

**Willow Marina,
Willow Lane, Wargrave**

**Prepared for
Val Wyatt Marine Ltd**

by

**Stuart Michael
Associates Limited**

April 2018



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ACRONYMS AND ABBREVIATIONS

AOD	Above Ordnance Datum
AStGWF	Areas Susceptible to Groundwater Flooding (National map produced by the EA)
BGS	British Geological Survey
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FFL	Finished Floor Level
FMfSW	Flood Map for Surface Water (National map produced by the EA, showing flood risk from surface water at the 30 year and 200 year return periods)
ha	Hectares
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
m	Metres
mm	Millimetres
NPPF	National Planning Policy Framework
WBC	Wokingham Borough Council
PPG	Planning Practice Guidance
QBAR	Mean Annual Flood (IoH Report No. 124 Flood Estimation for Small Catchments)
SFRA	Strategic Flood Risk Assessment
SMA	Stuart Michael Associates



1.0 INTRODUCTION

- 1.1. Stuart Michael Associates Limited, consulting engineers, has prepared this Flood Risk Assessment (FRA), hereafter referred to as the 'Report', on the instruction of Val Wyatt, hereafter referred to as the 'Applicant'.
- 1.2. The Report supports the proposed change of use of an existing building from office to café / shop, hereafter referred to as the 'Site'.
- 1.3. The requirements and policies of Wokingham Borough Council (WBC) and the Environment Agency (EA) have been taken into account when considering flood risk at the Site.
- 1.4. The purposes of the Report are:
 - 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 risk of flooding elsewhere.
- 1.5. The Report presents an assessment of flood risk in accordance with the National Planning Policy Framework (NPPF), March 2012 and its supporting Planning Practice Guidance (PPG), April 2015, both published by the Department of Communities and Local Government.
- 1.6. The NPPF and supporting PPG provide guidance on how flood risk should be considered during 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.
- 1.7. Wokingham Borough Council is the Local Planning Authority (LPA), controlling flood risk and water environment issues, through policies and guidance presented in the WBC Local Flood Risk Assessment (LFRA), April 2015 and the Strategic Flood Risk Assessment (SFRA), February 2012.
- 1.8. WBC, in its role as Lead Local Flood Authority (LLFA), are a statutory consultee for all major applications.



Pre-Application Consultations

Environment Agency, Wallingford

- 1.9. A meeting was held with a representative from the Environment Agency on 10th April 2018 to discuss the proposed change of use. As the site is a marina the use class is Sui Generis.
- 1.10. Wokingham Borough Council (WBC) has confirmed that the existing building which forms the basis for the application was previously used as an office which is classified in the Town and County Planning Order 1987 as B1 (Business). The applicant proposes to convert the building into a café/shop which is classified in the Town and County Planning Order 1987 as A3 (Restaurants and Cafes).
- 1.11. In terms of Flood Risk Vulnerability Classification both the previous use (B1 Business) and the proposed use (A3 Restaurants and Cafes) are classified as 'less vulnerable' in the NPPF and PPG. As such, the EA has advised that they have no objection in principle to the proposed change of use application.



2.0 THE SITE

Location

- 2.1. The Site is located on land to the east of The River Thames and to the west of Wargrave Road. Existing vehicular access is via Willow Lane of the A321 Wargrave Road. The Site comprises a Marina with 120 moorings. There are two existing buildings on the site housing boat related businesses. A 'house boat' has been located on the site to provide office space for the Marina. The site extends to approximately 1.3ha.
- 2.2. To the north, south and east is predominately open farm land and the village of Wargrave is to the south east. To the North West are other residential and business properties. The A321 runs north south to the west of the site.
- 2.3. The Ordnance Survey national grid reference for the approximate centre of the Site is 478492E and 179320N. The Site location plan is presented as **Figure 1**.

Topography

- 2.4. No topographical survey was provided for this site.

Geology and Hydrogeology

Geology

- 2.5. British Geological Survey (BGS) mapping indicates that the superficial deposits beneath the Site are Alluvium - Clay, Silt, Sand and Gravel.
- 2.6. The bedrock geology beneath the Site comprises primarily Seaford Chalk Formation and Newhaven Chalk Formation (undifferentiated). The BGS map is reproduced as **Figure 2**.
- 2.7. Soilsmap information indicates that the soil underlying the Site comprises loamy and clayey floodplain soils with naturally high groundwater.
- 2.8. The EA bedrock map indicates that the Site lies within a Principal Aquifer, as presented in **Figure 3**.

Ground Investigation

- 2.9. An intrusive ground investigation has not been undertaken on this site.



Hydrogeology

- 2.10. The EA Groundwater Vulnerability Map shows that the Site is within a Major Aquifer High Groundwater Vulnerability Zone, as shown at **Figure 4**.
- 2.11. The WBC SFRA map documents of the area around the Site confirm that there is no historical record of groundwater flooding

Watercourses

- 2.12. The nearest main river is The River Thames, which lies immediately to the west of the Site. This river conveys surface water runoff from the wider catchment in a north westerly direction, eventually discharging into the sea, 70km to the east.

Existing Drainage

- 2.13. Asset plans have not been obtained for this site as the existing infrastructure is not being altered as part of the application.
- 2.14. The SFRA map documents of the area around the Site confirm that there are no known sewer flooding problems. The local SFRA map documents are reproduced as **Appendix A**.

Environmentally Sensitive Areas

- 2.15. There are no Environmentally Sensitive areas in proximity of the Site.



3.0 DEVELOPMENT PROPOSALS

- 3.1. The development proposals as shown on the Block Plan presented in **Appendix B** comprise a change of use of part of an existing building from office (B1) to café/shop (A3).
- 3.2. The building is located within a marina and as such falls under the classification use of 'Sui Generis'.
- 3.3. The Café and shop will be operated seasonally during the spring / summer months.

Site Access

- 3.4. Current vehicular access to the Marina is via Willow Lane off the A321 Wargrave Road.

Vulnerability Classification

- 3.5. Table 2 of the PPG provides a detailed list of the types of development falling into the vulnerability classifications. This list provides guidance on the various uses and their subsequent flood risk vulnerability classification.
- 3.6. As per Table 2, **Less Vulnerable** classification applies to the proposed change of use, while the remainder of the Site uses fall within the **Water Compatible** criteria, as the site is a Marina.
- 3.7. The vulnerability classification of the existing building has not changed as the previous office (B1) and café/shop (A3) fall within the same category.



4.0 FLOOD RISK ASSESSMENT

Fluvial Flooding

- 4.1. Flood Zones shown on the UK Government flood maps for planning service are the main constraints used to inform the LPA when to consult the EA and LLFA on flood risk in development control decisions.
- 4.2. The Flood Zones 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. 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.
- 4.3. The Flood Zones, as described in the PPG, indicate the probability of flooding without the presence of defences and significant manmade structures such as bridges, culverts, and rail or motorway embankments. They show areas that may be at risk from flooding and where further investigation in the form of a Flood Risk Assessment should be used to ascertain the probable risk of flooding on site.
- 4.4. An extract from the Flood Map (for the Site) is presented as **Figure 5**. This indicates that the Site is entirely located within Flood Zone 3 (High probability) defined as:

“Flood Zone 3 – Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.”

Therefore, the proposed change to the existing development is considered to be at high risk of fluvial flooding.

Existing Modelled Flood Data

- 4.5. Product 4 (detailed flood risk) data was obtained for the site from the EA and is reproduced at Appendix C.
- 4.6. The modelled flood levels presented within the Product 4 data were taken from the ‘Thames (Whitchurch – Henley) Flood Mapping Study’ which was completed in August 2000. The flood levels for a range of return periods at the closest most appropriate model node point are presented in **Table 1** (below).



