



# Bleak Farm

Flood Risk Assessment

August 2015

Simon Siggers





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Simon Sagers

Guilden Gate, 86 North End, Bassingbourn, Royston, SG8 5PD



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# Executive Summary

Mott MacDonald has been commissioned by Simon Sadders of Bleak Farm, Bassingbourn, Cambridgeshire to carry out a Flood Risk Assessment (FRA) for a proposed “Change of Use” at Bleak Farm. It is proposed to change two agricultural buildings to dwellings, hereby referred to as ‘Site 1’ and ‘Site 2’.

Site 1 and Site 2 are located in a rural area in the vicinity of two small watercourses, known as ‘Back Path Stream’ and ‘North End Ditch’. This report provides the outcome of the Flood Risk Assessment which has been carried out in accordance with the National Planning Policy Framework (NPPF, 2012), and the accompanying Planning Practice Guide (PPG, 2014).

The updated Environment Agency (EA) flood mapping information indicates that Site 2 is located within Flood Zone 1 and therefore at low risk from fluvial flooding. Site 1 is located within Flood Zone 3 and therefore at fluvial flood risk. However, the proposed development includes garage space on the ground floor and permanent living accommodation on the first floor. Taking into consideration the flood extent outlines and the local topography it is considered that the first floor accommodation is not at fluvial flood risk. Safe access and egress can also be made from the front of the building.

Surface water flood risk to both sites is ‘Very Low’, as indicated by the EA “Risk of Flooding from Surface Water” map. Surface water runoff rates and volumes from the two sites will not alter as there will be no structural changes to the building.

The proposed development includes the installation of a new infiltration soak-away 5m from the buildings which will collect surface water runoff. It is considered that this may improve the local surface water flood risk.

The sites are considered to be at a ‘Very Low’ risk from sewer flooding and groundwater flooding.

The sites are not considered to be at risk from tidal flooding or flooding from reservoirs, canals and other sources of artificial flooding.

The Flood Risk Assessment demonstrates that the change of the use of the two sites is very unlikely to cause an increase in flood risk elsewhere. A proposed soak-away will help to manage surface water flood risk at Bleak Farm in the future. It is therefore considered that the proposed change of use satisfies the requirements of the NPPF (2012) and PPG (2104).



# 1 Introduction

## 1.1 Scope

It is proposed to change the use of two buildings at Bleak Farm in Bassingbourn, South Cambridgeshire from agricultural use to permanent living accommodation and garage space. Mott MacDonald was commissioned by Simon Sagers of Bleak Farm to carry out a Flood Risk Assessment for the proposed “Change of Use”.

## 1.2 Site Description and Study Area

Bleak Farm is located on North End Road in Bassingbourn, South Cambridgeshire (NGR TL 32932 44795). A location plan of the site is presented in Figure 1.1. The red boxes indicate the boundary of the two “sites” (buildings under consideration for change of use), hereby referred to as “Site 1” and “Site 2”. The larger red polygon is the Bleak Farm property boundary.

Figure 1.1: Bleak Farm Site Location



Source: Contains Ordnance Survey data Crown copyright and database right © 2015

Site 1 and Site 2 are situated in a rural village, within the property boundary of Bleak Farm. Bleak Farm includes a large grassy area that stretches from the front of the property boundary to the rear, where it meets Back Path Stream. The property currently consists of a house, barn and several other agricultural units such as storage buildings. Site photos are available in Appendix A.

Bleak Farm is bounded by North End Ditch to the west and Back Path Stream to the east, which flow in a northerly direction, towards the River Cam (as shown in Figure 1.1). Access is gained to the site from North End Road. The north and south of Bleak Farm is bounded by other properties.

The British Geological Survey geology maps indicate that Bassingbourn lies on the West Melbury Marl Chalk formation. This implies that the bedrock in the area is porous with potential to transfer groundwater.

### 1.3 Proposed Change of Use of Existing Buildings

Site 1 and Site 2 are shown in Figure 1.2 and Figure 1.3 respectively. Site 1 is currently a barn, in use for storage/agricultural purposes. It is proposed to renovate this building with garages on the ground floor and new permanent living accommodation on the first floor. Site 2 is a ground floor building only currently used for storage/agricultural purposes. It is proposed to renovate this building to be used as permanent living accommodation. Neither site has a basement.

The proposed changes are not intended to change the structure, layout, roof or footprint of the properties.

