

APPENDIX C

**ENVIRONMENT AGENCY
PRODUCT 4 FLOOD INFORMATION
NOVEMBER 2019**

Product 4 (Detailed Flood Risk) for CATALYST BICESTER, WENDLEBURY ROAD, BICESTER Our Ref: THM149488

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:

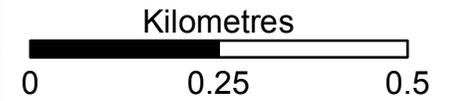
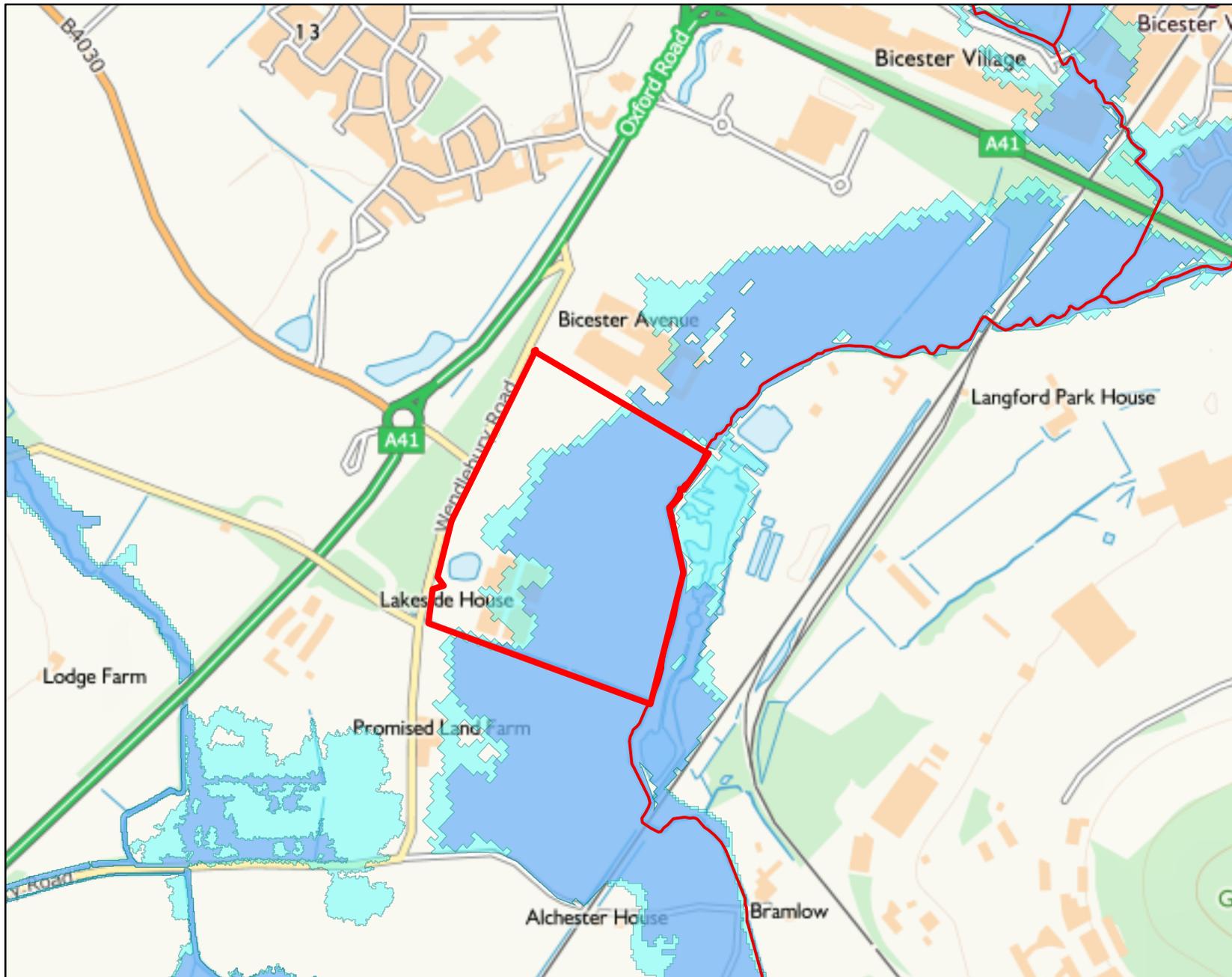
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

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 Catalyst Bicester, Wendlebury Road, Bicester

Created on 08/11/2019 REF:THM149488



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
- Flood Event Outline

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

THM149488

Model: Langford Brook (Bicester) & Pingle-Back-Bure 2010

Description: The information provided is from the Langford Brook (Bicester) & Pingle-Back-Bure 2010 detailed mapping project. The study was carried out using 2D modelling software (ISIS-Tuflow).

