13 Hydrology (including Flood Risk & Drainage)

13.1 Introduction

13.1.1 The chapter considers the outcome of the assessment of the likely environmental effects, which may arise from the Proposed Development:

- Flood Risk and Drainage including fluvial, pluvial and reservoirs
- Hydrogeology
- Water Framework Directive Status
- Water Resources

13.1.2 This assessment reports the likely environmental effects as a result of the operation and construction of the Proposed Development, and mitigation measures that will be implemented to prevent or reduce the adverse effects or provide beneficial effects.

13.1.3 This Chapter is supported by a Flood Risk Assessment and Drainage Strategy (FRA), produced by Abley Letchford (AL). A copy of the FRA is provided in Appendix 13.2 and the Drainage Strategy is provided in Appendix 13.3.

13.1.4 This Hydrology, Flood Risk and Drainage Chapter has been produced and reviewed by AL and RPS. AL staff are members of CIWEM. The flood risk and water supply elements have been checked and approved by an AL Associate Director who is a chartered engineer and chartered member of CIWEM; the hydrogeology and WFD elements have been reviewed and approved by a chartered member of CIWEM from RPS.

13.1.5 The chapter details the methodology followed, a review of the baseline conditions in the defined study area, and the results of the assessment.

13.2 Assessment methodology

Predicting effects

13.2.1 An Environmental Impact Assessment (EIA) Scoping Report prepared by Savills was published in December 2024 on behalf of outlining the proposed approach to assessing hydrological impacts a on behalf of the University of Reading (UoR), Gleeson Land (Gleeson) and Hatch Farm Land Ltd. The scoping report identified receptors, impact during both construction and operation phases, and outlined methodologies proposed for this ES Chapter. Based on the scoping process, the following have been scoped into this ES Chapter:

- Flood Risk and Drainage including fluvial, pluvial and reservoirs.
- Hydrogeology
- Water Framework Directive (previously referred to in Scoping Report as Surface Water Quality).
- Water Resources (previously referred to in Scoping Report as Water Supply and Treatment).

13.2.2 Based on the scoping process, with agreement from the LLFA and EA, the following has been scoped out of this ES Chapter on the grounds that this can be mitigated and will not impact the wider environment:

- Groundwater flood risk.

13.2.3 A drainage scoping opinion was carried out by Wokingham Borough Council to determine the content of the EIA scoping report. The scoping opinion states '*In summary, the drainage strategy for this proposed development should focus on sustainable, integrated solutions that address both flood risk and water quality. The drainage network should be designed to handle surface water and foul water runoff without exacerbating flood risks in surrounding areas. Careful consideration of flood alleviation, SuDS implementation, sewer capacity, and water quality control will be essential. Coordination with existing infrastructure and attention to long-term sustainability and maintenance will also be critical for the success of the drainage system'*.

13.2.4 The following sections set out the framework in terms of key legislation and guidance for the assessments under each of the four headings in para 13.2.1.

Legislative Context, Technical Guidance and Best Practice – Flood Risk and Drainage

Legislative Context

13.2.5 The National Planning Policy Framework (NPPF), updated most recently in December 2024, sets out the Government's planning policies for England and how they are expected to be applied. In terms of Water Resources and Flood Risk, the NPPF sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow, with a view to achieving sustainable development.

13.2.6 To accompany the updated NPPF, the web-based Planning Practice Guidance (PPG), most recently updated in September 2025, provides additional technical guidance on flood risk and coastal change. The PPG retains key elements of former Planning Policy Statement (PPS) 25 Development and Flood Risk (withdrawn on adoption of the NPPF) as an interim measure, pending a wider review of guidance to support planning policy. The original technical guidance published in 2012 has also been replaced by this web-based resource

13.2.7 In terms of the general planning approach to development and flood risk, the Flood Risk and Coastal Change PPG sets out the following main steps to be followed:

- Assess Flood Risk;
- Avoid Flood Risk; and
- Manage and Mitigate Flood Risk

13.2.8 The guidelines also state that in plan-making, local planning authorities apply a sequential approach to site selection so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk. In plan-making this involves applying the 'Sequential Test' to Local Plans and, if needed, the 'Exception Test' to Local Plans. Guidance on when and how should the 'Sequential' and 'Exception' Tests be applied to planning applications is also provided in the PPG, with recent clarification provided to allow for exemptions to the Sequential Test where surface water flooding can be managed through the development strategy (through the proposed layout and design) and suitable mitigation measures.

13.2.9 In addition, the guidelines reiterate that local planning authorities and developers should seek flood risk management opportunities (e.g. safeguarding land), and to reduce the causes and impacts of flooding (e.g. through the use of SuDS in developments).

Policy

13.2.10 Wokingham Borough Adopted Core Strategy Development Plan Document, January 2010 sets the broad vision and policies of the adopted Core Strategy (adopted on 29th January 2010) for the Borough having been informed by the views of the community through consultation, the vision of Wokingham Borough Council (WBC) and Community Strategy, together with national policy. The Core Strategy sets out where development will occur within the Borough to 2026, taking account of health, well-being and quality of life.

13.2.11 Policy CP1 (Sustainable Development) states that:

'Planning permission will be granted for development proposals that…

Limit any adverse effects on water quality (including groundwater);

Ensure the provision of adequate drainage…

Incorporate facilities for recycling of water…

Avoid increasing (and where possible reduce) risks of or from all forms of flooding (including from groundwater) …

13.2.12 Policy CP3 (General Principles for Development) states that:

'Planning permission will be granted for proposals that…

c) Have no detrimental impact upon important… water courses;'

13.2.13 Wokingham Borough Adopted Managing Development Delivery Local Plan Document, February 2014 supports the policies within the Adopted Core Strategy and sets out additional detail on where new homes will be delivered within the Borough. The policies ensure that any new housing will be built to a high-quality taking cognisance of sustainable drainage, landscaping and environment factors.

13.2.14 Wokingham Borough Council (WBC) Local Plan Update (LPU) will put into place a new planning strategy for the period to 2040. The plan is to undergo public consultation but is expected to be adopted, at which point it will replace the current Core Strategy and Managing Development Delivery Local Plans.

13.2.15 The following policies from the Local Plan Update are relevant to flood risk assessment and consideration of flooding within the development strategy.

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

13.2.17 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.

13.2.18 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.

13.2.19 Policy FD3: River Corridors and Watercourses 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.

13.2.20 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.

13.2.21 Policy SS13: Loddon Valley Garden Village sets out development, place shaping and delivery principles for the LGV.

13.2.22 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'*.

13.2.23 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.'

13.2.24 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.

13.2.25 Wokingham Borough Council has produced several Supplementary Planning Documents (SPD) that have been adopted for the purposes of development control. Of relevance to hydrology is the Sustainable Design and Construction SPD. The SPD provides an up to date and comprehensive approach to considering sustainable design and construction in new development. It is a material planning consideration for all planning applications.

13.2.26 Section 11 sets out expectations in respect to water efficiency and resource management. All developments are expected to include water efficiency measures to reduce overall water consumption in line with requirements such as BREEAM.

13.2.27 Section 12 outlines the approach to flooding, flood resilience, sustainable drainage, and requirement for a site-specific Flood Risk Assessment in support of Policy CP1 within the Adopted Core Strategy.

13.2.28 Shinfield Parish Council has developed a Neighbourhood Development Plan February 2017, which covers the period from 2016 through to 2026.

13.2.29 Policy 8: Flooding states:

> '*Where appropriate, new developments must incorporate the existing open watercourses, points and ditches within the development site, to lessen the risk of flooding to property, fields and roads.*
>
> *Existing open watercourses, ponds and ditches shall be preserved in new developments and substituted only where necessary or otherwise appropriate.*
>
> *The creation of Sustainable Drainage Systems (SuDS) in new developments should be promoted wherever practicable and should be incorporated into the site layout and landscape design, matching with the requirements of existing adjacent land and with regard to provision of fauna, flora and habitats. Provisions for the maintenance and management of the features must be made by the developer.'*

13.2.30 No development will be permitted which reduces the ability of the site to alleviate flooding, or which results in increases in surface water run-off rates that would have a detrimental effect off-site, unless suitable mitigation is put in place.

Guidance and Best Practice

13.2.31 Current best practice guidance on the planning for and design of SuDS treatment is provided by C753 The SuDS Manual36, The Design Manual for Roads and Bridges (DMRB) HA 103/06 Vegetative Treatment Systems for Highway Runoff37, and the DMRB HD 33/06 Surface and Subsurface Drainage Systems for Highways38. In the context of the Proposed Development, the assessment guidance described in the C753 The SuDS Manual34 is the most appropriate method of assessment to determine the risk to the water environment and the need for treatment measures, and this is described in more detail later in this chapter'.

Legislative Context, Technical Guidance and Best Practice – Hydrogeology

Legislative Context

13.2.32 Part III of The Water Resources Act 1991 principally relates to the protection of controlled water (i.e., rivers, lakes, canals and groundwater) from pollution. It sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries and, in some areas, navigation. It also regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater.

13.2.33 The Groundwater Regulations 2009 transpose the provisions of the European Union Groundwater Directive 2006/118/EC into law in England. Although the Directive no longer has effect in the UK, the regulations remain in place to provide a comprehensive and risk-based approach to pollution prevention, in relation to groundwater contamination.

13.2.34 The quality of public drinking water supplies in England is regulated by the Water Supply (Water Quality) Regulations 2016 and the Water Supply (Water Quality) Regulations 2018. These regulations set standards for drinking water quality. Although standards are not specified for all chemical compounds in existence, the regulations do require that, in order to be regarded as 'wholesome', drinking water must not contain any substance at a level which would constitute a potential danger to human health (as well as meeting the other requirements of the regulations).

Policy

13.2.35 The Wokingham Borough Council (WBC) Adopted Core Strategy Development Plan Document, January 2010 sets the broad vision and policies of the adopted Core Strategy (adopted on 29th January 2010) for the Borough having been informed by the views of the community through consultation, the vision of WBC and Community Strategy, together with national policy. The Core Strategy sets out where development will occur within the Borough to 2026, taking account of health, well-being and quality of life.

13.2.36 Policy CP1 (Sustainable Development) states that:

Planning permission will be granted for development proposals that…

Maintain or enhance the high quality of the environment;

Minimise the emission of pollutants into the wider environment;

Limit any adverse effects on water quality (including groundwater);

13.2.37 Policy CP3 (General Principles for Development) states that:

Planning permission will be granted for proposals that:

Have no detrimental impact upon important ecological, heritage, landscape (including river valleys) or geological features or water courses.

13.2.38 (The WBC Local Plan Update (LPU) will put into place a new planning strategy for the period to 2040. Once adopted, it will replace the current Core Strategy and Managing Development Delivery Local Plans.

13.2.39 Policy HC5 (Environmental Protection) states that:

Development proposals will only be supported where it can be demonstrated that individually, or cumulatively in combination with other schemes, they do not have an unacceptable impact, either during the construction phase, or when completed, on Air and Water quality (including surface and groundwater).

13.2.40 Policy HC9 (Environmental Protection) states that:

Development proposals on or near sites which are known, or suspected to be potentially contaminated, or proposals for sensitive land uses, will only be supported where it can be demonstrated that the following sensitive receptors would not be exposed to levels of potential contamination that would give rise to unacceptable risks or harm to health, or other adverse impacts…

Water bodies; including both surface water and groundwater bodies.

Guidance and Best Practice

13.2.41 Current best practice guidance for the management and control of groundwater is set out in the Construction Industry Research and Information (CIRIA) manual on groundwater control (C750D).

13.2.42 C750D covers the effects of groundwater on construction works, groundwater control techniques, site investigation requirements and design methods for groundwater control schemes.

Legislative Context, Technical Guidance and Best Practice – Water Framework Directive

Legislative Context

13.2.43 The WFD (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000) is a European Union Directive which committed member states to achieve good qualitative and quantitative status of all water bodies by 2015. Under the Directive water bodies are defined as all ground and surface waters, including rivers, lakes, transitional waters, and coastal waters (up to one nautical mile from shore).

13.2.44 The regulations require that the impacts of a Proposed Development on biology, chemistry and hydromorphology are considered in relation to WFD status classes and are reported under a specific WFD section in any Environmental Statement or in a separate WFD compliance report (Environment Agency, 2010).

13.2.45 The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations).

Policy

13.2.46 Consideration of the WFD is required for development which has the potential to detrimentally impact the chemical and/or ecological status of a waterbody or to prevent improvements that may otherwise result in a waterbody meeting its WFD objectives.

13.2.47 The following objectives (derived from the Environmental Objectives of the Directive) are used to determine whether the Proposed Development, in and around the water environment, which is affected by the Proposed Development, comply with the overarching objectives of the WFD:

- Objective 1: To prevent deterioration in the ecological status of the water body;
- Objective 2: To prevent the introduction of impediments to the attainment of good WFD status for the water body;
- Objective 3: To ensure that the attainment of the WFD objectives for the water body are not compromised; and
- Objective 4: To ensure the achievement of the WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

13.2.48 Good WFD status is determined from the ecological and chemical status of surface waters. These statuses are assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora);
- Hydromorphological quality (e.g., riverbank structure, river continuity and substrate of the riverbed); and
- Physical-chemical quality (e.g., temperature, oxygenation, and nutrient conditions).

13.2.49 The chemical quality refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. The WFD operates on a ‘one out, all out’ basis, so if one such concentration is exceeded, then the water body will not be classed as having a good status. The pure chemical status of surface waters is therefore classified as either good or fail with the physical-chemical quality indicators being classified as either high, good, moderate, poor, or bad.

13.2.50 The ecological status of surface waters is classified as being high, good, moderate, poor, or bad, whilst water bodies that have been modified (e.g., canals or contain significant flood defences) are classed as 'Heavily Modified Water bodies' (HMWB) and have to reach at least good potential by their objective year.

13.2.51 The WFD stipulates that groundwater bodies must achieve good quantitative status and good chemical status by their objective year. Groundwater bodies are classified as either good or poor. The quantitative status considers elements such as impacts of saline intrusion, ability to serve groundwater and surface water abstractions, and ability to support groundwater dependent terrestrial ecosystems. The chemical status refers to the environmental quality standards for river basin specific pollutants and the priority substances specified under the WFD.

13.2.52 The WFD introduced River Basin Districts (RBDs) to better manage watercourses without administrative and political boundaries. Each river basin is managed to achieve at least good status according to River Basin Management Plans, which provide a clear indication of how the objectives set for the river basin are to be reached within the required timescale.

Guidance and Best Practice

13.2.53 Within a WFD assessment consideration must be shown if an activity will:

- Cause or contribute to deterioration of status; and / or
- Jeopardise the waterbody achieving good status in the future.

13.2.54 The assessment will follow the EA's guidance for completing WFD assessments (Environment Agency, 2023) and the Planning Inspectorate's Advice Note Eighteen (National Infrastructure Planning, 2024). The following sections set out the methodology for assessing the impacts under each of the four headings in para 13.2.1.

Flood Risk and Drainage

13.2.55 The following section deals with the methodology to assess the impacts in respect of flood risk and drainage.

13.2.56 A site-specific Flood Risk Assessment has been undertaken in accordance with NPPF and local policy and is included within Appendix 13.2.

13.2.57 In order to assess the significance of any potential impacts, a matrix approach has been adopted to map the potential impacts to the vulnerability of potential receptors of flooding. We have adopted the vulnerability categories for flood risk as set out in the NPPG as below.

13.2.58 The assessment methodology stages can be outlined as follows:

Table 13.1 Value/sensitivity assessment

Receptor value / sensitivity	Receptor type
High	Highly Vulnerable/Essential Infrastructure
Medium	More Vulnerable
Low	Less Vulnerable
Negligible	Water compatible

13.2.59 Magnitude of impact is based on an assessment of two factors. Firstly, how flood levels might change as a result of impacts on the fluvial floodplain and secondly, qualitatively how surface water flows might be increased as a result of the proposed drainage strategy.

Table 13.2 Magnitude of impact

Magnitude	Description
High	Greater than 100mm increase in fluvial levels/significant Increase in SW run off rates
Medium	Greater than 50mm increase in fluvial levels/minor increase in SW run off rates
Low	10mm to 50mm increase in fluvial levels/no increase in SW runoff rates
Negligible	Less than 10mm increase in fluvial levels/no increase in SW runoff rates

13.2.60 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how significant this effect is. Effects may be adverse or beneficial.

