LODDON VALLEY STRATEGIC DEVELOPMENT LOCATION, WOKINGHAM

FLOOD RISK ASSESSMENT

UNIVERSITY OF READING

18 September 2025

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Appendices

1 Introduction

1.1 Context

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Abley Letchford, on behalf of the University of Reading to support an outline planning application comprising of;

- up to 2,800 residential units to include up to 100 custom and self-build plots;
- 2 primary schools (up to 3 forms of entry) to include early years provision and 1 secondary school (up to 12 forms of entry);
- one District Centre, to incorporate up to 11,000m2 of Class E (Commercial, Business and Service, to include a including food store of around 2,500m2), and Class F (Local Community and Learning);
- one Local Centre; to incorporate up to 2,400m2 of Class E;
- a Sports Hub to include sports pitches and pavilion space;
- up to 4,250m2 of further Class E and Class F development to include commercial, health care and public house (sui generis);
- comprehensive green infrastructure including a Country Park, landscaping and public open space, and ecological enhancement measures;
- 20 gypsy and traveller pitches;
- comprehensive drainage and flood alleviation measures to include Sustainable Urban Drainage Systems (SUDS) and engineering measures within Loddon Valley for the River Loddon;
- internal road network including spine road with pedestrian and cycle connections and associated supporting infrastructure;
- new and modified public rights of way;
- associated utilities, infrastructure, and engineering works, including the undergrounding of overhead lines;
- Ground reprofiling to accommodate infrastructure, flood alleviation and development parcels;
- Up to 0.5ha of land adjoining St Bartholomew's church for use as cemetery;
- Electricity substation (up to 1.5ha)

1.1.2 The site is located to the south of the M4, north of Arborfield and east of Shinfield.

1.2 Development Proposals

1.2.1 The proposed development is show in PP01 LGV Parameter Plans Land Use provided in **Appendix A**.

1.3 Requirement for a Flood Risk Assessment

1.3.1 The requirement for an FRA is set out in Section 14 of the National Planning Policy Framework (NPPF) December 2024.

1.3.2 The footnote accompanying Paragraph 181 states:

'A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.'

1.3.3 The site covers approximately 397.4 hectares. For any site covering an area greater than 1 hectare, a site-specific flood risk assessment is required. To comply with the requirements of the NPPF, matters related to flood risk are addressed within this report. Matters relating to drainage are addressed in report A392-R058 Drainage Strategy which should be read in conjunction with this FRA.

1.4 Report Aim and Formation

1.4.1 The principal aims of this report are to demonstrate that the proposed development complies with national and local planning policy in respect to flood risk and to demonstrate that a suitable drainage strategy can be provided as part of development.

1.4.2 This report will also summarise the impacts the development could have on flood risk to the surrounding area and outlines the mitigation strategies that will be implemented to minimise this risk.

1.5 Report Structure

1.5.1 This report addresses the requirements of NPPF and considers the following aspects:

- Section 2: Policy, Stakeholder Engagement and Sources of Information – a review of policy relevant to the assessment, summary of liaison with key stakeholders and sources of information used to inform the assessment.
- Section 3: Site Setting – a description of the site location, topography, geology and hydrology.
- Section 4: Overview of Flood Risk – a review of data for flooding from all sources to determine the baseline flood risk to the site and an assessment of the impacts of the development on flood risk.
- Section 5: Sequential Test and Exception Test – a description of the proposed development and a classification of the vulnerability in the context of the Sequential Test and Exception Test.
- Section 6: Flood Risk Mitigation – a summary of the mitigation measures implemented to manage both the potential flood risk to the development and any impacts of the proposals on flood risk elsewhere.
- Sections 7: Conclusion – a summary of the development proposals in the context of site vulnerability and the requirements of the NPPF.

1.6 Summary of Flood Risk

1.6.1 Assessment of available data and review of WBC's own detailed site summary confirms that parts of the site can be significantly affected by fluvial and pluvial flooding. However, the potential extent and severity of this flooding is well understood through modelling. The flooding is primarily associated with areas to the west of the River Loddon.

1.6.2 The site is large and given the nature and extent of potential flooding there is more than adequate scope for developing the site in a sustainable and robust way from a flood risk perspective, with development avoiding the key flood risk areas.

1.6.3 The key principles for the development can be evidenced from the EA approved strategic modelling and mapping, and the findings of the detailed modelling are adequate to inform the necessary constraints planning and mitigation design at this stage.

2 Policy and Sources of Information

2.1 Introduction

2.1.1 This chapter provides a review of policy relevant to the assessment and the available information on all sources of flood risk.

2.1.2 It also includes details of the Local Plan Update and specifically the policies relating to the proposed development of this site.

2.2 National Planning Policy

2.2.1 National Policy in relation to flood risk is set out in Section 14 of the NPPF, Dec 2024 and Planning Practice Guidance ID:7 for Flood Risk and Coastal Change, Aug 2022 (PPG). Flood Risk is discussed at Paragraphs 170 to 182 of the NPPF.

2.2.2 Paragraphs 173 to 176 discuss the sequential approach with respect to individual applications. Paragraph 174 refers to the Strategic Flood Risk Assessment (SFRA) that would form the basis of applying the Sequential Test for local authorities to allocate developments, whilst Paragraphs 177-179 relate to Exception Tests.

2.2.3 Paragraph 181 discusses the determination of planning applications stating:

'When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location.*
- *The development is appropriately flood resistant and resilient, such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment.*
- *It incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate.*
- *Any residual risk can be safely managed; and*
- *Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.'*

2.2.4 The proposed development is for 2,800 at the site which covers approximately 397.4 hectares. The proposed development is therefore classed as a Major development (it comprises 10 or more dwellings and the site is greater than 0.5 hectares). Paragraph 182 states:

'Sustainable drainage systems provided as part of proposals for major development should:

a) Take account of advice from the lead local flood authority.

b) Have appropriate proposed minimum operational standards; and

c) *Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.'*

2.2.5 The PPG sets out more specific guidance on how to apply and implement the NPPF policies. This includes guidance on when a Sequential Test is required and considerations on how to apply the test. In paragraph 023 of the PPG the aim of the sequential approach is clarified and includes the following:

'*The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk*.'

2.2.6 In applying the Sequential Test to planning applications, NPPF paragraph 175 confirms specific development cases when the test is not applicable:

'*The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk)*.'

2.3 Wokingham Borough Council Planning Policy: Local Plan Update 2024

2.3.1 Wokingham Borough Council (WBC) is the local planning authority for this area and it published the proposed submission version of its Local Plan Update (2023 – 20240) in September 2024.

2.3.2 The following policies, which are currently still draft, are from the Local Plan Update and are relevant to flood risk assessment and consideration of flooding within the development strategy.

Policy FD1: Development and Flood Risk (from all sources)

2.3.3 Policy FD1 sets out how development proposals need to account for all sources of flood risk at all stages in the planning process in line with national policy and the Strategic Flood Risk Assessment (SFRA).

2.3.4 The policy goes on to confirm when the Sequential Test is applicable, the requirements of the Exception Test and the requirements for a site specific FRA, with these consistent with NPPF.

2.3.5 The supporting text confirms that for allocated sites the Sequential Test does not need to be applied again, but the Exception Test may be required.

Policy FD3: River Corridors and Watercourses

2.3.6 This policy focuses on conserving and enhancing the natural, ecological, and cultural value of river corridors and watercourses. Development proposals near rivers must respect the setting, improve public access, and protect the biodiversity associated with these environments.

2.3.7 Key principles include maintaining natural banks, preventing negative impacts on water quality, and ensuring that any river or watercourse culverting is avoided when possible. The policy also supports de-culverting where appropriate.

Policy SS13: Loddon Valley Garden Village

2.3.8 This policy sets out development, place shaping and delivery principles for the LGV.

2.3.9 Place shaping principles guide the siting, layout and form of the LGV including that it should:

'*Locate new buildings except those for water compatible uses, outside areas of flood risk, with development planned for sequentially, by placing the most vulnerable development in the lowest areas of flood risk'*.

2.3.10 Under the Delivery principles is a section on Drainage and flood alleviation which states:

'*Development proposals should devise and implement a comprehensive drainage and flood alleviation strategy that:*

a) Provides high quality sustainable drainage systems (SuDS) that are integrated into the wider landscape and green and blue infrastructure strategy, including mitigation at source and makes a positive contribution to attractive open spaces, and improvement to biodiversity and water quality;

b) Considers and takes opportunity as appropriate to improve the management of flood risk and reduce the risk of flooding to areas beyond the garden village; and

c) Establishes clear and robust arrangements for future maintenance.'

2.3.11 The policy also sets out that that an integral element of the garden village is a country park along the River Loddon and there is a focus on delivering blue/green infrastructure, such that the development embraces its riverside location and valuable water environment.

2.4 Environment Agency Liaison

2.4.1 The Flood and Water Management Act (2010) provides the Environment Agency (EA) a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for Main Rivers and coastal areas. The EA is a statutory consultee in relation to flood risk and planning for sites within the floodplain.

2.4.2 The EA Flood Map for Planning, EA Long Term Flood Risk Mapping and the Catchment Data Explorer websites have been interrogated in respect to flood risk extents and sources.

2.4.3 The EA is a key consultee to both WBC's Local Plan Update and to this planning application. It has been engaged at each stage of the Local Plan Update process including a meeting in July 2022, and also for a site specific meeting, in April 2025, to cover the proposed approach for the FRA to support this planning application.

2.5 Wokingham Borough Council Liaison

2.5.1 The site lies within the administrative area of Wokingham Borough Council (WBC). WBC is the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA).

2.5.2 Over the course of the Local Plan Update there have been a number of meetings with WBC to discuss the key principles for the development of this site and to address specifically the flood risk and drainage elements.

2.5.3 WBC planning policy and the supporting evidence documents have been reviewed to inform the approach for this FRA. The following key documents have been taken into account:

- WBC Adopted Core Strategy, Core Policy CP1 (adopted April 2015);

- WBC Local Plan Update (2023 – 2040) (dated February 2025);
- WBC Local Plan Update: Proposed Submission Plan (Regulation 19) (dated September 2024);
- WBC Local Flood Risk Management Strategy (dated April 2015);
- WBC Preliminary Flood Risk Assessment (PFRA) (dated June 2011) and PFRA addendum (dated 2017);
- WBC Level 1 Strategic Flood Risk Assessment (SFRA) (dated 2021);
- WBC Level 1 Strategic Flood Risk Assessment (SFRA) (dated May 2023); and
- WBC Level 2 SFRA (dated August 2023).

2.5.4 WBC became the LLFA under the Flood and Water Management Act 2010. WBC provide guidance to assess, manage and inform flood risk.

2.5.5 WBC has permissive rights over any Ordinary Watercourses including land drainage ditches. If any work is required within the watercourse (improvements or crossings) then approval from the LLFA is required under the Flood and Water Management Act 1991.

2.6 Local Water Authority Liaison

2.6.1 Thames Water is responsible for the supply of clean water and the disposal of wastewater for the Shinfield and Arborfield area.

2.6.2 Information with regards to sewer and water main flooding contained within the SFRA has been reviewed as part of this FRA. All water companies have a statutory obligation to maintain a register of properties and areas which are at risk of flooding from the public sewerage system and is shown on the DG5 Flood Register.

2.7 Key Sources of Information

2.7.1 Information on flood risk and the site setting has been obtained from various sources and reviewed to inform the FRA. Key sources are listed below.

EA Mapping

2.7.2 The most up-to-date EA mapping was used to create flood risk and baseline mapping of the site area. This includes the most recent NaFRA Flood Zone (March 2025) and Surface Water (January 2025) mapping.

WBC SFRAs

2.7.3 WBC SFRA, Levels 1 and 2 and associated mapping are used to inform this FRA.

2.7.4 Alongside the main bodies of these reports, there are additional appendices and mapping that accompanies them. Some of this mapping is referred to through this FRA.