Table 2 of the NPPF PPG defines the proposed residential dwellings as 'More Vulnerable'.

Figure 1.2: Site 1 – Barn



Source: Mott MacDonald

Figure 1.3: Site 2 – Small Storage Unit



Source: Mott MacDonald

## 1.4 Site Topography

The topography of Bleak Farm was assessed using contour mapping and a site visit conducted on the 17<sup>th</sup> of June 2015. Bleak Farm is generally flat at the location of Site 1 and 2 and slopes gently towards the north-east.

## 1.5 Existing Drainage

The existing drainage of Bleak Farm consists of ditches to the front (west) and the rear (east) of the property. North End Ditch flows in a south-north direction to the front of the property. The ditch is culverted to the front of Bleak Farm (see Figure 1.4). This culvert appears to be currently well maintained (by the applicant) with free flow at the orifices. The culvert spans 220m from Bleak Farm north to Guise Lane, where it discharges into another drainage ditch. Downstream from Bleak Farm, the various landowners are responsible for maintenance of their own culverts.

Back Path Stream flows in a south-north direction to the rear of the property. Back Path Stream is a large ditch roughly 1.5m in width (see Figure 1.5). According to the property owner and upon inspection of the topography a large portion of the Bleak Farm (eastern area of the property) drains towards Back Path Stream.

Figure 1.4: North End Stream Culvert at front of Bleak Farm property



Source: Mott MacDonald

Figure 1.5: Back Path Stream to rear of Bleak Farm property



Source: Mott MacDonald

## 2 Application of NPPF

### 2.1 Sequential Test

The Sequential Test aims to steer new development to locations with the lowest flood risk. Due to the fact this application concerns to change of usage of buildings, the development cannot be moved to an area of lower flood risk.

Section 3.3 demonstrates that Site 1 is located within Flood Zone 3 and Site 2 is located within Flood Zone 1. Table 1 of the PPG states that all land uses are appropriate in Flood Zone 1. The Table states that for 'More Vulnerable' developments within Flood Zone 3, the Exception Test is required.

### 2.2 Exception Test

In order to satisfy the Exception Test:

- 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.

The proposal includes a soakaway attenuation feature at the property. This will contribute towards mitigating the surface water flood risk at the site. This soak-away will be the inlet of a 1,500L underground storage tank, which will be used to store and redistribute rainwater across the site for agricultural purposes, thus adding sustainability benefits to the property and local community.

This FRA demonstrates that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere.



## 3 Assessment of Flood Risk

### 3.1 Potential Sources of Flooding

This section outlines the flooding mechanisms for the following potential sources of flooding:

- Fluvial;
- Tidal;
- Surface water and overland flow;
- Groundwater;
- Sewer; and
- Reservoir, canal and other sources of artificial flooding.

In order to determine the risk of flooding to the sites, a request was submitted to the Environment Agency (EA) for the latest flood risk information regarding the potential sources listed above. All correspondence and data provided by the EA can be found in Appendix B. This report is also written with reference to the South Cambridgeshire and Cambridge City (SCCC) Level 1 Strategic Flood Risk Assessment (SFRA).

### 3.2 Historical Flooding

EA historical records and the SCCC SFRA indicate that the local area has been subject to minor flooding incidents in the past. Table 3.1 displays information on previous flood events in the vicinity of Bassingbourn. Table 3.1 is also complimented by Figure 3.1. It can be seen that there are no recorded incidents of flooding at the proposed development sites. The owner of the property has also specified that since 1700 (when the farm was established), the site has not knowingly flooded.

Table 3.1: Historical Flood Events

Date	Location	Mechanism
1960 - 2001 (continuous)	Shedbury Lane & Spring Lane	Fluvial and groundwater
01/10/2008	High Street	Drainage/Sewer flooding due to blockage
01/06/2009	Church Street	Drainage/Sewer flooding due to blockage
07/06/2009	A1198	Highways drainage flooding
16/07/2015 (viewed on site visit, See Appendix Figure A.8)	Park View	Surface water flooding due to intense rainfall. Local estimates of 72mm in 2.5 hours

Source: South Cambridgeshire and Cambridge City Level 1 SFRA

The site visit of the 17<sup>th</sup> July followed an intense summer rainfall event. Local (non-verified) data received by Simon Siggers, estimate that 72mm of rainfall fell in 2.5 hours. Using the FEH Depth Duration Frequency (DDF) rainfall model, from the FEH CD ROM<sup>1</sup>, this would potentially put this storm event in a 1 in 200 year rainfall event. It was evident that there was some small scale surface water flooding experienced in Bassingbourn, at Park View (see Figure A.8). There was, however, no flooding at Bleak Farm and the North End Stream culvert appeared to be conveying flow appropriately (Figure 1.4).