Table 13.3 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Substantial	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

13.2.61 The proposed drainage system for the Proposed Development will be developed and described, including the extent to which Sustainable Drainage Systems (SuDS) will be used.

13.2.62 The outputs are reported within the FRA (Appendix 13.2) and overall Drainage Strategy (Appendix 13.3) and summarised within this ES chapter.

Hydrogeology

13.2.63 Shallow groundwater is expected to be present on the Site. Groundwater will be largely restricted to the granular fluvial sand and gravel deposits typically present in the valleys of the River Loddon and River Thames. These deposits are designated Secondary A aquifer units and are perched upon underlying clay deposits of the Thames Group. Given the shallow nature of this groundwater body, the Proposed Development may affect groundwater levels, quality and flow in those aquifer units. This in turn may affect other groundwater dependent receptors, most notably the River Loddon and existing groundwater abstractions (private or licensed).

13.2.64 A hydrogeological conceptual model has been developed for the Site that includes key groundwater dependent receptors. That model shall be based on publicly available data sources, a consultation process and a Water Features Survey. The vulnerability of groundwater receptors will be assessed using a standardised sensitivity criteria (Table 13.4) The significance of groundwater effects shall be assessed using the model and, where required, appropriate mitigation measures identified and/or monitoring strategy defined.

Table 13.4 Sensitivity Criteria

Magnitude	Description
Very High	Groundwater aquifer(s) with very high productivity or Water Framework Directive (WFD) good groundwater quality and quantity status. Exploitation of groundwater resource is extensive for public, private domestic and/ or agricultural use (i.e. feeding ten or more properties) and/ or industrial supply. Important sites of nature conservation dependent on groundwater as per importance criteria attributed in Chapter 11: Ecology or groundwater is considered likely to support wetland vegetation which is highly groundwater dependent. Surface water features with hydrological importance to designated sensitive ecosystems of national/ international importance (refer to Chapter 11: Ecology)
High	Groundwater aquifer(s) with moderate/ high productivity or WFD good groundwater quality and quantity status. Exploitation of groundwater resource is not extensive (i.e. private domestic and/ or agricultural supply feeding less than ten properties). Local areas of nature conservation dependent on groundwater as per importance criteria attributed in Chapter 11: Ecology, or groundwater is considered likely to support wetland vegetation which is moderately groundwater dependent. Surface water features with hydrological importance to sensitive ecosystems of regional importance (refer to Chapter 11: Ecology).
Medium	Groundwater aquifer(s) with low productivity or WFD variable groundwater quality and quantity status. No current known exploitation of groundwater as a resource and aquifer(s) properties make potential exploitation appear unlikely. Minor areas of nature conservation with a degree of groundwater dependency, as per importance criteria attributed in Chapter 11: Ecology. Surface water features with some but limited hydrologic importance to sensitive or protected ecosystems of authority area importance (refer to Chapter 11: Ecology)

Magnitude	Description
Low	Groundwater aquifer(s) with very low productivity or WFD poor groundwater quality and quantity status. No known past or present exploitation of groundwater aquifer(s) as a resource. Areas of vegetation with no groundwater dependency. Surface water features with minimal/insignificant hydrological importance to sensitive ecosystems of less than authority area importance (refer to Chapter 11: Ecology).

Water Framework Directive

13.2.65 Surface water quality aspects, as referred to in the Scoping Report, are covered by the Water Framework Directive.

13.2.66 The WFD assessment follows the EA's guidance for completing WFD assessments (Environment Agency, 2023) and the Planning Inspectorate's Advice Note Eighteen (National Infrastructure Planning, 2024).

13.2.67 A three-stage process is recommended by the EA. The three stages are:

- Stage 1 - WFD screening. To determine if parts of the Proposed Development do not require further consideration, and provide a baseline summary.
- Stage 2 - WFD scoping. To identify risks of the Proposed Development's activities to receptors based on the baseline environment, and how embedded mitigation may limit impacts.
- Stage 3 - WFD impact assessment. A detailed assessment of water bodies and their quality elements that are likely to be affected by the Proposed Development, which have not been screened and scoped out.

13.2.68 The screening assessment identifies the WFD water bodies within the vicinity of the Proposed Development. Each component of the Proposed Development has been reviewed in terms of its potential to impact to the water environment (i.e., on surface and groundwater bodies).

13.2.69 The receptor sensitivity criteria for WFD surface waterbodies as a whole is set out in Table 13.5, below.

Table 13.5 Sensitivity Criteria

Magnitude	Description
Very High	WFD current overall status of high. The surface water body supports sensitive aquatic ecological receptors and is extensively used for public water supply and large-scale agricultural use.
High	WFD current overall status of good. Surface water body may support sensitive aquatic ecological receptors and is used is used for public water supply/medium scale industrial or agricultural use.
Medium	WFD current overall status of moderate. The surface water features may be locally important for spawning of salmonid species. Surface water body is used for private water supply or small scale industrial/agricultural use.
Low	WFD current overall status of poor. Surface water bodies are not significant in terms of sensitive ecological receptors or fish spawning. Small scale (single residential or commercial use) abstraction licences are present in close proximity.
Negligible	WFD current overall status of bad. No sensitive ecological receptors or fish spawning are present within the surface water bodies. No abstraction licences present within the area.

13.2.70 The magnitude of impact on WFD waterbodies are assessed against the impact on the rating of the WFD elements of a waterbody, and the ability to improve them in the future.

Table 13.6 Significance of Effect

Magnitude	Description
Major	Anticipated to result in a permanent increase or decrease of the WFD classification of a waterbody, or prevent the waterbody from reaching a 'Good' rating in the future.
Moderate	Substantial effect on one WFD element, or moderate effect on several elements. May result in a temporary increase/decrease of the WFD classification of the body. May prevent the waterbody from reaching 'Good' rating in future.
Minor	Minor, localised impact on one or several WFD elements. No effect on the overall classification of the water body. Would not prevent the water body from reaching a 'Good' rating in the future.
Negligible	Very minor, local effect. No change to classification of any WFD elements.
No Change	No anticipated change in classification of any WFD elements.

13.2.71 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how significant this effect is. Effects may be adverse or beneficial.

Table 13.7 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Substantial	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

13.2.72 The screening assessment is based upon the "Value" of the receptors. How a receptor is valued is proportional to its importance to the overall WFD water body it is located in. The specific criteria for the specific receptors are set out in **Error! Reference source not found.** – WFD Screening Criteria.

13.2.73 The WFD scoping assessment will identify links between the proposed onshore activities and each WFD quality element that could be affected. It is also necessary at this stage to consider the proposed activities and how they could affect the morphological mitigation measures for waterbodies, where applicable.

13.2.74 The scoping phase involves considering each WFD quality element to identify those (if any) where a possible causal link exists. That is, where water body status or environmental objectives could potentially be affected at a water body level by the proposed activities.

13.2.75 Each activity type is examined based on the maximum design scenario. Where potential impacts from proposed activities exist, they will be scoped into the assessment and mitigation measures highlighted for further development as design progresses.

13.2.76 The waterbodies and impacts which are screened and scoped in during Stages 1 and 2 are considered further for specific impacts that may occur as a result of the development. A detailed impact assessment will examine the potential residual impact on water bodies (including cumulative impacts), suggesting further mitigation measures and enhancements where appropriate.

13.2.77 Within the context of the wider Proposed Development, the WFD assessment will provide the opportunity to inform detailed design by avoiding, minimising, mitigating and compensating risks to WFD surface water and groundwater receptors where the risk assessment determined that the proposed activities may have potential impacts.

13.2.78 The sources of information used in the assessment are set out in the table below:

Table 13.8 Sources for WFD Desk Study

Title	Source	Author
BGS Geology Viewer	https://geologyviewer.bgs.ac.uk/?_ga=2.60345197.172764960.1660052920-1090504202.1660052920	British Geological Society (BGS)
Magic Map Application	https://magic.defra.gov.uk/MagicMap.aspx DEFRA	DEFRA
Catchment Data Explorer	https://environment.data.gov.uk/catchment-planning/	Environment Agency (EA)
Geoindex Onshore Mapping	https://www.bgs.ac.uk/map-viewers/geoindex-onshore/	BGS
Soilscapes viewer	http://www.landis.org.uk/soilscapes/	The National Soils Research Institute
Thames River Basin District River Basin Management Plan: Updated 2022	https://www.gov.uk/government/publications/thames-river-basin-management-plan-updated-2022-habitats-regulation-assessment	EA

13.2.79 A review of the proposed potential works and the potential impacts to the identified surface water and groundwater bodies has been undertaken by identifying the impacts that could improve or reduce the WFD status or affect the ability of the water bodies to meet the objectives of the WFD.

13.2.80 The following factors have been considered when determining whether the potential effects of the Proposed Development are likely to lead to an improvement / reduction in status or impact on objectives being met:

- Whether the impact is temporary (such as short-term construction impacts) or permanent/long term;
- The characteristics and sensitivity of the specific water features affected by the Proposed Development (which may be different to the designated WFD water body);
- The scale and importance of the specific water features affected by the Proposed Development to the designated WFD water body; and
- The nature, scale, and extent of potential impact in the context of the existing pressures and proposed measures for the water body.

13.2.81 The assessment has been undertaken using the design scenario (as of June 2025), in order to ensure the assessment captures the specific likely affects arising from the development. Should significant changes to the design occur, further assessment may be required.

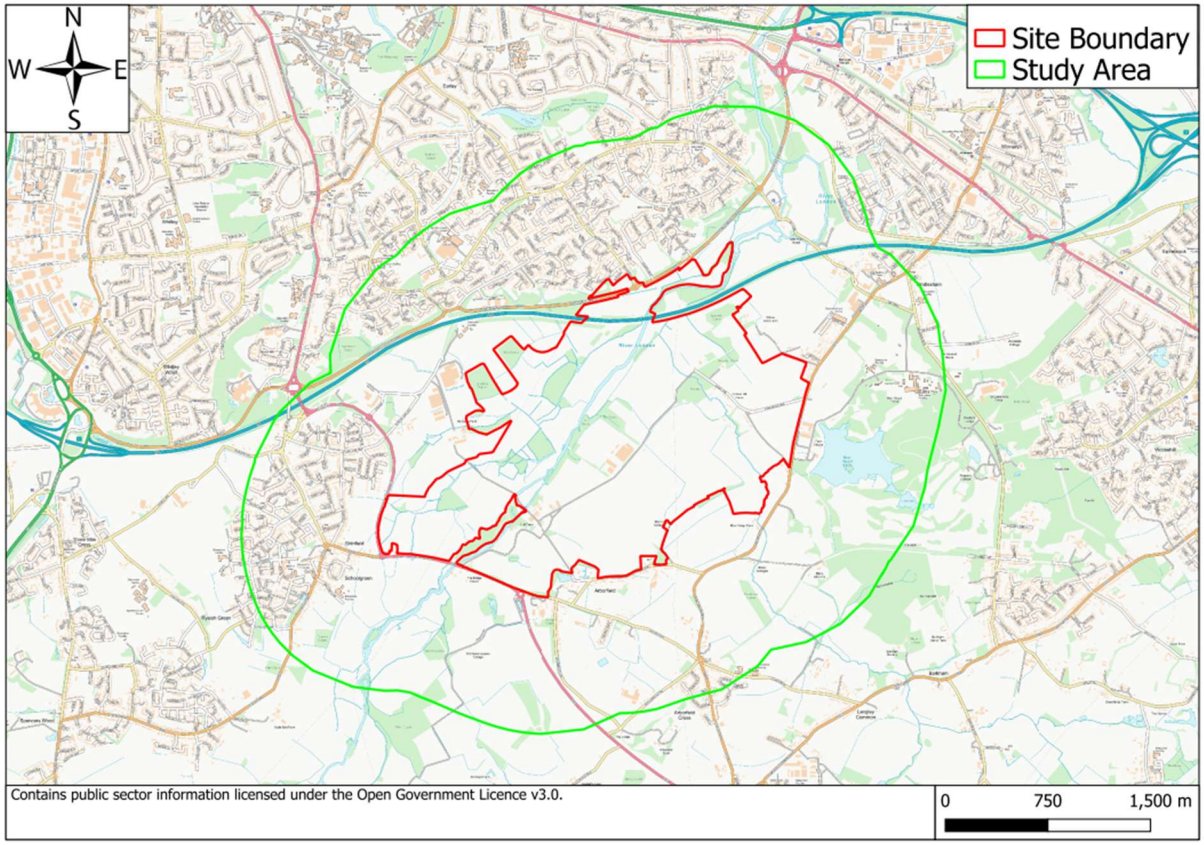
13.2.82 A further cycle of WFD data was released in 2022, however these have not been released for all waterbodies. Therefore, some of the data used in the assessment may not be reflective of the current situation. Once the updated data is released it will further help inform the baseline environment.

Geographical Scope

13.2.83 The extent of the study area for Food Risk, Hydrogeology WFD and Water Resources is 1km from the Loddon Garden Village outline planning application site boundary. This area is considered, in the professional opinion of those carrying out the assessment, to encompass the sensitive receptors which may be impacted by the Proposed Development.

13.2.84 **Figure 13.1** shows the extent of the study area

Figure 13.1 Geographical Scope



13.2.85 Outside this distance, it is unlikely that the proposed development will have an impact on Flood Risk, Hydrogeology, WFD and Water Resources.

Temporal Scope

13.2.86 Typically for a residential development the Flood Risk Assessment will consider the potential changes in risk for a period of 100 years into the future and commercial development would be 60 years into the future.

13.2.87 All aspects of the assessment (flood risk, drainage, hydrogeology, WFD and water resources) will be assessed against the 100-year temporal scope.

Consultation

13.2.88 In addition to the EIA scoping exercise, there has been further consultation on the detailed methodology with both the EA and WBC as the LLFA.

13.2.89 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.

13.2.90 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. The FRA, which forms part of this assessment, has included detailed flood modelling as agreed with the EA and WBC as well as drainage design in line with the WBC's specific requirements,

Assumptions

13.2.91 The EA data which include the Flood Map for Planning, Risk of Flooding from Surface Water, risk of reservoir flooding, historic flood extents, WFD catchments and Main Rivers is assumed to be current and representative of the hydrology and flood risk baseline for the Site.

13.3 Baseline conditions

Current Baseline

13.3.1 The current baseline condition has been assessed for the four key areas and the sensitive receptors within the area of interest are listed below:

- The River Loddon, minor tributaries and floodplain
- Barkham Brook, tributaries and floodplain
- Arborfield Cut and floodplain
- Ordinary Watercourses and tributaries
- Bearwood Lake
- Loddon Clay Formation Bedrock Geology
- Occupiers of existing dwellings and commercial premises within the Site or close proximity to the Site
- Users of Local Roads and transport
- Surface water and groundwater regimes

Watercourses

13.3.2 **Figures 13.2 – 13.6** show the Main River and Ordinary Watercourse receptors within the study area.

