

Product 4 (Detailed Flood Risk) for Site at Barrett Street, Oxford, OX2 0AT Our Ref: THM198376

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 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:

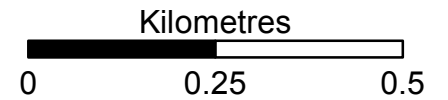
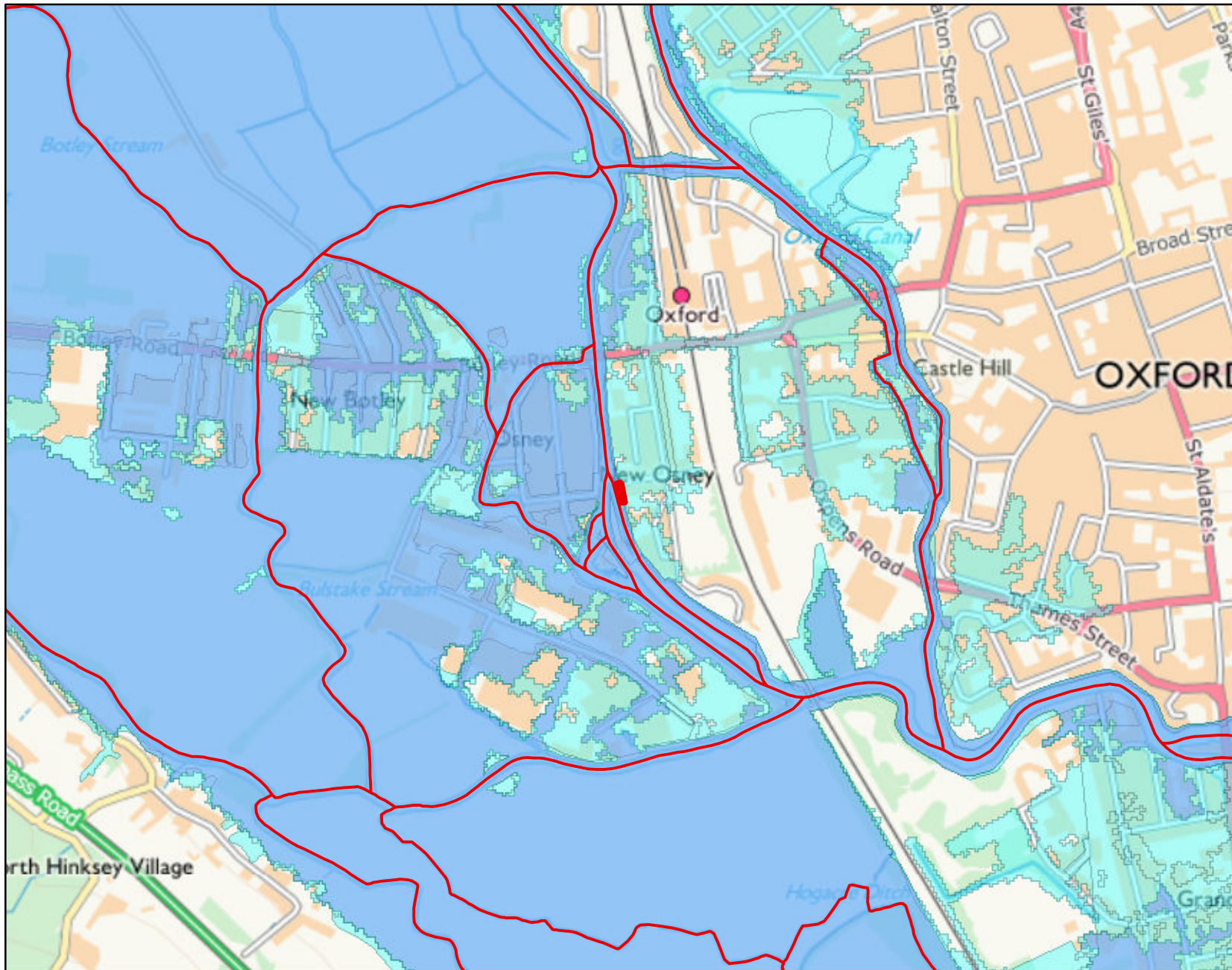
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

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 OX2 0AT

Created on 22.12.20 REF: THM198376



Legend

- Main River
- 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.