<sup>1</sup> Version 3

Figure 3.1: Historical Flood Events in Bassingbourn



Source: South Cambridgeshire and Cambridge City Level 1 SFRA

### 3.3 Risk of Fluvial Flooding

#### 3.3.1 Environment Agency Flood Map

The latest EA Flood Map indicates that Site 2 is located within Flood Zone 1 and is therefore classified in Table 1 in the NPPF PPG as being 'land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)'. Table 3 of the NPPF PPG states that 'More Vulnerable' development is permitted within Flood Zone 1.

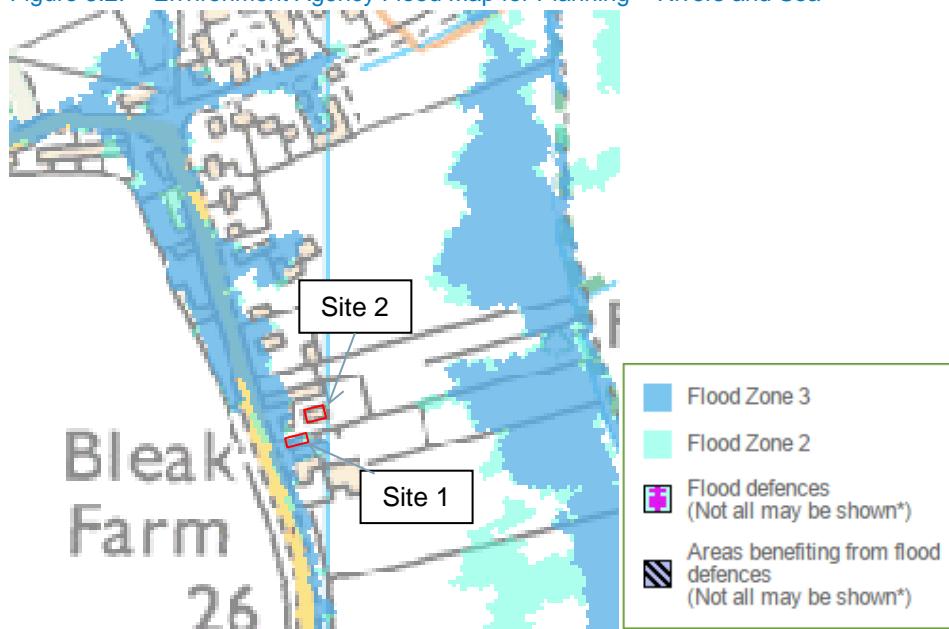
Site 1 is located within Flood Zone 3 and is therefore classified in Table 1 in the NPPF PPG as being 'land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)'. Table 3 in the NPPF PPG states that the Exception Test is required for 'More Vulnerable' development to be permitted.

The proposed use at Site 1 is for garages on the ground floor and permanent living accommodation on the first floor. Therefore, the 'More Vulnerable' part of the change of use is on the first floor. Taking into consideration the flood extents shown in Figure 3.2 and the flat topography of the area it is considered that

the proposed permanent living accommodation will be located substantially above the peak water level. There is also safe access and egress out of the front of the property (which faces north).

In order to reduce the risk of flooding due to blockage of the North End Ditch culvert at this site, it is recommended that regular culvert maintenance be undertaken by the property owner.

Figure 3.2: Environment Agency Flood Map for Planning – Rivers and Sea



Source: Environment Agency

### 3.4 Risk of Tidal Flooding

The site is located significantly far upstream from the tidal reaches of the River Ouse to conclude that it is not at risk from tidal flooding.

### 3.5 Risk of Surface Water Flooding

The EA Risk of Flooding from Surface Water map (Figure 2.2) indicates the two properties are at 'Very Low' risk from surface water flooding (each year, this area has a chance of flooding of less than 1 in 1000 (0.1%).

Due to the proposed change of use of the buildings, the proposed development will not alter the surface water runoff volumes and rates and will therefore not increase the risk from flooding off site.

