PROPOSED RE-DEVELOPMENT OF UNITS 6-8 AND 10 HIGH STREET INTO RESIDENTIAL ACCOMMODATION

FLOOD RISK ASSESSMENT

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FLOOD RISK ASSESSMENT

Report No.	Issue Detail	Originator	Date	Checked By	Date
01	Nissen Richards Studio	JCh	27/11/2013	JC	27/11/2013

For: Nissen Richards Studio
Unit 3
Waterhouse
8 Orsman Road
London
N1 5QJ

Date: November 2013
Job No: J-4560-CFM
Edition: 01

CONTENTS

APPENDICES

1.0 INTRODUCTION

Nissen Richards Studio are representing the owners of 6-8 and 10 High Street, Hampton Wick who are investigating the viability of re-developing the units and associated workshops into commercial and residential uses.

As part of the planning process it has become apparent that the site lies within the EA designated Flood Zones 2 and 3 associated with the nearby River Thames. An extract of the EA indicative flood map is shown in Figure 1.1 below.

In order to investigate potential issues in this matter, Nissen Richard Studios have commissioned H_2OK Consultants. The objective of the appointment is essentially to prepare a FRA, in accordance with the National Planning Policy Framework (NPPF) and its associated Technical Guidance (NPPF-TG). The study will assess the possible extent to which flooding could occur at the site, and will recommend measures to mitigate against the possible risks that could be posed as a result of the development. This report describes the findings of the FRA.

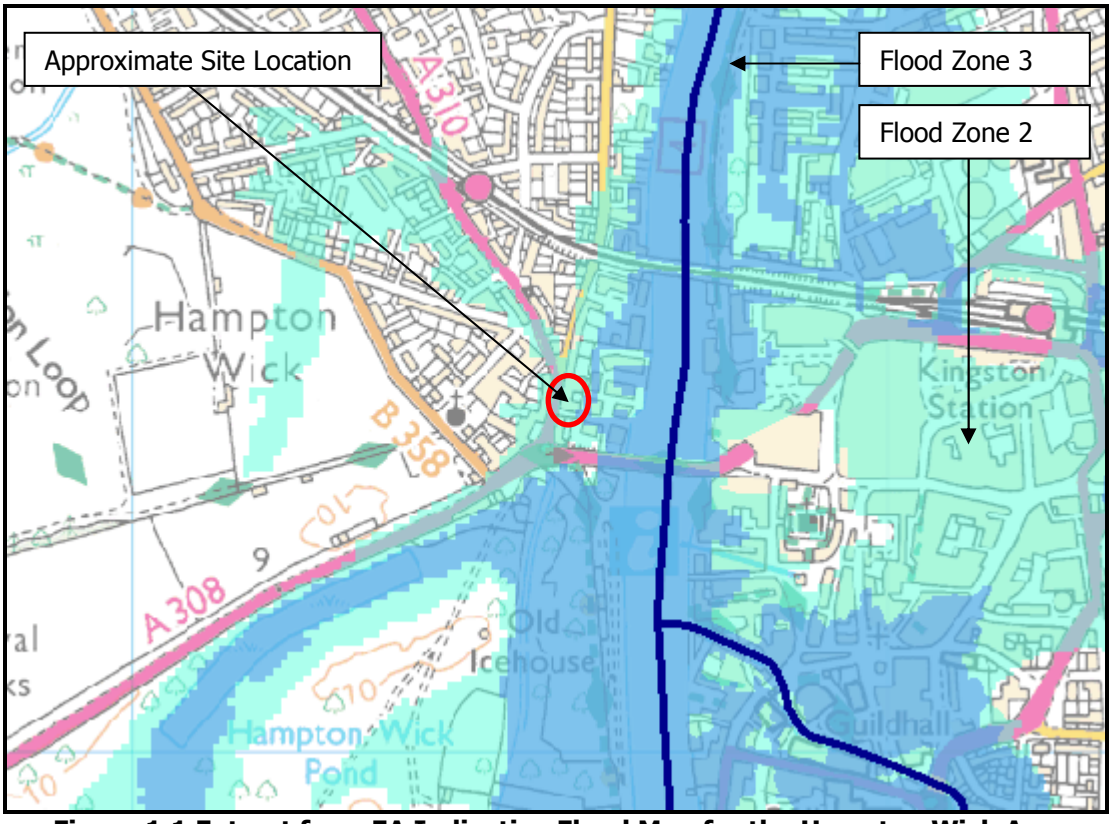


Figure 1.1 Extract from EA Indicative Flood Map for the Hampton Wick Area

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The proposed development site is located in Hampton Wick, London around 100m west of the River Thames. The OSGR for the site is TQ 17589 69479. A site location plan is shown in Figure 2.1 below and included in **Appendix A**.

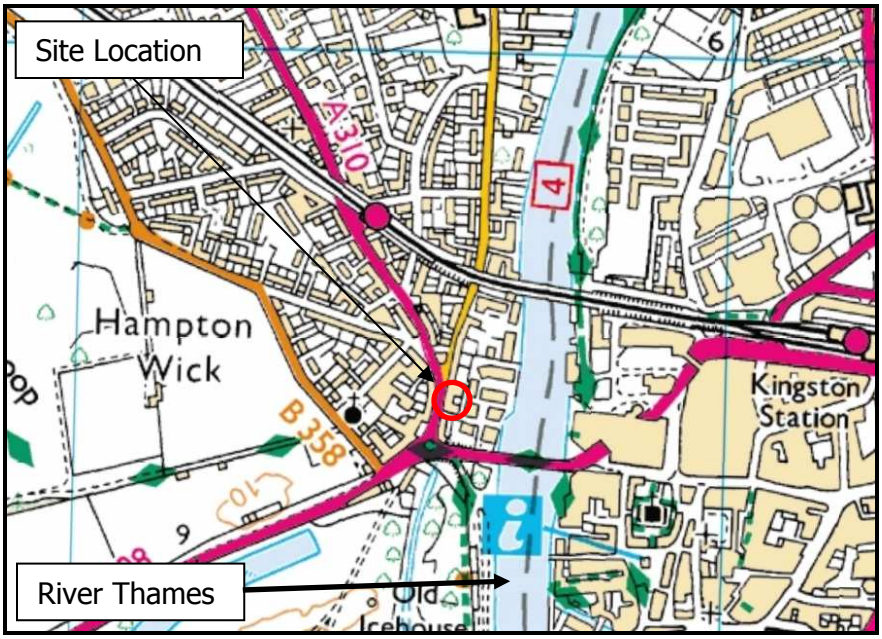


Figure 2.1 Site Location Plan

The site sits within the Hampton Wick area which is a well-defined suburban area, in the London Borough of Richmond upon Thames, about 9 miles west-southwest of central London.

The site is bordered by High Street to the west and Marina Place to the east. Existing commercial/residential units are located either site of the proposed development site.

With regards to topography, the site slopes in a general west to east direction towards the River Thames.

The finished floor levels (FFL) of the existing units are shown in Drawing SD13357-02 included in **Appendix B**. The drawing shows that the FFLs increase from east to west. The minimum ground floor FFL is at an elevation of 7.13m AOD, the maximum FFL is 8.21m AOD. There is a basement level which has a FFL of 6.15m AOD.

2.2 Existing Usage

The existing site comprises of the 3 units (6-8 and 10 High Street) which were previously used for commercial and residential purposes, as well as workshops behind the units. The existing site plan is included in **Appendix B**.