Defence information

Defence Location:

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

Model: Thames (Eynsham to Sandford) 2018

Description: The information provided is from the Oxford Flood Alleviation Scheme mapping completed in March 2018. The project included updating the existing (2014) hydraulic model to support development of the outline FAS design. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow).

Model design runs:

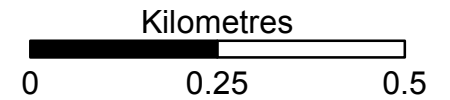
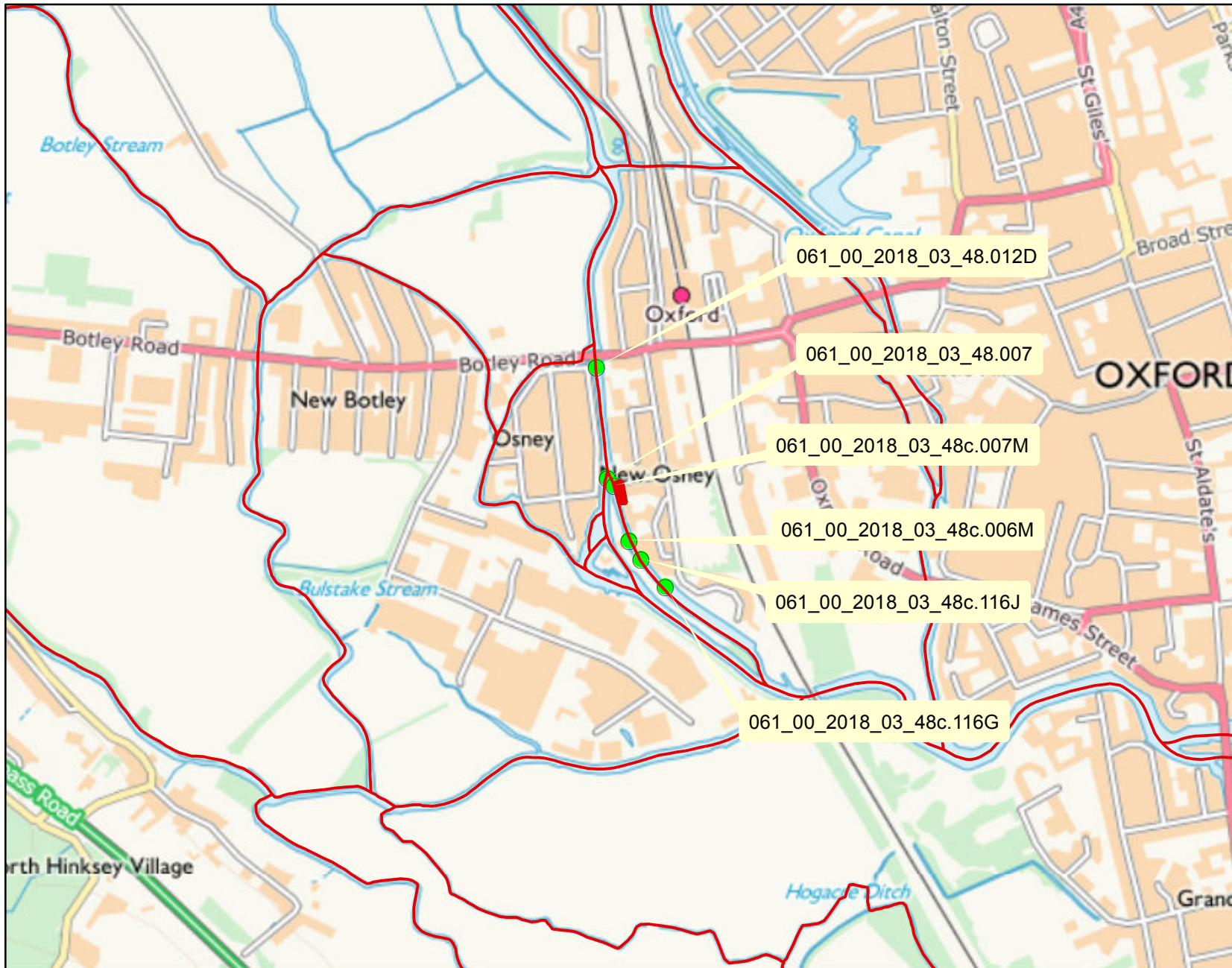
1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 10/ 10% AEP; 1 in 20 / 5% AEP; 1 in 50/ 2% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP, 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; 1 in 200/ 0.5% AEP and 1 in 1000 / 0.1% AEP.

