

# Flood Risk Assessment

For the proposed fishing hut at  
**Wendlebury Park Farm, Wendlebury**

Prepared by  
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**Innervision Design Ltd**

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## Disclaimer

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# **1 Executive Summary**

- A. The proposal is for a fishing hut and is minor and water compatible development.
- B. The site of the hut itself lies entirely in Flood Zone 1.
- C. There is no documented evidence of flood risk from any other sources and the development does not impact on flood risk elsewhere.
- D. Assuming the warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor, water compatible, development of a fishing hut adjacent to a pond is considered acceptable

## 2 Introduction

### 2.1 Site location

The project is on land at Wendlebury Park Farm, Wendlebury (see Figure 1). The site is adjacent to the Wendlebury Brook and the proposal is minor development.

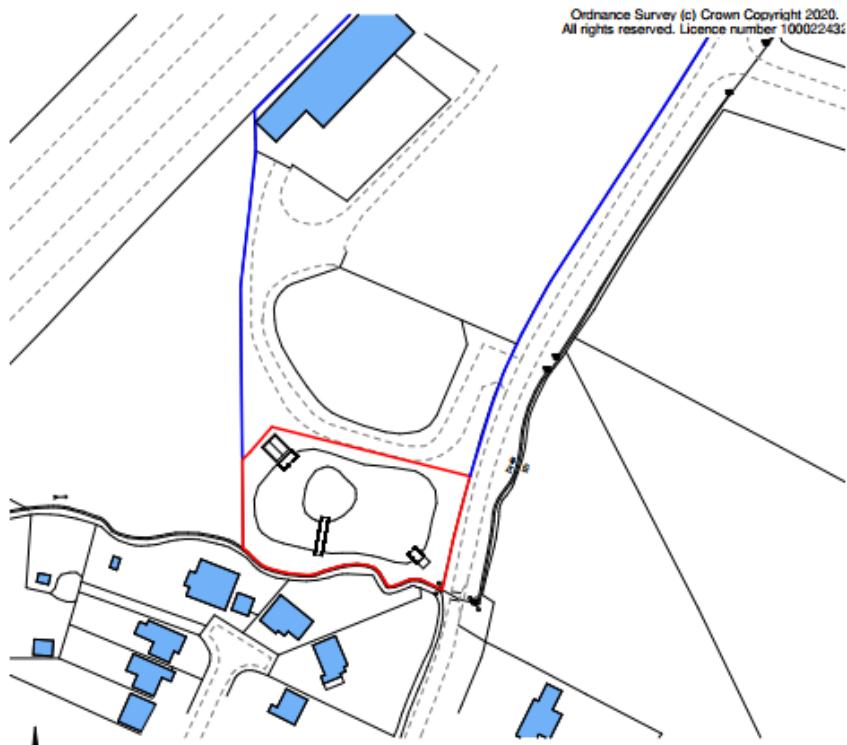


Figure 1: Site location plan, as indicated with North topmost. (source: client)

### 2.2 Development description

The proposal is for a timber framed fishing hut adjacent to a pond. The proposed layouts and proposed sections are provided in Appendix A.

## 3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework<sup>[2]</sup> and British Standards on Assessing and Managing Flood Risk<sup>[1]</sup> were reviewed, and their related policies are, where applicable, referred to in this report.

The Environment Agency has been consulted in order to establish the flood zone of the proposed site.

In addition, planning policies from the Local Authority were also reviewed including its Strategic Flood Risk Assessment.

Some of key policies are summarised as below.

### **3.1 National Planning Policy Framework (NPPF)**

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

#### **3.1.1 Paragraph 158 - Sequential test**

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

#### **3.1.2 Paragraph 163**

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;
- the development is appropriately flood resilient and resistant;
- it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and

- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

### **3.2 Environment Agency Guidance on More Vulnerable development up to 1ha in size in Flood Zone 2**

The Sequential Test is applied by the Local Planning Authority (LPA) to planning applications within this category. Details of the sequential test are set out in paragraph 101 of the NPPF. The Sequential Test does not apply to Change of Use applications.

Planning applications must be accompanied by a site-specific Flood Risk Assessment (FRA). The FRA should include information listed below:

- Flood level for the 1 in 100 annual probability river flood (1%); or 1 in 200 annual probability sea flood (0.5%) in any year (including an allowance for climate change) in relation to Ordnance Datum (Newlyn)
- Average ground level of the site in relation to Ordnance Datum (Newlyn)
- Finished floor level of lowest habitable room in relation to Ordnance Datum (Newlyn)
- 1 in 1000 annual probability (0.1%) in any year flood level including an allowance for climate change where this information is available.
- To indicate that surface water will be managed in accordance with the following standards:
  - Specific requirements for managing surface water set out in an adopted Strategic Flood Risk Assessment and/or Surface Water Management Plan produced by the Local Planning Authority.
  - Surface water run-off will be controlled to ensure no flooding of property and no increase in surface water run-off from the site to a watercourse or receiving water body compared to the existing pre-application run-off rate in a 1 in 100 year storm event (1% chance in any one year) plus an appropriate allowance for climate change (Flood risk Practice Guide paragraphs 5.51 and 5.54)
  - Meets the requirements of Approved Document Part H of Building Regulations 2000.

