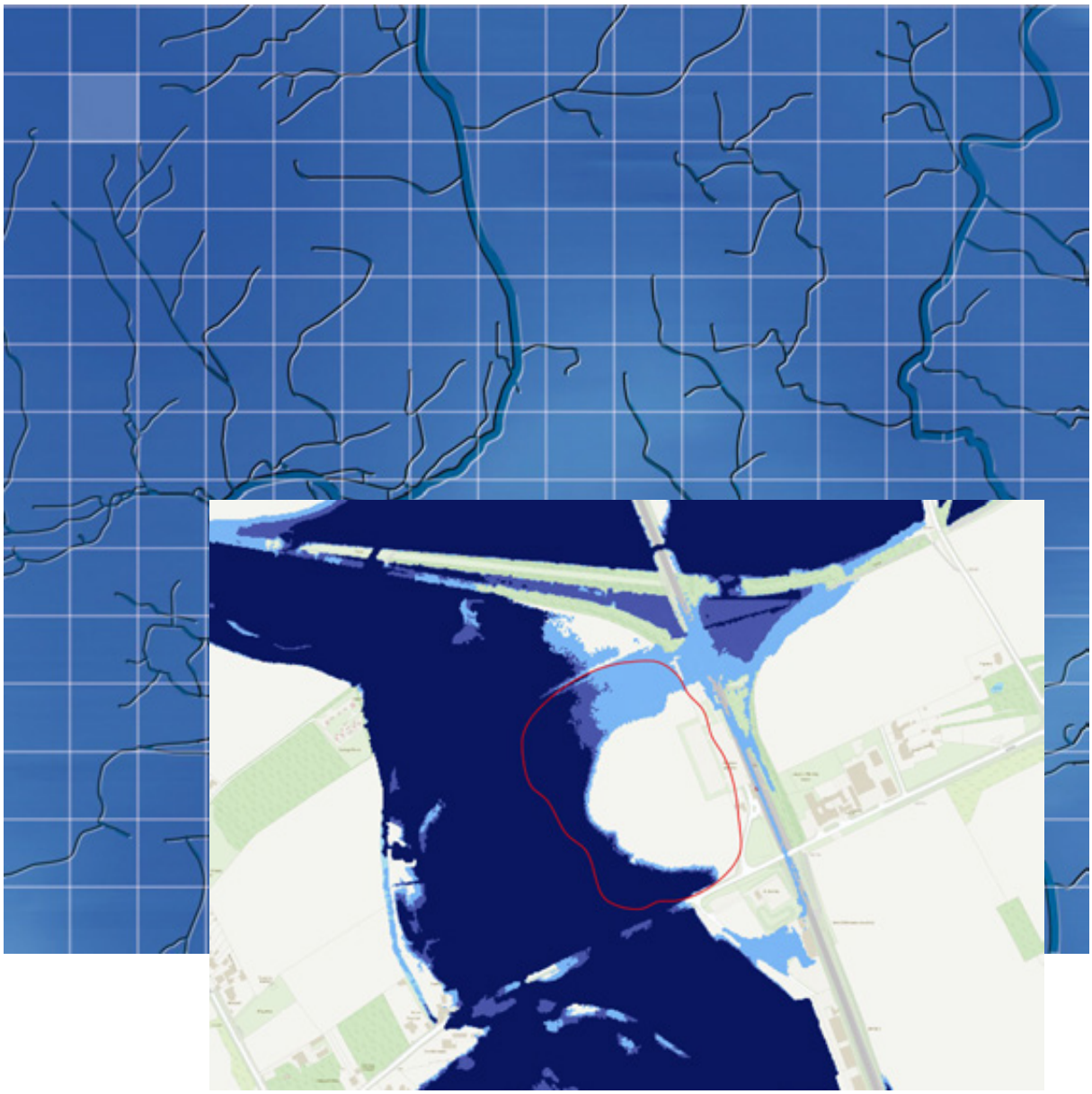
The drainage strategy for the proposed development should be suitably designed to manage additional runoff arising from the development and ensure that surface water flood risk at the site and to third party land is not increased. In assessing and demonstrating the viability of any drainage solution 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.

West Oxfordshire District Council

April 2026

Land adjacent to Kingham Station (KING 005)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land adjacent to Kingham Station (KING 005)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	17/04/2026	Draft	Lloyd Prytherch (*Graduate Consultant*)	Joel Leyshon-Jones (*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.

Registered Office Stables 4 Howbery Business Park, Benson Lane, Wallingford, England, OX10 8BA

www.hydrosolutions.co.uk

Land adjacent to Kingham Station (KING 005) Level 2 SFRA

Flood Risk Overview

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

Flood Risk

Fluvial flood risk represents the primary flood risk to the site. In the Flood Map for Planning (FMfP), 37.6% of the site is located in Flood Zone 2 and 30.4% is located in Flood Zone 3a, 25.3% of the site is located in Flood Zone 3b. The Risk of Flooding from Rivers and Sea (RoFRS) depth data shows that in most locations, depths are less than 0.6m with the exception of land adjacent to the western boundary of the site. Overall fluvial flood risk is considered to be moderate.

Pluvial flood risk at the site is considered to be low for the majority of the site and is limited to a small area in the southwest of the site.

The risk from other sources of flooding is considered to be low.

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 residential, which is classed as *more vulnerable development*. *More Vulnerable Development* 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. 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.

Given that Flood Zone 3b inundates around a quarter of the site (25.3%) it should be possible to locate the majority of infrastructure outside of its extent. The current extents for Flood Zone 2 and 3a should also allow for infrastructure to be located in Flood Zone 1. The surface water flood extents, similar to the fluvial flood extents, are predominantly located in the western part of the site. As such, it should be feasible to position the majority of infrastructure outside of both areas simultaneously.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land adjacent to Kingham Station (KING 005) (Reference: R) 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 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

The Land adjacent to Kingham Station (KING 005) (R) is a 8.02ha site located to the west of Kingham Train Station, southwest of the village of Kingham, see Figure 1. Current land use at the site is largely agricultural, with a car park located along the eastern boundary of the site. The site is approximately 6km southwest of Chipping Norton, adjacent to the administrative boundary of West Oxfordshire.

Within the emerging local plan, the site is allocated for 70 residential dwellings.

2.2 Topography

Based on 1m LiDAR data, the highest ground is located along the northeastern boundary of the site adjacent to Kingham Station. The site slopes gently to the south, west and north from here towards lower ground associated with the floodplains of nearby watercourses. The ground levels within the site boundary range from 104.0 to 110.9m AOD, see Figure 2. The average ground level is 106.5m AOD.

2.3 Nearby Watercourses

The closest watercourse to the site is a small drain, which runs the length of the site's northern and western boundaries, see Figure 1. Colwell Brook runs approximately 0.1km north of the site, before heading south and bifurcating to the northwest of the site, with both channels continuing into the River Evenlode.

The broader area includes two further tributaries of the River Evenlode. The Bledington Brook and Westcote Brook. These flow into the River Evenlode within the immediate vicinity of the site, 0.25km northwest and 0.2km southwest of the site, respectively. The River Evenlode then continues southwards away from the site.

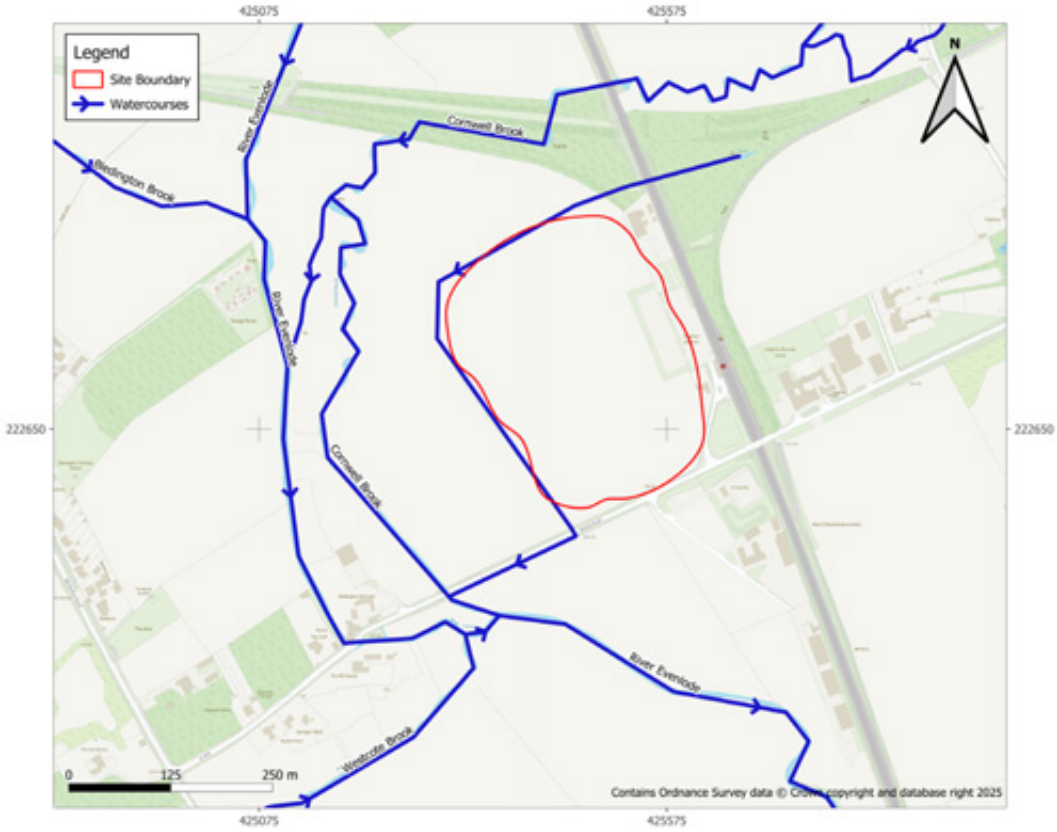


Figure 1 - Site Location

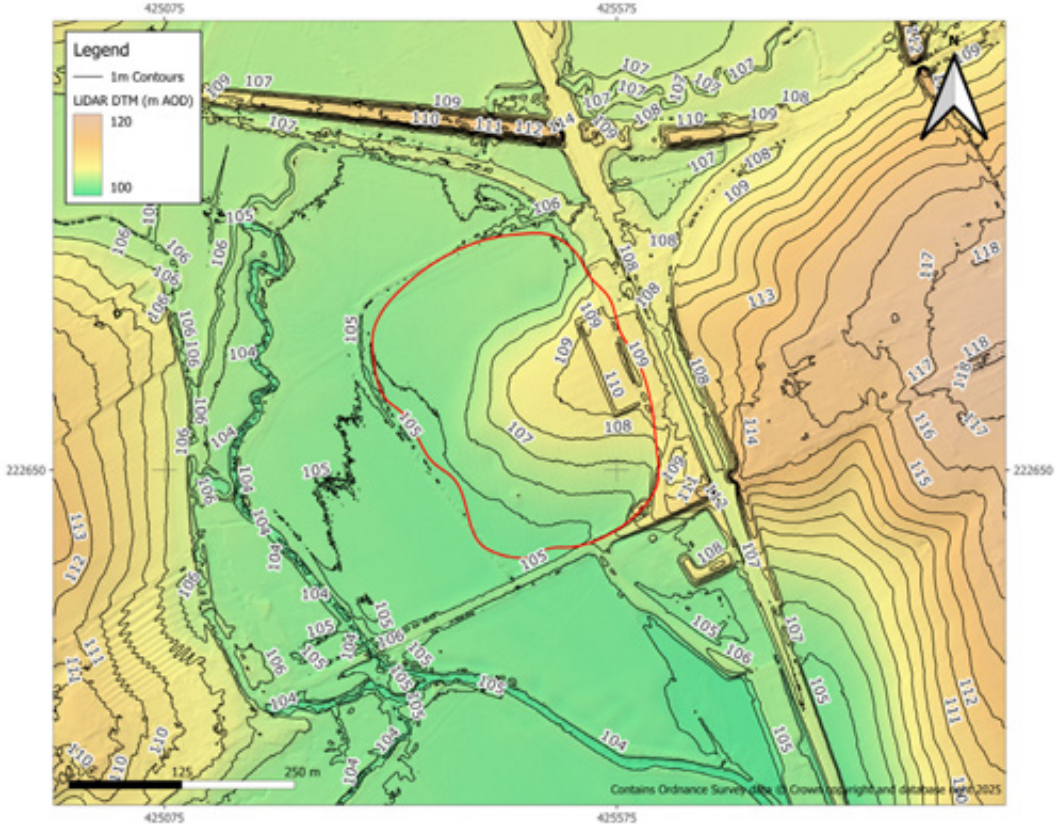


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has several records of historic flooding in the vicinity of the site, see Figure 3. The closest record of flooding occurred 0.1km north of the site along Cornwell Brook in Late Autumn 1993. Another event along Cornwell Brook occurred in April 1988, this also affected low lying land upstream, approximately 0.4km north of the site. To the west of the site, an event in July 2007 on the River Evenlode inundated Station Road and properties 0.2km from the site. All records of historical flooding close to the site relate to fluvial events.

3.2 Fluvial Flood Risk

In the existing Flood Map for Planning (FMfP), 37.6% of the site is located within Flood Zone 2 (0.1% AEP), and 30.4% is located within Flood Zone 3a (1% AEP). These Flood Zones consider the undefended scenario whereas Flood Zone 3b (3.3% AEP) considers the defended scenario. The Flood Zone 3b extent shows 25.3% of the site to be inundated. All flooding at this site is associated with Cornwell Brook and the River Evenlode and their respective tributaries, see Figure 4.

The EA climate change fluvial outputs for the 3.3% AEP defended, the 1.0% AEP and 0.1% AEP undefended events have also been assessed, with the proportion of the site within the flood extents increasing to 29.8%, 35.3% and 49.4% respectively, see Figure 5. It should be noted that the FMfP is not thought to capture flood risk from the small drain bordering parts of the site, this is captured by the EA's surface water flood maps (see section 3.4).

Overall, fluvial flood risk is considered to be moderate and is assessed in greater detail in section 4.

3.3 Flood Defence Infrastructure

There are natural high ground embankments surrounding the watercourses in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 4.7% of the site is inundated during the 3.3% AEP event, 6.5% is inundated during the 1.0% AEP event and 10.6% is inundated during the 0.1% AEP event, see Figure 6. When accounting for climate change the proportions moderately increase to 5.9% in the 3.3% AEP event, 8.0% in the 1.0% AEP event and 13.5% in the 0.1% AEP, see Figure 7.

The current NaFRA2 surface water mapping includes a 'drainage sump' which removes areas of fluvial flooding along 'main' watercourses (i.e. those being included in the fluvial models). However, there is a land drain which borders parts of the site which is not within the fluvial models and therefore are represented in the surface water flood map. In this regard the flooding shown in some parts of the surface water flood map may be both fluvial (river overtopping) and pluvial (overland flow) in origin. This is likely to be the case for the majority of flooding seen in the west of the site

The risk of surface water flooding across the majority of the site is considered to moderate and is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by a bedrock predominantly comprised of mudstone in the form of the Charmouth mudstone formation. The mudstone bedrock is expected to permit low amounts of infiltration. Superficial deposits of alluvium are present on the lowest ground in the site, with some river terrace deposits present in the west of the site. Both are expected to have

moderate permeability. The soils at the site are noted as slowly permeable base rich-loamy and clayey soils.

Based on the data available, the risk of groundwater flooding is considered low given relatively low permeability. More data is required at the planning stage to confirm the risk level and the distribution of risk across the site.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 8 The nearest extent of reservoir flood risk is located 0.8km south of the site.

3.7 Flood Warning Service

The site is not located within or near an EA Flood Warning Area. This could be due to the lack of detailed modelling or gauging stations in the catchment. The River Evenlode at Milton under Wychwood, Shipton under Wychwood and Ascott under Wychwood EA flood warning area, is located approximately 4.5km downstream of the site.