2.3 Proposed Usage

The development proposal comprises of renovating the existing 3 units on High Street into 2 residential dwellings (Units 1 and 2) and an office/retail unit (Unit 3). The workshops at the rear of Units 1-3 will be demolished and replaced with 3 new residential units (Units 4-6). The proposed development plans are included in **Appendix B**.

3.0 EXISTING HYDROLOGY AND FLOOD ALLEVIATION MEASURES

3.1 Surface Water Hydrology

The proposed development site is situated within the Thames catchment region. The Thames catchment is approximately 12,900km^2 in area, with an average yearly rainfall of around 690mm. The river varies along its longitudinal profile in width from 18m to a maximum width of 100m. The catchment upstream of the site is around 10,000km^2.

3.2 River Thames

The River Thames is conveyed past the site approximately 100m to the east of the site.

The Thames river basin is conventionally divided into four areas: the tidal, lower, middle and upper Thames. The lower Thames runs from the confluence of the River Kennet in Reading to Teddington weir which is the official upper tidal limit of the Thames.

The proposed development site is situated within the upper tidal limit of the Thames and will be afforded protection from the Thames tidal barrier, if the need arises.

3.3 Existing Flood Alleviation Schemes

The site is afforded protection from the Thames barrier which protects London to a level of 6.9m AOD. The Thames barrier is located downstream, approximately 15km to the east of the site.

In reference to the Strategic Flood Risk Assessment produced for Richmond upon Thames, produced by Jacobs in June 2008, *"It is reiterated that a proportion of the London Borough of Richmond is delineated as Zone 3a High Probability, however the presence of raised defences provides a degree of protection against flooding. It is broadly accepted that these defences reduce the actual risk to properties within lower lying areas of the district…"*

(London Borough of Richmond upon Thames SFRA, p. 39, Jacobs, June 2008)

4.0 POTENTIAL MECHANISMS FOR FLOODING AND ASSOCIATED RISKS

4.1 Mechanisms for Flooding

A number of possible flooding mechanisms have been considered at the site in line with advice given in the National Planning Policy Framework, these are discussed further below and where necessary are covered in more detail in later sections of this report.

4.2 Groundwater Flooding

The site is located approximately 100m from the River Thames. Although the site is low lying, the area is extensively developed with many properties having basements. It is considered that groundwater drainage will have been addressed in this urbanised area by the implementation of surface water drainage systems, and if necessary pumping arrangements.

4.3 Overland Sheet Flow

The land surrounding the site is predominately built-up environment incorporating predominantly residential units.

Given the flat nature of the site and the well developed nature of the surrounding area, overland sheet flow is highly unlikely to represent a flood risk at this site. Any surface water would be intercepted by the existing drainage networks. In addition there is no history of flooding from sewers in this area. Given the surrounding topography and surface water drainage network, overland sheet flow has been discounted from further consideration.

4.4 Fluvial (River) Flooding

EA information has been purchased for the propose development site. This information details the flood risk to the site, in this case fluvial flood risk is considered to be the primary flood risk to the site. This will be discussed further in **Section 5.**

EA information is included in **Appendix C**.

4.5 Tidal Flooding

The site could be subject to tidal flooding due to it's proximity to the River Thames.

The particular threat to the site is from tidal surge. These events occur when a combination of spring high tide, easterly winds and a weather system depression over the North Sea can lead to tidal levels significantly above the normal (predictable) tidal range. The result is a large elevated volume of water being pushed across the North Sea funnelling up the Thames.

The EA information provided fluvial levels only which are anticipated to be well above the tidal levels. As such tidal flood risk has been discounted from further consideration.

4.6 History of Flooding

The EA product 4 flood information pack provided details regarding past flood events in the area surrounding the subject site. An extract of this information is shown in Figure 4.1 below.

From the information provided it is clear that the proposed site has not been subject to a flood event according to EA records.

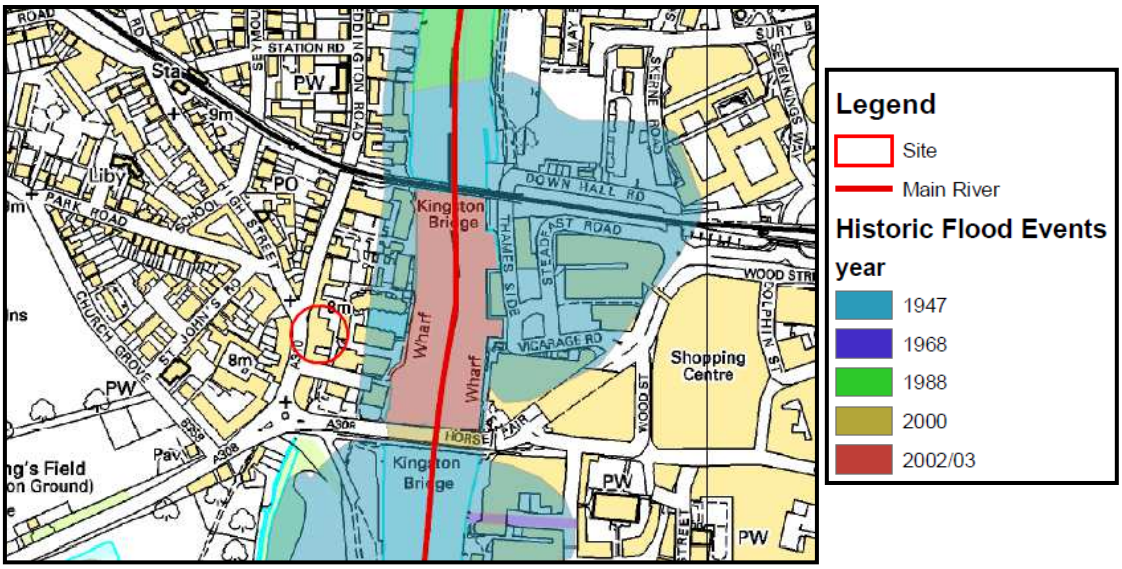


Figure 4.1 Extract of EA Information Historic Flood Events

4.7 Flooding as a Result of the Development

The proposed development is a redevelopment of existing units and hard paved areas, as such there will be no increase in impermeable area and therefore no increase in flood risk as a result of the proposed development.

4.8 Other Sources of flooding

There is no history of flooding from sewers in this area.

It is considered that the site is not at risk from sources of flooding. These mechanisms of flooding are therefore discounted from further consideration in this report.

5.0 FLUVIAL FLOODING

5.1 General

As discussed above, the proposed development site is potentially at risk from fluvial flooding from the adjacent River Thames.

The finished floor levels (FFL) of the existing units show a fall from the west to east. The existing ground floor units have FFLs ranging between 7.13m AOD to 8.21m AOD. These are shown in Figure 5.1 below.