Node Label:	Grid Ref:	Flood Levels (mAOD)		
		20%AEP	5%AEP	1%AEP
06100_MN_072	478440,179200	33.43	33.78	34.17

Table 1: Modelled in-channel flood levels

- 4.7. The finished floor level of the existing building is circa 33.40m AOD. The depths of flooding at the site based on the modelled flood levels is presented in **Table 2** (below).

Node Label:	Grid Ref:	Flood Depths (m)		
		20%AEP	5%AEP	1%AEP
06100_MN_072	478440,179200	0.03	0.38	0.77

Table 2: Depth of flooding

Floodplain Flow Conveyance and Storage Capacity

- 4.8. The Site is located within Flood Zone 3b – ‘the functional floodplain’ as indicated in the Product 4 data. As the footprint of the existing building is to remain unaltered, there will be no additional loss of flood storage or flood flow conveyance.

Coastal Flooding

- 4.9. The Site lies over 70km from English Channel and is not located within the tidal reaches of The River Thames at risk of coastal flooding as indicated on the Government flood maps.

Safe Access

- 4.10. The Site is located within an area at high risk from fluvial flooding. The access arrangements have not changed due to the development. Willow Lane is the main means of access and will flood. Therefore access to the development will be restricted during these times.
- 4.11. Flooding in this location has a long lead-in due to the flood waters coming from the upstream catchment. Any flood warnings will give sufficient time to make safe the site and evacuate.
- 4.12. When flood waters are evident the site will not be accessed by the public.



Climate Change

- 4.13. EA Climate Change Allowances for Flood Risk Assessments were updated in February 2016. This advice updates previous climate change allowances to support the NPPF.
- 4.14. The climate change allowances include predictions of anticipated change for peak river flows by river basin district.
- 4.15. The River Thames is situated within the Thames River Basin District. Peak river flow allowances for the Thames River Basin are presented in **Table 3**.

River Basin District	Allowance Category	Total potential change anticipated for the '2020s' (2015-2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Thames	Upper end	25%	35%	70%
	Higher central	15%	25%	35%
	Central	10%	15%	25%

Table 3: Peak River Flow allowances for River Thames Basin

- 4.16. The EA have produced guidance for use in flood risk assessment in the Thames Area which defines possible approaches to account for flood risk impacts due to climate change in development proposals.
- 4.17. Table A of the guidance states that the 'Basic' approach is considered to be the appropriate method in this instance which allows an allowance to be added to the design flood (1%AEP) to account for the potential climate change impacts.
- 4.18. Table B of the guidance provides local allowance for potential climate change impacts. For 'less vulnerable' development in sensitive locations, the higher central climate change allowance should be used to inform built in resilience measures in FZ 3. Therefore, 700mm will be added to the 1%AEP modelled flood level to determine the impact of climate change on the change of use application.

Node Label:	Grid Ref:	Flood Depths (m)	
		1%AEP	1%AEP
06100_MN_072	478440,179200	34.17	34.87

Table 4: Climate change flood levels

- 4.19. This increases the potential depth of flooding at the site to 1.47m



Groundwater Flooding

- 4.20. 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 over permeable soils or rocks.
- 4.21. The WBC SFRA map documents of the area around the Site confirm that there is no historical record of groundwater flooding and that the AStGWF map suggests the area is mostly in the lowest category of risk of groundwater flood emergence.

Surface Water Flooding

- 4.22. Surface Water Flooding occurs when the intensity of rainfall exceeds ground infiltration. Typically, this happens where the ground surface is impermeable, such as roads and paved areas within urban development and where there are impermeable soils, such as clay.
- 4.23. 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.
- 4.24. The Government map 'Flood risk from surface water' shows that the Site lies primarily within an area at low risk of surface water flooding.
- 4.25. The surface water flood map is reproduced as **Figure 6**.
- 4.26. The WBC SFRA's FMfSW indicates a potential flow path, shown to the west edge of the Site for the 1000yr map along with other small areas of ponding.

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).



- 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 Site is adjacent to the River Thames, there are no formal flood defences in this location. Therefore the risk of flooding from this mechanism of flooding is considered low.

Flooding from Reservoirs

4.29. The Government map 'Flood Risk from Reservoirs' shows that the Site is not within an area at risk of reservoir flooding. The reservoirs flood risk map is reproduced as **Figure 7**.

Historical Flooding

4.30. The WBC SFRA historic flooding map FMfsSW shows a history of surface water flooding at the Site.

4.31. Information contained within the Product 4 data supplied by the EA, indicates that there have been 6no. recorded flood events at the Site the latest of which was in the winter 2013/2014.

Sequential and Exception Tests

4.32. The Site is classified as Flood Zone 3. As the development proposals involve a change of use within the same vulnerability classification 'less vulnerable' the sequential and exception tests are not required.



5.0 FLOOD MITIGATION

- 5.1. The development proposals comprise a change of use of part of an existing building from office (B1) to café/shop (A3).

Flood Awareness, Warning and Evacuation

- 5.2. The building has an existing office (B1) classification. It is unlikely the numbers of employees working of the site will change significantly. Customers will be transient and likely arrive by boat.
- 5.3. The proposed use as café/shop is intended to be used during the summer season when the risk of flooding is lower.
- 5.4. The operators of the café/shop will be committed to the flood warning service, Floodline, provided by the EA.
- 5.5. If and when flood warnings are received from the above service the café/shop will be made safe, removing furniture and perishable goods to a place above the flood level and closing the building to employees and clients.

Flood Resilience

- 5.6. The building is located within FZ3 with a modelled 1%AEP climate change flood level of 34.87m AOD which could represent a depth of flooding within the building of 1.47m.
- 5.7. In order to mitigate against the effects of a flood of this magnitude, the existing building will be refurbished using flood resistant and resilient measures such as:
- a) The building will be internally fitted out with low permeable materials such as tiled floors and wall treatments which resist water penetration,
 - b) All gas and electrical outlets will be located above the predicted flood level,
 - c) All sanitary wares will be fitted with devices to prevent back-flow,
 - d) Floors will be re-graded to allow water to drain away effectively after a flood event,
 - e) All spaces within the building will have access to allow for drying and cleaning following a flood event,



- f) All external furniture which is too heavy to move will be bolted or chained to the floor to prevent it from being washed away during a flood event.



6.0 SUMMARY & CONCLUSIONS

- 6.1. Stuart Michael Associates Limited (SMA) has been instructed by Val Wyatt Marine Ltd (the Applicant) to prepare a Flood Risk Assessment for the proposed change in use of a building at the Willow Marina, Willow Lane, Wargrave (the Site).
- 6.2. This Report presents an assessment of flood risk in accordance with the guidelines set out in the NPPF and it's supporting PPG, as well as the policies of WBC, and the EA.
- 6.3. The report confirms that the Site is suitable for the 'Change of Use' proposals and complies with the policies of the EA.

Flood Risk

- 6.4. The Government Flood Maps indicate that the Site is at a high risk of fluvial flooding, and a low risk of surface and reservoir water flooding.
- 6.5. The SFRA indicates that there have been historical surface water flood events at, or in proximity of the Site.
- 6.6. The Report demonstrates that the proposed development will remain at a high risk of flooding due to the nature of the site. The café and shop will operate during the summer season. To mitigate against the effects of flooding, flood resilient techniques will be used to fit out the café and shop.
- 6.7. Although the Site is located within FZ3, the proposals will not increase the footprint of the building and will therefore not increase the loss of floodplain storage or conveyance and will therefore not create an unacceptable increase in flood risk elsewhere.

Conclusion

- 6.8. In summary, the proposed development is located on an area at high risk of flooding and mitigation measures have been recommended in order to ensure the Site remains resilient, and does not increase the risk of flooding elsewhere.
- 6.9. With regard to the above, it is concluded that the proposed development complies with WBC, EA, and NPPF guidance.