Figure 13.2 River Loddon, Tributaries and Watercourses East of the Loddon

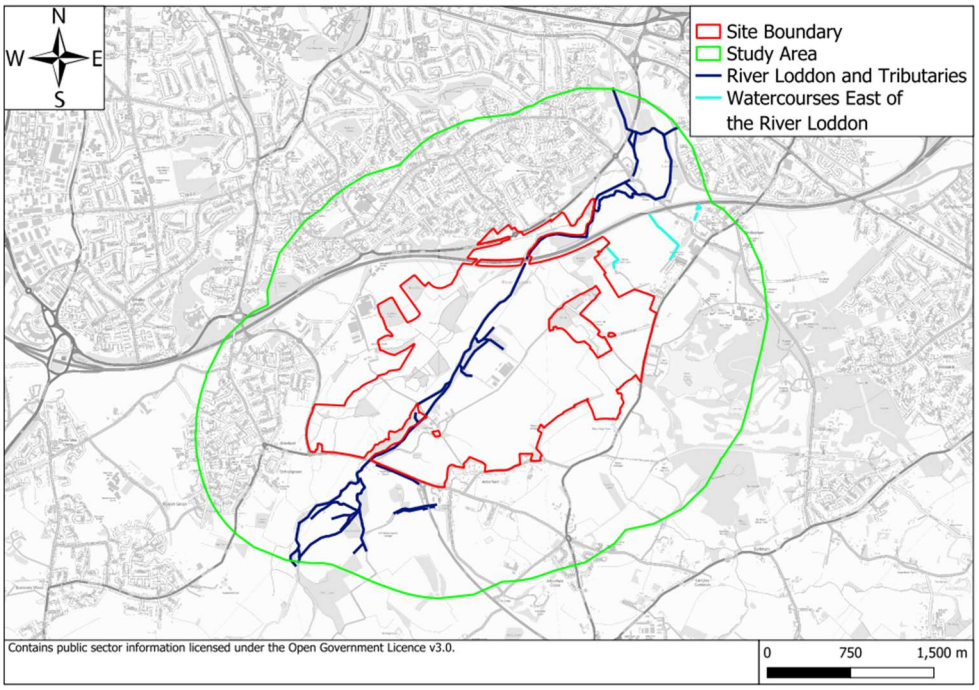


Figure 13.3 Barkham Brook and Tributaries

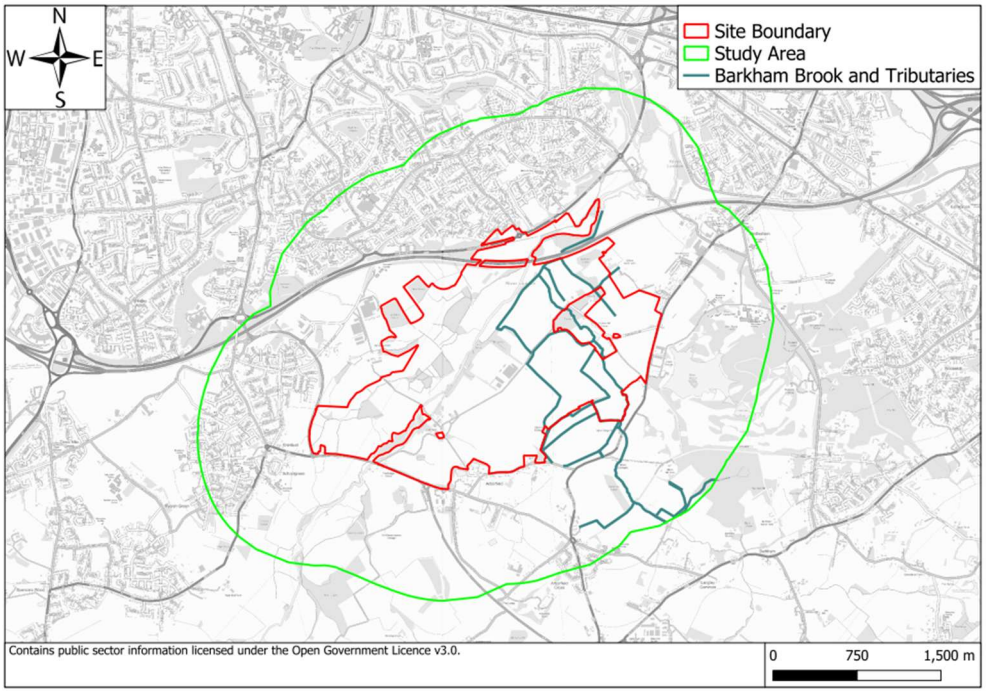


Figure 13.4 Arborfield Cut

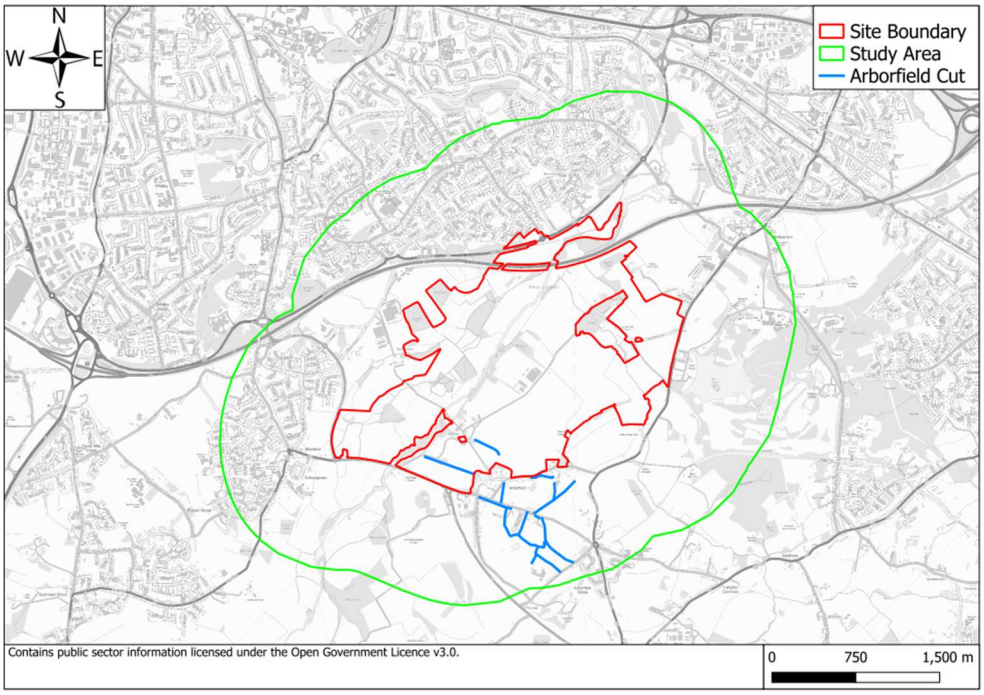


Figure 13.5 Western Watercourses and School Green

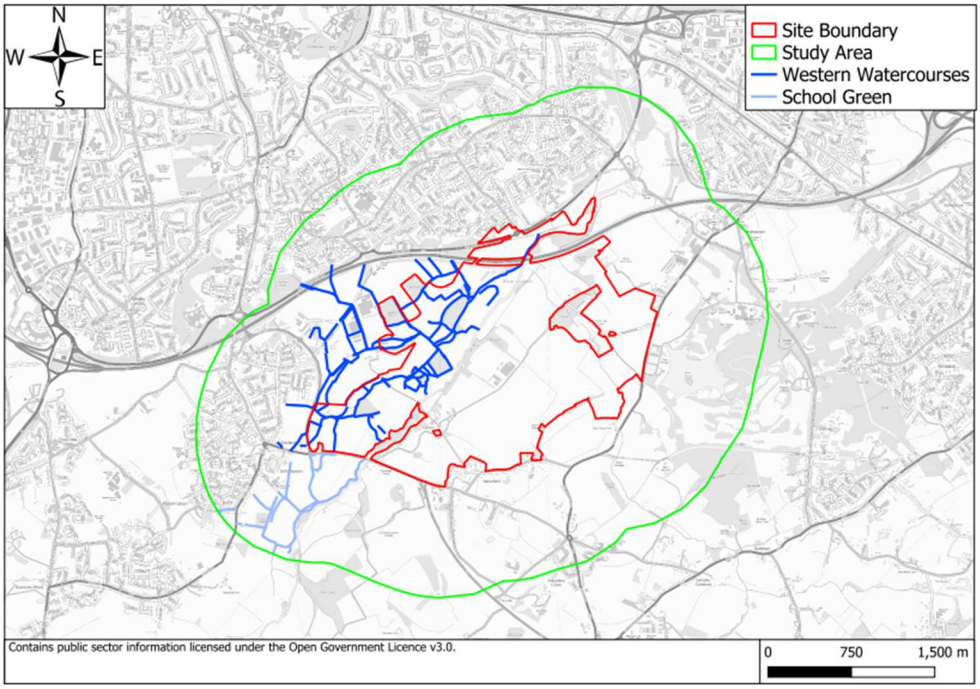
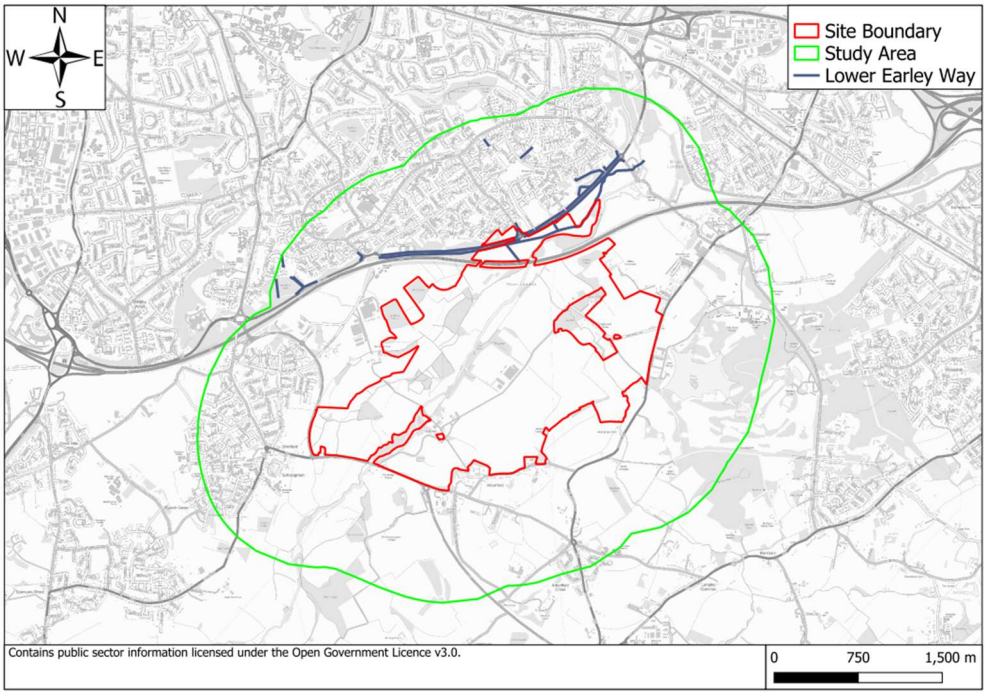
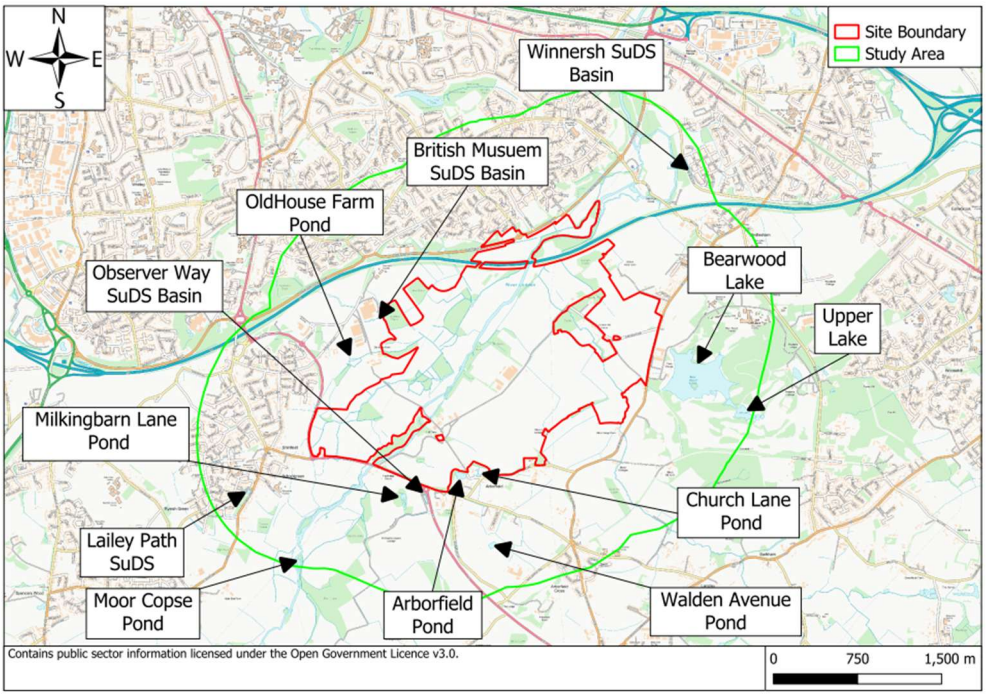


Figure 13.6 Lower Earley Way



13.3.3 **Figure 13.7** shows surface water feature receptors within the Study Area

Figure 13.7 Surface Water Features



13.3.4 Figures **13.2 – 13.4** shows the River Loddon, Barkham Brook and Arborfield Cut, which are all designated an Environment Agency (EA) Main River. The River Loddon flows in a northerly direction between the eastern and western boundaries of the study area. Barkham Brook and Arborfield Cut are both on the eastern side of the study area. Barkham brook flows in a northerly direction into the River Loddon and Arborfield Cut flows in a westerly direction towards the River Loddon.

13.3.5 **Figures 13.2-13.6** shows a number of Ordinary Watercourses within the Site. The Ordinary Watercourses are a mix of natural channels and manmade drainage ditches.

13.3.6 The natural channels flow in a westerly and easterly direction towards the River Loddon and the manmade channels follow field boundaries

13.3.7 **Figure 13.7** shows the ponds and SuDS basins are located within the study area.