- Flood resilience and resistance: to indicate that flood resilience/resistance and emergency escape measures/procedures have been incorporated where possible. This applies to any part of the building (e. g. basements), that are situated below the 1 in 100 annual probability river flood (1%); or 1 in 200 annual probability sea flood (0.5%) level in any year (including an allowance for climate change).
- Other sources of flooding (not rivers or the sea): to indicate that the SFRA has been referred to and that the recommendations regarding other sources of flooding have been incorporated into the application.

All flood management measures will need to be supported by plans and drawings that form part of the FRA.

### **3.3 Vulnerability**

The proposal is classed as “water compatible” where this is defined as:

- Water-based recreation (excluding sleeping accommodation).
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.

## 4 Flood risk analysis

### 4.1 Sources of potential flooding

Flood risk from various sources at the site is analysed in this section. It is concluded that the primary flood risk at the site is fluvial from The Wendlebury Brook.

#### 4.1.1 Flood risk from sea and rivers

Flooding can occur from the sea due to a particularly high tide or surge, or combination of both.

The site is not at risk from tidal flooding.

Flooding can also take place from flows that are not contained within the river channel due to high levels of rainfall in the catchment.

With reference to the Environment Agency Flood Map, Figure 2 and the data at Appendix B, the site of the hut itself lies entirely in Flood Zone 1 while the adjacent pond lies in Zones 2 & 3 of The Wendlebury Brook.

This means that the proposed site of the hut is at a very low risk from fluvial flooding (less than a 1 in 1000yr annual probability of fluvial flooding).

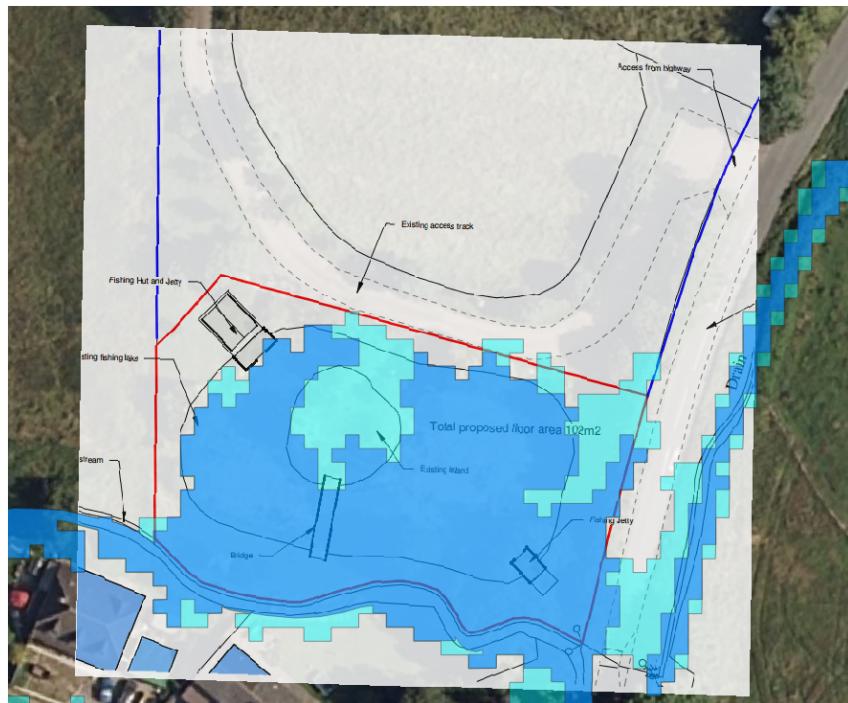


Figure 2: Flood Zones 2 & 3 relative to the proposal. The fishing hut is located in Flood Zone 1.

#### **4.1.2 Flood risk from groundwater**

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather. The site's geology is classified as having low susceptibility to groundwater flooding.

With reference to "Strategic Flood Risk Assessment" from the Council, the site has no documented evidence of flood risk from ground water.

Given the nature of the building and the proximity of the pond, the impact of ground-water flooding on the proposed site will be minimal.

Hence, the risk of groundwater flooding on the proposed site can be considered to be Low.

#### **4.1.3 Flood risk from sewer and highway drains**

Flooding occurs when combined, foul or surface water sewers and highway drains are temporarily over-loaded due to excessive rainfall or due to blockage.

There are no indicators to Sewer flooding at the site.

Hence, the risk of sewer and highway flooding to the proposed site can be considered to be Low.

#### **4.1.4 Flooding risk from surface water**

Flooding occurs when rainfall fall on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.

With reference to the E.A online mapping , the site is classed as being adjacent to an area with a High risk of surface water flooding (greater than 1 in 100 1 in 1000yr annual probability within the area of the pond), Figure 3. The location of the hut is shown to lie outside of the 1 in 1000yr Surface water flood extents.