Mapped outputs:

1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 10/ 10% AEP; 1 in 20 / 5% AEP; 1 in 50/ 2% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP, 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; 1 in 200/ 0.5% AEP and 1 in 1000 / 0.1% AEP.

Node Map centred on OX2 0AT

Created on 22.12.20 REF: THM198376



Legend

- Main River
- Model Nodes

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.

Modelled in-channel flood flows and levels

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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 (+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
061_00_2018_03_48c.116G	Thames (Eynsham to Sandford) 2018	450437	205814	56.03	56.31	56.58	0.00	56.73	56.81	57.00	56.83
061_00_2018_03_48c.116J	Thames (Eynsham to Sandford) 2018	450394	205865	56.03	56.31	56.60	0.00	56.76	56.84	57.03	56.85
061_00_2018_03_48c.006M	Thames (Eynsham to Sandford) 2018	450372	205899	56.68	56.88	57.06	0.00	57.20	57.28	57.45	57.30
061_00_2018_03_48c.007M	Thames (Eynsham to Sandford) 2018	450346	205997	56.68	56.88	57.06	0.00	57.20	57.28	57.45	57.30
061_00_2018_03_48.007	Thames (Eynsham to Sandford) 2018	450334	206010	56.68	56.88	57.06	0.00	57.20	57.28	57.45	57.30
061_00_2018_03_48.012D	Thames (Eynsham to Sandford) 2018	450314	206209	56.79	56.98	57.16	0.00	57.31	57.38	57.56	57.40