Site Topography

13.3.8 Figures 13.8- 13.16.(View A-I) show the topography of the Site and study area.

Figure 13.8 View A – Study Area

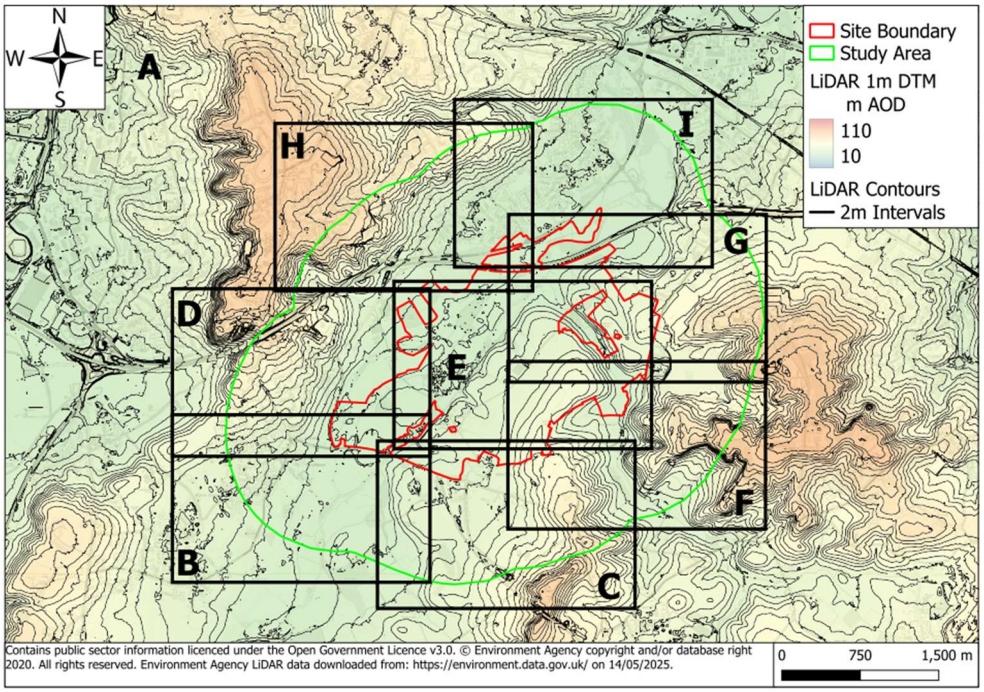


Figure 13.9 View B – School Green

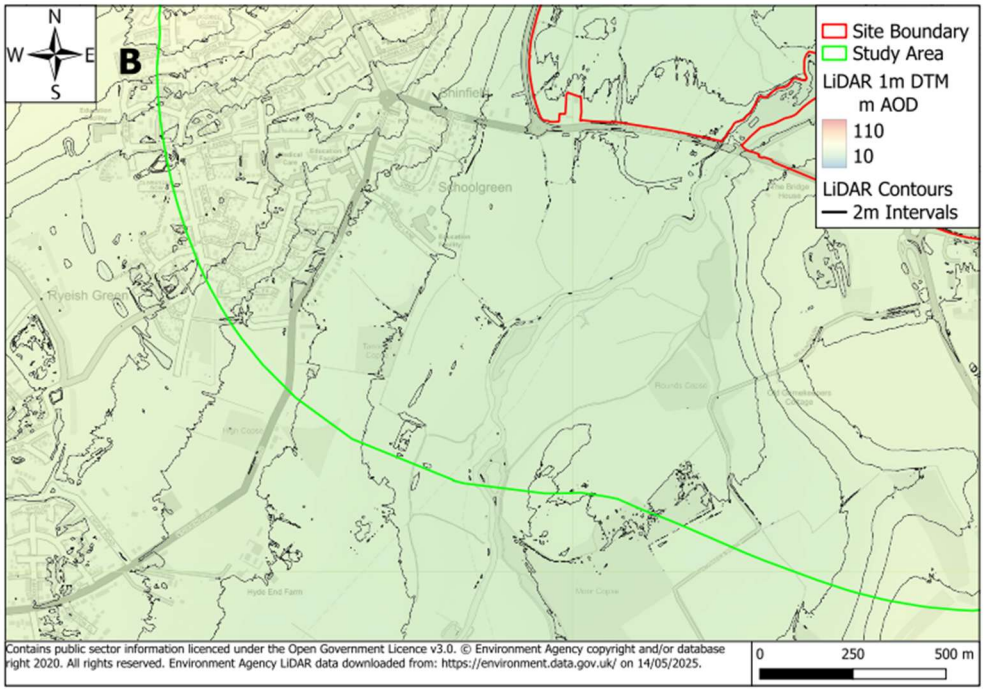


Figure 13.10 View C- Arborfield

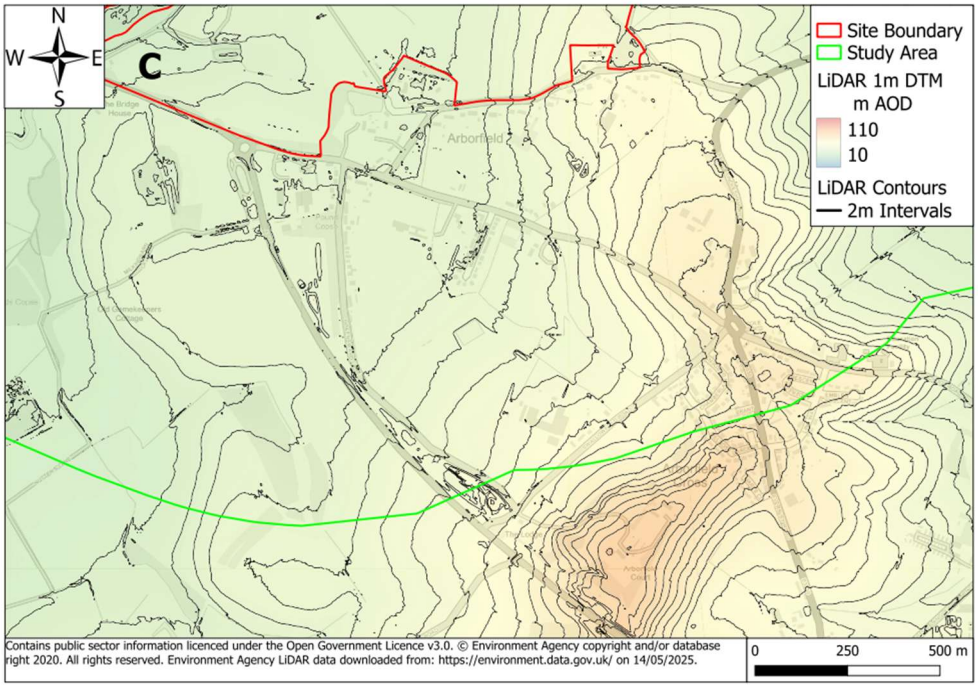


Figure 13.11 View D – Western Watercourses

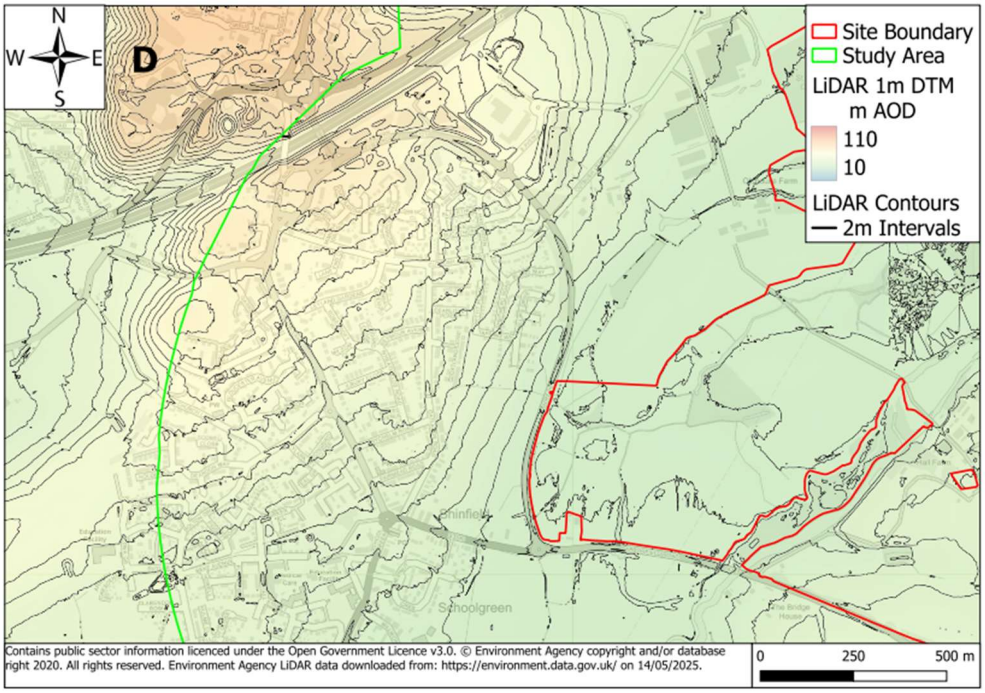


Figure 13.12 View E- Hall Farm

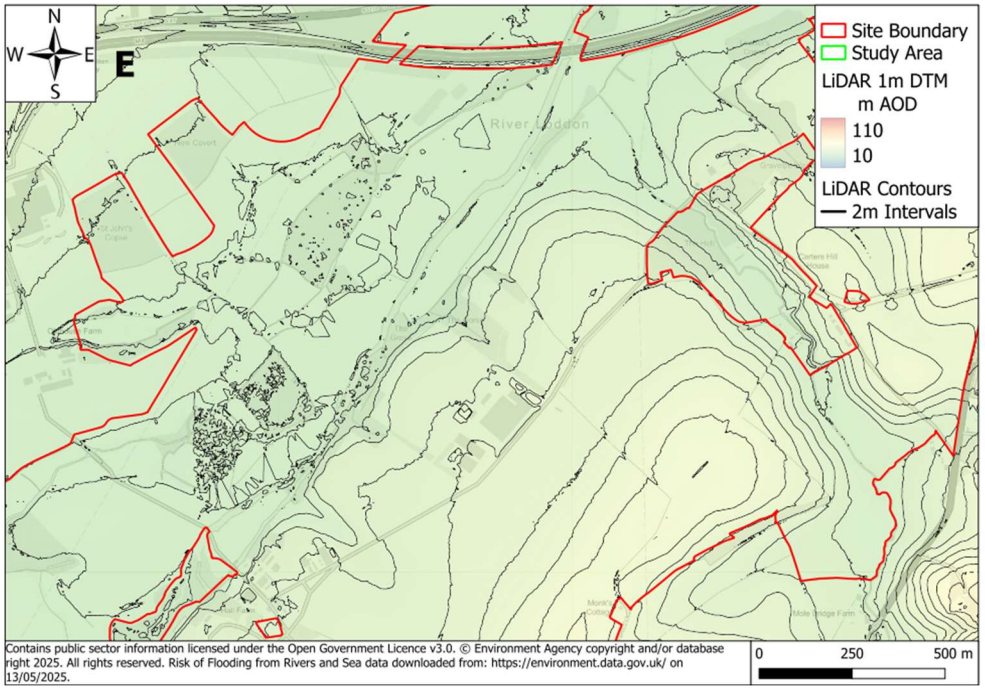


Figure 13.13 View F – Barkham Brook South

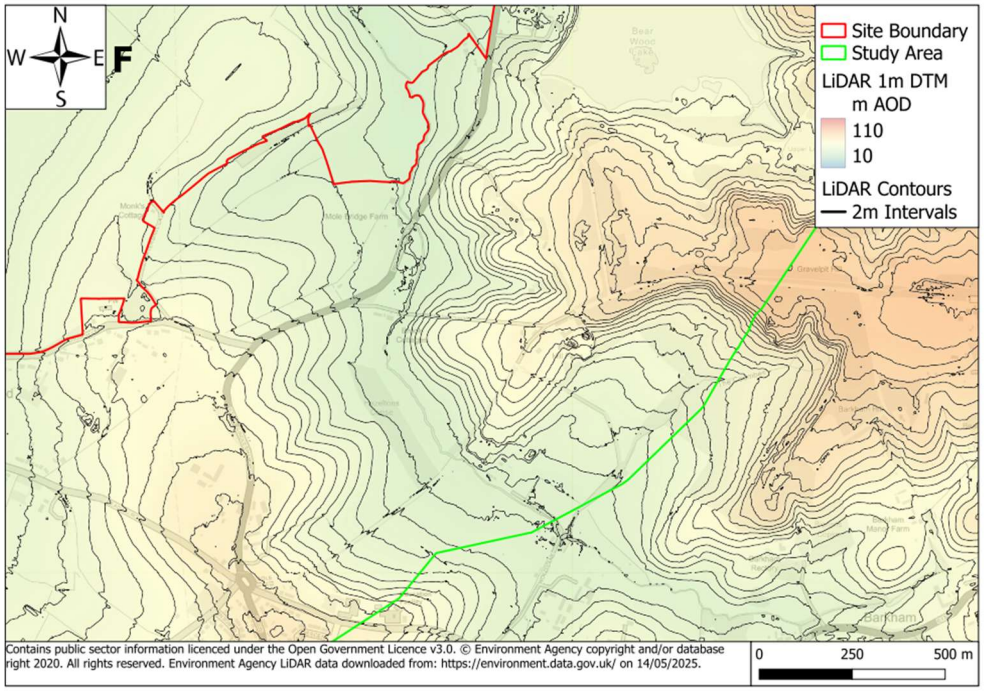


Figure 13.14 View G – Barkham Brook North

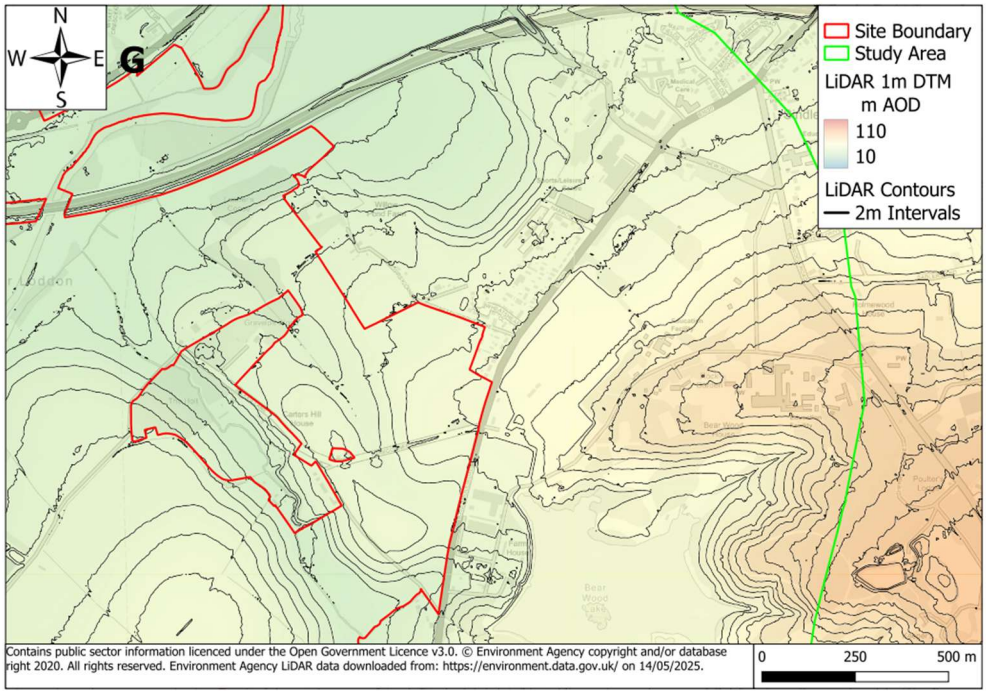


Figure 13.15 View H – Lower Earley Way West

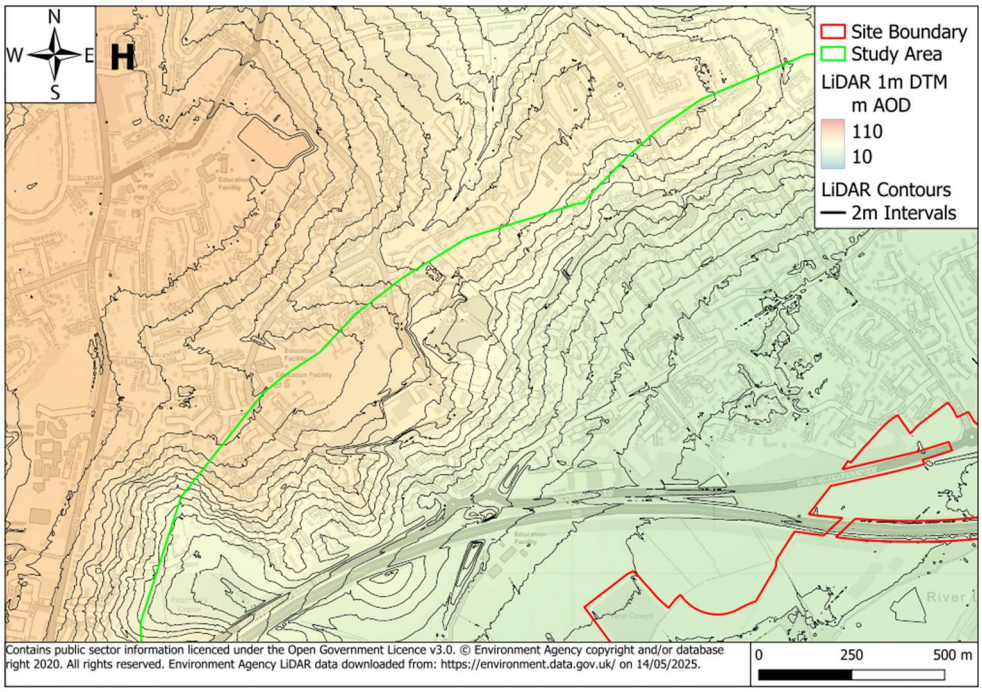
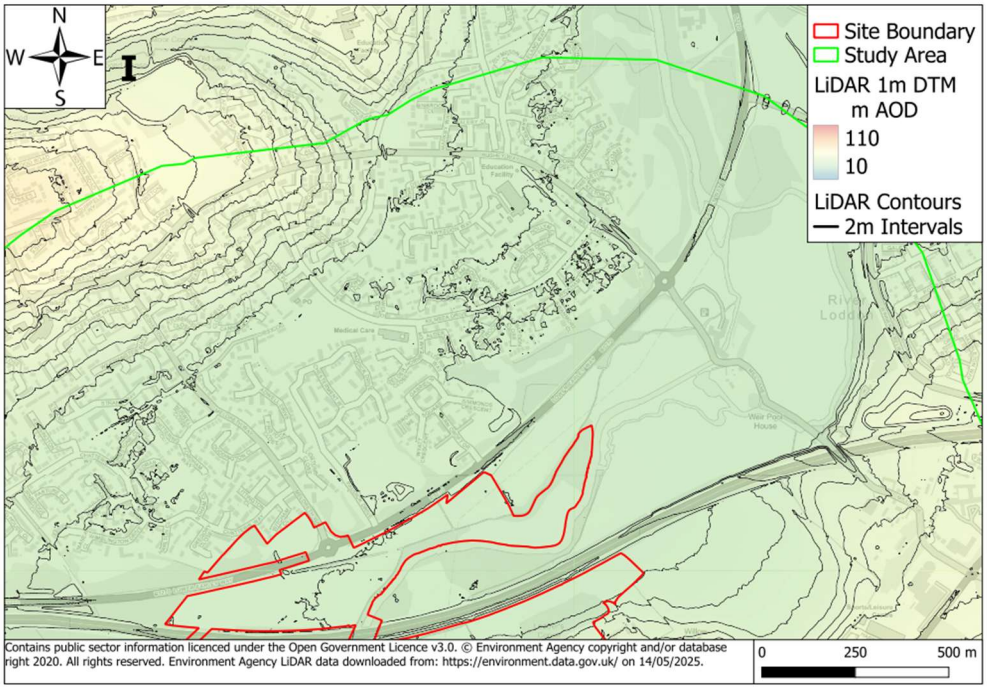


Figure 13.16 View I – Lower Earley Way East



13.3.9 **View A** shows two topographical catchments within the study area, with the River Loddon forming the topographical low point. On the western side, the land slopes downward from the northwestern part of the Site toward the River Loddon. Similarly, on the eastern side, the land descends from the southeastern area towards the River Loddon.