Figure 3 - Recorded Flood Outlines

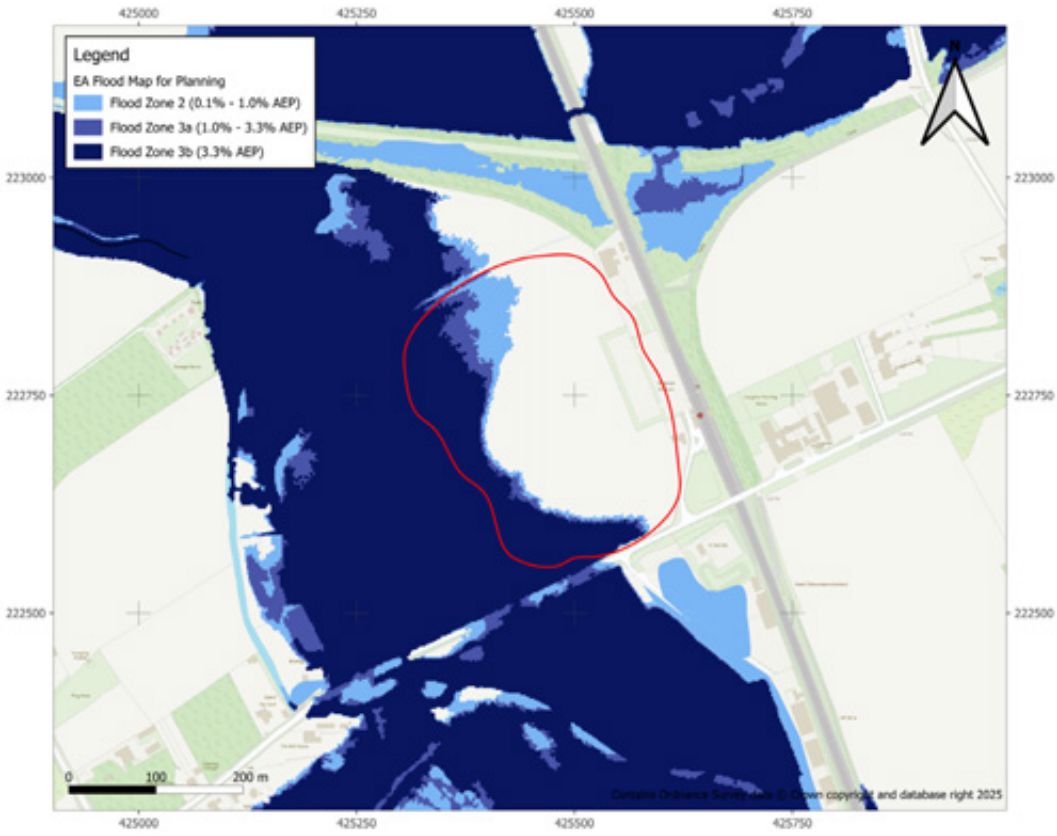


Figure 4 - Fluvial Flood Map

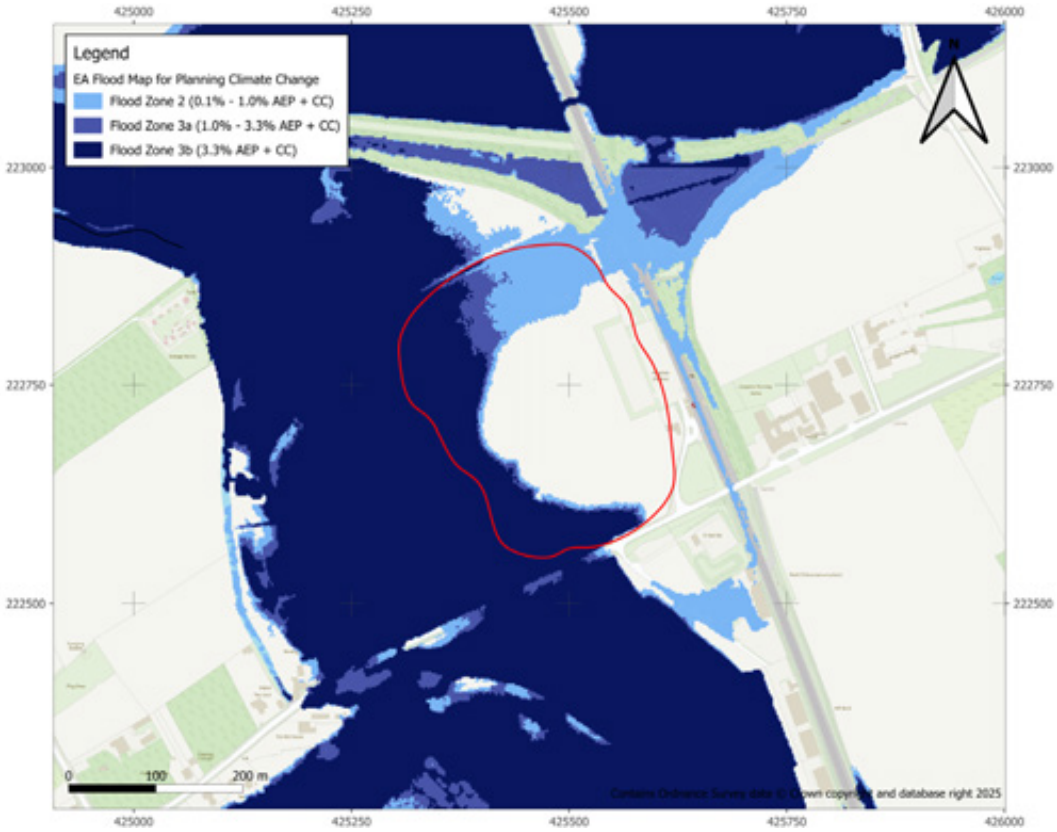


Figure 5 – Fluvial Climate Change Flood Map

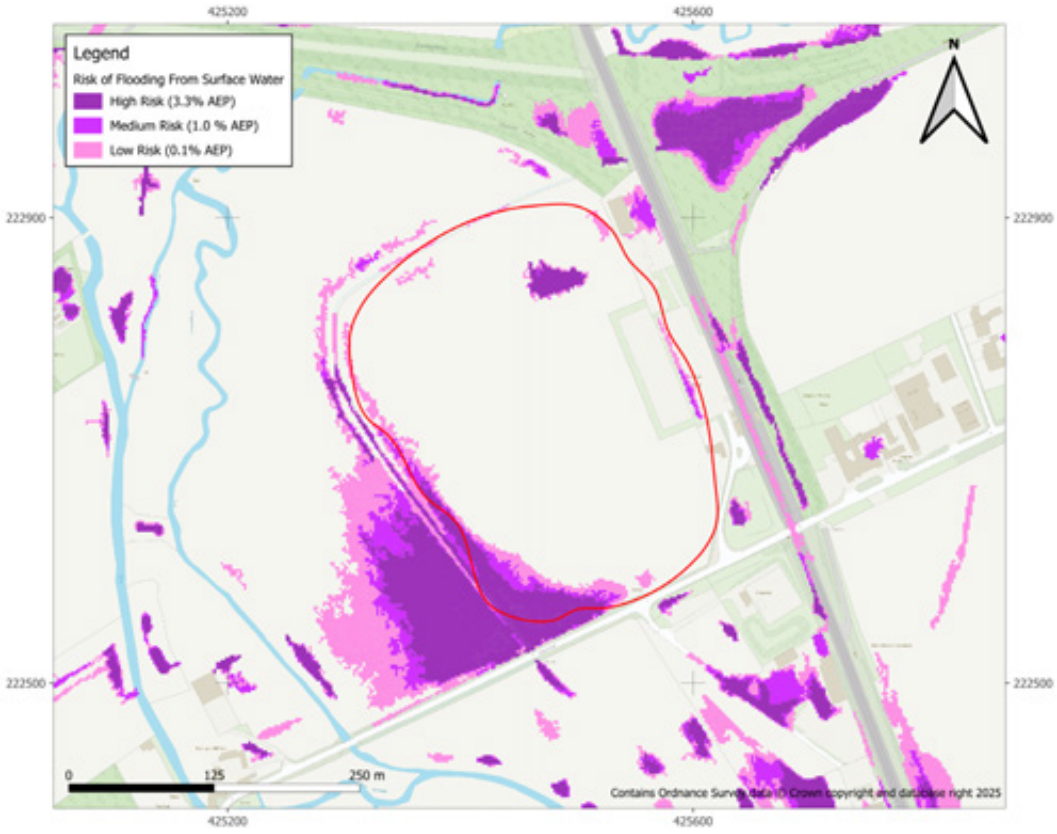


Figure 6 – Surface Water Flood Map

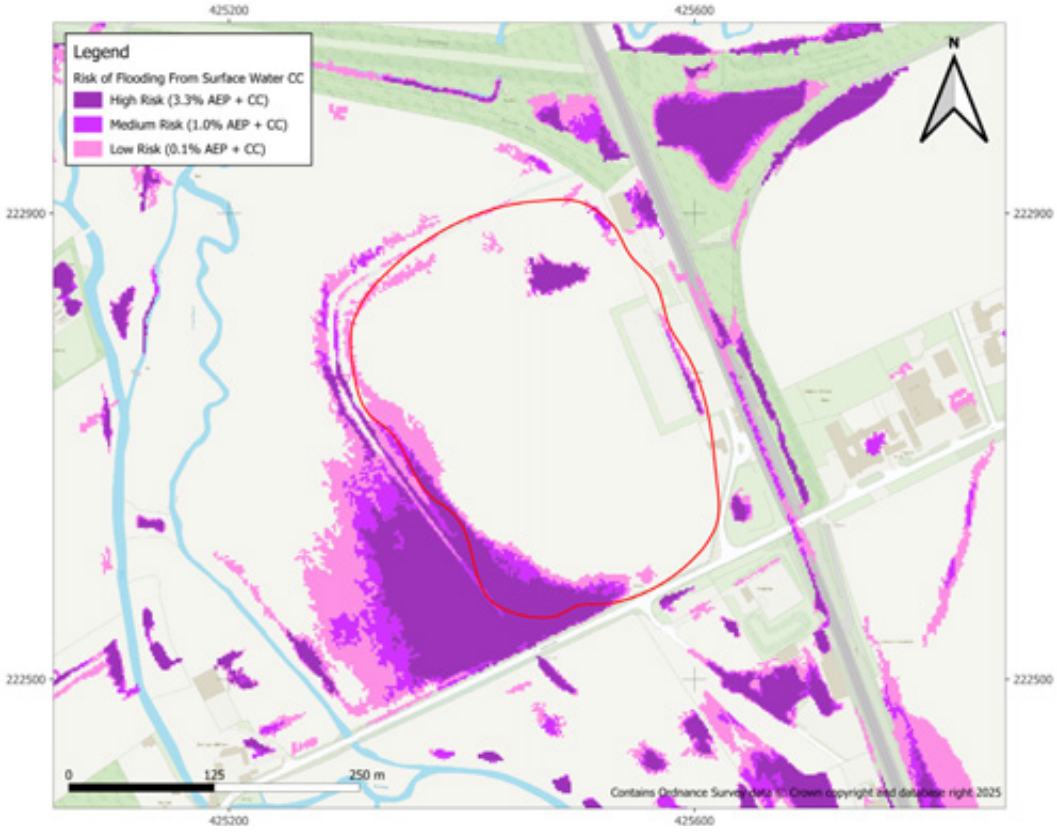


Figure 7 -Surface Water Climate Change Flood Map

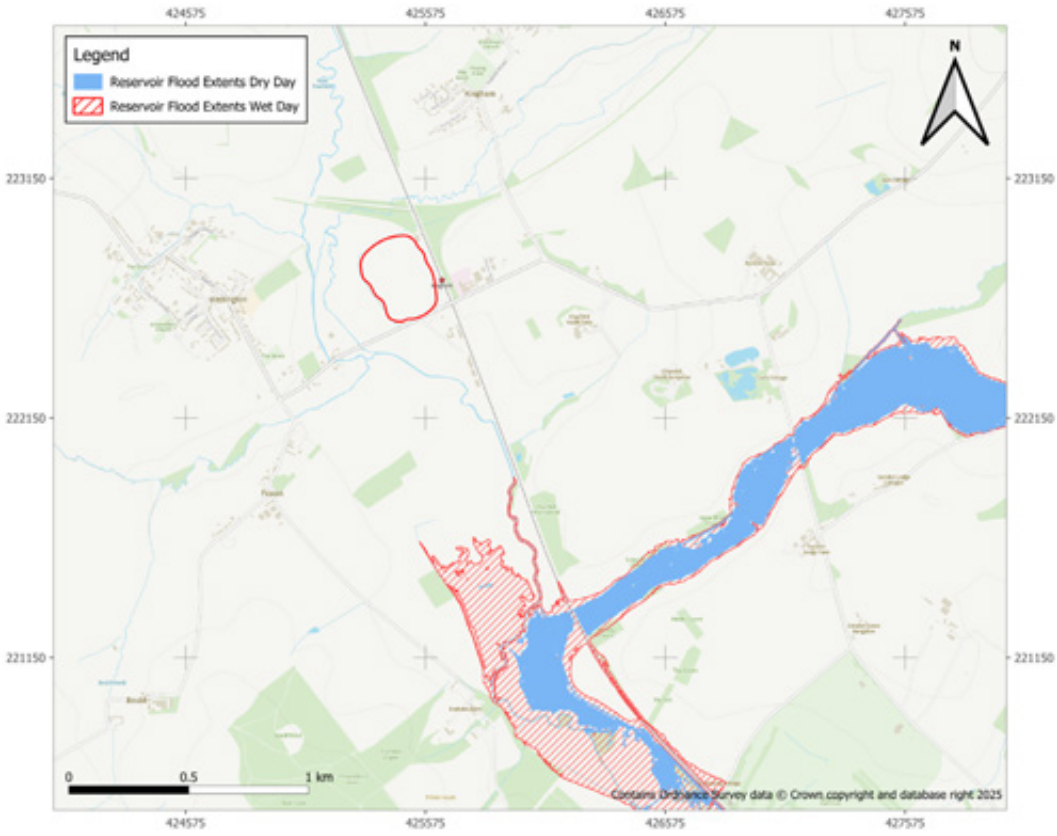


Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is fluvial. However pluvial flooding is potentially significant in the west of the site. The flood risk associated with both sources is assessed in more detail below.

4.2 Flood Risk Metrics

Depth data is not available for the climate change extents reviewed in Section 3.2; these extents consider the 2080s epoch (2070-2125). However, depth data is available from the national mapping from the Risk of Flooding from Rivers and Sea (RoFRS) dataset. The climate change allowances used in RoFRS are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow increases. The RoFRS extents are similar to the extents applying the 2080s allowances, therefore are considered suitable for the purposes of this SFRA. However, it should be noted that given the expected lifetime of the development, a site-specific FRA will need to consider the climate change impacts for the 2080's epoch (2075-2125).

The depth mapping across the site (see Figure 9) shows flooding to be limited to the western parts of the site. Approximately 32.7% of the site is inundated during the design event, with depths along the site boundary reaching 0.9 - 1.2m. As the topography rises away from the western boundary, depths are generally between 0.2 - 0.9m. During the design event, flood water ponds against Station Road, which generally sits approximately 1m above the adjacent land level. The culverts through Station Road for both the River Evenlode and Colwell Brook may not have been represented in the national model, in which flooding upstream of Station Road (including within the site) may be inaccurate likely being overestimated.

Similar areas are affected by the design pluvial event, however the floodwater present in the site is likely due to flooding associated with the ditch which runs adjacent to the site's northern and western boundary. A small area of surface water ponding is also present in the north of the site, with depths up to 0.3m. Given the relative flatness of the site and surrounding area, flow velocities are expected to be limited, in turn reducing flood hazard levels.

Overall, the surface water flood mapping is considered a reasonable proxy of flood risk from the land drain bordering the site. Topographical data shows the watercourse to be very flat with limited catchment area, so the extents shown are not thought to be underestimated. During the planning stage a site-specific FRA should assess the risk of flooding from these watercourses in greater detail. This should include a review of any structures present along the reach.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is assumed to be via Station Road, accessible from east and west from the site. During the 1.0% AEP +CC fluvial design event, Station Road becomes inundated, with depths generally between 0.2 - 0.3m. Due to this risk, the best access and egress route is suggested to follow Station Road to the east from the site, which rises to higher ground, see Figure 10. Onwards access/egress should then continue northeast on the B4450 towards

Chipping Norton. This route is entirely located in Flood Zone 1; however localised areas of surface water flood risk are present along the route.

Kingham Station, located adjacent to the site, remains flood free during the design event, residents would be able to seek refuge here.

It should be noted that the routes identified 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 and assess in more detail the nature of the flood risk to determine how quickly it occurs and the degree of hazard.

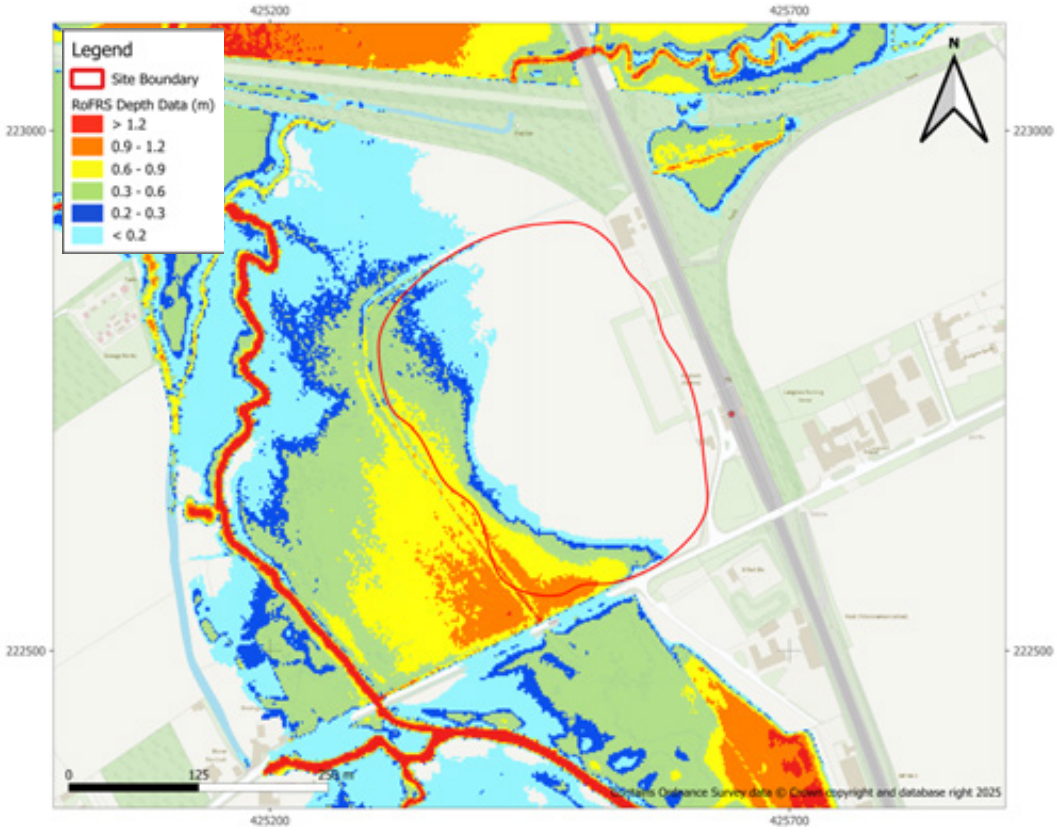


Figure 9 – RoFRS Depth Data for 1.0% AEP + Climate Change Event

Figure 10 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential, which is classed as *more vulnerable development*. *More Vulnerable Development* 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. 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.

Given that Flood Zone 3b inundates around a quarter of the site (25.3%) it should be possible to locate the majority of infrastructure outside of its extent. The current extents for Flood Zone 2 and 3a should also allow for infrastructure to be located in Flood Zone 1. The surface water flood extents, similar to the fluvial flood extents, are predominantly located in the western part of the site. As such, it should be feasible to position the majority of infrastructure outside of both areas simultaneously.

5.2 Scale of Development

The total site area is currently 8.02ha, allocated for 70 dwellings. Assuming medium density housing (60 dwellings per hectare), 70 dwellings would require 1.17ha. In total only 49.4% of the site or 3.96ha of land lies within the fluvial flood zones when accounting for climate change, leaving 4.06ha in Flood Zone 1. This should mean that the majority of infrastructure can be sited outside of areas of flood risk, this is provided there are no constraints (non-flood related) which require development to be located in at-risk areas. Even if this is the case, as stated above residential development is also permissible in Flood Zone 2.

The surface water flood extents like the fluvial extents are primarily in the west of the site also and it should also be possible to located the majority of infrastructure outside of these also.

To reduce the impact on floodplain storage, building footprints and infrastructure should be sited outside of flood extents wherever possible. This should in turn reduce the need for compensatory storage which could compromise the land available for development.

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. employment land, 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 at the site in similar areas as fluvial risk, it should therefore also be used to inform the development layout, with development located outside of high-risk areas if possible.

5.4 Other Site-Specific Considerations

If it is necessary for any infrastructure to be located in flood risk areas it is recommended that applicants must undertake site-specific modelling as part of a site-specific FRA. This is to ensure the development is safe for its lifetime and to assess 3rd party impacts. Subsequently, development will need to be set at a floor level to provide an appropriate freeboard (typically 300mm minimum) above the flood level for the 1.0% AEP (plus central climate change allowance) design event. If ground raising is implemented within the flood extents, the modelling will also need to be undertaken to assess 3rd party impacts and

compensatory storage requirements. Based on the current scale of development it should be possible to locate all infrastructure outside of fluvial and surface water flood extent.

Parts of the access route to the site are shown to be at high surface water risk. A site-specific FRA should consider in more detail the nature of the surface water flood risk to determine how quickly it occurs and the degree of hazard on site.