Figure 1

Location Plan

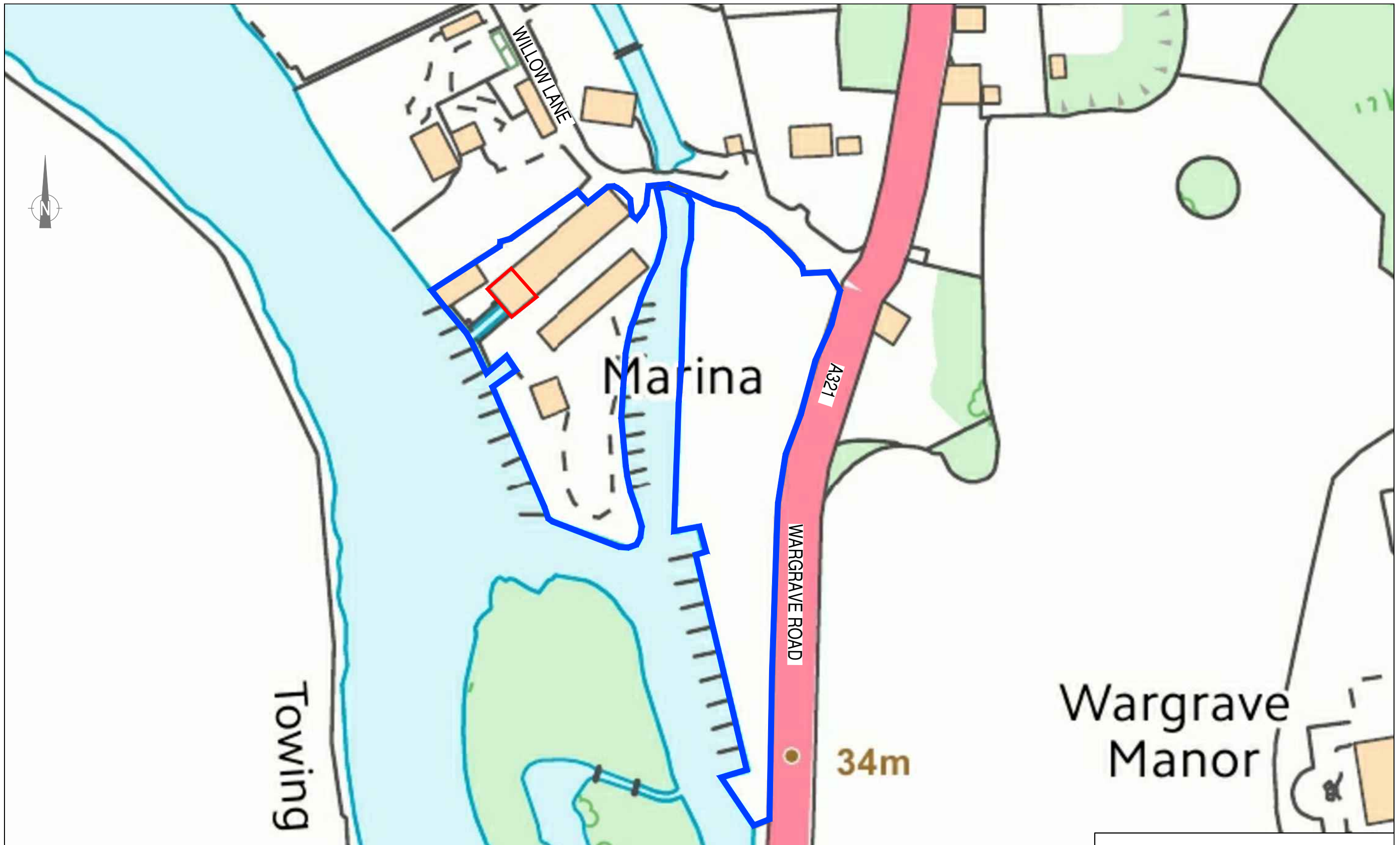


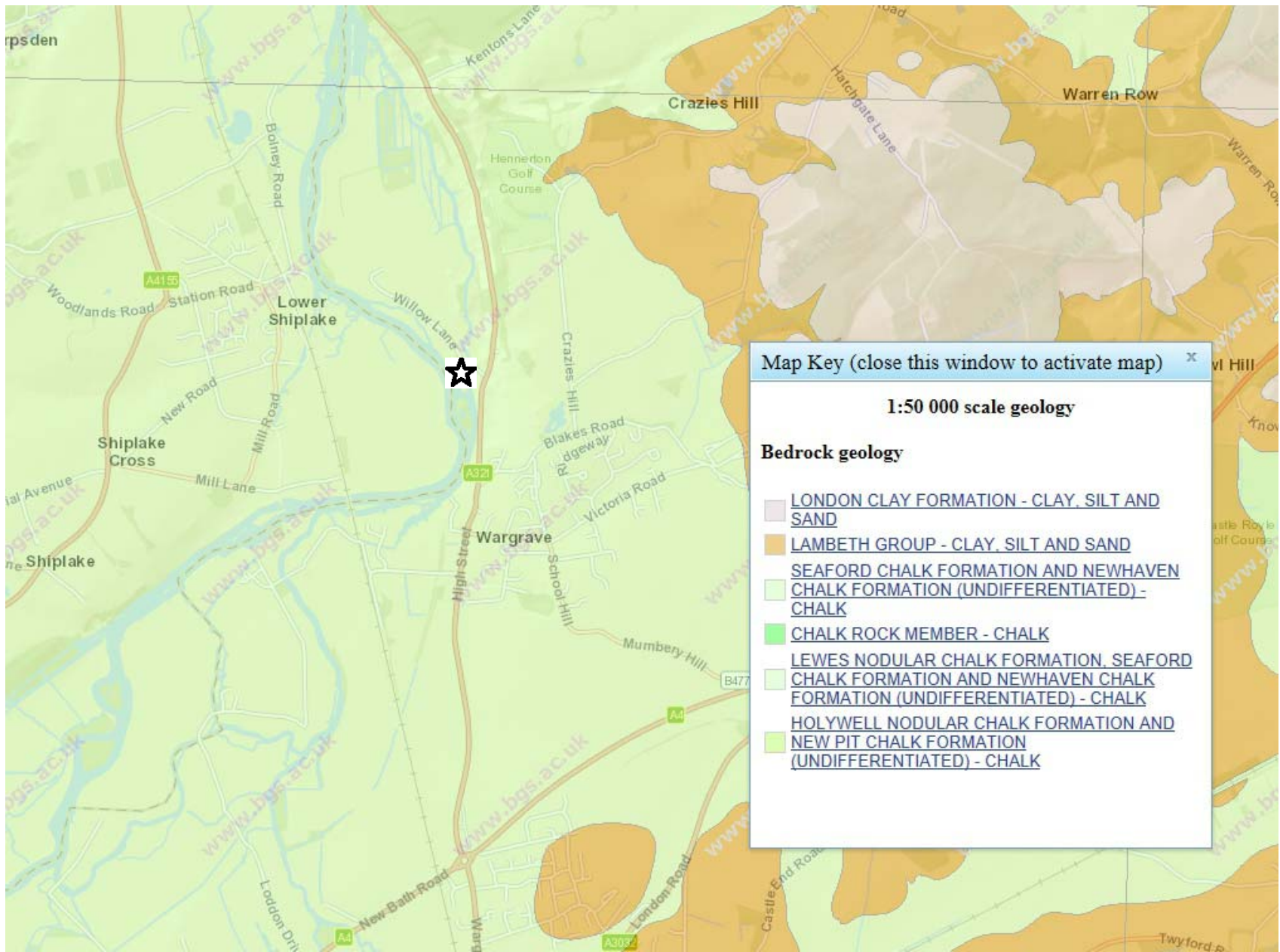


Figure 2

BGS Geology Map



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☆ Site

Map Key (close this window to activate map) x

1:50 000 scale geology

Bedrock geology

-  LONDON CLAY FORMATION - CLAY, SILT AND SAND
-  LAMBETH GROUP - CLAY, SILT AND SAND
-  SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK
-  CHALK ROCK MEMBER - CHALK
-  LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK
-  HOLYWELL NODULAR CHALK FORMATION AND NEW PIT CHALK FORMATION (UNDIFFERENTIATED) - CHALK



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**BGS Geology Map -
Bedrock**

FIGURE NO.

