



## Flood Risk Assessment

Residential development comprising five dwellings, each with private outside areas and car parking

Land Adjacent to College Farm House,  
Wyverstone,  
Suffolk

David Black & Son Ltd.  
Version 3 - February 2024



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## Document Control Sheet

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Prepared by	Approved by	Version	Description	Date
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## Contents

Document Control Sheet.....	2
Appendices .....	3
1 Introduction .....	4
2 Site Appraisal.....	5
Location.....	5
Geology and Hydrogeology.....	5
Hydrology .....	5
Flood Map for Planning .....	5
3 Flood Risk.....	7
Potential Sources of Flooding .....	7
Flood Risk Summary.....	10
4 Assessment of Surface Water Flood Risk .....	12
General.....	12
Assessment of Surface Water Flood Maps.....	12
Surface Water Flood Risk to Existing Access Road .....	13
Vehicle and Walking Routes .....	15
5 Conclusions and Recommendations .....	17

## Appendices

Appendix A: Development Plan

Appendix B: Risk of Flooding from Surface Water Maps - 0.1%, 1% and 3.3% AEP

Appendix C: Proposed Route to Public Footpath

# 1 Introduction

- 1.1 BHA Consulting Ltd (BHA) have been commissioned by David Black & Son Ltd to produce a Flood Risk Assessment in support of a residential development comprising five dwellings, each with private garden areas and associated infrastructure, on land adjacent to College Farm House, Wyverstone, to be referred hereafter as 'the Site'. A Development Plan is provided in **Appendix A**.
- 1.2 The purpose of this report is to provide information on the flood risks associated with the proposed development and present mitigation measures as necessary to enable the development to proceed and meet the relevant design criteria. This is to be achieved by ensuring that the development is safe from flooding to recognised standards and does not increase the risk of flooding to neighbouring properties.
- 1.3 The report follows the guidance set out in:
- National Planning Policy Framework (NPPF)
  - National Planning Practice Guidance.
- 1.4 The following data was reviewed as part of this assessment:
- Environment Agency (EA) Flood Data
  - Babergh & Mid Suffolk Level 1 Strategic Flood Risk Assessment (SFRA) Final Report, JBA Consulting, August 2020
  - British Geological Survey's (BGS) 'Geology of Britain' on-line maps
  - We have also utilised our knowledge of the local area and experience in dealing with similar related matters.

## 2 Site Appraisal

### Location

- 2.1 The Site is in a rural location approximately 1.5km south-west of Wyverstone village and around 10km north of the town of Stowmarket. The Site lies to the north-east of College Farm House, to the west of College Road, and is partially occupied by a barn associated with this residential property. The land surrounding the Site is generally laid to arable farmland, with a small cluster of other residential properties in the vicinity, principally located to the north-east on the opposite side of College Road. See **Figures 2.1 and 2.2**, below.



Figure 2.1: Site Location Plan



Figure 2.2: Site Location Plan: Aerial View

### Geology and Hydrogeology

- 2.2 The British Geological Survey (BGS) website lists the bedrock underlying the Site as the Crag Group (Sand). This is masked by superficial deposits of the Lowestoft Formation (Diamicton).
- 2.3 The Crag Group is designated as a Principal Aquifer (usually providing a high level of water storage to support water supply and/or river base flow on a strategic scale) and is within a Source Protection Zone 3. The superficial Lowestoft Formation is designated as a Secondary (Undifferentiated) Aquifer (an aquifer with variable permeability).

### Hydrology

- 2.4 The Site is not connected to the wider watercourse network.

### Flood Map for Planning

- 2.5 The development area of the Site is in a fluvial Flood Zone 1 as shown in **Figure 2.3** below. Land in a fluvial Flood Zone 1 has a less than 0.1% (<1 in 1000) annual exceedance probability (AEP) of flooding from rivers and/or the sea.

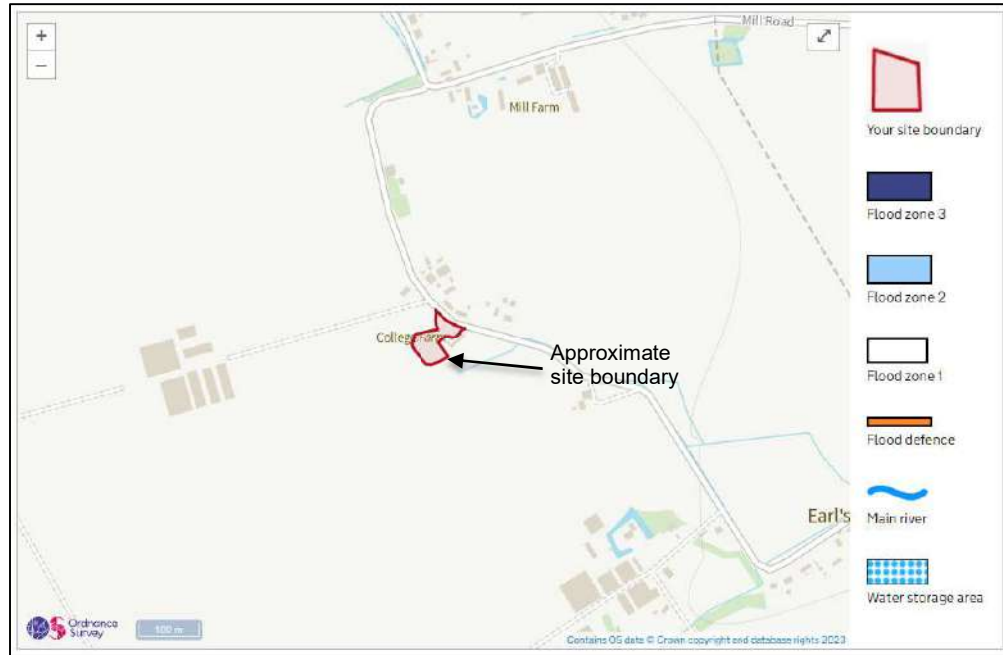


Figure 2.3: Flooding Map for Planning (Rivers and Sea) – Undefended Risk

### 3 Flood Risk

#### Potential Sources of Flooding

3.1 Potential sources of flooding that may affect the site have been reviewed and are summarised in the table below:

SOURCE	LIKELIHOOD
<p><b>Rivers and Sea:</b></p> <p>River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land. Sea flooding happens when there are high tides and stormy conditions.</p> <p>*This risk considers the presence and effect of flood defences in the area (defended). These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail.</p>	<p>Low</p> <p>(Source: EA Risk of Flooding from Rivers and Sea map, Figure 3.1)</p>
<p><b>Surface Water:</b></p> <p>This can result when high intensity rainfall falling onto impermeable surfaces (i.e. roofs and paved areas) or low permeability soils and geology (such as clayey soils) is unable to enter drainage systems or soak into the ground sufficiently rapidly. When this happens, the excess water can flow across the ground surface, including adjoining sites, and potentially cause flooding. Surface water flood risk is discussed in detail in <b>Section 4</b> of this report. 0.1%AEP, 1%AEP and 3.3% AEP flood maps are provided as <b>Appendix B</b>.</p>	<p>Very Low to High</p> <p>(Source: EA Risk of Flooding from Surface Water map 1%AEP, Figure 3.2)</p>
<p><b>Groundwater:</b></p> <p>This can occur in areas where the groundwater level is high, when rainfall raises the prevailing groundwater level to an extent such that structures within the ground become at risk of inundation. Typically, this might include basements or drainage infrastructure.</p> <p>Information within the SFRA indicates that groundwater flooding in the whole study area is limited and very localised.</p>	<p>Negligible</p> <p>(Source: SFRA, Figure 3.3)</p>
<p><b>Adopted Drains:</b></p> <p>Sewer failure can be the result of overloading, leading to surcharge and the escape of water from manholes, gullies, etc. or, more commonly, because of blockage.</p> <p>*Any new sewers will be built to adopted standards.</p>	<p>Very Low*</p> <p>(Source: SFRA, Figure 3.4)</p>
<p><b>Private Drains:</b></p> <p>The failure of small diameter private sewers is likely to be more common through lack of maintenance, but the consequences are likely to be less severe.</p>	<p>Very Low</p>
<p><b>Dam/Reservoir Breach:</b></p> <p>There are no reservoirs near the development site.</p>	<p>Very Low</p> <p>(Source: EA Risk of Flooding from reservoirs map, Figure 3.2)</p>
<p><b>Canals:</b></p> <p>There are no canals near the development site.</p>	<p>N/A</p>
<p><b>Flood Defences:</b></p> <p>There are no flood defences near the development site</p>	<p>N/A</p>
<p><b>Historical Flooding (Published Record Search):</b></p> <p>There are no recorded flood outlines shown near to the Site.</p>	<p>(Source: Groundsure, Figure 3.5)</p>

