

**FLOOD RISK ASSESSMENT
FOR COMMERCIAL DEVELOPMENT AT
BEACON FARM, SPALDING**

FINAL REPORT

ECL0346-2/3D PLANNING LTD

DATE NOVEMBER 2023

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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 Slator Bros (Farms) Ltd in respect of a commercial development that consists of two storage units at Beacon Farm, Spalding.

A planning application for the proposed development is to be submitted by 3D Planning Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is at Beacon Farm, Wiseman's Gate, Weston, Spalding, Lincolnshire, PE12 6JD. The National Grid Reference of the site is 52851/32527.

The location of the site is shown in Figure 1.

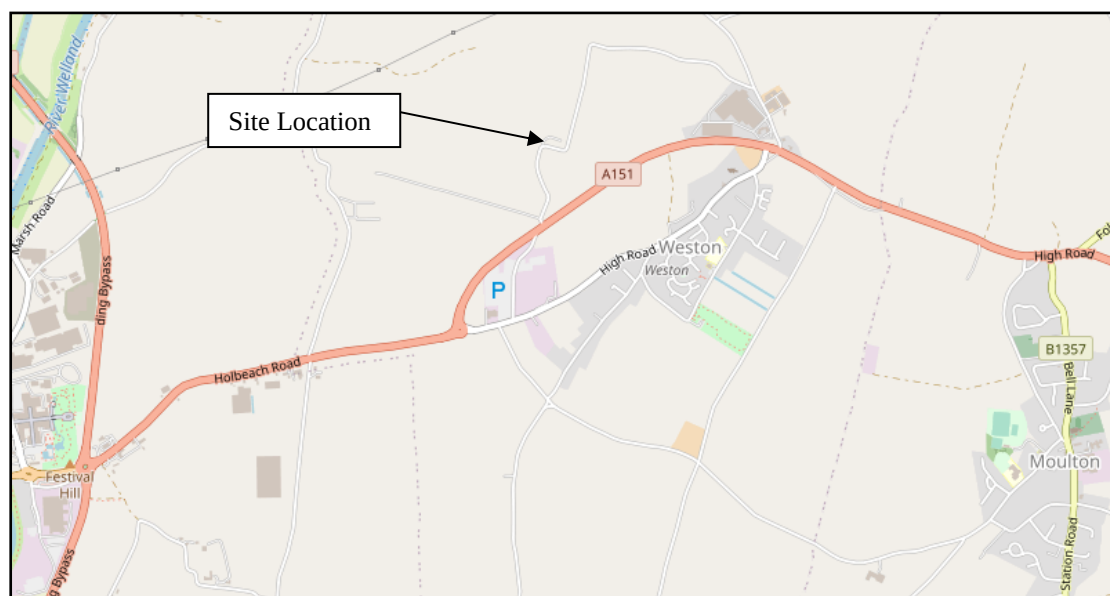


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is located on the western side of Wiseman's Gate and consists of the three buildings, hard standing areas, and an access. Immediately to the north of the site is an agricultural building used as a grain store. The site is surrounded by agricultural land. The area of development is approximately 0.45 hectares.

Environment Agency LiDAR data show that the site is at a level of +3.2m OD. The carriageway level of Wiseman's Gate and much of the surrounding agricultural land is typically at a level of +2.8m 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 are riparian drains close to the northern and western boundaries of the site and the nearest IDB high priority watercourse, Lords Drain, is approximately 400m to the west.

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

2.3 The Proposed Development

The proposed development consists of two storage units located in the north western part of the sites. A Proposed Site Plan is shown in Attachment 1, the proposed development is identified as Building D.