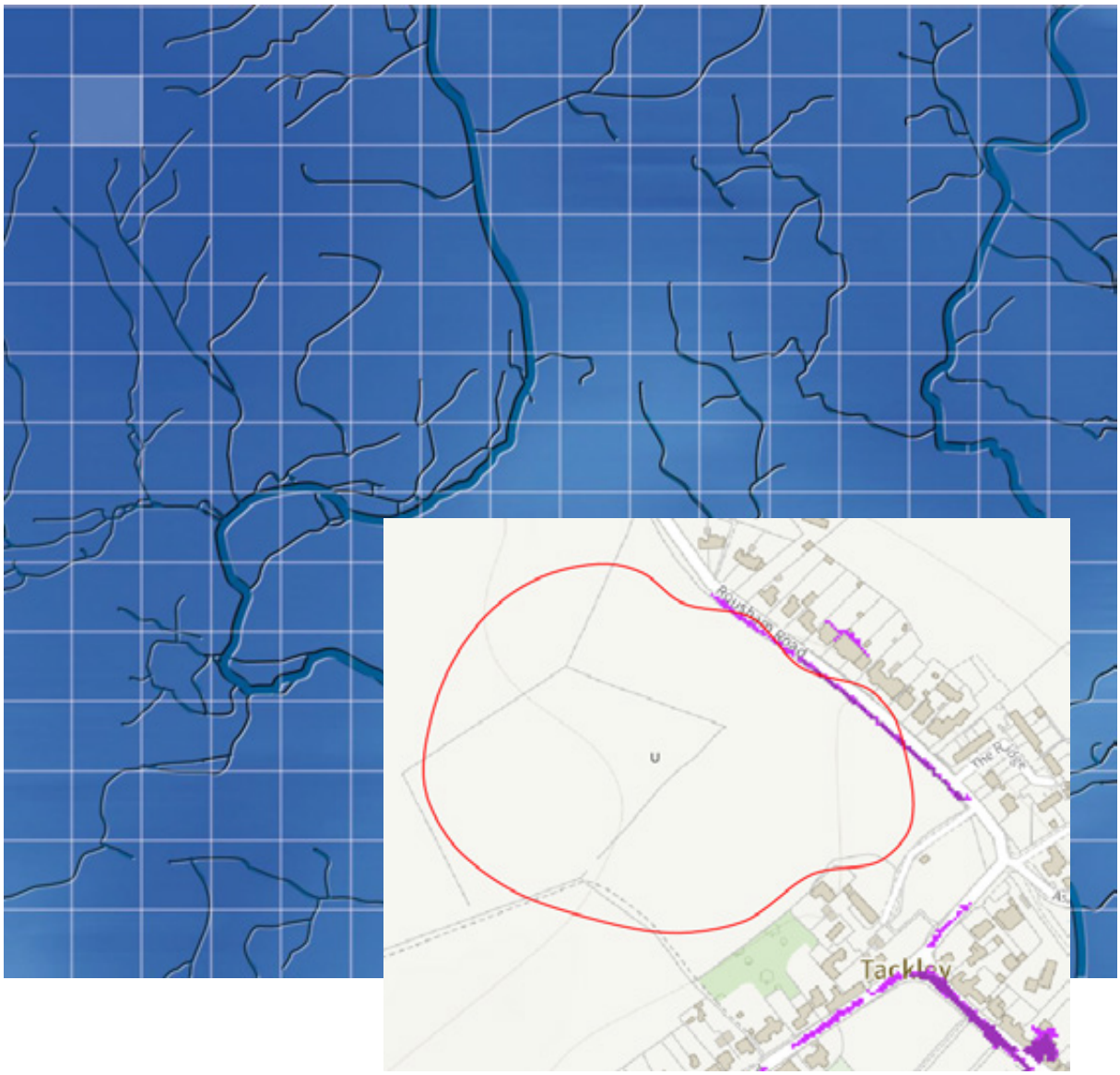
The drainage strategy for the proposed development should be suitably designed to manage additional runoff arising from the development and ensure that surface water flood risk at the site and to third party land is not increased. In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site has low to moderate permeability, therefore the significant use of infiltration SuDS solutions may 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 may also need to be considered as part of a site-specific FRA

West Oxfordshire District Council

April 2026

Land west of Rousham Road (U)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Land west of Rousham Road, Tackley (U)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	Draft	Jasmine Lucas (*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.

Registered Office Maclean Building, Benson Lane, Wallingford OX10 8BB
www.hydrosolutions.co.uk

Land west of Rousham Road, Tackley (U) 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 not at risk from fluvial sources; however, a flow route is present along the northeastern boundary of the site based on available surface water mapping. Flooding effects 0.5% of the site with a maximum flood depth of 0.3 m modelled during the 1.0% AEP +CC design event.

Overall pluvial flood risk at the site is considered to be low given that it is limited to a small area in the east of the site.

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 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. The design must ensure that areas of the site that may be located within Flood Zone 3b in the future are avoided altogether.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid altering the existing flow route.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Land west of Rousham Road, Tackley (Reference: U) 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 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

The Land west of Rousham Road, Tackley (U) site is 5.79-ha in area. The site is located to the northwest of the village of Tackley bordered by Rousham Road to the east. Land use at the site is currently agricultural, see Figure 1.

In the local plan, the site is allocated for 70 residential dwellings.

2.2 Topography

Based on 1m LiDAR data, the site slopes from west to east towards a valley in the topography. Within the wider area, lower land is located to the south with higher land is located to the north, west, and east of the site.

Within the site, ground levels range from 78.3m AOD in the south-east to 96.4m AOD in the west, see Figure 2. The average ground level is 87m AOD.

2.3 Nearby Watercourses

The site is located approximately 420m southwest of the River Cherwell and 485 m southwest of the Oxford Canal, see Figure 1. Two small drains are also situated close to the site to the north and southeast respectively. These drains follow the topography of the local area, flowing from north to south towards the River Cherwell.

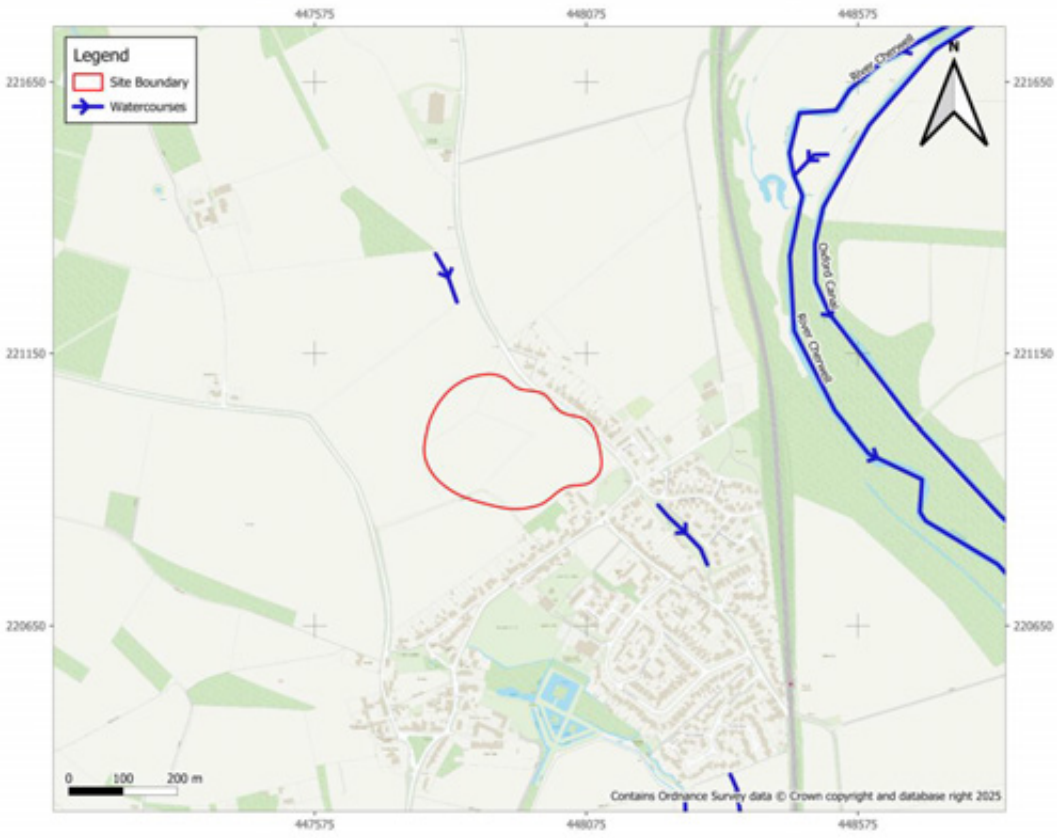


Figure 1 - Site Location

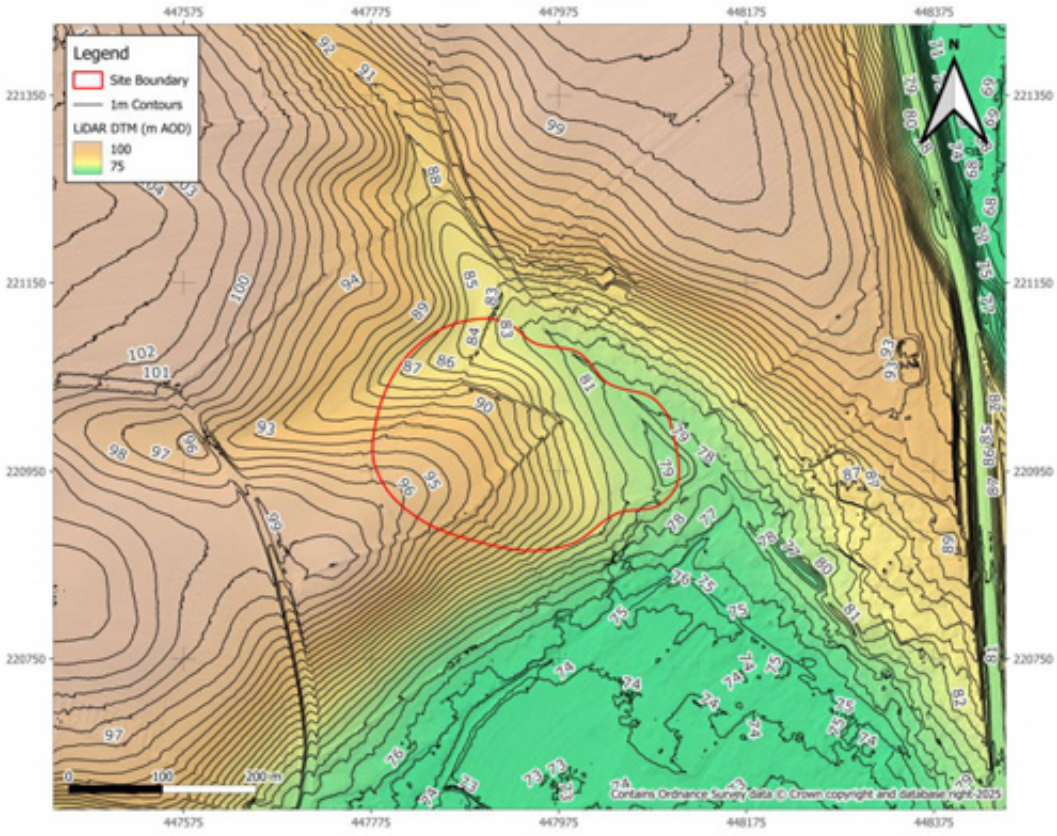


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest record of flooding is located 370m northeast of the site associated with the River Cherwell. This area of flood risk is associated with multiple flood events with the most recent occurring in July 2007.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) shows the whole site is located within Flood Zone 1, see Figure 3. When considering the EA's FMfP climate change extents the whole site remains within Flood Zone 1, see Figure 4. Therefore, the risk of fluvial flooding is considered to be low.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 0.2% of the site is inundated in the 3.3% AEP event, 0.5% is inundated in the 1.0% AEP event and 0.7% is inundated in the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 0.3% in the 3.3% AEP event, 0.5% in the 1.0% AEP event and 1.2% in the 0.1% AEP, see Figure 6.

Overall, the risk of surface water flooding is considered to be low though it is greater than the fluvial risk and mostly concentrated along an overland flow route along the eastern boundary of the site. Therefore, the residual risk associated with this flow route is assessed in more detail below in section 4.

3.5 Groundwater Flooding

The site is underlain by White Limestone formation bedrock which is expected to permit relatively high levels of infiltration. No superficial deposits are present within the site. The overlying soils are described as freely draining lime-rich loamy soils.

Based on the available data, the risk of groundwater flooding at the site is likely to be moderate given that the water table is likely mobile. The risk is likely to be greater in the east of the site where the ground levels are lower. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 7.