EA and WBC Modelling

2.7.5 The River Loddon area has been assessed through flood modelling to inform the EA flood mapping and to inform WBC's planning policy. The key models are listed below:

- EA River Loddon Model (2009)
- WBC 2021 SFRA River Loddon Model
- WBC 2023 SFRA River Loddon Model
- JBA Arborfield Brook Model (2023)

2.7.6 The suitability of these models for use in this FRA is discussed in the flood risk section. Where relevant the models have been rerun and updated to current modelling standards to provide data to inform this FRA.

Abley Letchford Modelling

2.7.7 As well as the EA and WBC modelling, detailed modelling has been completed as part of this FRA. This includes:

- Barkham Brook – Direct rainfall surface water model with key structures included. Using ESTRY and TUFLOW software.
- Barkham Brook – Fluvial model. Using ESTRY and TUFLOW software.
- Arborfield Cut – Direct Rainfall model with defined channels. Using ESTRY and TUFLOW software.
- Western Watercourses – Fluvial ESTRY TUFLOW model covering the area and Loddon tributaries south and east of the M4 and across the western side of the River Loddon.

Other Data

2.7.8 A desktop study of the site was carried out using the following websites to ascertain local features, hydrology and soil characteristics:

- DEFRA's Magic Map portal.
- British Geological Survey (BGS) 'Geology of Britain' online viewer; and
- Cranfield University 'Soilscapes' portal.

2.7.9 Additional guidance on development and flood risk is contained within CIRIA C624 Development and Flood Risk – Guidance for the Construction Industry which identifies several key aims for a development to ensure it is sustainable in flood risk terms.

Surveys

2.7.10 LiDAR data has been obtained from the EA and is confirmed to be the most current data as of May 2025.

2.7.11 Channel surveys were undertaken for a number of watercourses within the site area in 2023.

Site Walkovers

2.7.12 Site walkovers have been undertaken throughout the project and focussed site walkovers to inform the FRA were carried out between March and April 2025 which allowed observations of watercourses, ditches and structures within the site area.

2.7.13 A Technical Note has been produced which summarises the site walkovers undertaken and provides photographs of key features to inform the FRA. This is provided within **Appendix B** of this report.

3 Site Setting

3.1 Introduction

3.1.1 This chapter provides a description of the site location, its topography, hydrological context, geology and hydrogeology.

3.2 Site Location

3.2.1 The site is located at land to the south of the M4 at Reading, north of Arborfield and east of Shinfield. The nearest central postcode of the site is RG2 9HX. The site centre grid reference is SU 75022 68067. The site location is shown in **Figures 1A to 1F**.