The proposed development has the following floor levels:

- Units 1-3 – Existing FFLs or higher to be utilised
- Unit 4 – 7.55m AOD
- Unit 5 – 7.55m AOD
- Unit 6 – 7.55m AOD
- Units 4-6 – have parking areas with FFLs of 6.81m AOD

The levels are shown on the proposed plans included in **Appendix B.**

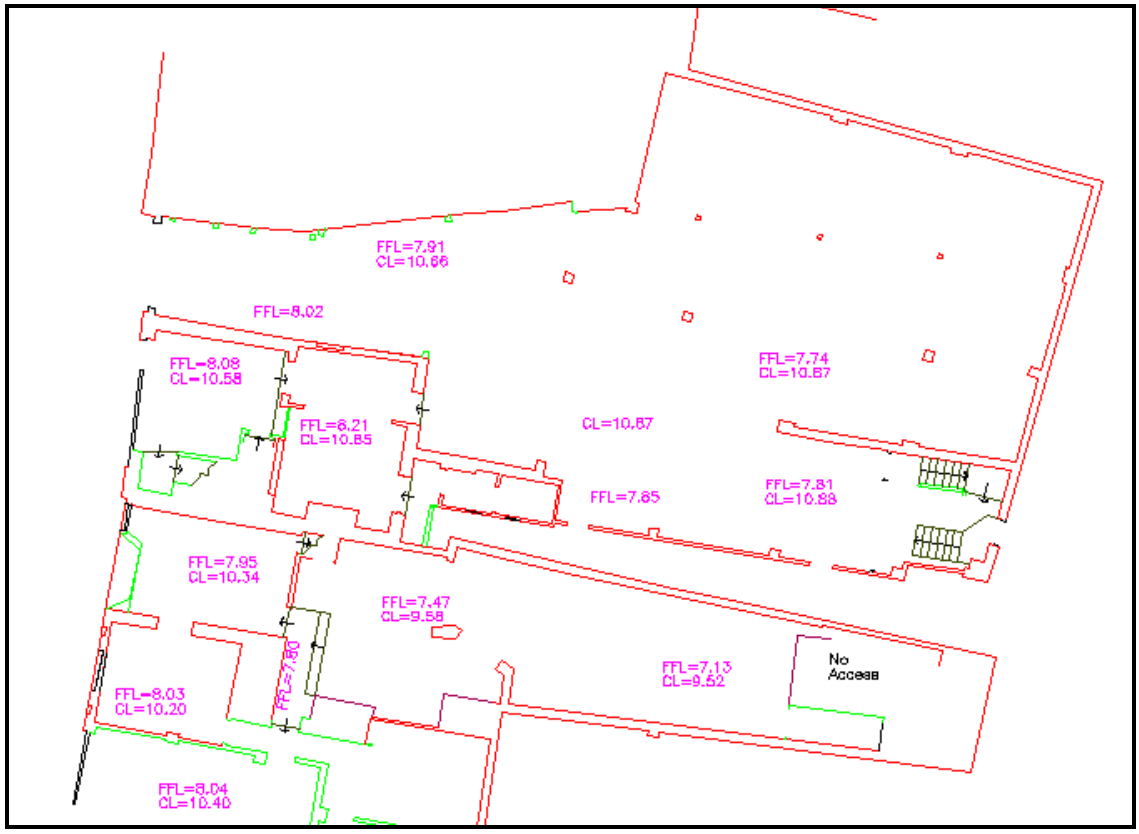


Figure 5.1 Existing Finished Floor Levels Units 6-8 and 10

5.2 Fluvial Flood Risk

The EA provided detailed model information ('Thames (Lower) Reach 4 2010' model) for the River Thames at the site location. The EA information is included in **Appendix C** of this report.

The information provided detailed modelled levels for High Street directly in front of the proposed development. The following levels were provided:

- 1 in 100 year event (Flood Zone 3 extents) – 6.90m AOD
- 1 in 100 year + Climate Change (CC) – 7.33m AOD
- 1 in 1,000 year event (Flood Zone 2 extents) – 8.16m AOD

5.3 Flood Risk Summary

The site is at risk from fluvial flooding associated with the River Thames.

The parking areas of units 4-6 are below the 1 in 100 year levels, these levels will not be used/accessed during a flood event.

From the above information it is clear that the living areas of the development have FFL which are above the 1 in 100 year fluvial event including an allowance for climate change.

It should be noted that the proposed development may be at risk from the 1 in 1,000 year fluvial event. However, this event is likely to be rare (between than 0.1% and 1% annual exceedence probability) and a substantial area within London would be flooded if this event was to occur. It is anticipated that the substantial defences in the London area would protect the site in an extreme flood event.

6.0 PROPOSALS TO MINIMISE/MITIGATE FLOOD RISKS

6.1 Minimising Flood Risk

To protect the proposed development from flooding during an extreme fluvial flood event, the proposed development site should adopt the following flood mitigation measures in the design of the proposed development.

6.2 General Flood Mitigation Measures

In order to minimise tidal flood risks a number of possible options could be considered for the new development. These are outlined below.

1. The Finished Floor Level (FFL) of the proposed units should be raised if feasible as high as possible to a minimum level of 7.63m AOD (1 in 100 year + climate change +300mm).

2. To increase the overall flood resilience of the development; flood resistant flooring and finishes should be utilised where possible throughout the building development up to 7.63m AOD above the finished floor level. All electrical circuitry and apparatus should be installed above or higher than this level. Alternatively ground based electrical installations should be designed to withstand flooding.

   Further advice on developing flood risk is available from Improving Flood Resilience of New Buildings available which is available at:
   http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

   A brief outline of measures is provided below:

   - Lime based plaster and finishes in preference to gypsum products.
   - Pressure treated timber for woodwork including framing and skirting boards.
   - All insulation below 7.63m AOD should be water resistant and quick drying.

3. Any vents, windows or doors below the a level of 7.63m AOD should have flood protection measures installed to prevent any water ingress. Tanked construction measures should also be used to prevent groundwater ingress.

The proposed development should be constructed in line with guidance in the Communities and Local Government document "Improving the Flood Performance of New Buildings" (reproduced below in Figure 6.1).

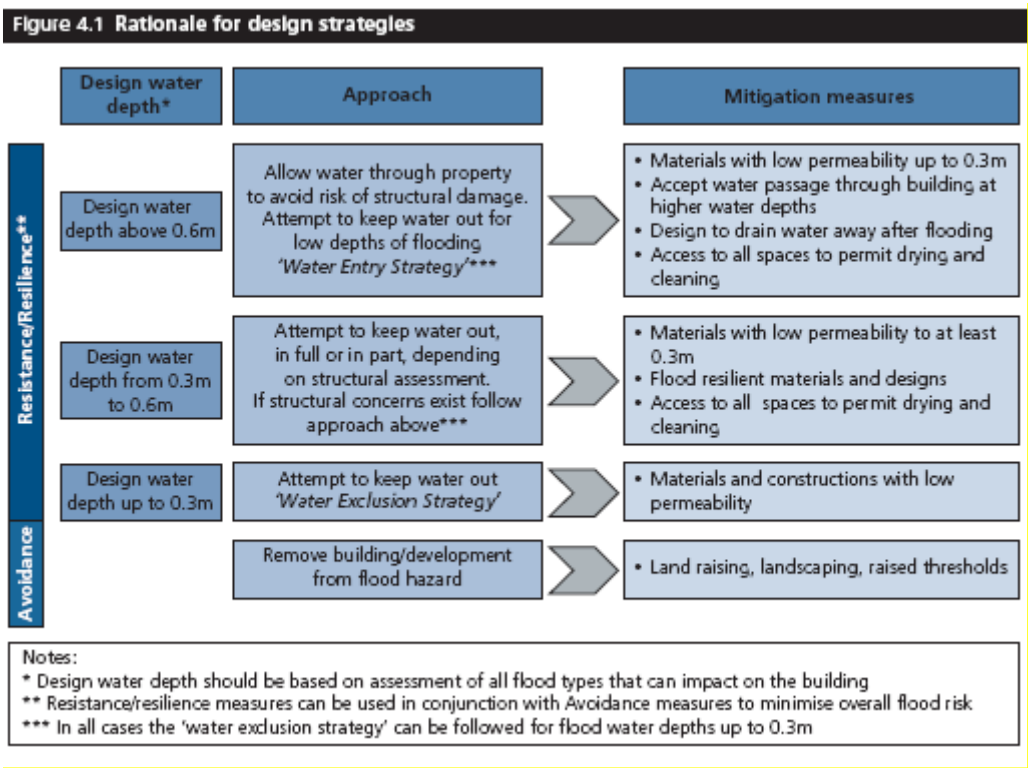


Figure 6.1 Rationale for design strategies (Figure 4.1 from "Improving the Flood Performance of New Buildings")

7.0 ACCESS AND EGRESS

The proposed development has been shown to be located within Flood Zone 2/3.