Model design runs:

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 100+20% / 1% AEP plus 20% increase in flows and 1 in 1000 / 0.1% AEP

Mapped Outputs:

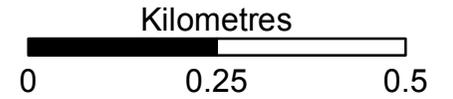
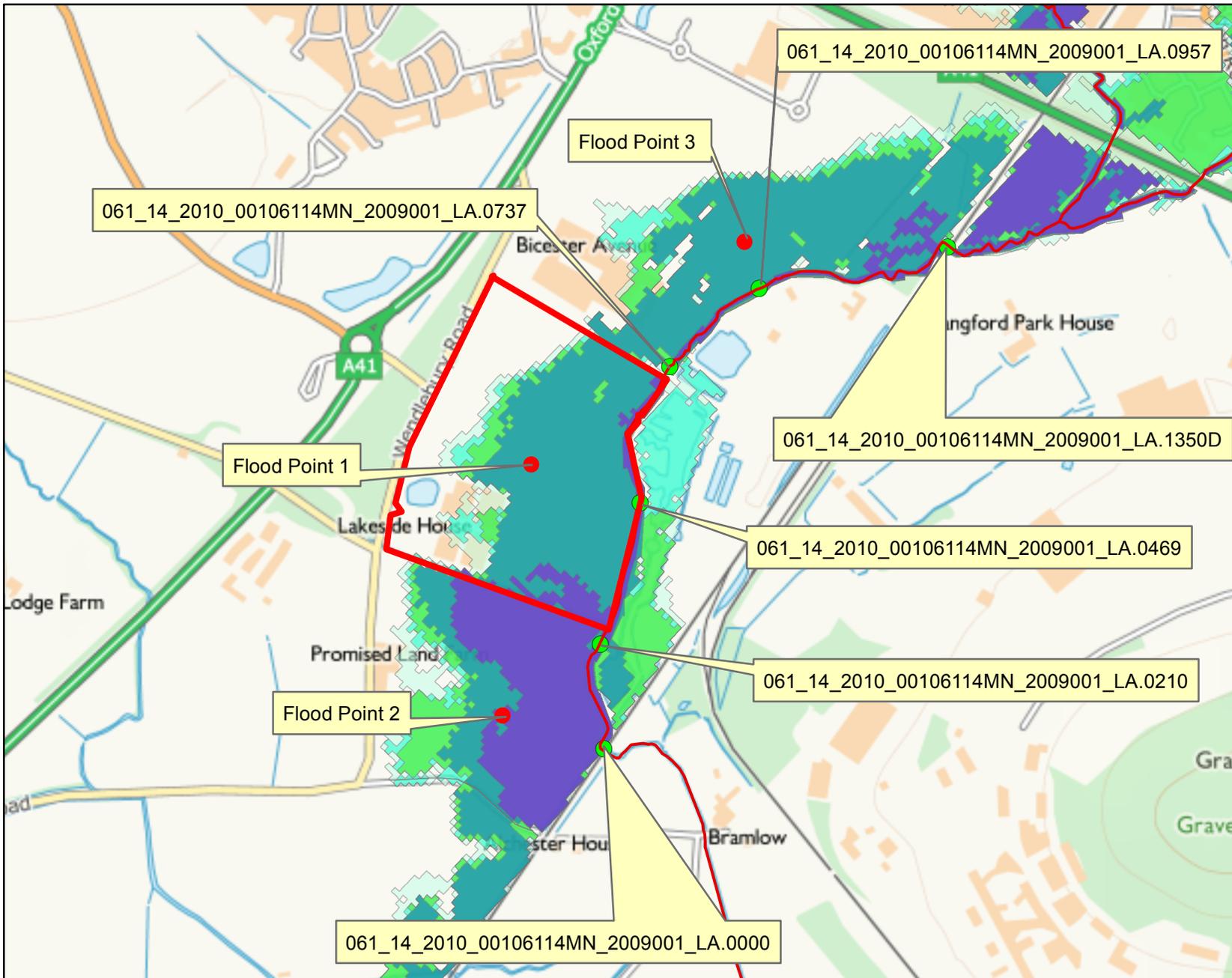
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP and 1 in 1000 / 0.1% AEP

