

FLOOD RISK ASSESSMENT FOR RESIDENTIAL DEVELOPMENT AT WILLOW TREE FARM, HOLBEACH ST MARKS

FINAL REPORT

ECL0465a/BIDWELLS

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of South Yorkshire Pensions Authority in respect of a development that consists of a Change of Use of an agricultural building to form one dwelling at Willow Tree Farm at Lapwater Lane, Holbeach St Marks.

A planning application for the proposed development is to be submitted by Bidwells.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Willow Tree Farm, Lapwater Lane, Holbeach St Marks, Lincolnshire, PE12 8DZ. The National Grid Reference of the site is 53784/33260.

The location of the site is shown in Figure 1.

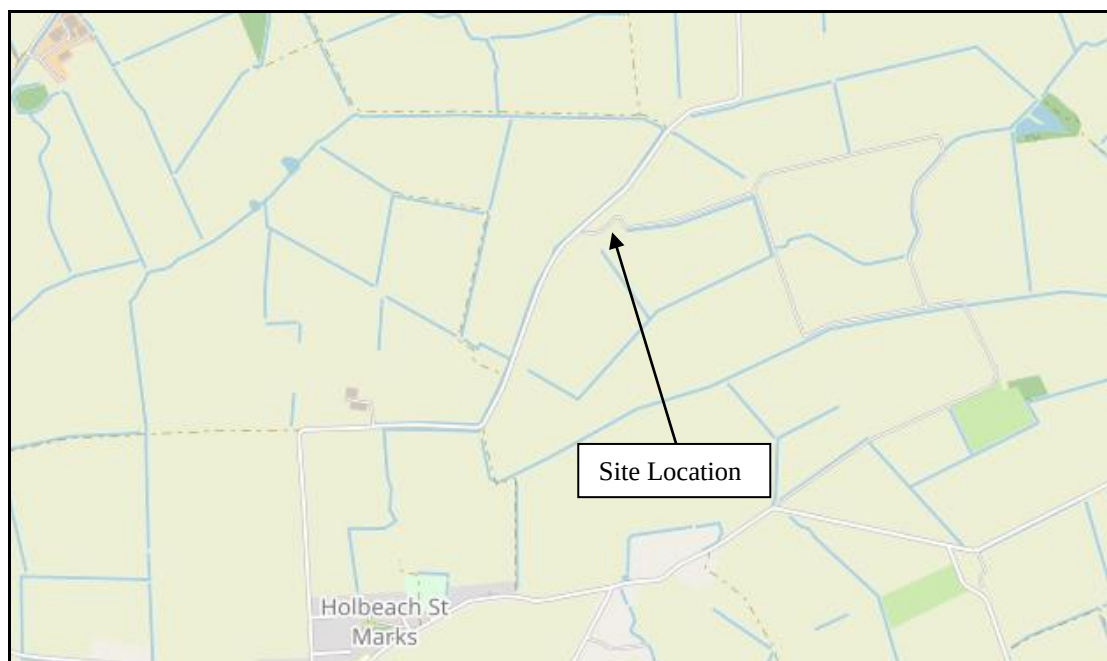


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is located on the south eastern side of Lapwater Lane approximately 1500m north east of Holbeach St Marks. The site is part of an agricultural holding and comprises three agricultural buildings that are adjoining. The eastern most barn has two storeys. The area of development is approximately 0.15 hectares.

A topographic survey of the site has been undertaken and is provided in Attachment 1. Ground levels around the perimeter of the agricultural buildings are between +3.3m OD and +3.5m OD. The finished floor level within the buildings is +3.5m OD. Lapwater Lane alongside the development is at a level of +3.8m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water at the site would naturally drain through soakaway and hence to the IDB drain system. There is a riparian drain close to the southern boundary of the site and the nearest IDB drain is 500m east of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by West Walton Formation Mudstone and Siltstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of the conversion of the agricultural buildings to form one new dwelling. The dwelling will have two storeys. Details of the proposed development are provided in Attachment 2.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities and reducing the impact of flooding

2.5 Flood Zones

The site is located within Flood Zone 3, an area with a high probability of flooding, of the Environment Agency Flood Maps for Planning as shown in Figure 2.