Figure 1A: Site Location Overview

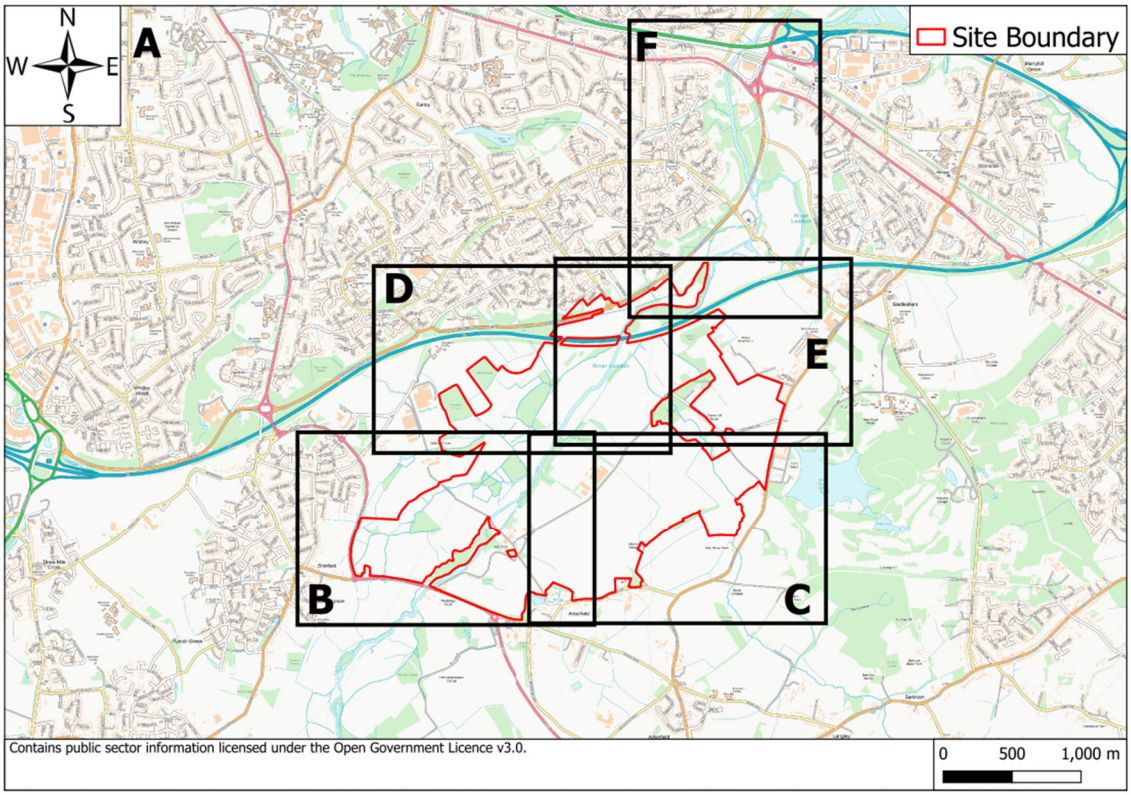


Figure 1B: Site Location

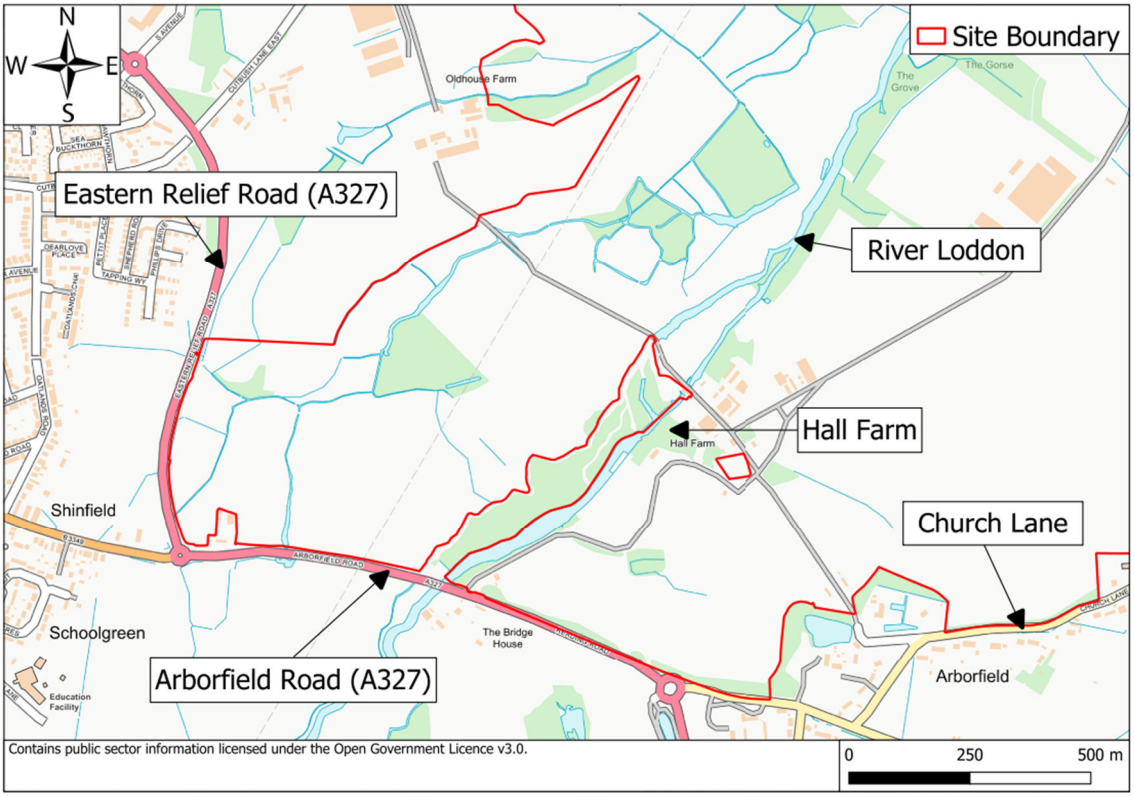


Figure 1C: Site Location

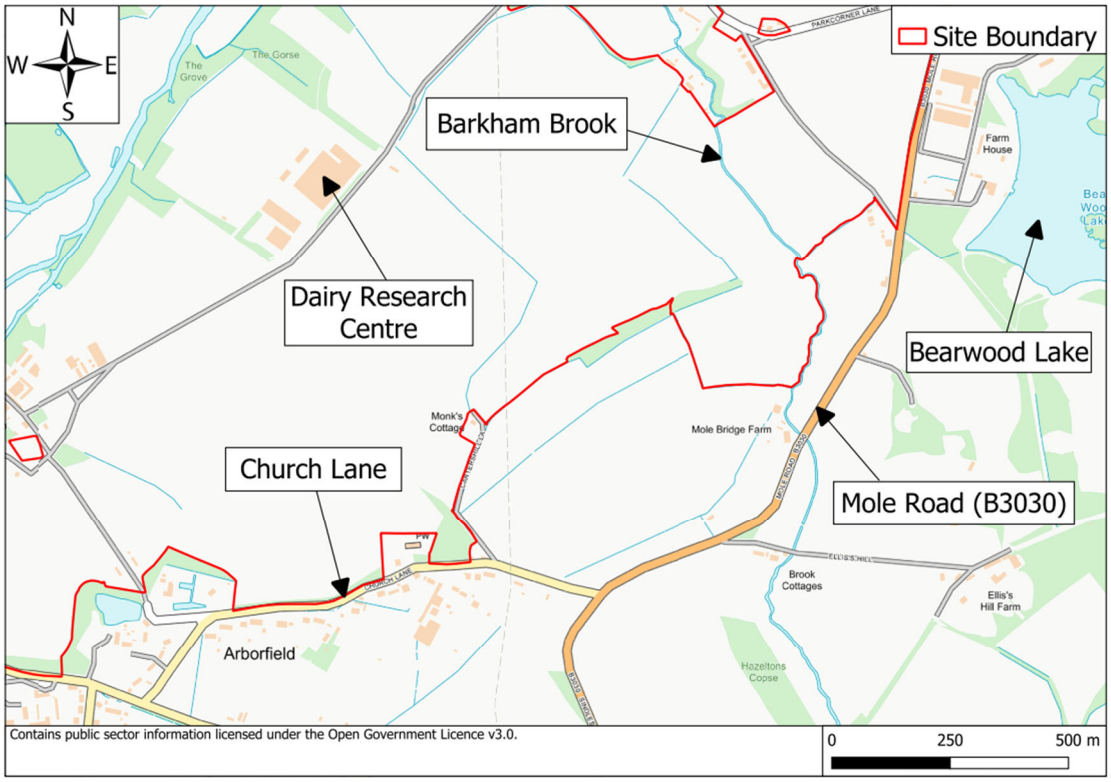


Figure 1D: Site Location

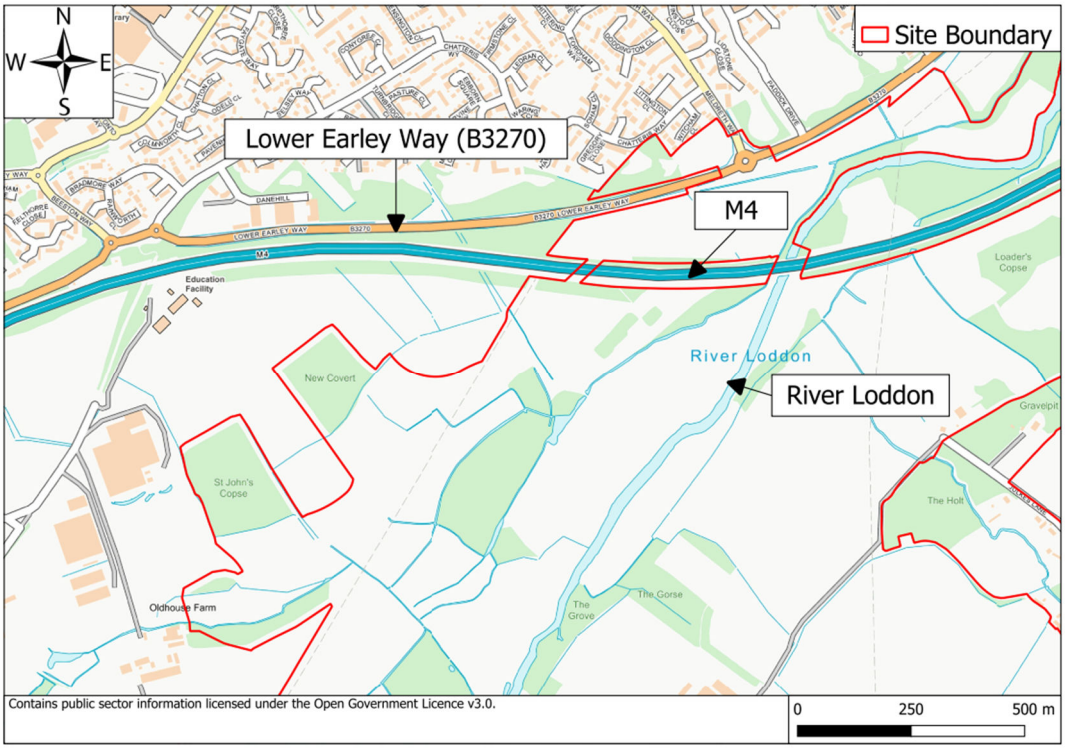


Figure 1E: Site Location

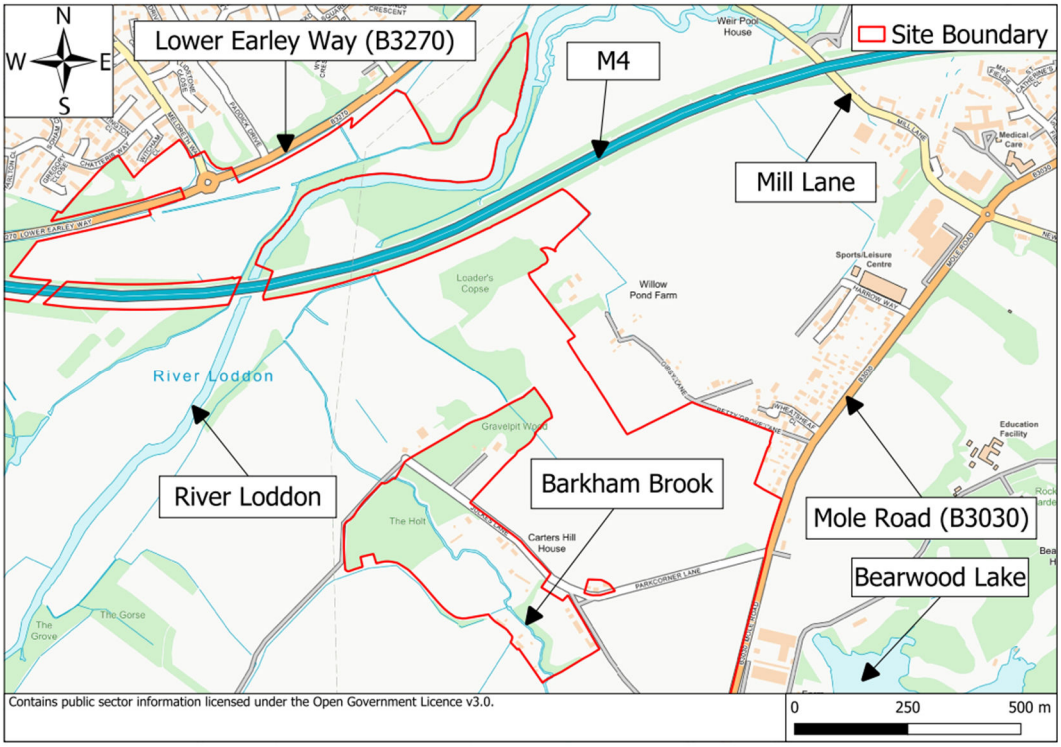
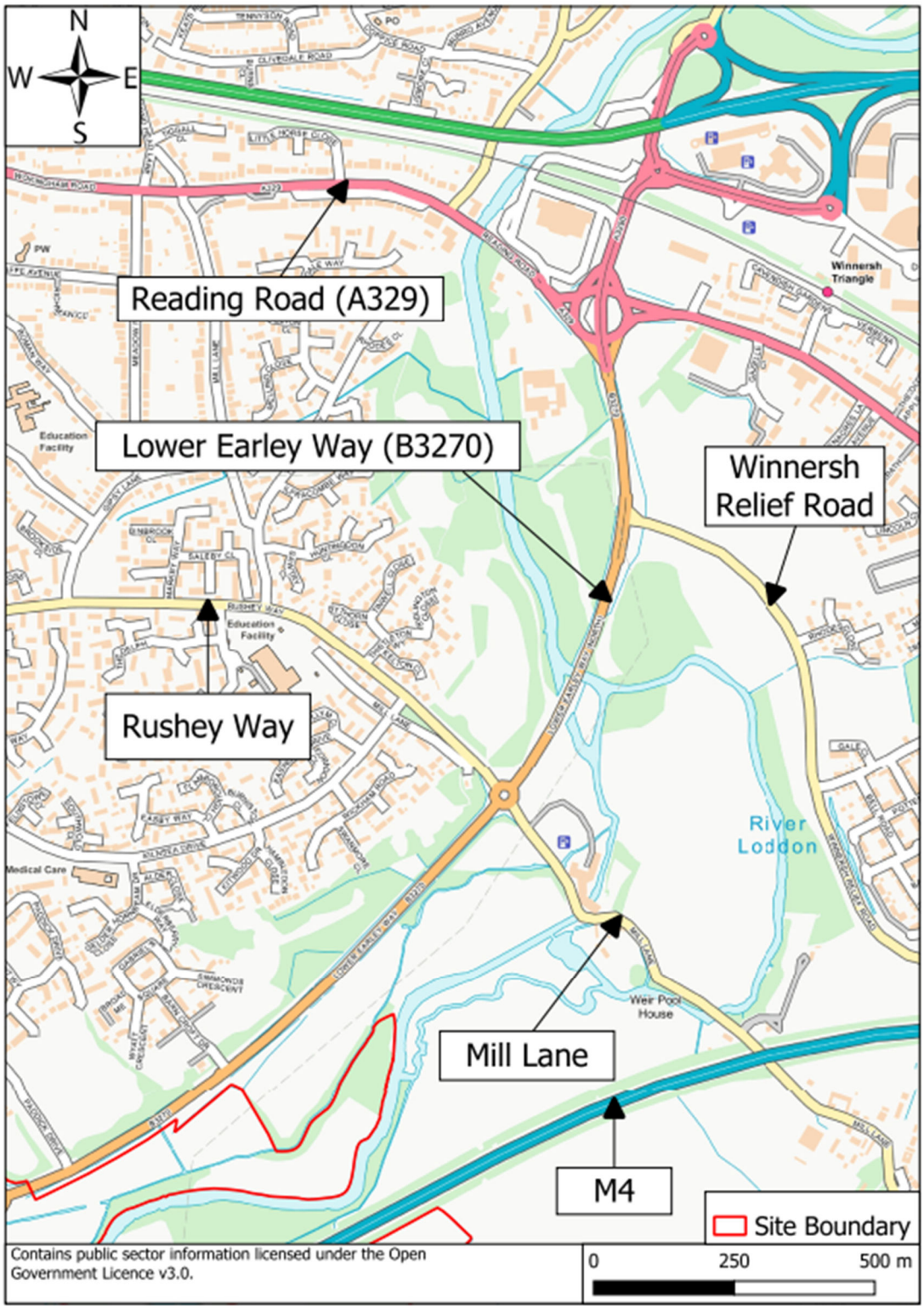


Figure 1F: Site Location



3.2.2 As shown in the figures, the site is located south of Reading. It comprises primarily agricultural areas and meadows with commercial and research (Centre for Dairy Research (CEDAR) and the

Cocoa Quarantine Centre) buildings and facilities as well as some residential dwellings. The River Loddon flows through the site in a northerly direction with tributaries of the Loddon beyond both the eastern and western banks.

3.2.3 The site is broadly confined by the M4 and Lower Earley Way to the north, Mole Road to the east, Church Lane and Reading Road to the south, and the Eastern Relief Road and Shinfield Studios to the west.