13.3.10 Ground levels across the Site are between 78m AOD and 39m AOD. The highest part of the study area is within the southeastern part of the Site with an elevation of 78m AOD, which is shown in **View F**. The lowest part of the Site is the central part of the River Loddon with an elevation of 39m AOD and shown in **View E**.

Baseline Flood Risk and Drainage

Fluvial Flood Risk

13.3.11 There are various sources of data for fluvial flood risk within the River Loddon catchment and corridor.

13.3.12 The first source of fluvial flooding data is the EA Flood Map for Planning which 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.

13.3.13 **Figures 13.17-13.25** show the EA Flood Zone mapping.

Figure 13.17 View A

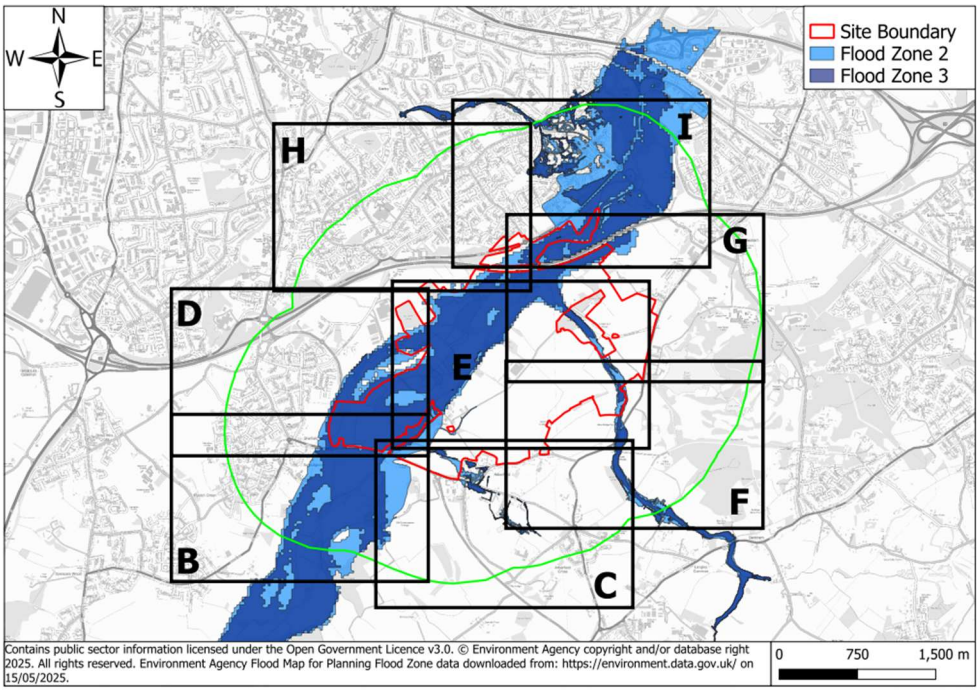


Figure 13.18 View B – School Green

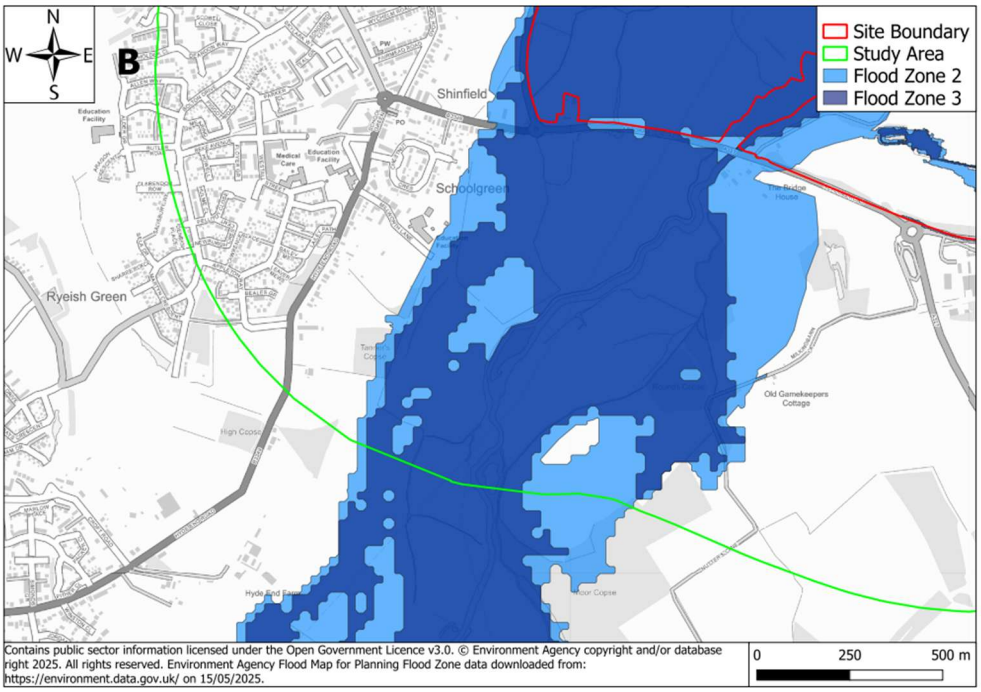


Figure 13.19 View C – Arborfield

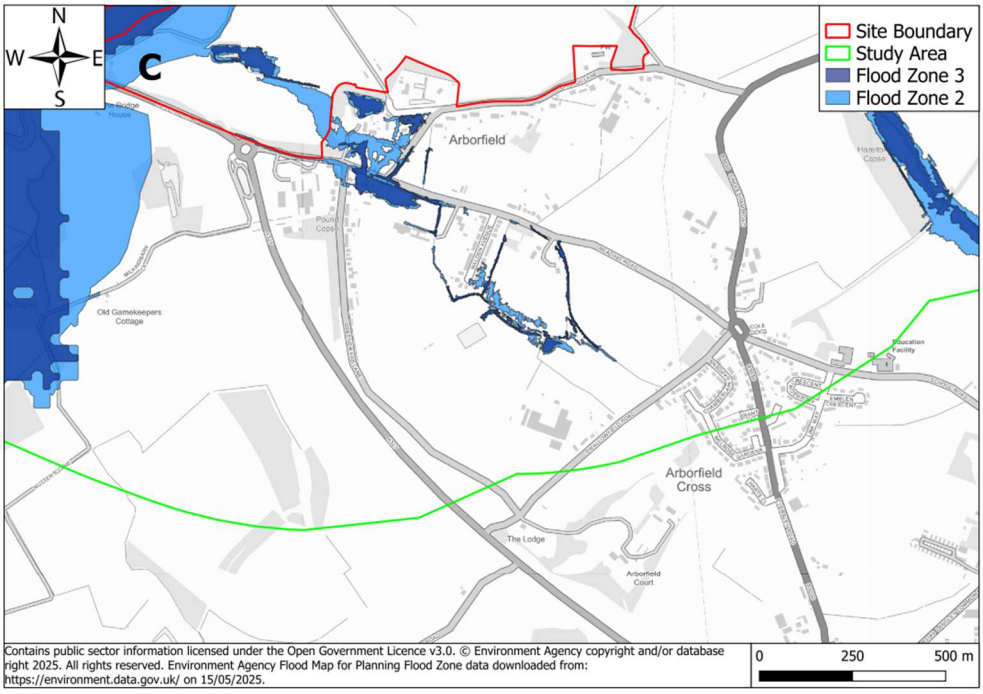


Figure 13.20 View D – Western Watercourses

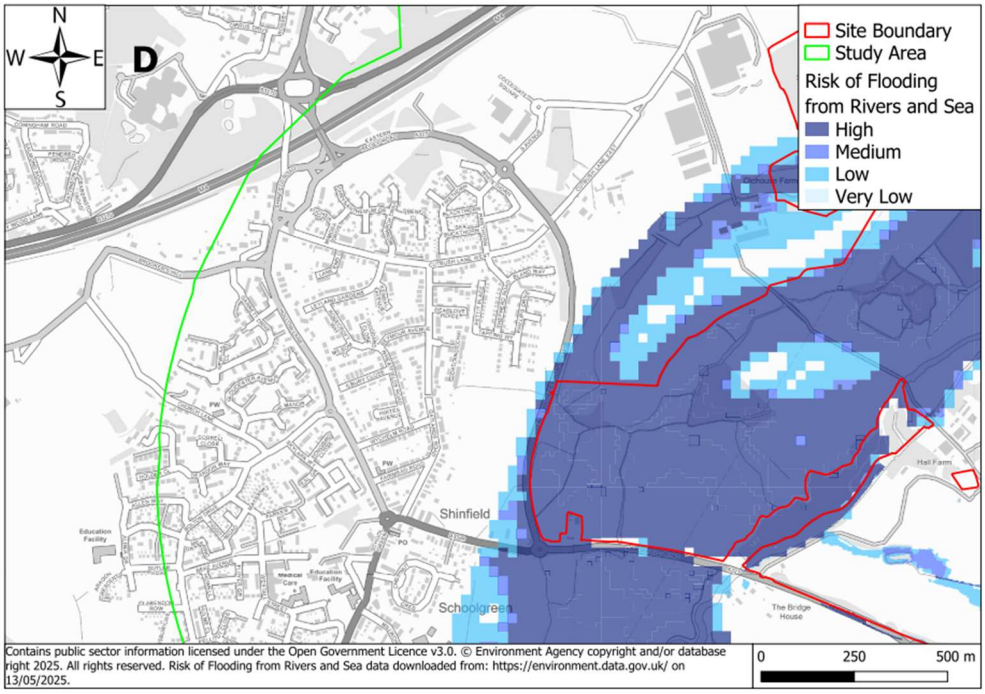


Figure 13.21 View E – Hall Farm

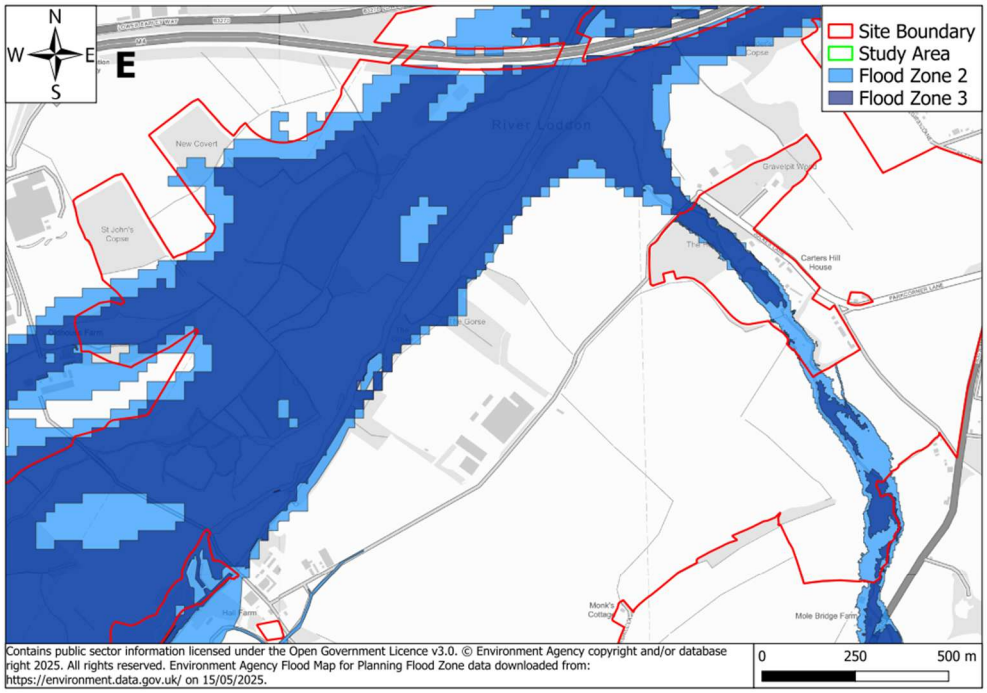


Figure 13.22 View F – Barkham Brook South

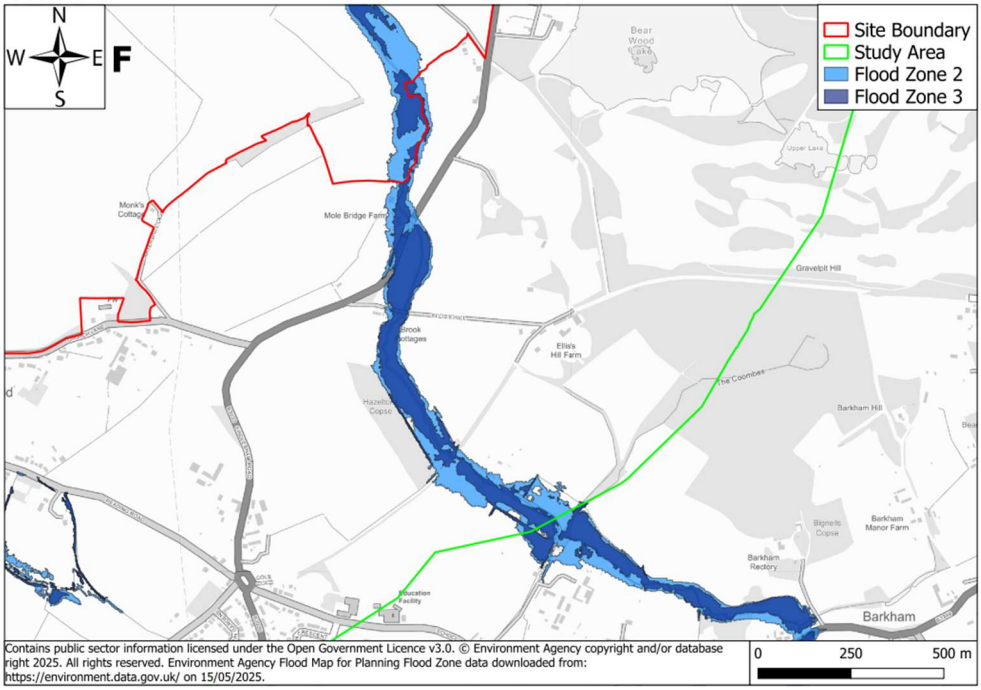


Figure 13.23 View G – Barkham Brook North