It is proposed that the courtyard between the units is raised to a level of 7.63m AOD (1 in 100 year level + climate change + 300mm freeboard). This would allow for safe 'dry' access onto the A310 (High Street) during a 1 in 100 year + climate change event. The A310 gradually climbs in a northerly direction away from the proposed site to Flood Zone 1 (shown in Figure 7.1 below).

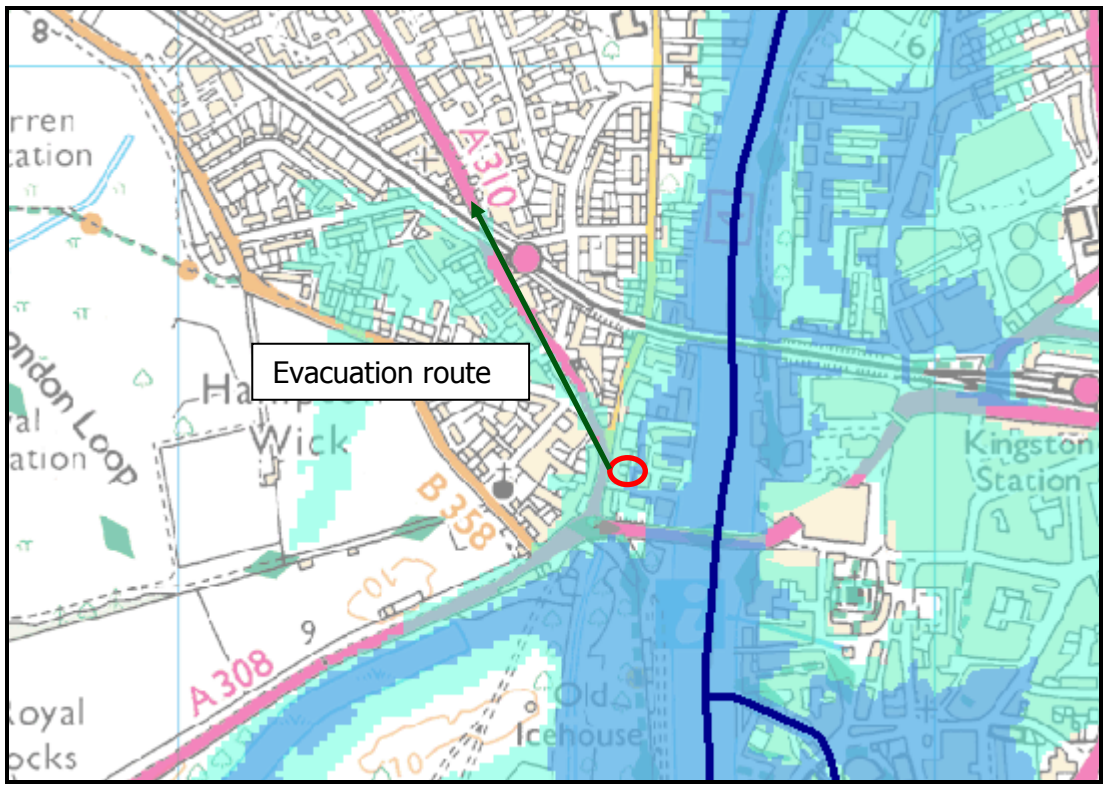


Figure 7.1 Flood Evacuation Route

It should be noted that the site is not dry in a 1 in 1000 year event, if this event was to occur much of London would be inundated with flood waters. It is anticipated that the substantial defenses would protect the site in this scenario.

The first floor of units 1-6 of the development would be situated at least 10m AOD which is well above any anticipated flood level. This elevation would act as a safe haven during a flood event where residents would be safe throughout the duration of the flood event.

8.0 RESIDUAL RISKS AFTER DEVELOPMENT

The development will be at risk from flood events exceeding the 1 in 100 year + climate change scenario. However, the chance of such extreme events occurring is very small. Furthermore the site is afforded both tidal and fluvial defences associated with the River Thames.

Sufficient mitigation proposals have been recommended in Section 6.0 of this report and if implemented are likely to manage the overall flood risk to the proposed development.

It is essential to recognise that the Thames barrier, and nearby embankment defences do not fully remove the risk of flooding to properties within the Borough. There is always the residual risk of system malfunction, overtopping and / or structural failure.

9.0 POLICY

The proposed development is the re-development of existing units and associated workshops at 6-8 and 10 High Street, Hampton Wick. As such the development can be considered to be on a brownfield site. As the site is within Flood Zone 2/3 the sequential test should be applied.

According to the sequential approach more vulnerable sections of the development should be located in areas at least risk of flooding. As such the residential areas of the site have been shown to be located within Flood Zone 2, however, the car parking areas for units 3-6 are within Flood Zone 3. It can therefore be confirmed that the sequential approach has been applied in the development layout.

Regarding the sequential test, Paragraph 102 of the National Planning Policy Framework (NPPF) states:

"102. If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- *it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and*
- *a site-specific flood risk assessment must demonstrate that 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.*

Both elements of the test will have to be passed for development to be allocated or permitted."

Table 3 of the NPPF-TG states; for a site classified as 'more vulnerable' that is located within Flood Zone 3, then the exception test should be applied. As the site is located within the Flood Zone 3 the sequential test should also be applied. If the site passes both tests then the development is deemed to be appropriate from a flood risk perspective, see **Figure 3** below.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

	Flood risk vulnerability classification (see table 2)	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Figure 3. Extract from NPPF-TG Table 3

Sequential and Exception Tests

Sequential Test

As the site is located within partially within Flood Zone 3 the application of the sequential test is required. The sequential test aims to steer new development to areas with the lowest probability of flooding.

As the development is a redevelopment of an existing brownfield site the development cannot be situated elsewhere. It is anticipated that the site would be appropriate when considering the sequential test. However, it is the ultimate responsibility of the LPA to apply the sequential test. The NPPF Paragraph 9 states the following:

"Pursuing sustainable development involves seeking positive improvements in the quality of the built, natural and historic environment, as well as in people's quality of life, including (but not limited to):

- *making it easier for jobs to be created in cities, towns and villages;*
- *moving from a net loss of bio-diversity to achieving net gains for nature;*[6]
- *replacing poor design with better design;*
- *improving the conditions in which people live, work, travel and take leisure; and*
- *widening the choice of high quality homes."*

The proposed site is located within walking distance of local amenities. This provides a sustainability benefit for the area which many other development sites could not provide. Furthermore the site is close to local sources of employment, services and transport links/routes.