3.2.4 To the north, beyond the M4, Lower Earley Way and the River Loddon extend towards Winnersh.

3.3 Topography

3.3.1 Ground levels across the site are shown by LiDAR data in **Figures 2A to 2F**.

Figure 2A: Site Topography

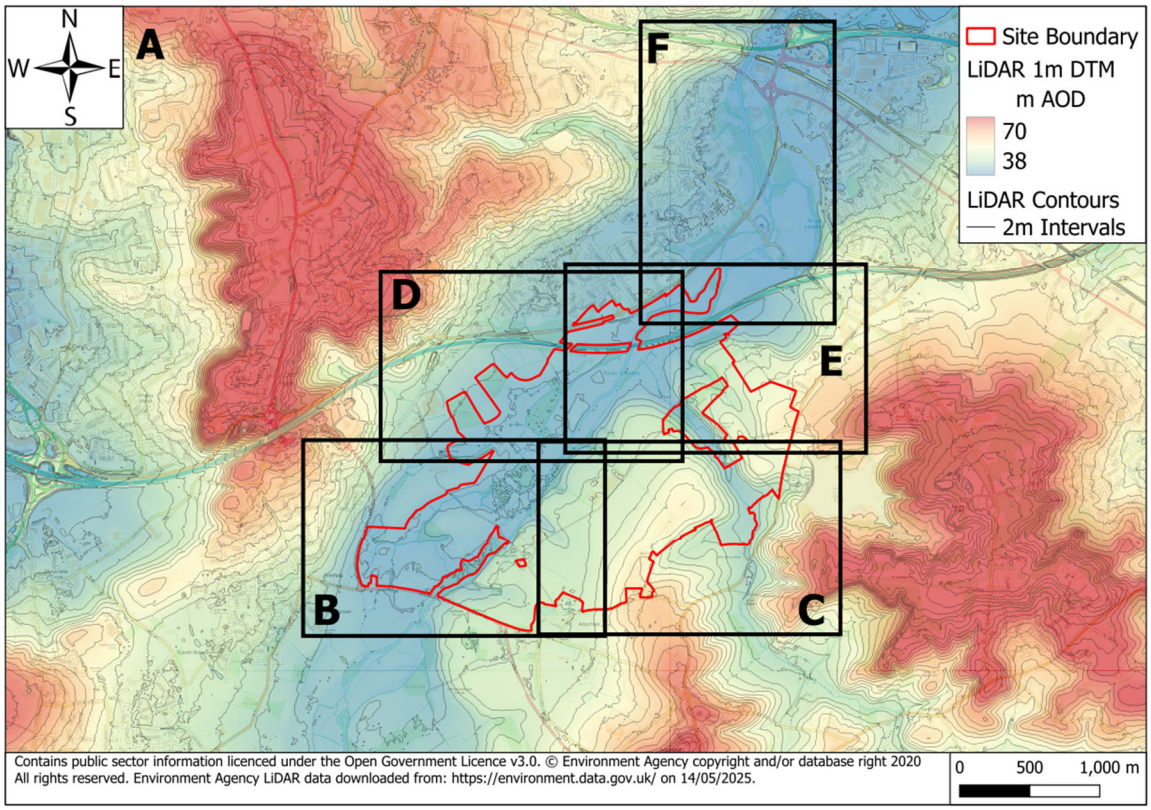


Figure 2B: Site Topography

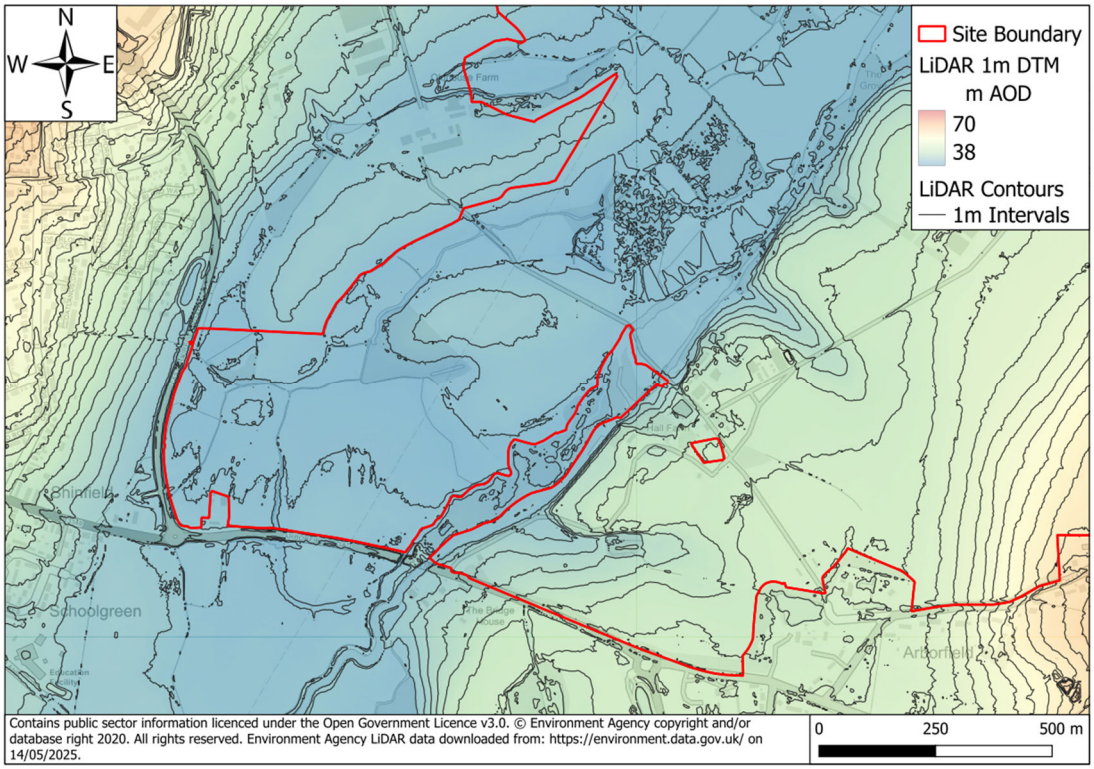


Figure 2C: Site Topography

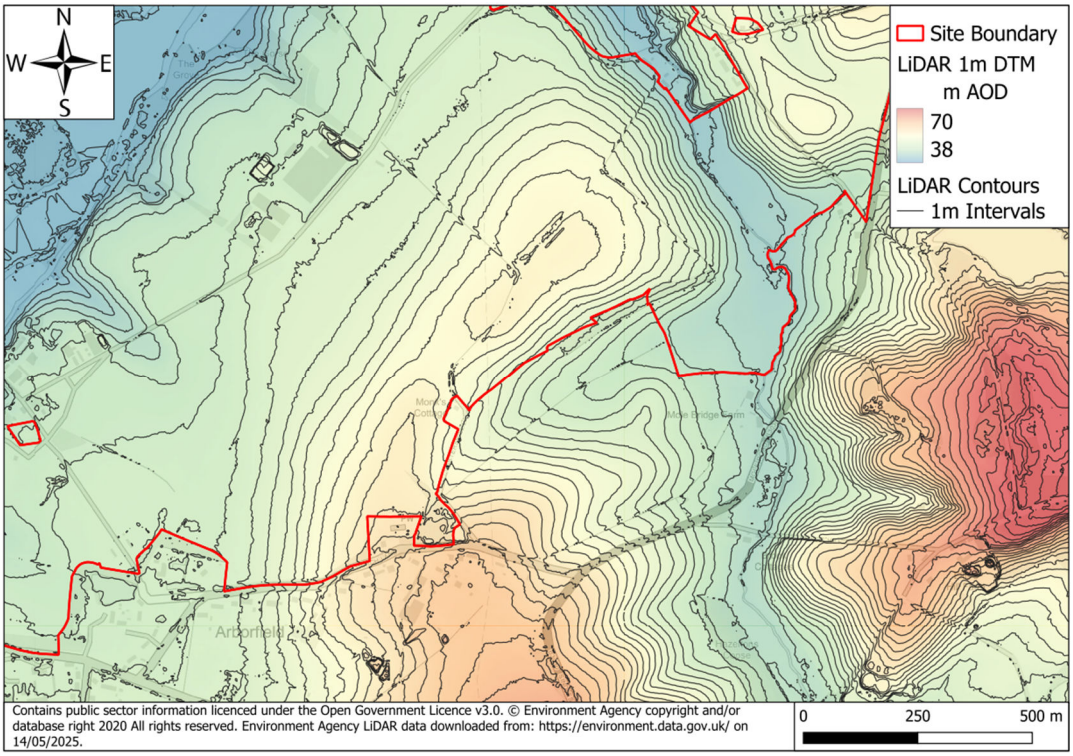
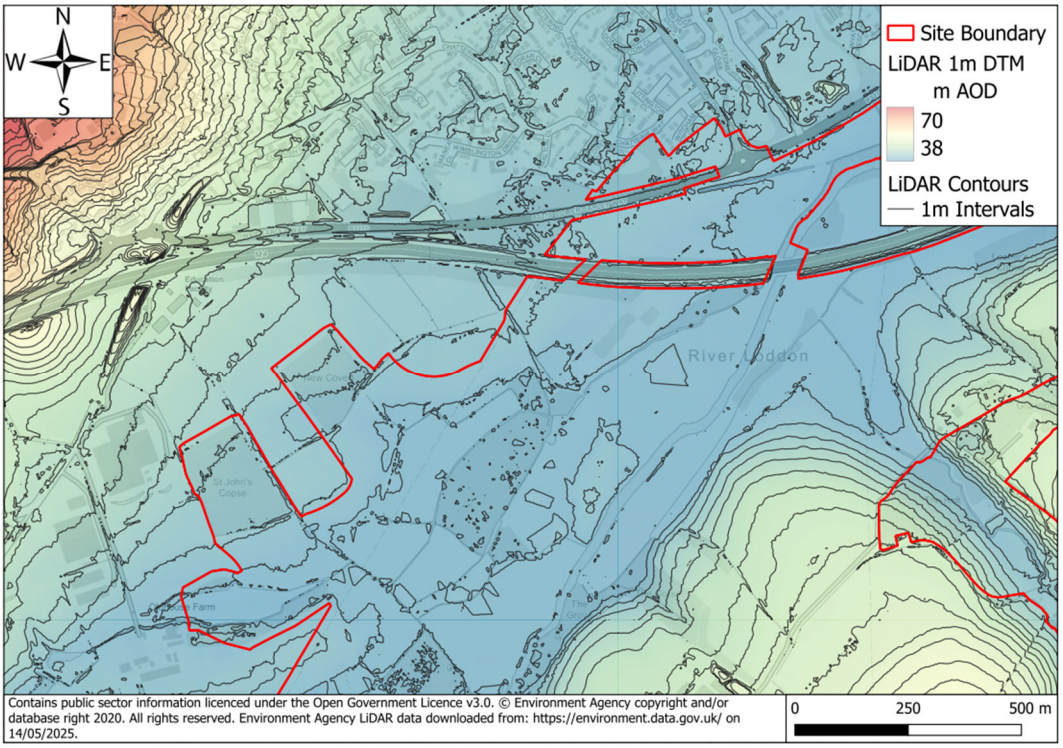


Figure 2D: Site Topography



Site 2E: Site Topography

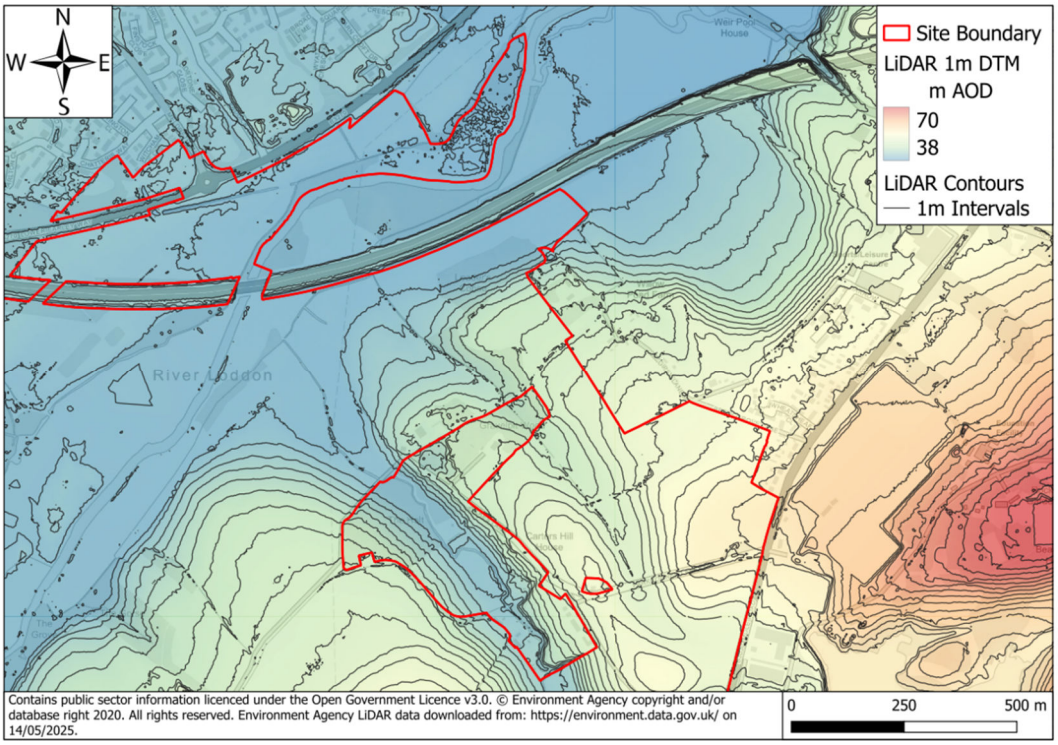
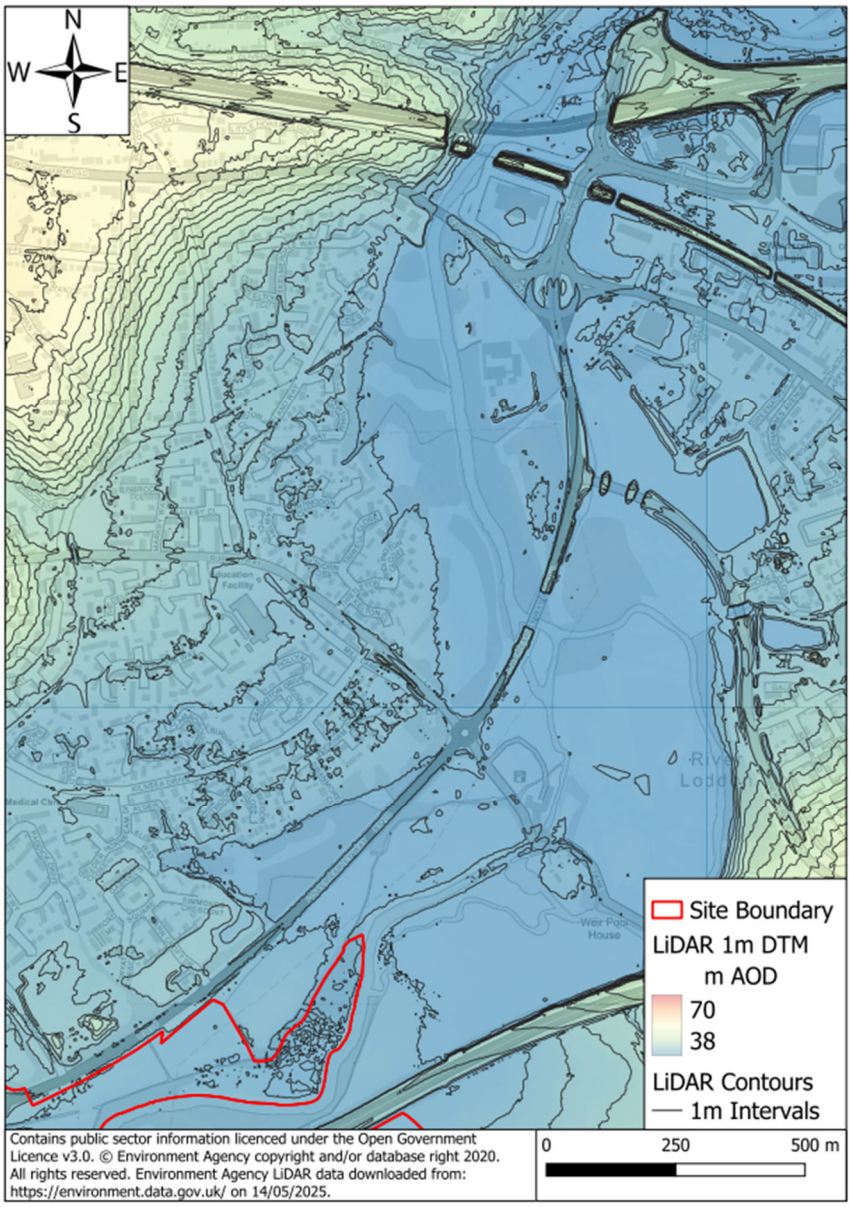