3.7 Flood Warning Service

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

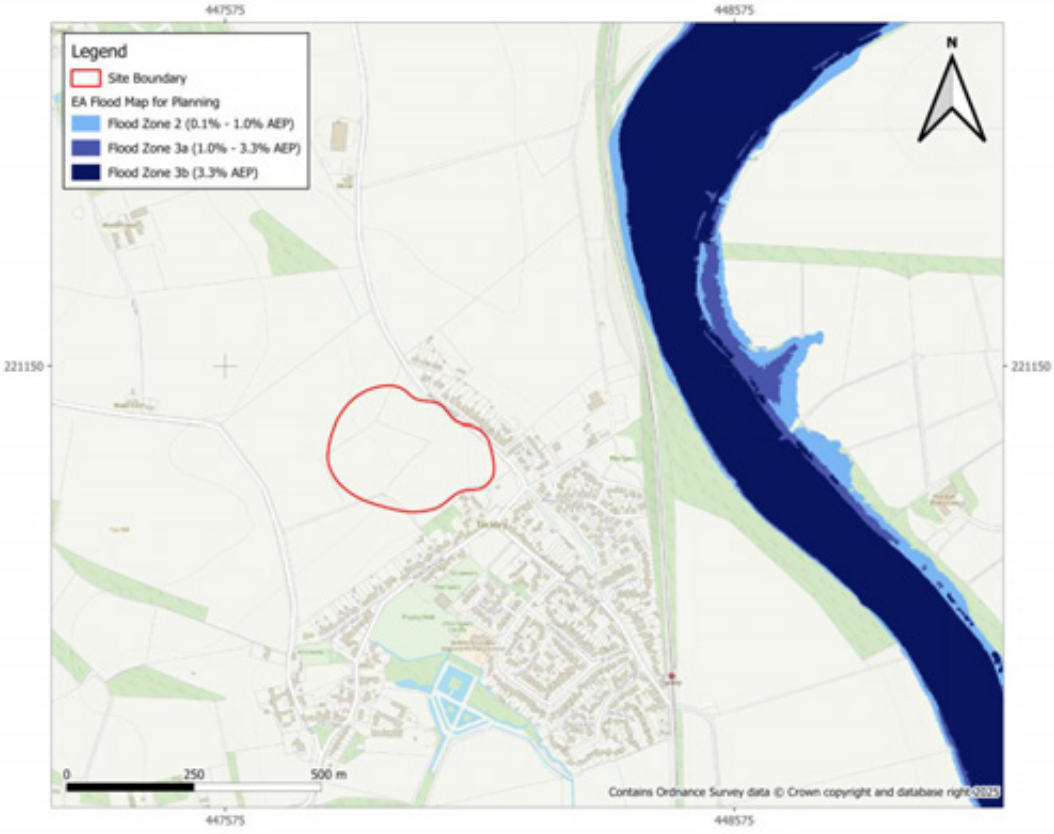


Figure 3 - Fluvial Flood Map

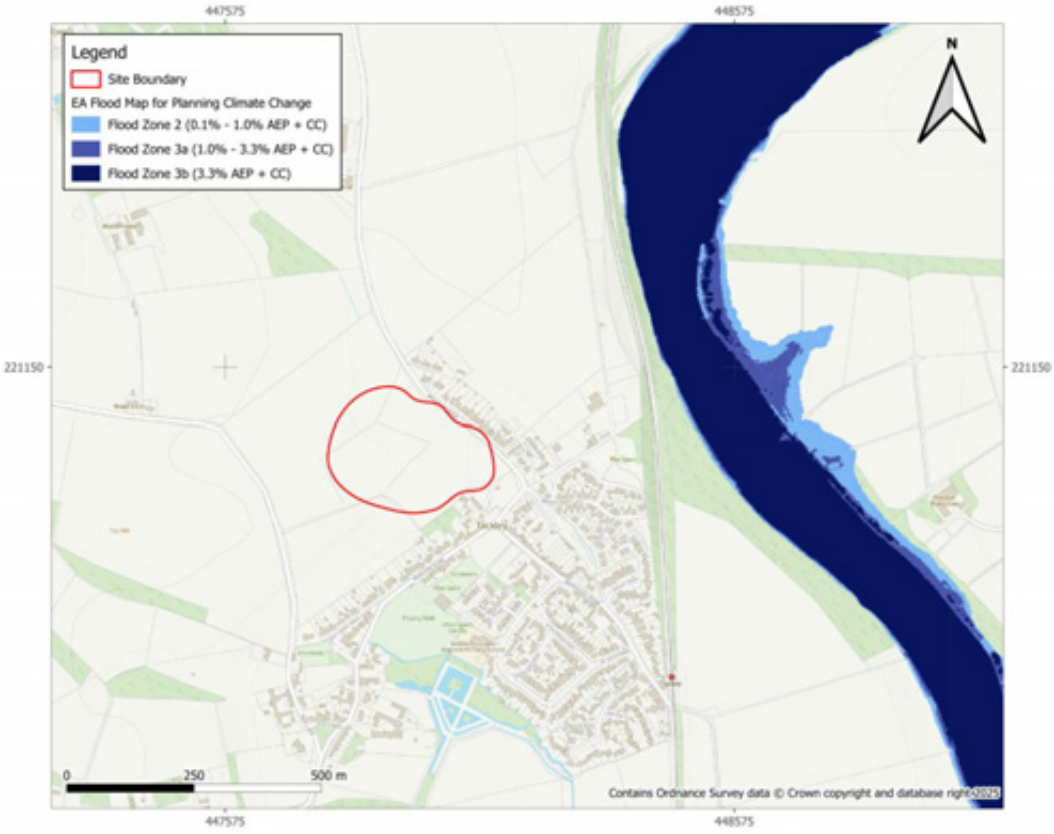


Figure 4 – Fluvial Climate Change Flood Map

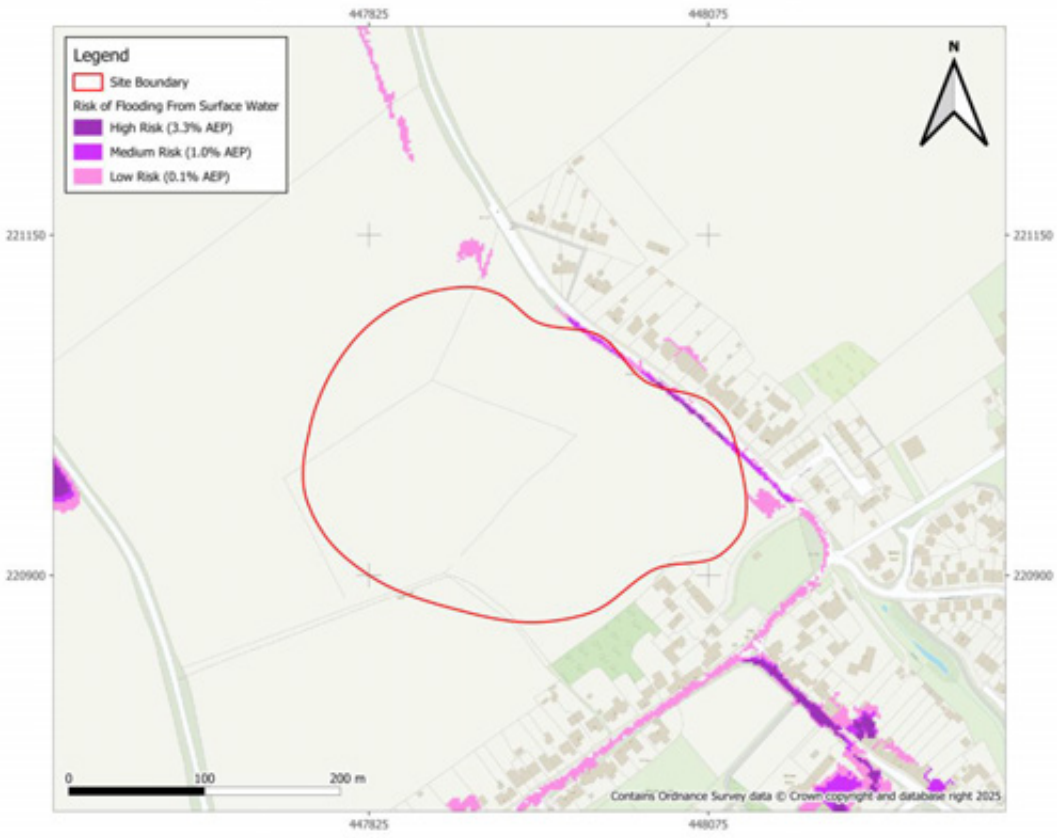


Figure 5 – Surface Water Flood Map

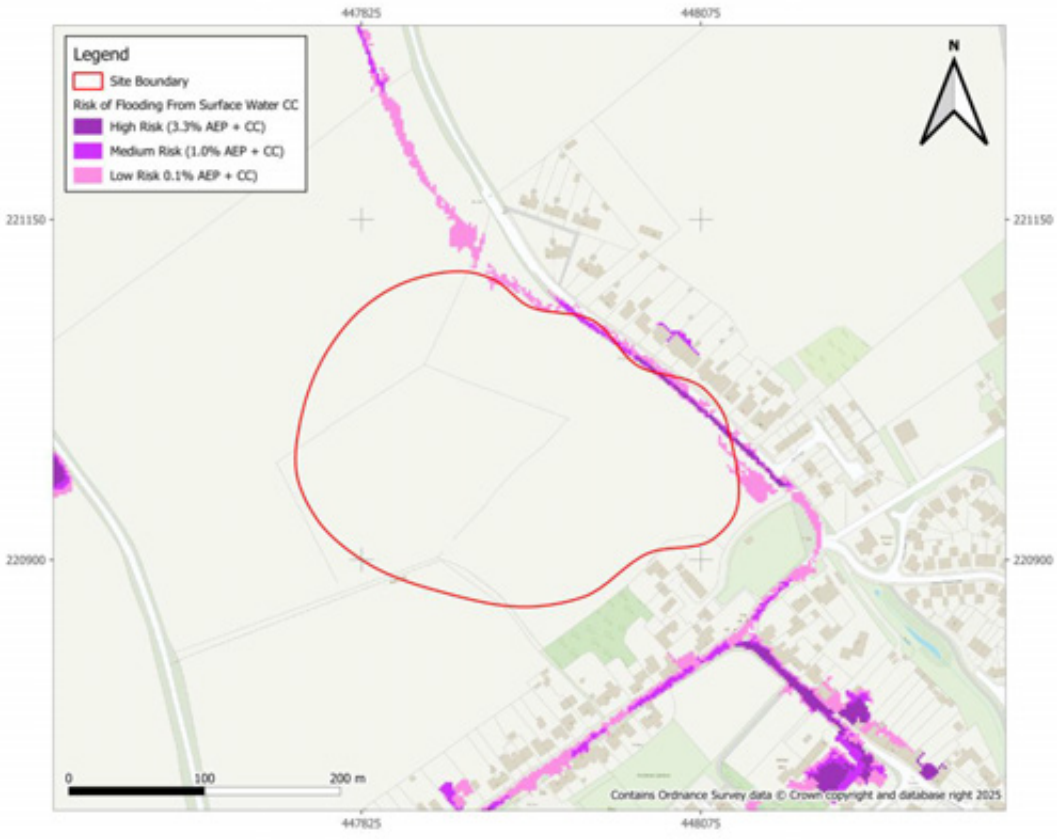


Figure 6 -Surface Water Climate Change Flood Map

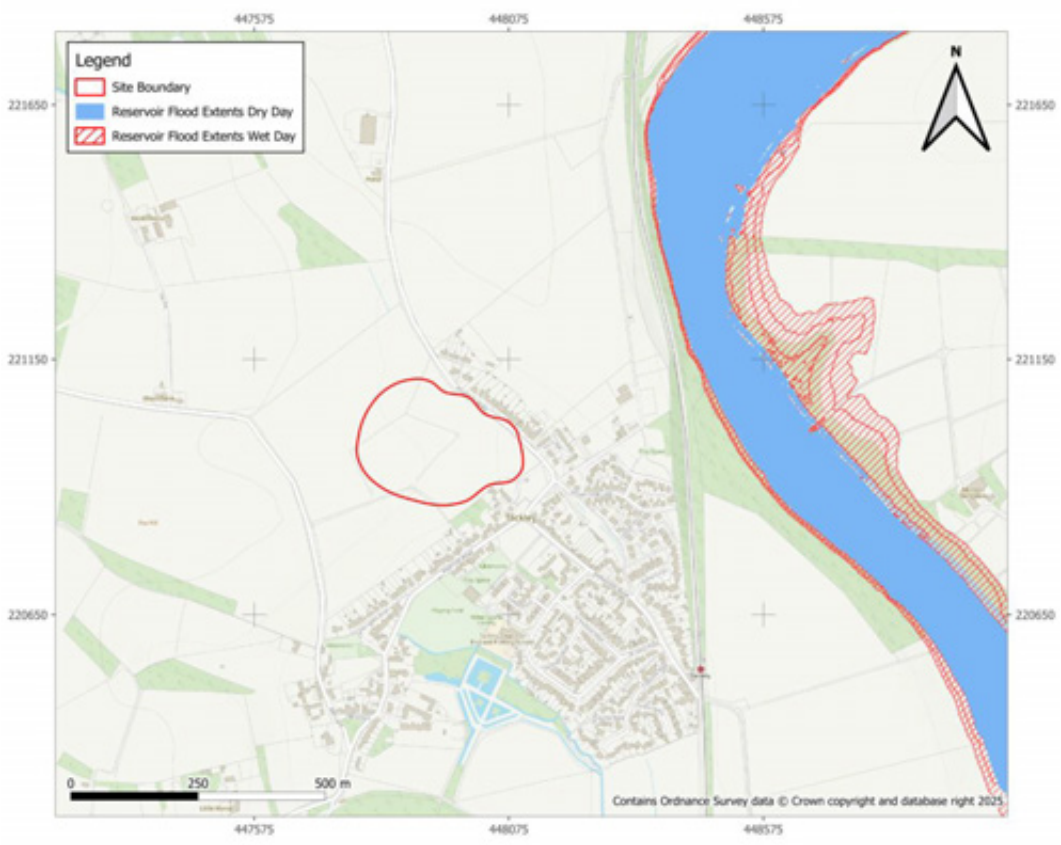


Figure 7 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The main flood risk mechanism to the site is expected to be pluvial in origin.

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.

All of the pluvial flooding on the site is associated with an flow route which runs along the site's eastern boundary. The depth mapping (see Figure 8) shows the surface water flow route has a maximum flood depth of 0.3 m with depths generally less than 0.2 m. Therefore, the hazard associated with this area is likely to be low. However, the sloping nature of the site may lead to relatively high velocities along the route.

It should be noted that the climate change allowances used in the RoFRS and RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is available via Rousham Road to the east. As no part of the site is inundated during any fluvial flood event, the preferred access route has been assessed against the Risk of Flooding from Surface Water 1.0% AEP +CC extent.

Figure 9 shows the proposed access route to the site which follows Rousham Road to the north. Aside from the area of surface water flood risk close to the site, no other part of the route is at risk of flooding.

Whilst the risk of both fluvial and surface water flooding to access is generally considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known.

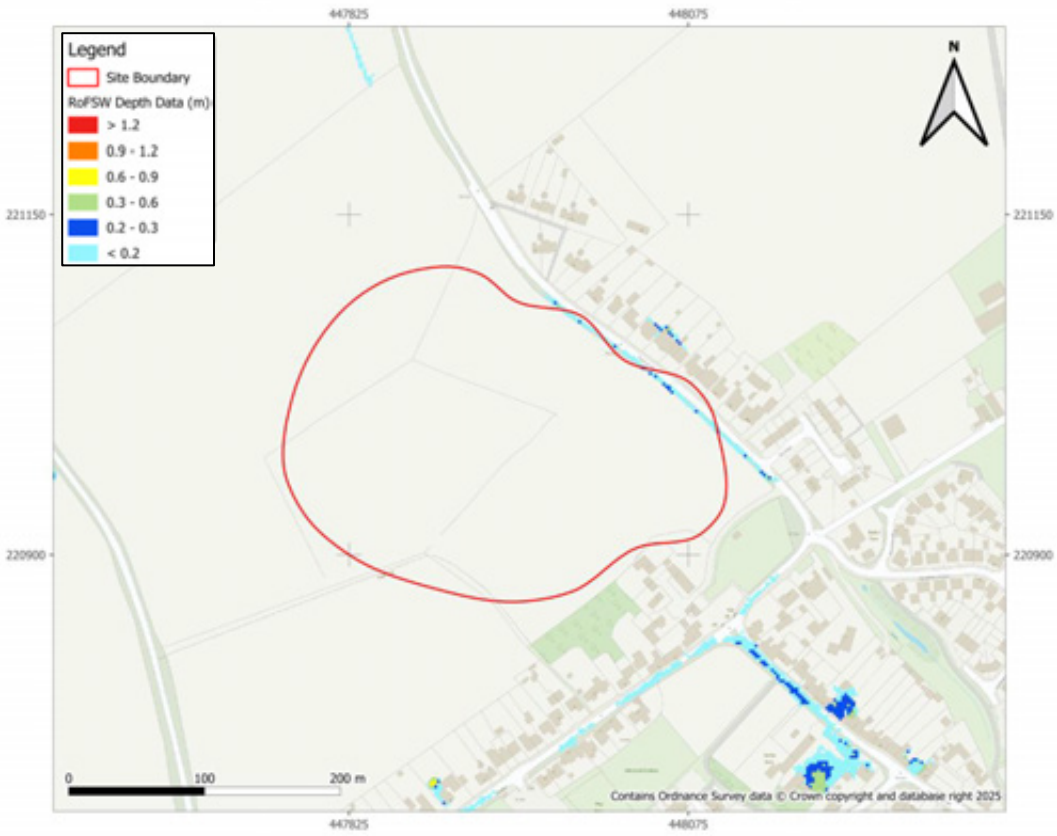


Figure 8 – RoFSW Depth Data for 1.0 % AEP + Climate Change Event

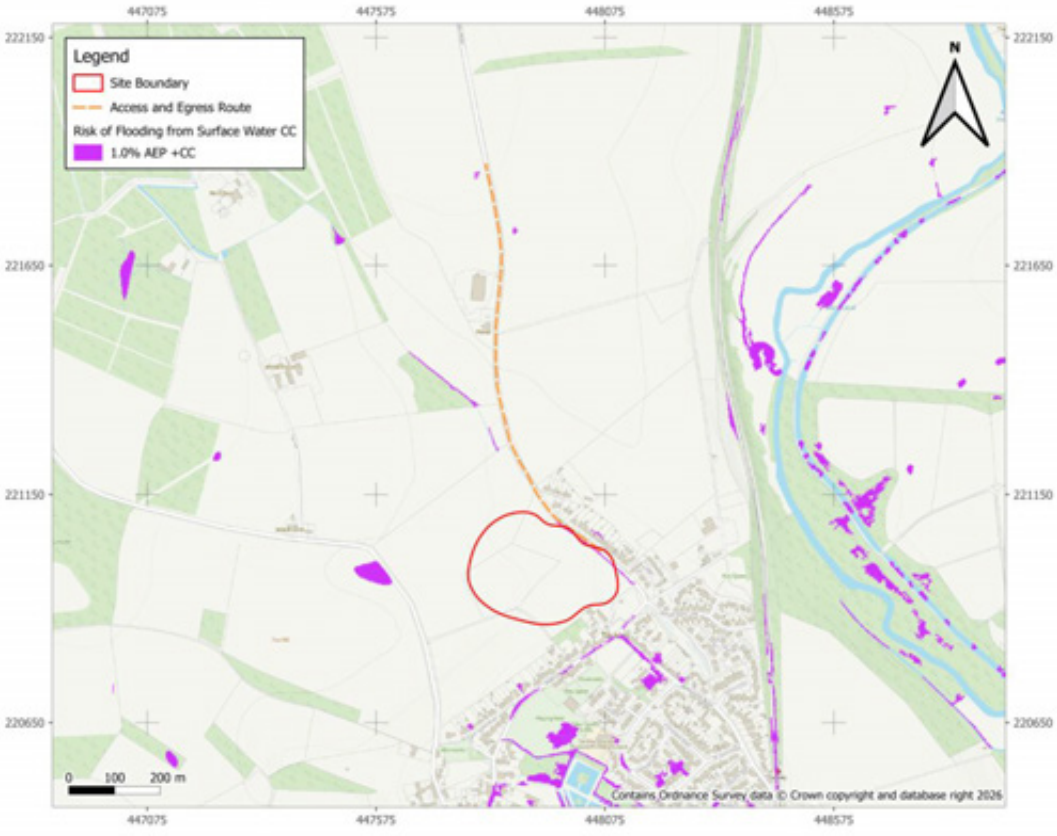


Figure 9 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed at the site is residential which is categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More vulnerable development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible in Flood Zone 3a. More vulnerable development is not permissible in Flood Zone 3b.

Given that the whole site is located within Flood Zone 1 and only a small surface water flow route is present, flood risk is unlikely to be a major barrier to development at this site. Despite this, the area of surface water flood risk should be used to sequentially place development within the site, to avoid altering the existing flow route.

5.2 Scale of Development

The total site area is currently 5.79 ha, allocated for 70 residential dwellings. Assuming medium density residential development (60 dwellings per hectare), 70 dwellings would require 1.17 ha of land. Given no part of the site is located within Flood Zone 2 or 3 and surface water flooding only effects a small part of the site this scale of development should be possible within the site.

5.3 Sequential Approach

As the site lies entirely within Flood Zone 1, surface water flood risk should inform a sequential approach to the development layout. Given that only a small portion of the site is affected by surface water flooding, it should be feasible to locate all development outside these areas. This approach would also avoid disruption to existing surface water flow routes, taking into account the potential impacts of climate change.

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.

It should be noted that the climate change allowances used in the design event scenario 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, the site-specific FRA should consider the climate change impacts for the 2080's epoch (2075-2125). Site-specific pluvial modelling may be required to better define flood risk depending on the final development layout.

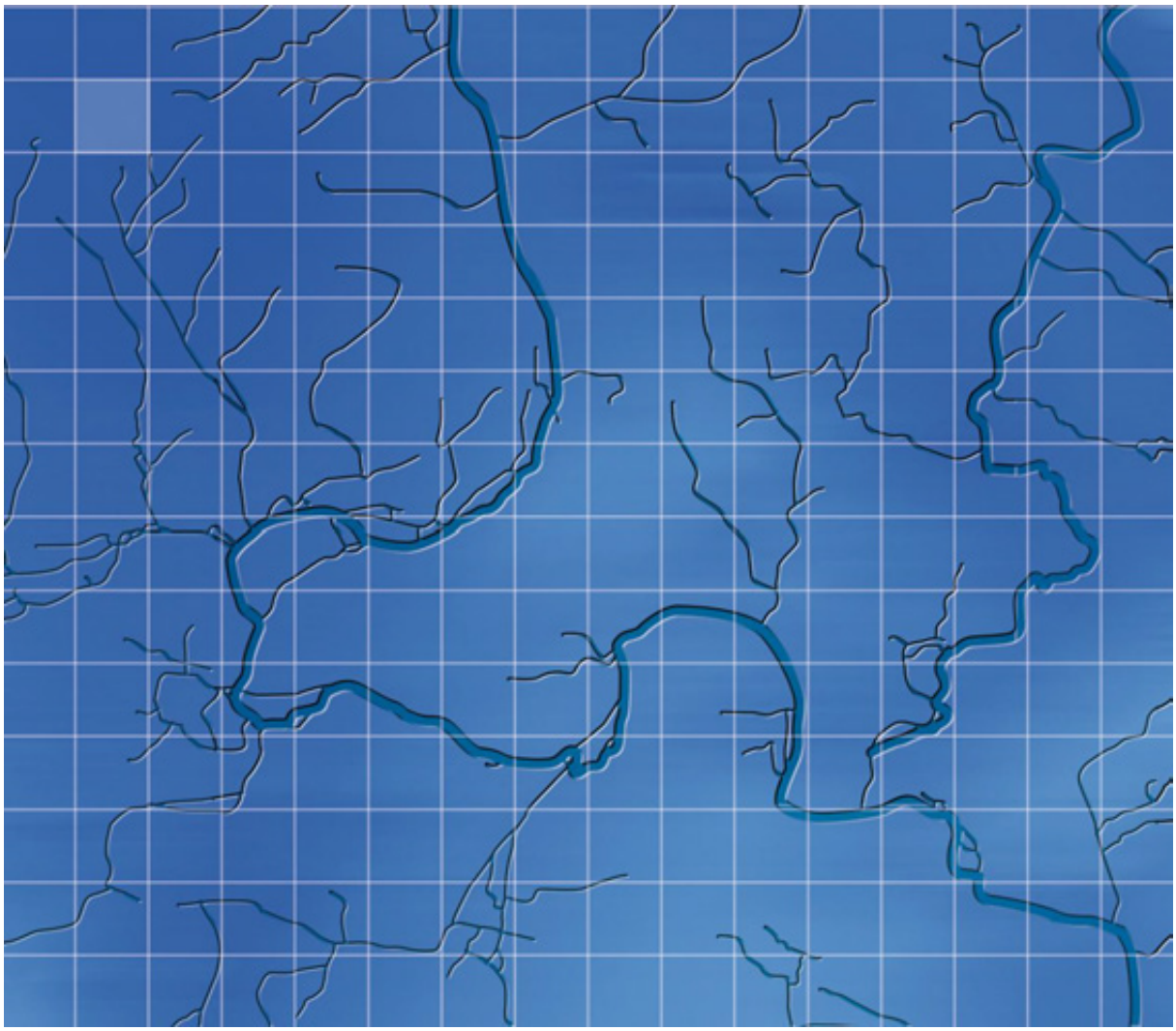
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The geology at the site has moderate permeability, therefore the use of infiltration SuDS solutions 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.

West Oxfordshire District Council

April 2026

Enstone Business Park (V)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Enstone Business Park (V)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	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.