The site is presently a brownfield site, as such the proposal would also provide 'improved conditions in which people live, work, travel and take leisure' as well as 'widening the choice of high quality homes'. Therefore in this case the wider sustainability benefits may outweigh the flood risk to the site, as the development would appear to meet 4 of the 5 points noted above. However, it is up to the Local Planning Authority (LPA) to make a decision regarding the sequential test with respect to the proposed development.

Exception Test

The exception tests consists of two parts, Paragraph 102 of the NPPF states the following:

"102. If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- *it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and*
- *a site-specific flood risk assessment must demonstrate that 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.*

Both elements of the test will have to be passed for development to be allocated or permitted."

Firstly as stated above the proposal is a re-development of an existing brownfield site, the site is also located within walking distance several local amenities. As such the wider sustainability benefits of this site may outweigh the flood risk at the site. However, it is the ultimate responsibility of the LPA to apply the sequential test.

Secondly the site-specific FRA (this report) recommends a number of mitigation measures which include; raising the finished floor level of the new-build units above the anticipated 1 in 100 year flood levels including an allowance for climate change, with a freeboard of 300mm to account for inconsistencies. Furthermore the bedrooms of the property are located on the first floor which would act as a safe haven during a flood event.

It is anticipated that the development passes both parts of the exception test as explained above. However, it is up to the LPA to make this decision.

10.0 CONCLUSIONS AND RECOMMENDATIONS

On the basis of this report it is clear that the site is located mostly within fluvial Flood Zone 2 with a small area within fluvial Flood Zone 3, this relates to a Medium and High Probability of flooding respectively as set out in NPPF-TG. However, on the basis of this report, it has been determined that the sites finished floor levels (FFL) and the defences in the area are appropriate to manage the flood risks.

On the basis of this assessment all 'living' areas of this development have finished floor levels above the 1 in 100 year + climate change flood level. The FFL are existing or higher in the existing units (units 1-3). The FFL for the new units 4-6 have a FFL of 7.63m AOD which is 1 in 100 year event + climate change + 300mm freeboard.

The car parking area of units 4-6 have a FFL of 6.81m AOD which is 0.09m below the 1 in 100 year event, as such these are the only areas within Flood Zone 3. These areas should remain as parking areas and have low vulnerability uses.

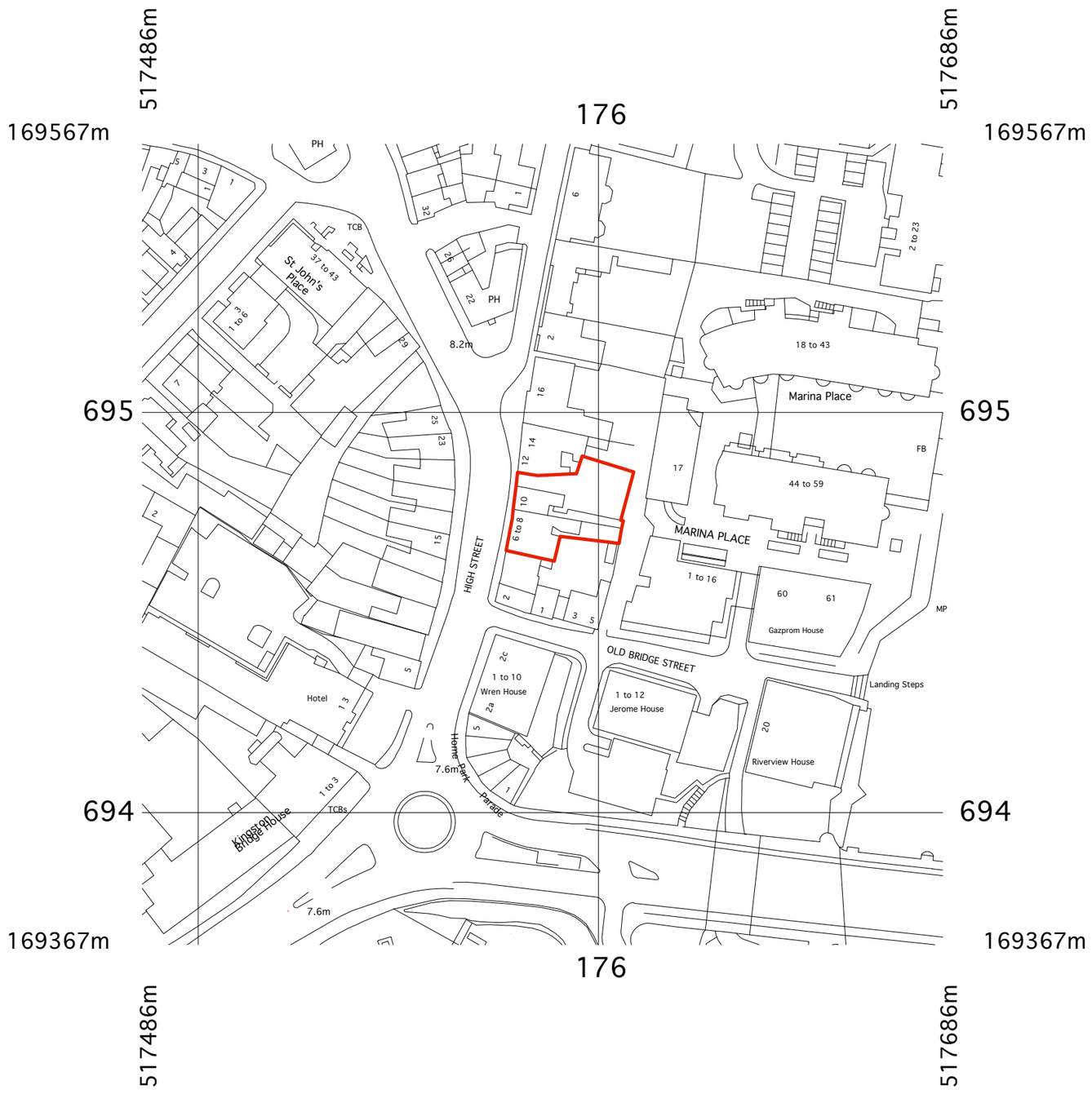
The proposed development has been shown to be within Flood Zone 2 (medium risk). It is not feasible to raise the area above this level, furthermore it is anticipated that the fluvial/tidal defences in the area would afford some protection for the site. It is anticipated that the first floor of the proposed units would be above any anticipated flood level and as such would be a safe haven if an extremely rare flood event was to occur.

A number of mitigation measures have been outlined in Section 6.0 which serve to minimise flood risks and provide flood resilience/protection. These include raising FFL where possible, flood resilient construction materials and raised access routes.

As the site is located within Flood Zone 2/3 the sequential test should be applied. Section 9.0 details the sequential approach and suggests that the site would pass the sequential test as the re-development of this site cannot be moved elsewhere. However, it is the ultimate responsibility of the LPA to apply the sequential test.

Table 3 of NPPF-TG states that a "more vulnerable" development can be deemed to be appropriate in Flood Zone 3 subject to the application of the Exception Test. Section 9 of this report details the exception test. This report suggests that the site would be more beneficial in social/economic terms than the existing site. Furthermore the site-specific FRA (this report) provides mitigation measures which demonstrate the site can be safe over its lifetime. It will be up to the LPA to determine the outcome of the exception test.