Figure 2F: Site Topography



3.3.2 The figures show that the site slopes down to the Loddon. The western side of the Loddon is generally flatter with ground levels between 38mAOD and 42mAOD. East of the Loddon there is an area of floodplain along the river itself but then ground levels rise quickly with typical levels varying between 39mAOD and 57mAOD. There is also a clear valley running in a north-westerly direction which contains the Barkham Brook.

3.3.3 Ground levels along the M4 adjacent to the Loddon are approximately 42mAOD. Along Mole Road ground levels are typically 44 to 57mAOD with levels of 41 to 60mAOD along Church Lane and Reading Road. The eastern Relief Road is generally at a level of 42mAOD adjacent to the site boundary.

3.3.4 Downstream of the site ground levels remain low, with typical levels in the river corridor of between 38 and 39 mAOD.

3.4 Watercourses and Ditches

3.4.1 The River Loddon flows through the site with various tributaries joining it from both the west and east within the site.

3.4.2 For the purposes of this FRA the watercourses have been grouped to allow for clearer descriptions and analysis of flood risk.

River Loddon through the Site

3.4.3 The River Loddon is a Main River, with a catchment of approximately 700km^2 at this location. Through the site the channel is typically between 15m and 25m wide and 2.5m and 3.5m deep with natural channel banks. At the upstream extent of the site, the Loddon flows through an open span bridge at Reading Road. There is a vehicular bridge crossing close to Hall Farm and the river flows under the M4 via box culverts within the main channel and along the eastern floodplain.

River Loddon downstream of the Site

3.4.4 Downstream of the M4 the Loddon channel is typically 30m wide and 3.5m deep, and it splits into multiple channels in some locations with wide meandering reaches east of Lower Earley Way. It flows under Lower early Way and into a more uniform channel section flowing towards Winnersh.

Western Watercourses

3.4.5 Various ordinary watercourses flow from under the M4 (via large diameter pipe culverts) and across the predominantly rural land to the west of the Loddon. A combination of natural drainage ditches and manufactured systems and channels, these convey the runoff from these areas to the Loddon with a short section of the watercourse designated Main River as it approaches and then flows under the M4.

Barkham Brook

3.4.6 The Barkham Brook is designated Main River from Barkham Street, approximately 2.7km upstream of the site . It joins the Loddon just downstream of the M4 and its catchment at that point is approximately 20km^2. Through the site it flows in a generally natural channel with a small ford crossing close to Carters Hill and a number of small bridge crossings for roads and footpaths. It is typically 7.5-8.5m wide and 1.5-2.5m deep.

Arborfield Cut

3.4.7 Designated a Main River, the Arborfield Cut is a smaller watercourse which, in some places, is little more than a shallow scrape. It flows into the Loddon just downstream of Reading Road at which point its catchment is 1.4km^2.

3.5 Local Sewers

3.5.1 Thames Water sewer asset records confirm that there are both foul and surface water sewers within some of the roads within the Site.

3.5.2 A copy of the asset plans is provided in **Appendix A**.

3.6 Geology and Hydrogeology

3.6.1 The British Geological Survey (BGS) 'Geology of Britain' online viewer indicates that the geology underlying the site is London Clay Formation – clay, silt and sand.

3.6.2 The Cranfield University 'Soilscapes' online viewer indicates that the site is split into three areas of soil type. The central area of the site is described as being loamy and clayey floodplain soils with naturally high groundwater. The eastern and western parts of the site are identified as being loamy soils with naturally high groundwater. There is also a small section in the north of the site that is described as slowly permeable seasonally wet, slightly acid but base-rich loamy and clayey soils.

3.6.3 The DEFRA Magic Map online viewer indicates that the part of the site is within a Secondary A aquifer. A Secondary A aquifer is described by the BGS as 'permeable layers capable of supporting water supplied at a local rather than strategic scale, and in some areas forming an importance source of base flow to rivers. There are generally aquifers formerly classed as minor aquifers'.

3.6.4 The southern part of the site is partially within a Groundwater Source Protection Zone (SPZ). A SPZ 1 with approximately 250m radius is located around the Loddon at Hall Farm, extending to a SPZ2 with a radius of approximately 750m.

3.6.5 A groundwater monitoring report was produced by RPS in June 2023. The report is provided in **Appendix C**. This monitoring looked at 15 specific borehole sites and recorded the geology present at each location. Of these, 12 are located in River Terrace Deposits with the other 3 in London Clay Formation.

4 Overview of Flood Risk

4.1 Introduction

4.1.1 This FRA must consider all potential sources of flooding using appropriate and available data.

4.1.2 Data from EA mapping and modelling, WBC's SFRAs including the associated modelling and from detailed modelling as well as other sources has been used in assessing the potential flood risk to the site and to confirm the suitability for development. The most relevant data has then been used to inform the masterplanning and development strategy for the proposals.

4.2 Fluvial Flooding

4.2.1 This is the potential for flooding from rivers. At this site, the key risk is from the River Loddon although the tributaries of the Loddon also pose a localised risk. Strategic data from EA mapping and the WBC SFRAs ae the primary sources of data, with detailed modelling providing site specific information.

EA Flood Map for Planning (Flood Zones)

4.2.2 The EA Flood Map for Planning provides an initial indication of the extent of Flood Zones. In the NPPF, Flood Zones are defined as follows:

- Flood Zone 1 'Low Probability' – Land less than 1 in 1,000 (0.1%) annual probability of river or sea flooding.
- Flood Zone 2 'Medium Probability' – Land between 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river flooding, or between 1 in 200 (0.5%) and 1 in 1,000 (0.1%) annual probability of sea flooding.
- Flood Zone 3 'High Probability' – Land at 1 in 100 (1%) or greater annual probability or river flooding, or 1 in 200 (0.5%) or greater annual probability of sea flooding.

4.2.3 **Figures 3A to 3F** show the EA Flood Zone mapping.

