



Infrastruct CS Ltd
The Stable
High Cogges Farm
High Cogges
Nr Witney
Oxon
OX29 6UN

FLOOD RISK ASSESSMENT

Scheme name:
Ready Power House, Molly Millar's Lane,
Wokingham, Berks, RG41 2QP

Document reference: **6314-MILL-ICS-XX-RP-C-07.001**

Report Prepared By:
Reno Sam Ireanius
MSc, B.Tech, GMICE

Report Checked By:
Richard White
BSc (Hons), CEnv, CWem, IEng, MCIWEM

Report Authorised By:
Mateo Blanco
MEng CEng MICE

April 2025
Project Number: **6314**



Original Date:	23rd April 2025
Project Number:	6314
Project Name:	Ready Power House, Molly Millar's Lane, Wokingham, Berks, RG41 2QP
Prepared By:	Reno Ireanius
Prepared For:	E T Planning

Document Revision Record

Issue	Checked By	Date	Description
Draft	RJW	23rd April 2025	Initial Issue

Foreword

This document has been prepared solely as a Flood Risk Assessment for the Client, E T Planning. No responsibility or liability will be accepted for any use that is made of this document other than by the Client for the purpose for which it was written. The conclusions resulting from this study and contained within this report are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

No person other than the client may copy use or rely on the contents of this document without prior permission.

Some of the information presented within this report is based on third-party information which is believed to be correct; no liability will be accepted for any discrepancies inaccuracies, mistakes or omissions in such information. The report assesses the flood risk in relation to the requirements of the Environment Agency and as such assesses the site for a specific flood event and not all flood events. The contents of this document must not be copied or reproduced in whole or in part without the written consent of Infrastruct CS Ltd.



Table of Contents

1.0	SUMMARY	4
2.0	INTRODUCTION.....	5
2.1	COMMISSION	5
2.2	GUIDANCE	5
2.3	AIMS AND OBJECTIVES.....	5
3.0	SITE DETAILS.....	6
3.1	LOCATION.....	6
3.2	GRID REFERENCE	8
3.3	TOPOGRAPHY AND SITE DESCRIPTION	8
3.4	GROUND CONDITIONS	8
3.5	GROUNDWATER	10
3.6	EXISTING WATERCOURSES.....	10
3.7	ENVIRONMENT AGENCY GROUNDWATER AND AQUIFER PROTECTION	11
4.0	PROPOSED DEVELOPMENT	12
5.0	LOCAL PLANNING POLICY AND GUIDANCE	13
5.1	NATIONAL PLANNING POLICY AND GUIDANCE	13
5.2	WOKINGHAM BOROUGH LOCAL PLAN.....	15
6.0	FLOOD RISK POLICY	16
6.1	ENVIRONMENT AGENCY FLOOD MAP	16
6.2	FLOOD MODELLING RESULTS FOR THE DEVELOPMENT SITE.....	16
6.3	PROPOSED SUBSTATION LEVELS	18
6.4	THE NATIONAL PLANNING POLICY FRAMEWORK	18
6.5	FLOOD ZONE DEFINITION.....	18
6.6	FLOOD ZONES – TABLE 1 PPG.....	19
6.7	FLOOD RISK VULNERABILITY CLASSIFICATION - EXTRACT FROM TABLE 2 PPG	19
6.8	FLOOD RISK VULNERABILITY & FLOOD ZONE COMPATIBILITY TABLE	20
7.0	OTHER SOURCES OF FLOOD RISK TO THE DEVELOPMENT	21
7.1	FLOODING FROM OVERLAND FLOWS.....	21
7.2	FLOODING FROM RISING GROUNDWATER	22
7.3	FLOODING FROM THE LOCAL SEWERAGE NETWORK	23
7.4	FLOODING FROM RESERVOIRS, CANALS & OTHER ARTIFICIAL SOURCES.....	24
8.0	RECOMMENDATIONS AND CONCLUSION	24
9.0	REFERENCES & BIBLIOGRAPHY	24
	APPENDIX A - TOPOGRAPHIC SURVEY	25
	APPENDIX B - DEVELOPMENT PROPOSALS.....	26
	APPENDIX C - FLOOD ZONE MAP	27
	APPENDIX D - PRODUCT 4 REPORT	28

1.0 Summary

A Flood Risk Assessment (FRA) and drainage strategy has been undertaken to accompany the planning application for the placement of a new transformer at Ready Power House, Molly Millar's Lane, Wokingham, Berks, RG41 2QP. Infrastruct CS Ltd has prepared this report on behalf of ET Planning in accordance with the guidelines set out in the National Planning Policy Framework.

The following table is an overview of the flood risk assessment for the proposed development of the site, based upon currently available information, and finds the following –

ITEM	RESPONSE
Site Location	The proposed transformer location is within an industrial estate accessed from Molly Millar's Lane in Wokingham, Berkshire, which is bound to the east by the 'North Downs Line' railway, with Molly Millar's Lane to the south and Ashville Way to the North. The site is 0.5 miles south of Wokingham Railway Station. The approximate grid reference is 480690E, 167934N.
Size and Current Land Usage	The proposed transformer location is approximately 20m ² in plan and is currently a portion of the car park area.
Flood Zone	The proposed transformer location falls entirely within Flood Zone 2, which is classified as medium probability of flooding.
Fluvial Flood Risk	Medium – Refer to Section 6.1
Overland Flood Risk	Low – Refer to Section 7.1
Groundwater Flood Risk	Low – Refer to Section 7.2
Sewerage Flood Risk	Low – Refer to Section 7.3
Artificial Flood Risk	Low – Refer to Section 7.4
Proposed Development	The current proposals involve the placement of a new transformer between the Intersurgical building and its car park.

Based on this assessment, it is concluded that in accordance with the Flood risk vulnerability and flood zone compatibility table in Section 6.7 of the Planning Practice Guidance document, the report considers the proposed development appropriate.



2.0 Introduction

2.1 Commission

E T Planning has commissioned Infrastruct CS Ltd, to prepare a Flood Risk Assessment (FRA) to support a planning application for the re-development at Ready Power House, Molly Millar's Lane, Wokingham, Berks, RG41 2QP.

2.2 Guidance

This flood risk assessment has been compiled in accordance with the recommendations of the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG).

2.3 Aims and Objectives

The purpose of this flood risk assessment is to assess the potential flood risks by and to the proposed development. It will identify the flood risk zone, potential sources of flood risk and will be used to support the proposed planning application.

3.0 Site Details

3.1 Location

The site is within an industrial estate accessed from Molly Millar's Lane in Wokingham, Berkshire, which is bound to the east by the 'North Downs Line' railway, with Molly Millar's Lane to the south and Ashville Way to the North. The site is 0.5 miles south of Wokingham Railway Station. The proposed transformer location is to the north of the Intersurgical building.

