

**Flood Risk Assessment
and Drainage Strategy**

**Old Forest Road,
Winnersh**

**Prepared for
Elstree Land
by**

**Stuart Michael
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CONTENTS

SECTIONS

	PAGE
EXECUTIVE SUMMARY	3
1.0 INTRODUCTION	4
2.0 THE SITE	11
3.0 DEVELOPMENT PROPOSALS	17
4.0 FLOOD RISK ASSESSMENT	18
5.0 SURFACE WATER DRAINAGE STRATEGY	27
6.0 WASTEWATER DRAINAGE STRATEGY	35
7.0 SUMMARY & CONCLUSIONS	36

APPENDICES

Appendix A	Topographical Survey
Appendix B	Thames Water Utilities Limited Sewer Records and Correspondence
Appendix C	Development Proposals
Appendix D	SFRA Extracts
Appendix E	Proposed Drainage Strategy
Appendix F	Proposed Surface Water Calculations
Appendix G	FEH Point Data and Greenfield Runoff Rate Calculation
Appendix H	Exceedance Routes Drawing
Appendix I	SuDS Management and Maintenance Plans
Appendix J	Surface Water Flood Risk & Layout Overlay Plan

FIGURES

Figure 1	Site Location Map
Figure 2	LiDAR Mapping Data
Figure 3	BGS Mapping Data
Figure 4	Source Protection Zones
Figure 5	Main Watercourses
Figure 6	Historic Flood Map
Figure 7	Flood Map for Planning
Figure 8	Risk of Surface Water Flooding Map
Figure 9	Reservoir Flood Extents



ACRONYMS AND ABBREVIATIONS

AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
BGS	British Geological Society
CC	Climate Change
CIRIA	Construction Industry Research and Information Association
DEFRA	Department for Environment, Food and Rural Affairs
DS	Drainage Strategy
EA	Environment Agency
FRA&DS	Flood Risk Assessment and Drainage Statement
ha	Hectares
km	Kilometres
LLFA	Lead Local Flood Authority
LFRMS	Local Flood Risk Management Strategy
LPA	Local Planning Authority
m	Metres
NPPF	National Planning Policy Framework
NTS	Non-statutory Technical Standards
PPG	Planning Practice Guidance to the National Planning Policy Framework
QBAR	Mean Annual Flood (Report No. 124 Flood Estimation for Small Catchments)
SAAR	Standard Annual Average Rainfall
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SUDS	Sustainable Drainage Systems
WBC	Wokingham Borough Council



EXECUTIVE SUMMARY

Flooding

The risk of coastal flooding, flooding from reservoirs, and river flooding at the Site is considered low. The majority of the Site is at very low to low risk of surface water flooding. There is an area located in the north of the Site at low to high risk of surface water flooding, but residential dwellings have been located entirely within areas at low risk from surface water flooding.

Surface Water

Surface water calculations show that the proposed strategy can provide the storage requirements for all storm events up to and including the 1 in 100 year +40%CC event for all impermeable areas on Site, allowing 10% for urban creep.

Drainage systems will also incorporate and consider development runoff, with no flooding for all storms up to, and including, the 1 in 30-year event. Flooding to any new buildings will also not occur during a 1 in 100-year event, including +40%CC allowance. Exceedance routes will be managed to follow natural slopes using rainfall in excess of a 1% annual probability event +40%CC to minimise risk.

The proposed SuDS Management Train provides sufficient pollution treatment minimising risk to water quality. It is proposed, where possible, to maximise permeable pavements within the development. It is proposed to provide a detention basin in the northeast of the Site. Surface water will then be discharged to existing surface water bodies on or within the vicinity of the Site at a restricted rate.

Wastewater

It is proposed to provide a connection to the existing TWUL sewer located in Old Forest Road to the south of the Site.



1.0 INTRODUCTION

- 1.1 Stuart Michael Associates Limited, Consulting Engineers, has prepared this Flood Risk Assessment and Drainage Strategy, hereafter referred to as the 'Report', on the instruction of Elstree Land, hereafter referred to as the 'Client'.
- 1.2 This Report supports a full application to Wokingham Borough Council (WBC) by the Client for residential development at Old Forest Road, Winnersh, hereafter referred to as the 'Site'.
- 1.3 The Site is approximately 1.6ha and is currently Greenfield.
- 1.4 The requirements and policies of WBC, Thames Water Utilities Limited (TWUL) and the Environment Agency (EA) have been taken into account when considering flood risk and drainage issues.

Scope of Report

- 1.5 The FRA section of the Report focuses on assessing flood risk issues at the Site as follows:
- Identification of all potential sources of flooding at the Site (i.e. fluvial, pluvial, groundwater, surface water, etc.);
 - Assessment of the existing flood risk at the Site and its potential impact on the proposals;
 - Consideration of flood risk implications, taking into account potential changes in risk due to climate change over the lifetime of the development, and the identification of measures to mitigate flood risk.
- 1.6 The purpose of the Report is:
- To confirm that the proposed development will not be subject to unacceptable flood risk or to show that flood risk can be managed acceptably;
 - To demonstrate that the proposed development will not increase flood risk elsewhere.



Policy Context

- 1.7 The Report presents an assessment of flood risk at the Site in accordance with the National Planning Policy Framework (NPPF), last updated December 2024, and its supporting Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change', last updated August 2022, both published by the Department of Communities and Local Government, and the Flood Risk Assessment – Climate Change Allowances guidance, last updated May 2022.
- 1.8 The updated NPPF introduces additional guidance on the application of the sequential risk-based approach to individual proposals which are “...known to be at risk now or in the future from any form of flooding” (paragraph 173).
- 1.9 Paragraph 175 states that:
- 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).*
- 1.10 The revised NPPF also sets out further guidance on the objectives of sustainable drainage systems within development. Paragraph 182 states:
- Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity.*
- 1.11 The NPPF and supporting PPG provide guidance on how flood risk should be considered during the planning and development processes. The requirement to protect both new and established development from increased risk of flooding forms an essential part of the guidance. Moreover, implementation of Sustainable Drainage Systems (SUDS) for new development is encouraged.
- 1.12 A major change in the latest update to the PPG is Paragraph: 023 Reference ID: 7-023-20220825, 'The Sequential approach to the location of development' which



requires development to be located in areas at little or no risk of flooding from any source by avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding.

1.13 WBC is the Local Planning Authority (LPA) controlling flood risk and water environment issues, through policies and guidance presented in the following documents:

- WBC Strategic Flood Risk Assessment (SFRA), dated May 2023;
- WBC Preliminary Flood Risk Assessment (PFRA), dated June 2011;
- Adopted Core Strategy Development Plan Document, dated January 2010;
- WBC Sustainable Design and Construction Supplementary Planning Document, adopted May 2010;
- Wokingham Borough Development Plan – Adopted Managing Development Delivery Local Plan, February 2014;
- Wokingham SuDS Strategy, dated January 2017;
- Wokingham Strategic Sites Report 2021, dated November 2021.

1.14 WBC is the Lead Local Flood Authority (LLFA). In its role as LLFA, WBC is a statutory consultee for all major applications in Wokingham Borough in relation to surface water drainage.

Adopted Core Strategy

1.15 The WBC Core Strategy sets out the key elements of WBC's vision for development in the Borough until March 2026. Relevant policies are detailed below.

1.16 Policy CP1 – Sustainable Development has several aspects linking to the use of SuDS. The policy states that proposals should limit any adverse effect on water quality, ensure the provision of adequate drainage, incorporation of facilities for



recycling of water and management of flood risk from all sources. The development should avoid increasing risks of or from all forms of flooding.

- 1.17 Policy CP3 – General Principles for Development states the proposals should have no detrimental impact on watercourses.

Managing Development Delivery Local Plan

- 1.18 The WBC Managing Development Delivery Local Plan builds on the principles contained within the Core Strategy, and includes more detailed policies for development within the Borough.
- 1.19 Policy CC09: Development and Flood Risk states all sources of flood risk must be taken into account at all stages and to the appropriate degree at all levels in the planning application.
- 1.20 Policy CC10: Sustainable Drainage states that all development proposes must reproduce greenfield runoff characteristics, for greenfield and brownfield sites both run-off rates and values should be reduced to as near greenfield as practicably possible. Developments must incorporate SuDS of an appropriate design to meet long term needs of the development.

Wokingham SuDS Strategy

- 1.21 The Wokingham SuDS Strategy sets out the key objectives for flood risk and the water environment in the Borough, including: to ensure well designed (SuDS) are used appropriately in all new and re-development (O4); to ensure high quality new development and re-development that manages surface water quantity and quality effectively (O5).
- 1.22 Within the Wokingham SuDS strategy, there is a total of 70 local standards for the Borough, covering a variety of topics in relation to flood risk and drainage strategies. The local standards cover the topics of flood risk outside the development, peak flow control, volume control, flood risk within the development, structural integrity, designing for maintenance considerations, construction, design, water quality, landscape and visual impact, ecology and health and safety. Some of the relevant local standards are detailed below.



- 1.23 WokBC-LS1 requires the drainage system to mitigate any potential negative impact of surface runoff from the development on flood risk outside the development boundary.
- 1.24 WokBC-LS3 states that if the SuDS system discharges to a water body, it should be demonstrated that high water levels within the receiving water body for the design storm event of the discharging system would not exacerbate flood risk.
- 1.25 Local Standard WokBC-LS5 requires demonstration that discharges from the proposed development for all return periods do not exceed their corresponding greenfield/previously developed discharge rates.
- 1.26 WokBC-LS8 states that the design of all flow control must be supported by appropriate calculations and drawings that enable the performance of the drainage system to the required standards to be confirmed.
- 1.27 WokBC-LS10 states attenuation storage must be provided to limit the rates of runoff to the required greenfield/pre-development discharge rates.
- 1.28 WokBC-LS15 states the drainage system must be designed so that the capacity of the drainage system takes account of the likely impacts of climate change and likely changes in impermeable area within the development.
- 1.29 WokBC-LS18 states that it should be demonstrated that any blockage within the system and extreme rainfall volumes can be accommodated through safe overflow routes.
- 1.30 WokBC-LS47 to WokBC-LS53 detail the local standards with regards to Water Quality. This includes ensuring that surface water discharge from the development does not adversely impact the current water quality of receiving water bodies; ensure appropriate treatment is provided to surface water runoff, and at least one surface SuDS feature shall be deployed within the management train.

Sustainable Design and Construction SPD

- 1.31 The Sustainable Design and Construction SPD states that all development is expected to produce a Surface Water Drainage Strategy in compliance with the



most recent guidance and should involve the introduction of SuDS techniques and to take into account climate change.

- 1.32 WBC is the Lead Local Flood Authority (LLFA) and in its role as LLFA, HCC is a statutory consultee for all major applications in Wokingham and surrounding areas in relation to surface water drainage.
- 1.33 The Flood and Water Management Act, 2010, requires the EA to develop, maintain and apply a National Flood and Coastal Erosion Management Strategy. Similarly, the LLFA is required to develop, maintain, apply and monitor a Local Flood Risk Management Strategy (LFRMS) for its area. The WBC Local Flood Risk Management Strategy, dated April 2015, sets out legislations and policies for local flood risk objectives for reducing flood risk, and identifies localised flooding in Wokingham Borough.
- 1.34 Rainfall-runoff management for the Site will follow the procedures laid down by the Non-statutory Technical Standards (NTS) for SUDS, which were published by the Department for Environment, Food and Rural Affairs (DEFRA) in March 2015.
- 1.35 The Water Framework Directive (WFD) (2000/60/EC) introduced a comprehensive river basin management planning system to help protect and improve the ecological health of waterbodies such as rivers, lakes, estuaries and coastal and groundwater. It is transposed into regulations through The Water Environment (Water Framework Directive) Regulations 2017. The WFD has two principal objectives, to prevent deterioration of the status of all water bodies and to protect, enhance and restore those water bodies. The development will be assessed in terms of the key aim of the WFD to achieve 'good' ecological and chemical status of all water bodies with a deadline set for 2027.