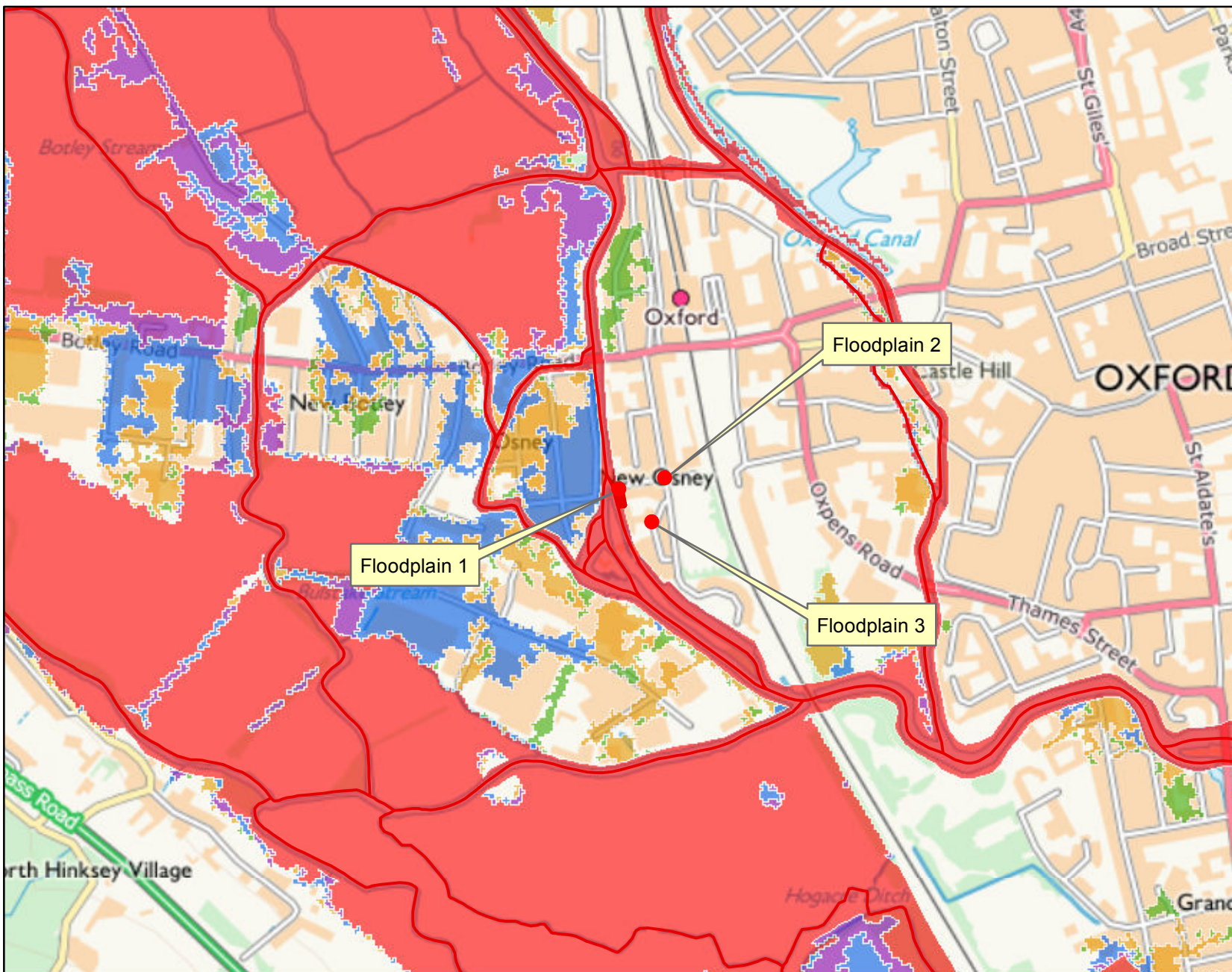
		Flood Flows (m3/s)									
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061_00_2018_03_48c.116G	Thames (Eynsham to Sandford) 2018	450437	205814	0.85	8.25	23.06	0.00	28.74	31.13	36.52	31.82
061_00_2018_03_48c.116J	Thames (Eynsham to Sandford) 2018	450394	205865	0.77	0.99	1.30	0.00	1.85	2.18	3.09	2.28
061_00_2018_03_48c.006M	Thames (Eynsham to Sandford) 2018	450372	205899	0.77	1.04	1.37	0.00	1.38	1.38	1.38	1.38
061_00_2018_03_48c.007M	Thames (Eynsham to Sandford) 2018	450346	205997	1.50	1.36	1.37	0.00	1.38	1.39	1.40	1.39
061_00_2018_03_48.007	Thames (Eynsham to Sandford) 2018	450334	206010	42.16	45.36	53.22	0.00	60.55	63.85	72.56	64.86
061_00_2018_03_48.012D	Thames (Eynsham to Sandford) 2018	450314	206209	41.47	46.37	56.55	0.00	64.72	68.14	74.99	69.10

Note:
 Due to 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.