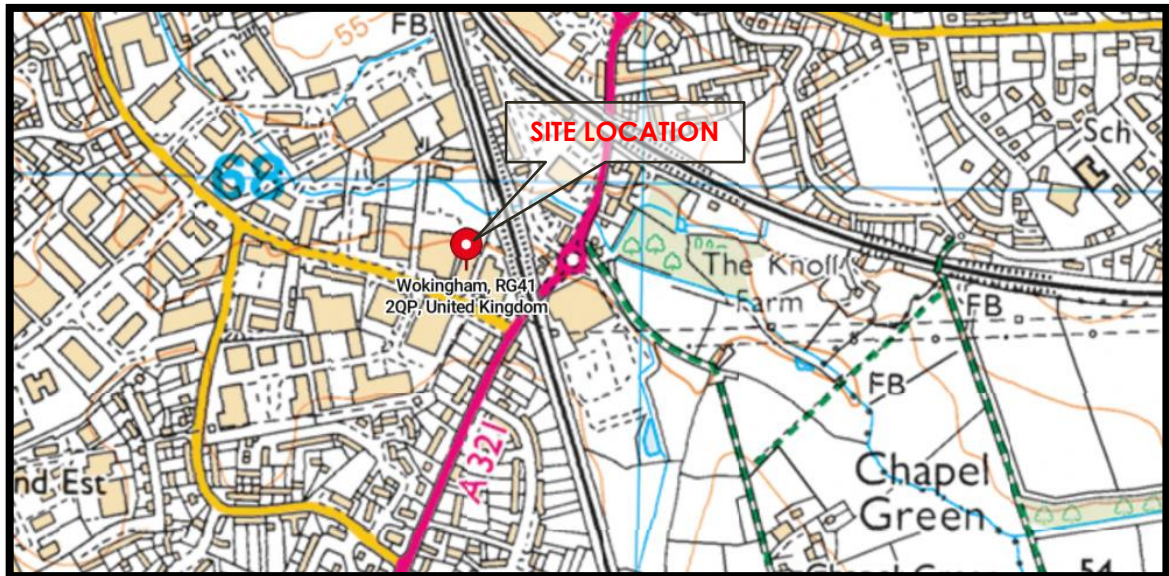


Figure 3.1.1 - Site Context

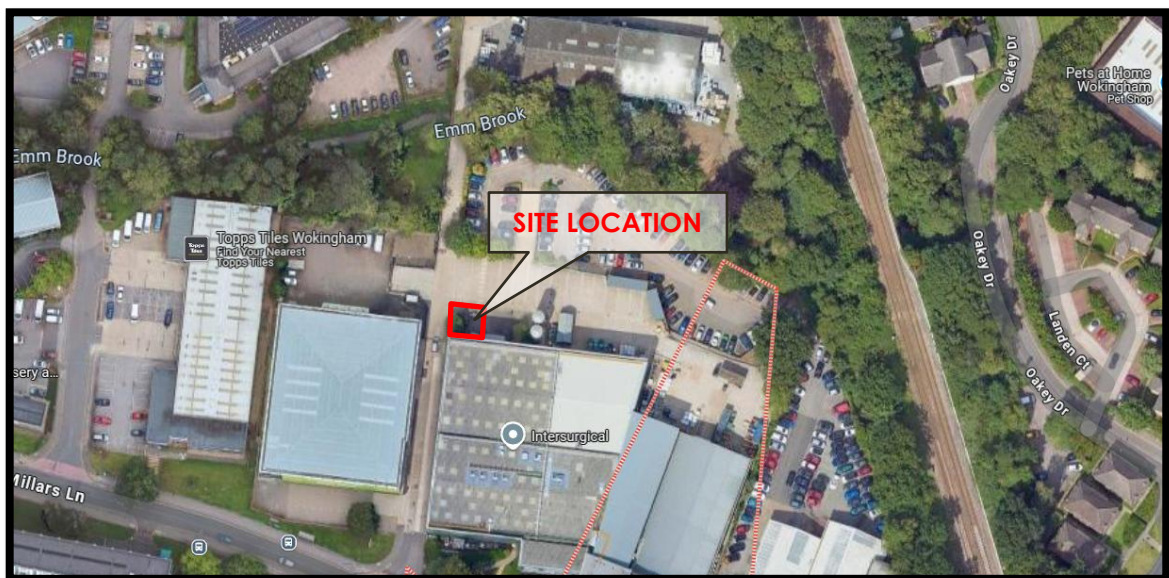


Figure 3.1.2 - Site location



Figure 3.1.3 - Image from Google Earth



Figure 3.1.4 - Image from Google Earth

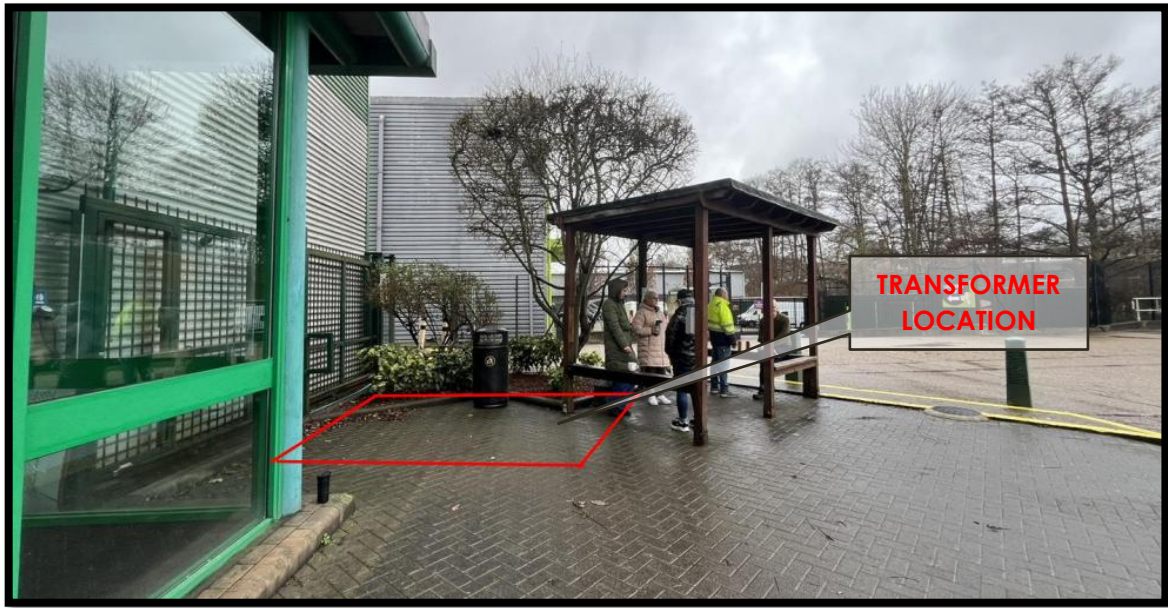


Figure 3.1.5 – Image from Google Earth

3.2 Grid Reference

The Ordnance Survey National grid reference for the centre of the site is:

480690E, 167934N (Nat Grid SU 80690 67934)

3.3 Topography and Site Description

The proposed transformer location covers an approximate area of 20m² and is located at Ready Power House, Molly Millar's Lane, Wokingham, Berks, RG41 2QP.

The current topographic levels of the proposed transformer location is flat. Refer to the Appendix for a copy of the topographic survey.

3.4 Ground Conditions

To date, no intrusive ground investigation has taken place on-site; however, reference to the Geological Survey of Great Britain indicates the following strata:

Superficial deposits: Alluvium - Clay, silt, sand, and gravel. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Head - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period.



Figure 3.4.1 – Superficial Deposit map from BGS online

Bedrock geology: London Clay Formation - Clay, silt and sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period.

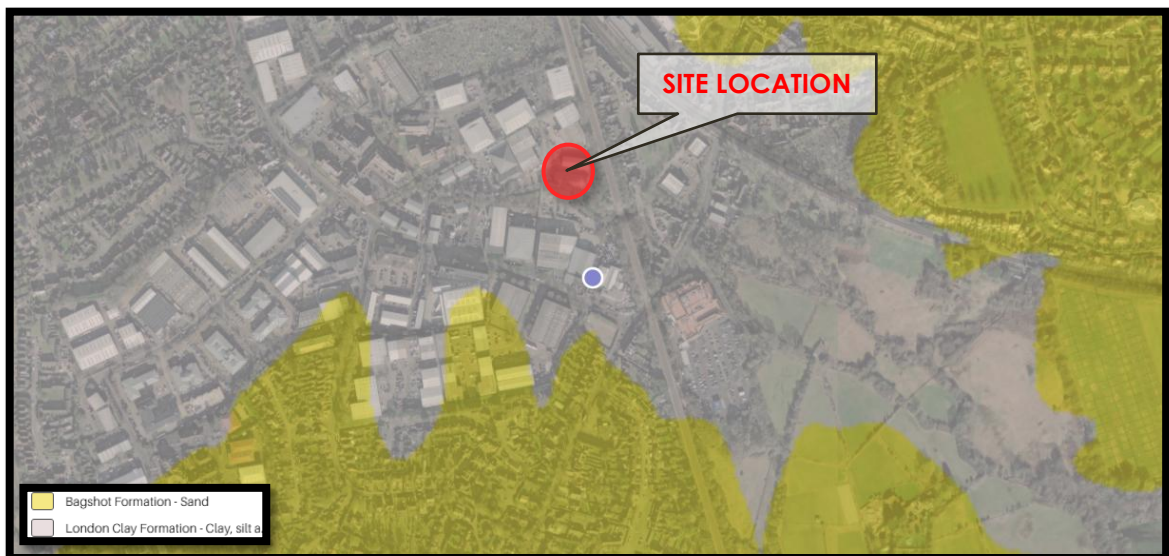


Figure 3.4.2 – Bedrock Deposit map from BGS online

Intrusive site investigations carried out adjacent/near the development and shown on the British Geological Survey database (BGS ID: 432324, BGS Ref: SU86NW5, British NGR: 480860,167900) Showed the following strata:

NATURE OF STRATA (and any additional remarks).	THICKNESS		DEPTH	
	Feet.	Inches.	Feet.	Inches.
Blue Clay	272	-	272	-
Brown Clay	21	-	293	-
Red Clay	5	-	298	-
Silver Sand	17	-	315	-
Grey Sand	3	-	318	-
Loamy Sand	7	-	325	-
Sand and thin Clay band	2	-	327	-
Blue Clay	4	-	331	-
Claystone and Sand	11	-	342	-
Chalk	695	-	1037	-
Sandstone	36	-	1073	-
Blue Marly Sandstone	58	-	1131	-
Gault				
London Clay	272	-	272	-
Reading Bed	73	6	345	6
Upper Chalk	324	6	670	-
Middle Chalk	170	-	840	-
Lower Chalk	194	-	1034	-
Upper Green Sand	56	-	1090	-
Gault	310	-	1400	-

Figure 3.4.2 – Borehole Records from British Geological Survey (BGS ID: 432324, BGS Ref: SU86NW5)

3.5 Groundwater

Boreholes carried out in the vicinity of the site found groundwater within the trial pits at 12.2mbgl. Further in-situ testing is required to confirm the groundwater depth within the site. The anticipated strata for the site do not lend itself to groundwater flooding, with the clay soils acting as a natural aquiclude.

3.6 Existing Watercourses

The nearest main river watercourses to the site are Emm Brook (directly to the south of the existing parking serving Brook House) and Barkham Brook (1.8km to the south-west), tributaries of the River Loddon which is located 4.8km north-west of the site.

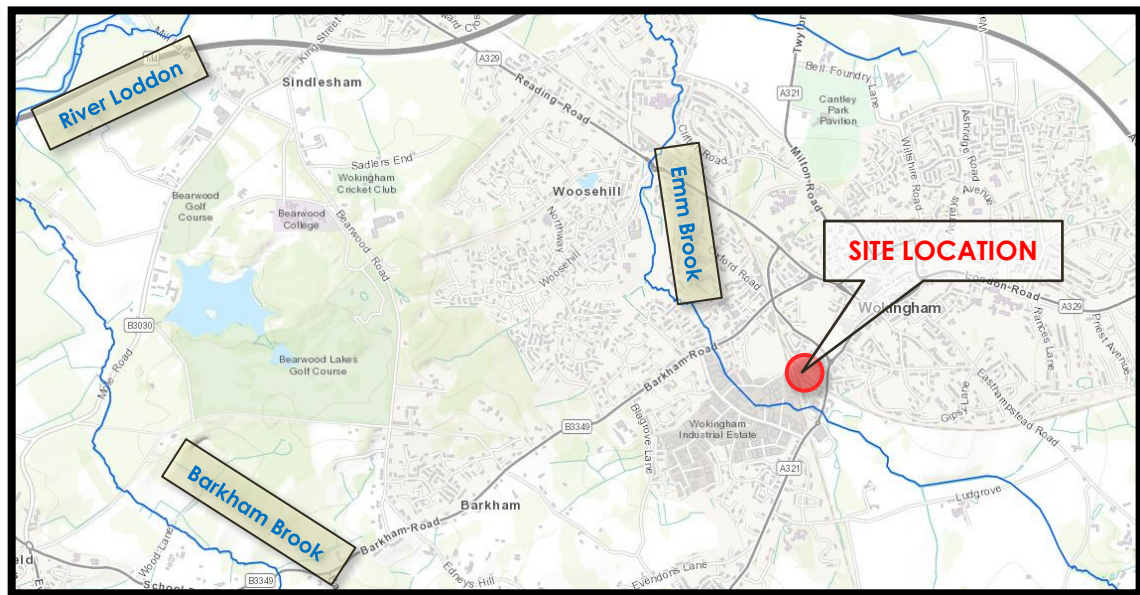


Figure 3.6 – Local Rivers

3.7 Environment Agency Groundwater and Aquifer Protection

Reference to the Environment Agency Groundwater Protection Zone Map shows the area is sited outside all groundwater protection zone. The Environment Agency has defined Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes, and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk.