Table 3.1: Sources of Flooding

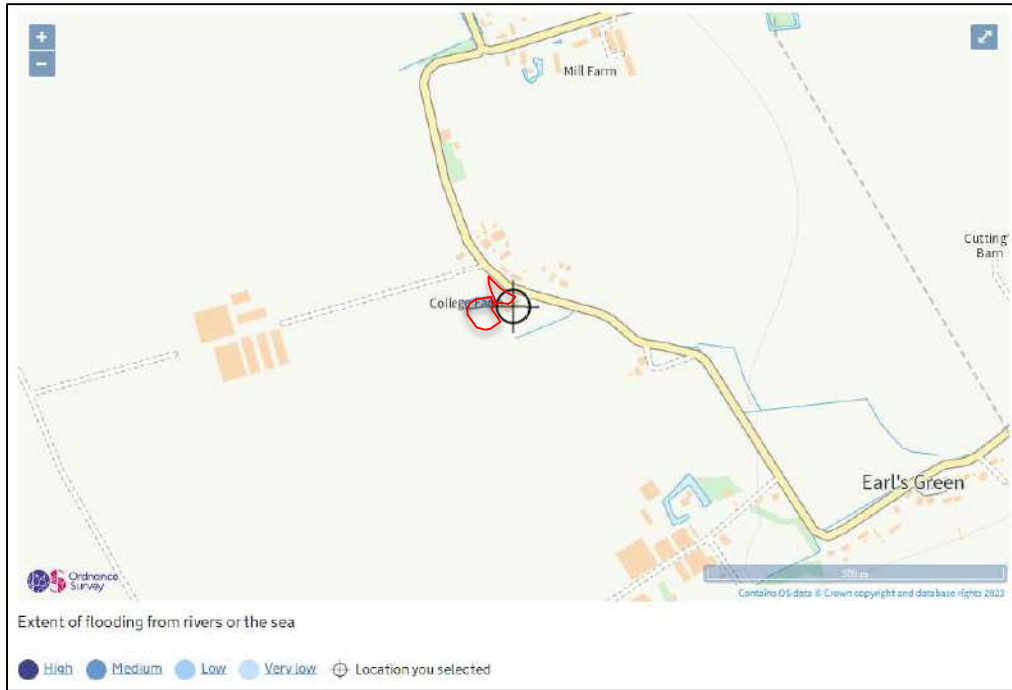


Figure 3.1: EA Risk of Flooding from Rivers and Sea Map (Defended – reflects the presence and effect of flood defences)

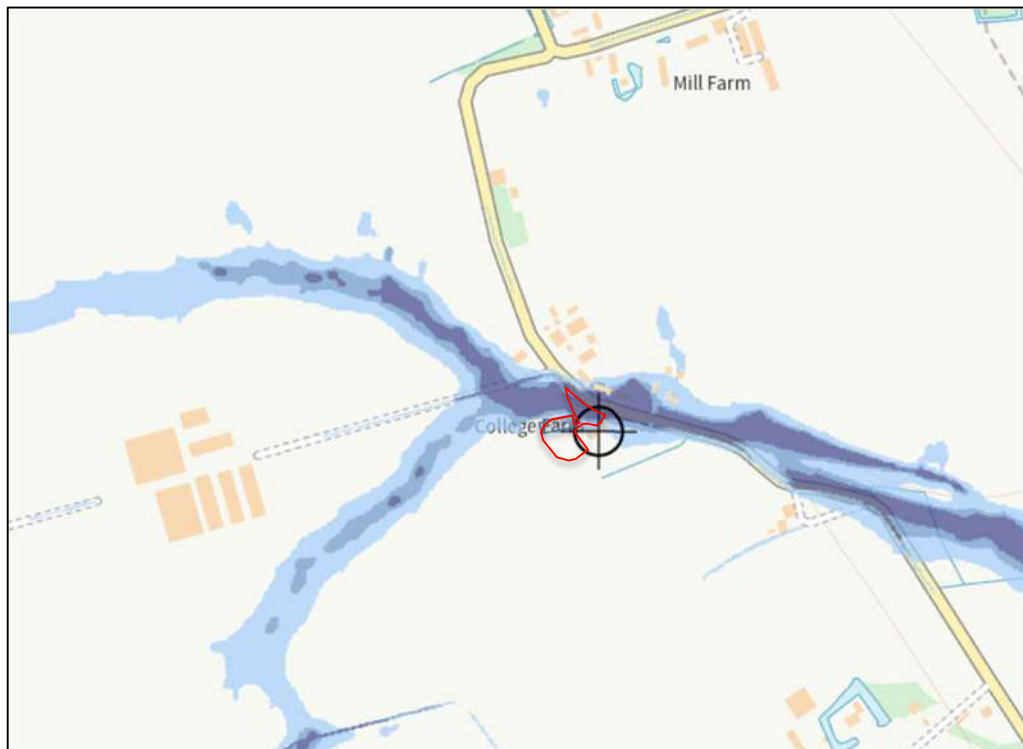


Figure 3.2: EA Risk of Flooding from Surface Water (All Risks)