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

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

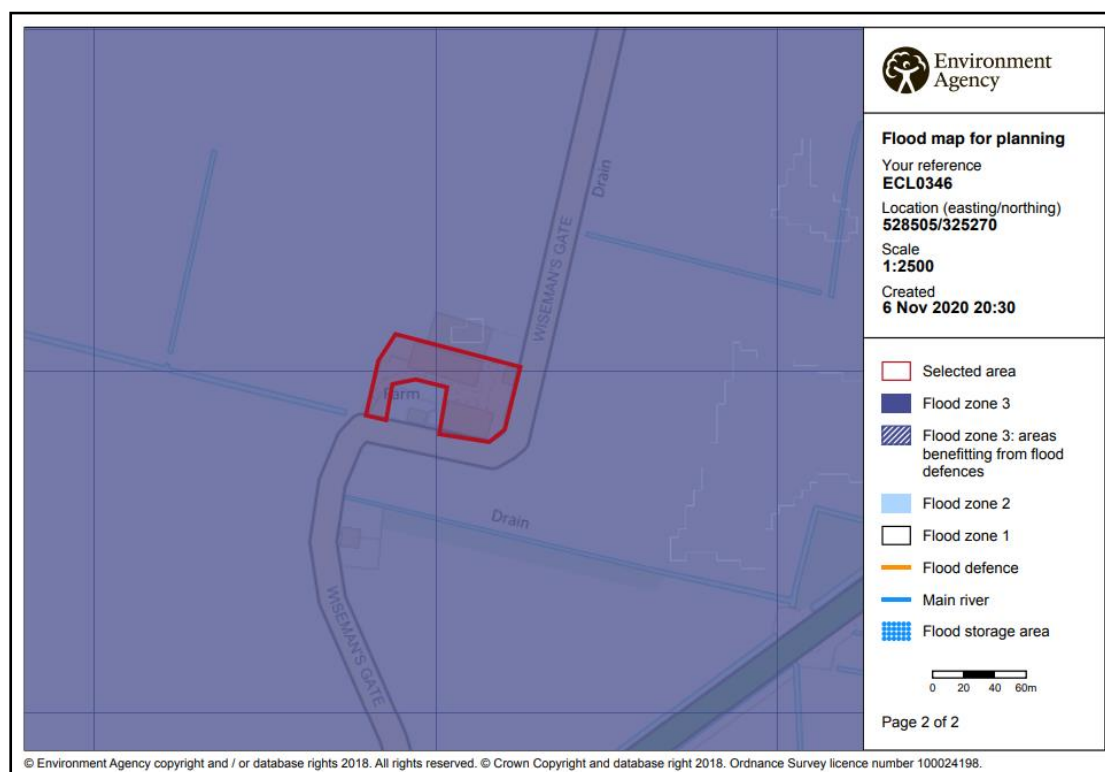


Figure 2 – Environment Agency Flood Map for Planning

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 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 'Danger for Some' area	The site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The peak flood depth is between 0.0m and 0.25m.	The peak flood depth is between 0.5m and 1.0m.

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 development is covered by the description of buildings used for industry and is classified as 'Less 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 'Less Vulnerable' therefore the development is considered appropriate. The development therefore does not require the application of 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 Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such the opportunities to undertake the development at an alternative site within Flood Zone 1 are limited.

The River Welland has defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event. The site therefore has a low probability of flooding. When it is considered that the storage units will form an extension to an existing business together with the standard of protection provided by the Environment Agency defences the site can be considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 2.7km east of the Coronation Channel. The Coronation Channel is a bypass channel of the River Welland constructed in the 1950's to convey river flows around Spalding. The Coronation Channel together with the Crowland and Cowbit Washes offer flood reduction to Spalding and the surrounding district.

North of Spalding, downstream of the confluence with the Coronation Channel, the area is protected by the River Welland tidal defences between Spalding and Fosdyke. The defences are 1.9km west of the site and minimum embankment levels of +7.0m OD. The River Welland and the Coronation Channel 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 High Priority Watercourse 400m west of the site. The site and surrounding land are part of the Lords catchment and drain by gravity to Lords Drain Pumping Station. The pumped water discharges to the tidal River Welland.

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

A summary of the sources of flooding is provided in Table 2.

Source of Flooding	Level of Risk
Drainage Network Flooding	The risk is assessed in Section 4.3.
Surface Water Flooding	Based upon the EA maps the risk is very low.
Fluvial Flooding	The risk is assessed in Section 4.3 and 4.5.
Tidal Flooding	The risk is assessed in Section 4.3 and 4.5.
Reservoir Flooding	The risk of a tidal breach is assessed in Section 4.6.
Groundwater Flooding	There is no evidence to suggest the site is at risk of groundwater flooding.

Table 2 – Sources of Flooding

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. Failure of Lord's Drain Pumping Station could lead to an increased level of risk at the site.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the South Holland IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The Coronation Channel earth embankment has a minimum crest level of +6.0m OD. The 1% annual probability (1 in 100 chance each year) peak flood level inclusive of climate change during the next 100 years in the River Welland is +5.45m OD. The Coronation Channel embankment provides a standard of protection of 1% annual probability (1 in 100 chance each year) with a minimum 0.55m freeboard.