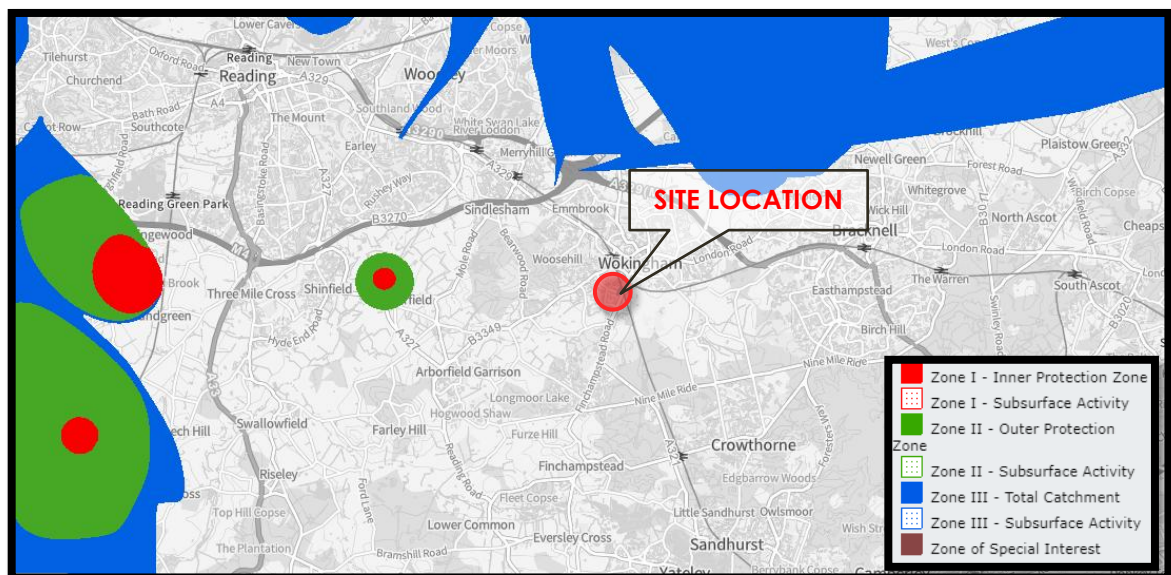


Figure 3.7.1 – Groundwater Protection Zones

The Environment Agency uses the zones to set up pollution prevention measures in areas at a higher risk and to monitor the activities of potential polluters nearby.

A study of the aquifer maps on the Environment Agency website revealed the site to be located within a Secondary A superficial aquifer and bedrock aquifer.

Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale and, in some cases, forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;

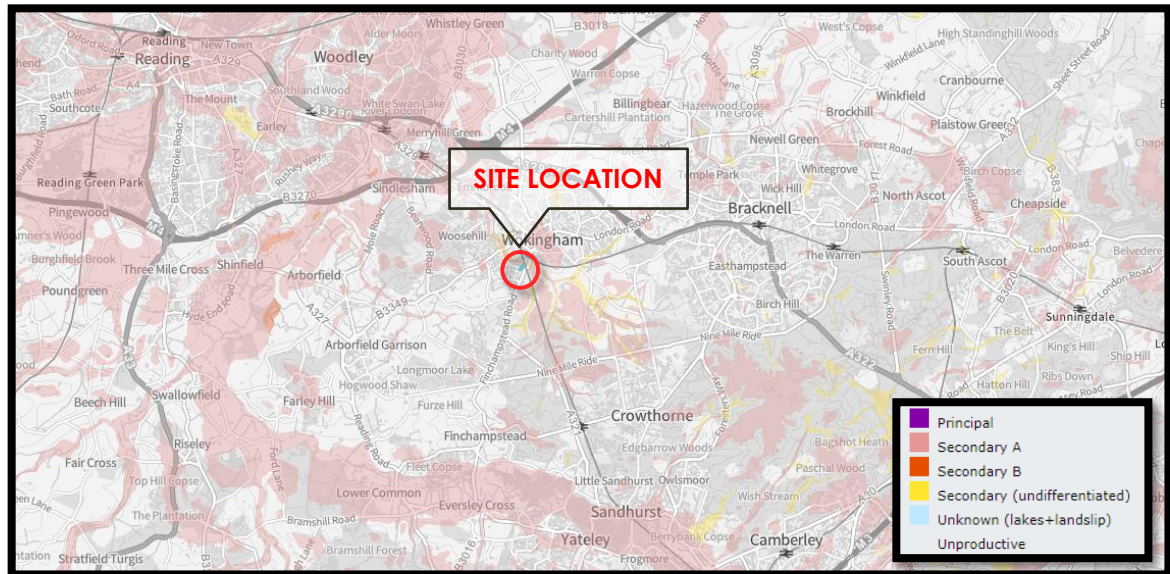


Figure 3.7.2 – Aquifer Designation Map – Superficial

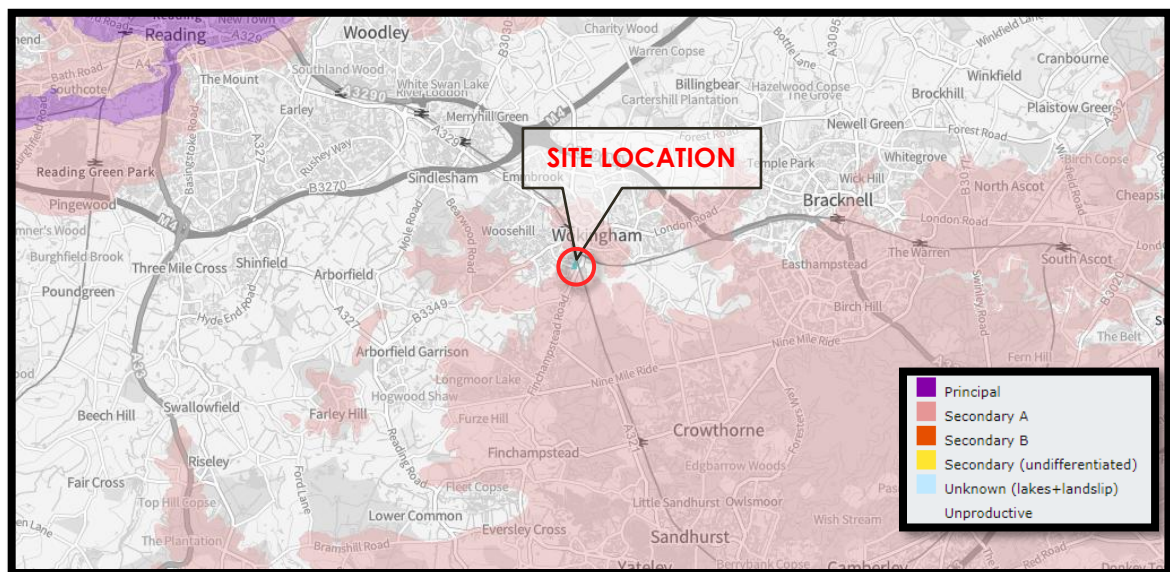


Figure 3.7.3 – Aquifer Designation Map – Bedrock

4.0 Proposed Development

The current proposals involve the placement of new transformer between Intersurgical building and its car park. The proposed development plans can be found in Appendix B.

5.0 Local Planning Policy and Guidance

5.1 National Planning Policy and Guidance

The NPPF sets out government's planning policies for England and how these are expected to be applied. The NPPF seeks to ensure that flood risk is taken into account at all stages in the planning process and is appropriately addressed.

Footnote 63 of the NPPF states that a site-specific flood risk assessment should be submitted for all development proposed in flood zone 2 and flood zone 3 whilst in flood zone 1, an assessment should accompany all proposals involving:

- sites of 1 ha or more;
- land identified as having critical drainage problems or as being at increased flood risk in future;
- or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

NPPF paragraph 170 states that “inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere”.

Paragraph 172 of the NPPF states that all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

- a) applying the sequential test and then, if necessary, the exception test as set out below;
- b) safeguarding land from development that is required, or likely to be required, for current or future flood management;
- c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and
- d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

NPPF paragraph 173 states that “a sequential risk-based approach should also be taken to individual applications in areas known to be at risk now or in future from any form of flooding, by following the steps set out below”.

NPPF paragraph 176 states that “applications for some minor development and changes of use⁶² should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote 63”.

NPPF paragraph 178 states that the application of the exception test should be informed by a strategic or sitespecific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

NPPF Paragraph 179 states that “both elements of the exception test should be satisfied for development to be permitted”.

NPPF paragraph 181 states that “When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.

Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

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

NPPF paragraph 182 states that 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. Sustainable drainage systems provided as part of proposals for major development should:

- a) take account of advice from the Lead Local Flood Authority;
- b) have appropriate proposed minimum operational standards; and
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.

5.2 Wokingham Borough Local Plan

CP1- Sustainable development

Planning permission will be granted for development proposals that:

- 1) Maintain or enhance the high quality of the environment;
- 2) Minimise the emission of pollutants into the wider environment;
- 3) Limit any adverse effects on water quality (including groundwater);
- 4) Ensure the provision of adequate drainage;
- 5) Minimise the consumption and use of resources and provide for recycling;
- 6) Incorporate facilities for recycling of water and waste to help reduce per capita water consumption;
- 7) Avoid areas of best and most versatile agricultural land;
- 8) Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;
- 9) Avoid increasing (and, where possible, reduce) risks of or from all forms of flooding (including from groundwater);
- 10) Provide attractive, functional, accessible, safe, secure and adaptable schemes;
- 11) Demonstrate how they support opportunities for reducing the need to travel, particularly by private car in line with CP6 and
- 12) Contribute towards the goal of reaching zero-carbon developments⁴¹ as soon as possible by:
 - a) Including appropriate on-site renewable energy features and
 - b) Minimising energy and water consumption by measures including the use of appropriate layout and orientation, building form, design and construction, and design to take account of microclimate to minimise carbon dioxide emissions through giving careful consideration to how all aspects of development form.