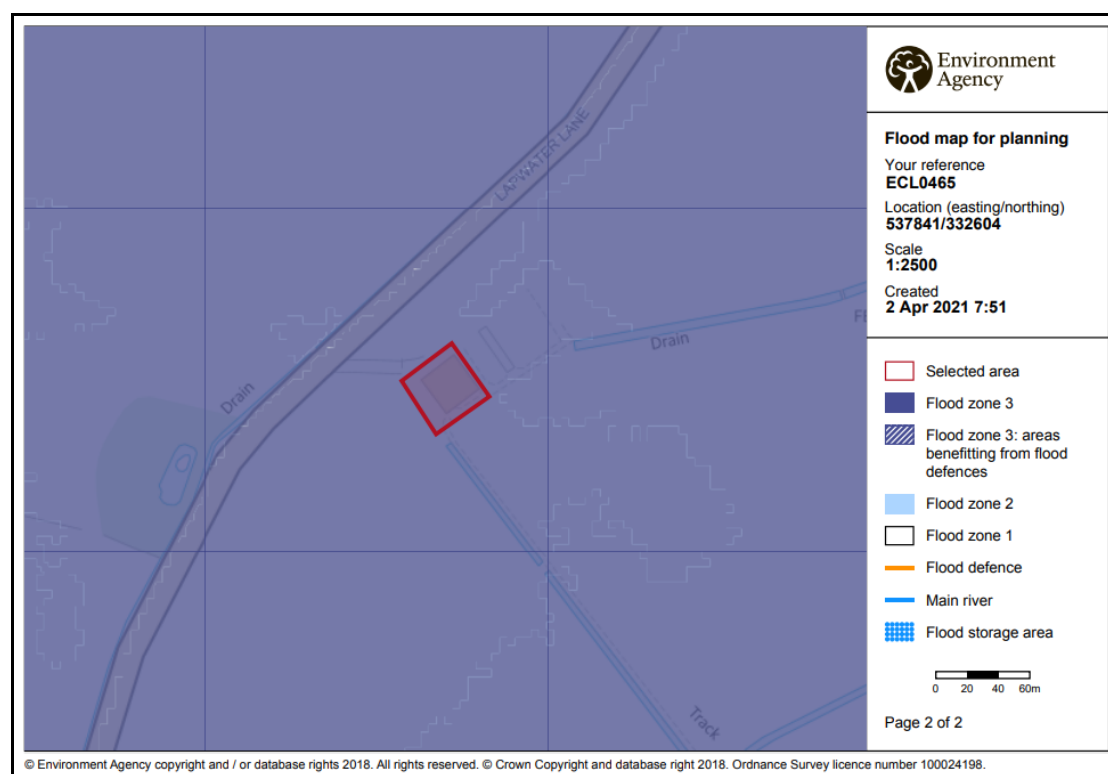


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- the site has a very low risk of surface water flooding (annual probability less than 0.1%); and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is in the 'Low Hazard' area	The site is in the 'Danger for All' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The site has a peak flood depth between 0.0m and 0.25m	The site has a peak flood depth between 1.0m and 2.0m

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for dwellings and is classified as 'More Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'More Vulnerable' therefore it is necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential and Exception Test

It is for the Local Planning Authority, taking advice from the Environment Agency as appropriate, to consider the Sequential Test.

Paragraph 033 of planning practice guidance (PPG) on Flood Risk and Coastal Change states that 'The Sequential Test does not need to be applied for applications for Change of Use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site)'.

Paragraph 048 of the PPG states that 'A Change of Use may involve an increase in flood risk if the vulnerability classification of the development is changed. In such cases, the applicant will need to show in their flood risk assessment that future users of the development will not be placed in danger from flood hazards throughout its lifetime.' The mitigation measures proposed in Section 5.2 of this flood risk assessment are such that risks to future users are mitigated.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

The Local Plan has a target of a net increase of at least 11,681 dwellings in South Holland over the 25-year local plan period. The Plan considers this new housing is

required to ensure the sustainability of the Local Plan area. The proposed development will contribute to this target.