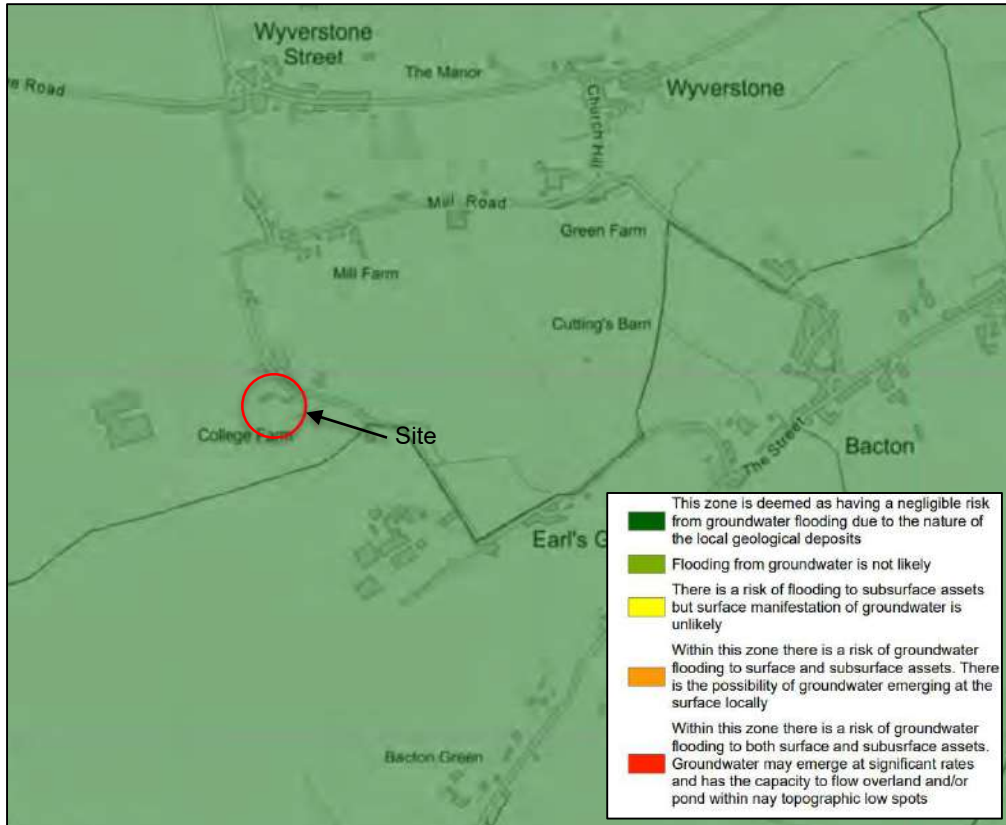


Figure 3.3: Risk of Flooding from Groundwater – SFRA

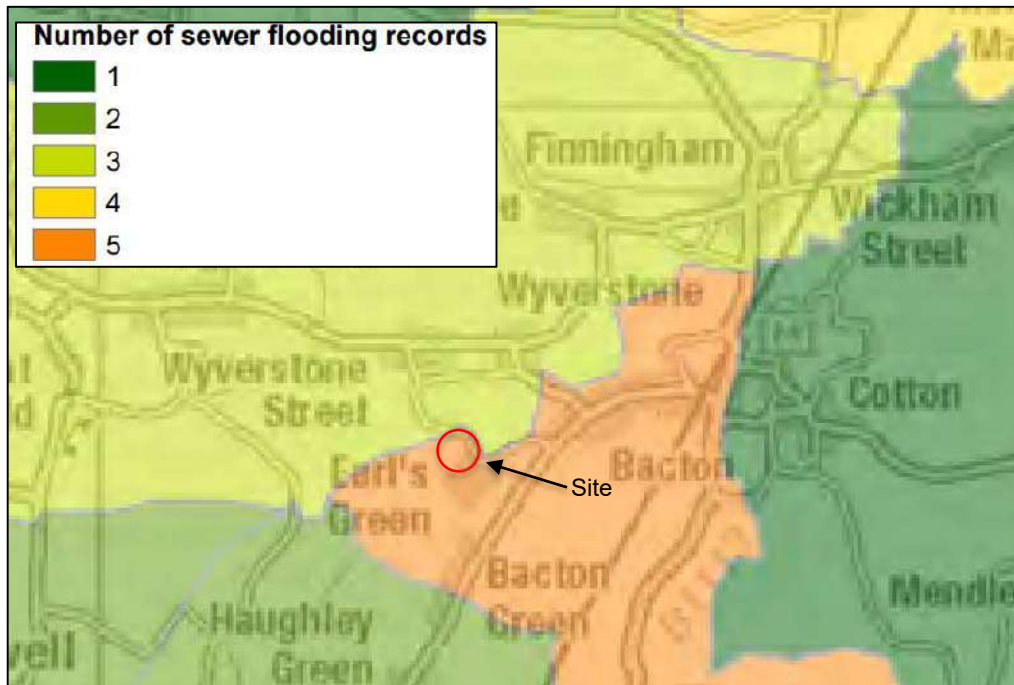


Figure 3.3: Anglian Water Sewer Flooding Records – SFRA

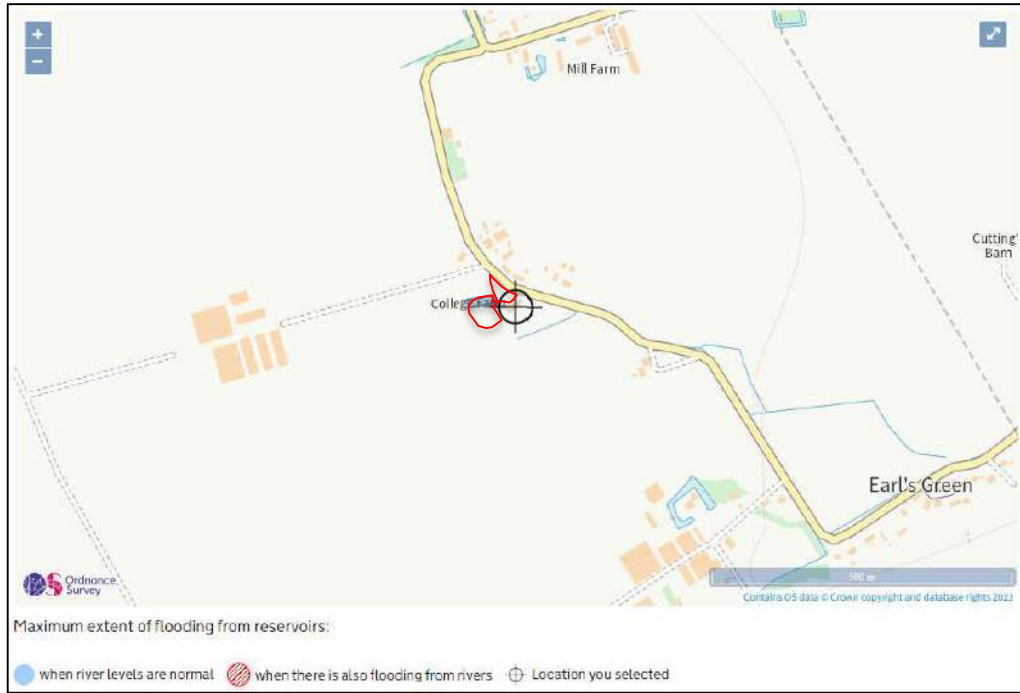


Figure 3.4: EA Risk of Flooding from Reservoirs

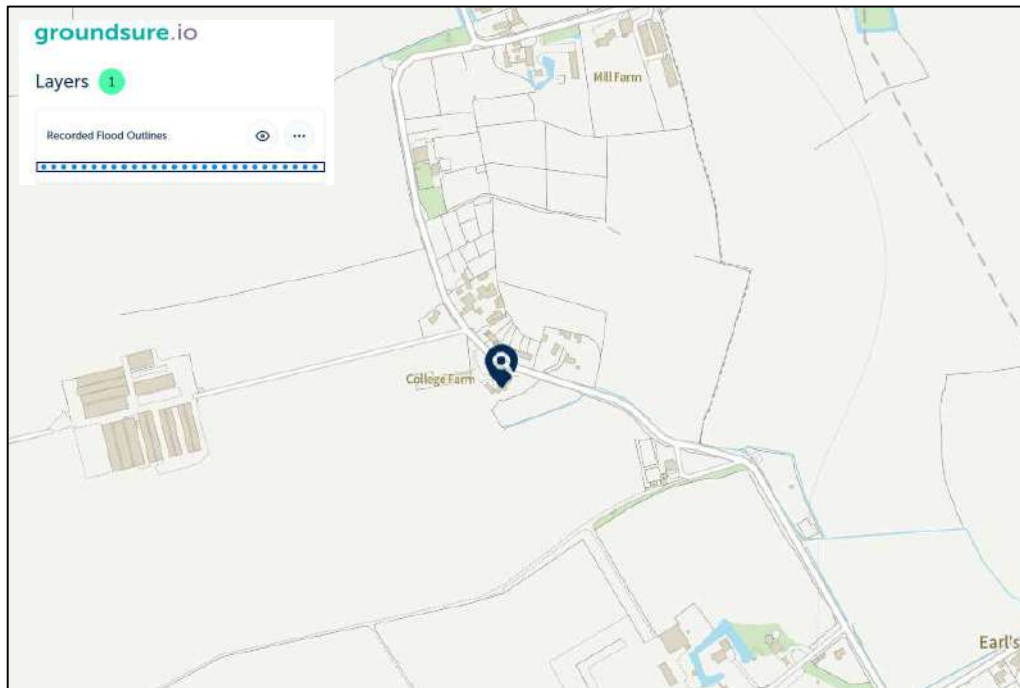


Figure 3.5: Recorded Flood Outlines (Source: Groundsure)

### Flood Risk Summary

- 3.2 The Site lies in Flood Zone 1. Land and property in Flood Zone 1 have a less than 0.1% (<1 in 1000) annual exceedance probability (AEP) of flooding from rivers and/or the sea (very low risk).