4.2.4 This mapping uses the results from the EA Loddon model from 2009 as well as the JBA Arborfield Cut model of 2023.

Figure 3A: EA Flood Zone Mapping

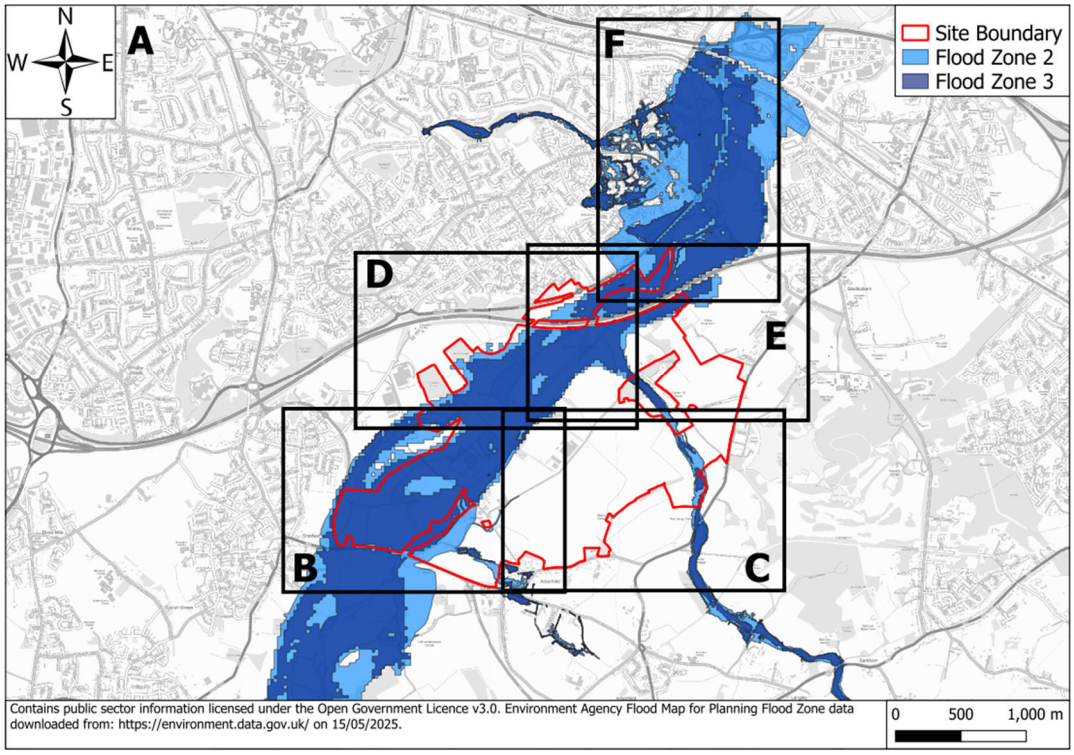


Figure 3B: EA Flood Zone Mapping

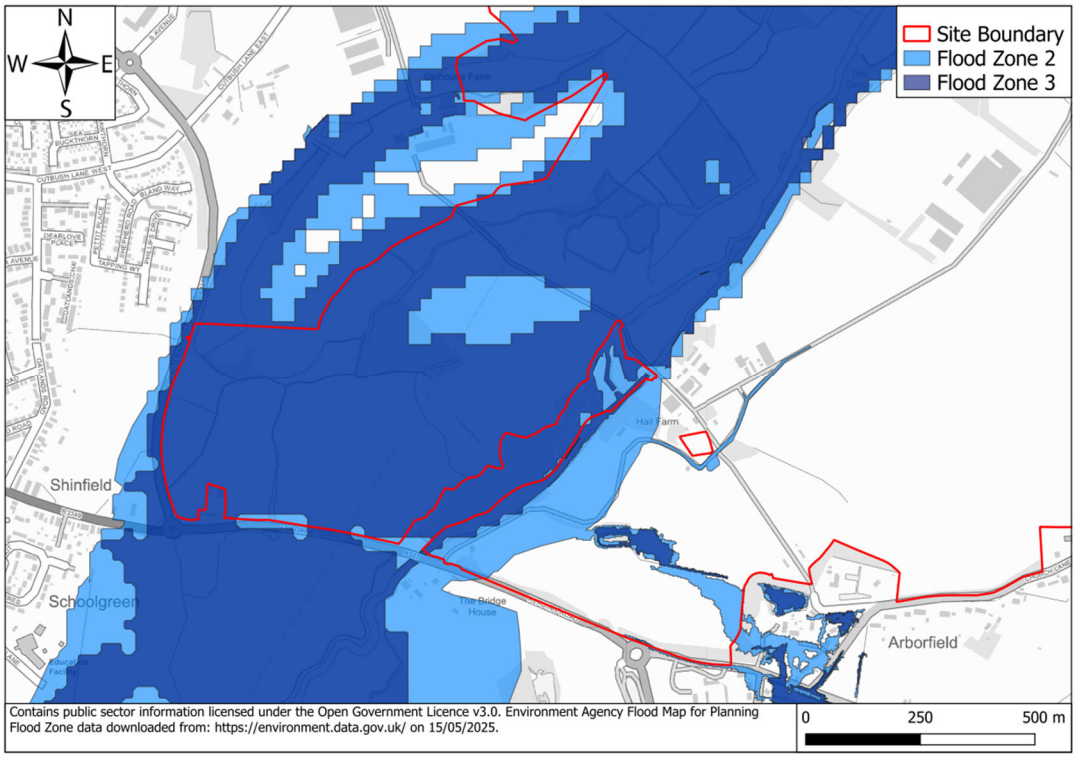


Figure 3C: EA Flood Zone Mapping

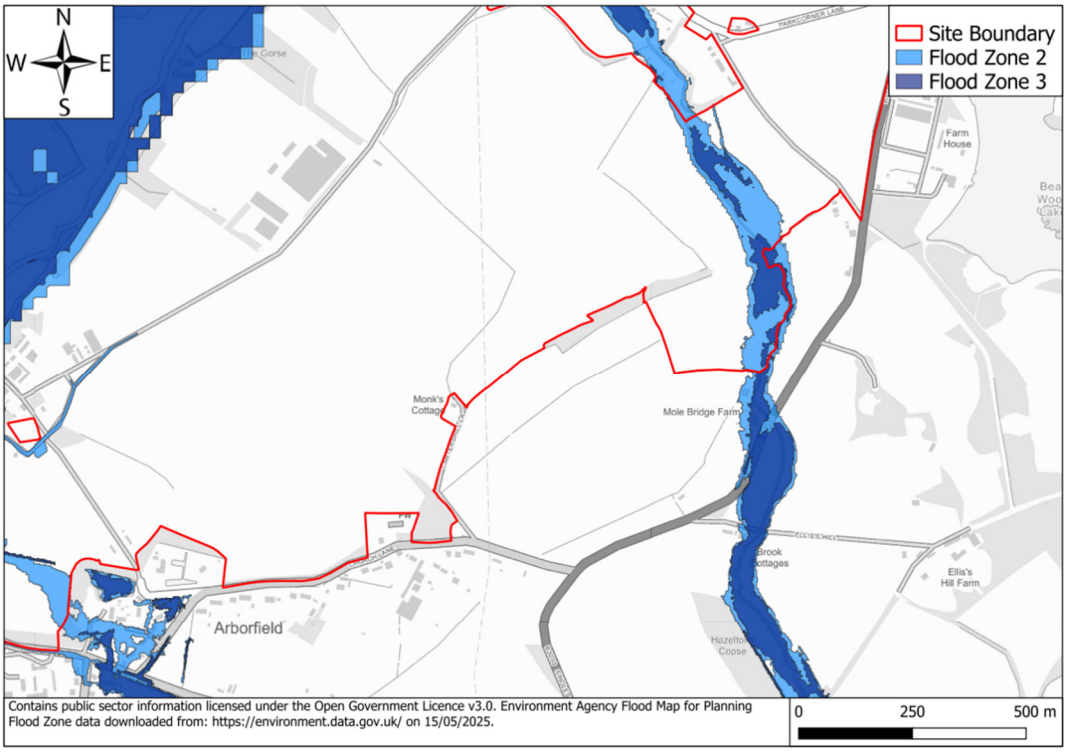


Figure 3D: EA Flood Zone Mapping

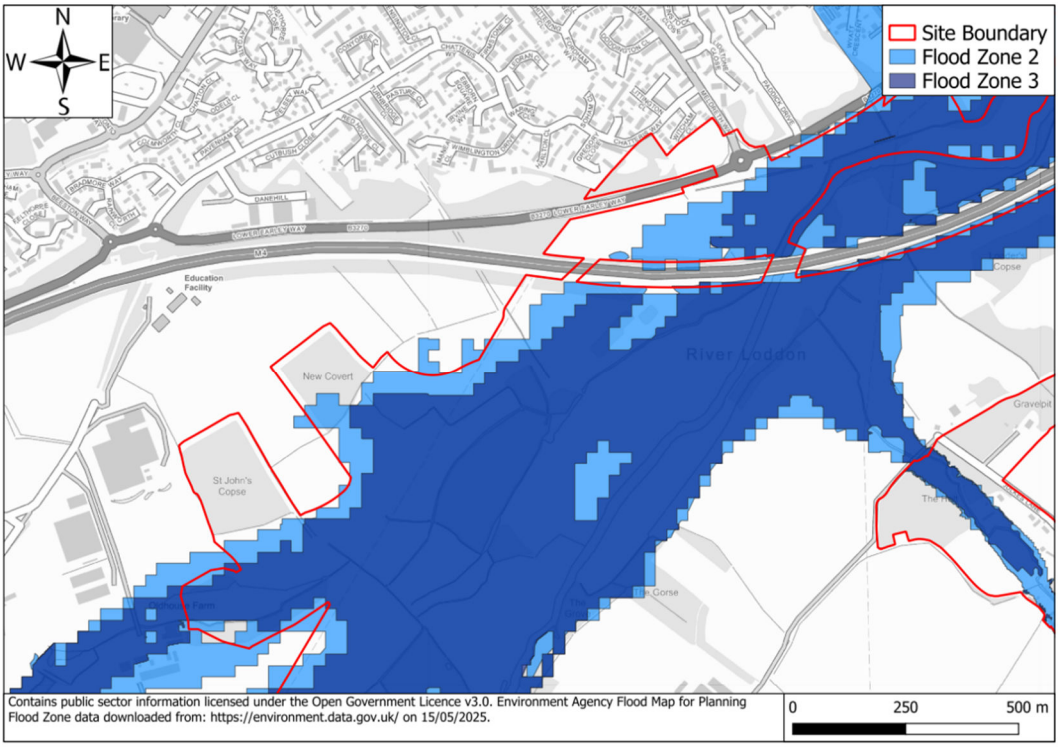


Figure 3E: EA Flood Zone Mapping

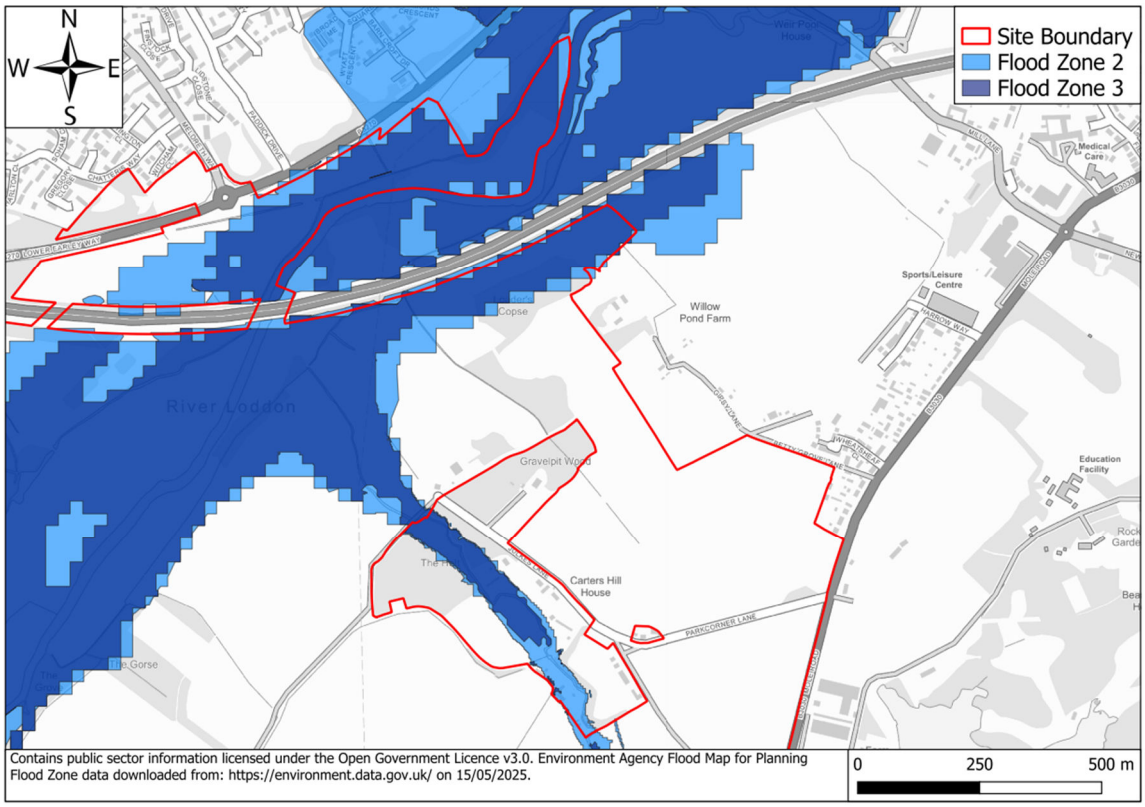
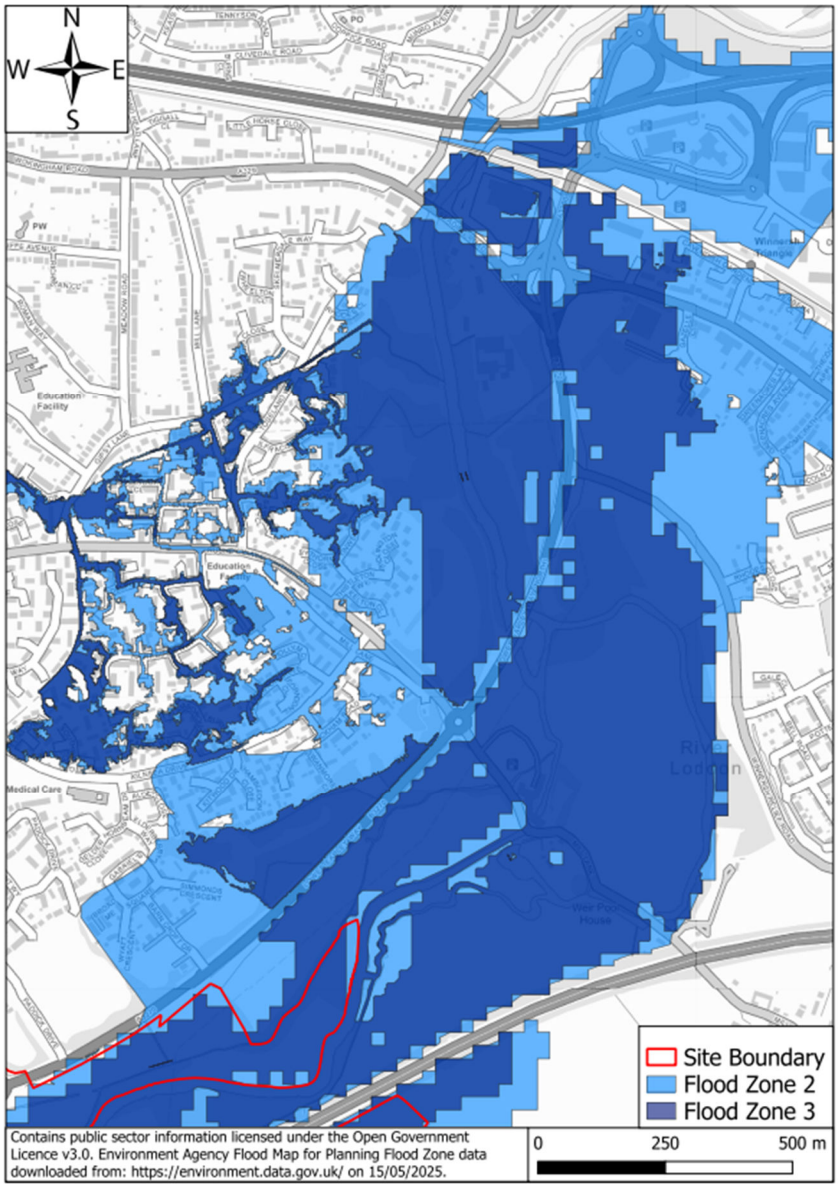


Figure 3F: EA Flood Zone Mapping



River Loddon through the Site

4.2.5 West of the Loddon there is an extensive area of floodplain, with most of the area to the west of the Loddon within either Flood Zone 2 or 3. East of the Loddon, the floodplain is much less extensive and restricted to the river corridor. This area of the site, to the east of the Loddon, and beyond the floodplain is where the proposed development will be located.