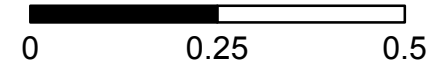
For further advice on the new allowances please visit <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

Detailed FRA Map 1 centred on OX2 0AT

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Kilometres



Legend

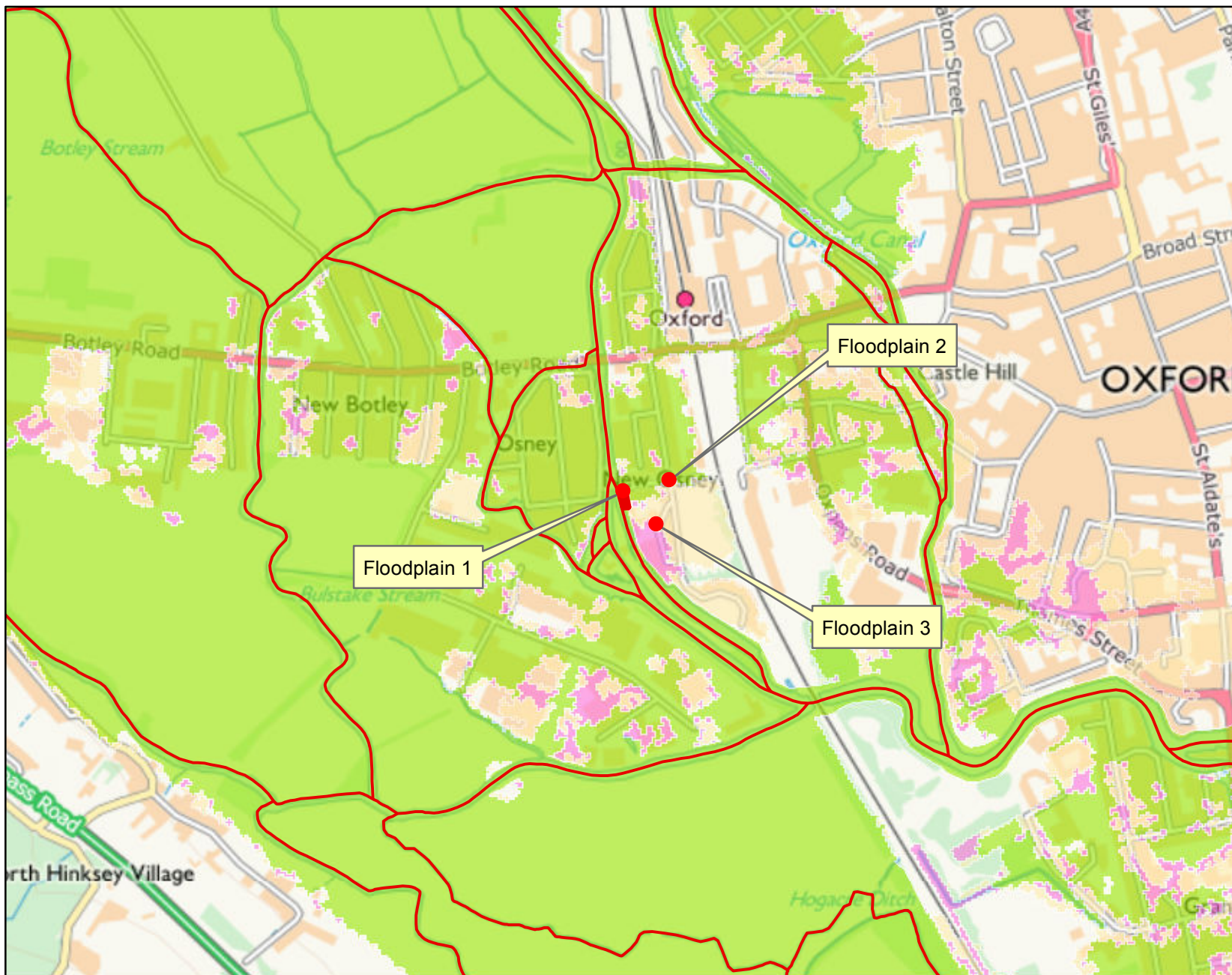
- Main River
- 50% AEP Flood Outline
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1.33% AEP Flood Outline
- 1% AEP Flood Outline