- 3.3 The Site is at low risk from all other sources of flooding except for surface water flooding of the site access on College Road which is discussed in detail in **Section 4**.
- 3.4 There are no recorded historical flood events that have affected the Site.

## 4 Assessment of Surface Water Flood Risk

### General

- 4.1 The required standard of protection from fluvial flood risk, as stipulated in the National Planning Practice Guidance is the 1 in 100 year (1%) AEP plus climate change flood event. The same standard of protection can therefore be applied to areas at risk from surface water flooding, the 1% AEP representing low risk and the 0.1% AEP representing very low risk (or commonly accepted to represent the 1% AEP + climate change event.)

### Assessment of Surface Water Flood Maps

- 4.2 The surface water flood maps generated from open-source data (data.gov.uk) in QGIS for the 1% AEP and 0.1% AEP flood depths and flow directions are presented below and provided in full in **Appendix B**. Flood depths within the site boundary are annotated accordingly.

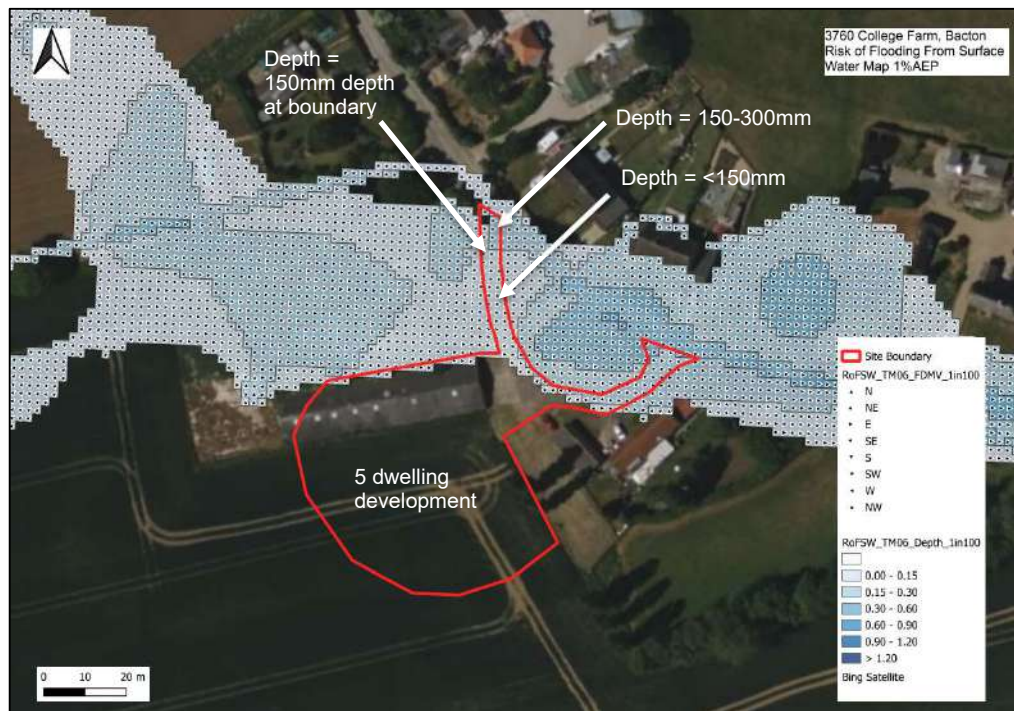


Figure 4.1: Surface water flood map 1% AEP (low risk) overlaid on aerial image.



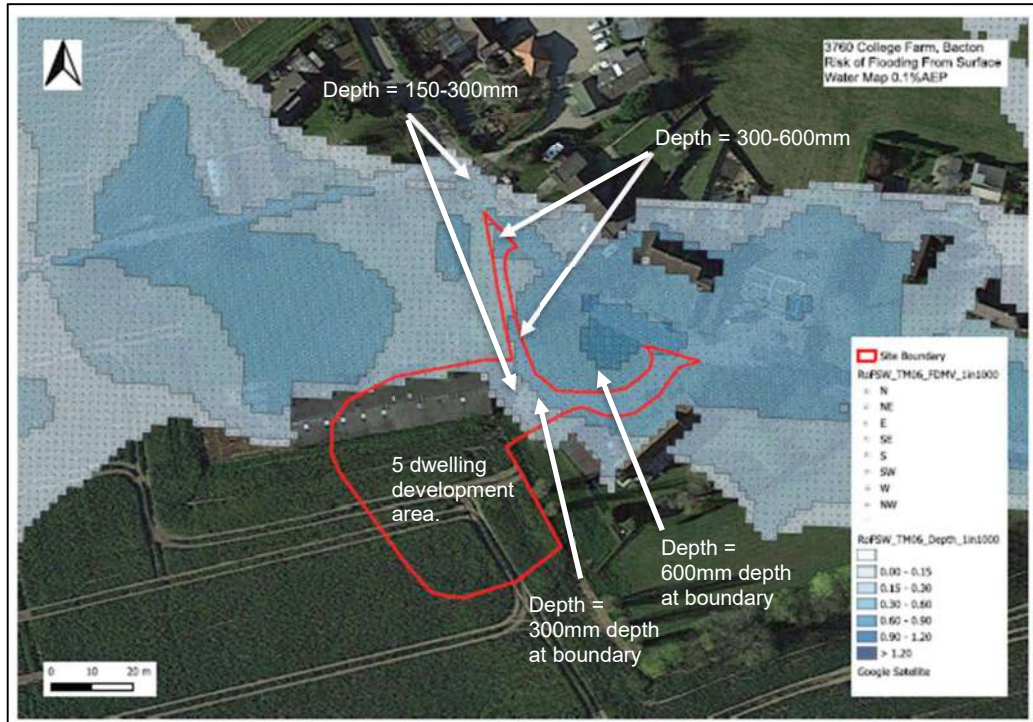


Figure 4.2: Surface water flood map 0.1% AEP (very low risk) overlaid on aerial image.

- 4.3 **Figure 4.1** above indicates for the 1% AEP low risk surface water flood event there is no risk to proposed properties, however, the proposed development access towards College Road to the north is at risk of surface water flooding up to 150mm with some areas in the 150-300mm depth category.
- 4.4 **Figure 4.2** above indicates for the 0.1% AEP very low risk surface water flood event there is no risk to proposed properties, however, the proposed development access towards College Road to the north is at risk of surface water flooding up to depths of between 150-300mm with some areas in the 300-600mm depth category. However, the 300mm depth boundary line is present within the red line boundary area and therefore it is reasonable to assume that the depth of surface water flooding only marginally exceeds the 300mm depth and a maximum depth of 350mm has been estimated for use in the calculations below.

#### Surface Water Flood Risk to Existing Access Road

- 4.5 In accordance with Flood Risk Assessment Guidance FD2320, new developments are required to provide safe access and exit during a flood event to enable the evacuation of people from the development, and to provide emergency services and flood defence authorities with access to the development. A safe access or exit route is a route that is safe for use by occupiers without the intervention of the emergency services or others; a route can only be completely safe in flood risk terms if it is always dry.
- 4.6 The requirements for safe access and exit from new developments in flood risk areas are as follows, in decreasing order of preference:

- Safe dry route for people and vehicles
- Safe dry route for people
- If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth & velocity of flooding) is low\* and should not cause a risk to people
- If a dry route for vehicles is not possible, a route for vehicles where the flood hazard is low\* to permit access for emergency vehicles

\*Low flood hazard routes should not have service covers that could be removed, or other underwater hazards. In addition, they should be clearly marked, for example with painted posts.