6.0 Flood Risk Policy

6.1 Environment Agency Flood Map

The flood map for the development site shown below suggests that the proposed transformer location falls within:

Flood Zone 2, which is defined as land assessed as having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river flooding; or land having between a 1 in 200 (0.5%) and 1 in 1,000 (0.1%) annual probability of sea flooding.

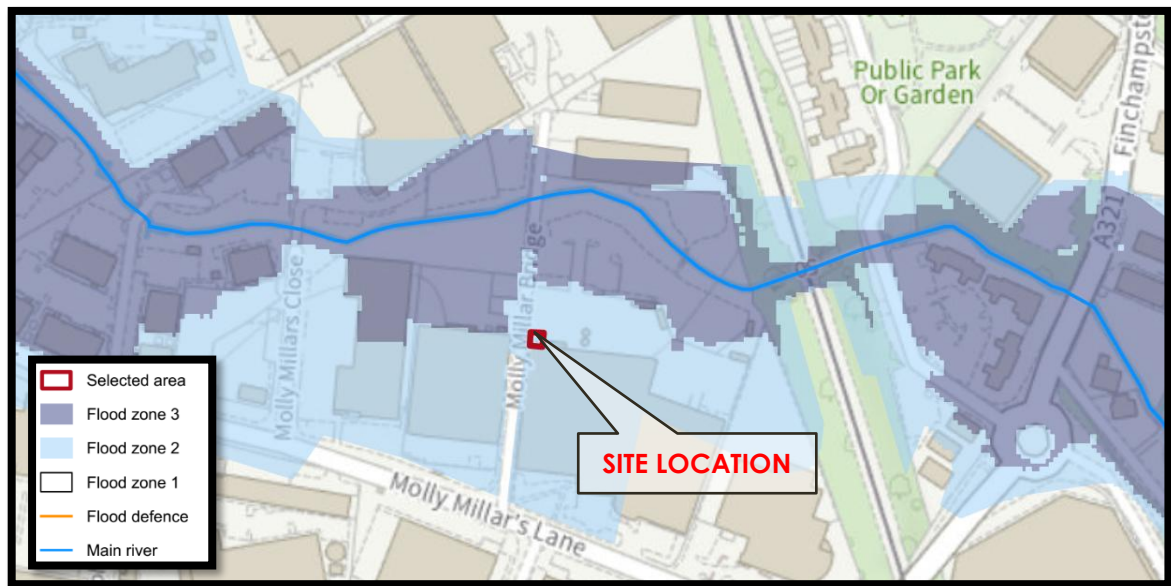


Figure 6.1 - Environment Agency © 2017 - Flood Zone map

It is, therefore, the consideration of this FRA that the site has a **medium** risk of flooding from fluvial sources.

6.2 Flood Modelling Results for the Development Site

As part of the information gathering exercise, a product 4 flood data request was made from the Environment Agency. This document provided specific flood level nodes for the development site, which could then be related to the detailed topographic survey, so an actual flood impact assessment of the site could be made.

The data provided by the Environment Agency was modelled using the Loddon (Lower Tribs) 2007 detailed mapping project and undertaken with the ESTRY TUFLOW modelling software. The site was then further assessed using five model areas: Emm Brook (Wokingham), Emm Brook (Upstream), Ashridge Stream, Waterloo Road Stream. (See full document in Appendix D).

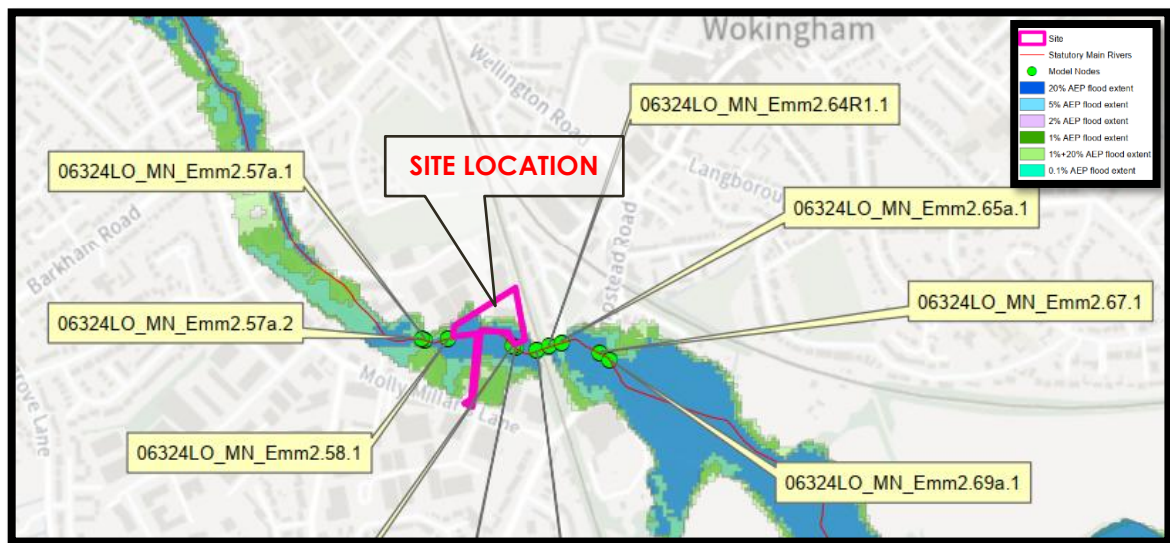


Figure 6.2.1 – Product 4 Report – Node Location

For the basis of this report, the site will be solely assessed on the 1 in 100yr and 1 in 100yr event plus climate change in accordance with the NPPF recommendations.

As such the Environment Agencies flood model for the development site provided the following levels for the 1 in 100yr and 1 in 100yr event plus climate change:

Floodplain Reference	1 in 20yr	1 in 100yr	1 in 100yr + 20% climate change	1 in 100yr + 35% climate change	1 in 100yr + 70% climate change	1 in 1000yr
06324LO_MN_Emm2.61R1.1	49.40m	49.76m	49.94m	-	-	-
06324LO_MN_Emm2.62a.2	49.43m	49.76m	49.95m	-	-	-
06324LO_MN_Emm2.62a.1	49.53m	49.86m	50.03m	-	-	-

As the Product 4 report issued by the Environmental Agency lacks detailed information, the precise extent of Flood Zone 2 remains uncertain. Also, we have interpolated the flood levels to establish a level margin between Flood Zones 3a and 3b.

As illustrated in Image 6.2.2, the flood levels for various return periods have been overlaid onto the topographic survey. Based on this analysis, the proposed transformer location falls within Flood Zone 2, which is considered a safe placement. Additionally, to further enhance safety measures, the transformer will be elevated 600mm above ground level.

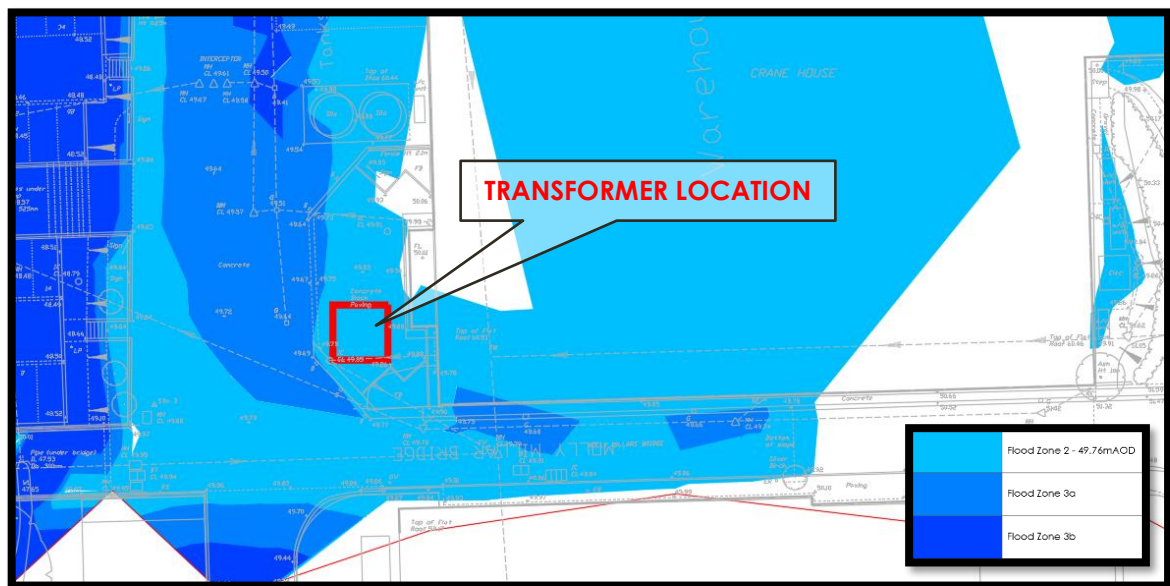


Figure 6.2.2 – Flood Zone map created using civil 3D from product 4 report

Therefore, this FRA states that the site is generally at a **medium risk of flooding from fluvial sources**. However, raising the proposed transformer at 50.25m, 300mm above the 1 in 100 year + 20% event without affecting the floodplain will significantly lower this risk to **very low**.

6.3 Proposed Substation Levels

The substation should be set higher than 50.25m, which is 300mm above the 1 in 100 years + 20% event.

6.4 The National Planning Policy Framework

The National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance (PPG) gives direction for development with respect to flooding. These documents promote a sequential approach to encourage development away from areas that may be or are susceptible to flooding. In doing so it categorizes flood zones in the context of their probability of flooding, as shown in the table within Section 6.3 below.

6.5 Flood Zone Definition

The National Planning Policy Framework Definition of Flood Zones

Flood zone	Fluvial	Tidal	Probability of flooding
1	< 1 in 1000 year	<1 in 1000 year	Low probability
2	Between < 1 in 1000 year and 1 in 100 year	Between <1 in 1000 year and 1 in 200 year	Medium Probability
3a	> 1 in 100 year	> 1 in 200 year	High probability
3b	Either > 1 in 30 (3.3%) or as agreed between the EA and the LPA	Either > 1 in 30 or as agreed between the EA and the LPA	Functional flood plain

6.6 Flood Zones – Table 1 PPG

(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 2 - Medium Probability	
Definition	
	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Appropriate uses	
	Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in (Table 2 NPPF) are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses in Table 2 are only appropriate in this zone if the Exception Test is passed.
FRA requirements	
	All development proposals in this zone should be accompanied by a FRA.
Policy aims	
	In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

6.7 Flood Risk Vulnerability Classification - Extract from Table 2 PPG

Essential infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood.
- Wind turbines.
- Solar farms.