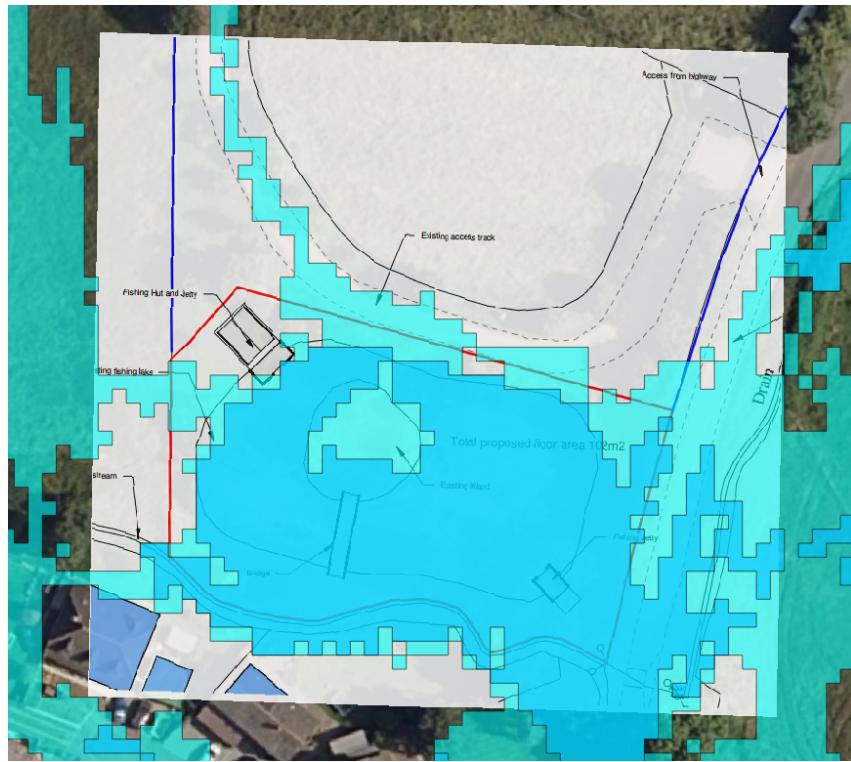


Figure 3: SW Flood risk mapping from the EA online data. Light blue tone indicates a Low risk area, darker blue indicates high risk.

#### 4.1.5 Flood risk from infrastructure failure

Flooding occurs because of canals, reservoirs, industrial processes, burst water mains or failed pumping stations.

With reference to EA data, the site is not at flood risk from reservoir failure.

#### 4.1.6 Historic flood events

The EA data indicates the site has previously flooded.

## 4.2 On-site surface water analysis and management

### 4.2.1 Generation of Run-off

Given the proximity of the pond and the shortness (at the location on the bank of the pond) of the natural flow path to it, the water falling on the roof of the hut will not increase surface water run-off since the pond is the natural outfall for this immediate pond side area.

#### **4.2.2 Impact on flood risk elsewhere**

Given the location of the hut is not shown to be at very low flood risk, the impact on flood risk elsewhere is low.

## **5 Levels**

### **5.1 Flood level data**

Given the close proximity of Food Zone 3 to the hut, revised climate change allowances are now applied to the data provided to ensure the hut remains outside of the shown flood extents (the EA provided flood maps do not include this revised climate change uplift).

#### **5.1.1 Climate change allowances**

+25% Central Allowance to guide design to the period 2115

#### **5.1.2 Stage discharge curve**

The intermediate approach is used to apply the revised climate change allowances. A Stage - Discharge curve has been constructed for the nearest in-channel model node 1652\_MN, using data as provided by the EA (Appendix B), as shown at Figure 4.