4.7 FD2320 states that cars will stop and/or float in water as shallow as 0.5m, whilst some emergency vehicles may survive in water of 1m due to the high-level air intakes/exhausts.

4.8 Using the intermediate approach (FD2320) the danger to people can be assessed by calculating a Flood Hazard Rating (HR) using  $((v + 0.5)*D)+DF$ , where v = velocity (m/s), D = depth (m) and DF = Debris Factor. The HR is then used to determine a Hazards to People Classification as noted in **Table 1** below.

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
Less than 0.75		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

Table 1: Hazards to People Classifications (Environment Agency)

- 4.9 Using national mapping information a velocity of 0.30m/s has been used for the calculations (<0.25m/s). A DF of either 0.5 for water depths less than 0.25m or 1 for water depths greater than 0.25m has been used in the calculations.
- 4.10 The HR for the 0.1% surface water flood event has therefore been calculated to be 0.62 for flood depths up to 150mm ('very low hazard') to 1.28 for flood depths up to 350mm ('Danger for Some'). These areas are annotated on **Figure 4.3** below.

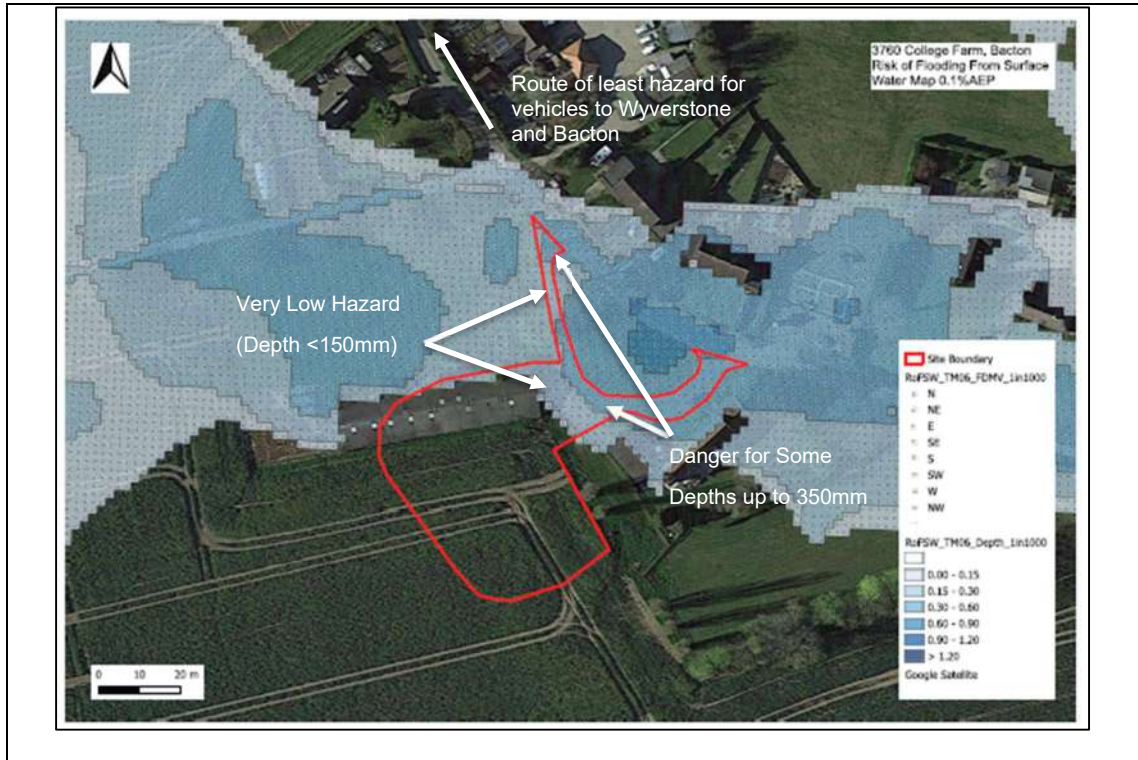


Figure 4.3: Calculated Hazard to People Classifications

- 4.11 As annotated in **Figure 4.3** above there is only a very small area with a ‘danger for some’ hazard rating. As such, considering the depth of flood water is generally <350mm it is unlikely that emergency services will be impeded from accessing the site in the event of an emergency.

**Vehicle and Walking Routes**

- 4.12 **Figure 4.4** below shows the routes of least hazard for vehicles and people to Bacton if required during a 0.1% AEP flood event. A link to existing public footpaths is recommended and the proposed route is shown in **Appendix C**.

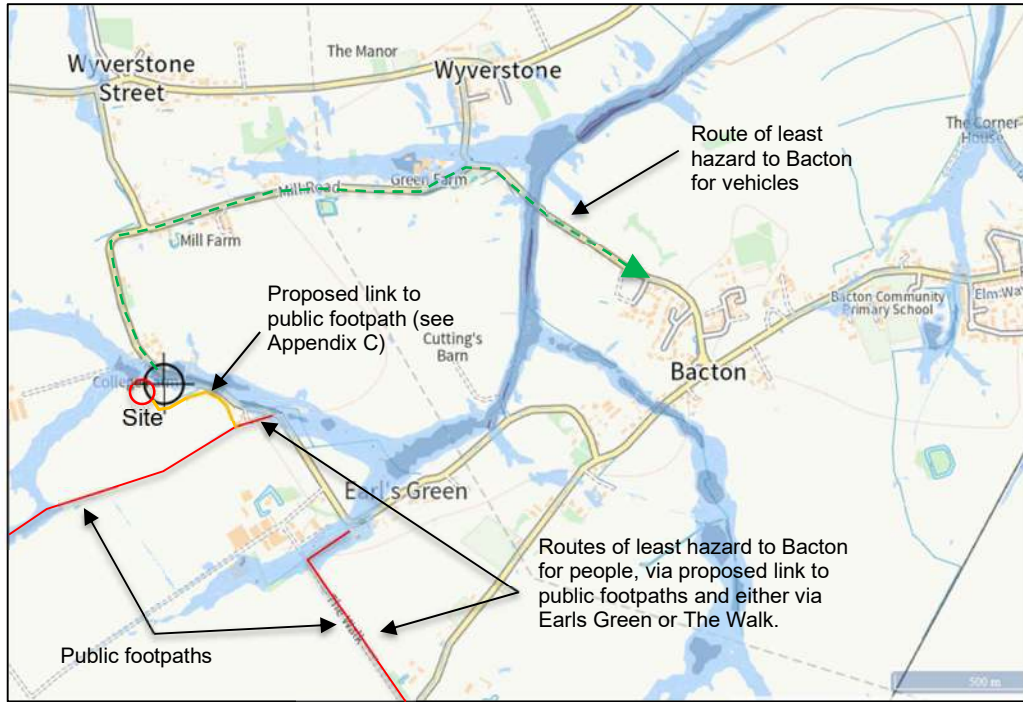


Figure 4.4: Routes of Least Hazard to Bacton, for People and Vehicles during a 0.1% AEP Surface Water Flood Event.