6.8 Flood Risk Vulnerability & Flood Zone Compatibility Table

Vulnerability classification flood zone	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
1	✓	✓	✓	✓	✓
2	✓	Exception test required	✓	✓	✓
3a †	Exception test required (†)	X	Exception test required	✓	✓
3b *	Exception test required (*)	X	X	X	✓ (*)

✓ Development is appropriate X development is not appropriate

Notes to table 2:

- This table does not show the application of the Sequential Test which should be applied first to guide development to the lowest flood risk areas; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to those developments set out in National Planning Policy Framework footnote 62. The Sequential and Exception Tests should be applied to 'major' and 'non major' development;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

"†" In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

"*" In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

The above table, taken from PPG (Table 3), confirms that the proposed transformer location within Flood Zone 2 is an appropriate development.

7.0 Other Sources of Flood Risk to The Development

In addition to the potential for assessing flooding from fluvial and tidal sources NPPF also requires that consideration is given to other mechanisms for flooding:

- Flooding from land – intense rainfall, often in short duration, that is unable to soak into the ground or enter drainage systems, can run rapidly off land and result in local flooding.
- Flooding from groundwater – occurs when water levels in the ground rise above the surface elevations.
- Flooding from sewers – In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater sewers known as combined sewers. Flooding can result causing surcharging when the sewer is overwhelmed by heavy rainfall.
- Flooding from reservoirs, canals and other artificial sources – Non-natural or artificial sources of flooding can result from sources such as reservoirs, canals lakes etc, where water is held above natural ground levels.

7.1 Flooding from Overland Flows

The risk of flooding due to overland flood flows is low by the Environment Agency. The surface water flood data for the site, shown below, indicates that there is high flood risk to the north of the site, but very low risk to the proposed transformer location.

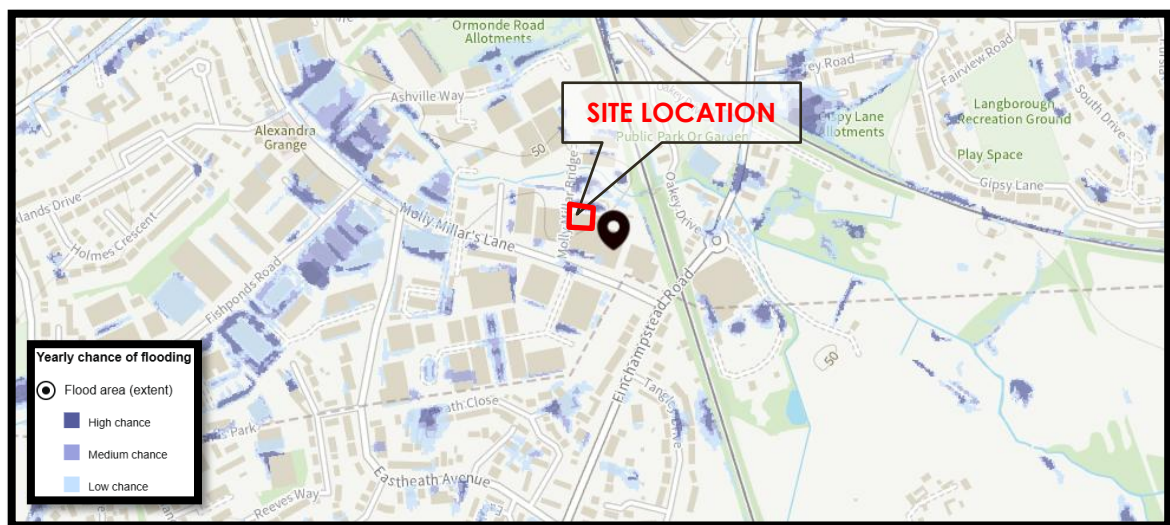


Fig 7.1.1 – Environment Agency © 2017 - Flood Risk from Surface Water map

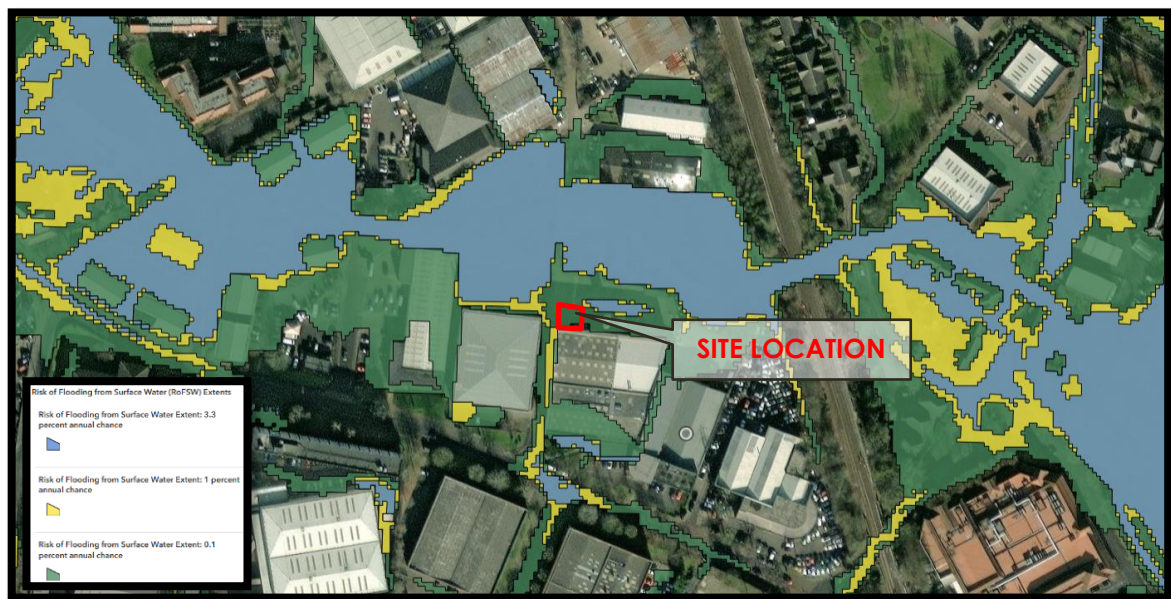


Figure 7.1.2 – Surface Water Flood Zone Map from ArcGIS Map

It is, therefore, the consideration of this FRA that the site has a **low** risk of flooding from overland flows.

7.2 Flooding from Rising Groundwater

Groundwater flooding is dependent on local variations in topography, geology and soils. The causes of groundwater flooding are generally understood; however it is difficult to predict the actual location, timing and extent of groundwater flooding without comprehensive datasets.

There is a lack of reliable measured datasets to undertake flood frequency analysis and even with datasets, this analysis is complicated due to the non-independence of groundwater level data. Surface water flooding incidents are sometimes mistaken for groundwater flooding incidents, such as where runoff via infiltration seeps from an embankment, rather than locally high groundwater levels.

Section 3.5 of this report confirms that boreholes carried out in the vicinity of the site and, found groundwater at approximate depths of 12.2mbgl. Further testing is recommended to establish the groundwater levels along the whole site so the infiltration capacity if the SuDS features is not affected.

The Strategic Flood Risk Assessment by Wokingham Borough Council includes a map, that illustrates areas vulnerable to groundwater flooding (Figure 7.2). It indicates that the proposed site has a lower susceptibility to groundwater flooding.

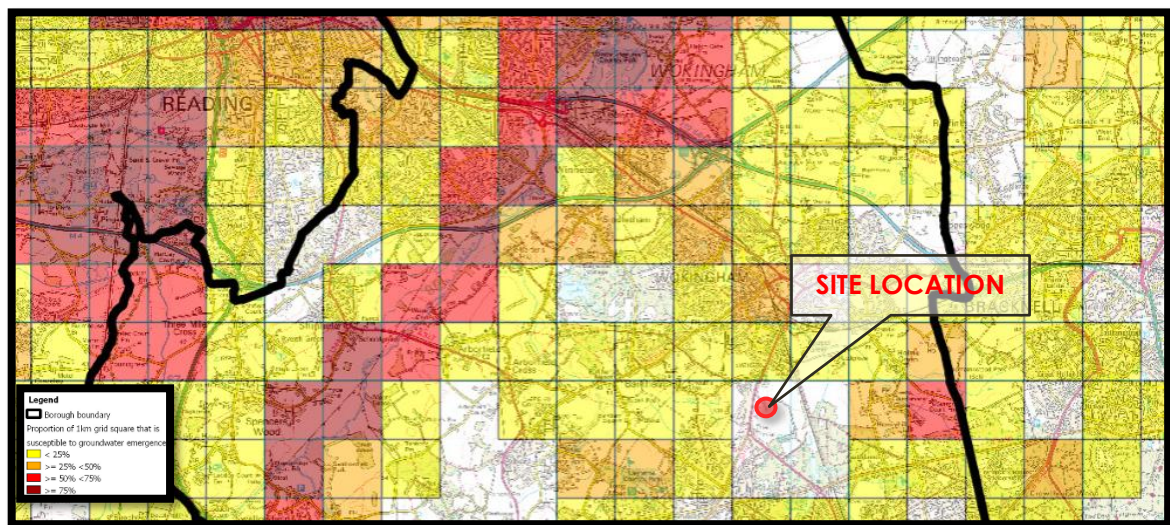


Figure 7.2 – Area susceptible to groundwater flooding – SFRA by Wokingham Borough Council

It is, therefore, the consideration of this FRA that the site has a **low** risk of flooding from rising groundwater levels.

7.3 Flooding from the Local Sewerage Network

Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding from sewers can also occur as a result of blockage, poor maintenance or structural failure.

As the site is at a higher elevation than the road, it is likely that any sewer flooding would be contained within the public highway, away from the development.

It should be noted that much of the wider adopted sewer network dates back even to Victorian times, some of which is of unknown capacity and condition. More recent sewers are likely to have been designed to the guidelines in 'Sewers for Adoption' (WRC, 2006). These sewers tend to have a design standard of up to the 1 in 30 year storm event, although in many cases, it is thought that this design standard is not achieved, especially in privately owned systems.