Section 5 of this Flood Risk Assessment describes the flood mitigation measures and the management of the residual risks, demonstrating that this development will be safe and not increase flood risk elsewhere. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The South Holland IDB district is protected by the Wash tidal defences along the Holbeach Marsh frontage with embankment levels at a minimum of +7.0m OD. The Wash tidal defences are approximately 3km from the site. The River Welland tidal defences are approximately 3.1km to the north west of the site. Both defences are the responsibility of the Environment Agency.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by South Holland IDB. There is an IDB Ordinary Watercourse approximately 500m east of the site. The site and the surrounding land are within the Lawyers catchment and drains in a northerly direction to discharge to the Wash at the Lawyers Pumping Station.

During the operation and maintenance of its pumping stations, associated structures and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the South Holland Internal Drainage Board and the Environment Agency are generally good.

4.2 Sources of Flooding

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the IDB drainage system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of Lawyers Pumping Station; and
- overtopping and breaching of the Wash or River Welland tidal defences.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the South Holland IDB drainage system is low due to the maintenance standards achieved and managed by the IDB.

The standard of drainage provided by South Holland IDB is assessed at 2% annual probability (1 in 50 chance each year), compatible with the Department of the Environment, Food and Rural Affairs (DEFRA) target level of service for rural drainage and flood defence works. The risk associated with flooding due to events greater

than 2% annual probability (1 in 50 chance each year) is lowered due to the South Holland IDB high priority watercourses incorporating a freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

The site is within an area benefitting from defences. The flood embankments to the Wash and the River Welland tidal defences provide protection during a 0.5% annual probability (1 in 200 chance each year) event. The flood risk from the Wash is lowered further by second line defences and various informal banks constructed during the reclamation of Holbeach Marsh.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded. Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1% annual probability (1 in 100 chance each year), caused no flooding to any residential properties.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased tide levels.

The tidal flood level during the 0.5% annual probability (1 in 200 chance each year) event inclusive of climate change to 2115 is estimated to be 7.2m AOD. The minimum defence level of the Wash and River Welland embankments is 7.0m AOD. There is a risk during such an event for wave and wind action to cause overtopping and/or breaching of the tidal defences. However, the second line defences with embankment levels of 6.0m AOD would further reduce the probability of flood water reaching the development site.

4.6 Residual Risk

The South East Lincolnshire SFRA includes maps demonstrating the impact of climate change in 2116. The Residual Peak Depth maps within the SFRA indicate the maximum flood depths associated with a breach of the tidal defences. These show that when the climate change allowances are applied to the combination of a 1% annual probability (1 in 100 chance each year) fluvial event and a 0.5% annual probability (1 in 100 chance each year) tidal event the peak depth at the site would be between 1.0m and 2.0m. An extract from this map is shown in Figure 3.