Climate Change

- 1.36 In considering flood risk to the Site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.
- 1.37 In February 2016, the EA released new guidance on the application of climate change allowances in flood risk assessments, which was last updated in May 2022. Guidance can be found at:



<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

- 1.38 This guidance provides contingency allowances for potential increases in peak river flow by management catchment, and for potential increases in rainfall intensity. The latter requires consideration in any surface water drainage strategy for new development.
- 1.39 Guidance for peak river flow climate change allowances states that the central allowance should be used for all assessments except for essential infrastructure, where the higher central allowance should be used. The upper end should be used for 'credible maximum scenario' assessments.
- 1.40 Guidance for peak rainfall climate change allowances were last updated in May 2022. Peak rainfall allowances are now provided by management catchments instead of at a national scale (for England). Peak rainfall allowances are provided for 1% annual exceedance probability (AEP) events and for 3.3% AEP events, and for 2 epochs rather than 3. The guidance on how to apply peak rainfall allowances has changed, using the central allowance for development with a lifetime up to 2100 and the upper end allowance for development with a lifetime from 2100 to 2125.



2.0 THE SITE

Location

- 2.1. The Site is located to the south of Winnersh, south of the M4. See **Figure 1** for the Site location.
- 2.2. The Site is bound by Toutley Road to the north and residential development on Old Forest Road to the south.
- 2.3. The approximate centre of the Site is situated at OS national grid reference 479414E, 170276N.

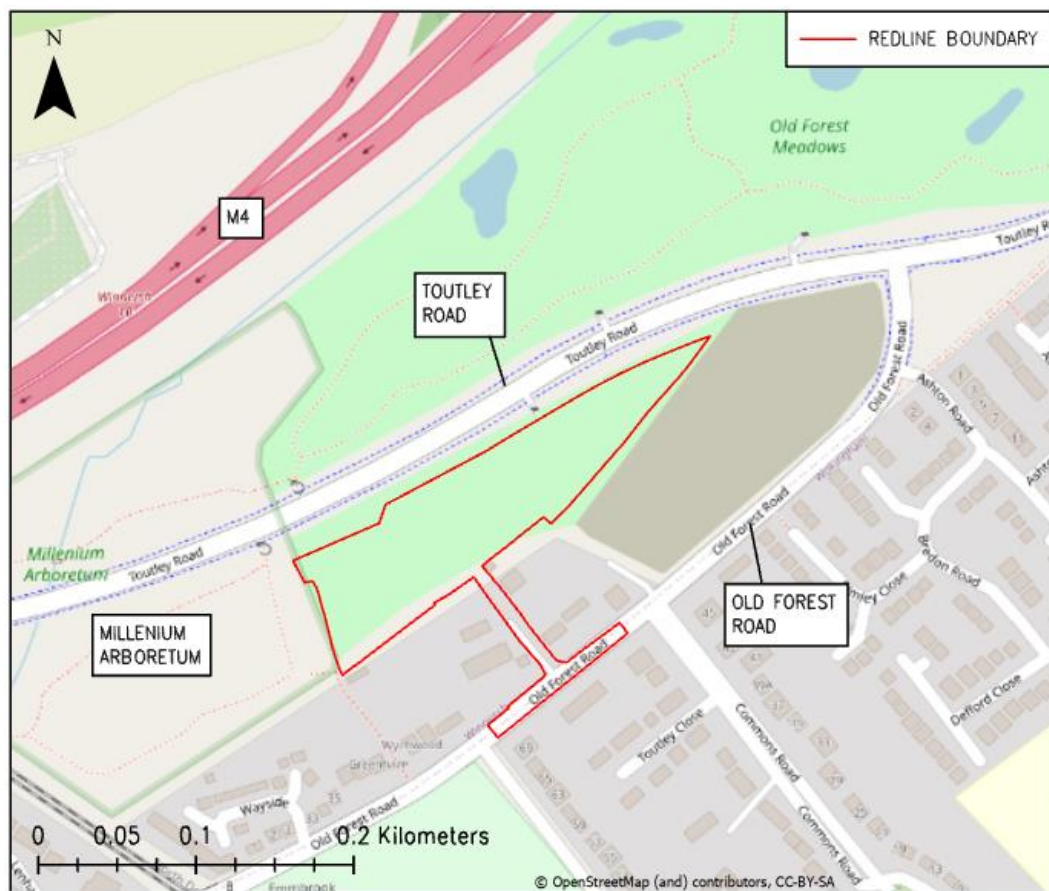


Figure 1- Site Location Map



Topography

- 2.4. A topographical survey of the Site was carried out by CD Surveys Limited in January 2022 and provides levels for the Site. A copy of the topographical survey is contained in **Appendix A**.
- 2.5. The topographical survey indicates that levels on the Site fall towards the northeast corner, where the lowest levels are approximately 47.80mAOD. The highest levels on the Site are located in the northwestern corner, where levels are approximately 52.00mAOD.
- 2.6. **Figure 2** below details the wider topographical area based on the Environment Agency's LiDAR Composite DTM 1m (2022) data. The wider topographical area indicates that levels around the Site fall to the north, towards Emm Brook.

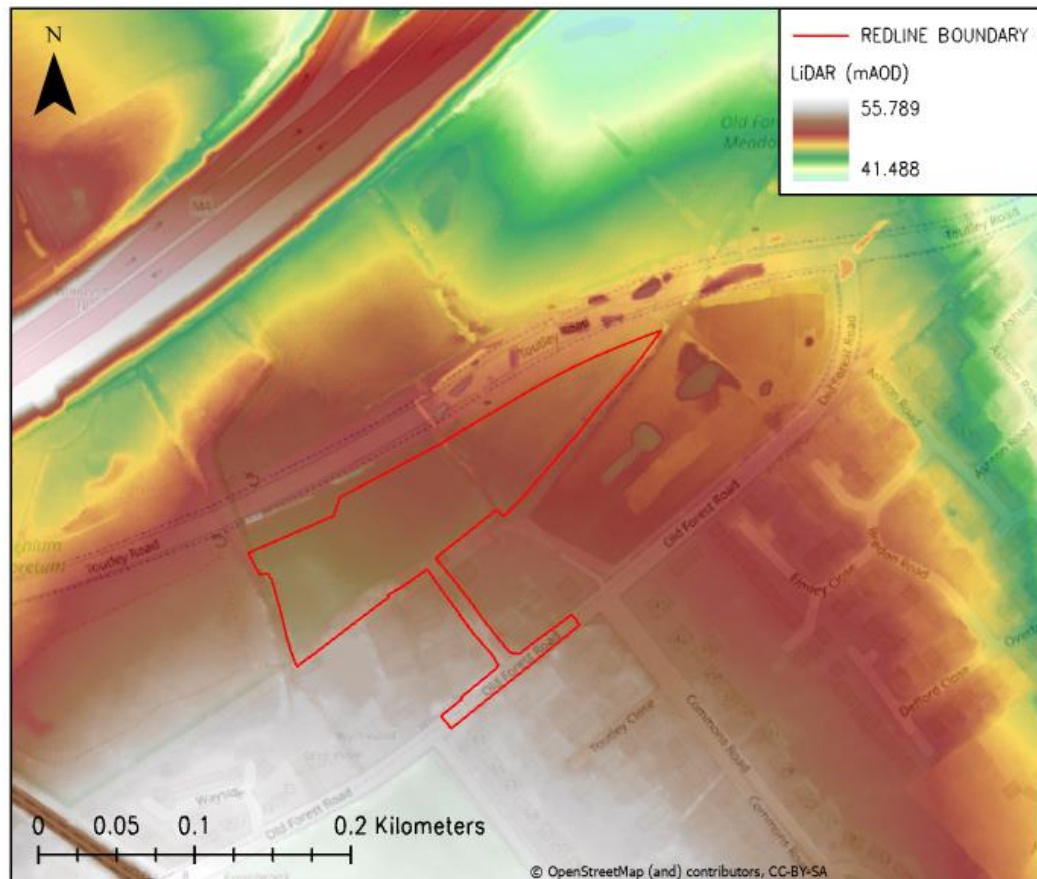


Figure 2 - LiDAR Mapping Data



Geology and Hydrogeology

Soils and Geology

- 2.7. Information contained in 'Soilscapes' defines the entirety of the Site as comprising of *"Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils"*.
- 2.8. British Geological Survey (BGS) mapping indicates a small area in the southwest of the Site is underlain by superficial deposits of River Terrace Deposits, 4 – Sand and gravel. The remainder of the Site is not indicated to be underlain by superficial deposits. Mapping indicates that the entirety of the Site is underlain by bedrock geology of London Clay Formation – Clay, silt and sand. Extracts from the BGS mapping tool are found below in **Figure 3**.

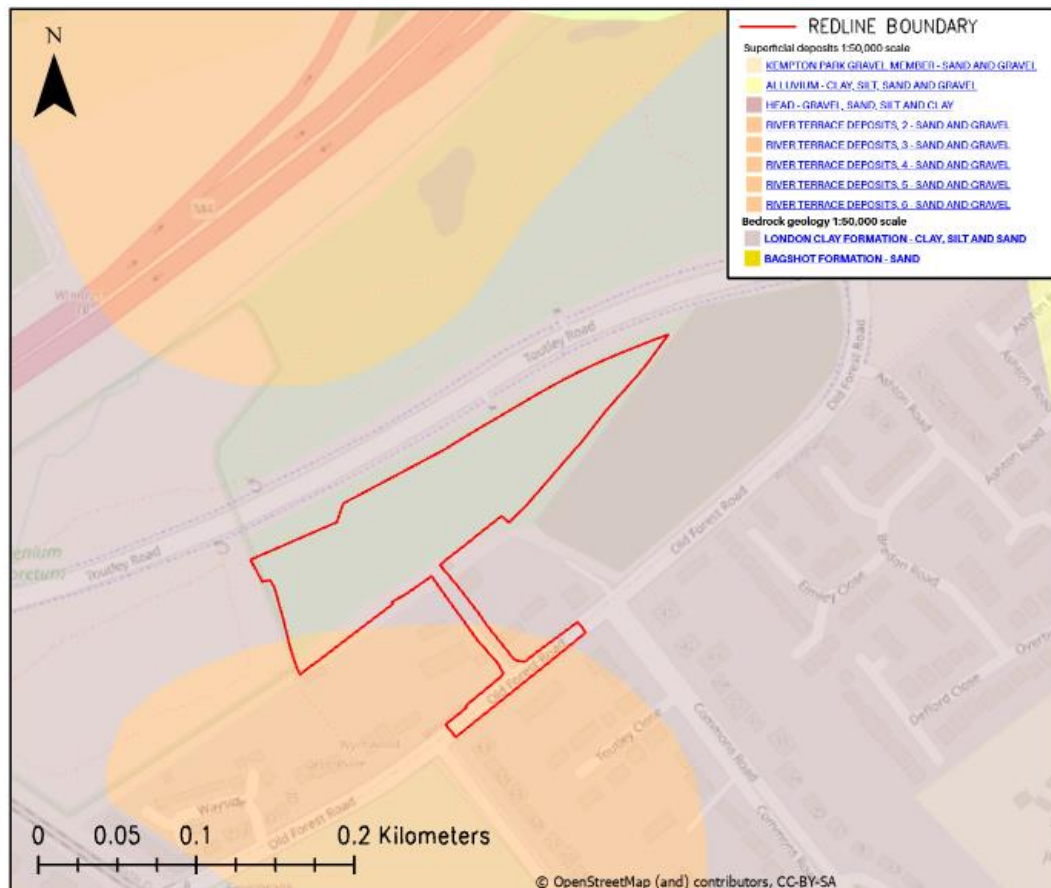


Figure 3 – BGS Mapping



Hydrogeology

2.9. UK Government DEFRA mapping indicates that the Site is:

- Located within a Nitrate Vulnerable Zone;
- Located in a Drinking Water Safeguard Zone (Surface Water);
- Underlain by an unproductive Bedrock Aquifer and partially underlain by a Secondary A Superficial Drift Aquifer;
- Not located within a Source Protection Zone (see **Figure 4**).