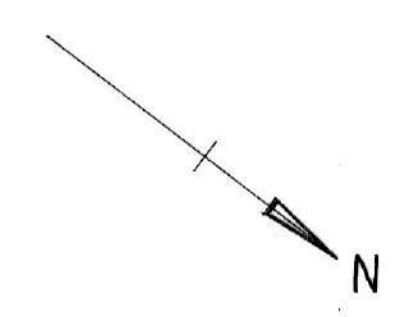
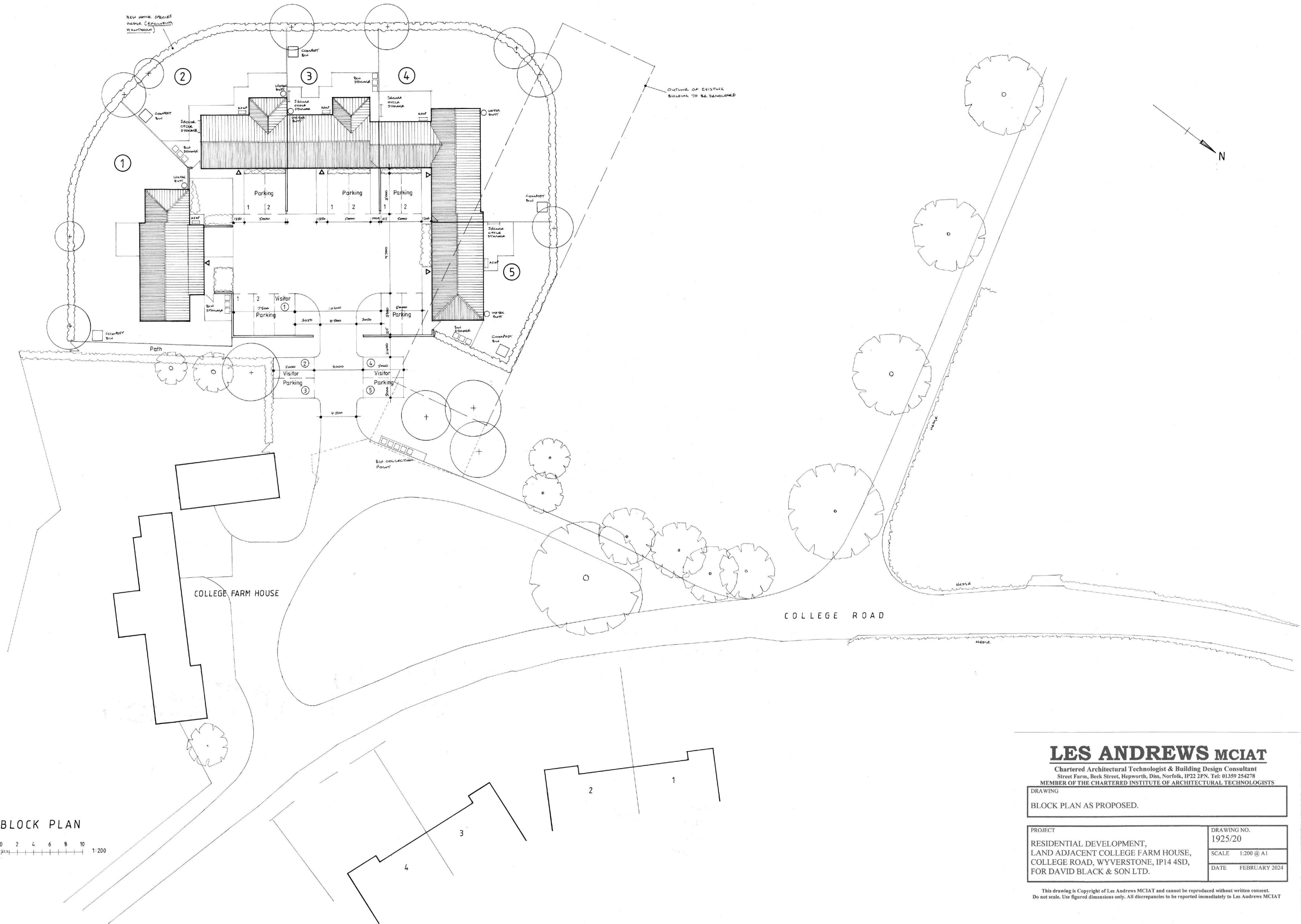
## 5 Conclusions and Recommendations

- 5.1 This flood risk assessment has been commissioned in support of a five dwelling development with associated parking and access on land adjacent to College Farm House, Wyverstone.
- 5.2 The proposed dwellings or car parking areas are not at risk from any sources of flooding, indicating site users will be safe from flood risk for the development lifetime.
- 5.3 The existing access road is at risk from surface water flooding up to the 0.1% AEP surface water flood event, however, flood depths generally remain <350mm.
- 5.4 Associated Hazard to People Classifications have been calculated in accordance with Flood Risk Assessment Guidance FD2320 and correspond to 'very low hazard' and 'danger for some' respectively. However, the 'danger for some' area is limited, and it is concluded that it is unlikely that emergency services will be impeded from accessing the site in the event of an emergency.
- 5.5 Routes of least hazard for vehicles and people are provided, and a new link to the public footpath is recommended.
- 5.6 Dwellings and their associated garages are not proposed in areas at risk of flooding, therefore, the development will not increase off site flood risk.

### **Extant Class Q Permission**

- 5.7 It is important to note that the site currently holds a valid Class Q permission for converting the barn into five dwellings. Each unit has access to amenity space located to the north, potentially exposing the entire amenity space to the risk of surface water flooding. The proposed five-dwelling plan, however, offers an improvement over the existing permission. The dwellings, along with their associated garages and garden areas, will be situated outside the area susceptible to surface water flooding.
- 5.8 Furthermore, whether for the existing permission or the proposed plan, access will be via College Road, thus not increasing any risk associated with the site access.

## Appendix A: Development Plan



**BLOCK PLAN**  
 0 2 4 6 8 10  
 1:200

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 Chartered Architectural Technologist & Building Design Consultant  
 Street Farm, Beck Street, Hepworth, Diss, Norfolk, IP22 2PN. Tel: 01359 254278  
 MEMBER OF THE CHARTERED INSTITUTE OF ARCHITECTURAL TECHNOLOGISTS

DRAWING  
**BLOCK PLAN AS PROPOSED.**

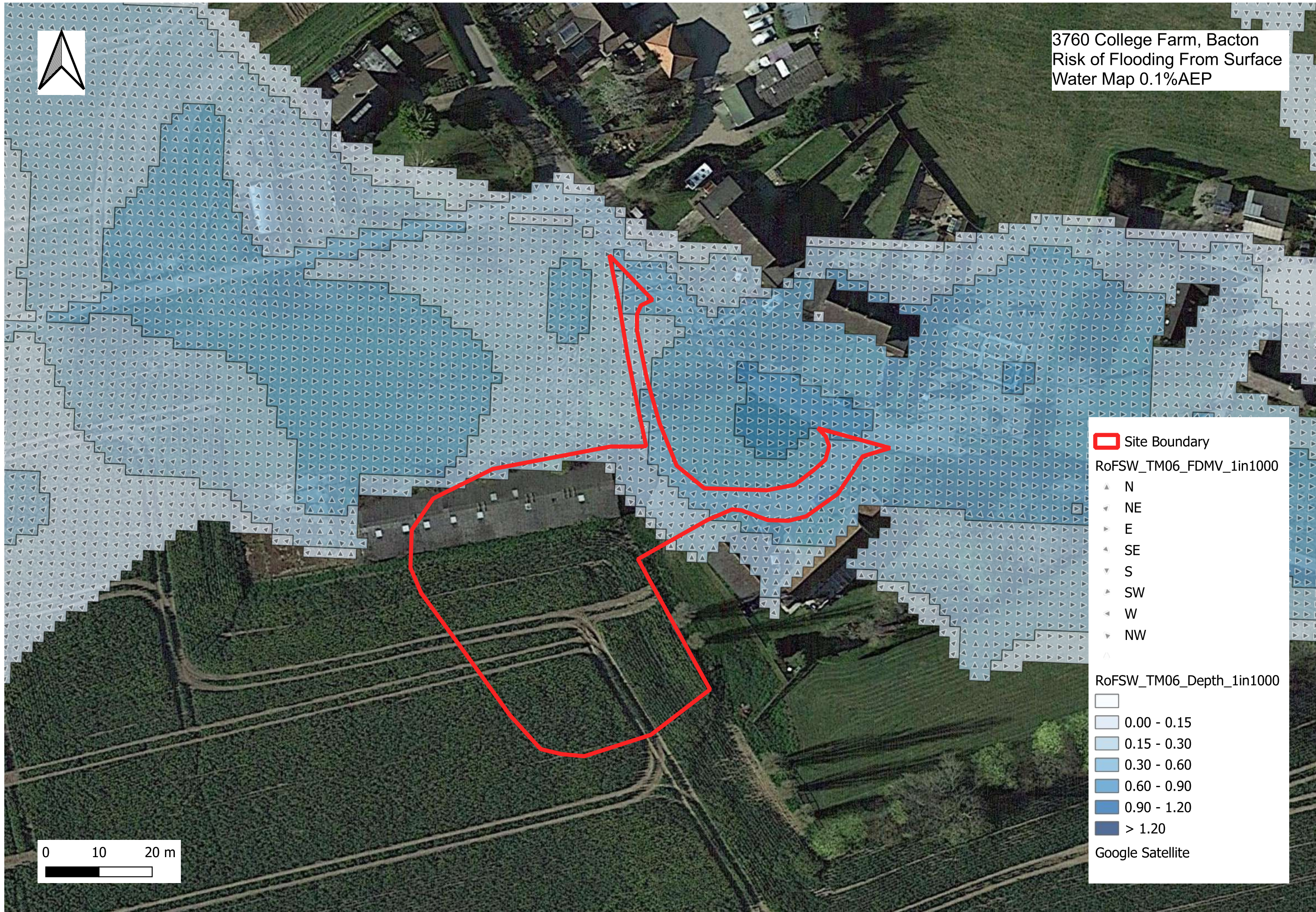
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SCALE	DATE
1:200 @ A1	FEBRUARY 2024