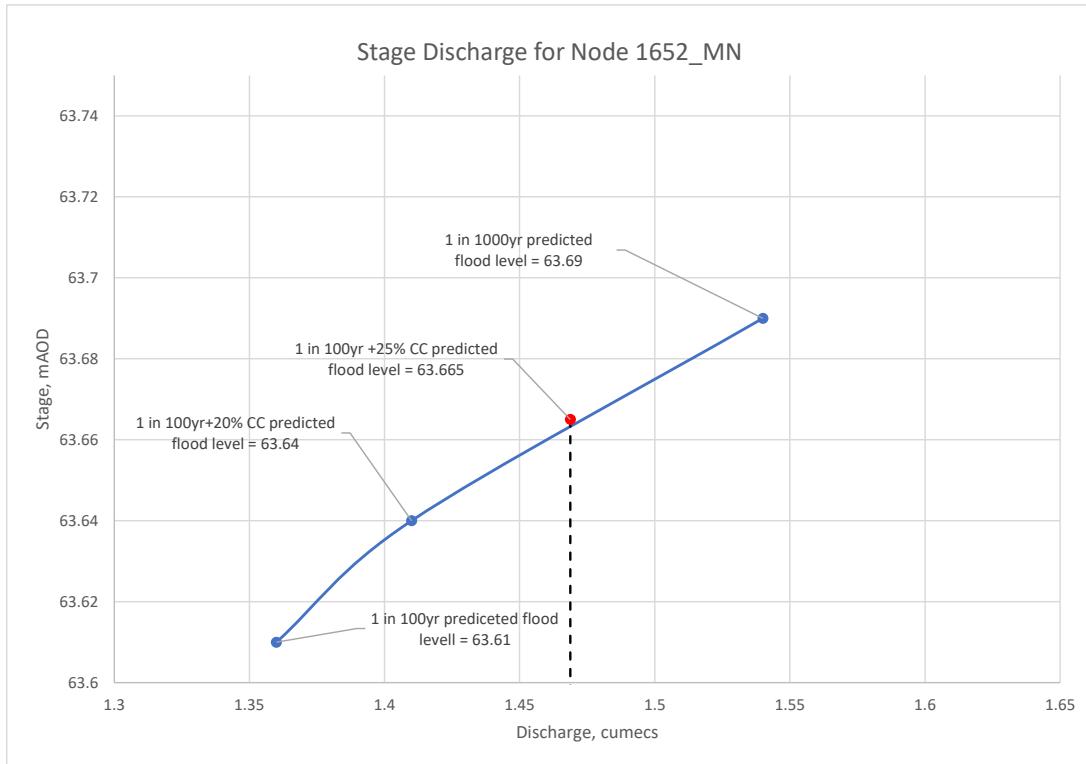


Figure 4: Stage Discharge curve for nearest model node

The 1 in 100yr flow is given as 1.36 cumecs

The 1 in 100yr + 20% flow is given as 1.41 cumecs

$$1.36 \times 1.2 = 1.63$$

Hence a normalisation factor of  $1.41 / 1.63 = 0.864$  applies.

Normalised 1 in 100yr flow + 25% = 1.47 giving a predicted flood level of **63.665m AOD**

Hence the extents of Flood Zone 3 are defined by a flood level of 63.665m AOD.

The extents of Flood Zone 2 remain defined by the flood level of 63.69m AOD

## 5.2 External ground level data

Lowest ground level at the location of the hut is surveyed as 63.88m AOD

This confirms that, with the allowance for revised climate change applied to the data set, the hut remains in Flood Zone 1 on land at a higher elevation than Flood Zones 2 & 3.

## **5.3 Proposed floor level**

Proposed floor level is a minimum 100mm above external ground levels at 63.98m AOD

### **5.3.1 Free board**

A minimum 300mm freeboard is required above design 1 in 100yr + cc flood levels.

For this site the minimum floor level is therefore  $63.665 + 0.3m = 63.965m$  AOD

Freeboard provided therefore exceeds the minimum required when the floor is set a minimum 100mm higher than the lowest external ground level at the site of the hut.

The proposed floor level is therefore satisfactory.

## **6 Flood risk mitigation measures**

Because the proposal is located in flood zone 1, and floor levels are greater than 300mm above predicted 1 in 100yr + 25% CC flood events, flood risk mitigation or resilience measures are not required.

### **6.1 Safe access and egress routes**

The NPPF stipulates that, where required, safe access and escape routes should be available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit buildings in design flood conditions.

With reference to Figures 2 & 3 it can be seen that safe and dry access and egress routes to the hut are immediately available.

### **6.2 Residual Risk**

Since it has been established that the site is sited in an area with a possibility of flooding the owners of the dwelling should (if they have not done so already) sign up to the E.A. "Flood Warnings Direct" which is a free service providing flood warnings by phone, text or email. See <https://www.fws.environment-agency.gov.uk/app/olr/register>, or call the E.A. on 0345 988 1188 for full information. In doing so any residual risk can be safely managed.

## 7 Conclusions

Given that:

- The proposal is water compatible and minor development;
- The site of the hut lies in Flood Zone 1;
- Greater than 300mm freeboard is provided over the design, 1 in 100yr + climate change flood level;
- Flood resilience and alleviation methods are not required;
- The proposed scheme does not impact on, or impede, existing access and egress routes and the site will be signed up to flood warning schemes;
- There is no documented evidence of flood risk from any other sources;
- The development does not impact on flood risk elsewhere;

and assuming the warning and evacuation procedures can be maintained over the life-time of the development, the proposed minor, water compatible, development of a fishing hut adjacent to a pond is considered acceptable.

Signed:



Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

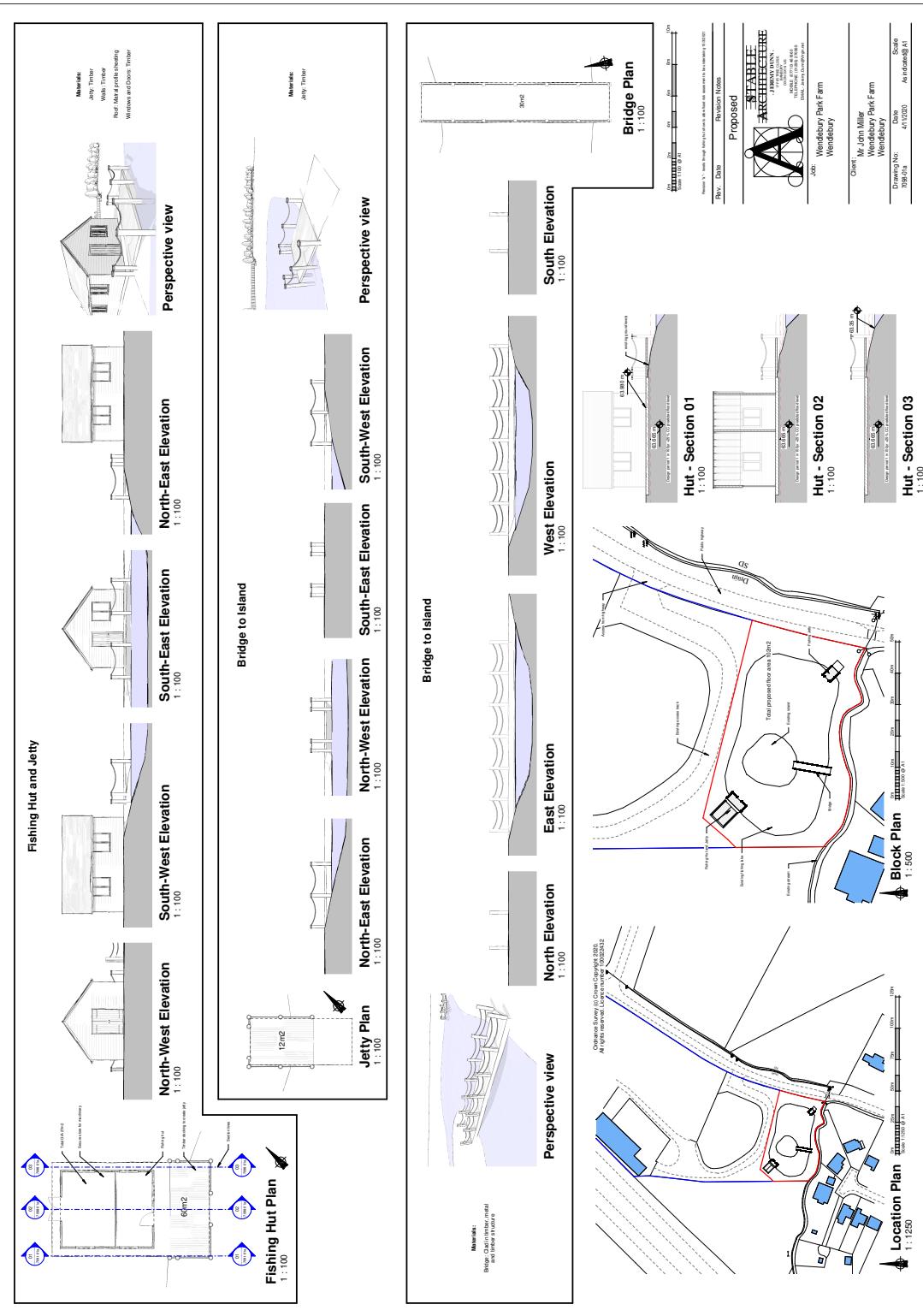
Date: 6<sup>th</sup> April, 2021

## References

- [1] BSI. BS 8533:2011. Technical report, 2011.
- [2] Ministry of Housing, Communities and Local Government. National planning policy framework. 2019.

# A Proposal plans

## A.1 Proposed Layout



## B EA data



### Product 4 (Detailed Flood Risk) for OX25 2PE Our Ref: THM209810

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 XY 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.

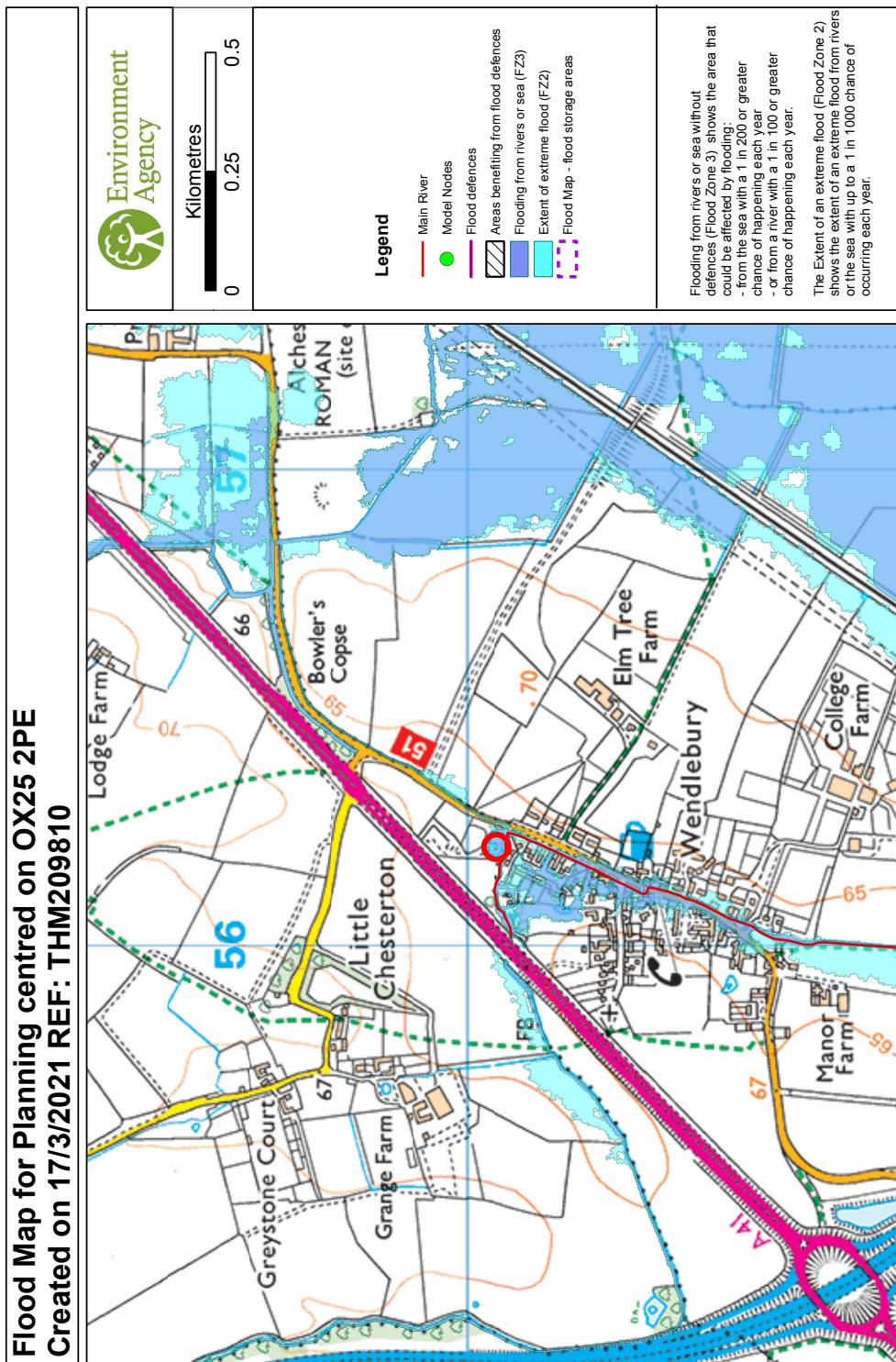
This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