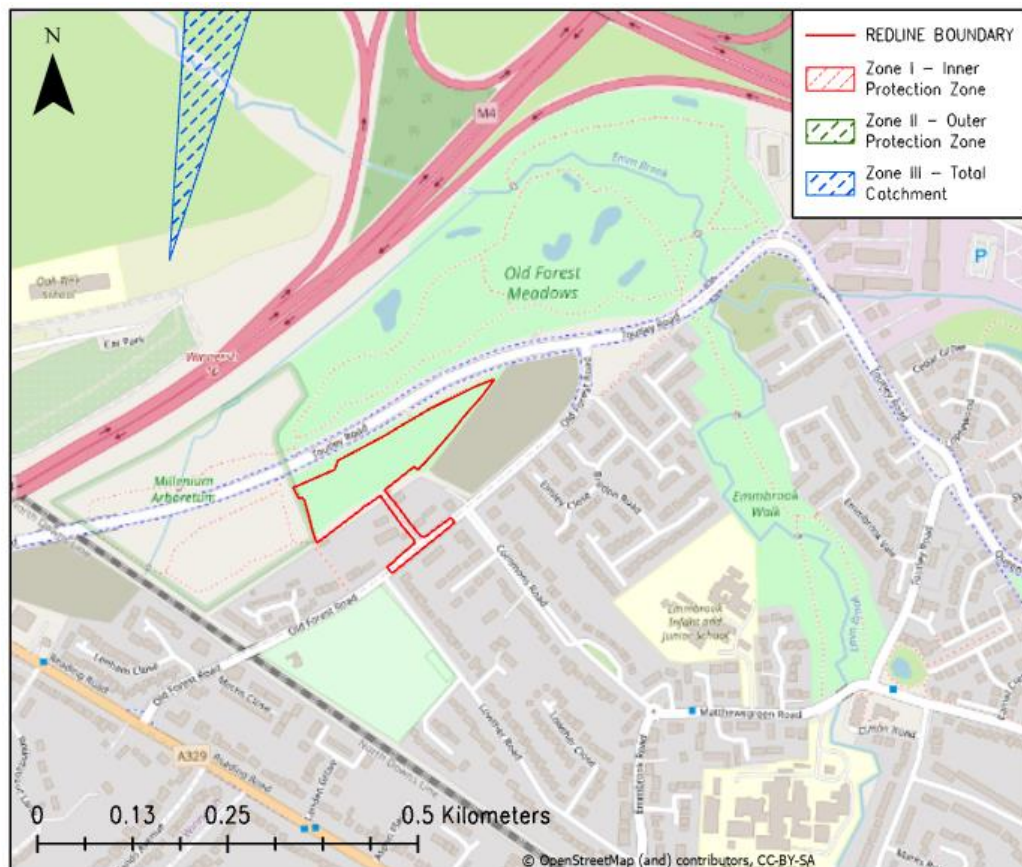


Figure 4 – Source Protection Zones

Existing Sewers

Wastewater Sewers

2.10. Thames Water Utilities Limited (TWUL) asset records indicate there are no foul assets within the Site boundary. The nearest foul sewer, a 100mm sewer, is located within Old Forest Road to the south of the Site. There is a 150mm diameter foul sewer within Commons Road to the south of the Site.



Surface Water Sewers

- 2.11. TWUL asset records indicate there are no surface water sewers within the Site boundary. The nearest surface water sewer is indicated to be within Old Forest Road to the south of the Site. A copy of TWUL sewer records are presented as **Appendix B**.

Hydrological Setting

- 2.12. The Site is located within the Thames River Basin District, located within the Loddon and Trib Management Catchment.
- 2.13. The topographical survey indicates there are watercourses on the Site and adjacent to the Site boundaries. This includes a ditch which runs through the centre of the Site in a northwest direction.
- 2.14. There are no Main Rivers, managed by the EA, on the Site. The Main River nearest the Site, Emm Brook, is situated approximately 300m to the east of the Site. See **Figure 5** below.

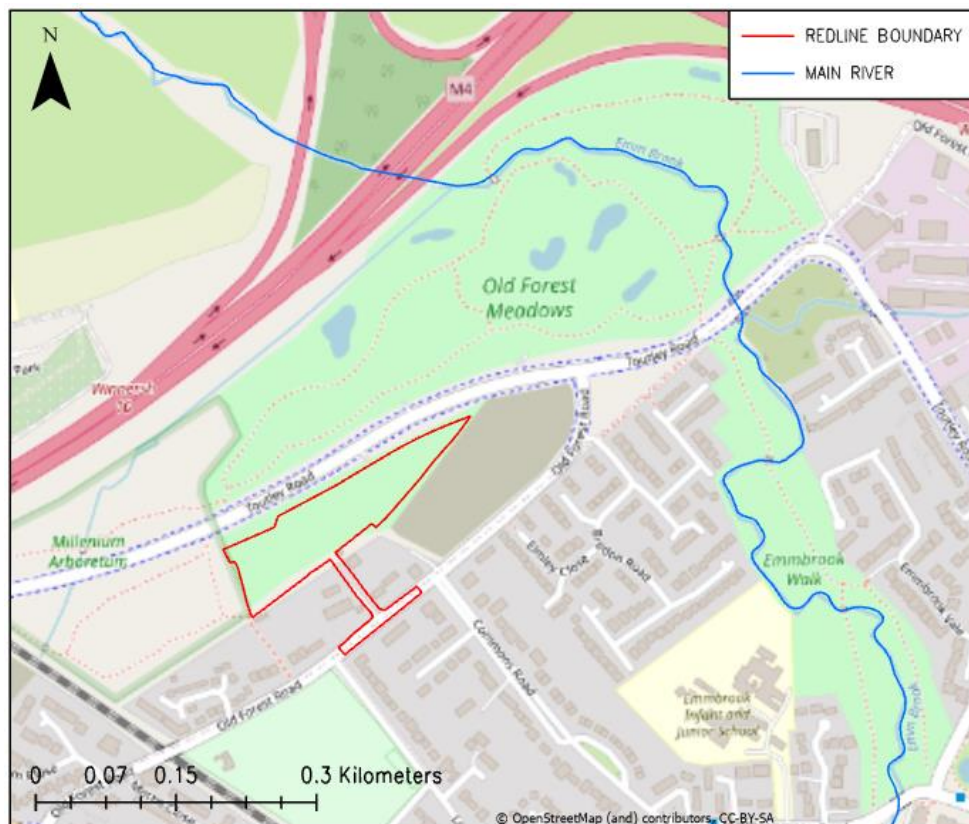


Figure 5 – Main Rivers Map



Site Sensitivity

Designated sites

- 2.15. According to UK DEFRA mapping, the Site is not located within any statutory designated areas such as Ramsar, Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), and Special Protection Areas (SPA).
- 2.16. According to UK DEFRA mapping, the nearest SSSI is located over 3km from the Site.



3.0 DEVELOPMENT PROPOSALS

Site Layout

- 3.1. This report has been prepared to inform the evidence base in support of the Client's development proposals at Old Forest Road, Winnersh.
- 3.2. The proposed development includes a full application for 53 residential dwellings.
- 3.3. The Site layout is presented in **Appendix C**.
- 3.4. The proposed mitigation is based on a design life for the development of 100 years, and the climate change allowances within the mitigation measures and drainage design are based on this assumption.

Vulnerability Classification

- 3.5. The NPPF PPG 'Flood Risk and Coastal Change' Annex 3, specifies the 'Flood risk vulnerability classification' of a Site, depending upon the proposed usage. This classification is subsequently applied to PPG Table 2 to determine whether:
 - The proposed development is suitable for the flood zone in which it is located, and;
 - Whether an Exception Test is required for the proposed development.
- 3.6. Annex 3 of the PPG classes the proposed residential development as a 'More Vulnerable' development.

NPPF Sequential Test

- 3.7. The NPPF requires the LPA to apply a Sequential Test in consideration of any new development. The NPPF follows a sequential risk-based approach in determining the suitability of land for development in areas at little or no risk of flooding from any source by avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. This is following the latest update to the PPG. The principle of the sequential test is applied on a site-specific basis.



4.0 FLOOD RISK ASSESSMENT

Historical Flooding

- 4.1. The EA 'Historic Flooding' map is a GIS layer showing the maximum extent of individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set of criteria. It shows areas of land that have previously been subject to flooding in England. The map indicates that the Site has not experienced historical flooding, see **Figure 6** below.
- 4.2. The WBC SFRA does not mention historic flood events occurring at the Site.
- 4.3. SFRA extracts are included in **Appendix D**.

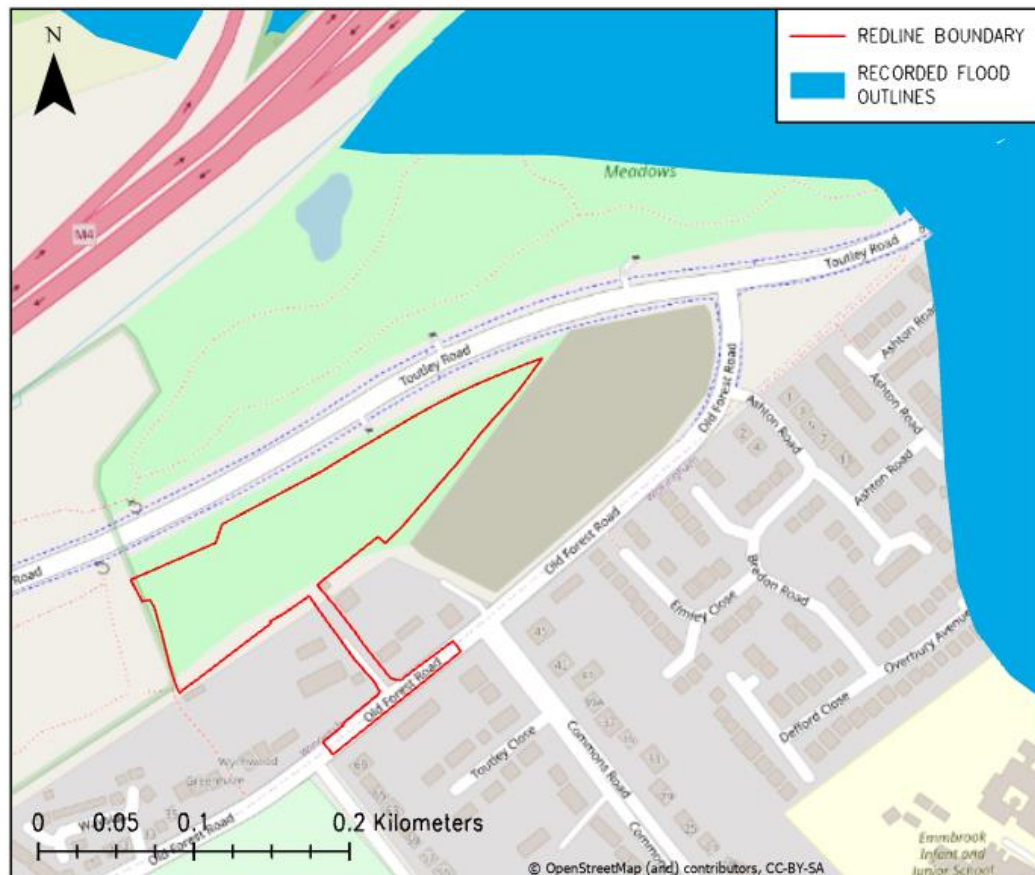


Figure 6 – Historic Flood Map

Groundwater Flooding

- 4.4. Groundwater flooding occurs where groundwater levels rise sufficiently to intersect the ground surface and flow onto low-lying areas. Generally,



groundwater flooding may be a problem where developments are situated over permeable soils or rocks.

- 4.5. The WBC SFRA Areas Susceptible to Groundwater Flooding map indicates the Site is within an area where there is $\geq 25\% < 50\%$ susceptibility for groundwater flooding to occur.
- 4.6. SFRA extracts are included in **Appendix D**.

Fluvial Flooding

- 4.7. Flood Zones shown on the UK Government flood maps are the main constraints used to inform the LPA when to consult the EA and LLFA on flood risk in development control locations.
- 4.8. The Flood Zones, as described in the PPG, refer to the probability of flooding and this varies depending on the source of flooding being fluvial or coastal. Flood Zones 1, 2 and 3 refer to low, medium and high risk of flooding respectively. These zones for fluvial risks of flooding correspond to the Annual Exceedance Probabilities (AEP) of less than 0.1%, in the range of 0.1-1% and greater than 1% in any given year, respectively.
- 4.9. Flood Zones indicate the probability of flooding without the presence of defences and significant manmade structures such as bridges, culverts, and rail and motorway embankments.
- 4.10. An extract from the EA's 'Flood Map for Planning' in **Figure 7** shows that the entirety of the Site is located within Flood Zone 1 (low probability). The nearest fluvial floodplain is located approximately 150m to the north of the Site.