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

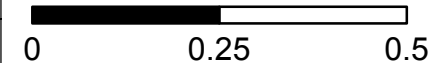
Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Detailed FRA Map 2 centred on on OX2 0AT

Created on 22.12.20 REF: THM198376



Kilometres



Legend

- Main River
- 1%+25% CC AEP Flood Outline
- 1%+35% CC AEP Flood Outline
- 1%+70% CC AEP Flood Outline
- 0.1% AEP Flood Outline

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.

Modelled floodplain flood levels

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

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)								
				20% AEP	5% AEP	1% AEP	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	
Floodplain 1	Thames (Eynsham to Sandford) 2018	450,356	205,994	No data	No data	No data	No data	No data	No data	No data	57.46	No data
Floodplain 2	Thames (Eynsham to Sandford) 2018	450,438	206,014	No data	No data	No data	No data	57.26	57.33	57.49	57.44	57.36
Floodplain 3	Thames (Eynsham to Sandford) 2018	450,415	205,934	No data	No data	No data	No data	No data	No data	No data	57.44	No data

This flood model has represented the floodplain as a grid.

The flood water levels have been calculated for each grid cell.

Note:

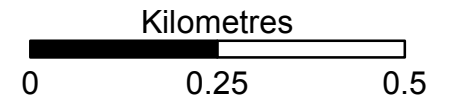
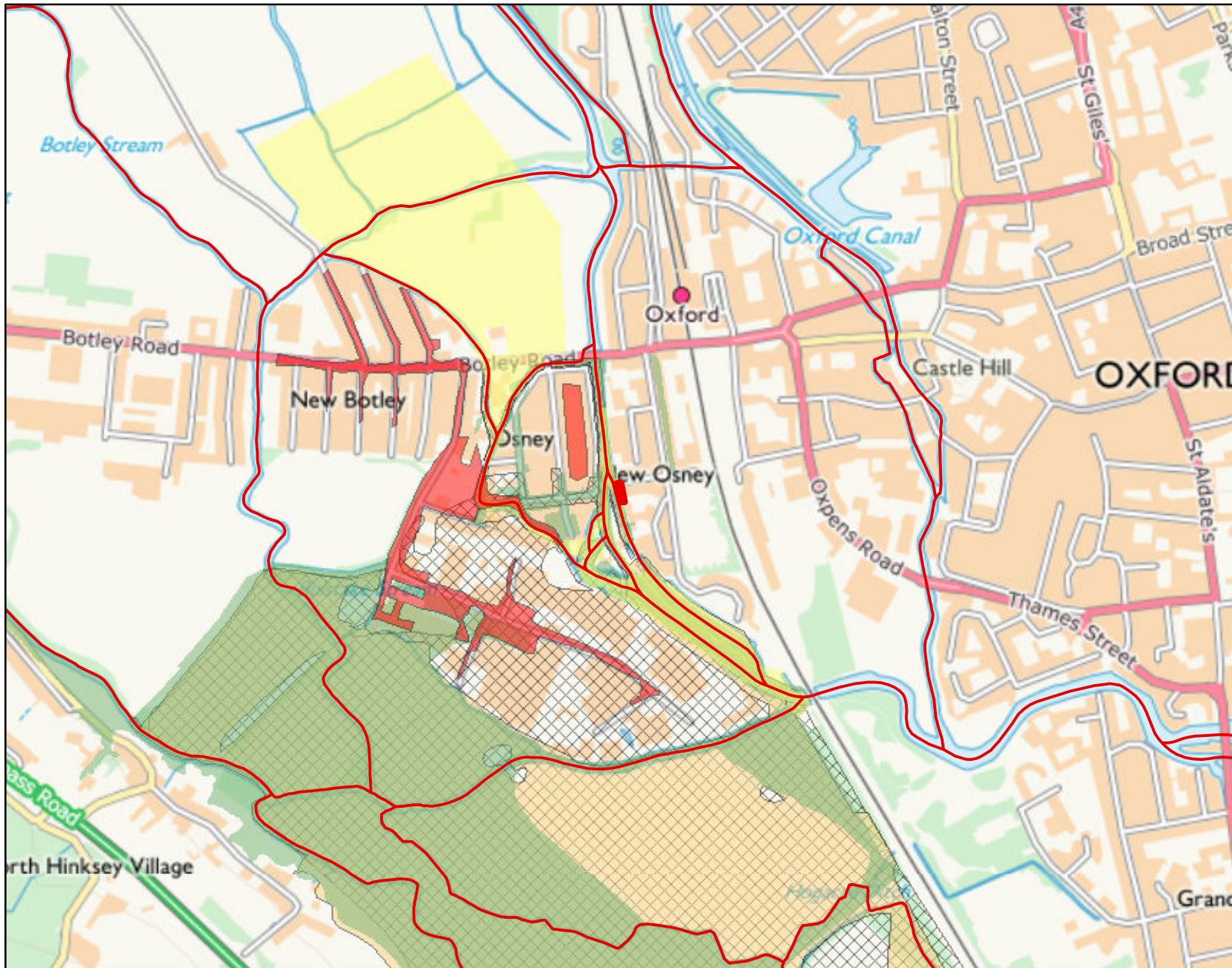
Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