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

Enstone Business Park (V) 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

Pluvial flood risk represents the greatest risk of flooding to the site with 3.0% of the site inundated during a 1.0% AEP + climate change design event. With surface water flood risk being associated with a surface water flow route in the east and pooling surrounding existing buildings on the site.

The Risk of Flooding from Surface Water (RoFSW) depth data shows the greatest flood depth (0.6 m) is in an area of topographic low in the northwest of the site. Outside of this, flood depths are predominantly less than 0.2m. Overall surface water flood risk is considered to be low.

The risk from fluvial flooding is considered to be low, as the site is located entirely within Flood Zone 1.

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 because national scale modelling has been used to inform the assessment.

Conclusions and Recommendations

The development proposed is employment categorised as *Less Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located along a surface water flow path which drains to a small watercourse to the east of the site. As most of the site lies outside areas at risk of surface water flooding, it should be possible to locate a large amount of infrastructure outside of these areas. A site-specific FRA should verify this with a further assessment of groundwater flood risk and site access.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Enstone Business Park (Reference: V) 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 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

The Enstone Business Park (V) site is 49.0 ha, located to the west of Church Enstone and east of Gagingwell, see Figure 1. Current land use at the site is mixed, with the east of the site being agricultural land and the west being an industrial estate. The site is bordered by the Enstone Airfield to the west and north and agricultural land to the south and east.

The proposed development at the site is 4-ha of employment land, 1-ha is proposed for Class E use, commercial offices, businesses and services. The remaining 3-ha is proposed for B2/B8 use, industrial, storage and distribution.

2.2 Topography

Based on 1m LiDAR data, the site slopes eastwards towards Gagingwell. The ground levels within the site boundary range from 152.6m AOD to 170.3m AOD, see Figure 2. The average ground level is 161.5m AOD.

2.3 Nearby Watercourses

The nearest watercourse is a small drainage channel approximately 245m east of the site, see Figure 1. The nearest main watercourse is the River Glyme which flows from northwest to southeast, approximately 1.2km southwest of the site.

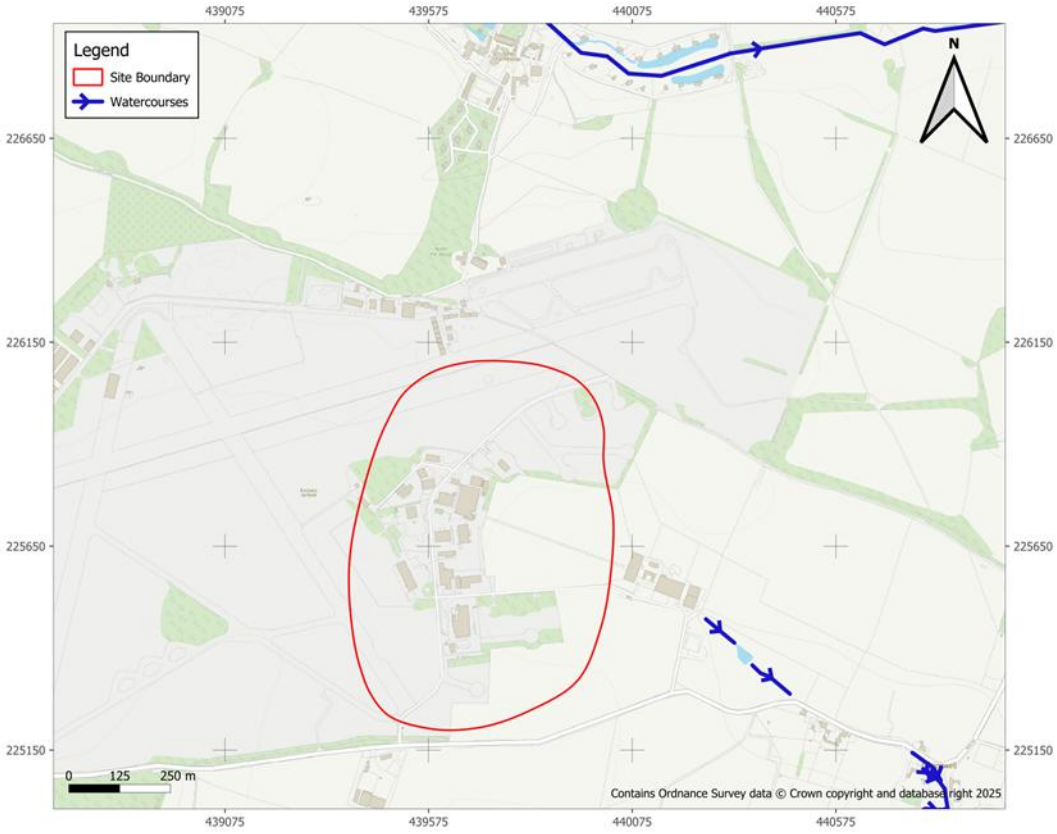


Figure 1 - Site Location

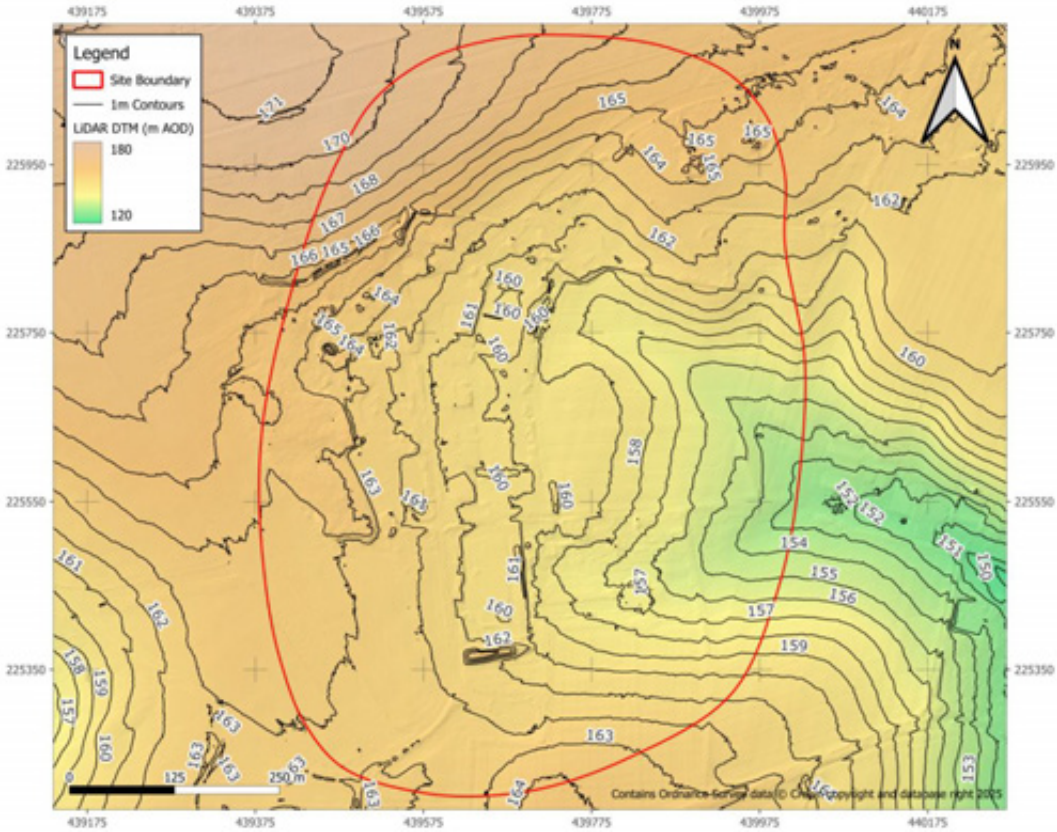


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has no record of historic flooding at the site. The closest record of flooding is located approximately 8km east of the site associated with the River Cherwell.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) dataset indicates that the whole site is located within Flood Zone 1, defined as land with a less than 0.1% annual probability of flooding, see Figure 3.

Based on the FMfP climate change dataset, the site remains within Flood Zone 1 when considering an allowance for climate change, see Figure 4.

Fluvial flood risk is considered to be low.

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 1.3% of the site is inundated during the 3.3% AEP event, 2.2% is inundated during the 1.0% AEP event and 5.1% is inundated during the 0.1% AEP event, see Figure 5. When accounting for climate change the proportions moderately increase to 1.9% in the 3.3% AEP event, 3.0% in the 1.0% AEP event and 6.8% in the 0.1% AEP, see Figure 6. Flooding on the site is largely concentrated along an overflow route which appears to discharge to the small drainage channel approximately 245m east of the site. Some flooding is also present in the west of the site adjacent to the buildings making up the industrial estate.

Overall, the risk of surface water flooding is considered to be low though it is greater than the fluvial risk and mostly concentrated along an overland flow route through the site's centre. Therefore, the residual risk associated with this flow route is assessed in more detail below in section 4.

3.5 Groundwater Flooding

The site in underlain entirely by the White Limestone Formation, which is expected to be permeable. There are no superficial deposits present at the site. The overlying soils are freely draining shallow lime-rich loamy soils.

Based on the data available the risk of groundwater flooding is considered moderate, due to the water table likely being mobile. More data is required at the planning stage to confirm the risk level and its distribution across the site.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, with the site being located approximately 3.3km north of an area at risk of reservoir flooding, see Figure 7.

3.7 Flood Warning Service

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

Figure 3 - Fluvial Flood Map

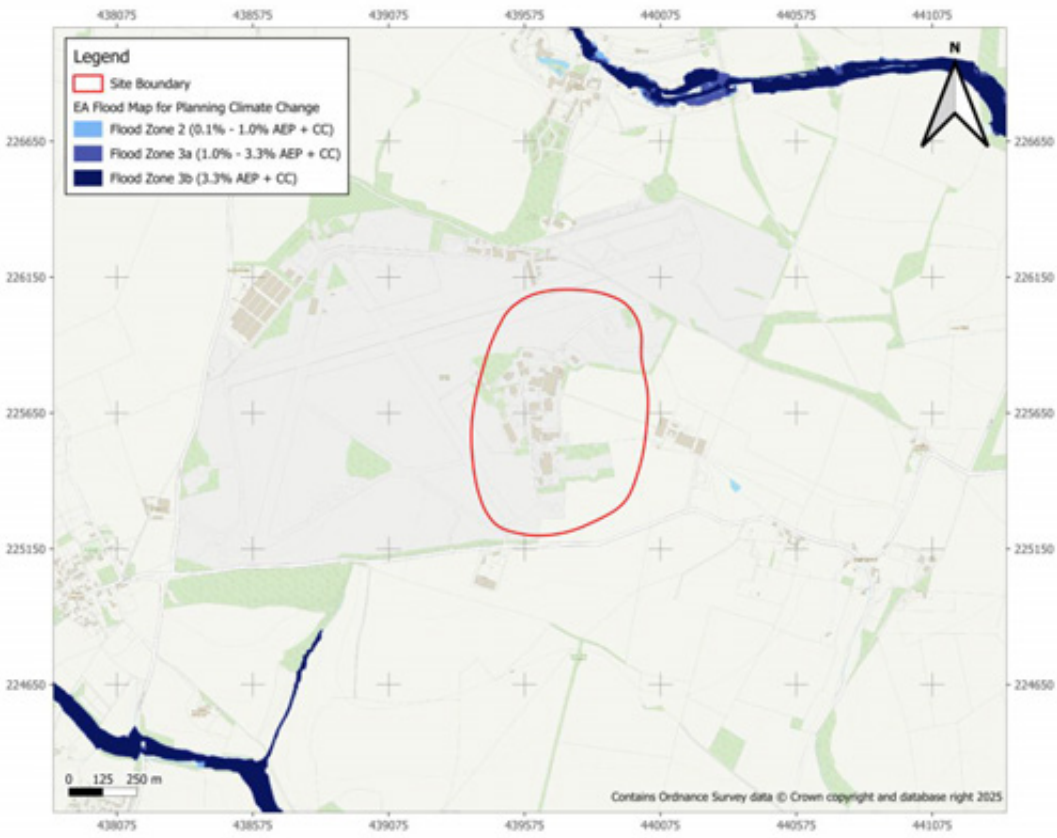


Figure 4 – Fluvial Climate Change Flood Map

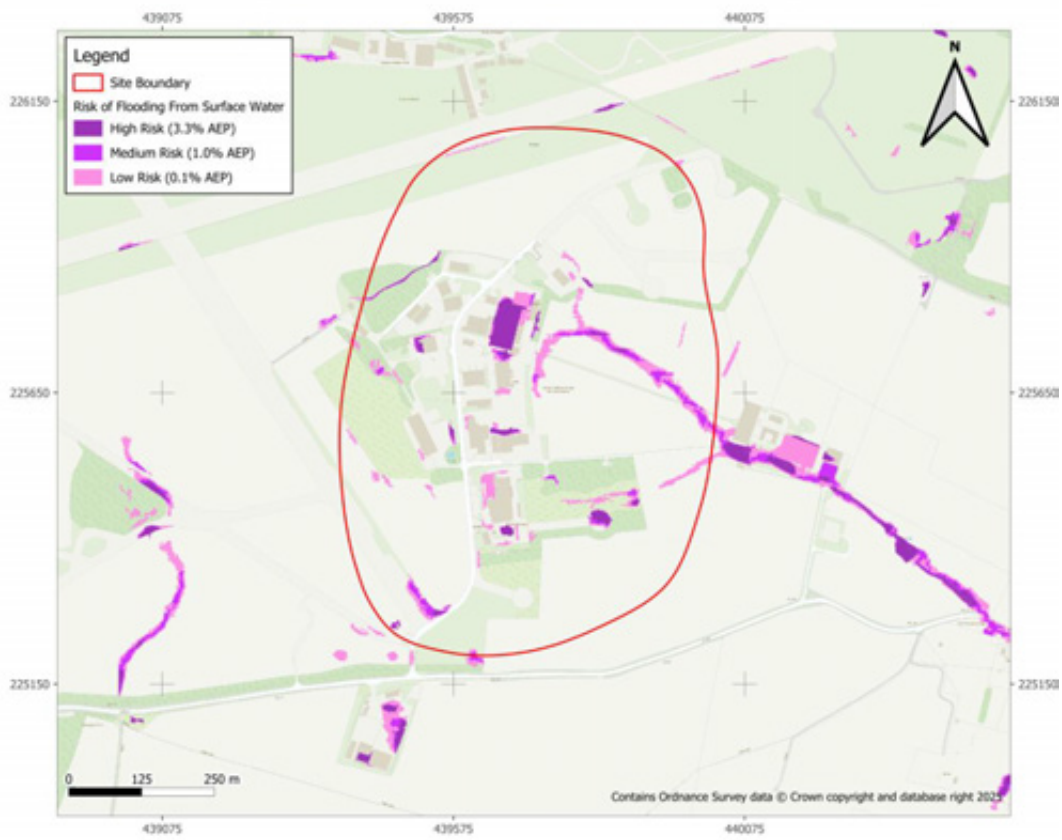


Figure 5 – Surface Water Flood Map

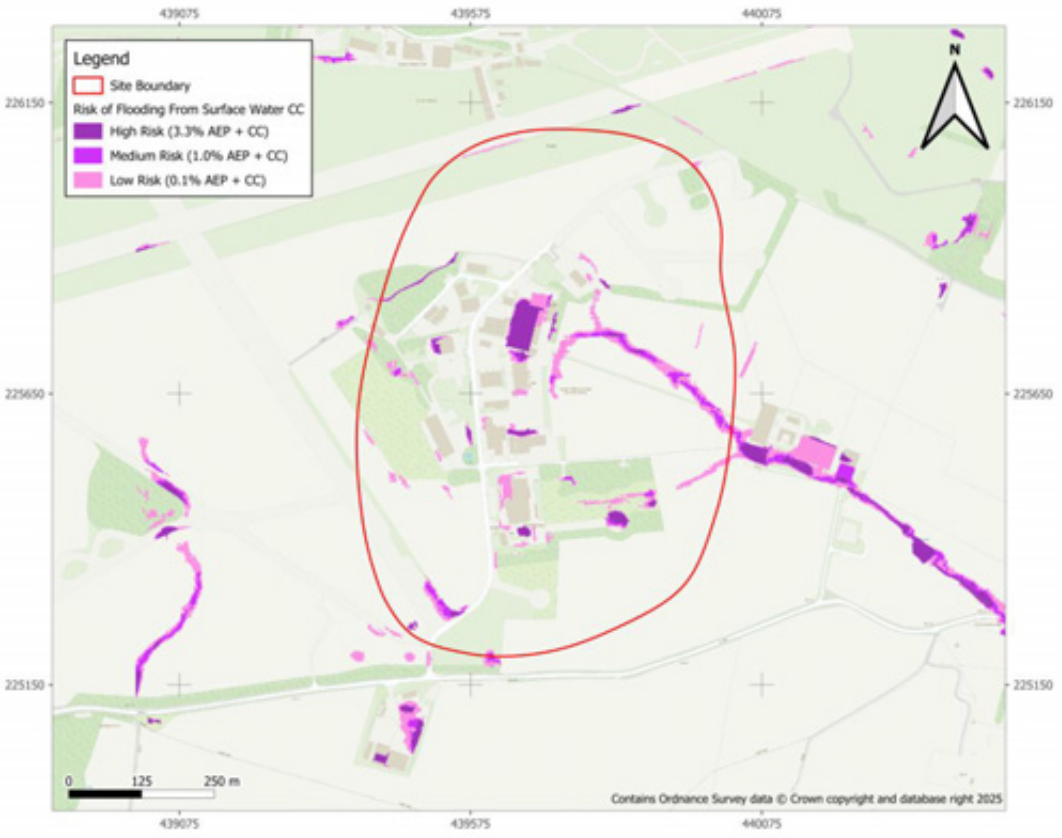


Figure 6 -Surface Water Climate Change Flood Map

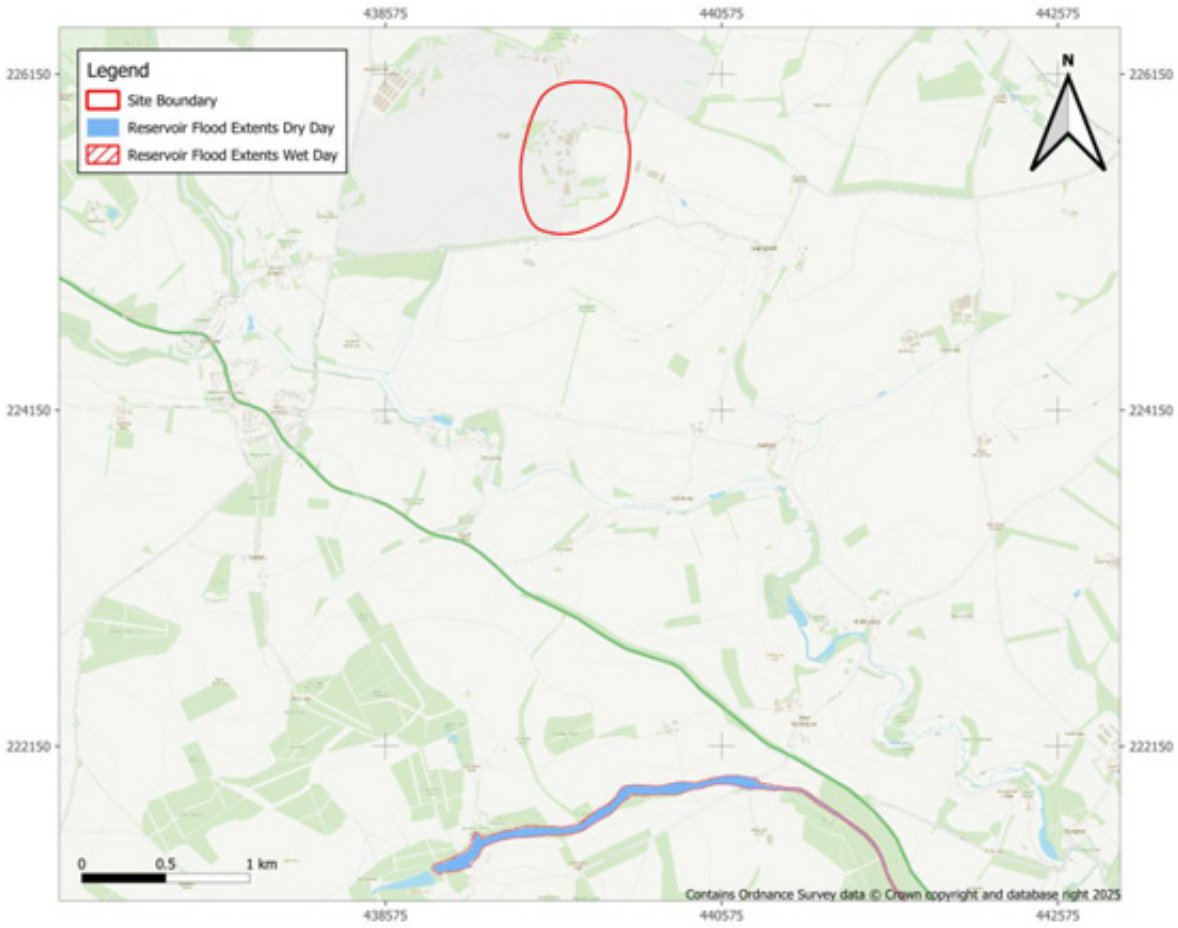


Figure 7 Reservoir Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The primary flood risk mechanism at the site is pluvial.