"Flood Zone 1 – Land having a less than 0.1% (1 in 1,000) annual probability of flooding."



4.11. Surface water flooding occurs when the intensity of rainfall exceeds ground infiltration. Typically, this can happen where ground is impermeable, such as roads and paved areas within urban development and where there are impermeable soils. The risk of flooding from surface water runoff is greater in locations that are situated adjacent to sloping land, within natural valleys and/or are within local depressions.

4.12. The EA 'Risk of Flooding from Surface Water' ('RoFSW') shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event. The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:

- 1 in 30 (3.3%) annual probability rainfall event ('High' risk);
- 1 in 100 (1%) annual probability rainfall event ('Medium' risk);



- 1 in 1000 (0.1%) annual probability rainfall event ('Low' risk).
- 4.13. Land at lower than 1 in 1000 (0.1%) annual probability of flooding is considered to be at 'Very Low' risk of flooding.
- 4.14. **Figure 8** below indicates the majority of the Site is at very low risk of surface water flooding. There is an area near the northern boundary of the Site which is at low to high risk of surface water flooding.
- 4.15. A section of the Site, within Old Forest Road, is indicated to be between low to high risk of surface water flooding. The majority of Old Forest Road within the Site boundary is at low risk of surface water flooding.
- 4.16. All residential dwellings have been located within areas at low risk from surface water flooding, as shown on the Layout Overlay plan included within **Appendix J**.

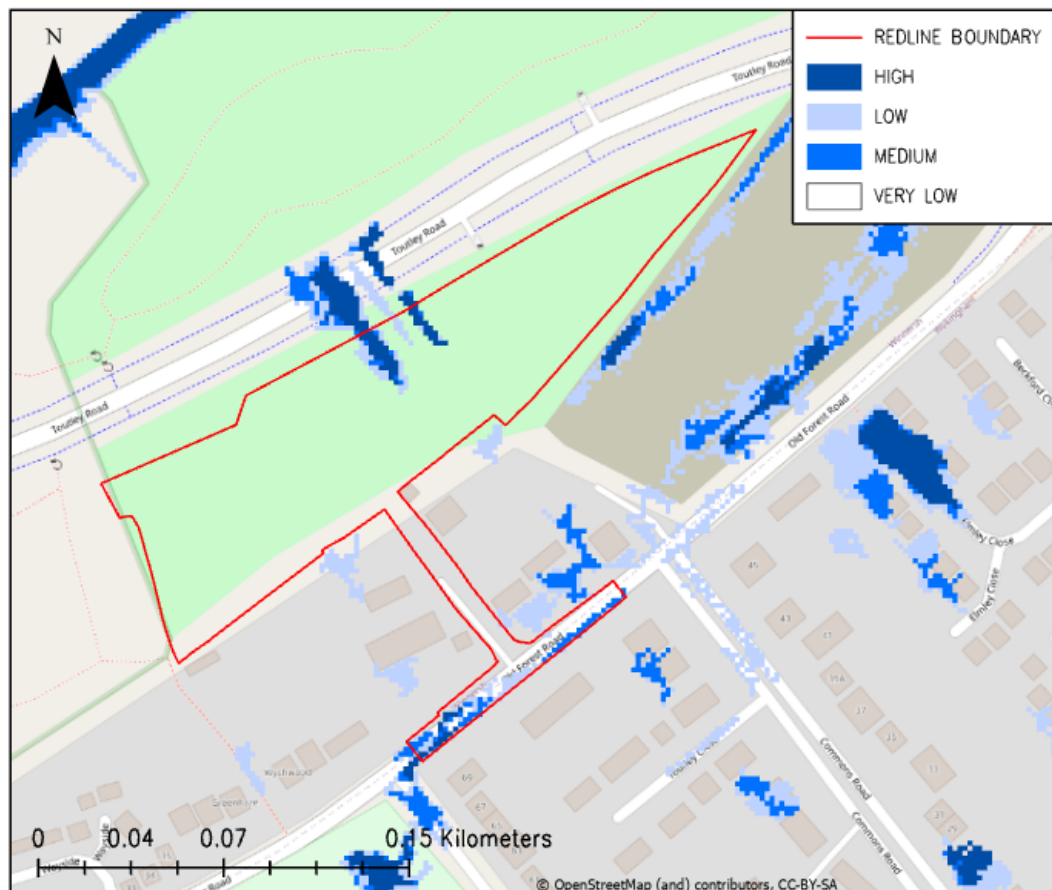


Figure 8 - Risk of Surface Water Flooding Map



Climate Change

- 4.17. In considering flood risk to the Site together with its mitigation, it is necessary to fully consider the potential impacts of climate change over the lifetime of the development. Making an allowance for climate change will help to minimise the vulnerability and provide resilience to flooding in the future.
- 4.18. In February 2016, the EA released guidance on the application of climate change allowances in flood risk assessments. Allowances are based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere. There are different allowances for different epochs or periods of time over the next century. The guidance provides contingency allowances for potential increases in peak river flow and for potential increases in rainfall intensity.
- 4.19. The guidance recommends that a 'central' allowance should be used for all assessments except for essential infrastructure, where the 'higher central' allowance should be used. An 'upper end' allowance should be used for 'credible maximum scenario' assessments.
- 4.20. In accordance with PPG, residential development should be considered to have a minimum of 100 years life-span. Therefore, drainage design for the proposed development will consider rainfall adjustments for the most distant epoch (2070s) and will conservatively assume an upper end projection scenario (+40%).

Peak Rainfall Allowances

- 4.21. Increased rainfall affects river levels and land and urban drainage systems. **Table 1** shows the anticipated changes in extreme rainfall intensity in Loddon and tributaries management catchment.
- 4.22. For Flood Risk Assessments and Strategic Flood Risk assessments for developments with a lifetime beyond 2100, guidance states assess the upper end allowances. This must be done for both the 1% and 3.3% annual exceedance probability (AEP) events for the 2070s epoch (2061 to 2125). For development with a lifetime between 2061 and 2100 take the same approach by use the central allowance for the 2070s epoch. Development with a lifetime up to 2060, take the same approach but use the central allowance for the 2050s epoch (2022 to 2060).



- 4.23. An allowance for increased rainfall will require consideration in the surface water drainage strategy for the proposed development.

Table 1: Peak rainfall intensity allowance for Loddon and tributaries Management Catchment

Allowance Category		Total potential change anticipated for the '2050s' (up to 2060) (1% AEP)	Total potential change anticipated for the '2050s' (up to 2060) (3.3% AEP)	Total potential change anticipated for the '2070s' (2061 to 2125) (1% AEP)	Total potential change anticipated for the '2070s' (2061 to 2125) (3.3% AEP)
Loddon and tributaries	Upper end	40%	35%	40%	35%
	Central	20%	20%	25%	25%

Peak River Flow Allowances

- 4.24. The climate change allowances include predictions of anticipated change for peak river flows by management catchment.
- 4.25. Statutory Main Rivers near the Site are located within Loddon and tributaries Management Catchment. River flow allowances for the management catchment are presented in **Table 2**.
- 4.26. Consideration of the river flow climate change allowance is not required as the Site is not exposed to medium or high fluvial flood risk.

Table 2: Peak river flow allowances for the Loddon and tributaries Management Catchment.

Management Catchment	Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Loddon and tributaries	Upper End	23%	25%	46%
	Higher Central	11%	10%	23%
	Central	7%	4%	14%

Flooding from Infrastructure Failure

- 4.27. Where infrastructure retains, transmits or controls the flow of water, flooding may occur if there is a structural, hydraulic, geotechnical, mechanical or operational failure. There are three main categories of infrastructure associated with this mechanism of flooding:



- Failure of infrastructure designed to store or carry water (e.g. dam break, canal leak, burst water mains or sewer, blockage or overflow).
- Failure of infrastructure designed to protect an area from flooding (e.g. breached flood defences, flap valve or penstock failure, pumping station failure).
- Failure of a pipe, bridge or culvert due to blockage.

4.28. The risk of flooding from infrastructure failure is low.

Flooding from Artificial Drainage Systems

4.29. Artificial drainage systems, such as pipes, land drains, sewers and drainage channels, are provided to manage and convey runoff from developed land. During heavy rainfall, flooding of these drainage systems may occur if: runoff exceeds the capacity of the systems; debris or sediment blocks the system; or, if the system becomes surcharged due to high water levels in the downstream system.

4.30. The WBC SFRA sewer flooding incidents table, recorded by Thames Water, indicates the Site is within an area that has 8 recorded incidents from 2000-2019.

Flooding from Reservoirs

4.31. Major reservoirs throughout the UK are normally well maintained and the likelihood of a failure causing downstream flooding is extremely low. In the very unlikely event of a dam failure, a large volume of water could be released, quickly flooding a large area and possibly causing significant property damage or even loss of life.

4.32. **Figure 9** below uses EA reservoir flooding data, which indicates that the Site is not at risk of flooding from reservoirs.

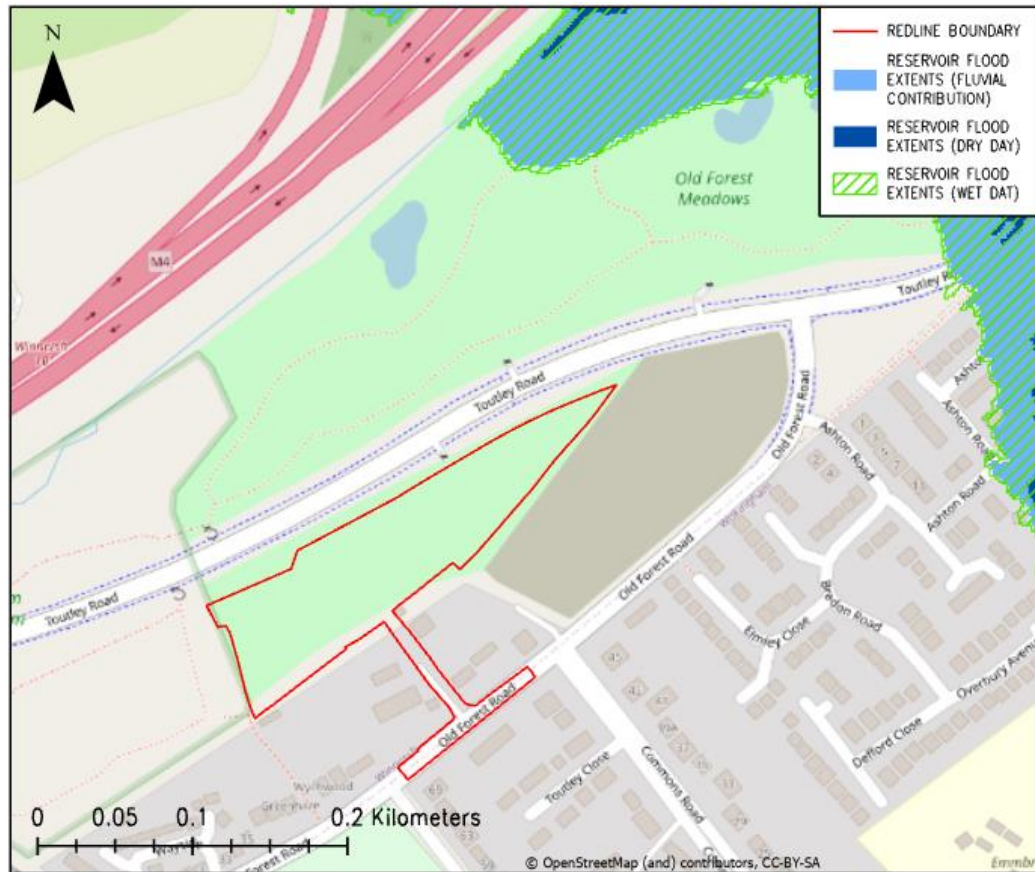


Figure 9 – Extent of Reservoir Flooding

Coastal Flooding

- 4.33. The Site is located a sufficient distance inland and at an elevation in excess of approximately 47.80m AOD that does not expose it to a risk of tidal flooding.