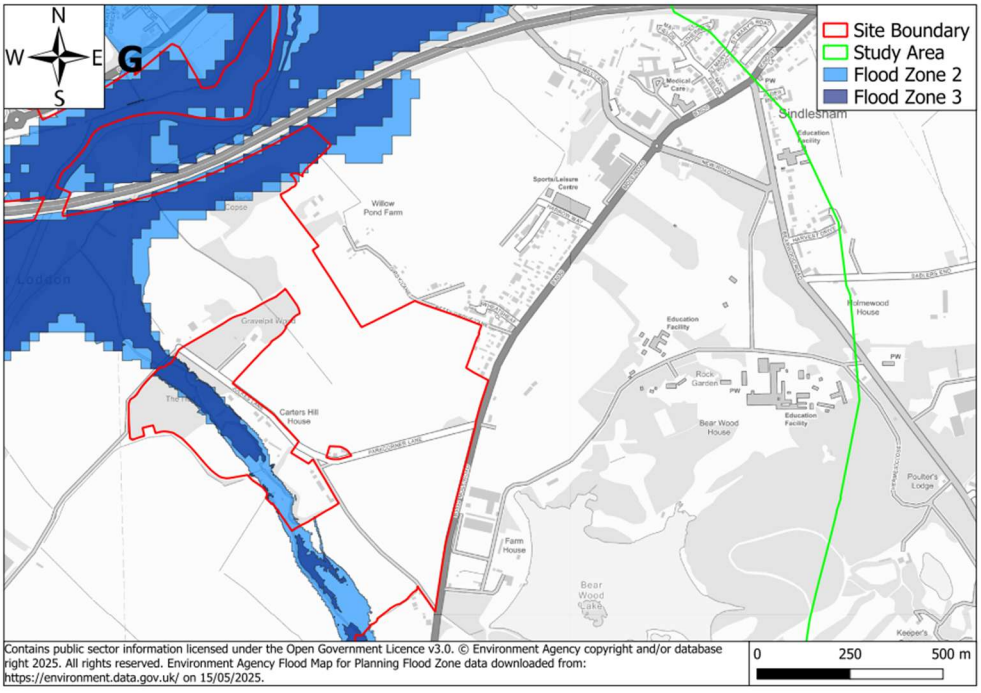


Figure 13.24 View H – Lower Earley Way West

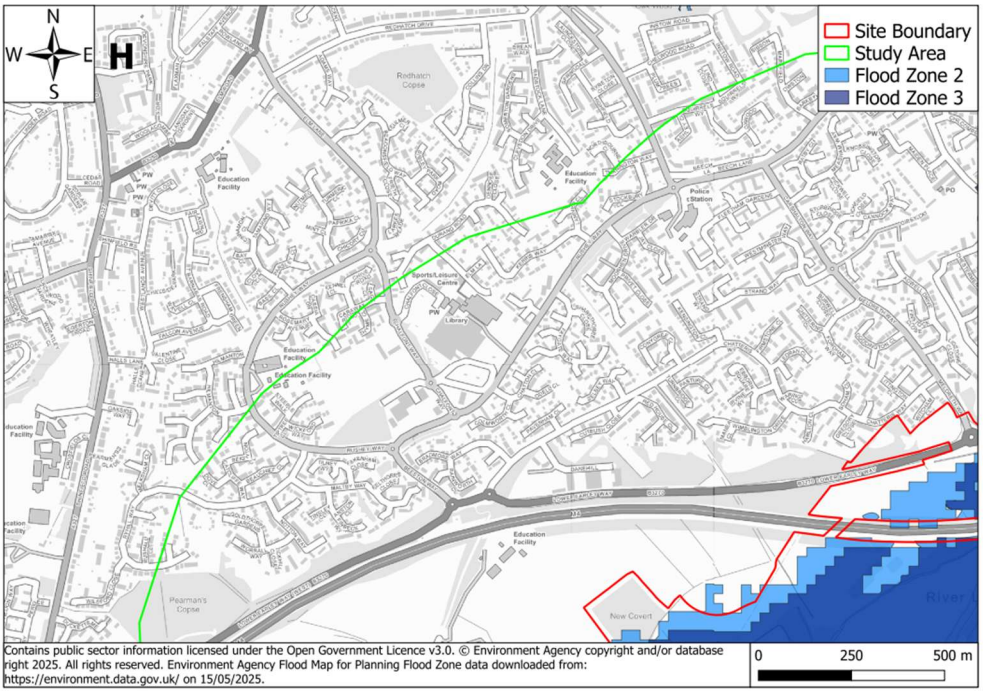
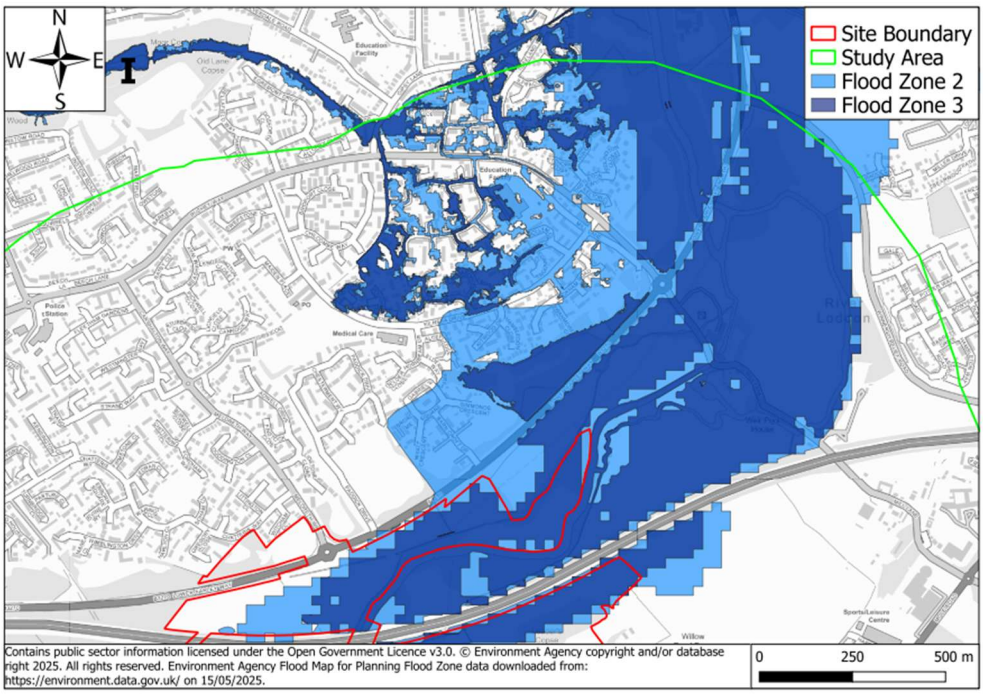


Figure 13.25 View I – Lower Earley Way East



13.3.14 **View A** shows that the majority of the Site lies within Flood Zone 1. There are areas of Flood Zone 2 and 3 and these predominantly lie along the River Loddon itself and in the area to the west of the River Loddon (**View B, View D, View E, View I and View G**). There are also areas of Flood Zone 2 and 3 within the corridors of the Barkham Brook and Arborfield Cut (**View C and View F**). The area for built development has been located outside of the areas of Flood Zones 2 and 3.

13.3.15 The EA's Risk of Flooding from Rivers and Sea mapping, updated in January 2025 shows areas at risk of flooding from rivers and sea taking into account the presence and condition of flood defences. The EA Rivers and Sea flood map is based on the following:

- High Risk: 1 in 30 or more (3.3% or greater) annual probability
- Medium Risk: 1 in 100 to 1 in 30 (1% to 3.3%) annual probability
- Low Risk: 1 in 1,000 to 1 in 100 (0.1% to 1%) annual probability
- Very Low Risk: Less than 1 in 1,000 (0.1%) annual probability