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 the majority of surface water flooding to be located to the area of lower topography in the east of the site, which appears to be an overland flow route to the drainage channel east of the site. There are some smaller areas of surface water flooding associated with pooling around buildings within the industrial estate.

The maximum flood depth within the site is 0.6-0.9m located in an area of lower ground in the northwest, however, the majority of flood depths across the site are less than 0.2m so flood hazard is generally expected to be low.

It should be noted that the climate change allowances used in the RoFSW extents are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

Access to the site is assumed to be via the B4030 heading west towards Church Enstone, see Figure 9. This route remains entirely within fluvial Flood Zone 1, a small section of the route, near the southern entrance to the site is within an area at risk of surface water flooding. Depths are 0.2m and below during the 1.0% + climate change design event. Due to the small extent and shallow depths, the risk is considered manageable.

Whilst the risk of both fluvial and surface water flooding to site access is considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known.

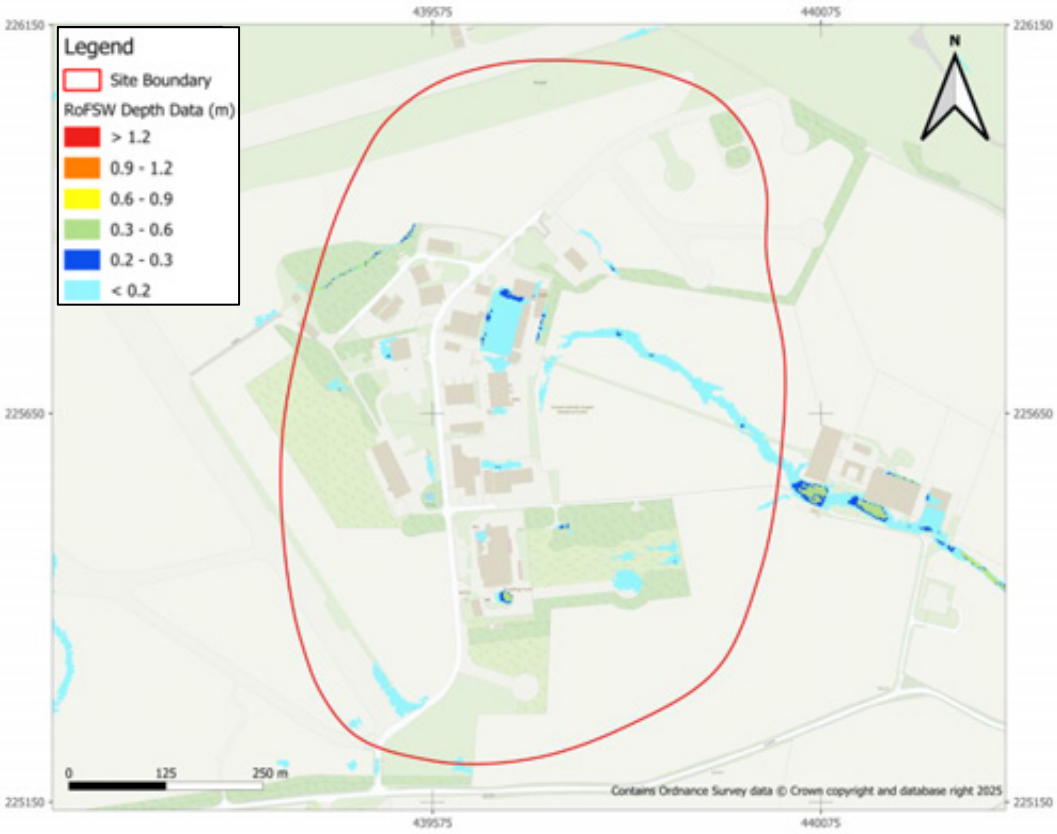


Figure 8 RoFSW Depth Data for 1.0% AEP + Climate Change Event

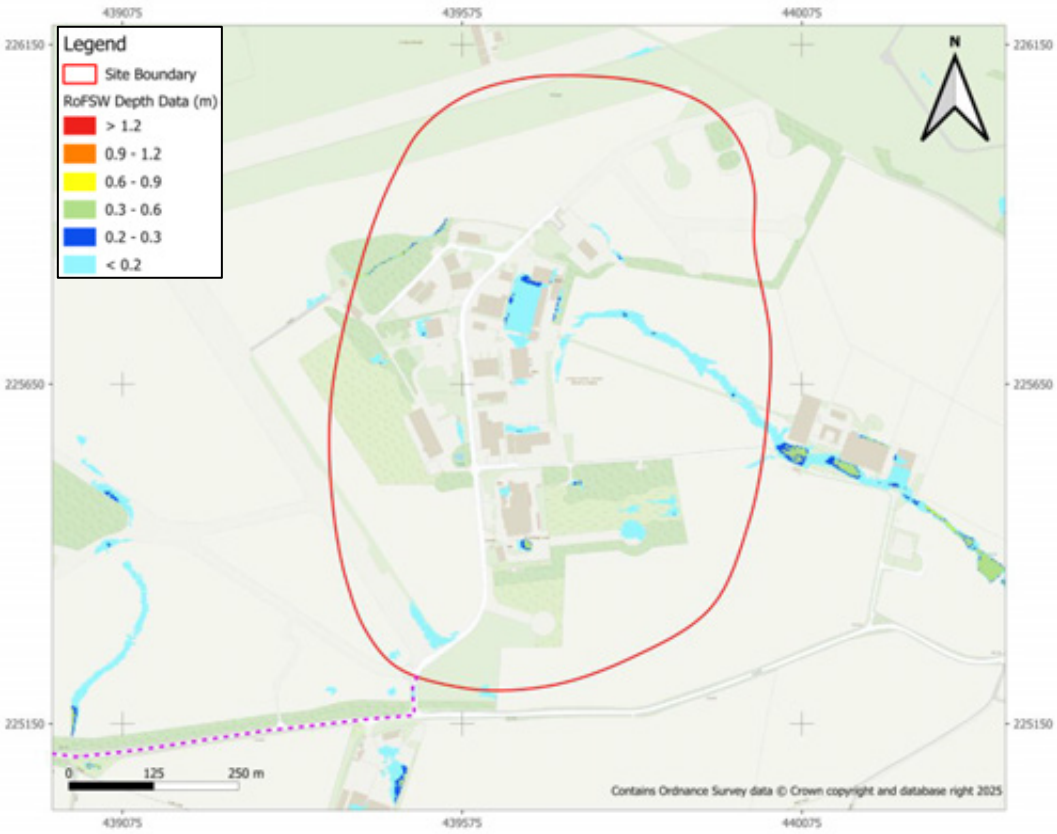


Figure 9 Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is employment categorised as *Less Vulnerable Development.* It should be possible to locate all infrastructure in Flood Zone 1 at this site to avoid fluvial flood risk to people and property.

It should be noted that whilst the site is at low fluvial flood risk, parts of the site are at pluvial flood risk based on the EA's surface water modelling extents. This risk is primarily located along a surface water flow path which drains to a small watercourse to the east of the site. As most of the site lies outside areas at risk of surface water flooding, it should be possible to locate a large amount of infrastructure outside of these areas. A site-specific FRA should verify this with a further assessment of groundwater flood risk and site access.

5.2 Scale of Development

The total site area is currently 49.0-ha, allocated for 4-ha of employment land. As the whole site is located within Flood Zone 1, development should be guided by the surface water flood risk at the site. The 1.0% AEP + climate change design event inundates 3.0% of the site which indicates that 47.6ha of land at the site remains flood free during the design event. It should be noted that there is currently infrastructure located on the site, this should be taken into account when planning for new development. However, overall, it should be possible to locate all development 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. As the whole site is located within Flood Zone 1 in the FMfP, the surface water flood maps should be used to ensure development is prioritised in areas of lower flood risk. The layout of the development should avoid locating infrastructure within the potential overland flow route in the east of the site to avoid altering natural flow paths wherever possible. Overall given the scale of the development, 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.

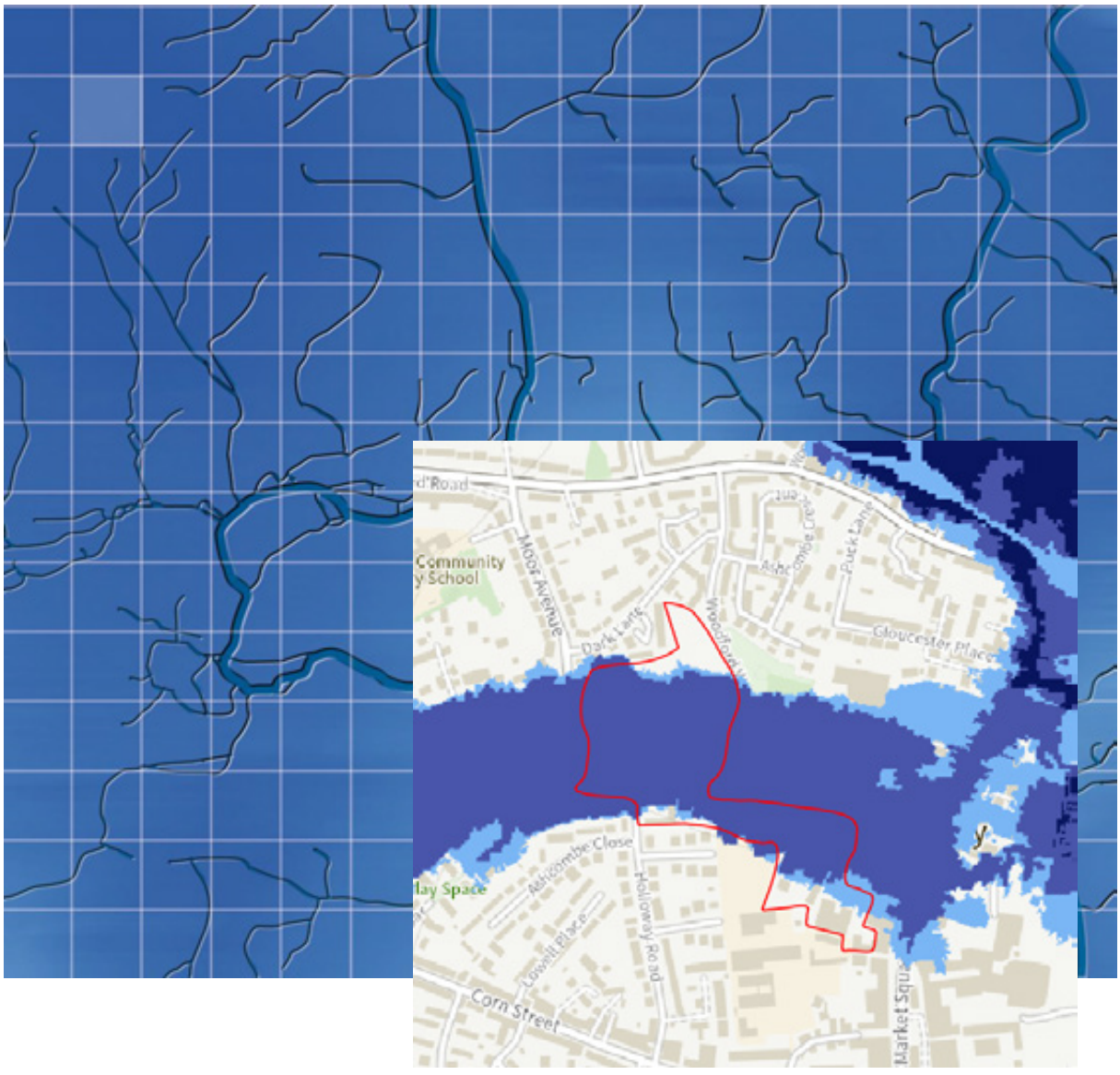
In assessing and demonstrating the viability of any drainage solution for the site, a site-specific FRA should follow the national standards for SuDS and any relevant Local Authority Local Plan policies. The site is entirely underlain by limestones; therefore the use of an infiltration SuDS solutions may be possible. It is recommended that a geotechnical investigation is undertaken at this site to obtain further information relating to infiltration rates. Attenuated discharge to a watercourse or a sewer will also need to be considered as part of a site-specific FRA.

West Oxfordshire District Council

April 2026

Welch Way (W)

Level 2 Strategic Flood Risk Assessment



West Oxfordshire District Council

Welch Way (W)

Level 2 Strategic Flood Risk Assessment

Document issue details

WHS10174

Version	Issue date	Issue status	Prepared By	Approved By
1.0	10/04/2026	Draft	Jasmine Lucas (*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.

Registered Office Maclean Building, Benson Lane, Wallingford OX10 8BB
www.hydrosolutions.co.uk

Welch Way (W) Level 2 SFRA
Flood Risk Overview

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

Flood Risk

The site is at risk from both fluvial and pluvial sources

Overall, the risk from fluvial flooding is considered to be moderate. The EA Flood Map for Planning dataset shows 73.8% of the site is located in Flood Zone 2, but no part of the site is located within Flood Zone 3a or 3b. The Windrush (Worsham to A40) 2014 detailed EA model has depth results for the 1.0% AEP plus 35% Climate Change design event. It shows the maximum flood depth outside of any watercourse within the site is 1.35 m and average flood depth across the site is 0.46 m.

The EA's surface water flood maps show 5.6% of the site is inundated in the 3.3% AEP event, 10.7% is inundated in the 1.0% AEP event and 43.2% is inundated in the 0.1% AEP event which indicates the flood risk is moderate.

The risk from other sources of flooding is considered to be low though the risk of groundwater flooding should be assessed in more detail.

The overall confidence in the assessment is high as a detailed fluvial model has been used to inform the assessment of the primary flood mechanism (fluvial flooding) at the site.

Conclusions and Recommendations

The development proposed is residential categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More Vulnerable Development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible within Flood Zone 3a. More Vulnerable development is not permissible in Flood Zone 3b.

All existing infrastructure at the site lies outside the current Flood Zone 3a and 3b extents. However, approximately 71.4% of the site falls within the design flood extent (1.0% AEP plus climate change allowance). The proposed development should adopt a sequential approach, prioritising locations outside the design flood extent where feasible. This may necessitate delivering fewer than the upper allocation of 100 dwellings. Where development within the design flood extent is unavoidable, mitigation measures such as ground raising may need to be assessed using hydraulic modelling at the planning stage.

Contents

1 Introduction

1.1 Background

Wallingford HydroSolutions Ltd has been commissioned by West Oxfordshire District Council District Council (CDC) to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) at Welch Way (Reference: W) 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 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

The Welch Way (W) site is 5.0ha in area. The site is mostly urbanised comprising the civic buildings along Welch Way, Witney Community Hospital, Woodford Way car park, Clarkes Timber Yard, and the Witney Telephone Exchange, see Figure 1. The site is surrounded by predominantly commercial uses to the east, with residential uses in all other directions.

In the local plan the site is designated for residential development consisting of 50-100 dwellings.

2.2 Topography

Based on 1m LiDAR data, the topography at the site slopes towards the centre with higher ground to the north and south. The site is thought to lie within the abandoned meander which leads to this topography, see Figure 2.

Ground levels within the site range from 78.6 m AOD to 85.0 m AOD with an average ground level of approximately 80.0 m AOD.

2.3 Nearby Watercourses

Two small watercourses are located within the site. One flows in an east to west direction north of Witney Community Hospital. The second flows from south to north to the east of the hospital. It is not fully clear where these watercourses eventually drain, however it is expected they are associated with the Queen Emma's Dyke and the River Windrush. Queen Emma's Dyke is located approximately 550 m southwest of the site and flows in a southeasterly direction. The River Windrush flows from northwest to southeast, lying approximately 275m north and 360m east of the site, see Figure 1.