Sequential and Exception Tests

- 4.34. The proposed development is not at risk of tidal flooding, reservoir flooding, low risk of flooding as a result of artificial drainage systems, at low risk at groundwater flooding, and with the Site solely residing in Flood Zone 1. The majority of the Site is at low risk of surface water flooding. All development should be steered towards the areas of lowest risk of all types of flooding, showing that the development will be safe for its lifetime taking into account the vulnerability of its users, and that it won't increase flood risk elsewhere.
- 4.35. According to Table 3 of the NPPF 'Flood Risk Vulnerability Classification', the 'More Vulnerable' residential development in the north of the Site is appropriate for the flood designation, with the Site lying solely within Flood Zone 1.



- 4.36. The Site lies inland at an elevation in excess of 47.80m AOD and therefore risk of tidal flooding is considered to be low. The Site is not indicated to be at risk of fluvial flooding, groundwater flooding, reservoir flooding, infrastructure failure, or artificial drainage systems.
- 4.37. All residential dwellings have been located within areas at low risk of flooding.
- 4.38. See the Flood Risk Sequential Test Report produced by Savills for more information on the sequential test.



5.0 SURFACE WATER DRAINAGE STRATEGY

Discharge Destination

- 5.1. In order to ensure that surface water runoff from a developed Site does not have a detrimental impact on the downstream catchment it is important to prioritise where surface water runoff is discharged, control how fast the runoff is discharged and also control how much runoff is discharged from the Site.
- 5.2. The proposed development will lead to an increase in impermeable area. As such, it is proposed to employ Sustainable Drainage Systems (SuDS) measures to ensure surface water is managed effectively.
- 5.3. Any development presents an opportunity to incorporate SuDS, which might include infiltration techniques or attenuation of flows to protect receiving sewers or watercourses. The choice of methods is dependent upon ground conditions and availability of suitable areas within the particular scheme layout.
- 5.4. In line with national and local planning policy, it is proposed to employ Sustainable Drainage Systems (SuDS) to manage surface water runoff close to source using guidance given in CIRIA report C753 'The SuDS Manual' and Non-statutory Technical Standards for SuDS by DEFRA (March 2015). Runoff will be managed both at source and across the Site as a whole.
- 5.5. Water is a valuable resource and priority should be given to the reuse of runoff on Site (rainwater harvesting) once it has been appropriately treated. The destination of any surplus runoff should be prioritised in accordance with 'Requirement H3 Part 3' of the Building Regulations Approved Document H (2002 Edition), which states:
- 5.6. "Rainwater from a system provided pursuant to sub-paragraphs (1) and (2) should discharge to one of the following listed in order of priority:
 - (a) an adequate soakaway or some adequate infiltration system; or, where this is not reasonably practicable,
 - (b) a watercourse; or, where that is not reasonably practicable,
 - (c) a sewer".



5.7. This guidance is replicated in the PPG (Paragraph 056) which states: “Where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:

- Into the ground (infiltration);
- To a surface water body;
- To a surface water sewer, highway drain or another drainage system;
- To a combined sewer”.

Surface Water Drainage Strategy

5.8. In accordance with the discharge destination hierarchies of the Building Regulation H3 and the PPG, an assessment of the suitability of the Site to utilise infiltration drainage techniques has been undertaken.

5.9. British Geological Survey (BGS) mapping indicates the Site is underlain by bedrock geology of London Clay Formation – Clay, silt and sand. The majority of the Site is not indicated to be underlain by superficial deposits except for a small section in the southwest of the Site, which is indicated to be underlain by superficial deposits of River Terrace Deposits, 4 – Sand and gravel. Therefore, it is deemed that infiltration is not a suitable method of surface water disposal.

5.10. The topographical survey indicates there are ditches on the Site and adjacent to the Site boundary.

5.11. TWUL sewer records indicates the nearest surface water sewer is located to the south of the Site within Old Forest Road.

5.12. Therefore, it is proposed that surface water will discharge to an existing ditch. One discharge point is to the existing ditch located through the centre of the Site. The second discharge point is located to the north east of the Site to an existing ditch located on the boundary.

5.13. Porous paving can be provided in certain locations throughout the Site to provide attenuation, source control, conveyance of surface water, and water quality benefits.



- 5.14. A detention basin will be provided in the northeast of the Site which will discharge runoff to an existing ditch located adjacent to the boundary.
- 5.15. The drainage strategy drawing has been included as **Appendix E**.
- 5.16. Surface water calculations are included as **Appendix F**, showing that the drainage strategy can provide the storage requirements for all storm events up to and including the 1 in 100 year +40%CC event, for all impermeable areas on Site including a 10% allowance for Urban Creep.
- 5.17. **Table 3** below provides a summary of SuDS components suitability at the Site.

Table 3: SuDS Components Suitability

SuDS Component	Site Suitability	Reasoning
Rainwater Harvesting	Maybe	The use of rainwater harvesting cannot count towards storage; however, it can be provided on dwellings to help deal with the first 5mm of rainfall.
Green Roofs	No	Green roofs are not appropriate for pitched roofs on residential dwellings and have high maintenance costs.
Infiltration Systems	No	BGS mapping indicates the site is underlain London Clay Formation – Clay, silt and sand and is therefore not deemed possible to infiltrate.
Proprietary Treatment Systems	No	It is not expected that there will be highly contaminated roads within the proposed development and therefore are deemed unnecessary for the proposed development.
Filter Strips	No	Filter strips are best suited to treating runoff from relatively small drainage areas. Filter strips are typically located on cropland immediately adjacent to streams, lakes, ponds, ditches, sinkholes, wetlands, or groundwater recharge areas.
Filter Drains	No	Filter drains are typically used to drain roads, usually main roads.
Swales	No	Swales can be used as attenuation or conveyance features. Due to limited space on the site, it is not proposed to provide swales.
Bioretention Systems	No	Due to limited space throughout the site, it is not proposed to provide bioretention systems.
Pervious Pavements	Yes	Can be used on private drives and parking areas, either as a permeable system or with a connection to the piped drainage system.



Detention Basins	Yes	It is proposed to provide a basin in the northeast of the site which will discharge to the existing surface water body adjacent to the boundary.
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Development Runoff

5.18. In compliance with the Non-statutory Technical Standards (NTS), the drainage systems across the Site will be designed so that the surface water runoff from the proposed development is contained within the drainage network, with no flooding for all storms up to, and including, the 1 in 30 year-event. Furthermore, the drainage system will be designed so that flooding to any new or existing buildings does not occur during a 1 in 100-year event, including +40% allowance for climate change.

5.19. Runoff rates for the existing Greenfield Site have been calculated using the FEH method and are provided in **Table 4** below and at **Appendix G**.

Table 4: Existing Runoff Rates

Return Period 1 in X year	Greenfield Discharge Rate (l/s/ha)
1	4.1
2	4.2
30	11.1
100	15.4

5.20. To provide betterment to the existing situation it is proposed to discharge surface water from the development to existing watercourses at a peak discharge rate of **4.1 l/s/ha**, which is equivalent to the 1 year Greenfield runoff rate. **Table 5** below details the peak discharge rates from each development catchment area.

Table 5: Proposed Discharge Rates

Catchment	Impermeable (ha)	Area	Discharge Rate (l/s)
1 (West)	0.570		2.3
2 (East)	0.242		1.0

5.21. A comparison of pre- and post-development runoff rates at each outfall location is provided in **Tables 6** and **7** below, which demonstrates that the proposed drainage strategy complies with NTS requirements.



Table 6: Surface Water Catchment 1 (West) - Pre and Post-development Runoff Rates

Return Period 1 in X year	Pre-development Runoff Rates (l/s)	Post-development Runoff Rates (l/s)
1	2.3	2.3
2	2.4	2.3
30	6.3	2.3
100	8.8	2.3
100 + 40% cc	n/a	2.3

Table 7: Surface Water Catchment 2 (East) - Pre and Post-development Runoff Rates

Return Period 1 in X year	Pre-development Runoff Rates (l/s)	Post-development Runoff Rates (l/s)
1	1.0	1.0
2	1.0	1.0
30	2.7	1.0
100	3.7	1.0
100 + 40% cc	n/a	1.0

Exceedance Design

- 5.22. Very high rainfall intensities can overwhelm pipe-based drainage systems for brief periods, whereas SuDS tend to have longer-duration critical storm events. In all cases, there will be events that cause flooding at points in the network if the storm event exceeds the design event.
- 5.23. Flows resulting from rainfall in excess of a 1% annual probability event plus 40% climate change event will be managed in exceedance routes following the natural slope to minimise the risks to people and property.
- 5.24. The exceedance flow routes drawing showing the for the Site, showing how exceedance flows will be managed across the built development and along the access roads, is presented within **Appendix H**.

Surface Water Management & Treatment Train

- 5.25. In accordance with CIRIA Report C753: The SuDS Manual, a “SuDS Management Train” process will be undertaken to assure that the proposed drainage strategy mimics the natural catchment of the Site as closely as possible.



- 5.26. The proposed Management Train (**Table 8**) will provide appropriate levels of risk management to protect the receiving water body.

Table 8: SuDS Management Train

SuDS Component	Interception	Primary Treatment	Secondary Treatment	Tertiary Treatment
Porous Pavements	Y	Y		
Detention basin	Y	Y	Y	

- 5.27. Source control techniques will be incorporated into the drainage strategy to ensure that storm water runoff is managed as close to source as possible.

Porous Paving

- 5.28. Porous pavements are structures that allow rainwater to infiltrate through the surface layer and into the underlying sub-structure, where it will be temporarily stored before being discharged into the surface water network.
- 5.29. As runoff percolates through the sub-layers, pollutants and contaminants are filtered out by the surfacing layer and biological process in the sub-base.
- 5.30. Porous pavements are built as an alternative to impermeable surfaces and therefore require no extra development space for their construction.
- 5.31. Permeable pavements can be provided, where possible, on all private drives and car park areas within the development.

Detention Basins

- 5.32. Detention basins are surface storage basins or facilities that provide flow control through attenuation of stormwater runoff. They also facilitate some settling of particulate pollutants.
- 5.33. Detention basins can be vegetated depressions or hard landscaped storage areas. They are normally dry except during and immediately following storm events.
- 5.34. A detention basin is proposed in the northeast of the Site which will discharge to an existing surface water body located adjacent to the Site boundary.



Downpipe Planters

- 5.35. Downpipe planters can be provided on all proposed buildings to provide additional treatment to surface water runoff from roofs.
- 5.36. Downpipe planters work by water in the downpipe being directed into a planter. The soil/compost absorbs and stores the rainwater for the plants to use. Excess rainwater filters into the gravel layer and drains out the base drainage pipe. Any water that pools on the surface drains down the overflow upstand.

Water Quality Management

- 5.37. CIRIA C753 states that “wherever possible, when discharging runoff from the site to surface waters, SuDS should be designed to intercept (i.e. prevent) runoff (and the associated pollutants) for most rainfall events approximately 5mm in depth”.
- 5.38. When runoff does occur, treatment within SuDS components is essential for frequent rainfall events, for example up to a 1:1 year return period event, where urban contaminants are being mobilised and washed off urban surfaces, and the aggregated contribution to the total pollutant load to the receiving body is potentially high.
- 5.39. **Table 9** details the pollution hazard indices for the Site as stated by CIRIA C753. The indices range from 0 (no pollution hazard for this contaminant type) to 1 (high pollution hazard for this contaminant type).

Table 9: Pollution Hazard indices for different land use classifications

Land Use	Pollution Hazard	Total Suspended solids (TSS)	Metals	Hydro-carbons
Individual property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4
Total	-	0.5	0.4	0.4

- 5.40. To deliver adequate treatment, selected SuDS components must have a total pollution index (for each contaminant type) that equals or exceeds the pollution hazard index. Where two or more SuDS components are being used in combination, a factor of 0.5 is applied to account for the reduced performance of



secondary or tertiary components associated with already reduced inflow concentrations.

Total SuDS mitigation index = mitigation index1 + 0.5 (mitigation index2)

- 5.41. **Table 10** lists the mitigation provided by each SuDS component and shows that sufficient measures are provided for within the Site using the above calculation.