There is, therefore, potential that parts of the existing sewer system could surcharge during large, high intensity rainstorm events resulting in frequent flooding, particularly if the systems are combined and if climate change forecasts are correct.

The on-site drainage has been subject to a CCTV survey, showing the sewers to generally be in a good condition.

The surface Water system, discharging to the Emm Brook appears to be in an acceptable condition, taking flows from the immediate surroundings.

According to the EA and Wokingham Borough Council, the nearest land drainage flooding incidents to the site are located at Denmark Street (A321) approximately 515m northeast and one at Barkham Road approximately 550m northwest of the site.

Localised flooding is possible if the capacity of the existing drainage network is exceeded.

It is, therefore, the consideration of this FRA that the site has a **low** risk of flooding by surcharging of the local sewer network.

7.4 Flooding from Reservoirs, Canals & Other Artificial Sources

Reservoirs in the UK have an extremely good safety record. The EA is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected, and essential safety work is carried out. These reservoirs therefore present a minimal risk.

Flooding may result from the failure of engineering installations including flood defence, land drainage pumps, sluice gates and floodgates. Hard defences may fail through the slow deterioration of structural components such as the rusting of sheet piling, erosion of concrete reinforcement and toe protection or the failure of ground anchors. This deterioration can be difficult to detect, so that failure, when it occurs, is often sudden and unexpected. Failure is more likely when the structure is under maximum stress, such as extreme fluvial events.

It must be noted that the EA have mapped the maximum flood extent in the event of reservoir breach. Their maps are an absolute worst-case scenario, which assumes reservoirs are full at the time of breach, that there are no emergency reservoir operating measures and that lots of different reservoirs fail at the same time.

There are no known reservoirs, canals or other artificial sources in the vicinity of the site.

It is, therefore, the consideration of this FRA that the site has a low risk of flooding by reservoirs, canals or other artificial sources.

8.0 Recommendations and Conclusion

Flood risk to the site has been assessed, and where risks have been deemed above low, mitigation measures have been proposed to reduce the risk to the site.

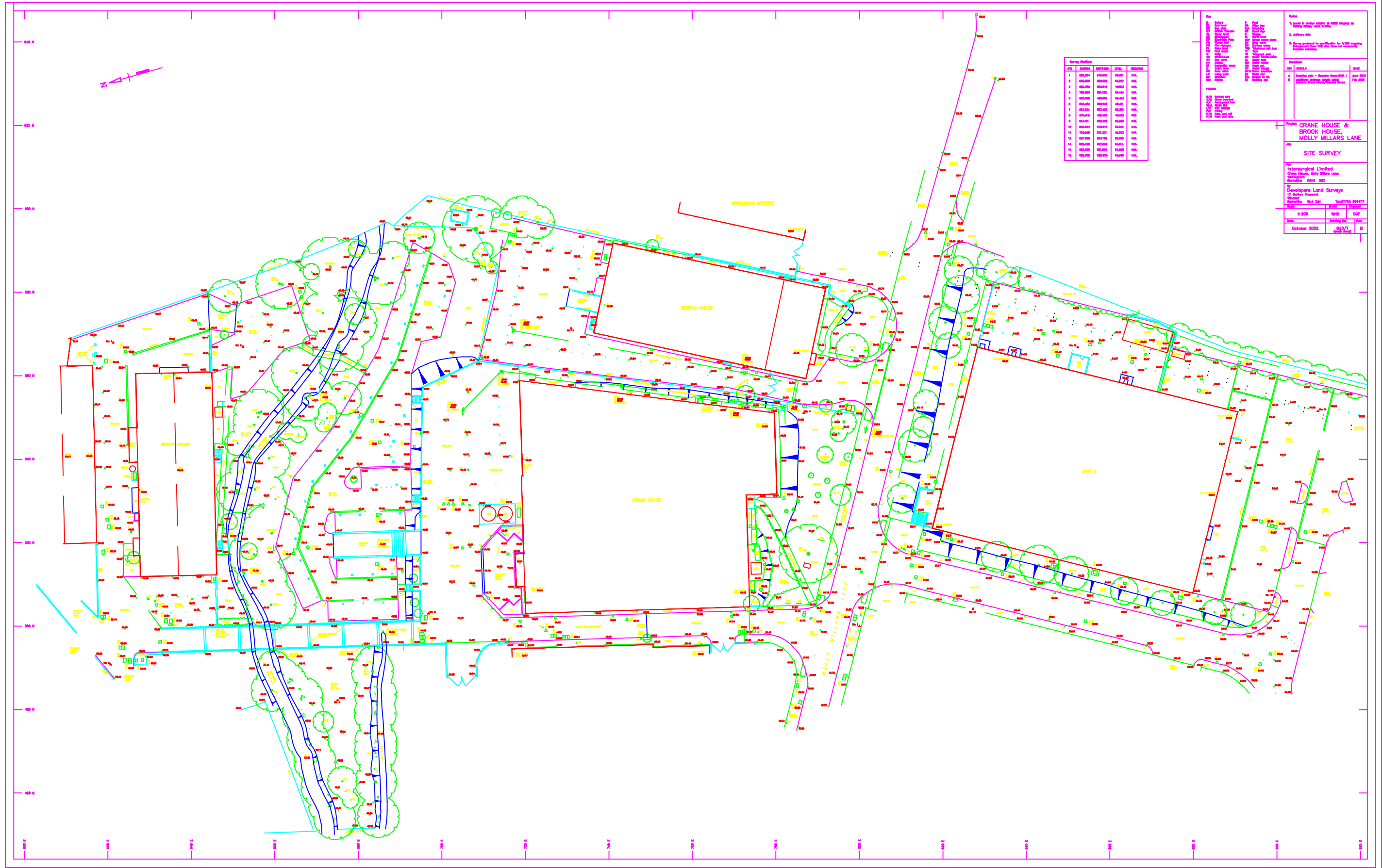
Therefore, in line with the recommendations of the National Planning Policy Framework, the development site lies within land classified as flood zone 2, which is considered at a medium risk of flooding, and therefore appropriate for a development of this nature. Having assessed the other forms of flood risk to and from the development site, this report finds that the site is not considered at high risk from any other sources of flooding.

9.0 References & Bibliography

- The National Planning Policy Framework December 2024
- Planning Practice Guidance.
- Environment Agency - Rainfall-Runoff Management for Developments
- Environment Agency indicative flood maps <https://flood-map-for-planning.service.gov.uk/>
- Environment Agency indicative groundwater source protection zone maps <http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx>
- Environment Agency indicative Aquifer designation maps <https://magic.defra.gov.uk/>
- <https://www.bgs.ac.uk/information-hub/borehole-records/>
- <https://geologyviewer.bgs.ac.uk/>
- Wokingham Borough Local Plan Strategic Flood Risk Assessment.
- Flood Estimation Handbook



Appendix A - Topographic Survey



Survey Station				
STN	EASTING	NORTHING	LEVEL	REMARKS
1	585.254	594.559	55.251	NEL
2	585.259	593.559	55.257	NEL
3	585.265	592.559	55.263	NEL
4	585.269	591.559	55.268	NEL
5	585.273	590.559	55.273	NEL
6	585.276	589.559	55.276	NEL
7	585.279	588.559	55.279	NEL
8	585.282	587.559	55.282	NEL
9	585.285	586.559	55.285	NEL
10	585.288	585.559	55.288	NEL
11	585.291	584.559	55.291	NEL
12	585.294	583.559	55.294	NEL
13	585.297	582.559	55.297	NEL
14	585.300	581.559	55.300	NEL
15	585.303	580.559	55.303	NEL
16	585.306	579.559	55.306	NEL

Notes:
1. Station 1 is located within the 100m closed in
2. Station 2 is located within the 100m closed in
3. Station 3 is located within the 100m closed in
4. Station 4 is located within the 100m closed in
5. Station 5 is located within the 100m closed in
6. Station 6 is located within the 100m closed in
7. Station 7 is located within the 100m closed in
8. Station 8 is located within the 100m closed in
9. Station 9 is located within the 100m closed in
10. Station 10 is located within the 100m closed in
11. Station 11 is located within the 100m closed in
12. Station 12 is located within the 100m closed in
13. Station 13 is located within the 100m closed in
14. Station 14 is located within the 100m closed in
15. Station 15 is located within the 100m closed in
16. Station 16 is located within the 100m closed in

Project		CRANE HOUSE & BROOK HOUSE, MOLLY MILLARS LANE	
Job		SITE SURVEY	
For			
Interregional Limited Crane House, Molly Millars Lane Bathurst NSW 2102			
Developers Land Surveys 12 Gifford Street Bathurst NSW 2102 Telephone 02 6332 1000 Fax 02 6332 1001			
Date	Scale	Drawn	Checked
1/200	1:200	WHD	CPD
Date	Scale	Drawn	Checked
October 2002	1:200	WHD	CPD