As part of the proposed development, a new infiltration soak-away is to be installed, 5m from the buildings in the centre of the farm yard area which will collect surface water runoff. This soak-away will also be the

inlet of a 1,500L underground storage tank, which will be used to store and redistribute rainwater across the site for agricultural purposes. This will contribute towards managing the local surface water flood risk at site and provide the benefit of rainwater reuse for agricultural purposes at the property.

Figure 3.3: Environment Agency Risk of Flooding from Surface Water



Source: Environment Agency

### 3.6 Risk of Groundwater Flooding

Groundwater flooding occurs when water levels in the ground rise above surface elevations, and is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

EA Groundwater mapping indicates that underlying bedrock is designated as a 'Principal Aquifer'. Principal Aquifers are defined as having high inter-granular and/or fracture permeability, meaning they usually provide high yields in boreholes. This is further backed up by the British Geological Survey online maps which indicate that the geology of the area is of the West Melbury Marl Chalk formation. This implies that the bedrock may support water supply and/or river base flow.

Information provided by the SCCC SFRA indicates that there has been groundwater flooding (reported as 'minor flooding of the fields') in the in the area of Bassingbourn (see Figure 3.1), however this has been located to the south of Bassingbourn around Spring Lane and Pepper Close, close to a natural spring.



These historical events occurred to the south of Bassingbourn, some distance from Bleak Farm. Therefore, it is considered that the site is at low risk from groundwater flooding.

### **3.7 Risk of Sewer Flooding**

Information provided by the SCCC SFRA indicates that there is a history of sewer flooding (three incidents between 2008 and 2009) within the village of Bassingbourn, These incidents were all the result of blocked drainage. The closest sewer flooding incident to the site was located on Church Close in 2009 (see Figure 3.1). This is located sufficiently far away from the site to not have caused any flooding at the site. It is therefore considered that the proposed development is at low risk from sewer flooding.

### **3.8 Reservoirs, Canals and Other Sources of Artificial Flooding**

The EA has produced maps of the extent of flooding that would be expected in the unlikely event of a reservoir breach at any of the UK's reservoirs with a water volume of greater than 25,000m<sup>3</sup>. A review of the EA Risk of Flooding from Reservoirs Map indicates that the site is not at risk of flooding from reservoirs.

There are no canals or other sources of artificial flooding in the vicinity of the site.

## 4 Conclusions

This Flood Risk Assessment has demonstrated that Site 1 is located within Flood Zone 3 and is therefore classified in Table 1 in the NPPF PPG as being located in 'land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)'. However, it has been shown that the proposed permanent living accommodation will be located substantially above the peak water level, with safe access and egress to the north, and is therefore not considered to be at risk.

It has been demonstrated that Site 2 is located within Flood Zone 1 and is therefore classified in Table 1 in the NPPF PPG as being located in 'land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%)'.

It is recommended that the North End Ditch culvert at the entrance of Bleak Farm is regularly maintained to reduce the risk of a blockage which may lead to localised flooding.

The site is considered to be a low risk from surface water flooding, groundwater flooding and sewer flooding.

The site is not considered to be at risk of tidal flooding or flooding from reservoirs, canals and artificial sources.

Due to the proposed change of use of the buildings, the proposed development will not alter the surface water runoff volumes and rates and will therefore not increase the risk from flooding off site.

The proposed development includes the installation of a new infiltration soakaway 5m from the buildings which will collect surface water runoff. It is considered that this may improve the local surface water flood risk.

This FRA demonstrates that the proposed change of use for Site 1 and Site 2 at Bleak Farm satisfies the requirements of the NPPF (2012).

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## Appendix A. Site Visit Photos

Figure A.1: Change of Use Property 1 - Barn



Source: Mott MacDonald

Figure A.2: Change of Use Property 2



Source: Mott MacDonald



Figure A.3: Back Path Stream Culvert (d/s from Bleak Farm)



Source: Mott MacDonald

Figure A.4: Back Path Stream (at eastern end of Bleak Farm)



Source: Mott MacDonald

Figure A.5: Facing East, towards Back Path Stream



Source: Mott MacDonald

Figure A.6: Culvert under front of Bleak Farm



Source: Mott MacDonald



Figure A.7: North End Stream (facing d/s, prior to culvert under front of Bleak Farm)



Source: Mott MacDonald

Figure A.8: Surface water flooding at Park View, Basingstoke



Source: Mott MacDonald

## Appendix B. EA Flood Map