Table 10: Indicative SuDS mitigation indices for discharges to surface waters.

SuDS Component	Total Suspended solids (TSS)	Metals	Hydro- carbons
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6

- 5.42. Runoff from areas of the Site will at a minimum drain through one treatment stage which alone has a mitigation index which equals/exceeds the pollution hazard index for the Site.
- 5.43. It is considered that sufficient pollution treatment is provided within the proposed SuDS Management Train, minimising risk to water quality and to the receiving water bodies from the Site.

Maintenance

- 5.44. The long-term management of surface water drainage assets, including any SuDS components, is essential to ensure they continue to function to their design standard. As such, a management and maintenance plan will need to be developed in order to ensure the systems continue to work effectively.
- 5.45. A maintenance schedule (indicating with whom any responsibilities lie) will need to be produced as part of the detailed design works. Maintenance responsibilities will be with a management company. Management and maintenance schedules for the proposed SuDS features on-site are included within **Appendix I**.



6.0 WASTEWATER DRAINAGE STRATEGY

- 6.1. TWUL sewer records indicate that there is a 100mm diameter foul sewer located to the south of the Site within Old Forest Road. This sewer then goes to a 150mm diameter sewer within Commons Road.
- 6.2. It is proposed to provide a pumped connection to MHREF 5201, located to the south of the Site within Old Forest Road.
- 6.3. A pre-development enquiry has been submitted to TWUL to determine whether there is sufficient capacity within the existing network to accommodate the proposed development and a response is pending.
- 6.4. TWUL have a duty to serve the development and will be required to undertake modelling work, design a solution and build the necessary improvements to ensure the appropriate upgrades are made if it is determined that there is insufficient capacity within the network.



7.0 SUMMARY & CONCLUSIONS

Summary

- 7.1. A Flood Risk Assessment and Drainage Strategy report has been prepared to inform the preparation of a planning application at Old Forest Road, Winnersh.
- 7.2. This Report presents an assessment of flood risk in accordance with the guidelines set out in National Planning Policy Framework (NPPF) and its National Planning Policy Guidance (PPG). It also refers to, and complies with, DEFRA standard and the policies of the Environment Agency (EA), Wokingham Borough Council (WBC), and Thames Water Utilities Limited (TWUL).

Flood Risk

- 7.3. The EA's 'Flood Map for Planning' shows the Site is located in Flood Zone 1 and therefore is at low risk from fluvial flooding. The majority of the Site is at very low risk of surface water flooding and all residential dwellings have been located within low risk areas. The Site is indicated to be at low risk from all other sources of flooding.

Surface Water Drainage Strategy

- 7.4. The proposed surface water drainage strategy for the development consists of a series of SuDS features such as porous paving and a detention basin.
- 7.5. The proposed SuDS Management Train provides sufficient pollution treatment minimising risk to water quality.

Wastewater

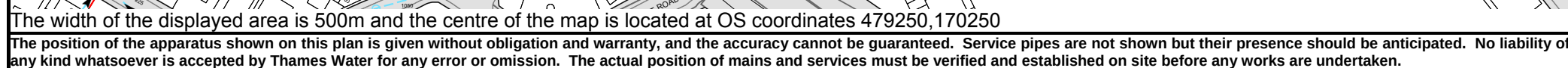
- 7.6. It is proposed to connect via a pumped connection to the existing TWUL foul sewer located to the south of the Site within Old Forest Road.
- 7.7. This report confirms that developing the Site would not increase the risk of flooding within the Site, or elsewhere, and that there is a satisfactory strategy, incorporating sustainable drainage techniques, for the disposal of surface water runoff and wastewater from the proposed development.

Appendix A

Topographical Survey

Appendix B

TWUL Sewer Records and Correspondence

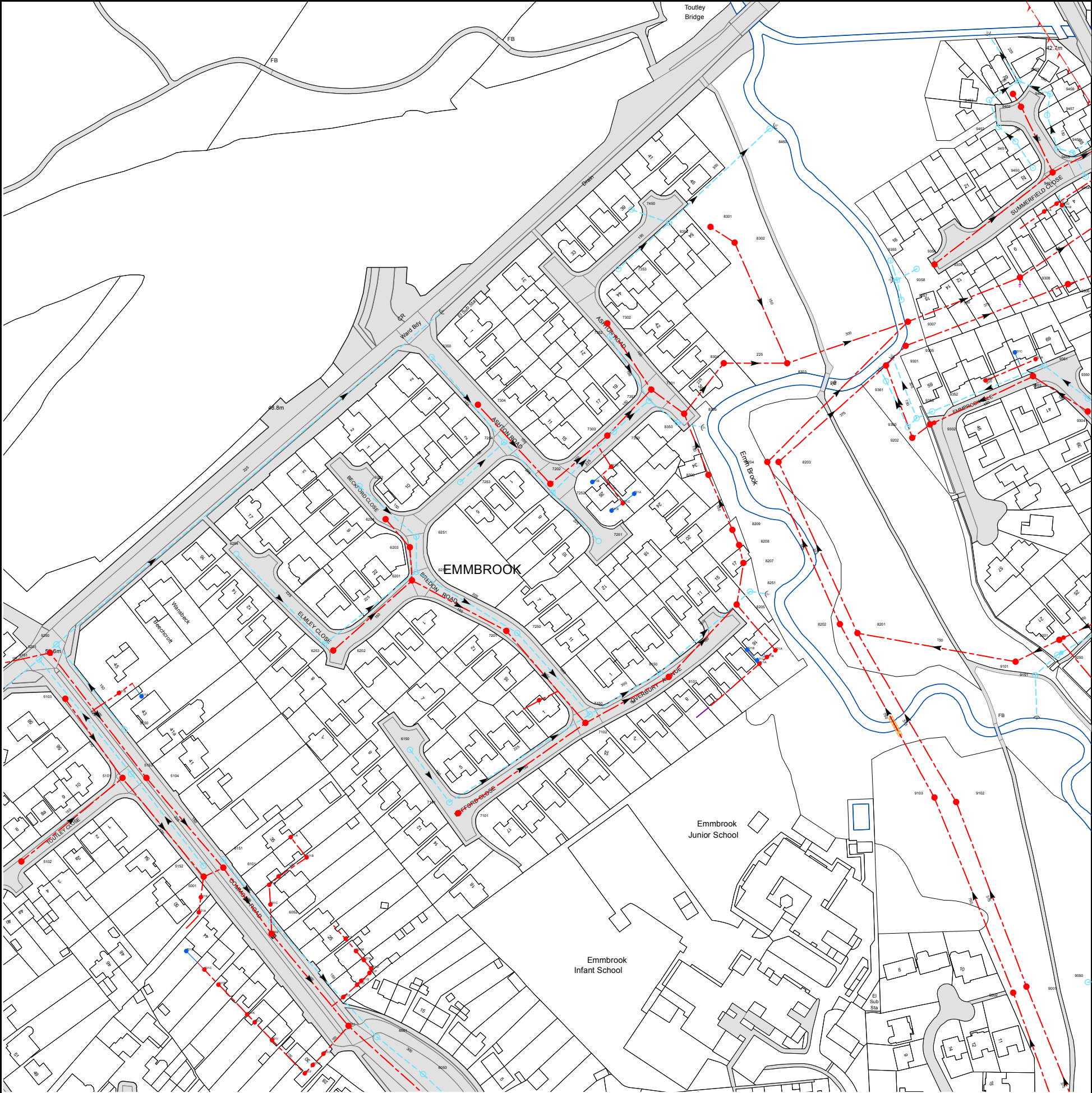


Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
203I	n/a	n/a
203F	n/a	n/a
203E	n/a	n/a
311A	n/a	n/a
301O	n/a	n/a
301K	n/a	n/a
301E	n/a	n/a
301G	n/a	n/a
301C	n/a	n/a
301N	n/a	n/a
301L	n/a	n/a
301Q	n/a	n/a
301S	n/a	n/a
301R	n/a	n/a
301H	n/a	n/a
301I	n/a	n/a
301B	n/a	n/a
301M	n/a	n/a
301A	n/a	n/a
301P	n/a	n/a
3001	53.34	52.67
3002	53.23	52.53
3003	53.09	52.53
4152	52.64	51.49
4150	52.02	50.98
201K	n/a	n/a
201L	n/a	n/a
202Q	53.48	n/a
202R	n/a	n/a
201H	n/a	n/a
202S	n/a	n/a
203S	n/a	n/a
202V	n/a	n/a
202T	n/a	n/a
202U	n/a	n/a
201G	n/a	n/a
202W	n/a	n/a
202X	n/a	n/a
203A	n/a	n/a
201J	n/a	n/a
203B	n/a	n/a
203C	n/a	n/a
202Y	n/a	n/a
201B	n/a	n/a
203H	n/a	n/a
211A	n/a	n/a
202Z	n/a	n/a
201I	n/a	n/a
211C	n/a	n/a
201R	n/a	n/a
203N	n/a	n/a
202B	n/a	n/a
203O	n/a	n/a
201C	n/a	n/a
203P	n/a	n/a
202D	n/a	n/a
202C	n/a	n/a
201A	n/a	n/a
203Q	n/a	n/a
202E	n/a	n/a
202L	n/a	n/a
202J	n/a	n/a
202K	n/a	n/a
201Q	n/a	n/a
202A	n/a	n/a
202O	n/a	n/a
202P	n/a	n/a
201F	n/a	n/a
201P	n/a	n/a
202G	n/a	n/a
201O	n/a	n/a
203G	n/a	n/a
201M	n/a	n/a
203T	n/a	n/a
202I	n/a	n/a
201N	n/a	n/a
202N	n/a	n/a
202M	n/a	n/a
203R	n/a	n/a
4001	52.99	51.99
4050	53.2	51.99
4051	53.49	52.32
411A	n/a	n/a
001A	n/a	n/a
0053	55.37	53.56
001B	n/a	n/a
0051	n/a	n/a
0052	50.62	49.52
001C	n/a	n/a
1052	52.16	50.8
1050	53.11	52.17