River Loddon downstream of the Site

4.2.6 Beyond the M4 the Loddon floodplain is extensive, with significant residential development within Flood Zones 2 and 3 as well as the large open spaces around the river. This also extends onto the road network at Lower Earley Way and around Winnersh.

Western Watercourses

4.2.7 According to the EA mapping, most of the western watercourses are closely linked to the River Loddon floodplain and located in Flood Zones 2 and 3.

Barkham Brook

4.2.8 There is a well defined river corridor along the Barkham Brook within Flood Zones 2 and 3. This appears to range between 50m and 100m wide on either the east or west bank.

Arborfield Cut

4.2.9 The Flood Zones are not well defined in the area around the Arborfield Cut and do not follow the observed watercourses. Within the site there are areas of Flood Zone 2 in low lying land north of Reading Road and some areas of Flood Zone 3 closer to the Loddon. However these areas are not part of the proposed development.

EA Long Term Flood Risk Mapping: Rivers and Sea

4.2.10 Across the site the EA Long Term Flood Risk Mapping has generally been used to inform the Flood map for Planning and the Rivers and Sea mapping is almost identical to the Flood Zone maps. There are minor differences in the flood zone 2 extent within the western watercourses area beyond the site boundary and near the Shinfield Studios, but generally the fluvial flooding is represented by the Flood Zone mapping. Therefore, it has not been reproduced again here.

4.2.11 As noted above the mapping is generally based on a model which does not reflect current catchment conditions. The model does not include a full representation of the physical infrastructure within the floodplain west of the Loddon, with areas such as the eastern relief road not included in the model.

WBC 2021 SFRA Model

4.2.12 At this location, the EA 2009 model is not fully representative of the current physical features within the floodplain and catchment of the River Loddon. There has been significant development within the area and the provision of key infrastructure such as the Eastern Relief Road since this original model was produced.

4.2.13 From an extensive review of the available models, the WBC 2021 SFRA River Loddon model has been shown to be the most representative of existing catchment conditions including the physical representation of the floodplain areas. The SFRA is a key evidence document in the Local Plan Update.

4.2.14 **Figures 4A to 4F** show the output from this modelling for the 1 in 100 year and 1 in 1,000 year events (i.e. FZ3 and FZ2 respectively). Figure 4A: WBC 2021 SFRA Modelling