Model accuracy:

Levels \pm 250mm

Detailed FRA centred on Catalyst Bicester, Wendlebury Road, Bicester

Created on 08/11/2019 REF:THM149488



Legend

- Main River
- THM Model Nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1% AEP Flood Outline
- 1%+20% 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 in-channel flood flows and levels

THM149488

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% 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_14_2010_00106114MN_2009001_LA.0000	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457662	220482	63.61	63.86	63.98	64.04	0.00	0.00	0.00	64.14	
061_14_2010_00106114MN_2009001_LA.0210	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457656	220665	63.70	63.92	64.04	64.10	0.00	0.00	0.00	64.19	
061_14_2010_00106114MN_2009001_LA.0469	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457726	220914	63.87	63.97	64.06	64.11	0.00	0.00	0.00	64.20	
061_14_2010_00106114MN_2009001_LA.0737	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457778	221152	64.10	64.22	64.27	64.38	0.00	0.00	0.00	64.46	
061_14_2010_00106114MN_2009001_LA.0957	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457937	221290	64.41	64.55	64.63	64.67	0.00	0.00	0.00	64.71	
061_14_2010_00106114MN_2009001_LA.1350D	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458270	221363	65.11	65.27	65.37	65.43	0.00	0.00	0.00	65.57	

Node label	Model	Easting	Northing	Flood Flows (m3/s)								
				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_14_2010_00106114MN_2009001_LA.0000	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457662	220482	6.18	8.04	9.17	9.71	0.00	0.00	0.00	10.67	
061_14_2010_00106114MN_2009001_LA.0210	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457656	220665	6.12	6.89	7.02	7.03	0.00	0.00	0.00	7.03	
061_14_2010_00106114MN_2009001_LA.0469	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457726	220914	6.14	7.03	7.37	7.45	0.00	0.00	0.00	7.55	
061_14_2010_00106114MN_2009001_LA.0737	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457778	221152	6.15	8.97	11.22	11.54	0.00	0.00	0.00	12.27	
061_14_2010_00106114MN_2009001_LA.0957	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457937	221290	6.15	6.63	6.58	6.59	0.00	0.00	0.00	6.59	
061_14_2010_00106114MN_2009001_LA.1350	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458270	221363	5.97	9.09	12.18	14.29	0.00	0.00	0.00	18.70	

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>.

Modelled floodplain flood levels

THM149488

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)	0.1% AEP
Flood Point 1	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457,534	220,982	No Data	63.94	64.07	64.12	64.21
Flood Point 2	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457,483	220,537	63.65	63.90	64.03	64.08	64.18
Flood Popint 3	Langford Brook (Bicester) & Pingle-Back-Bure 2010	457,912	221,369	No Data	64.64	64.73	64.77	64.8517

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 data

THM149488

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:

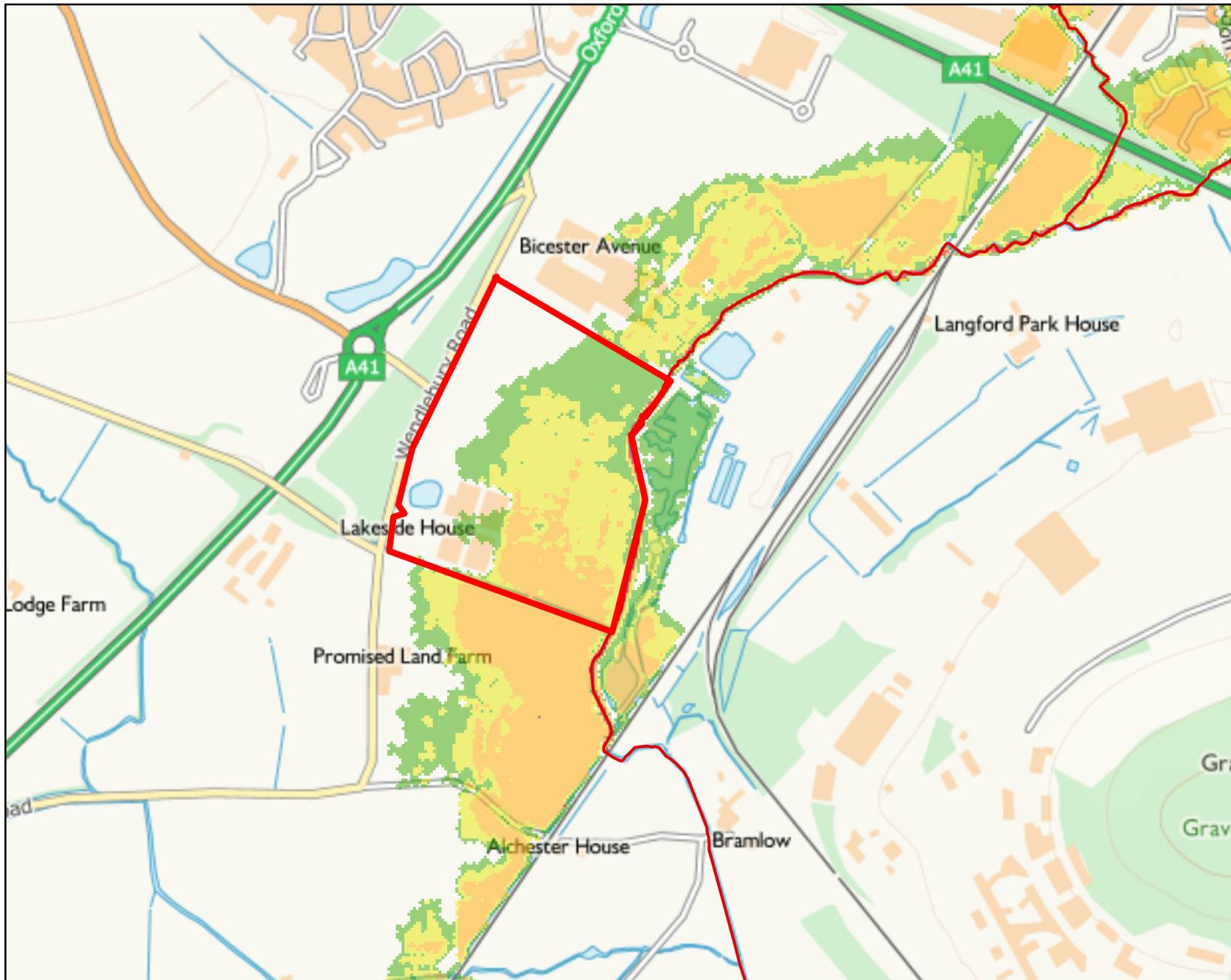
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
	NO KNOWN HISTORIC FLOOD EVENTS				

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.

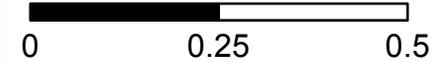
Start and End Dates shown above may represent a wider range where the exact dates are not available.

Hazard Map centred on Catalyst Bicester, Wendlebury Road, Bicester

Created on 08/11/2019 REF:THM149488



Kilometres



Legend

- Main River
- 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

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		Very low hazard - Caution
0.75 to 1.25		Danger for some - includes children, the elderly and the infirm
1.25 to 2.0		Danger for most - includes the general public
More than 2.0		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

Thames Area Climate Change Allowances

Guidance for their use in flood risk assessments

Jan 2017

We recently updated our national guidance on climate change allowances for Flood Risk Assessments. The following information provides additional local guidance which applies to developments within our Thames area boundary.

Climate change allowances - overview

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency to our guidance on considering climate change in Flood Risk Assessments. We updated this guidance in February 2016 and it should be read in conjunction with this document to inform planning applications, local plans, neighbourhood plans and other projects. It provides:

- Climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height
- A range of allowances to assess fluvial flooding, rather than a single national allowance
- Advice on which allowances to use for assessments based on vulnerability classification, flood zone and development lifetime

Updated climate change allowances guidance:

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

National Planning Practice Guidance:

<http://planningguidance.communities.gov.uk/>

Assessing climate change impacts on fluvial flooding

Table A below indicates the level of technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location (flood zone). Please note that this should be used as a guide only. Ultimately, the agreed approach should be based on expert local knowledge of flood risk conditions, local sensitivities and other influences.