APPENDIX A SITE LOCATION PLAN



01 : SITE LOCATION PLAN

Rev.	Date	Description
-	05.08.13	Pre-Application Planning Submission.

north

Notes:

Application Site

NISSEN RICHARDS studio

Unit 3 Waterhouse Square T 020 7870 8899
8 Orsman Road info@nissenrichardsstudio.com
London N1 5QJ www.nissenrichardsstudio.com

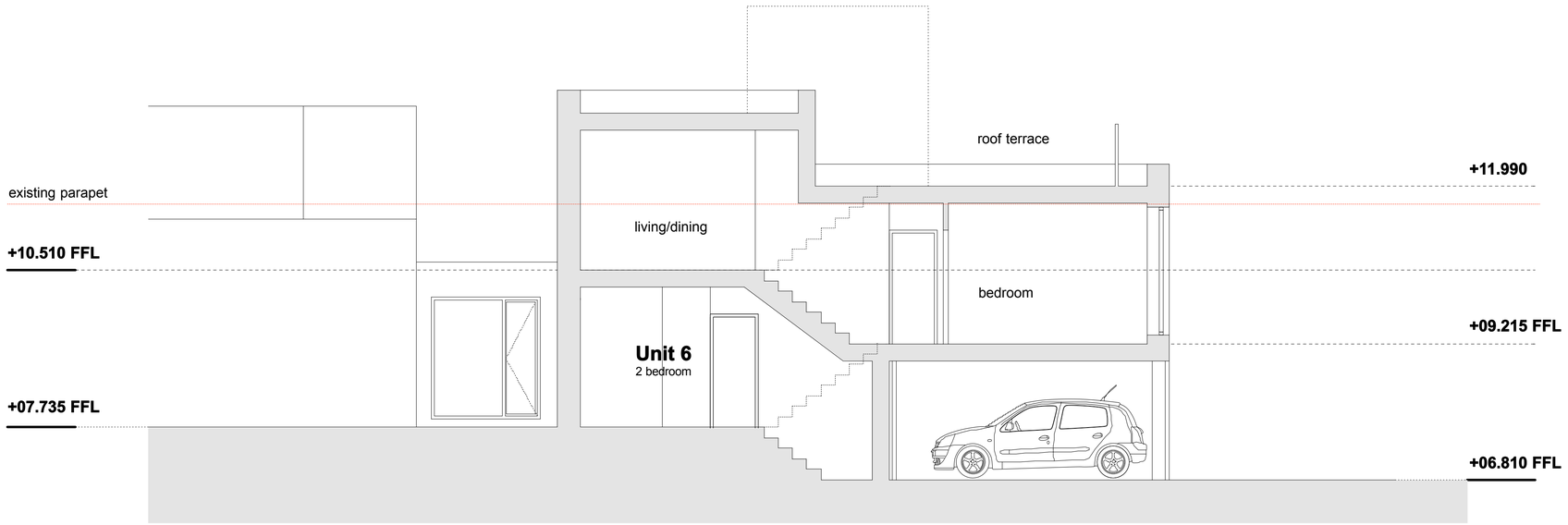
Project: 6-8 and 10 High Street, Hampton Wick, Kingston upon Thames, KT1 4DB
Client: Countrywide Design
Title: Site Location Plan

Scale: 1:625 at A1 1:1250 at A3
Project no: A1372

Drawing no: A1372-PL-001

APPENDIX B PROPOSED DEVELOPMENT PLANS

0 5m



01 : PROPOSED SECTION BB THROUGH UNIT 6

Rev.	Date	Description
--	12.02.14	Submitted for Planning Approval.

North

Key:

NISSEN RICHARDS studio
Unit 3 Waterhouse 8 Orsman Road London N1 5QJ
T 020 7870 8899 info@nissenrichardsstudio.com www.nissenrichardsstudio.com

Project: 6-8 and 10 High Street, Hampton Wick, Kingston upon Thames, KT1 4DB
Client: Countrywide Design
Title: Proposed Section BB New Build At Rear
Scale: 1:50 at A1 1:100 at A3
Project no: A1372
Drawing no: A1372-PL-511/D1

0 5m

SECTION CC refer drawing A1372-PL-512

SECTION BB refer drawing A1372-PL-511

SECTION AA refer drawing A1372-PL-510

SECTION DD refer drawing A1372-PL-513

New stair to be installed

Commercial
GIA 58sqm

Unit 3
2 bedroom
3 person
GIA 71sqm

new communal open courtyard garden

+07.735 FFL

Unit 6
2 bedroom
3 person
GIA 101sqm

kitchen/dining
22sqm

entrance/store

bedroom
12sqm

Unit 5
3 bedroom
5 person
GIA 121sqm

entrance/store

Unit 4
3 bedroom
5 person
GIA 126sqm

+06.810 FFL

+07.735 FFL

bedroom
12sqm

entrance/store

+08.060 FFL

Unit 2
5 bedroom
10 person
GIA 152sqm

dining/kitchen
36sqm

rear courtyard garden

kitchen
13sqm

kitchen/dining
11.6 sqm

courtyard garden

Unit 1
2 bedroom
4 person
GIA 89.2sqm

living/dining
22sqm

01 : PROPOSED GROUND FLOOR PLAN

Rev.	Date	Description
--	12.02.14	Submitted for Planning Approval.

North

Notes:

Key:

Application Site

Proposed Structure

Existing Structure

NISSEN RICHARDS studio

Unit 3 Waterhouse
8 Orsman Road
London N1 5QJ

T 020 7870 8899
info@nissenrichardsstudio.com
www.nissenrichardsstudio.com

Project:	**6-8 and 10 High Street, Hampton Wick, Kingston upon Thames, KT1 4DB**
Client:	**Countrywide Design**
Title:	**Proposed Ground Floor Plan Existing/Proposed Conservation Scheme**
Scale:	**1:50 at A1 1:100 at A3**
Project no:	**A1372**
Drawing no:	**A1372-PL-211/D1**

APPENDIX C EA INFORMATION

Product 4 (Detailed Flood Risk) for site at 6/8 & 10High Street, KT1 4DB
Our Ref: WT/12012

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 seperately)