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## Appendix B: Risk of Flooding from Surface Water Maps - 0.1%, 1% and 3.3% AEP












3760 College Farm, Bacton  
Risk of Flooding From Surface  
Water Map 0.1%AEP









 Site Boundary

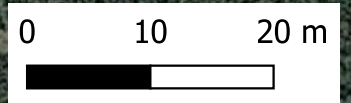
RoFSW\_TM06\_FDMV\_1in1000

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-  SE
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-  SW
-  W
-  NW
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RoFSW\_TM06\_Depth\_1in1000

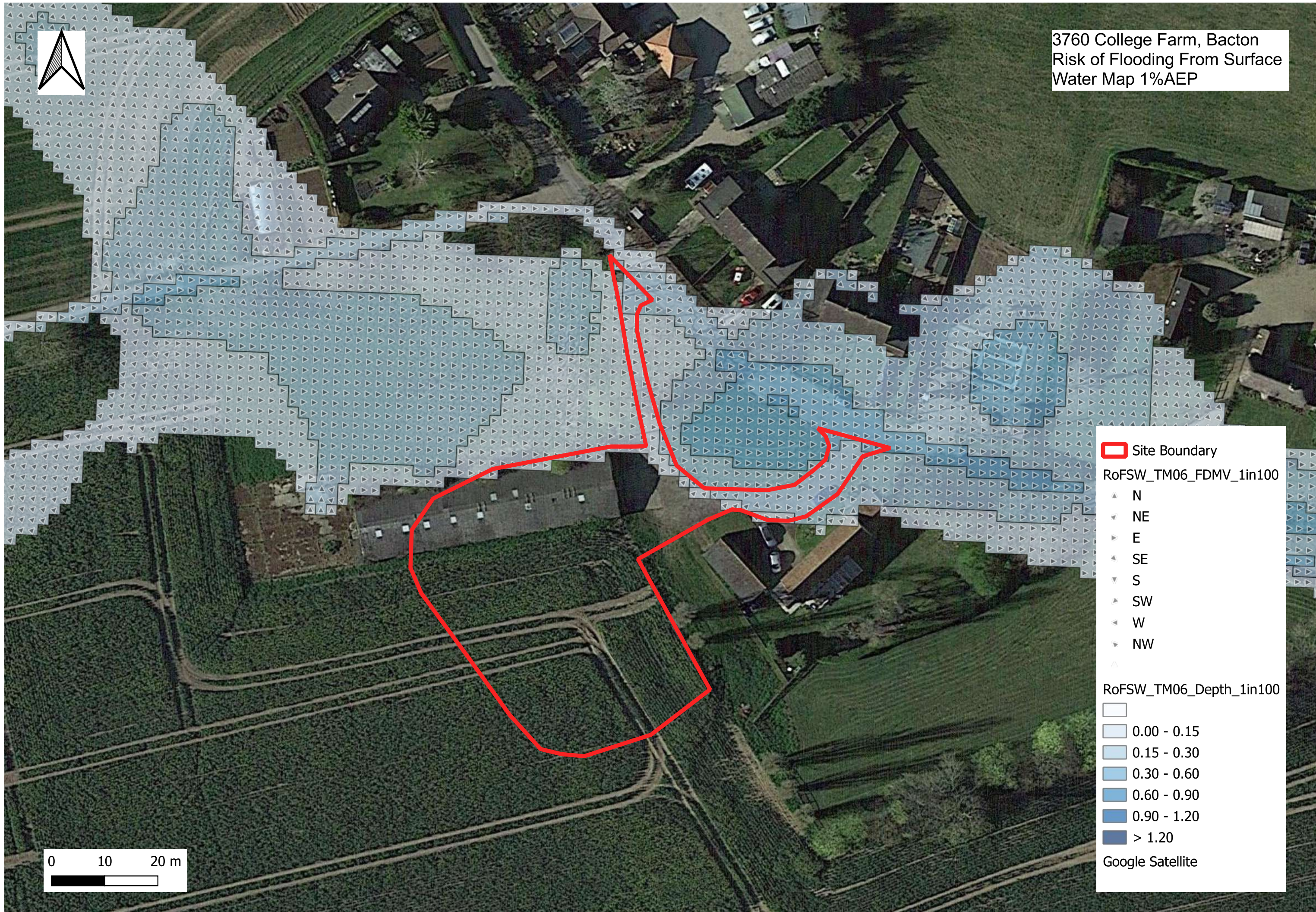
-  0.00 - 0.15
-  0.15 - 0.30
-  0.30 - 0.60
-  0.60 - 0.90
-  0.90 - 1.20
-  > 1.20


Google Satellite














3760 College Farm, Bacton  
Risk of Flooding From Surface  
Water Map 1%AEP









 Site Boundary

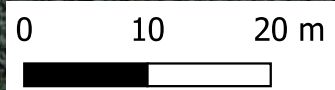
RoFSW\_TM06\_FDMV\_1in100

-  N
-  NE
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-  S
-  SW
-  W
-  NW
-  ^

RoFSW\_TM06\_Depth\_1in100

-  0.00 - 0.15
-  0.15 - 0.30
-  0.30 - 0.60
-  0.60 - 0.90
-  0.90 - 1.20
-  > 1.20