Applicants and consultants may contact the Environment Agency at the pre-planning application stage to confirm the assessment approach on a case-by-case basis. We provide standard guidance free of charge or bespoke advice for a fee for developments for which we are a statutory consultee. If your development is instead covered by Flood Risk Standing Advice, we recommend you contact the relevant Local Planning Authority for their guidance and confirmation of the assessment approach. Flood Risk Standing Advice can be found here:

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

Table A defines three possible approaches to account for flood risk impacts due to climate change in new development proposals:

1. **Basic** - Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.
2. **Intermediate** - Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance to apply to the 'design flood' flow.
3. **Detailed** - Perform detailed hydraulic modelling, through either re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.

Table A – Indicative guide to assessment approach

Vulnerability classification	Flood zone	Assessment by development type		
		Minor	Small-Major	Large-Major
Essential infrastructure	Zone 2	Detailed		
	Zone 3a	Detailed		
	Zone 3b	Detailed		
Highly vulnerable	Zone 2	Intermediate/Basic	Intermediate/Basic	Detailed
	Zone 3a	Not appropriate development		
	Zone 3b	Not appropriate development		
More vulnerable	Zone 2	Basic	Basic	Intermediate/Basic
	Zone 3a	Basic	Detailed	Detailed
	Zone 3b	Not appropriate development		
Less vulnerable	Zone 2	Basic	Basic	Intermediate/Basic
	Zone 3a	Basic	Basic	Detailed
	Zone 3b	Not appropriate development		
Water compatible	Zone 2	None		
	Zone 3a	Intermediate/Basic		
	Zone 3b	Detailed		

Definitions of terms in Table A

Minor

1-9 dwellings/less than 0.5 ha; office/light industrial under 1ha; general industrial under 1 ha; retail under 1 ha; travelling community site between 0 and 9 pitches.

Small-Major

10 to 30 dwellings; office/light industrial 1ha to 5ha; general industrial 1ha to 5ha; retail over 1ha to 5ha; travelling community site over 10 to 30 pitches.

Large-Major

30+ dwellings; office; light industrial 5ha+; general industrial 5ha+; retail 5ha+; gypsy/traveller site over 30+ pitches; any other development that creates a non-residential building or development over 1000 sqm.

Further info on vulnerability classifications:

<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/>

Further info on flood zones:

<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/>

Specific local considerations

Where the Environment Agency and the applicant or their consultant has agreed that a basic level of assessment is appropriate, the figures in Table B below can be used as an allowance for potential climate change impacts on peak design (i.e. 1% annual probability) fluvial flood level rather than undertaking detailed modelling.

Table B – Local allowances for potential climate change impacts

Watercourse	Central	Higher central	Upper
Thames	500mm	700mm	1000mm

Use of these allowances will only be accepted after discussion with the Environment Agency.

Fluvial food risk mitigation

Please use the [national guidance](#) to find out which allowances to use to assess the impact of climate change on flood risk.

For planning consultations where we are a statutory consultee and our [Flood Risk Standing Advice](#) does not apply, we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications.

These benchmarks are a guide only. We strongly recommend you contact us at the pre-planning application stage to confirm this on a case-by-case basis. Please note you may be charged for pre-planning advice.

For planning consultations where we are not a statutory consultee or where our Flood Risk Standing Advice does apply, we recommend local planning authorities and developers use these benchmarks but we do not expect to be consulted.

Essential Infrastructure

For these developments, our benchmark for flood risk mitigation is for it to be designed to the **upper end** climate change allowance for the epoch that most closely represents the lifetime of the development, including decommissioning.

Highly Vulnerable

For these developments in flood zone 2, the **higher central** climate change allowance is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **upper end** allowance.

More Vulnerable

For these developments in flood zone 2, the **central** climate change allowance is our minimum benchmark for flood risk mitigation. In flood zone 3 the **higher central** climate change allowance is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **higher central** (in flood zone 2) and the **upper end** allowance (in flood zone 3).

Water Compatible or Less Vulnerable

For these developments, the **central** climate change allowance for the epoch that most closely represents the lifetime of the development is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **higher central** to inform built in resilience, particularly in flood zone 3.

Further info on our Flood Risk Standing Advice:

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

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case we may want to check this data and how you propose to use it.

For more information

Please contact our Thames area Customers and Engagement team:

[Enquiries THM@environment-agency.gov.uk](mailto:Enquiries_THM@environment-agency.gov.uk)