<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#enquiry>

**Flood Map for Planning centred on OX25 2PE**  
**Created on 17/3/2021 REF: THM209810**



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## Defence information



Environment  
Agency

**THM209810**

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



**THM209810**

Model:	Wendlebury Brook 2014
Description:	The information provided is from the Wendlebury Brook Flood Mapping Study completed in April 2014. The study was carried out using 2D modelling software (ISIS-Tufflow).
Model design runs:	1 in 5 / 20% Annual Exceedance Probability (AEP); 1 in 10 / 10% AEP; 1 in 20 / 5% AEP; 1 in 30 / 3.3% AEP; 1 in 50 / 2% AEP; 1 in 75 / 1.33% AEP; 1 in 100 / 1% AEP; 1 in 100+20% / 1% AEP plus 20% increases in flows and in 1000 / 0.1% AEP.
Mapped outputs:	1 in 5 / 20% AEP; 1 in 10 / 10% AEP; 1 in 20 / 5% AEP; 1 in 30 / 3.3% AEP; 1 in 50 / 2% AEP; 1 in 75 / 1.33% AEP; 1 in 100 / 1% AEP and 1 in 1000 / 0.1% AEP.
Model accuracy:	Level ± 250mm



## Modelled in-channel flood flows and levels

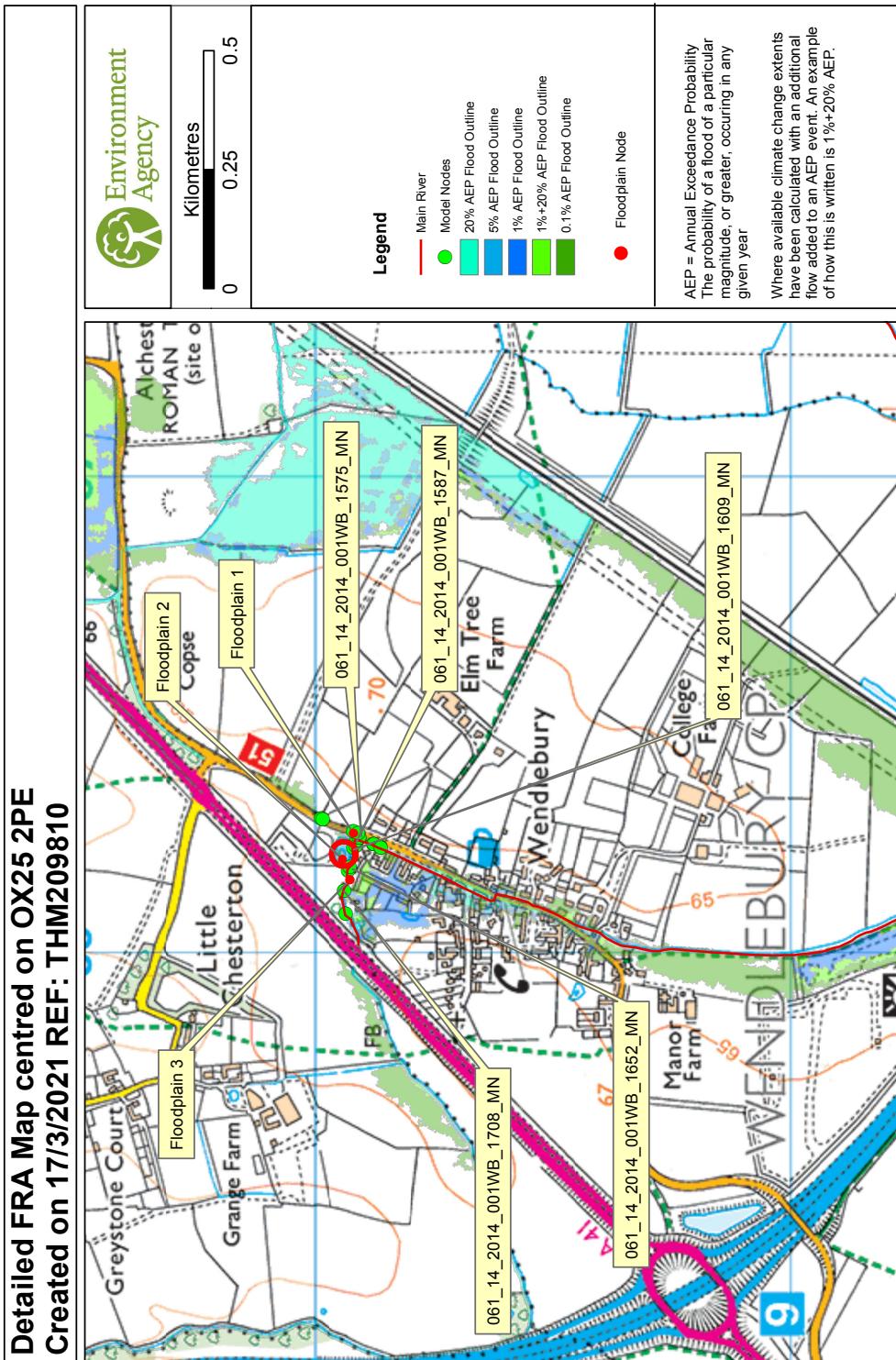
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Note:  
Due to changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer be used for development design purposes.  
The data included in this Product can be used for information or as part of an intermediate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