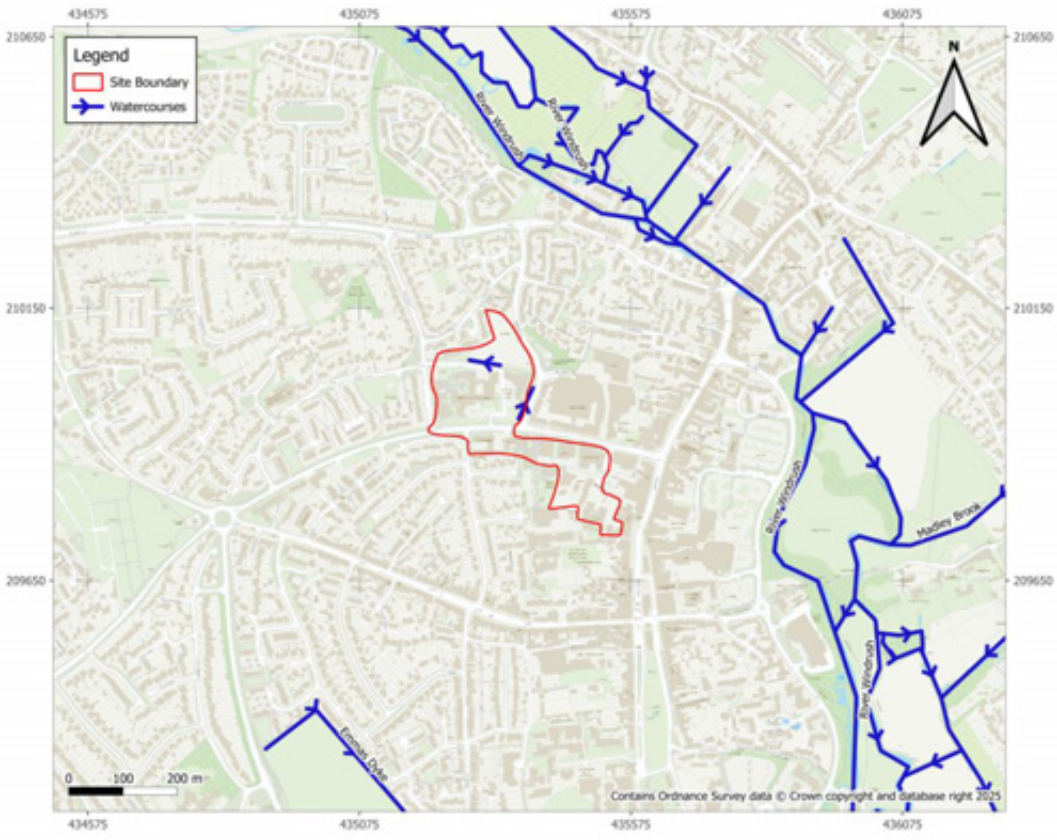


Figure 1 - Site Location

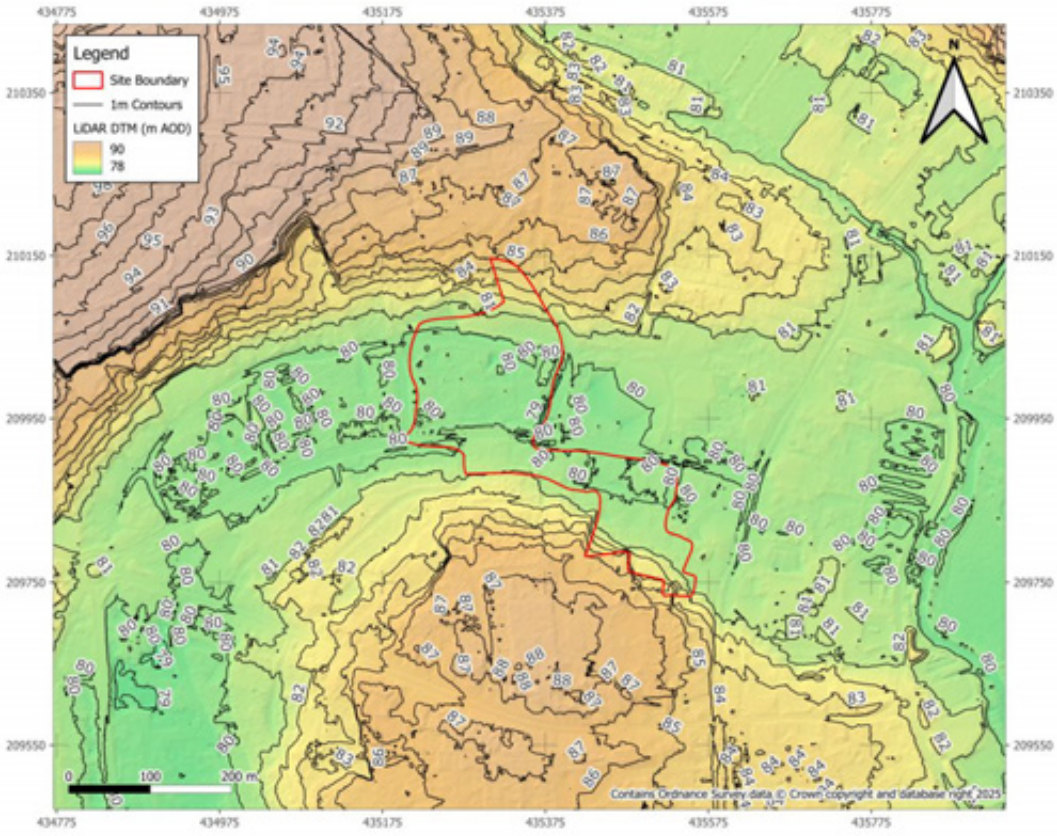


Figure 2 - Topography

3 Flood Risk

3.1 Historical Flooding

The EA has one record of flooding at the site. This occurred in July 2007 and was associated with the River Windrush. However, as shown in Figure 3, this flood extent inundated a very small area in the east of the site with the vast majority of the site remaining flood free.

3.2 Fluvial Flood Risk

The EA Flood Map for Planning (FMfP) dataset shows 73.8% of the site is located in Flood Zone 2 (0.1% AEP), but no part of the site is located within Flood Zone 3a (1.0% AEP) or 3b (3.3% AEP). Flood Zone 2 and 3a consider the undefended scenario whereas Flood Zone 3b considers the defended scenario. This area of inundation is associated with the lower topography in the abandoned meander of the River Windrush, see Figure 4.

The EA FMfP climate change dataset shows the site is inundated by both the 1.0% AEP event and 0.1% AEP event when considering an allowance for climate change. The 1.0% AEP event inundates 72.9% of the site whilst the 0.1% AEP event inundates 79.3% of the site, see Figure 5. The site remains outside of the 3.3% AEP defended climate change extent.

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

3.3 Flood Defence Infrastructure

There is no formal flood defence infrastructure in the vicinity of the site. The site is not located within an area associated with a reduction in risk of flooding from rivers and sea due to defences nor is it located within a flood storage area.

3.4 Surface Water Flood Risk

The EA's surface water flood maps show 5.6% of the site is inundated in the 3.3% AEP event, 10.7% is inundated in the 1.0% AEP event and 43.2% is inundated in the 0.1% AEP event, see Figure 6. When accounting for climate change the proportions moderately increase to 9.1% in the 3.3% AEP event, 19.5% in the 1.0% AEP event and 49.5% in the 0.1% AEP, see Figure 7.

Overall, the risk of surface water flooding is considered to be moderate and is assessed in more detail in section 4.

3.5 Groundwater Flooding

The site is underlain by mudstone which is expected to permit low levels of infiltration. Superficial deposits of alluvium follow the route of the abandoned meander of the River Windrush across the north of the site and are expected to have varying permeabilities. The overlying soils are described as shallow lime-rich soils over chalk or limestone.

Based on the data available the risk of groundwater flooding is considered variable with a greater risk of groundwater flooding where the site is underlain by alluvium deposits and the water table potentially mobile. However, more data is required at the planning stage to confirm this.

3.6 Reservoir Flood Risk

The FMfP shows that the site is not at risk from reservoir flooding during either the wet day or dry day scenario, see Figure 8.

3.7 Flood Warning Service

The majority of the site is located within the River Windrush at Witney and Ducklington EA Flood Warning Area.