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 OX2 0AT

Created on 22.12.20 REF: THM198376



Legend

— Main River

year

- 1947
- 1979
- 2000
- 2002
- 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.

Historic flood data

THM198376

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:

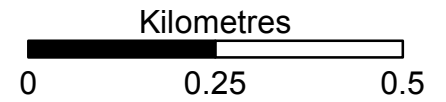
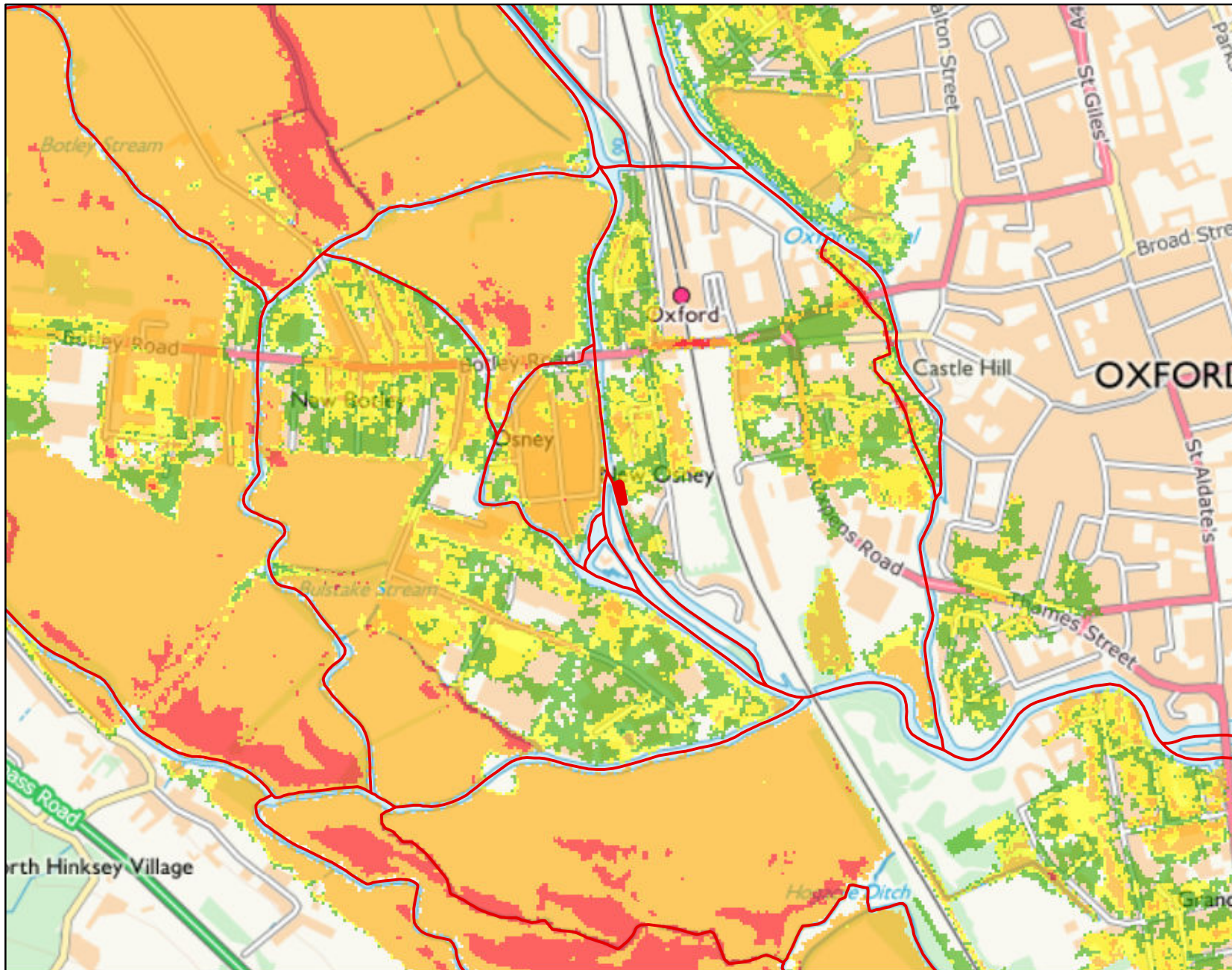
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0620001200471	06DecemberWinter2000	01/01/2000	12/12/2000	main river	channel capacity exceeded (no raised defences)
ea061162064	South Hinksey CP_Fluvial	19/07/2007	29/07/2007	main river	channel capacity exceeded (no raised defences)
EA0620030102155	06JanuaryNewYear2003	23/12/2002	12/01/2003	other	local drainage/surface water
EA0619790200070	06FebruaryWinter1979	01/01/1979	12/12/1979	main river	channel capacity exceeded (no raised defences)
EA0619470300067	06MarchSpring1947	01/01/1947	12/12/1947	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.

Hazard Map centred on OX2 0AT

Created on 22.12.20 REF: THM198376



Legend

- Main River
- Very low hazard
- Danger for some
- Danger for most
- Danger for all

For hazard and debris factor we used HR Wallingford and Environment Agency (May 2008) supplementary note on flood hazard ratings and thresholds for development planning and control purpose. The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

HR = flood hazard rating
 d = depth of flooding (m)
 v = velocity of floodwaters (m/sec)
 DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

Hazard Mapping (for the 1%+35% climate change scenario)

Hazard Mapping methodology:

To calculate flood hazard with the debris factor we have used the supplementary note to Flood Risk to People Methodology (see below).

The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

Where HR = flood hazard rating

d = depth of flooding (m)

v = velocity of floodwaters (m/sec)

DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

The resultant hazard rating is then classified according to:

Flood Hazard	Colour	Hazard to People Classification
Less than 0.75	Green	Very low hazard - Caution
0.75 to 1.25	Yellow	Danger for some - includes children, the elderly and the infirm
1.25 to 2.0	Orange	Danger for most - includes the general public
More than 2.0	Red	Danger for all - includes the emergency services

REF: HR Wallingford and Environment Agency (May 2008) Supplementary note of flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 113.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1