Figure 2

SCALE:

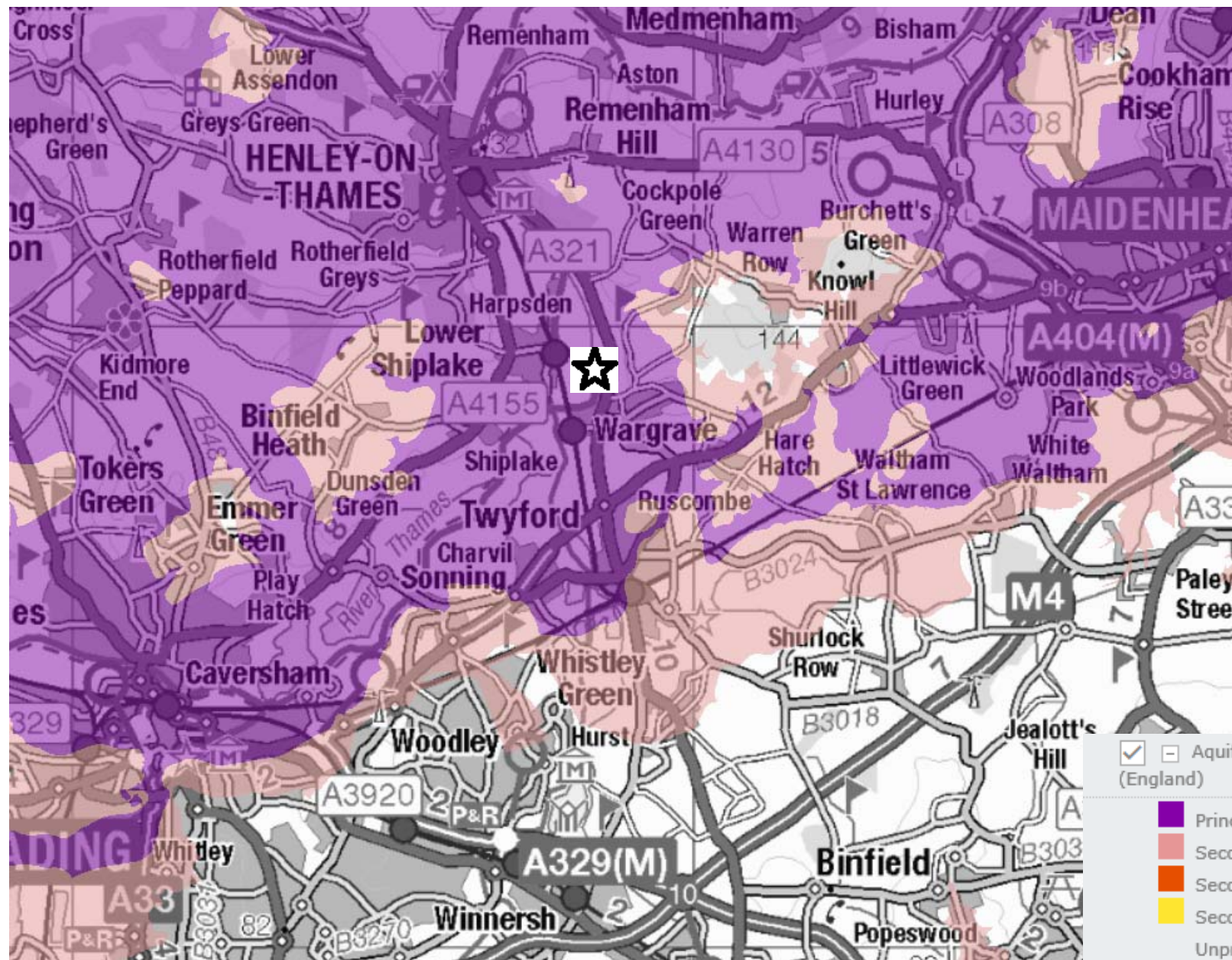
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Figure 3

EA Bedrock Map



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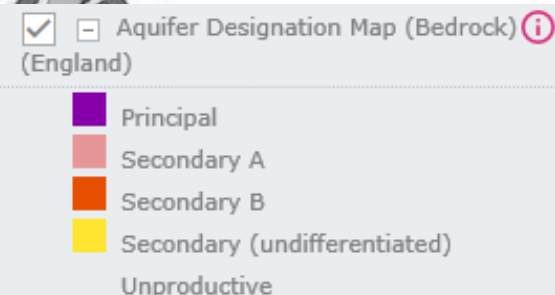