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

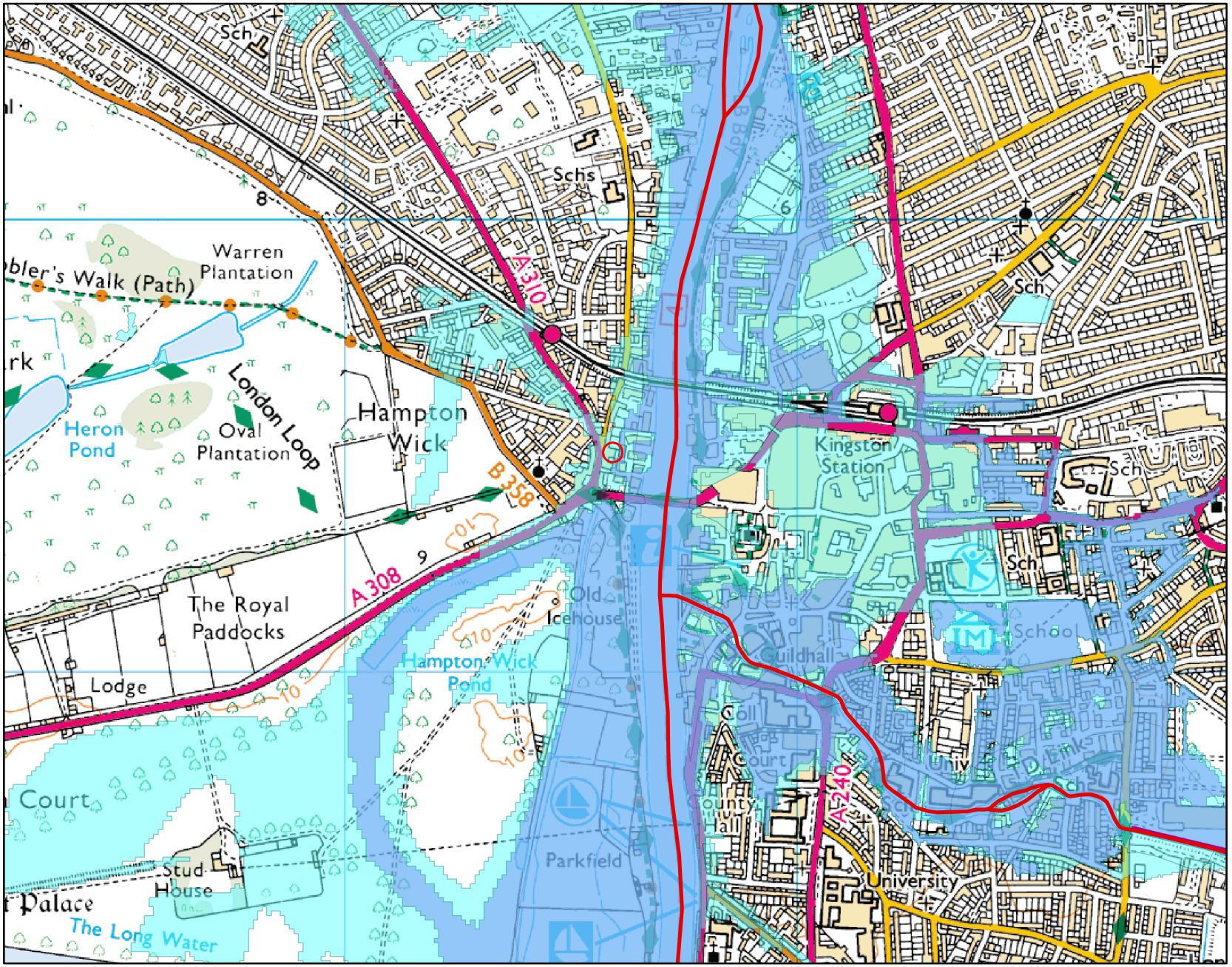
http://www.environment-agency.gov.uk/research/planning/82584.aspx

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

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD
Customer services line: 08708 506 506
Email: WTenquiries@environment-agency.gov.uk

Flood Map centred on KT1 4DB
Created 04 November 2013 REF WT/12012



Environment Agency

Kilometres

0 0.15 0.3

Legend

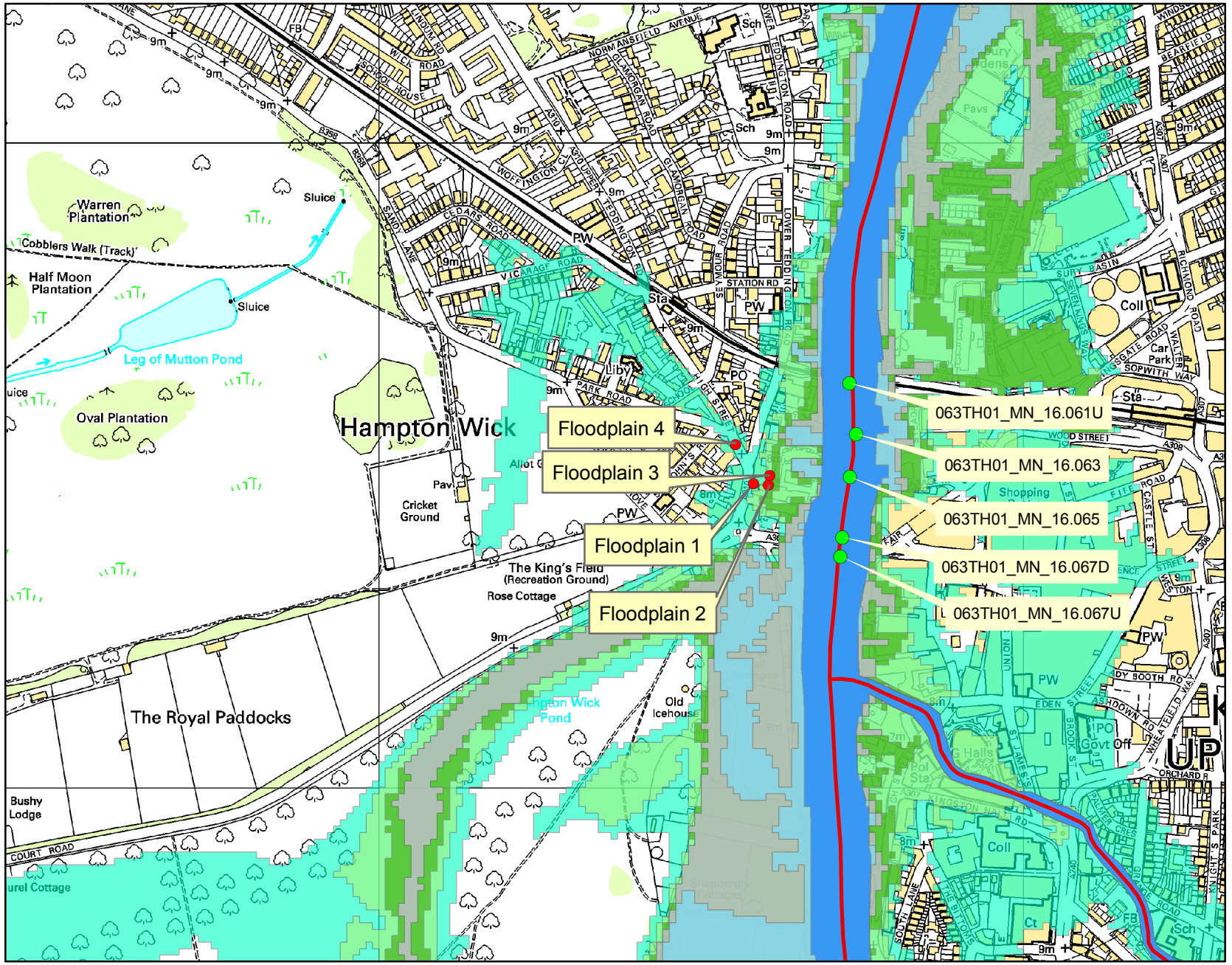
- Main River
- Site
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

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.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Detailed Flood Map centred on KT1 4DB
Created 04 November 2013 REF WT/12012



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Kilometres

0 0.1 0.2

Legend

- Nodes
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 2% AEP flood extent
- 1% AEP flood extent
- 1%CC AEP flood extent
- 0.1% AEP flood extent

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring 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)

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Modelled in-channel flood flows and levels