Google Satellite














3760 College Farm, Bacton  
Risk of Flooding From Surface  
Water Map 3.3%AEP









 Site Boundary

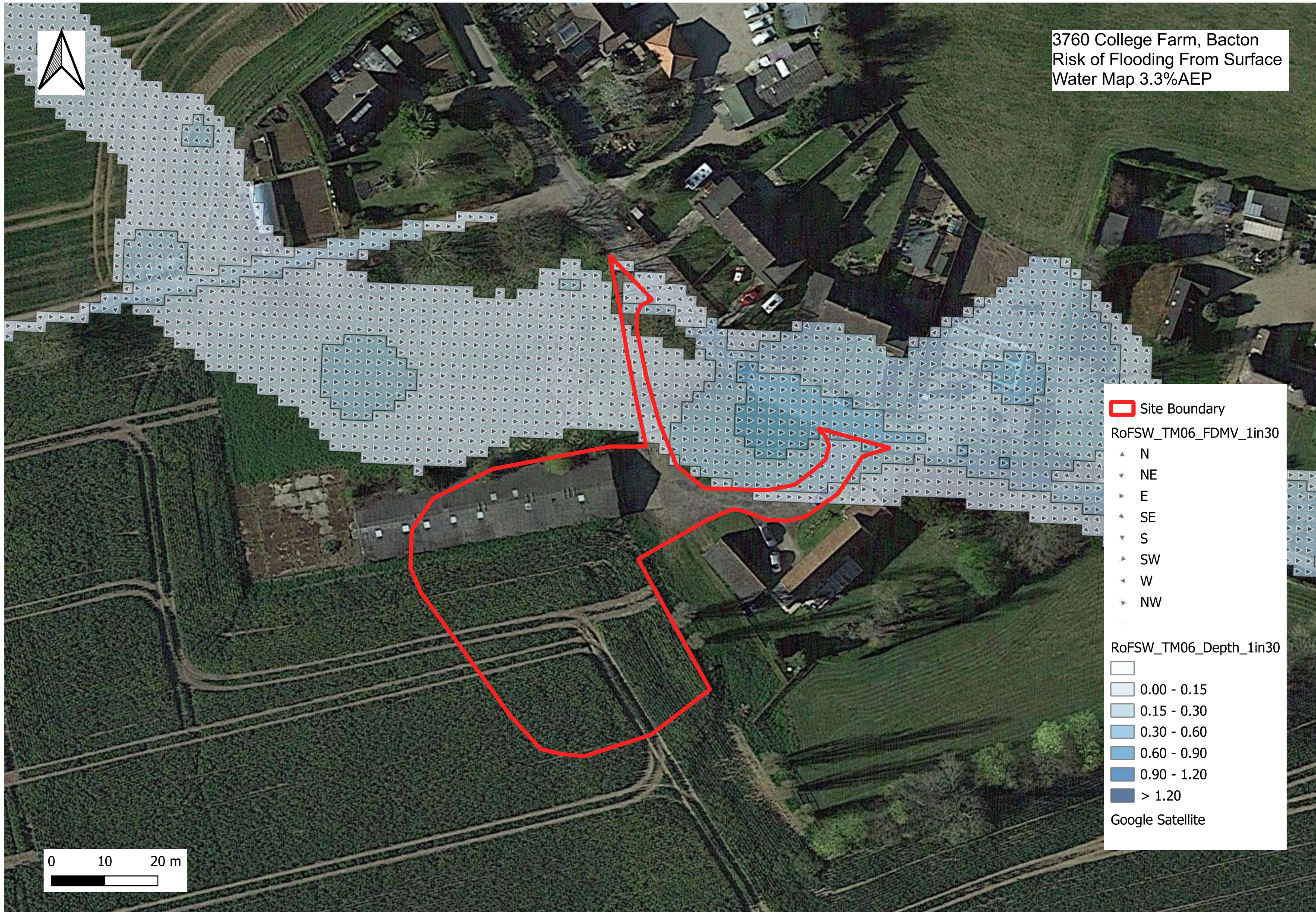
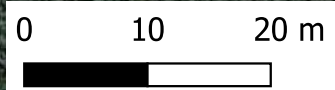
RoFSW\_TM06\_FDMV\_1in30

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-  NW
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RoFSW\_TM06\_Depth\_1in30

-  0.00 - 0.15
-  0.15 - 0.30
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-  0.60 - 0.90
-  0.90 - 1.20
-  > 1.20

Google Satellite

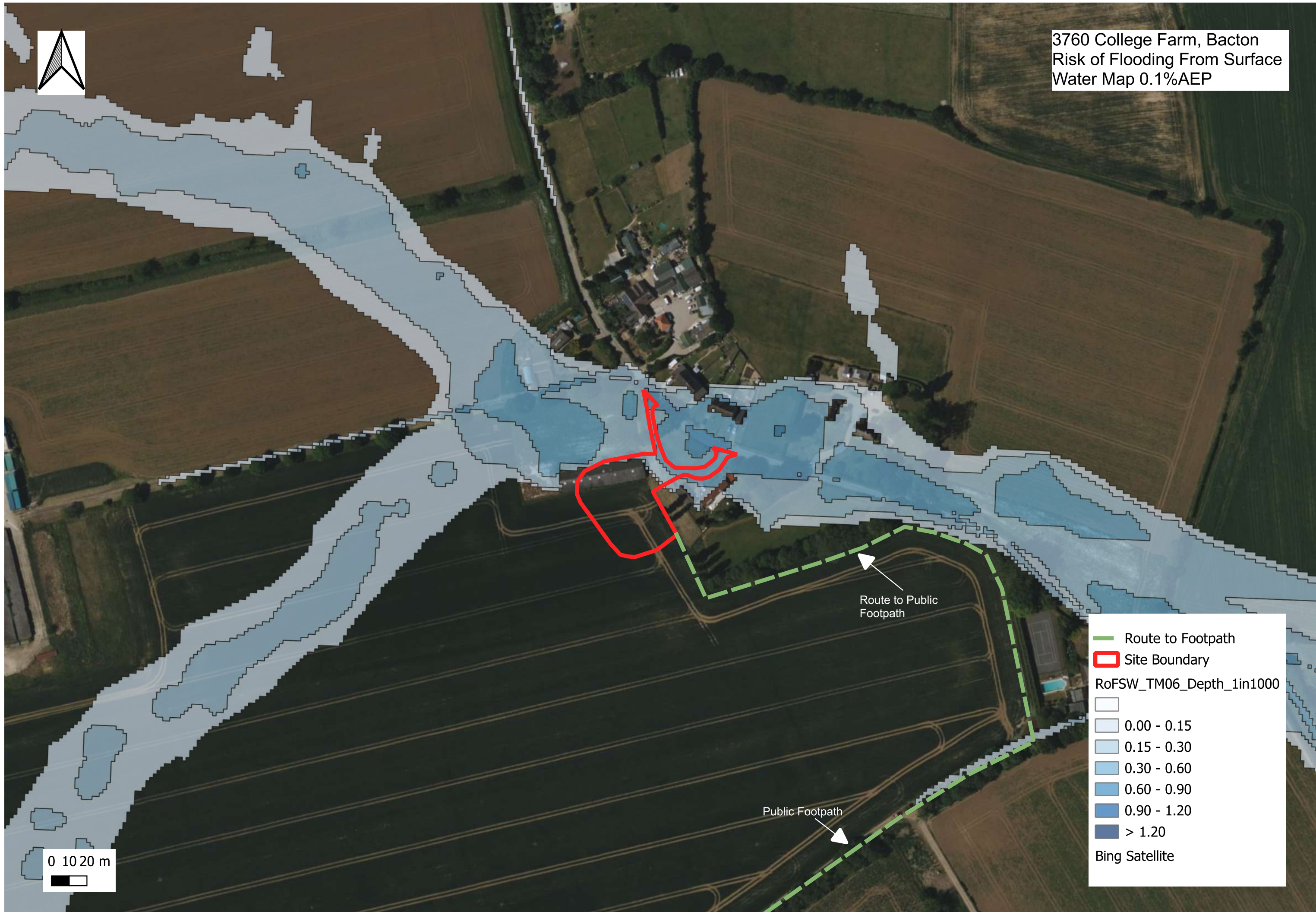
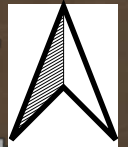




## Appendix C: Route to Public Footpath



3760 College Farm, Bacton  
Risk of Flooding From Surface  
Water Map 0.1%AEP



Route to Public Footpath

Public Footpath

- Route to Footpath
- Site Boundary
- RoFSW\_TM06\_Depth\_1in1000
  - 0.00 - 0.15
  - 0.15 - 0.30
  - 0.30 - 0.60
  - 0.60 - 0.90
  - 0.90 - 1.20
  - > 1.20
- Bing Satellite

0 10 20 m