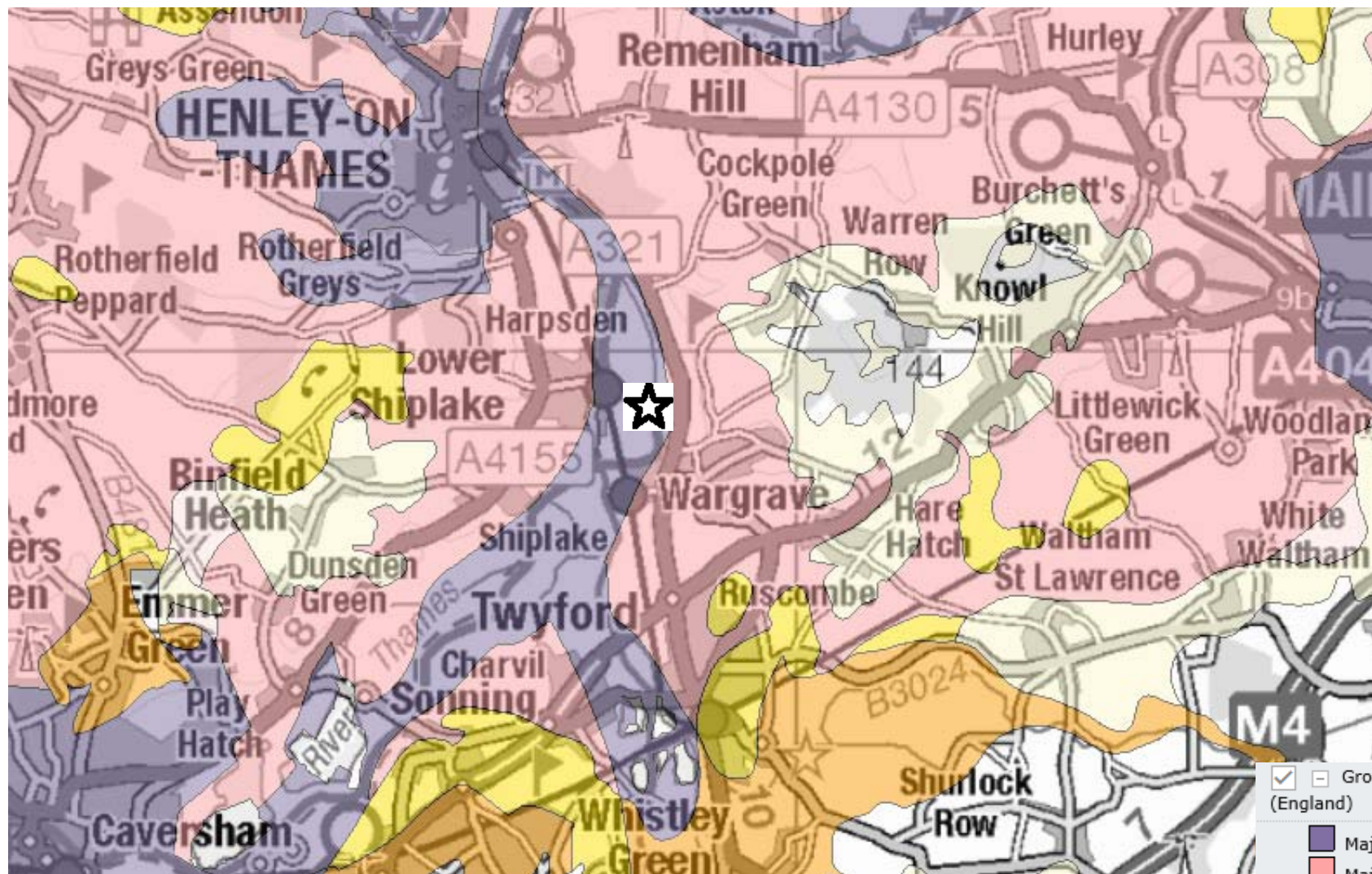


Figure 4

EA Groundwater Vulnerability Map



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☆ Site





Figure 5

UK Gov Flood Map



Legend

The Site 

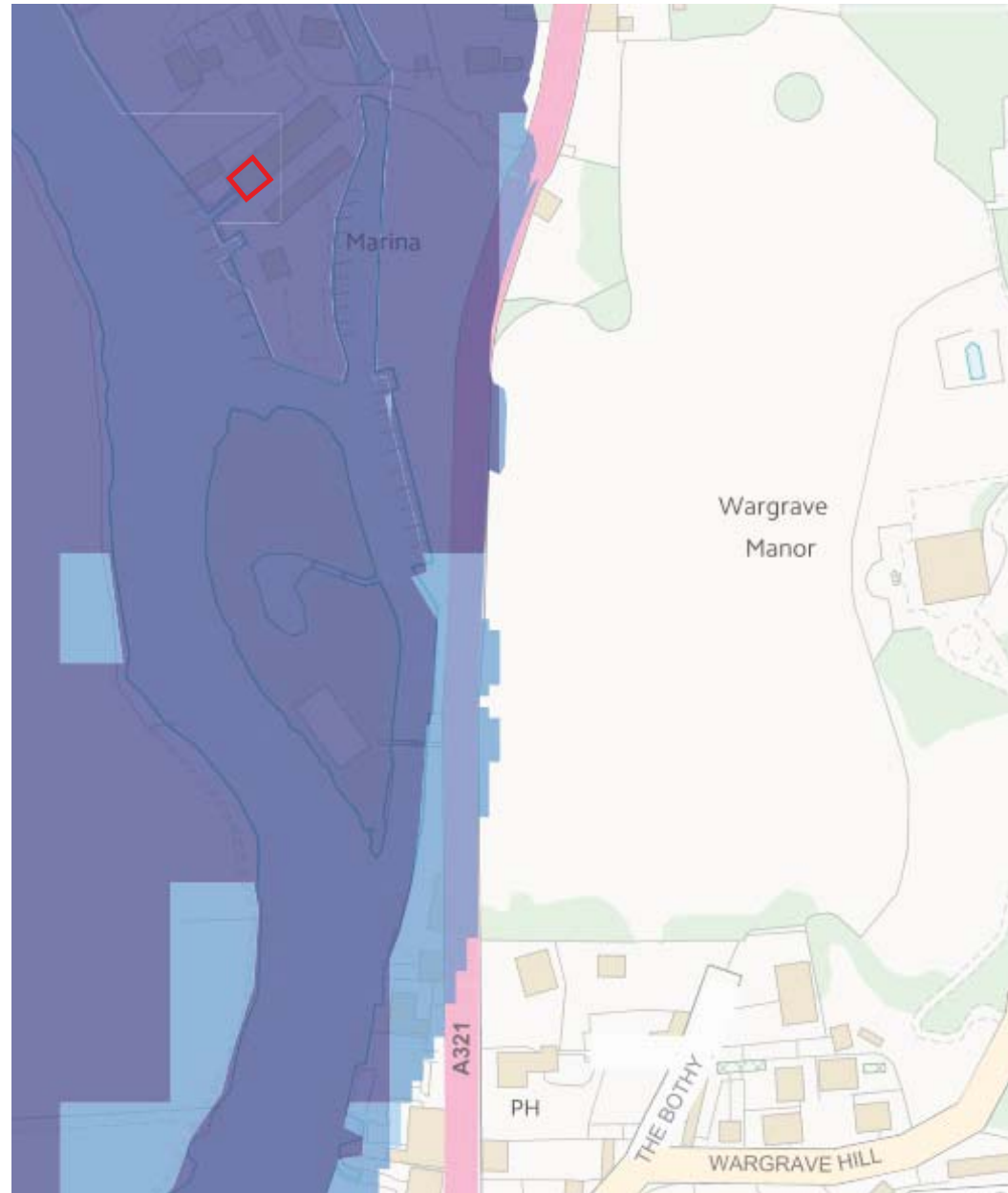
*Risk of Flooding from
River/Sea Water*

High 

Medium 

Low 

Very Low 



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**Willow Marina,
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**Risk of Flooding From
River/Sea Water -
Government Map**

FIGURE NO.

Figure 5

SCALE:

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Figure 6

UK Gov Surface Water Flood Map



Legend

The Site 

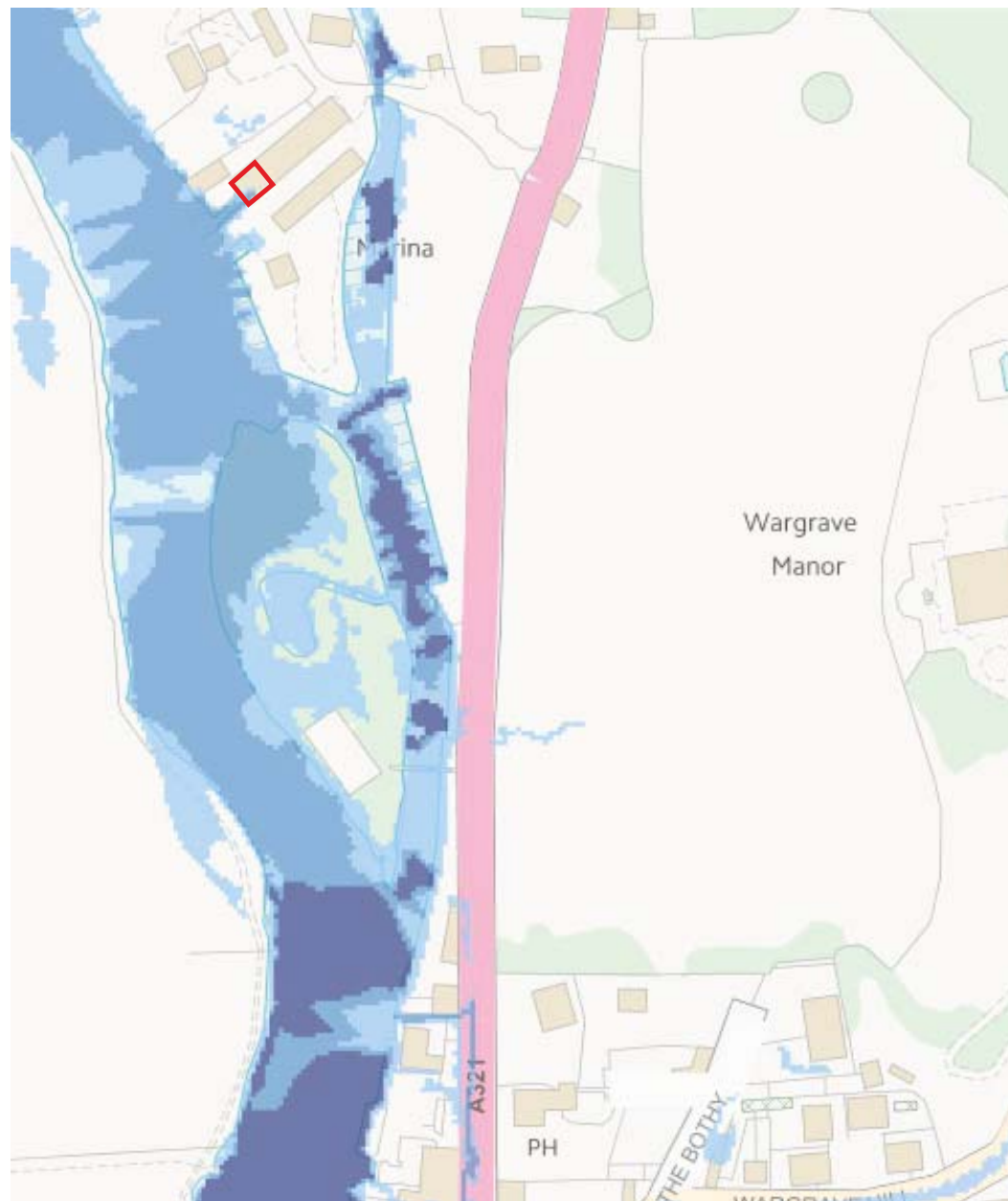
*Risk of Flooding from
Surface Water*

High 

Medium 

Low 

Very Low 



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**Risk of Flooding From
Surface Water -
Government Map**

FIGURE NO.

Figure 6

SCALE:

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Figure 7

UK Gov Reservoir Flood Map



Legend

The Site



*Risk of Flooding from
Reservoirs*

Maximum
Extent of
flooding



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**EA Risk of Flooding
From Reservoirs Map -
Government Map**

FIGURE NO.

Figure 7

SCALE:

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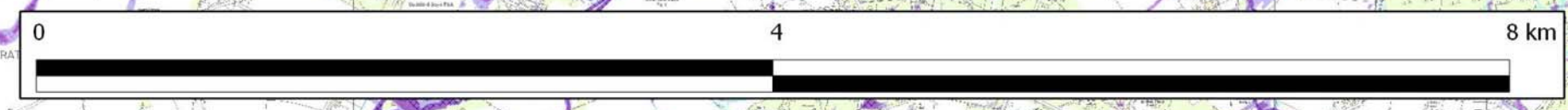


Appendix A

WBC SFRA FLOOD MAP

Legend

- Borough boundary
- Parish boundaries
- Historic Flooding 1993
- Foul
- Highway Drainage
- Land Drainage
- Restricted Toilet Use
- Surface Drainage
- Historic Flooding 2007
- Flood incident outside of flood zones
- Surface Water Flood Map
- 30 year deep
- 30 year shallow
- 200 year deep
- 200 year shallow
- Flooding information from Parishes etc.
- Surface Runoff



Wokingham Strategic Flood Risk Assessment

Map 6e: Flood Map for Surface Water

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Drawn by: AS
Checked by: BV
Revision: 4
Date: 06/08/11



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Appendix B

BLOCK PLAN



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DRAWING No.	5981.401	REV	.	SCALE
				1:1250 @ A3
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Appendix C

PRODUCT 4 DATA FROM EA

Product 4 (Detailed Flood Risk) for Val Wyatt Marina, Wargrave

Our Ref: THM_76377

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 areas benefiting from defences (where available/relevant);
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 read the enclosed guidance which sets out our 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

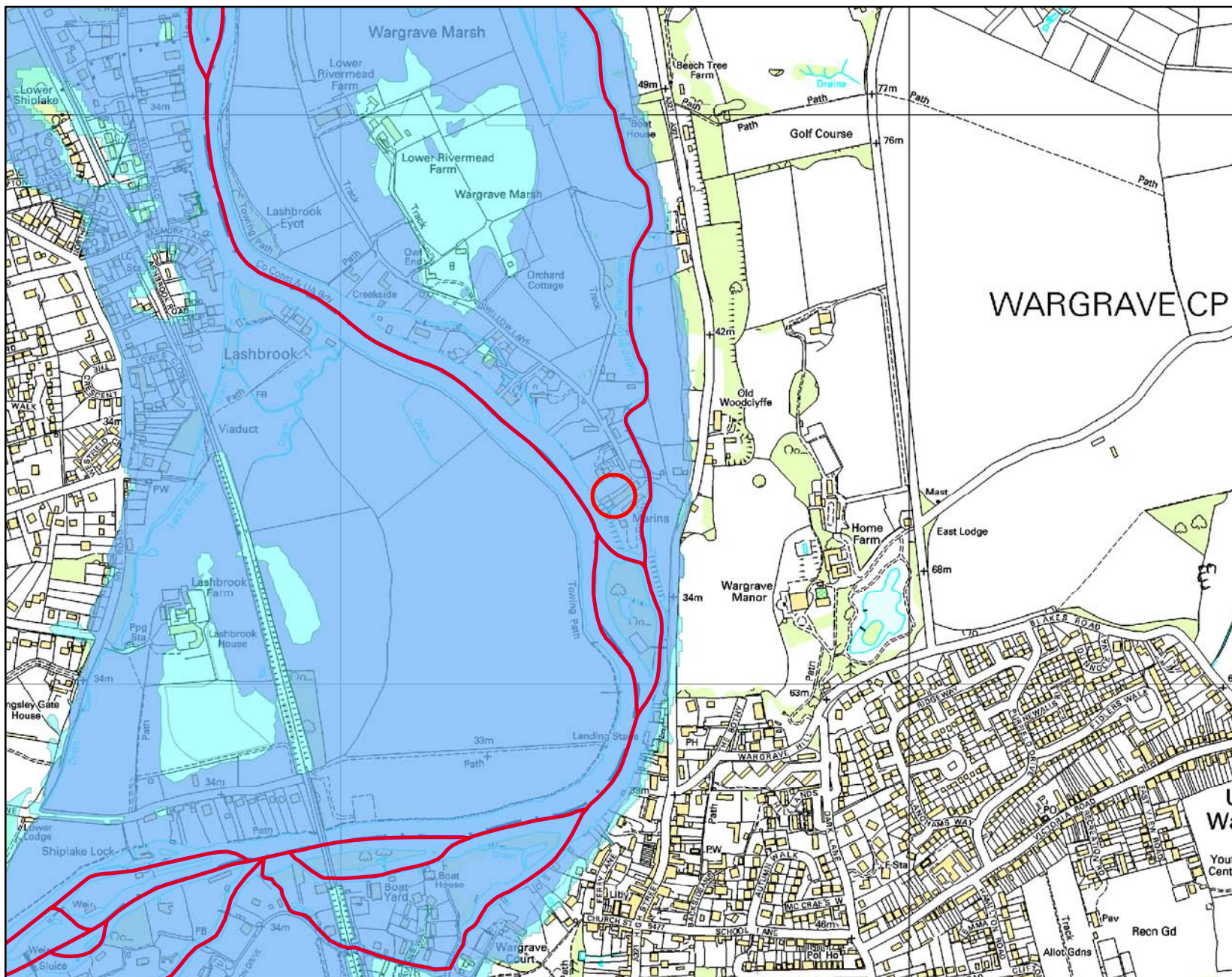
<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

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

<http://www.environment-agency.gov.uk/research/planning/33580.aspx>

Flood Map for Planning centred on: Val Wyatt Marina, Wargrave

Created on 27/02/2018 REF: THM_76377



Kilometres
0 0.09 0.18

Legend

- Main River
- 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

THM_76377

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

THM_76377

Model: Thames (Whitchurch to Henley) 2000

Description: The information provided is taken from the Thames (Whitchurch - Henley) Flood Mapping Study completed in August 2000, updated with Climate Change February 2006. The study was carried out using 1D modelling software (ISIS 2.3).

Climate change data was produced as part of the Thames (Henley - Hurley) Flood Mapping Study completed in 2002.