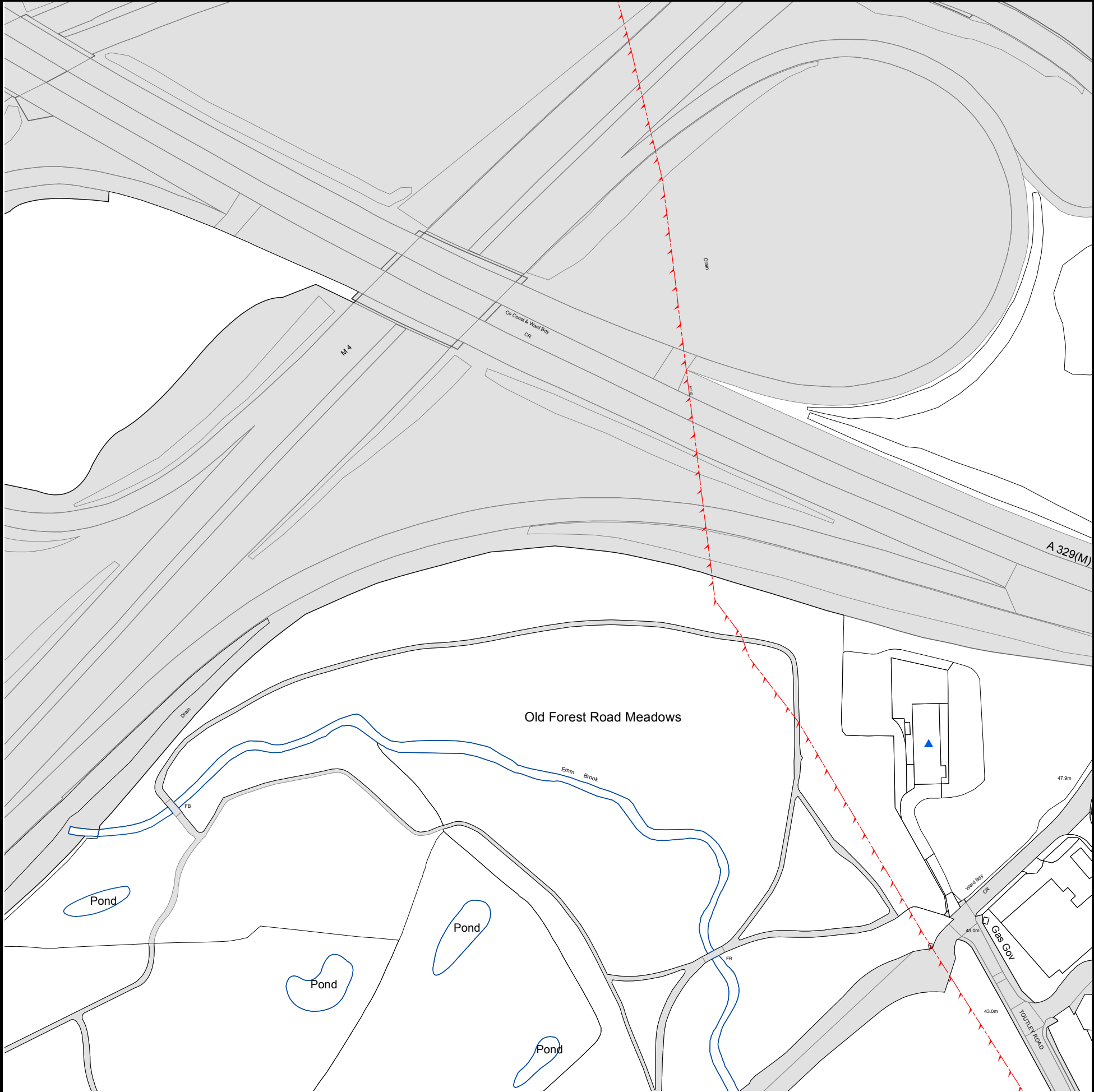
Manhole Reference	Manhole Cover Level	Manhole Invert Level
1053	52.32	51.36
1051	53.28	52.48
101C	n/a	n/a
101A	n/a	n/a
101B	n/a	n/a
101D	n/a	n/a
201W	n/a	n/a
203J	n/a	n/a
201Z	n/a	n/a
201T	n/a	n/a
201Y	n/a	n/a
203K	n/a	n/a
201U	n/a	n/a
201X	n/a	n/a
203L	n/a	n/a
201S	n/a	n/a
0050	50.51	49.03
0057	50.41	48.95
0002	50.48	48.55
0056	n/a	n/a
0055	n/a	n/a
0003	n/a	n/a
0054	55.68	53.6
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8204	42.68	39.68
8450	42	40.95
8203	42.43	40.83
8303	42.18	40.12
9361	42.78	41.48
9301	42.85	40.65
9355	n/a	n/a
9358	43.61	41.75
9357	43.61	41.95
9305	43.01	40.61
9360	43.12	41.68
9307	43.16	39.5
9202	100.38	98.27
9353	43.48	41.74
9356	43.69	42.33
9302	100.93	99.99
9352	100.85	99.47
9309	43.58	41.58
931B	n/a	n/a
9453	42.85	41.74
9452	42.79	41.91
9403	n/a	n/a
931C	n/a	n/a
9451	43.25	42.37
9459	42.95	41.7
9308	45.08	n/a
9402	42.65	41.4
9304	n/a	n/a
9350	n/a	n/a
9303	n/a	n/a
9351	46.15	44.72
931A	n/a	n/a
9306	45.19	40.21
941A	n/a	n/a
941B	n/a	n/a
941D	n/a	n/a
941C	n/a	n/a
9454	43.72	42.7
9401	43.53	40.7
9450	43.55	42.74
9455	43.3	42.35
9456	43.49	42.26
9457	43.14	41.93
9458	42.93	41.82
941E	n/a	n/a
821A	n/a	n/a
8202	42.63	39.69
8201	42.69	40.98
9103	n/a	n/a
9102	n/a	n/a
9101	100.34	99.08
9001	n/a	n/a
9151	100.34	99.13
9250	102.8	101.42
9201	103	101.8
9050	n/a	n/a
9002	n/a	n/a
8101	44.84	43.22
8150	45.01	43.14
811A	n/a	n/a
811C	n/a	n/a
811B	n/a	n/a
821B	n/a	n/a
8205	43.53	42.18
8251	43.44	42.37
8207	n/a	n/a
8208	43.16	41.85
8209	43.05	n/a
721E	n/a	n/a
721C	n/a	n/a
721A	n/a	n/a
8206	42.98	41.48
721D	n/a	n/a
7350	44.37	42.79
8350	43.01	41.66
8305	42.95	41.15
7351	43.22	42
7301	43.2	41.63
8304	42.36	40.47
7352	43.73	42.44
7302	43.78	42.18
7353	43.77	42.4
8302	42.31	40.91
8301	42.3	41.1
8352	42.93	41.6
7450	43.27	41.91
5150	50.8	n/a
5153	50.85	49.77
511A	n/a	n/a
6254	48.62	47.39

Manhole Reference	Manhole Cover Level	Manhole Invert Level
6253	48.87	46.77
6202	48.85	46.91
6252	48.06	46.7
6204	47.92	46.29
6150	49.04	47.7
6203	48.08	46.02
6201	48.31	45.8
6251	48.1	46.26
6250	48.31	46.11
6350	n/a	n/a
7253	47.43	46.06
7304	46.44	44.66
7254	46.14	44.34
7201	47.61	45.19
7250	47.67	45.49
711A	n/a	n/a
7202	45.84	44.04
7252	45.81	43.79
7102	46.8	44.56
7150	46.74	44.93
721B	n/a	n/a
7251	45.63	44.16
7303	44.5	42.75
601D	n/a	n/a
501B	n/a	n/a
601Q	n/a	n/a
601P	n/a	n/a
501C	n/a	n/a
601N	n/a	n/a
601M	n/a	n/a
501D	n/a	n/a
601L	n/a	n/a
6002	51.41	47.7
6052	51.5	50.58
501A	n/a	n/a
601C	n/a	n/a
501E	n/a	n/a
601B	n/a	n/a
5001	51.3	48.37
601A	n/a	n/a
6101	51.32	47.93
5152	51.26	50.41
6151	n/a	n/a
611B	n/a	n/a
611A	n/a	n/a
7101	48.86	47.97
7151	48.87	47.19
5104	50.9	48.26
5101	50.89	49.49
5102	51.52	50.14
5151	50.35	49.46
5201	50.28	49.29
5250	50.3	49.37
5103	50.48	49.77
511B	n/a	n/a
601G	n/a	n/a
601E	n/a	n/a
6001	51.06	47.36
6051	51.11	49.96
6050	50.86	49.77
601K	n/a	n/a
601J	n/a	n/a
601I	n/a	n/a
601F	n/a	n/a
601H	n/a	n/a
601O	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 479750,170750

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
n/a	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

	Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Storm Sewer
	Sludge Sewer
	Foul Trunk Sewer
	Surface Trunk Sewer
	Combined Trunk Sewer
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Vacuum
	Thames Water Proposed
	Vent Pipe
	Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

	Sewer		Culverted Watercourse
	Proposed		Decommissioned Sewer
	Content of this drainage network is currently unknown		Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve		Meter
	Dam Chase		Vent
	Fitting		

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Ancillary		Drop Pipe
	Control Valve		Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Inlet		Outfall
	Undefined End		

Other Symbols

Symbols used on maps which do not fall under other general categories.

	Change of Characteristic Indicator		Public / Private Pumping Station
	Invert Level		Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Chamber
	Operational Site

Ducts or Crossings

	Casement	Ducts may contain high voltage cables. Please check with Thames Water.
	Conduit Bridge	
	Subway	
	Tunnel	

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

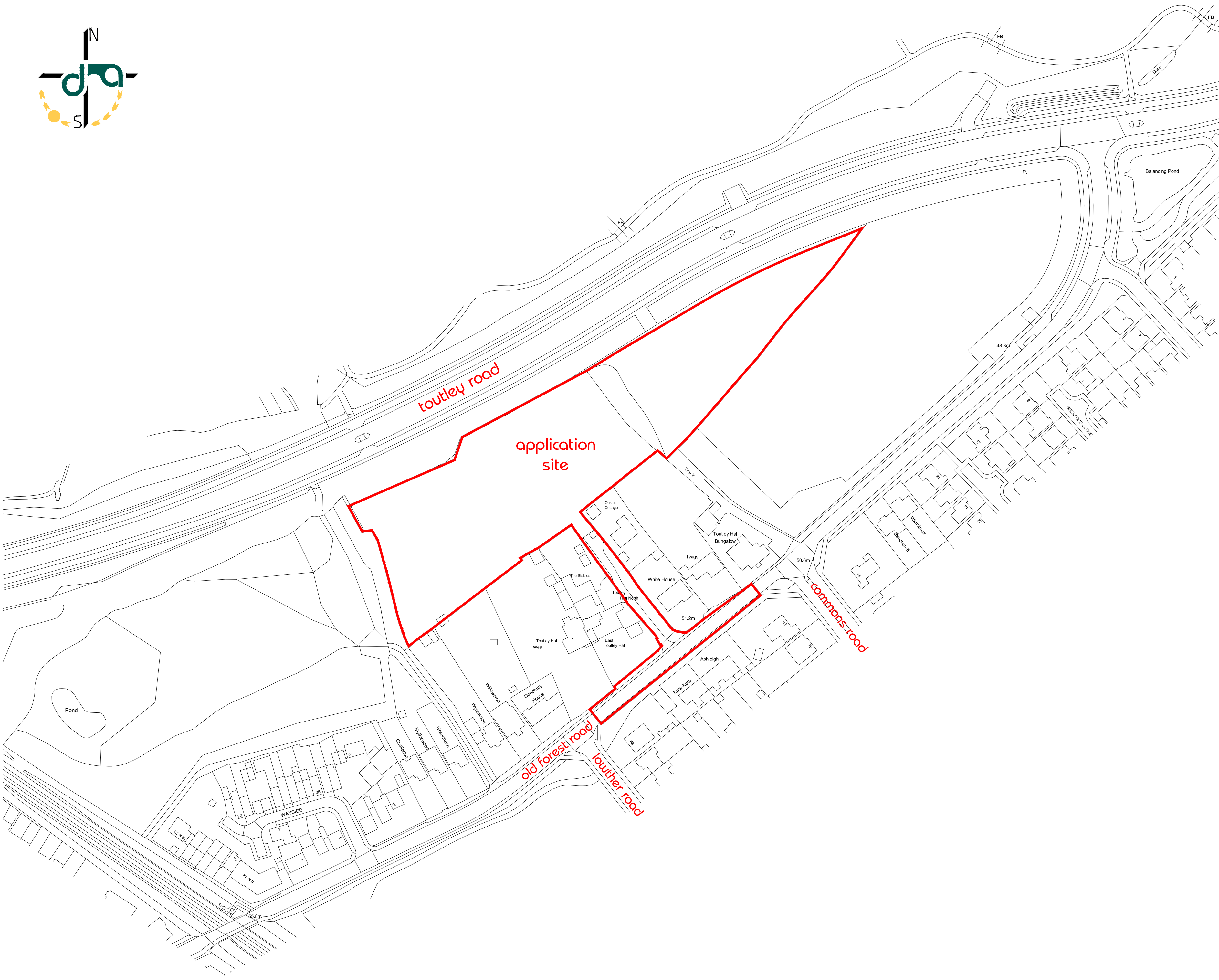
Appendix C

Development Proposals



ELSTREELAND

land at
old forrest road
wokingham



revdatebynotes

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1 : 1250 @ A2

created
context

16.05.2025
JEH

10m60m40m30m20m10m

location
plan

092404-ELS-06





ELSTREELAND

land at
old forest road
wokingham

SCHEDULE OF ACCOMMODATION		
Housetype	Description	Qty
Private		
2BA	2 Bed Apartment	6
2A	2 Bed House	2
2B	2 Bed House	3
3A	3 Bed House	6
3B	3 Bed House	1
3C	3 Bed House	1
3D	3 Bed House	1
4A	4 Bed House	4
4B	4 Bed House	2
4C	4 Bed House	2
4D	4 Bed House with integ garage	1
4E	4 Bed House with integ garage	3
Private Total		32
% of Total (Private)		60%
Affordable		
1BA	1 Bed Apartment	10
2BA	2 Bed Apartment	6
3AA	3 Bed House	5
Affordable Total		21
% of Total (Affordable)		40%
Overall Total		53

rev date by notes
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1 : 500 @ A1 created contact: 30.05.2025 JcH