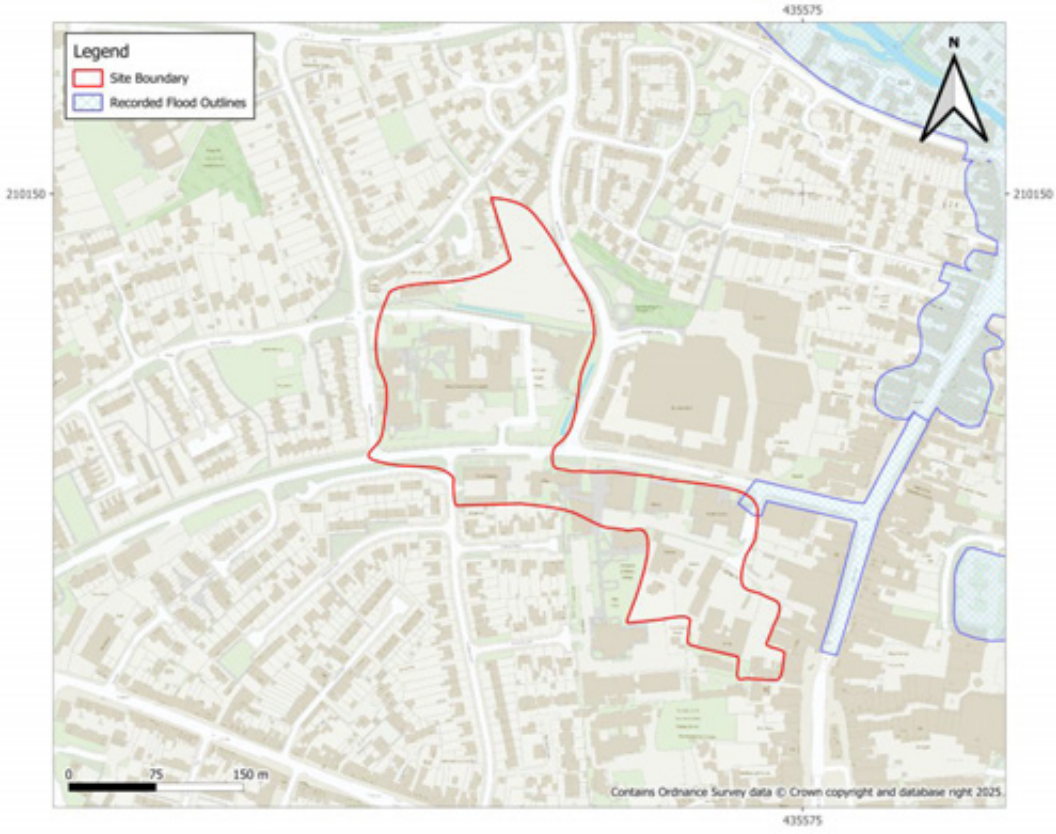


Figure 3 - Recorded Flood Extent

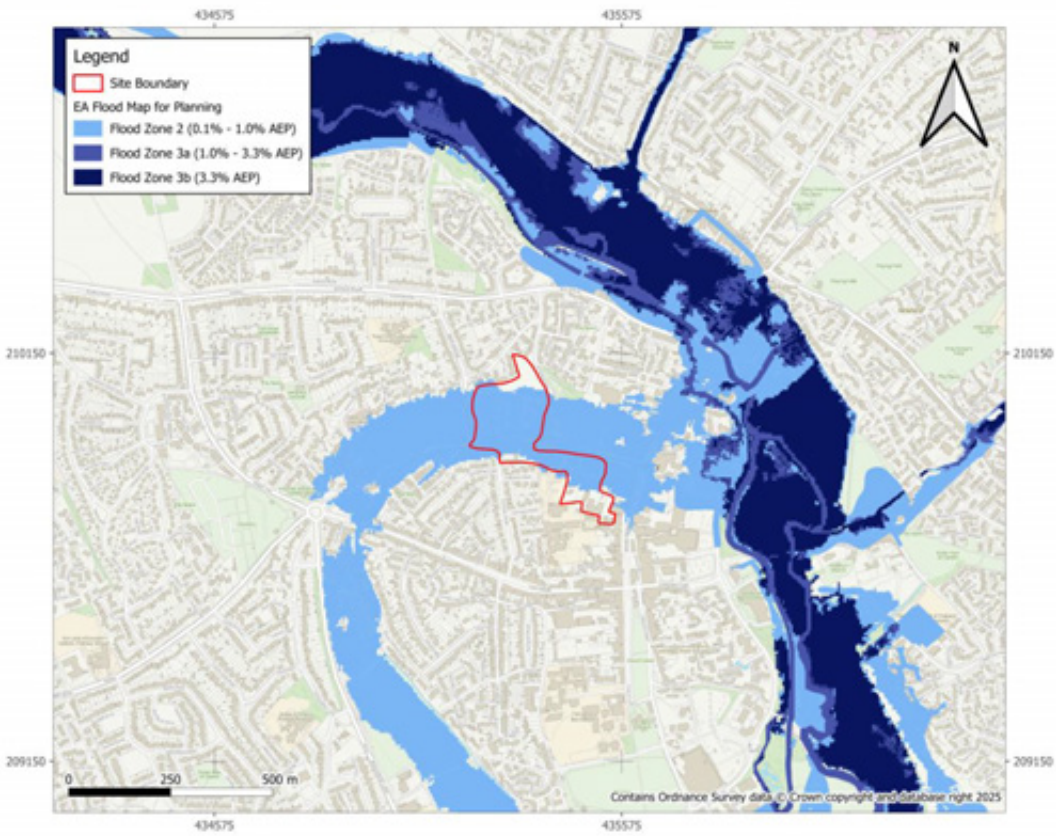


Figure 4 - Fluvial Flood Map

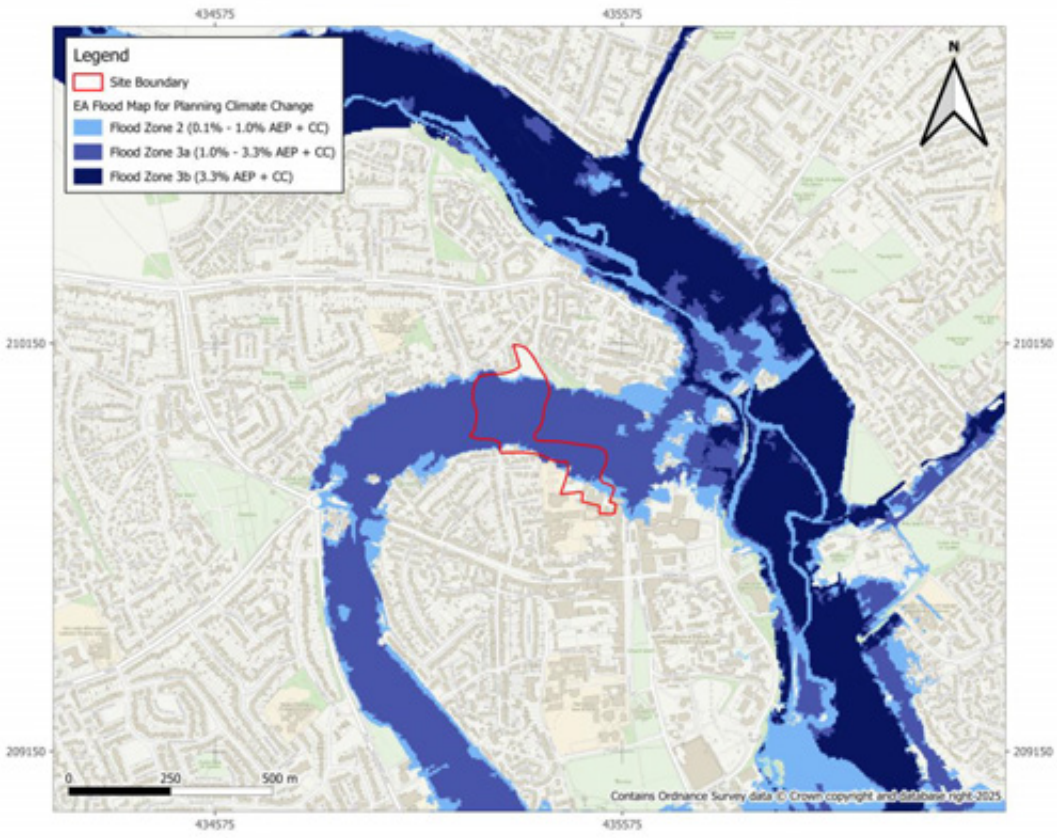


Figure 5 – Fluvial Climate Change Flood Map

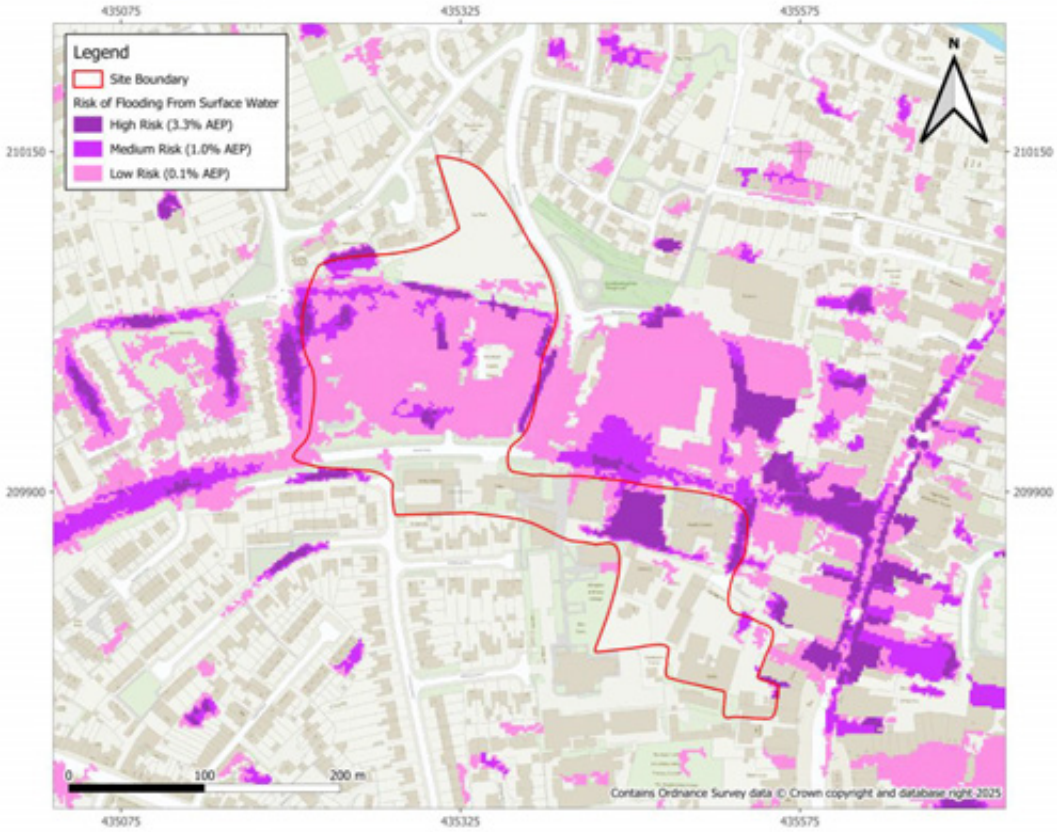


Figure 6 – Surface Water Flood Map

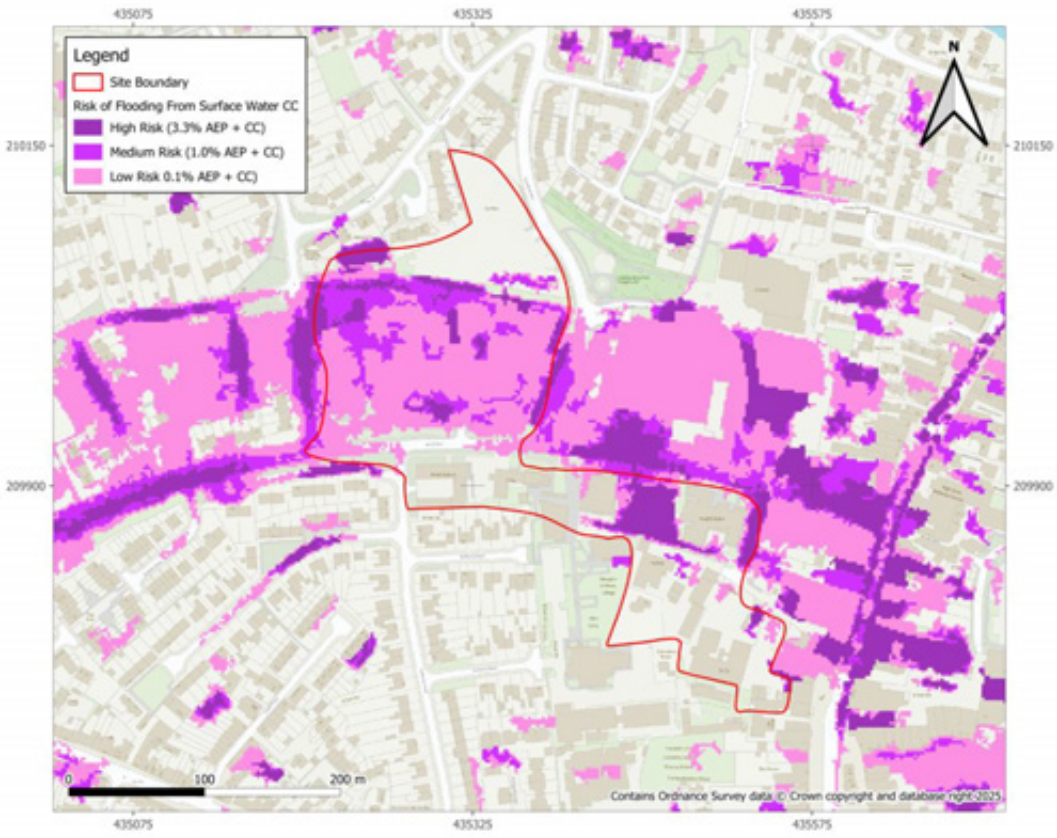


Figure 7 -Surface Water Climate Change Flood Map

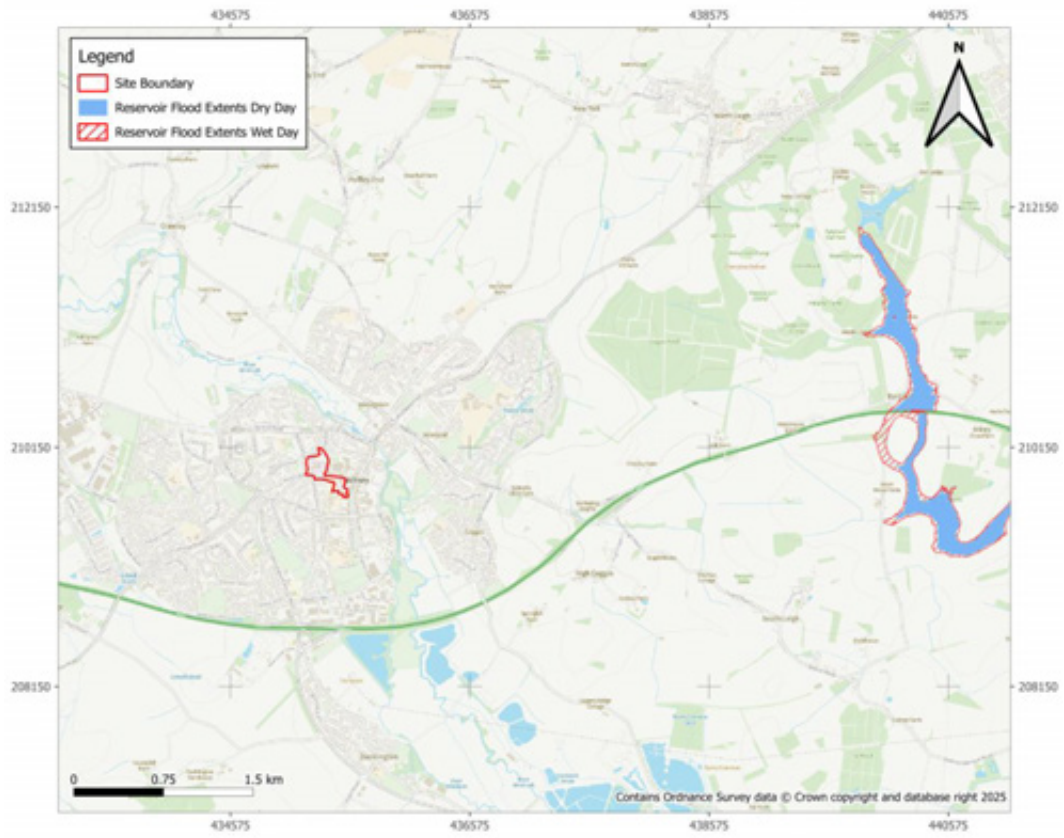


Figure 8 - Reservoir Failure Flood Map

4 Detailed Review of Primary Flood Risk

4.1 Primary Flood Risk

The site is at risk from both fluvial and pluvial flood risk sources and so they are both quantitatively assessed in more detail below.

4.2 Flood Risk Metrics

The Windrush (Worsham to A40) 2014 (updated in 2017) detailed EA model has been reviewed to attain further detail on fluvial flood risk to the site. The 2080s central climate change allowance applicable to the site is 30% (Cotswolds Management Catchment). The 1.0% AEP plus 30% climate change output is not available for the model, however a 35% climate change uplift scenario is available and has been considered to provide a conservative assessment. Note, the Flood Map for Planning likely uses both the detailed model and national model data to interpolate the extent to the updated 30% climate change allowance.

The maximum flood depth within the site during the 1.0% AEP plus 35% climate change is approximately 1.4 m located within the small watercourse in the northeast of the site. Outside of the small watercourses within the site boundary, the maximum flood depth is 1.35 m located in the north of the site, see Figure 9. The average flood depth across the rest of the site is 0.46 m with the inundated extent covering 71.4% of the total site area, concentrated in the middle of the site. The design flood level for the 1.0% AEP +35% climate change event is 80.26 m AOD, slightly greater than the average ground level at the site (80.0 m AOD).

Fluvial flood waters during the design event originate from the overtopping of the River Windrush 350 m northeast of the site. The model outputs show that flood waters begin flowing south along High Street approximately 70 hours into the model run time reaching the site after 87 hours. The peak flood extent occurs approximately 140 hours into the model run. These results indicate that the lower topography associated with the abandoned meander acts as a conveyance route for flood waters that overtop the main river channel.

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 flood depth data indicates the maximum flood depth during the 1.0% AEP plus climate change pluvial flood event is greater than 1.2 m located in a small area in the east of the site close to the existing library building on Welch Way. However, this area of high flood depth is very small. A small area of 0.9-1.2 m flood depth is also located within the Witney Community Hospital, see Figure 10. Across the rest of the site flood depths are predominantly 0.2 m or less with the total extent covering 19.5% of the total site area.

It should be noted that the climate change allowances used in the RoFSW extent are based on the 2050's epoch (2041-2069) and reflect the median estimate of flow and rainfall increases respectively. Both datasets are designed to be suitable for short-medium term decisions. 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

The main access route through the site is Welch Way however, during the 1.0% AEP plus Climate Change design event, this road is fully inundated. During an extreme flood event access and egress routes to the site would therefore likely be along Woodford Way to the north and Holloway Road to the south. Site users following Woodford Way north should continue their journey west along Burford Road towards the flood free areas of Witney in the west, see Figure 11. Site users travelling south along Holloway Road should also join Burford Road to the northwest of the site by travelling west along Corn Street and continuing

north along Tower Hill. A small area of this route along Corn Street is located within the design flood extent, however the model results indicate the hazard rating is low, see Figure 11. It should also be noted that the River Windrush catchment is largely underlain by Oolitic limestone so the watercourse is likely to exhibit high baseflows and increased lag time to rainfall events. This is reflected in the model results which show the area along Corn Street being flooded 118 hours into the model run. Given this anticipated long lead in time and that the site lies within a flood warning area, overall the risk to access and egress from fluvial sources is expected to be low.

Small areas of surface water flood risk are present across the route. Whilst the risk of both fluvial and surface water flooding is generally considered manageable, a site-specific FRA should reassess the route considering the development layout, final site access points, hazard associated with both fluvial and surface water flood risk, and updated climate change allowances. This FRA should also consider routes across the site once the development layout is known.

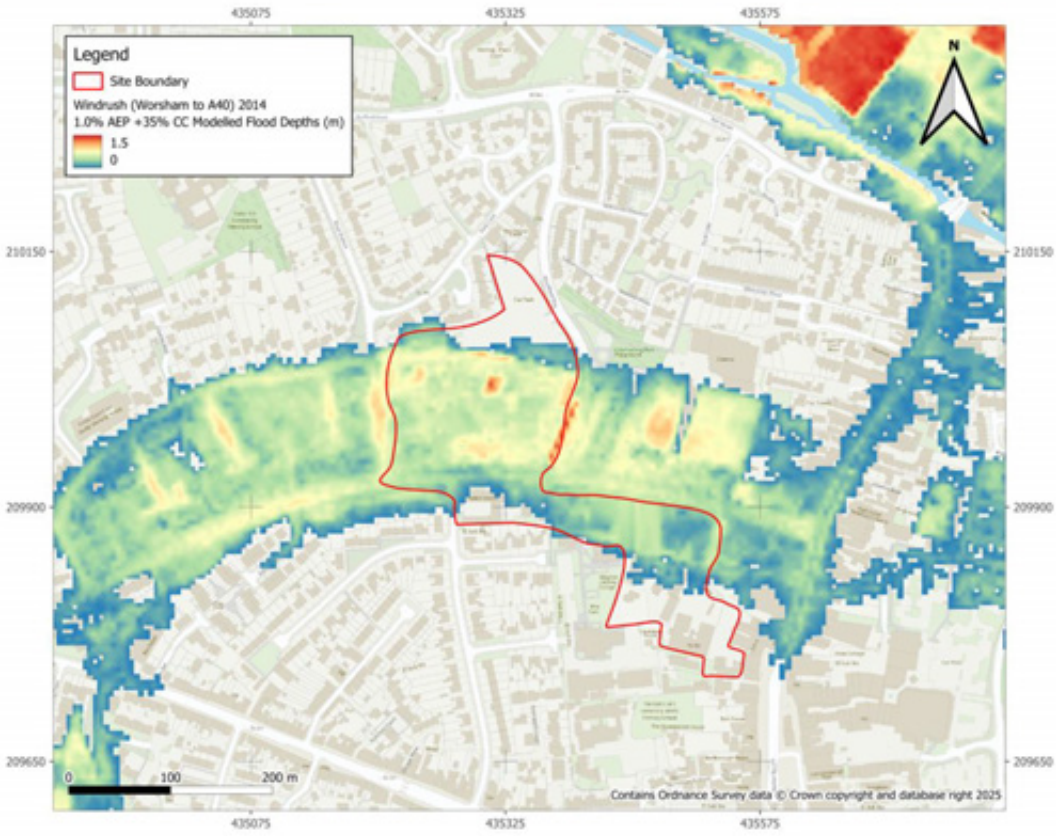


Figure 9 – Windrush (Worsham to A40) 2014 – 1.0% AEP +35% CC Modelled Flood Depths (m)

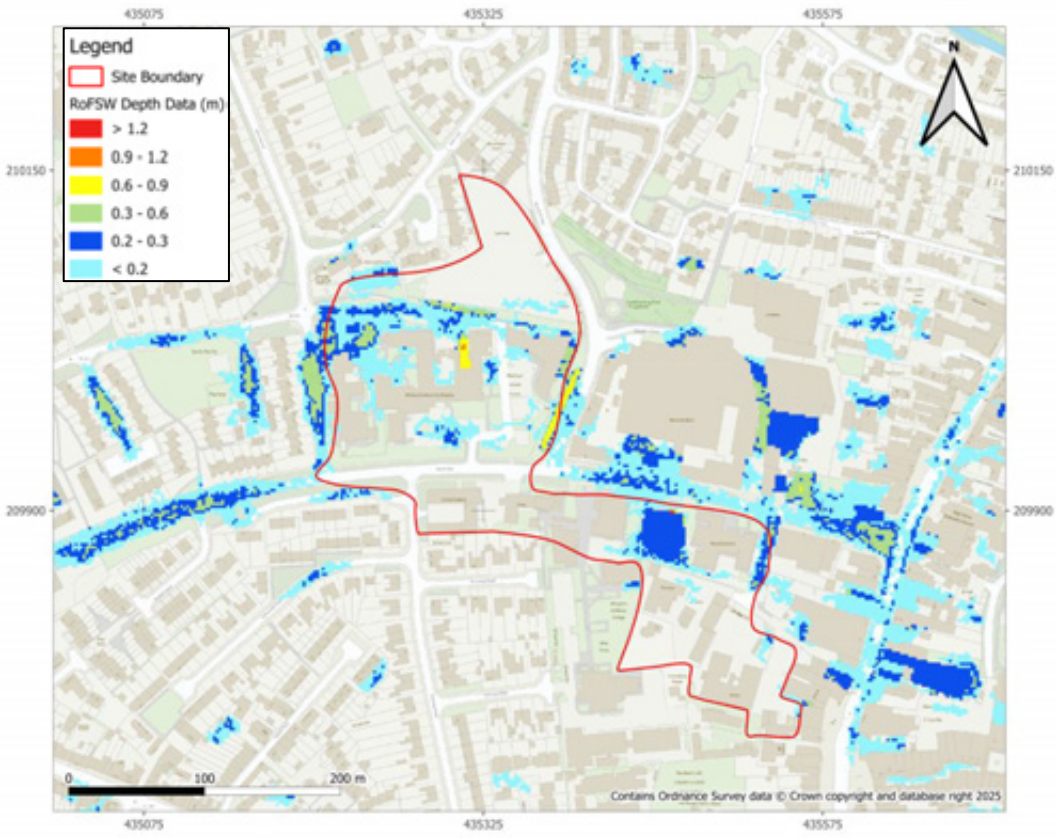


Figure 10 – RoFSW Depth Data for 1.0% AEP + Climate Change Event

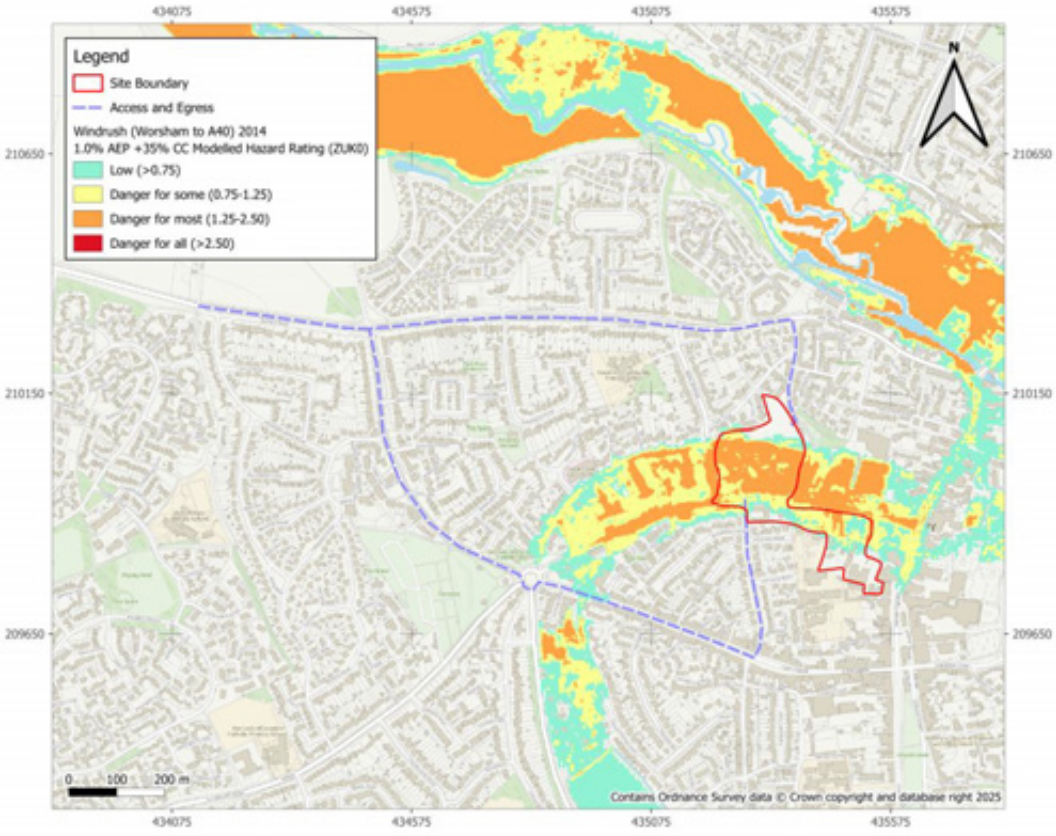


Figure 11 - Access and Egress Routes

5 Development Viability and FRA recommendations

5.1 Development Categorisation

The development proposed is residential categorised as More Vulnerable Development. A sequential approach to development is required, with development first prioritised within areas of Flood Zone 1 prior to consideration in higher flood risk zones. If development cannot be located exclusively in Flood Zone 1, More Vulnerable Development is permissible in Flood Zone 2 but must pass the Exception Test to be permissible within Flood Zone 3a. More Vulnerable development is not permissible in Flood Zone 3b.

All existing infrastructure at the site lies outside the current Flood Zone 3a and 3b extents. However, approximately 71.4% of the site falls within the design flood extent (1.0% AEP plus climate change allowance). The proposed development should adopt a sequential approach, prioritising locations outside the design flood extent where feasible. This may necessitate delivering fewer than the upper allocation of 100 dwellings. Where development within the design flood extent is unavoidable, mitigation measures such as ground raising may need to be assessed using hydraulic modelling at the planning stage.

5.2 Scale of Development

The total site area is currently 5.0 ha, allocated for 50-100 dwellings. Considering medium density residential development (60 dwellings per hectare) 50-100 dwellings would require 0.83−1.67 ha. In total 1.43-ha of the site lies outside of the design flood extent, if possible, it is recommended that this area be utilised for the development. When considering a medium density development an area of 1.43-ha would support 86 dwellings. However, it is noted that much of the site is already urbanised so the spaces available for development may be limited.

5.3 Sequential Approach

It is still 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 if required. The design flood extent should also be used with all development located outside of its extent if possible. As already stated, no development should be located in Flood Zone 3b.

Note that surface water flood risk is present across the site and should also be used to inform the development layout with development located outside of high-risk areas if possible.

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.

Development will need to be set at a floor level to provide an appropriate freeboard (typically 300mm minimum) above the flood level for the 1% annual exceedance probability (plus central climate change allowance) design event. If ground raising is implemented within the design flood extents, modelling may need to be undertaken to assess 3rd party impacts and compensatory storage requirements. A site-specific FRA should confirm any modelling requirements with the EA to assess 3rd party impacts. Furthermore, updates to the model may be required to assess the flood risk given a 30% climate change allowance rather than 35% in line with the 2080s central allowance for the Cotswolds Management Catchment.

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.