The data between Mapledurham and Sonning has been superseded by that in project Thames (Mapledurham to Sonning) 2011 and should not be used.

Model design runs:

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP and 1 in 100+20% / 1% AEP with climate change

Mapped Outputs:

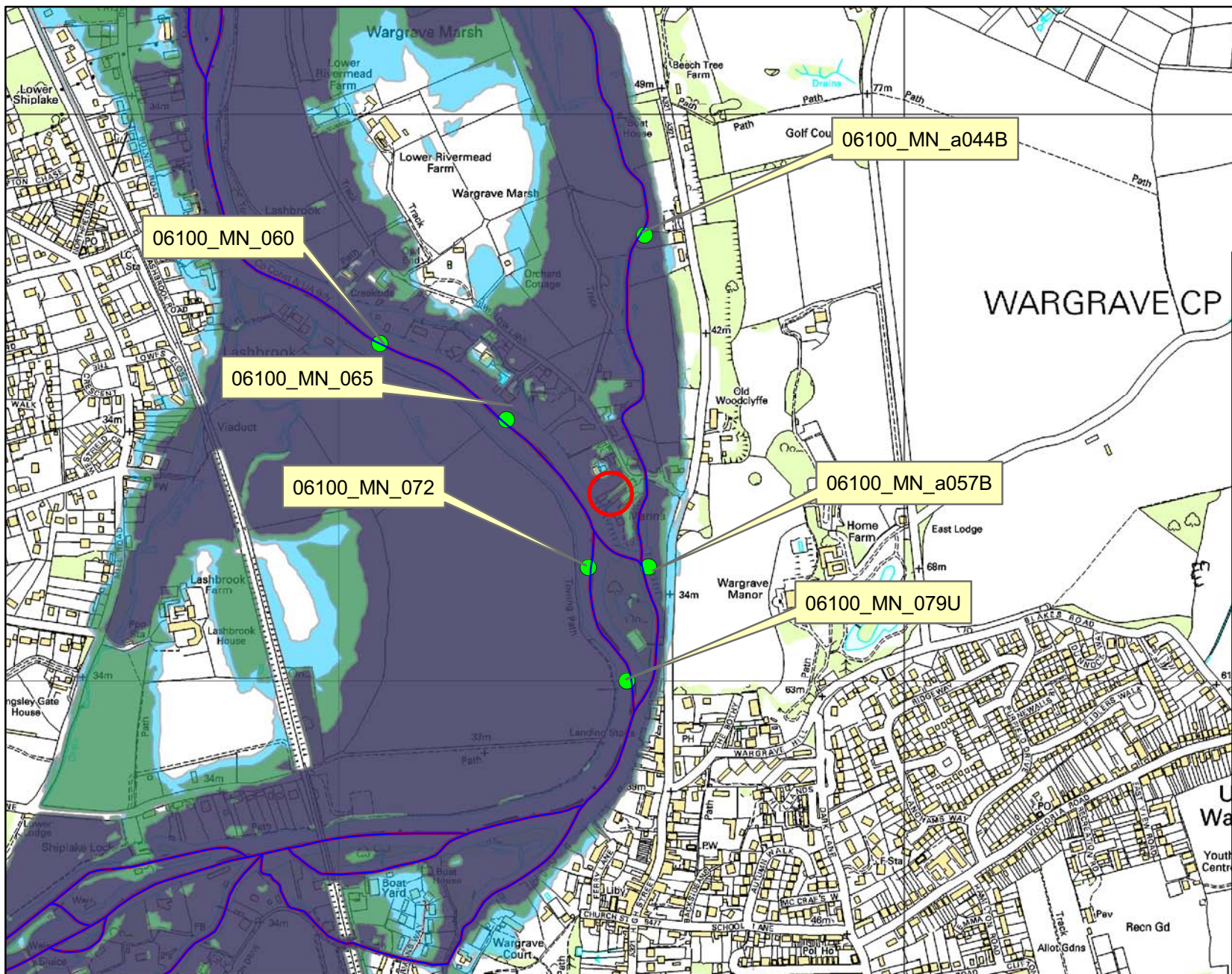
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP and 1 in 100+20% / 1% AEP with climate change

Model accuracy:

Levels $\pm$ 250mm

FRA Map centred on: Val Wyatt Marina, Wargrave

Created on 27/02/2018 REF: THM_76377



Kilometres
0 0.09 0.18

Legend

- Thames Model Node Data
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 1% AEP flood extent

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

1%CC = 1% Climate Change extent
This is the 1% AEP event with an allowance for climate change (+20% on river flows)

Modelled in-channel flood flows and levels

THM_76377

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:

Node label	Model	Easting	Northing	Flood Levels (mAOD)			
				20% AEP	5% AEP	1% AEP	1% AEP (+20% on river flows)
06100_MN_a044B	Thames (Whitchurch to Henley) 2000	478540	179788	33.35	33.75	34.15	34.44
06100_MN_060	Thames (Whitchurch to Henley) 2000	478071	179596	33.31	33.66	34.02	34.28
06100_MN_065	Thames (Whitchurch to Henley) 2000	478295	179461	33.34	33.69	34.06	34.33
06100_MN_072	Thames (Whitchurch to Henley) 2000	478440	179200	33.43	33.78	34.17	34.44
06100_MN_a057B	Thames (Whitchurch to Henley) 2000	478547	179201	33.51	33.88	34.31	34.74
06100_MN_079U	Thames (Whitchurch to Henley) 2000	478509	178999	33.51	33.88	34.26	34.54

Node label	Model	Easting	Northing	Flood Flows (m3/s)			
				20% AEP	5% AEP	1% AEP	1% AEP (+20% on river flows)
06100_MN_a044B	Thames (Whitchurch to Henley) 2000	478540	179788	12.04	19.29	35.68	64.83
06100_MN_060	Thames (Whitchurch to Henley) 2000	478071	179596	280.61	361.76	470.49	559.77
06100_MN_065	Thames (Whitchurch to Henley) 2000	478295	179461	284.72	373.81	483.94	558.23
06100_MN_072	Thames (Whitchurch to Henley) 2000	478440	179200	284.44	368.91	453.80	494.17
06100_MN_a057B	Thames (Whitchurch to Henley) 2000	478547	179201	12.32	24.20	65.82	128.89
06100_MN_079U	Thames (Whitchurch to Henley) 2000	478509	178999	284.44	366.95	425.60	436.87

Note:

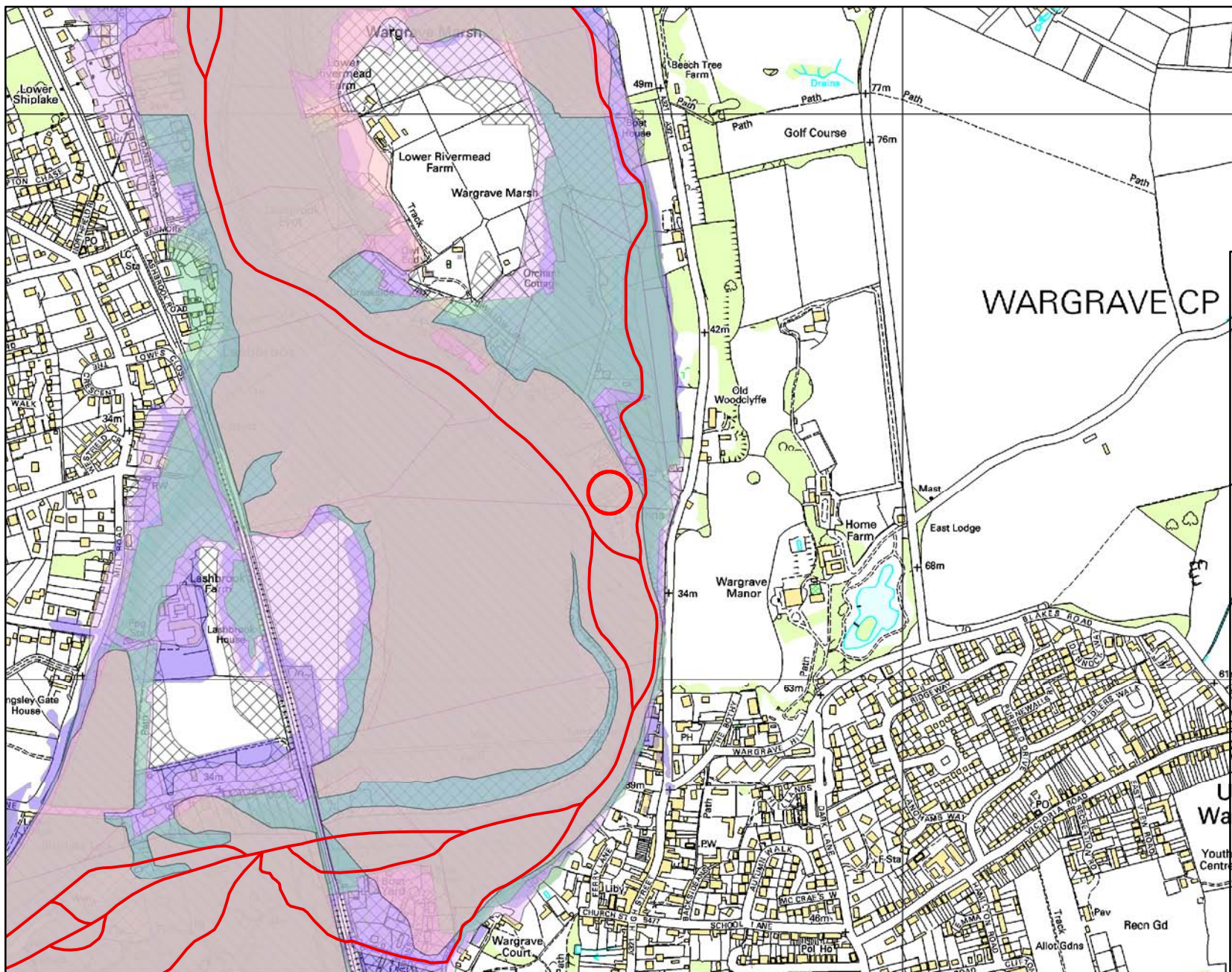
Due to recent changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an Intermediate level assessment.

For further advice on the new allowances please visit

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

Historic Flood Map centred on: Val Wyatt Marina, Wargrave

Created on 27/02/2018 REF: THM_76377



Kilometres
0 0.090.18

Legend

— Main River

Flood Event Outlines

year

- 1947
- 1974
- 2000
- 2002
- 2007
- 2014

Historic flood data

THM_76377

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
EA0619470300119	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)
EA0619741100469	06NovemberAutumn1974	01/01/1974	12/12/1974	main river	channel capacity exceeded (no raised defences)
EA0620001200512	06DecemberWinter2000	01/01/2000	12/12/2000	main river	channel capacity exceeded (no raised defences)
EA0620030101899	06JanuaryNewYear2003	23/12/2002	12/01/2003	main river	channel capacity exceeded (no raised defences)
ea061231490	Shiplake CP_Fluvial Water	19/07/2007	29/07/2007	main river	channel capacity exceeded (no raised defences)
EA061002014008	Winter 2013/2014	23/11/2013	28/02/2014	main river	channel capacity exceeded (no raised defences)

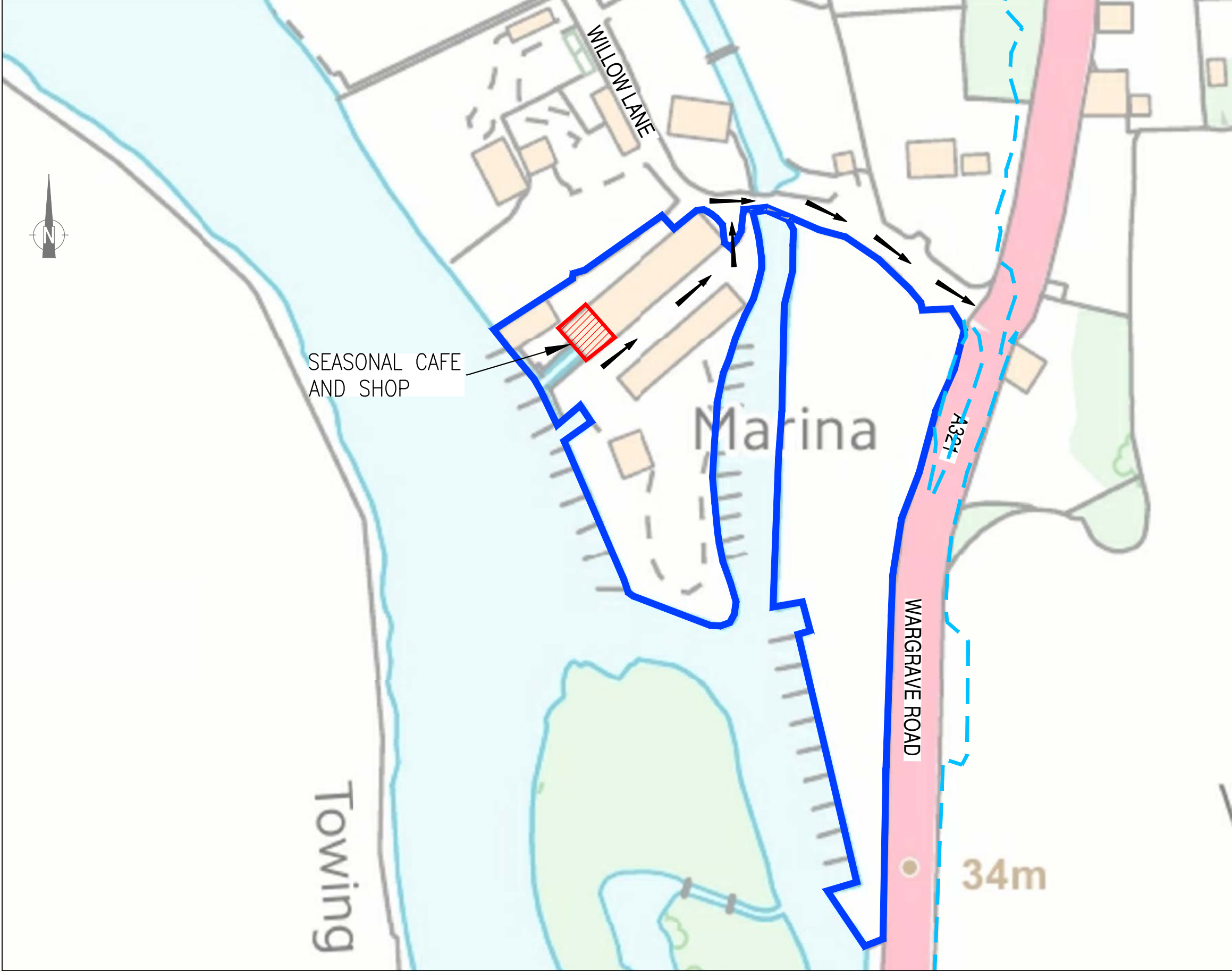
Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

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



Appendix D

FLOOD EVACUATION PLAN



NOTES: GENERAL

- 1. DO NOT SCALE FROM THIS DRAWING
- 2. ALL DIMENSIONS SHOWN ARE IN METRES

KEY

ESCAPE ROUTE
(IN ADVANCE OF FLOODING)



EXTENT OF FLOOD ZONE 3



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Val Wyatt Marine

JOB TITLE

WILLOW MARINA, WARGRAVE

DRAWING TITLE

EMERGENCY ROUTE PLAN

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Preliminary	Approval	Tender	Const.	
DRAWING STATUS				
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