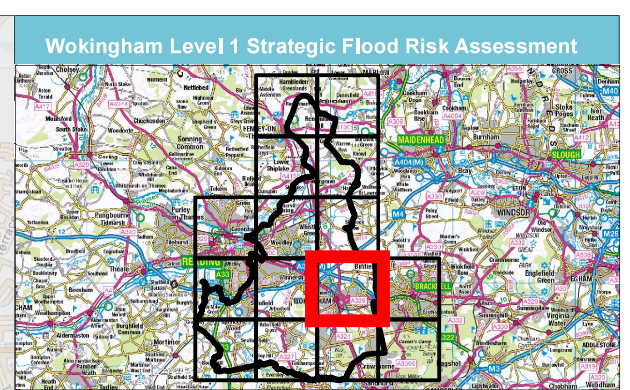
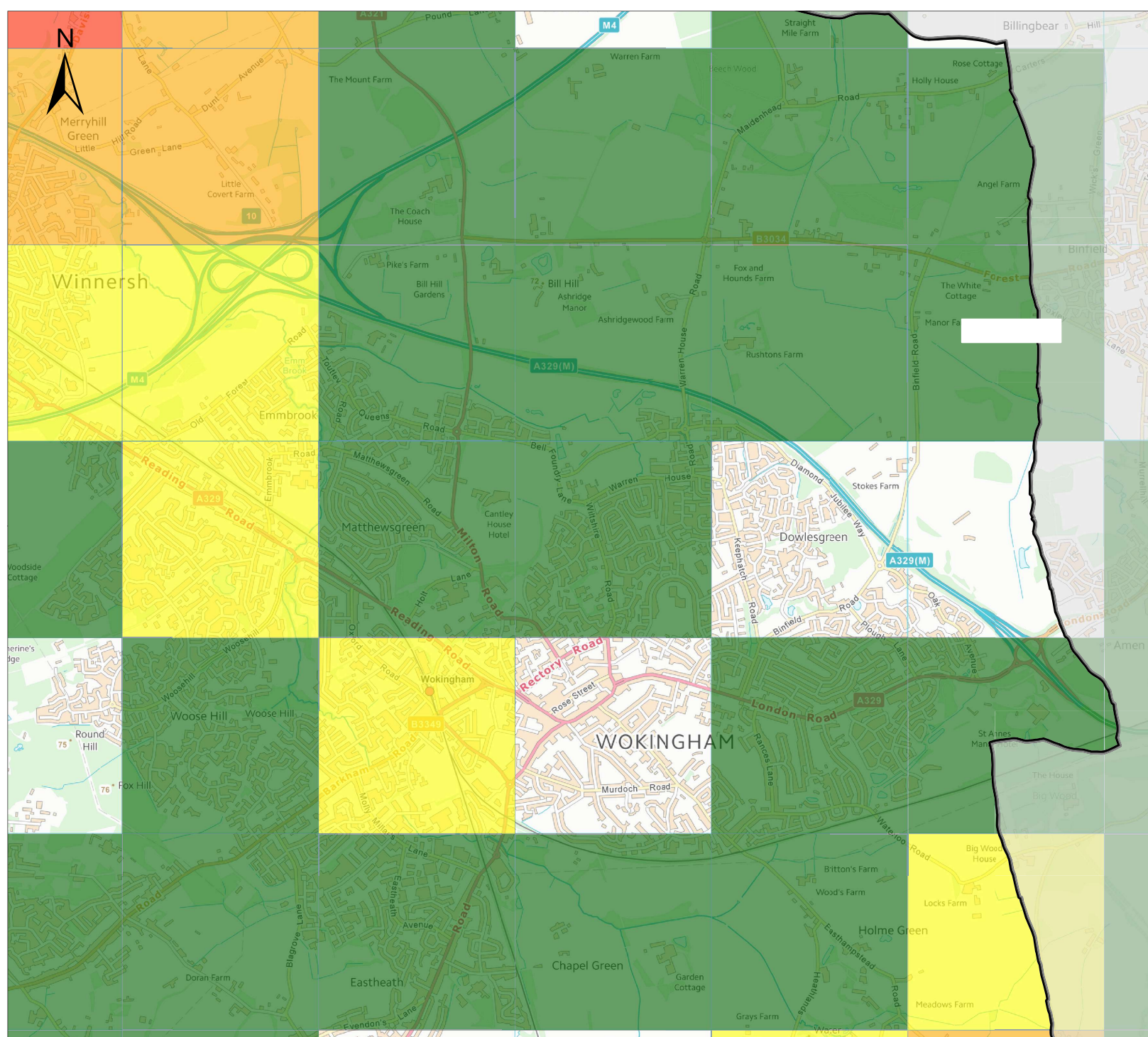
presentation
planning
layout

092404-ELS-01



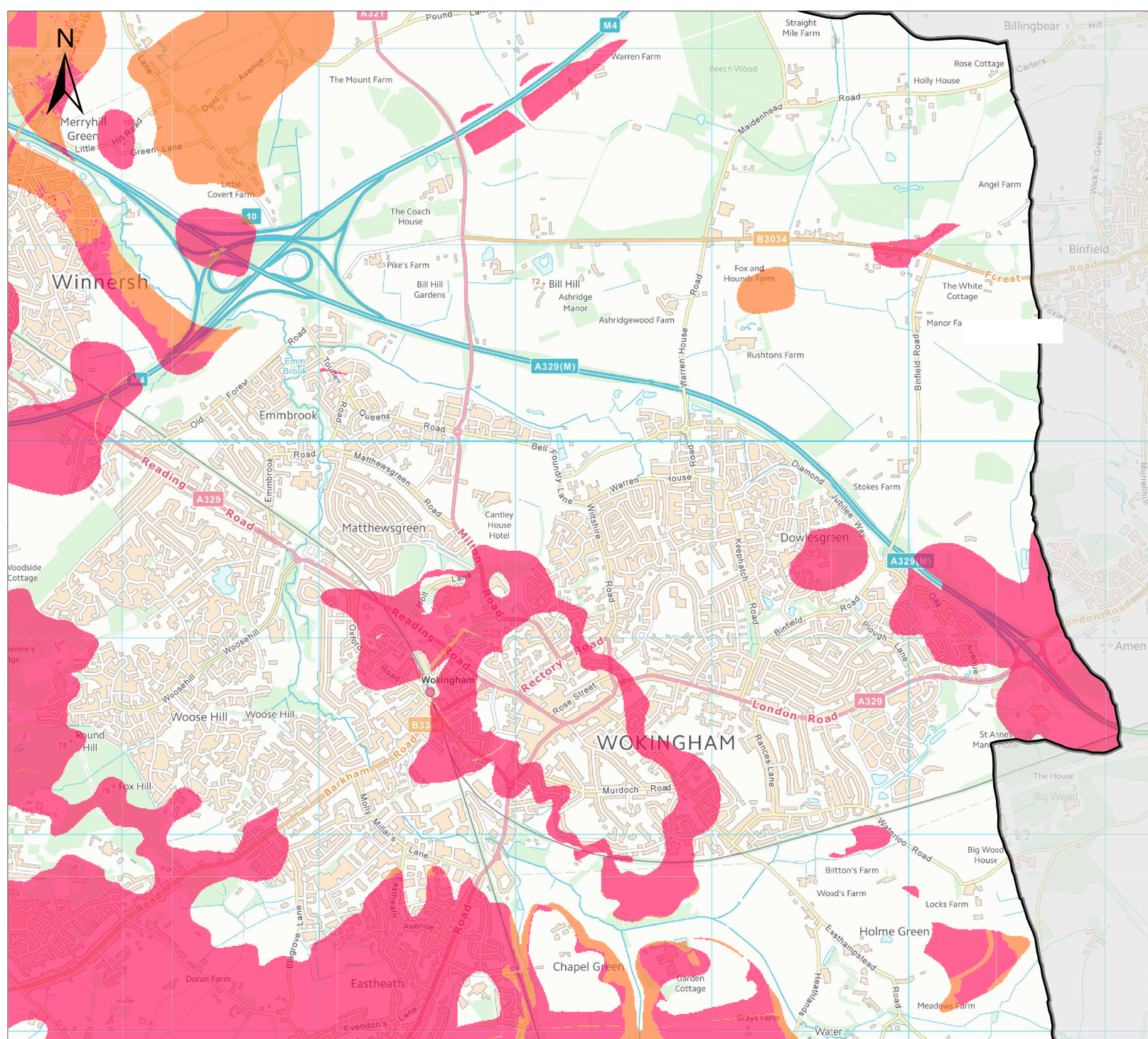
Appendix D

SFRA Extracts

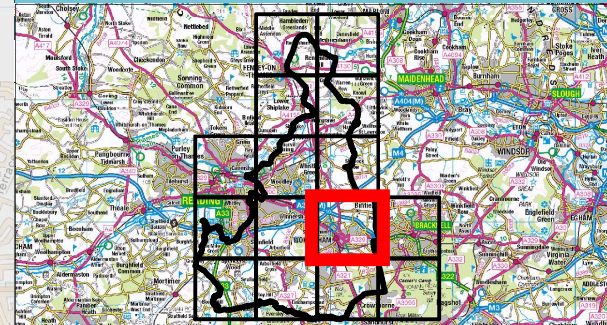


Legend
 Wokingham Borough Council boundary
Watercourses
 Main Rivers
 All Watercourses
Fluvial Flood Zones
 Indicative Flood Zone 3b
 Flood Zone 3b
 Flood Zone 3a
 Flood Zone 2
Fluvial Flood Extent with Climate Change
 1% AEP with Central Climate Change allowance
 1% AEP with Higher Central Climate Change allowance
Risk of Flooding from Surface Water
Surface Water Extent
 3.3% AEP
 1% AEP
 0.1% AEP
Surface Water Extent plus climate change
 3.3% AEP plus 35% Climate Change
 1% AEP plus 40% Climate Change

Risk of Groundwater Flooding
EA Areas Susceptible to Groundwater Flooding
 < 25%
 >= 25% < 50%
 >= 50% < 75%
 >= 75%
JBA Groundwater Emergence Map (5m Resolution)
Depth below ground surface
 Less than 0.025m below surface
 Between 0.025m - 0.5m below surface
 Between 0.5m - 5m below surface
 At least 5m below surface
 No risk
Risk of Flooding from Reservoirs
 Wet Day
 Dry Day
Flood Defences
 Demountable Defence
 Embankment
 Wall
 Natural High Ground
Flood Mitigation
 Flood Alert Areas
 Flood Warning Areas
Flood History
 EA Historic Flood map



Wokingham Level 1 Strategic Flood Risk Assessment



Legend

- Wokingham Borough Council boundary

Watercourses

- Main Rivers
- All Watercourses

Fluvial Flood Zones

- Indicative Flood Zone 3b
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

Fluvial Flood Extent with Climate Change

- 1% AEP with Central Climate Change allowance
- 1% AEP with Higher Central Climate Change allowance

Risk of Flooding from Surface Water

Surface Water Extent

- 3.3% AEP
- 1% AEP
- 0.1% AEP

Surface Water Extent plus climate change

- 3.3% AEP plus 35% Climate Change
- 1% AEP plus 40% Climate Change

Risk of Groundwater Flooding

EA Areas Susceptible to Groundwater Flooding

- < 25%
- >= 25% < 50%
- >= 50% < 75%
- >= 75%

JBA Groundwater Emergence Map (5m Resolution)

Depth below ground surface

- Less than 0.025m below surface
- Between 0.025m - 0.5m below surface
- Between 0.5m - 5m below surface
- At least 5m below surface
- No risk

Risk of Flooding from Reservoirs

- Wet Day
- Dry Day

Flood Defences

- Demountable Defence
- Embankment
- Wall
- Natural High Ground

Flood Mitigation

- Flood Alert Areas
- Flood Warning Areas

Flood History

- EA Historic Flood map

Notes

Please see the accompanying user guide of the SFRA report for further guidance on the sources of data included within the map. This map should be opened using Adobe Acrobat Reader.