13.3.16 The majority of the study area is not at risk of flooding from rivers and sea.

Figure 13.26 View A – Study Area

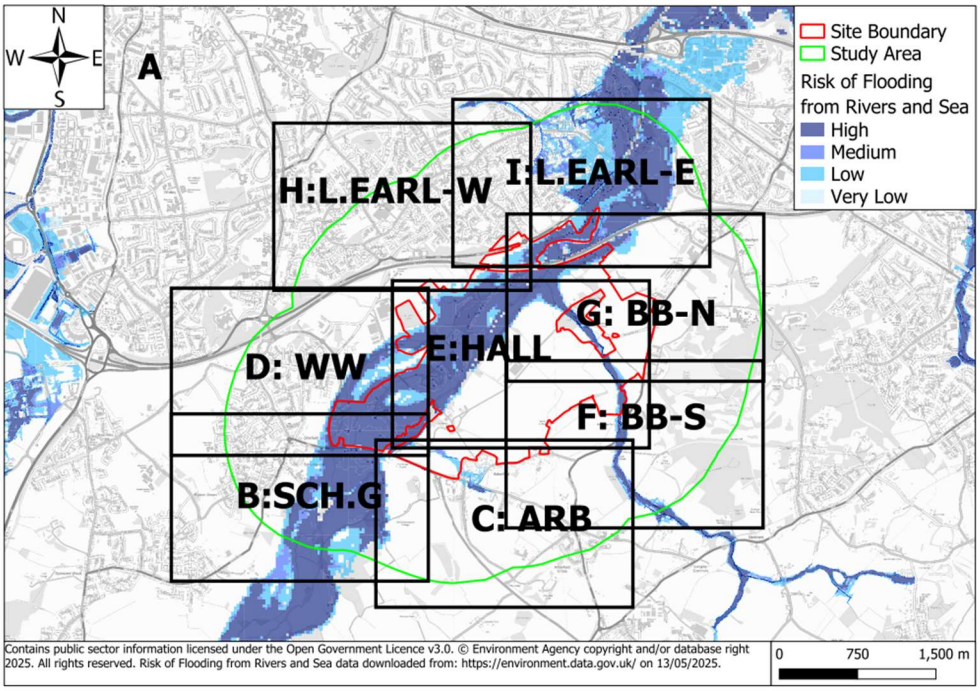


Figure 13.27 View B - School Green

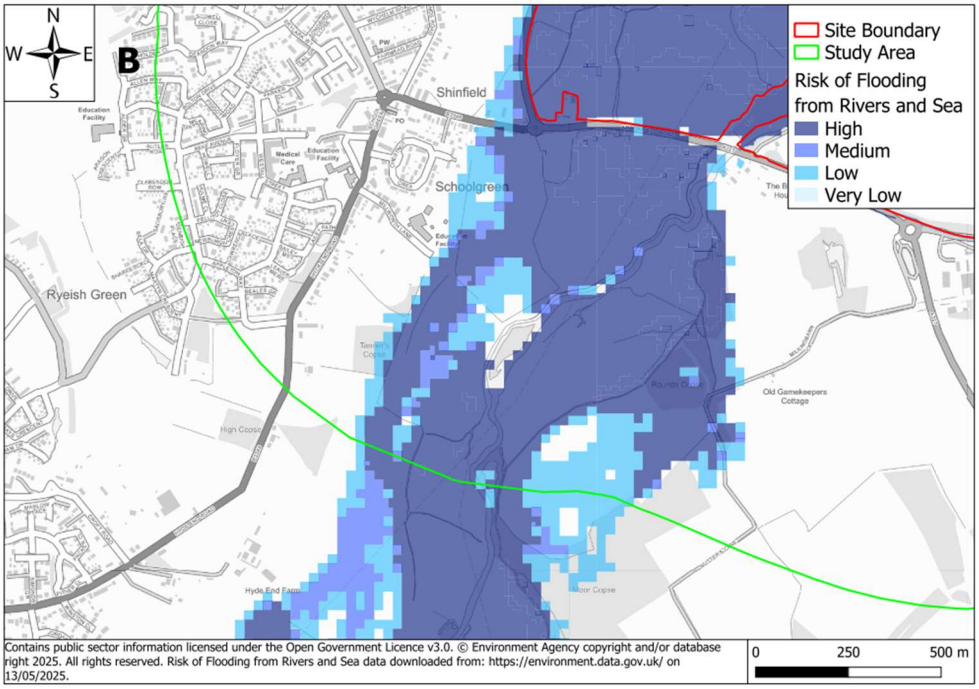


Figure 13.28 View C – Arborfield

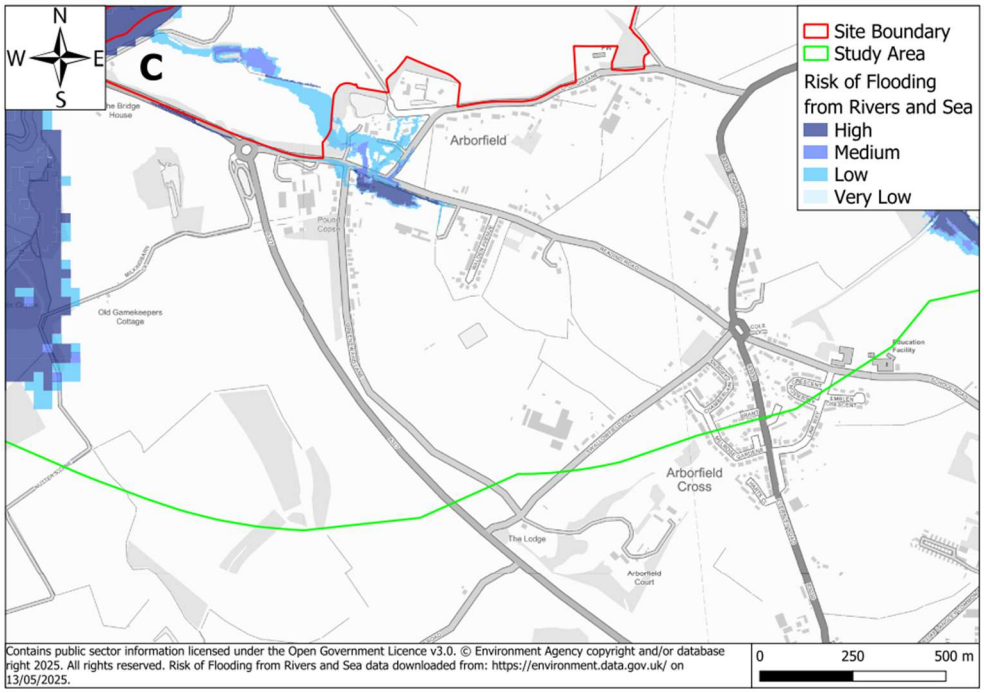


Figure 13.29 View D – Western Watercourses

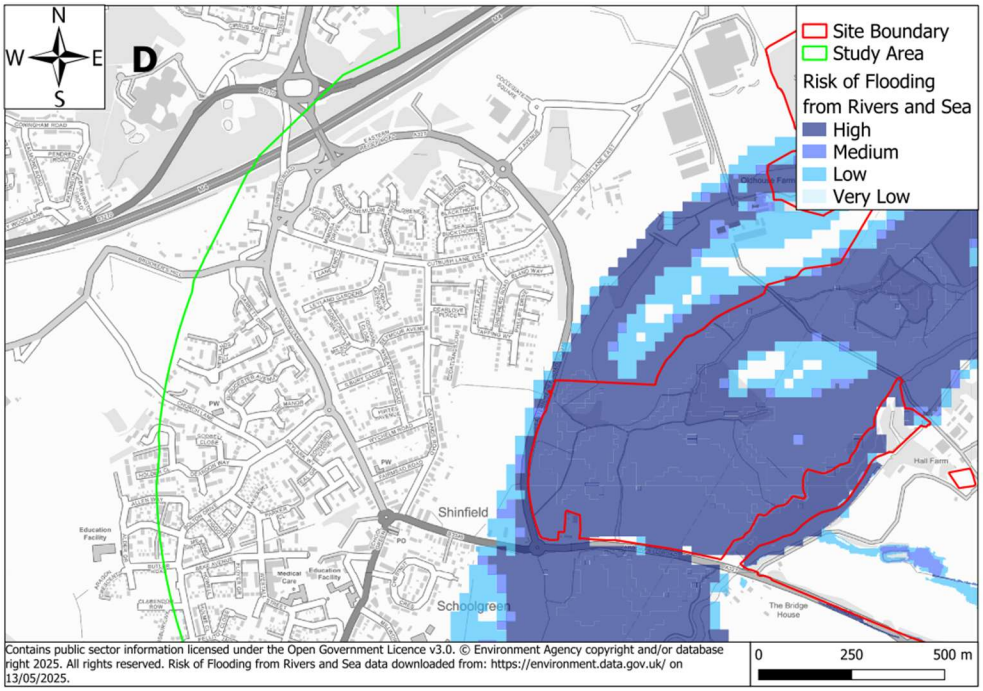


Figure 13.30 View E – Hall Farm

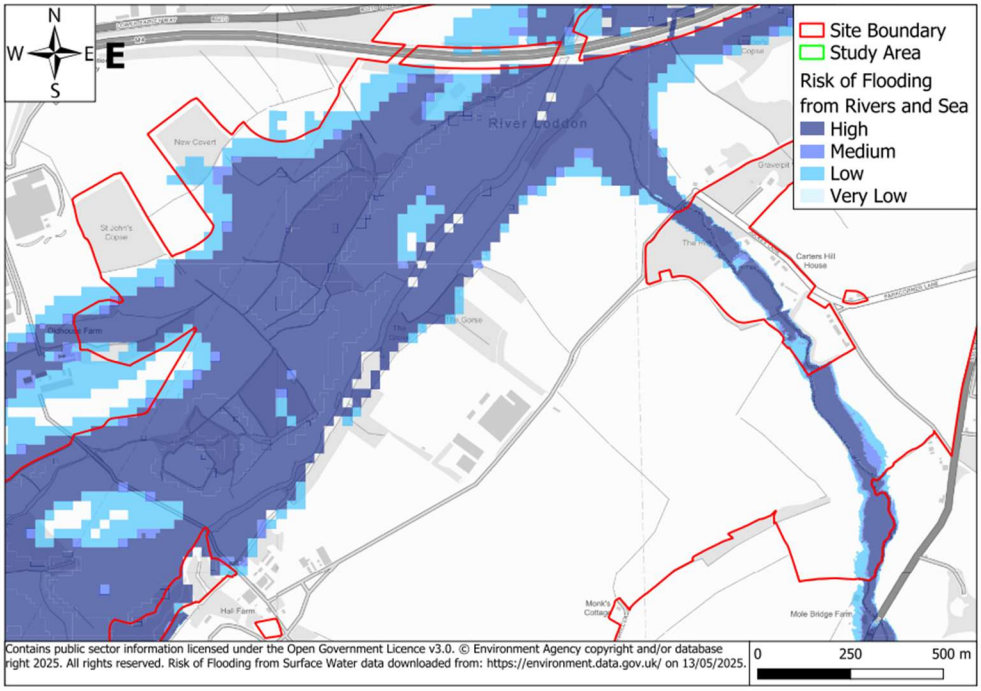


Figure 13.31 View F – Barkham Brook South

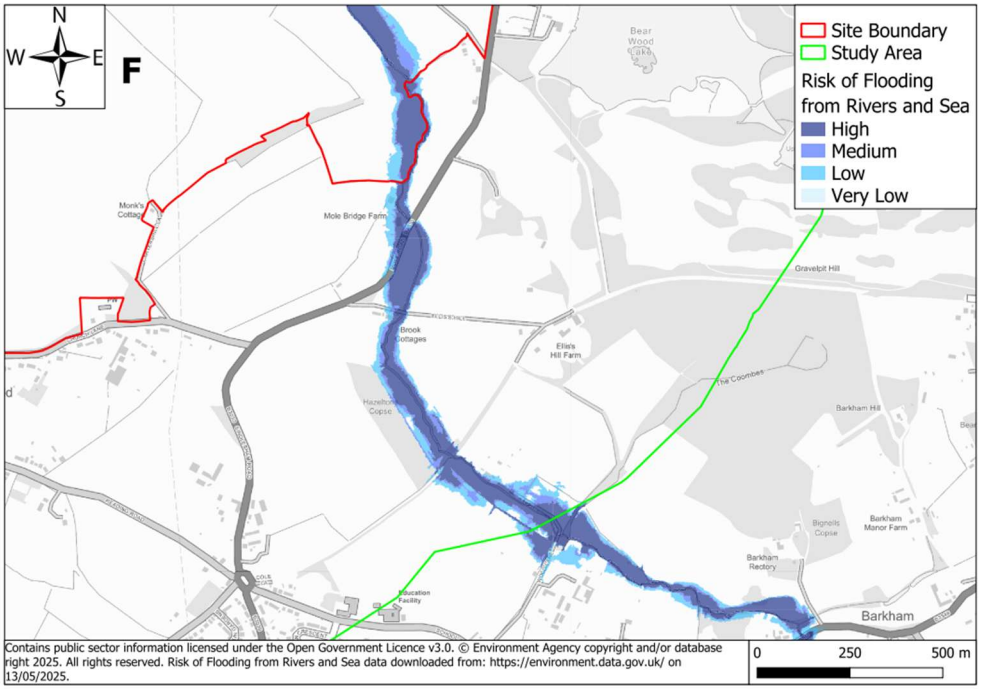


Figure 13.32 View G - Barkham Brook North

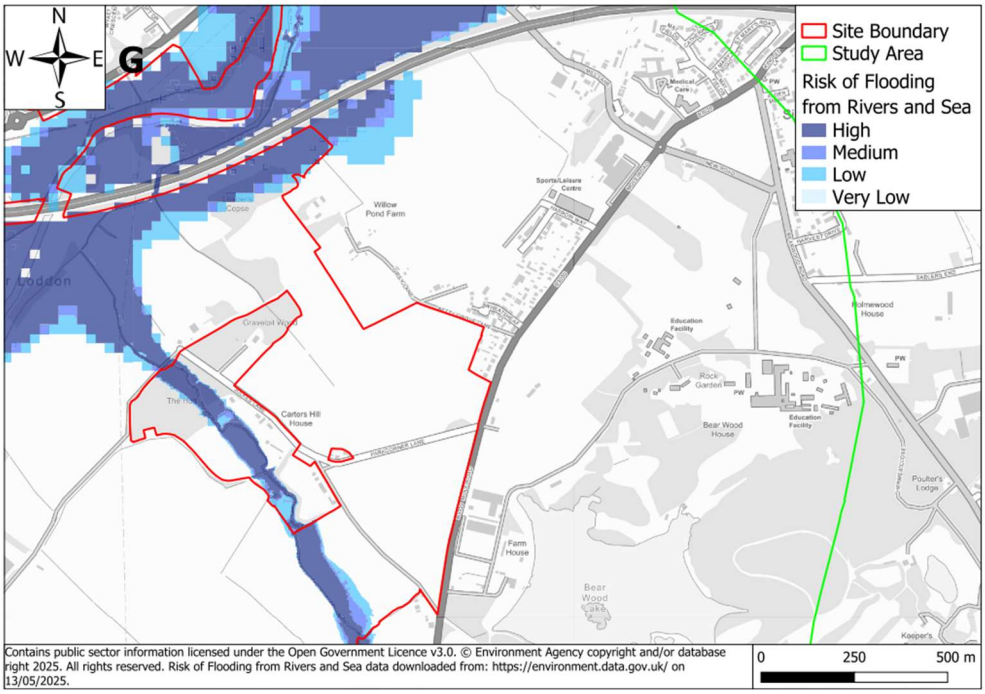


Figure 13.33 View H – Lower Earley Way West

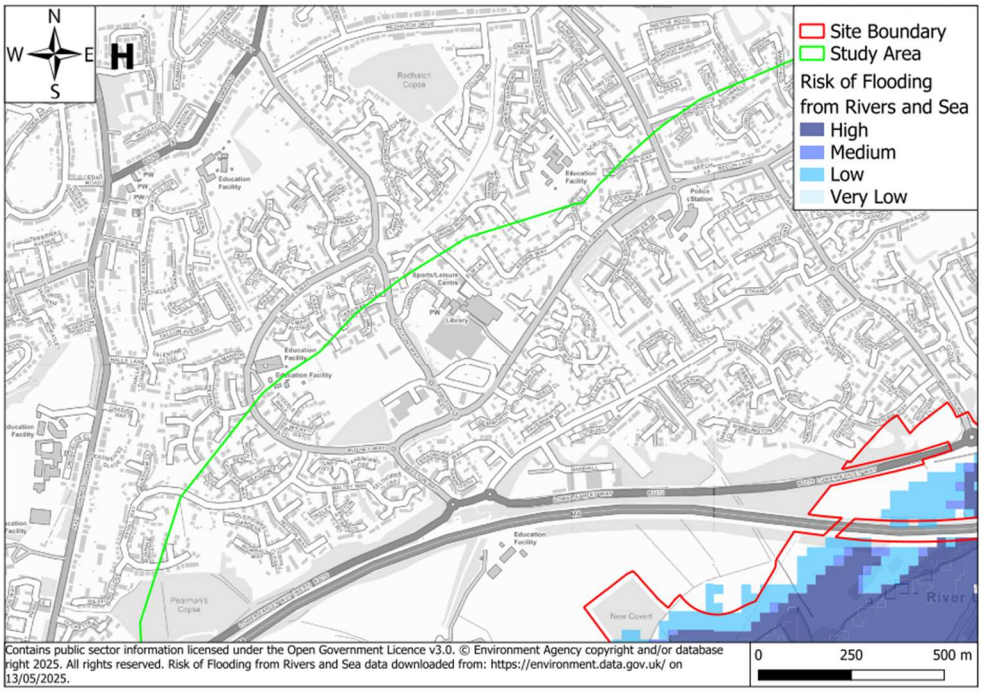
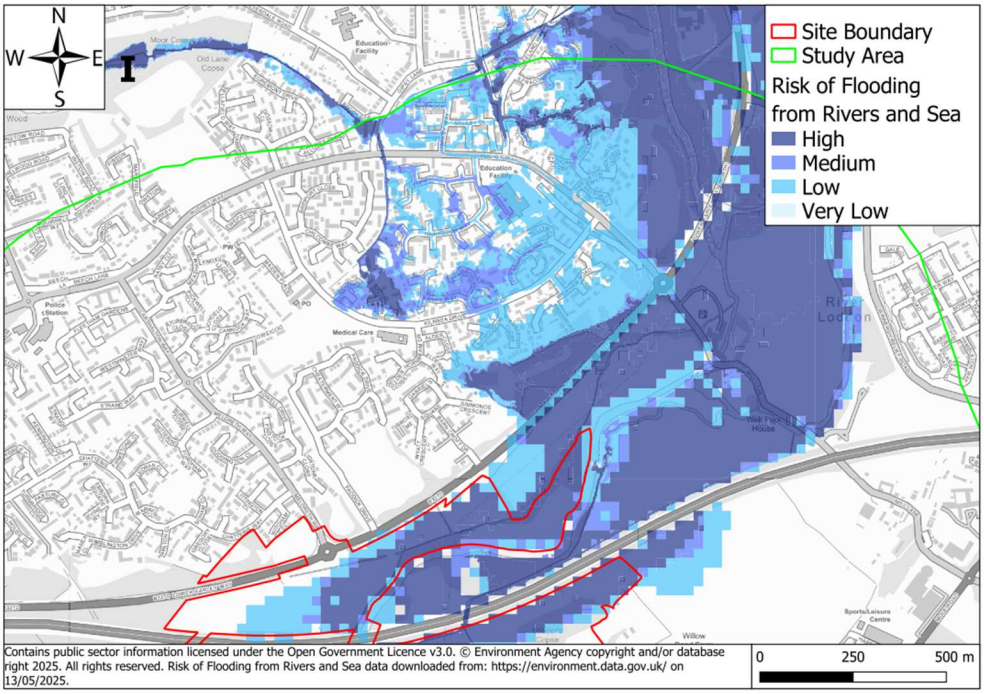


Figure 13.34 View I – Lower Earley Way East



13.3.17 **View A** shows that the majority of the Site is not at risk of flooding from Rivers and Sea. However, the flooding from rivers and sea floods the western side of the Site with a High, Medium and Low risk. The extent of flooding covers School Green (**View B**), Western watercourses (**View D**), and Lower Earley Way east (**View I**).

13.3.18 Additionally, flooding from Rivers and Sea also extends to the eastern side of the River Loddon along Arborfield Cut (**View C**) and Barkham Brook (**View F and G**).

13.3.19 As well as the EA mapping, detailed modelling of the River Loddon has been completed by WBC with further detailed modelling of the Loddon tributaries including Barkham Brook and the Arborfield Cut completed as part of the FRA.

13.3.20 The WBC 2021 SFRA Loddon modelling is deemed the most representative model for the River Loddon at this location. The results of this modelling are presented in the FRA.

13.3.21 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.

13.3.22 Model results are presented in the model reports in the FRA and the differences with the EA mapping are summarised below.

13.3.23 Western Watercourses: 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.

13.3.24 Barkham Brook: 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.

13.3.25 Arborfield Cut: 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.

Surface Water Flood Risk

13.3.26 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'.