For further advice on the new allowances please visit [www.hmrc.gov.uk/capitalallowances.htm](http://www.hmrc.gov.uk/capitalallowances.htm)

**Detailed FRA Map centred on OX25 2PE  
Created on 17/3/2021 REF: THM209810**



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## Modelled floodplain flood levels

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

THM 209810

This flood model has represented the floodplain as a grid.

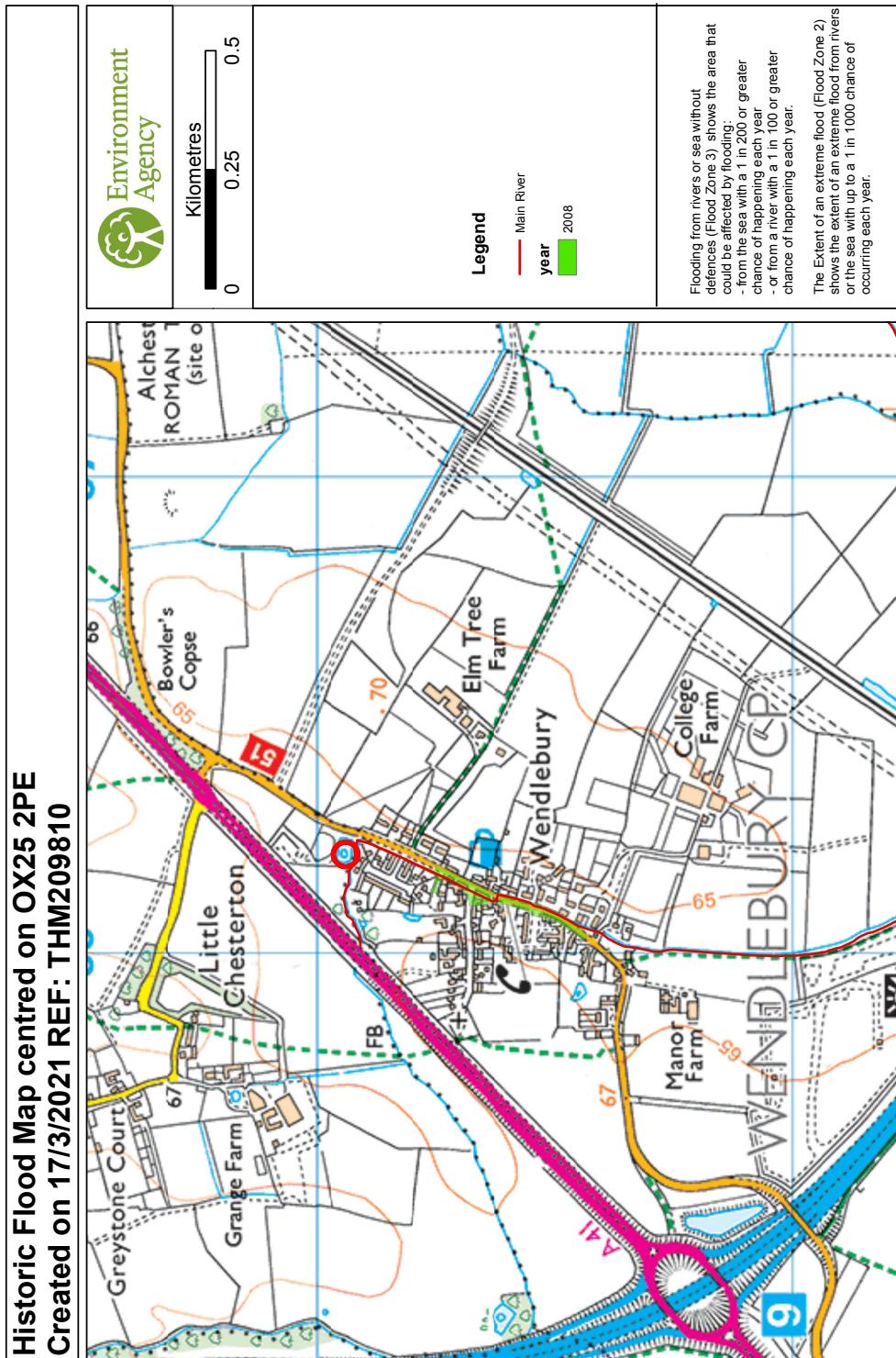
The flood water levels have been calculated for each grid cell.