Figure A: WBC 2021 SFRA Modelling

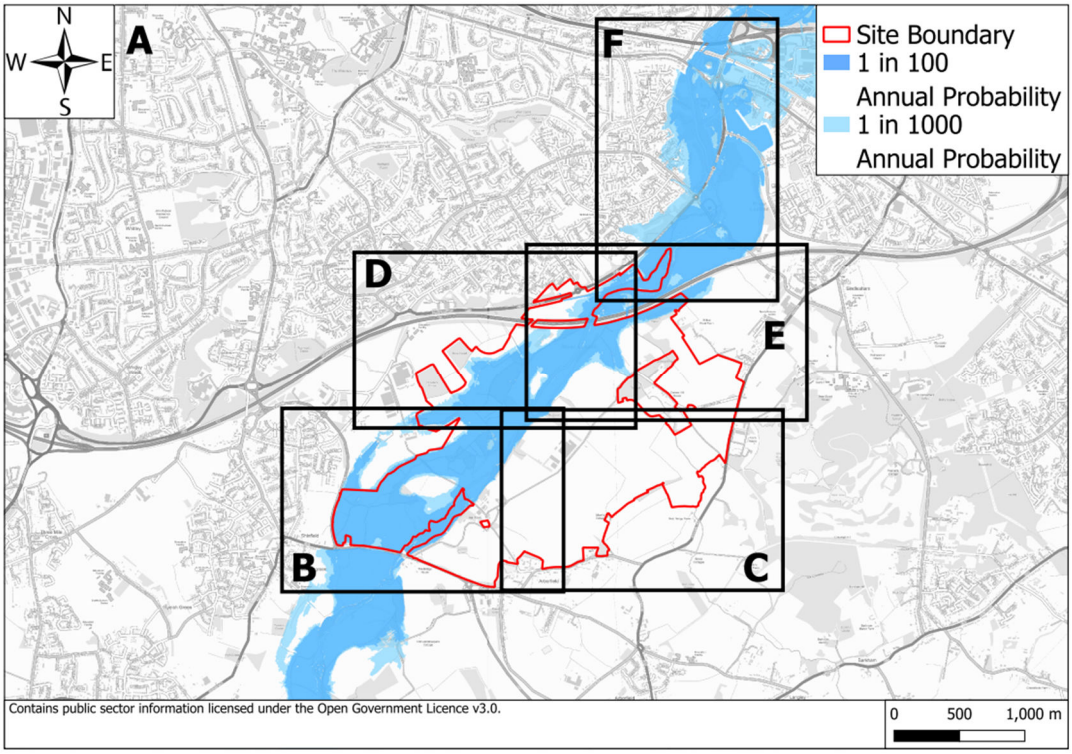


Figure B: WBC 2021 SFRA Modelling

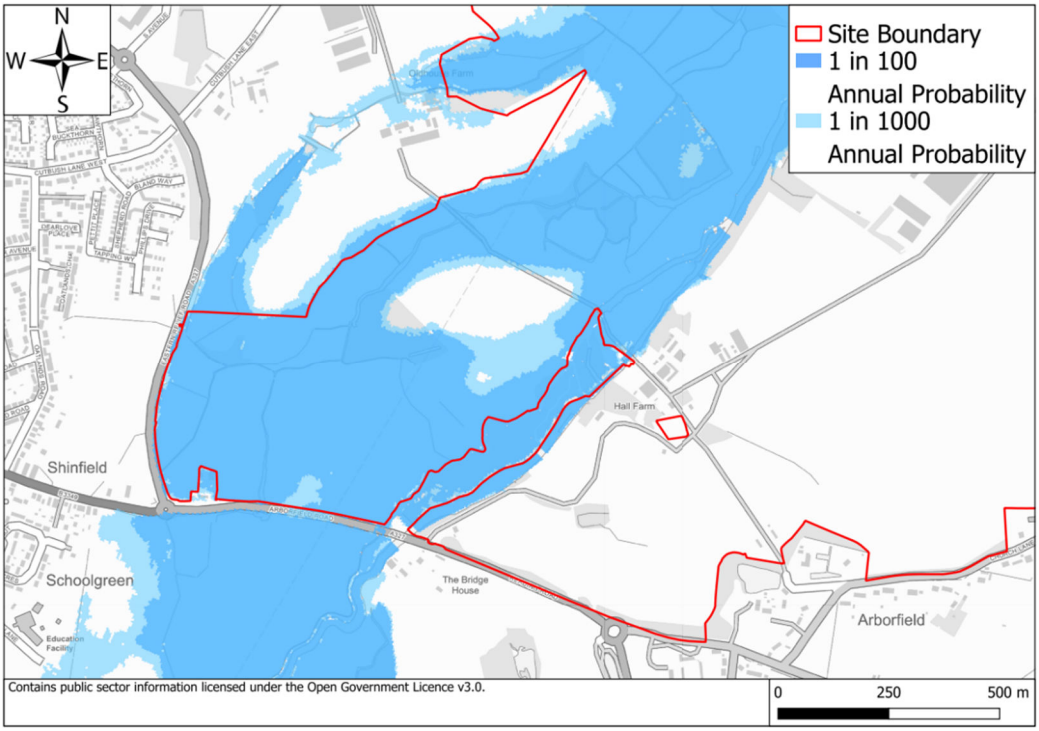


Figure 4C: WBC 2021 SFRA Modelling

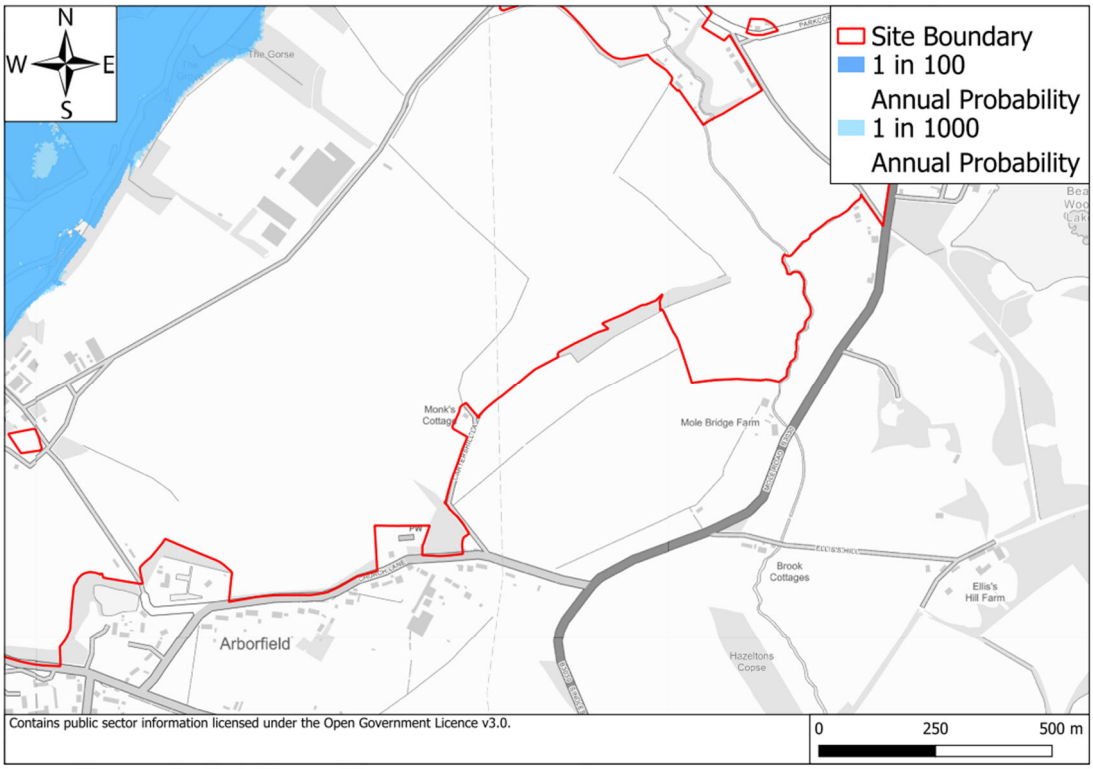


Figure 4D: WBC 2021 SFRA Modelling

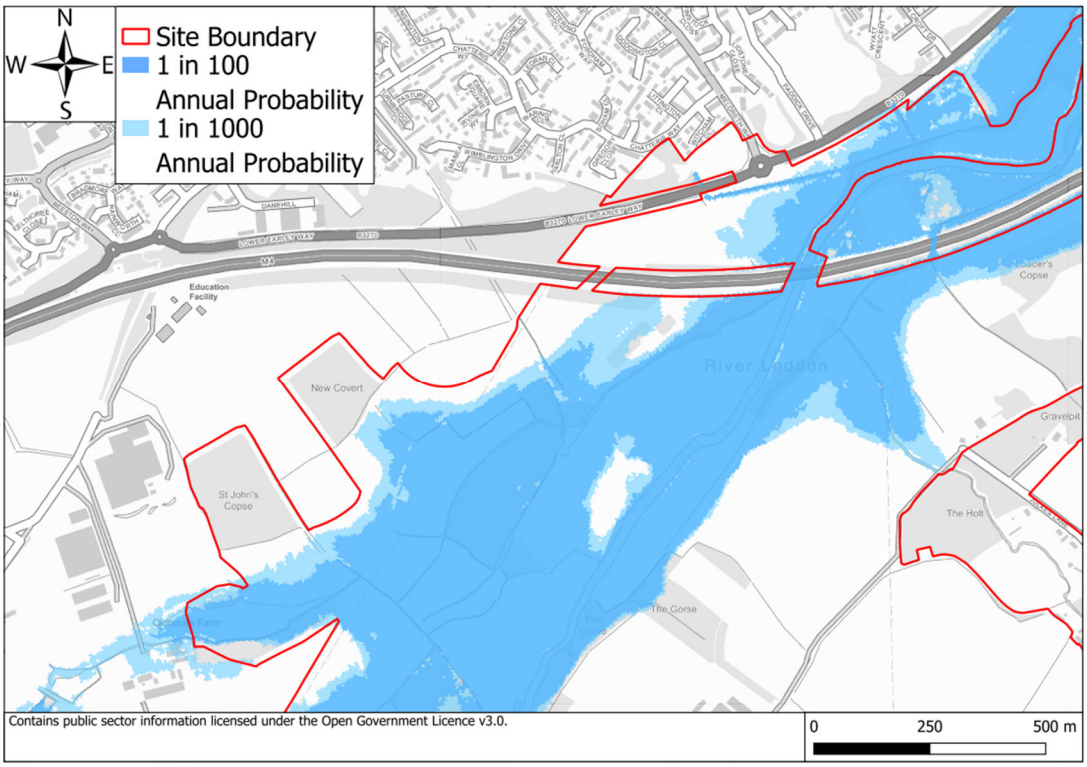


Figure 4E: WBC 2021 SFRA Modelling

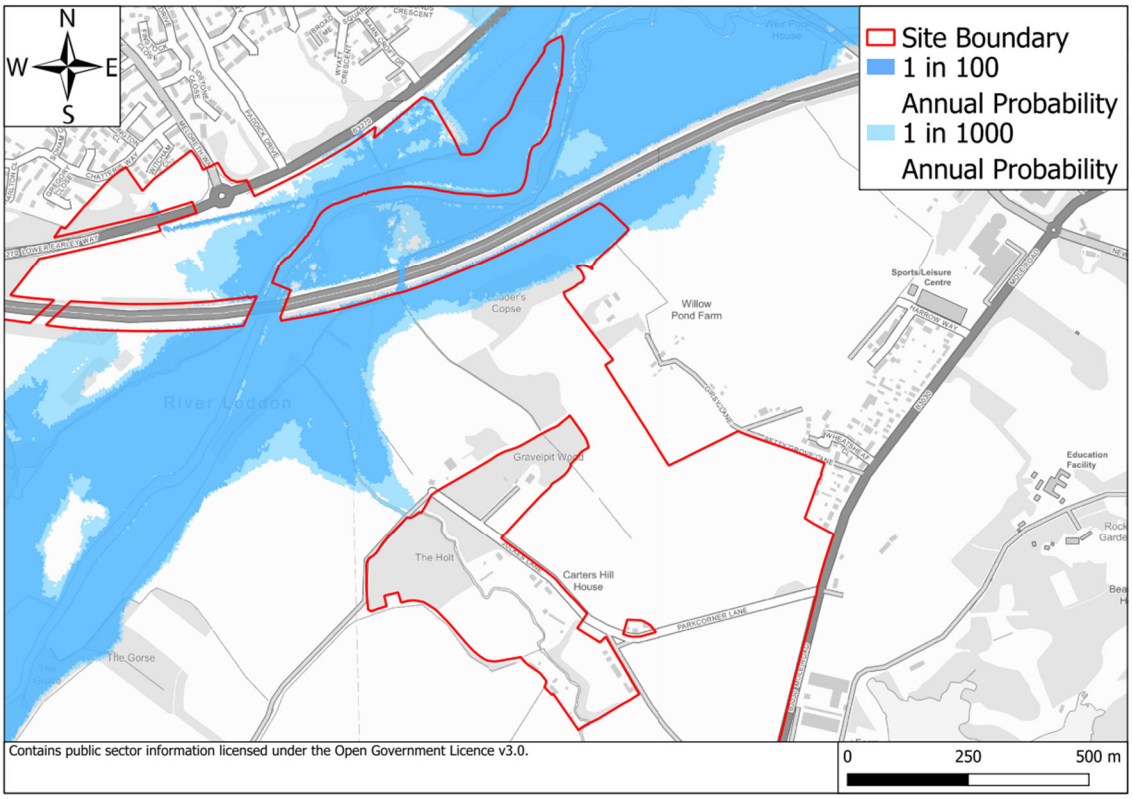
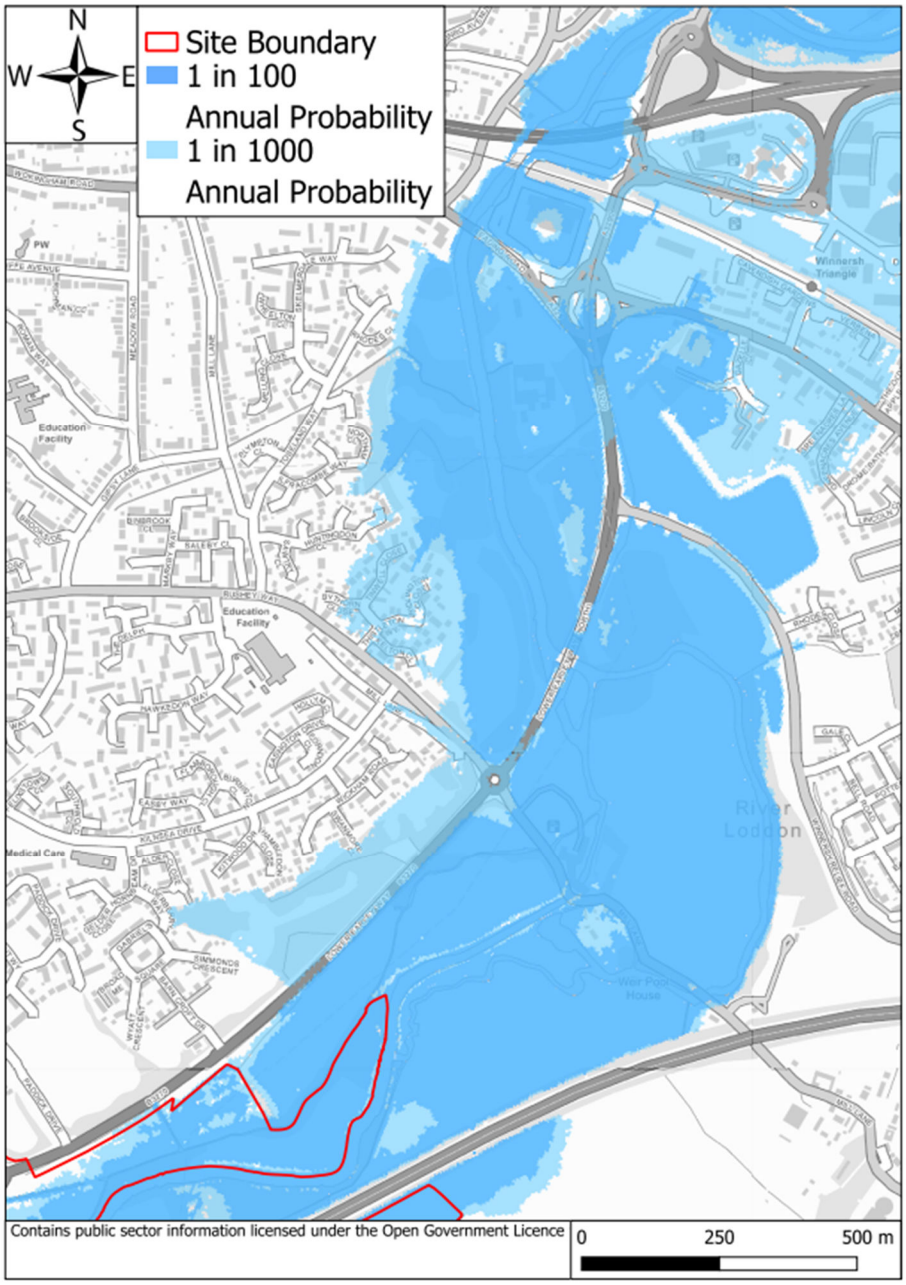


Figure 4F: WBC 2021 SFRA Modelling



4.2.15 The figures confirm that the River Loddon floodplain is not fully represented by the EA Flood Map for Planning or Long Term Flood Risk: Rivers and Sea mapping.

River Loddon through Site

4.2.16 The floodplain is less extensive on both the western and eastern sides of the Loddon with more significant dry island areas on the wester floodplain. The floodplain does not extend west beyond the Eastern Relief Road. East of the Loddon, the floodplain remains constrained to the river corridor and away from the proposed development area.

River Loddon downstream of the Site

4.2.17 The floodplain is still extensive on both the eastern and western side of the Loddon beyond the site boundary. However the floodplain does not reach the same number of residential properties to the west of Lower Earley Way downstream of the site.

Detailed Fluvial Modelling

4.2.18 Using site specific data and channel surveys as well as the most current hydrology data and methods, detailed modelling has been undertaken for the western watercourses, Barkham Brook and Arborfield Cut.

4.2.19 Model results are presented in the model reports in **Appendix D** and the differences with the EA mapping are summarised below.

Western Watercourses

4.2.20 New areas of potential flooding are defined along the ordinary watercourses between the M4 and the River Loddon. Given the nature of this area, this represents the fluvial flooding from these watercourses and an element of the surface water flooding.

Barkham Brook

4.2.21 The more detailed modelling provides a better understanding of the potential for flooding along the smaller ditches and tributaries of the Barkham Brook. It also shows a less extensive floodplain along the Barkham Brook itself.

Arborfield Cut

4.2.22 As noted earlier, the channel form along the Arborfield Cut is variable and in some places very poorly defined. The results from the detailed model are more representative of a surface water flooding assessment rather than a pure fluvial model.

Summary of Fluvial Flooding

4.2.23 From a review of all available modelling, the floodplain of the River Loddon is well defined and deemed to be best represented by the WBC 2021 SFRA model. The localised flood risks associated with potential fluvial flooding from the western watercourses, Barkham Brook and Arborfield Cut are also clearly defined through detailed modelling.

4.2.24 The detailed modelling and WBC 2021 SFRA model reflects current catchment conditions and provides a more complete understanding of the flood risk which locally affects the site when compared to the EA strategic mapping. It is, however, accepted that the results of the modelling may be refined in the future following review by the EA as statutory consultee.

4.2.25 For the purposes of this FRA the key principles demonstrating the suitability of the site for development are proven through applying both the EA strategic mapping and the general findings and conclusions of the detailed modelling. Therefore, these key principles are not reliant on the model review.

4.2.26 The detailed modelling, where appropriate, will be used to inform the design of features such as bridge crossings and flood mitigation measures. At this stage in the planning process the results from the detailed models are sufficiently robust to inform the general design parameters and design strategy.

4.3 Surface Water Flooding

4.3.1 Pluvial (or surface water) flooding generally describes the potential for flooding to occur as a result of surface water runoff causing ponding or flow overland. In some parts of the site the areas of potential fluvial and pluvial flooding are very similar. Thus the mapping is sometimes arbitrary in defining whether flooding is from a fluvial or pluvial source.

4.3.2 EA and WBC mapping has been reviewed to inform the assessment of surface water flood risk within the site alongside detailed modelling using a direct rainfall approach.

EA Long Term Flood Risk Mapping: Surface Water

4.3.3 The EA's Risk of Flooding from Surface Water mapping indicates areas that could be susceptible to surface water flooding during extreme rainfall events. The EA surface water mapping defines rainfall events based on the following:

- 1 in 30 (3.3%) annual probability 'High Risk'
- 1 in 100 (1%) annual probability 'Medium Risk'
- 1 in 1,000 (0.1%) annual probability 'Low Risk'
- Lower than 1 in 1,000 (0.1%) annual probability 'Very Low Risk'.

4.3.4 The NPPF PPG – 'Flood Risk and Coastal Change' includes the 1 in 100 annual probability of surface water flood (including climate change) within the definition of the design flood event to be used to inform a FRA.

4.3.5 **Figures 5A to 5F** show the EA surface water flood mapping.