13.3.27 **Figures 13.35-13.43** show the risk of flooding from Surface Water

Figure 13.35 View A – Study Area

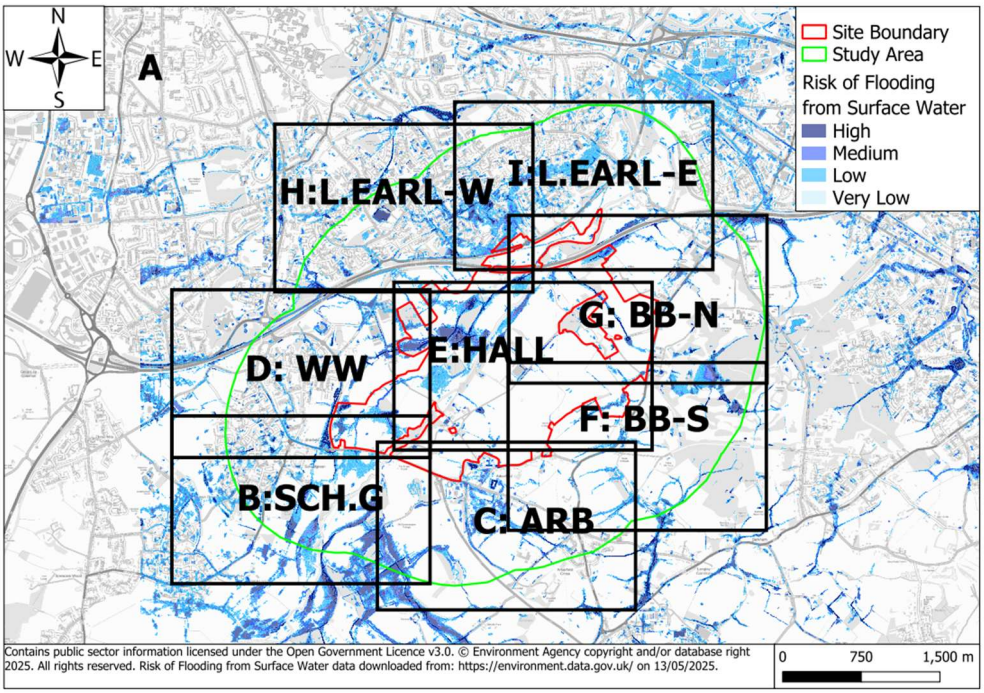


Figure 13.36 View B – School Green

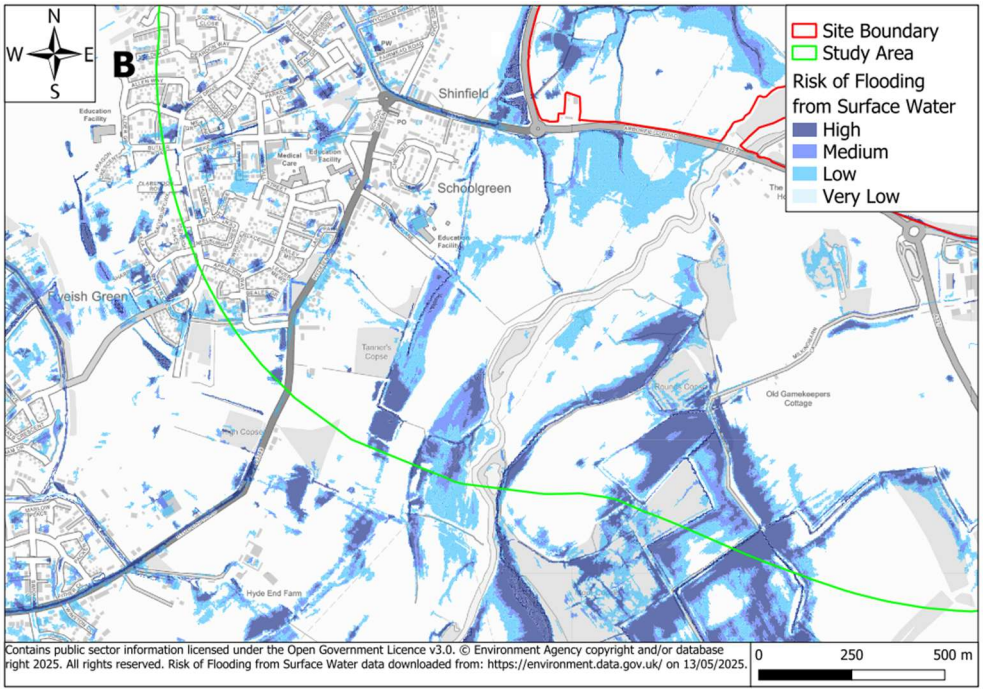


Figure 13.37 View C – Arborfield

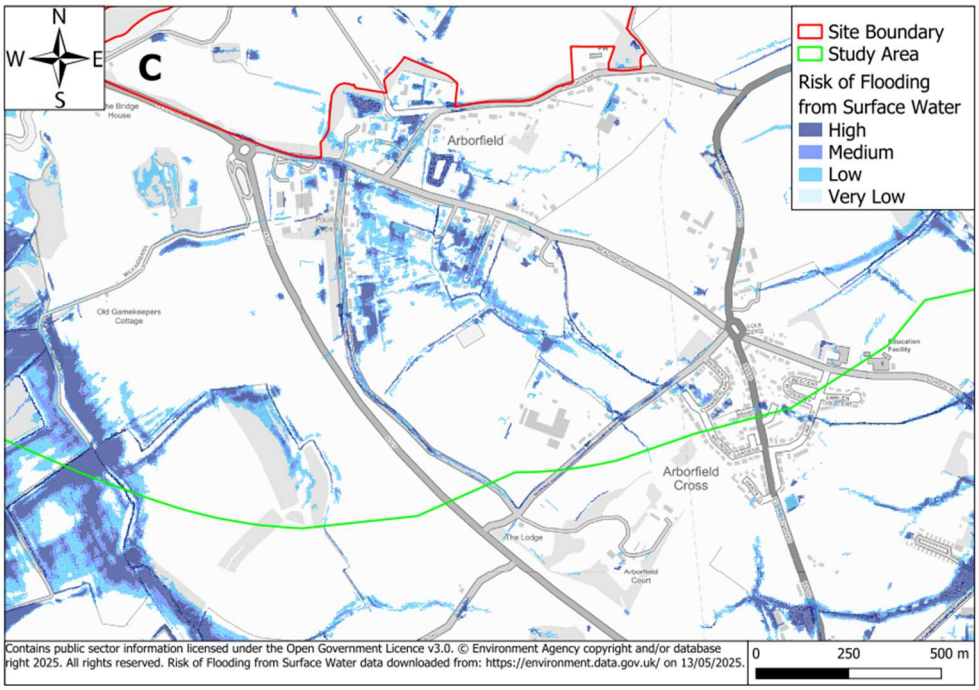


Figure 13.38 View D – Western Watercourses

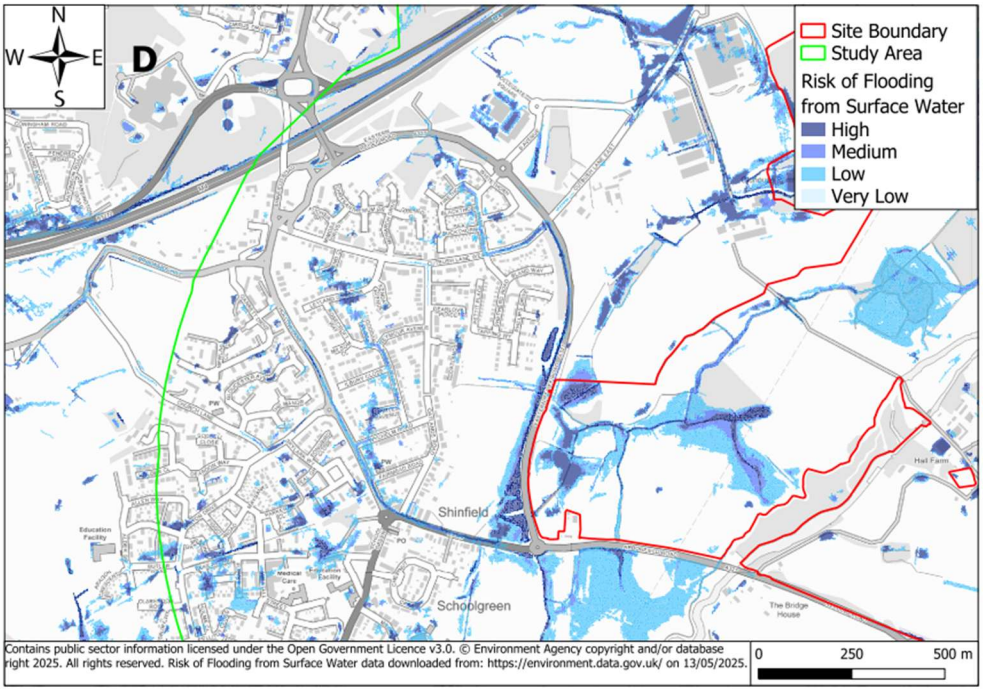


Figure 13.39 View E – Hall Farm

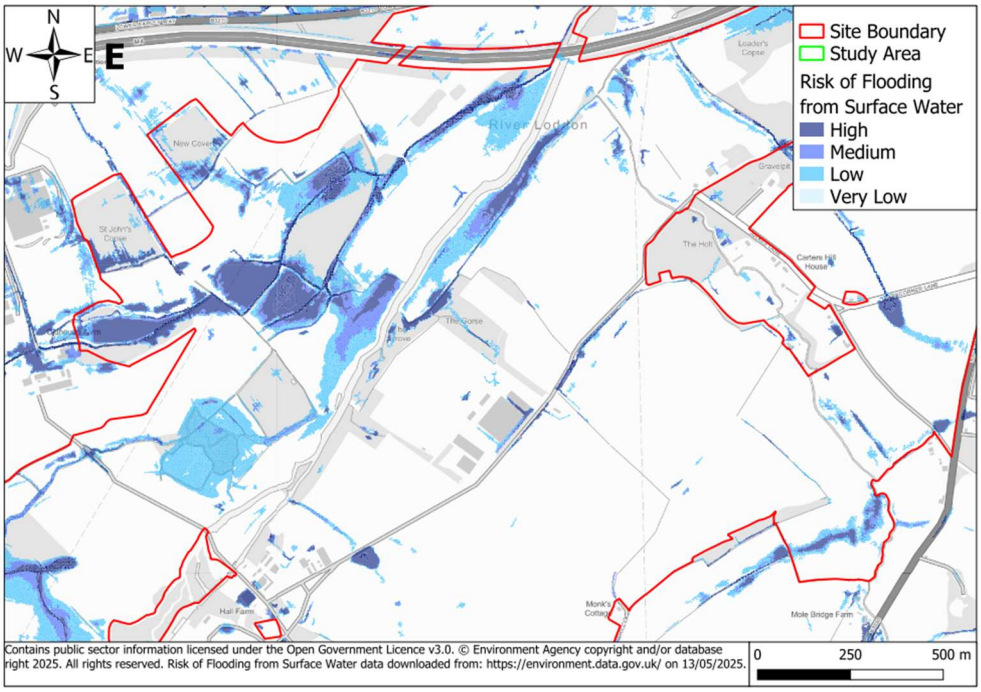


Figure 13.40 View F – Barkham Brook South

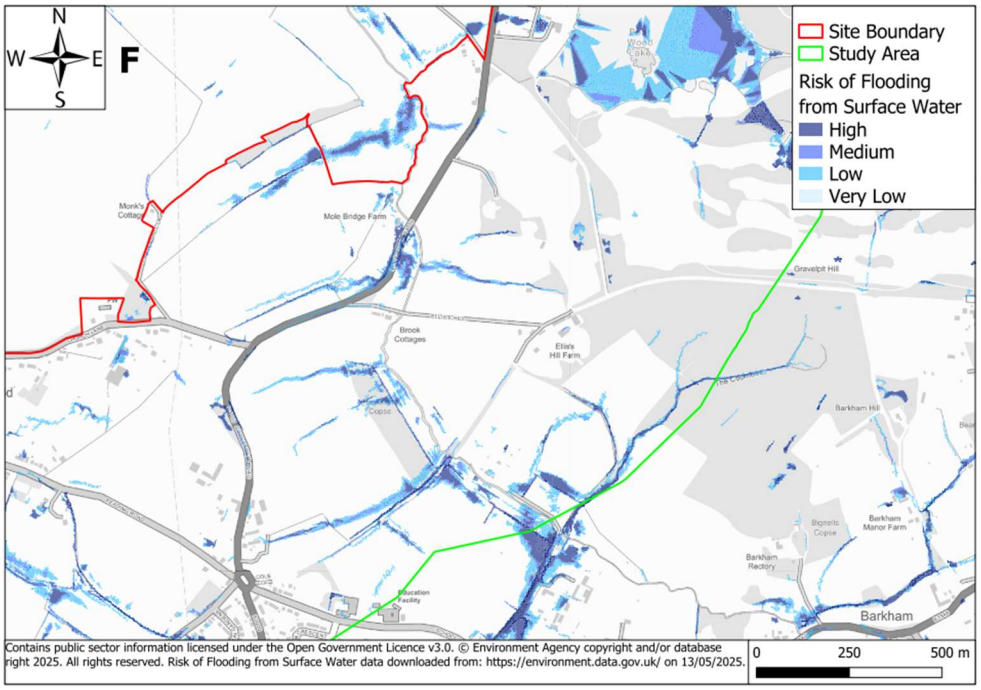


Figure 13.41 View G – Barkham Brook North

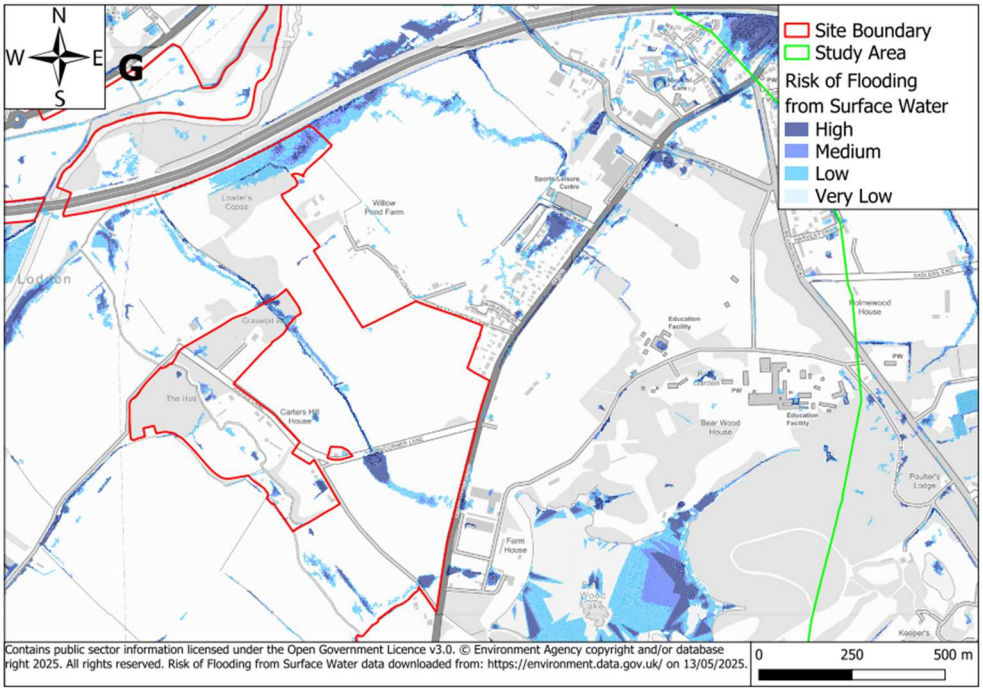


Figure 13.42 View H – Lower Earley Way West

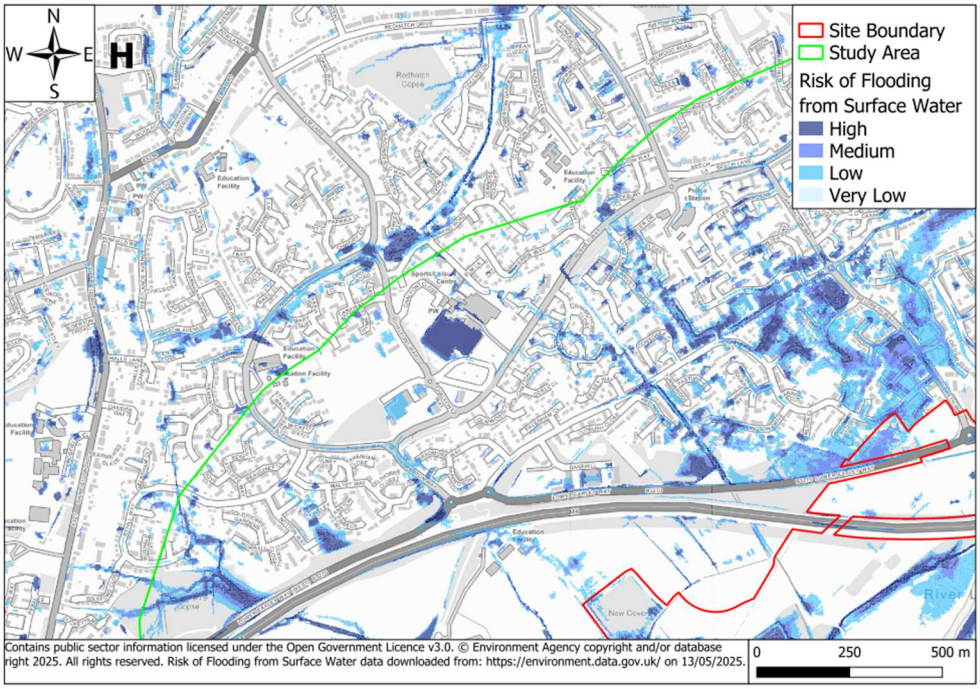
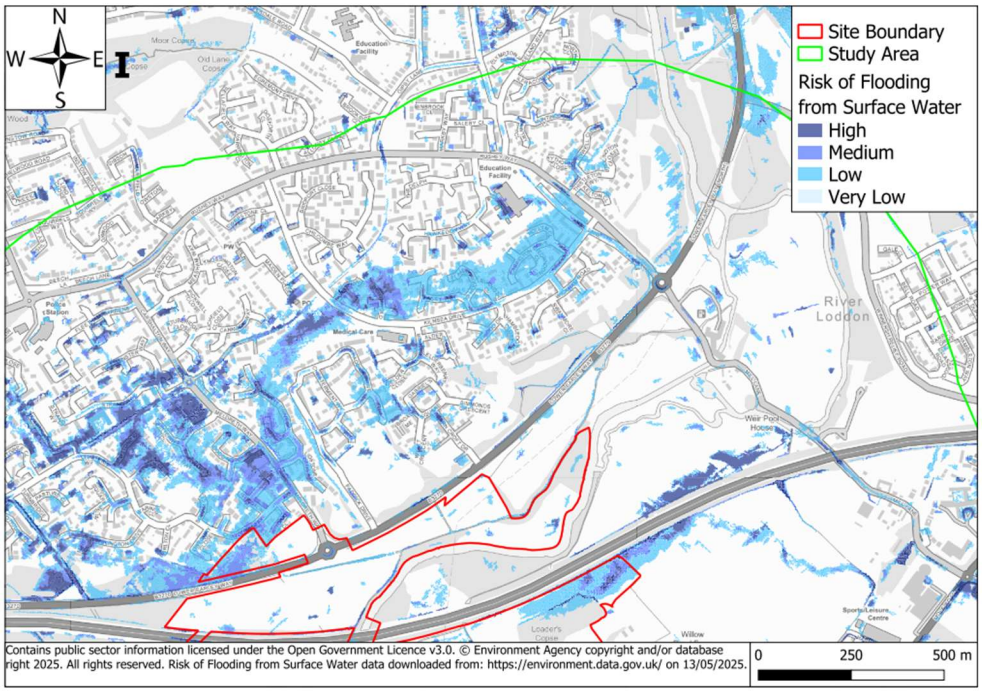


Figure 13.43 View I – Lower Earley Way East



13.3.28 **View A** shows that the majority of the Site and study area has a Very Low (less than 1 in 1,000 annual probability) risk of surface water flooding.

13.3.29 It is noted that the areas of potential surface water flooding generally follow the watercourses, some of which have already been identified as potential sources of fluvial flooding. There are also some areas of potential surface water ponding in local topographical low areas. Overall, the areas of surface water flooding are either represented by the fluvial modelling studies to define the constraint to development or are addressed through the proposed layout and design of the development and other mitigation measures which are addressed through design of the drainage strategy and outlined in the FRA or Drainage Strategy reports, thus addressing the requirements in PPG to ensure that surface water flooding does not give rise to the need for a Sequential Test.