Note:

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

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

**Historic Flood Map centred on OX25 2PE  
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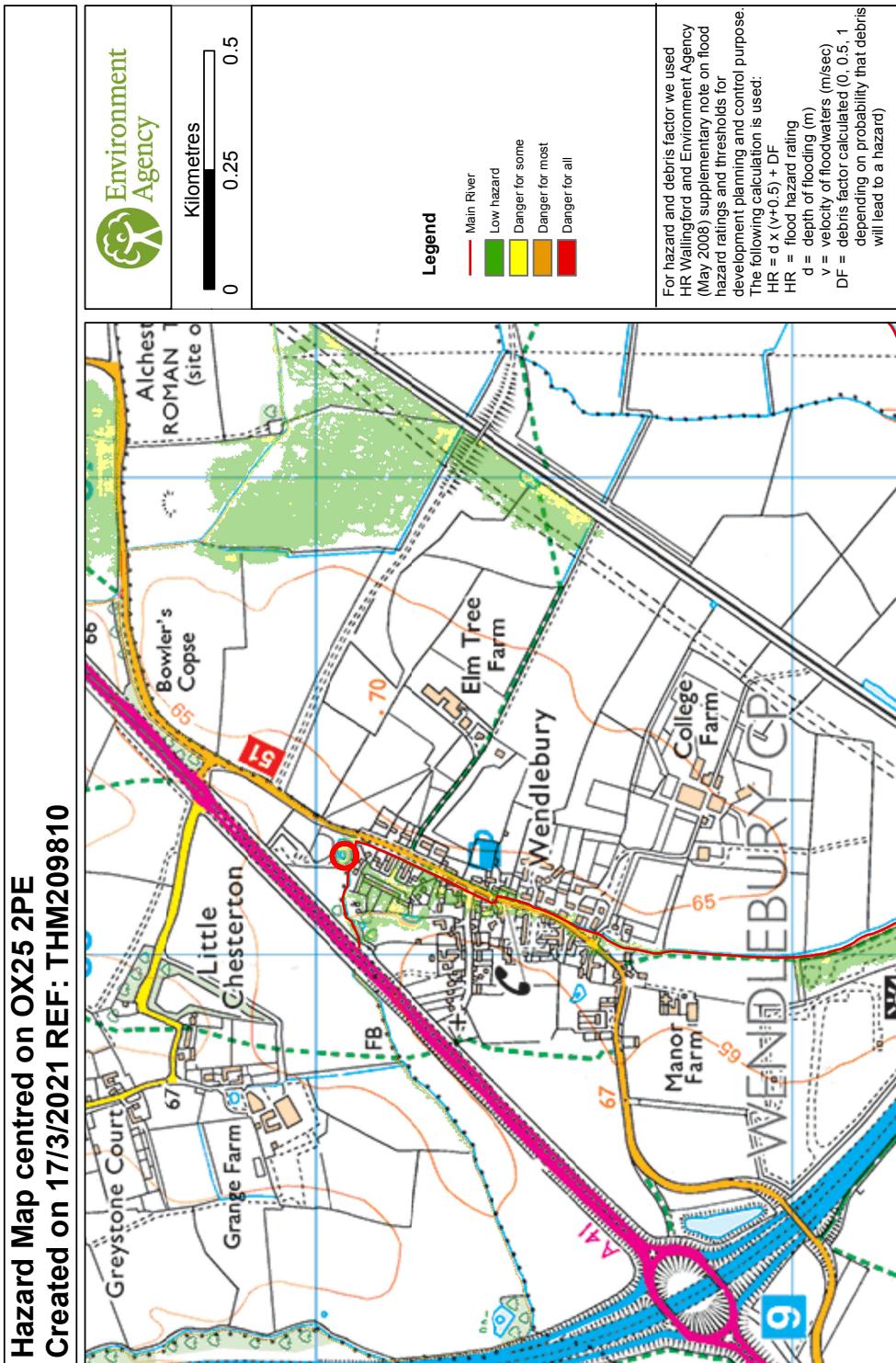
## Historic flood data

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:

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a potential 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 OX25 2PE  
Created on 17/3/2021 REF: THM209810**



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

THM20981(

### 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

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD

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Email: WTEnquiries@environment-agency.gov.uk

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)