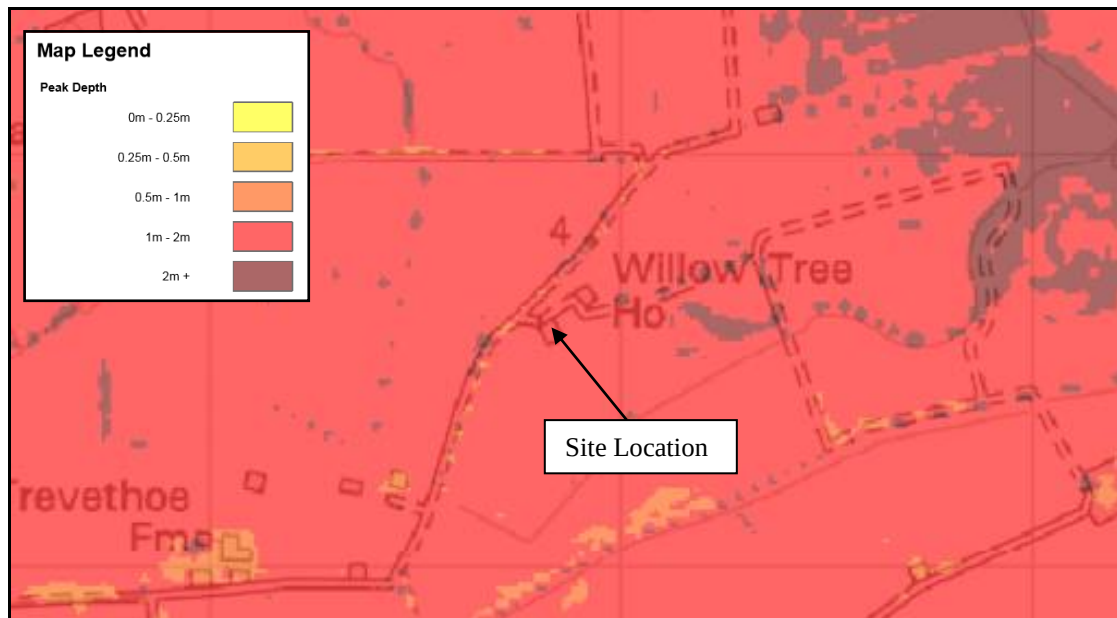


Figure 3 – SFRA 2116 Residual Peak Depth Map

Through a comparison of the flood extent and depth within the SFRA residual peak depth maps, topographic survey, and Environment Agency LiDAR data the flood level at the site is estimated to be +4.7m OD. This is a depth of 1.2m within the agricultural buildings.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Lawyers Pumping Station could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 0.5% annual probability (1 in 200 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development it is not anticipated that the site would flood from overtopping of the defences.

The SFRA considers the residual risk associated with a breach in the defences in 2116. The maps show that the peak flood depth at the site is between 1.0m and 2.0m. Based upon terrain data the flood level is estimated to be +4.7m OD, a depth of 1.2m within the agricultural buildings.

Any increase in impermeable area associated with the development will be minimal so there is no potential that flood risk will be increased elsewhere due to surface water.

5.2 Mitigation Measures

The South East Lincolnshire Standing Advice Matrix sets out mitigation measures for different types of development. The advice for a Change of Use in a Danger to All hazard area is that the Environment Agency is likely to object to proposals including ground floor habitable accommodation and that the FRA should aim to identify mitigation measures in line with those required for new build development of the same type as far as this is practicable.

Due to the constraints associated with using an existing building it is not practical to raise floor levels to be above the flood level. It is therefore proposed that the risk of flooding is mitigated through flood resilient measures. In this instance, having the ground floor at its existing level will enable the dwelling to have two storeys and therefore all sleeping accommodation will be on the first floor and there is a place of safe refuge. It is proposed that:

- the ground floor level will remain as existing;
- there is flood resilient construction to a level of +5.0m OD, 0.3m above the predicted flood level of +4.7m OD; and
- there is flood resistant construction (demountable defences) to a height of 0.6m above finished floor level.

The risk is further mitigated as the proposed dwelling will have 2 storeys.

The developer should ensure that the eventual occupier of the dwelling is sufficiently aware of the risk of flooding, and the standard of the existing defences. The

Environment Agency provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding. The occupier of the dwelling should register with the Floodline Direct Warnings Service to receive any future flood warnings.

During an exceedance event it is anticipated that sufficient time would be available to take precautionary actions to limit the potential impact of flooding.

Should there be a failure of Lawyers Pumping Station and conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment.

6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

- The proposed development consists of the conversion of agricultural buildings to form a two-storey dwelling at Willow Tree Farm, Holbeach St Marks/
- The proposed development is in Flood Zone 3. The site benefits from tidal defences on the Wash and River Welland that provide protection during the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event.
- The site is located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the South Holland IDB high priority watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).
- To mitigate the risk of a breach in the tidal defences it is proposed that there is flood resilient construction to a level of +5.0m OD and 0.6m of flood resistant construction (demountable defences) above finished floor level. The risk is mitigated further by the dwelling having two storeys.
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

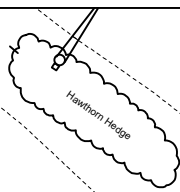
**TOPOGRAPHIC SURVEY
(Dwg GY/5031 1/001)**

ATTACHMENT 2

PROPOSED SITE LAYOUT



Arable Crop



Hawthorn Hedge

Grass Verge

Grass Verge

Tarmac

Concrete

Grass

260 sq m

251 sq m

426 sq m

Car Space 1

Car Space 1

Concrete

Grass Verge

-  Floor space for conversion
-  Curtilage
-  Existing structure to be removed
-  As existing slate roof
-  Corrugated metal roof
-  Existing rooflights to be replaced with metal rooflights

PROPOSED SITE LAYOUT