Appendix B - Development Proposals





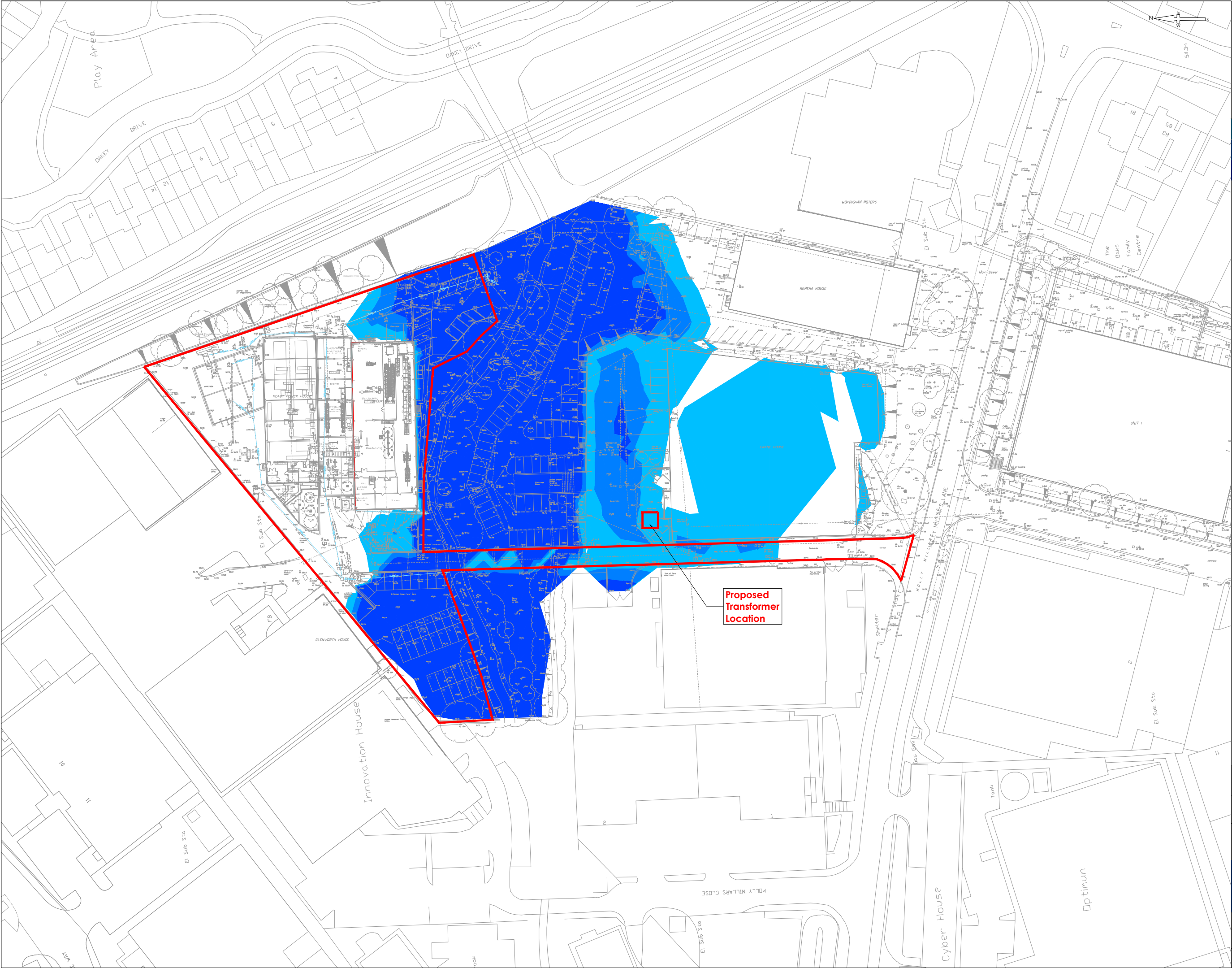








Appendix C - Flood Zone Map



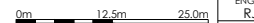
NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
3. This drawing has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE - EXCEPT FOR PLANNING PURPOSES). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.
5. Digital copies of this plan can only be considered accurate if supplied directly by Infrastruct CS Ltd.

Flood Zone 2 - 49.76mAOD

Flood Zone 3a

Flood Zone 3b

P01	RSI	RJW	Initial issue	23/04/25
REV	DRAWN	CHECK	REVISION COMMENTS	ISSUE DATE
DRAWING TITLE				SHEET NO.
Flood Zone Classification				1/1
PROJECT				
Ready Power House, Molly Millar's Lane, Wokingham, RG41 2QP				
CLIENT				
ET Planning		 Infrastruct CS Ltd		
SCALE @ A1				
1:500				
				
PROJECT NUMBER	STATUS	ISSUE PURPOSE		ENGINEER
6314	S2	INFORMATION		RJW
APPROVED				DRAFT
MBO				RSI
PROJECT	ORIGIN	PHASE	LEVEL	TYPE
MILL	ICS	01	XX	DR
ROLE				NO - REVISION
C				0010 P01



Appendix D - Product 4 Report

Product 4 (Detailed Flood Risk) for RG41 2QP

Our Ref: THM362008

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

- i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
- ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;

Statutory (Sealed) Main River (where available within map extents);

A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

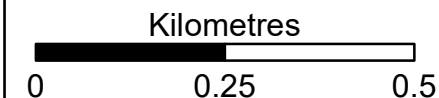
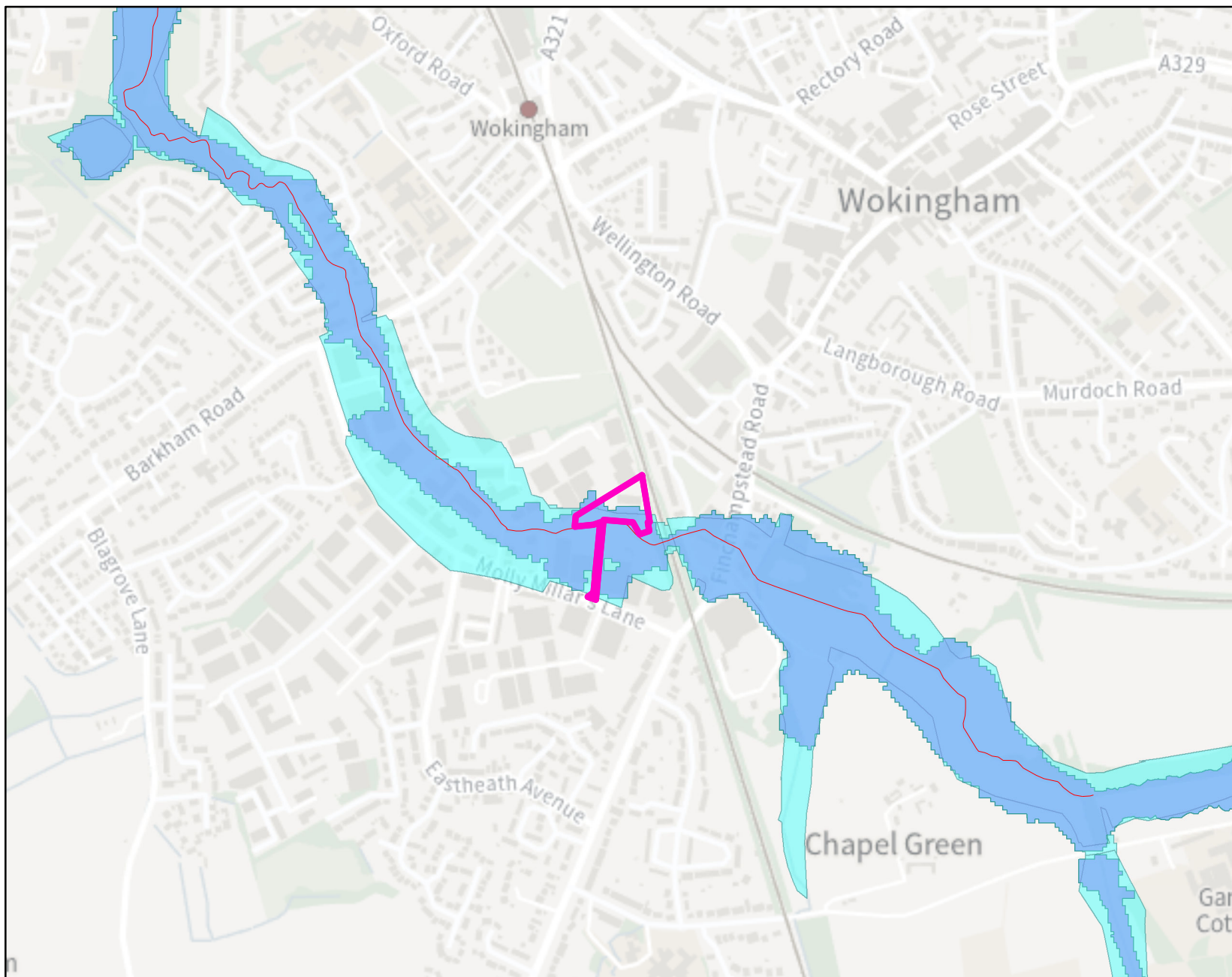
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Flood Map for Planning centred on RG41 2QP

Created on 06/06/2024 REF: THM362008



Legend

- Site
- Statutory Main Rivers
- Flood Map - Flood defences
- Flood Map - Flood Storage Areas
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM362008

Model: Loddon (Lower) 2009

Description: The information provided is taken from the Lower Loddon Detailed Flood Risk Mapping study which was completed in January 2009. This model is a 1D-2D model using ESTRY-TUFLOW. The model was originally built in 2007 but the hydrology was updated and model rerun in 2009. The model was re-run for more return periods on the main Loddon than on some of the tributaries.

River Channel Model: ESTRY 1D model of Lower Loddon, Old Loddon, St. Patricks Stream, River Thames (from Sonning to Marsh Lock), Twyford Brook, Billingbear Brook and Emm Brook (from Toutley Bridge to Loddon), Barkham Brook, Ashridge Stream, Waterloo Road Stream and Upper Emm Brook (from Nine Mile Ride to Toutley Bridge)

Model design runs (Main River Loddon):

1 in 5 / 20% Annual Exceedance Probability (AEP); 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; 1 in 1000 / 0.1% AEP; and 1 in 100+20% / 1% AEP plus 20% increase in flows

Mapped outputs (main River Loddon):

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP, 1 in 100+20% / 1% AEP plus 20% increase in flows, and 1 in 1000 / 0.1% AEP

Model design runs (tributaries – Emm Brook (Wokingham), Emm Brook (Upstream), Ashridge Stream, Waterloo Road Stream, Barkham Brook):

1 in 5 / 20% Annual Exceedance Probability (AEP); 1 in 20 / 5% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP plus 20% increase in flows

Mapped outputs (tributaries):

1 in 5 / 20% AEP; 1 in 20 / 5% AEP, 1 in 100 / 1% AEP and 1 in 100+20% / 1% AEP plus 20% increase in flows

Model accuracy:

Levels $\pm$ 250mm

Modelled in-channel flood flows and levels

THM362008

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

				Flood Levels (mAOD)											
Node label	Model	Easting	Northing	20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
06324LO MN Emm2.69a.1	Loddon (Lower) 2009	480933	167944	49.60	49.92		50.33			50.57					
06324LO MN Emm2.67.1	Loddon (Lower) 2009	480915	167957	49.54	49.82		50.12			50.31					
06324LO MN Emm2.65a.1	Loddon (Lower) 2009	480844	167976	49.20	49.63		49.97			50.16					
06324LO MN Emm2.64R1.1	Loddon (Lower) 2009	480820	167969	49.16	49.60		49.92			50.10					
06324LO MN Emm2.62u.1	Loddon (Lower) 2009	480797	167961	49.10	49.54		49.86			50.04					
06324LO MN Emm2.62a.1	Loddon (Lower) 2009	480758	167967	49.08	49.53		49.86			50.03					
06324LO MN Emm2.62a.2	Loddon (Lower) 2009	480753	167970	48.97	49.43		49.76			49.95					
06324LO MN Emm2.58.1	Loddon (Lower) 2009	480632	167984	48.89	49.38		49.74			49.92					
06324LO MN Emm2.57a.1	Loddon (Lower) 2009	480589	167981	48.86	49.34		49.70			49.90					
06324LO MN Emm2.57a.2	Loddon (Lower) 2009	480584	167982	48.82	49.31		49.62			49.78					

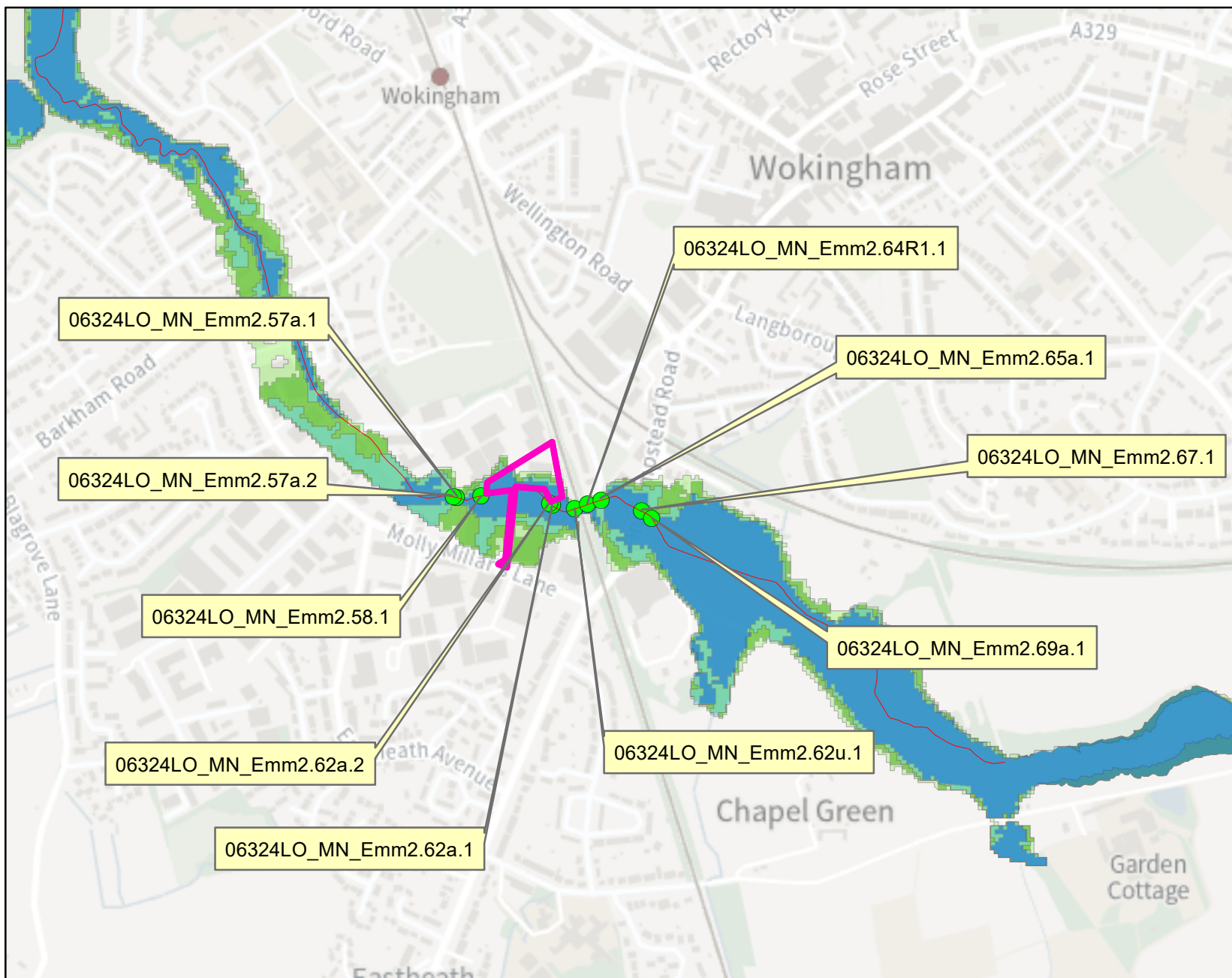
				Flood Flows (m3/s)											
Node label	Model	Easting	Northing	20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
06324LO MN Emm2.69a.1	Loddon (Lower) 2009	480933	167944												
06324LO MN Emm2.67.1	Loddon (Lower) 2009	480915	167957												
06324LO MN Emm2.65a.1	Loddon (Lower) 2009	480844	167976												
06324LO MN Emm2.64R1.1	Loddon (Lower) 2009	480820	167969												
06324LO MN Emm2.62u.1	Loddon (Lower) 2009	480797	167961												
06324LO MN Emm2.62a.1	Loddon (Lower) 2009	480758	167967												
06324LO MN Emm2.62a.2	Loddon (Lower) 2009	480753	167970												
06324LO MN Emm2.58.1	Loddon (Lower) 2009	480632	167984												
06324LO MN Emm2.57a.1	Loddon (Lower) 2009	480589	167981												
06324LO MN Emm2.57a.2	Loddon (Lower) 2009	480584	167982												

Note:
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

Detailed FRA Map centred on RG41 2QP

Created on 06/06/2024 REF: THM362008



Legend

- Site
- Statutory Main Rivers
- Model Nodes
- 20% AEP flood extent
- 5% AEP flood extent
- 2% AEP flood extent
- 1% AEP flood extent
- 1%+20% AEP flood extent
- 0.1% AEP flood extent

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occurring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Historic flood data

THM362008

Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

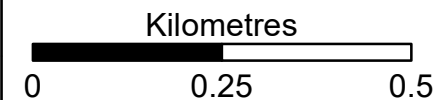
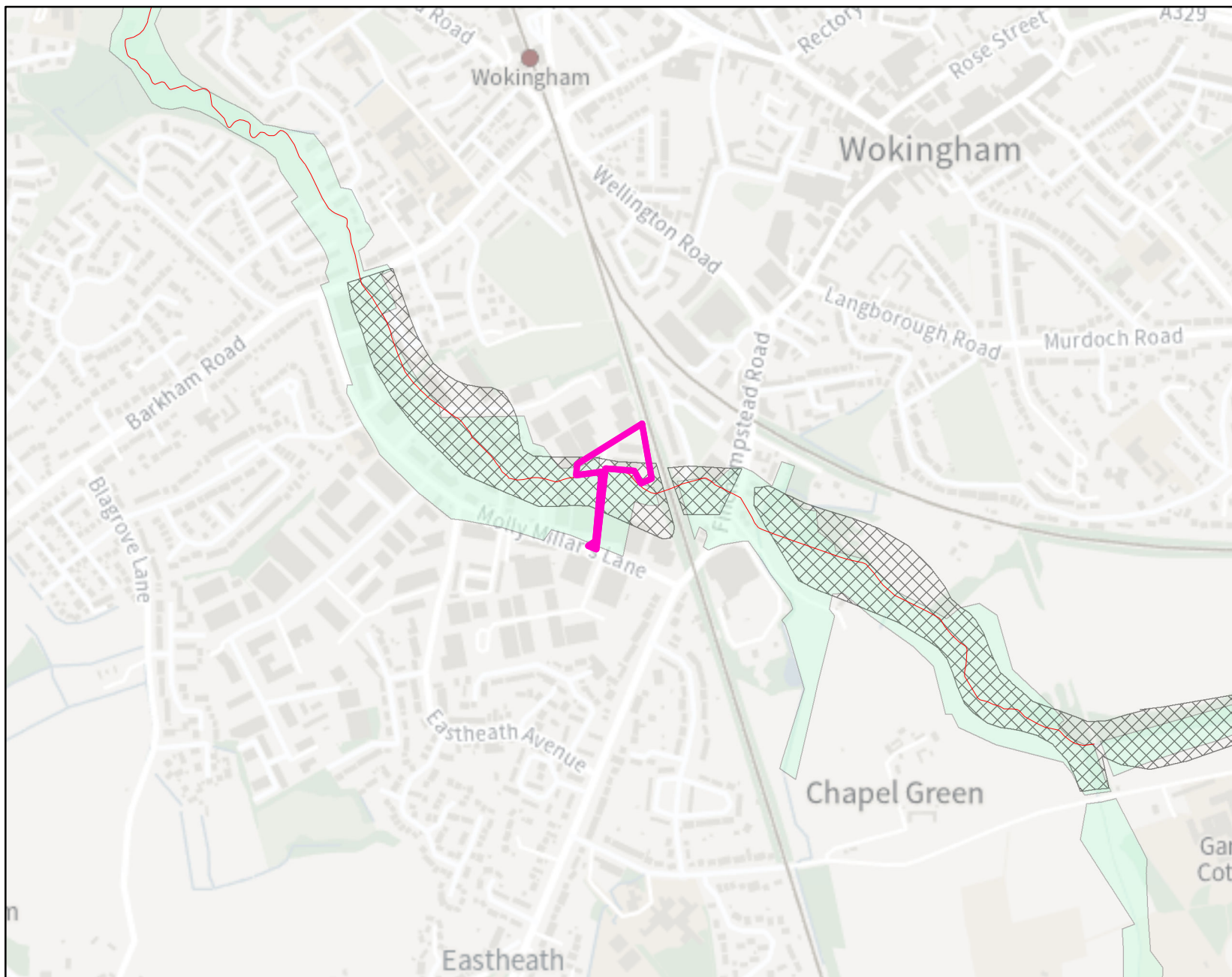
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0619470300383	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)
EA062007030127	Thames SE area July 2007	20/07/2007	21/07/2007	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

Historic Flood Map centred on RG41 2QP

Created on 06/06/2024 REF: THM362008



Legend

- Site
- Statutory Main Rivers
- 1947
- 2007

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.