WT/12012

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	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
063TH01_MN_16.067U	Thames (Lower) Reach 4 2010	517716	169358	5.37	6.19	7.03	7.65	8.34
063TH01_MN_16.067D	Thames (Lower) Reach 4 2010	517719	169388	5.30	6.09	6.91	7.49	8.17
063TH01_MN_16.065	Thames (Lower) Reach 4 2010	517731	169481	5.30	6.07	6.88	7.44	8.06
063TH01_MN_16.063	Thames (Lower) Reach 4 2010	517740	169548	5.27	6.05	6.86	7.42	8.06
063TH01_MN_16.061U	Thames (Lower) Reach 4 2010	517730	169627	5.22	5.98	6.79	7.33	7.95

				Flood Flows (m3/s)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
063TH01_MN_16.067U	Thames (Lower) Reach 4 2010	517716	169358	428.65	589.43	762.55	870.36	983.44
063TH01_MN_16.067D	Thames (Lower) Reach 4 2010	517719	169388	428.65	589.43	762.55	870.36	983.44
063TH01_MN_16.065	Thames (Lower) Reach 4 2010	517731	169481	428.80	589.64	786.71	937.13	1122.09
063TH01_MN_16.063	Thames (Lower) Reach 4 2010	517740	169548	429.58	588.28	782.50	932.89	1112.88
063TH01_MN_16.061U	Thames (Lower) Reach 4 2010	517730	169627	430.16	587.25	779.91	934.55	1121.39

Modelled floodplain flood levels

WT/12012

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

				flood levels (mAOD)				
2D grid cell reference	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
Floodplain 1	Thames (Lower) Reach 4 2010	517581	169470					8.16
Floodplain 2	Thames (Lower) Reach 4 2010	517603	169468			6.90	7.33	8.15
Floodplain 3	Thames (Lower) Reach 4 2010	517606	169483				7.29	8.07
Floodplain 4	Thames (Lower) Reach 4 2010	517555	169535					8.2

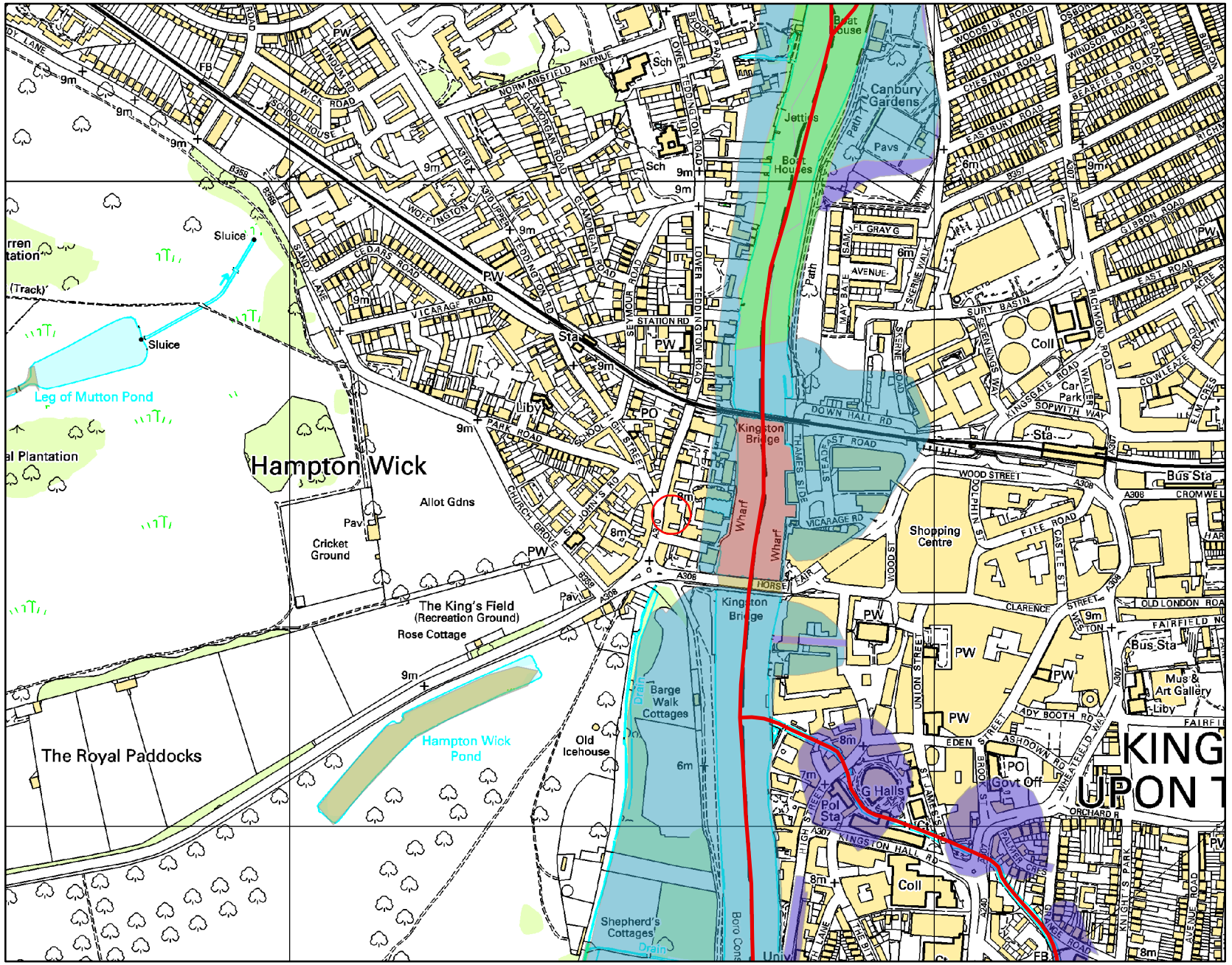
This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Model information

WT/12012

Model:	Thames (Lower) Reach 4 2010
Description:	Lower Thames Reach 4 (Sunbury Court Island to Teddington): The information provided is taken from the Lower Thames Reach 4 2D Modelling Study which was completed in December 2010. It was modelled usinga linked ISIS- TUFLOW model. The model accuracy has generally been maintained to be within ± 200mm of the gauged data at the head and tail water levels at the main locks on the River Thames for the calibration event. Model design runs: 1 in 5 / 20% 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 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; 1 in 1000 / 0.1% AEP and 1 in 100+20% / 1% AEP with climate change Model accuracy: Levels ± 200mm

Historic Flood Event Map centred on KT1 4DB
Created 04 November 2013 REF WT/12012



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0 0.1 0.2

Legend

- Site
- Main River

Historic Flood Events

year

- 1947
- 1968
- 1988
- 2000
- 2002/03

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

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Defence information

WT/12012

Defence Location:	River Thames Scheme (Datchet to Teddington)
Description:	We are currently working on The River Thames Scheme (Datchet to Teddington), a scheme which proposes measures to reduce the risk of flooding to the 15,000 properties which are currently at risk from flooding in the area from Datchet to Teddington. These measures include the construction of three flood diversion channels, the widening of Desborough Cut and improvements to Sunbury and Molesey Weirs and Teddington Lock. It also includes community based measures for improving resistance and resilience to flooding for smaller groups of properties and improving mapping information for emergency evacuation plans. For more information please visit our website at: http://www.environment-agency.gov.uk/homeandleisure/floods/123097.aspx

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