The River Welland tidal defences provide protection during a 0.5% annual probability (1 in 200 chance each year) event.

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 flood level in the River Welland at Fosdyke during the 0.5% annual probability (1 in 200 chance each year) event inclusive of climate change to 2069 is estimated to be 6.41m AOD. The minimum defence level of the River Welland embankments is 7.0m AOD.

In summary the site is not at risk for the design life of the development (i.e. 100 years).

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 and overtopping of 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 200 chance each year) tidal event the peak flood depth at the site is between 0.5m and 1.0m. An extract from this map is shown in Figure 3 below.

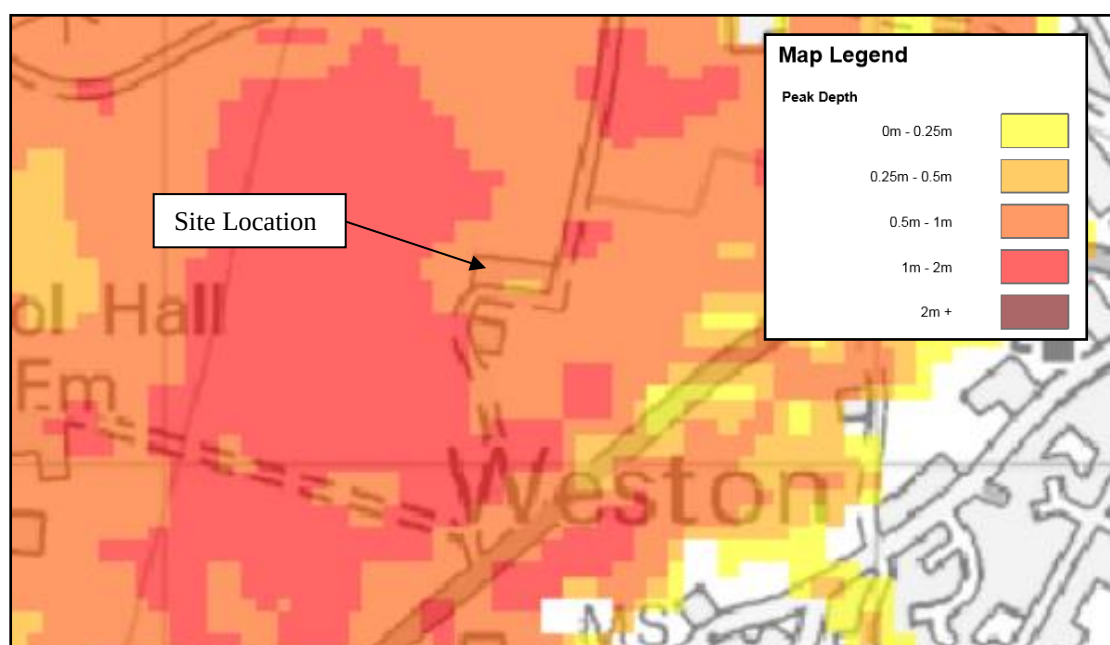


Figure 3 – SFRA 2116 Residual Peak Depth Map

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Lords Drain 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 overtopping and a breach in the defences in 2116. The maps show that the peak flood depth at the site is between 0.5m and 1.0m.

The development increases the impermeable area and therefore has the potential to increase flood risk elsewhere.

5.2 Mitigation Measures

The NPPF Planning Practice Guidance (PPG) on Flood Risk and Coastal Change provides direction regarding Making Development Safe from Flood Risk. The PPG states that resistance and resilience measures may be suitable in some circumstances. One example given when it is suitable is as a measure to manage residual flood risk. The mitigation measures required at this site are to manage the residual risk from a breach in the defences therefore flood resilience is appropriate.

Based upon the information available during the preparation of this flood risk assessment, to mitigate against the risk of a breach, the following flood resilience measures are recommended:

- there is a water entry strategy allowing flood water to enter the units and drain freely from them;
- the main electrical supply and switchboard are elevated above the flood level;
- the user of the site should register to receive flood warnings from the Environment Agency to reduce the vulnerability of people at the site; and
- the user of the site should identify the actions to be undertaken in the event of receiving a flood warning.

During a breach 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 Lords Drain 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.

It is recommended that surface water run-off is managed so that stormwater from the development will not affect any adjoining properties or increase the flood risk elsewhere.

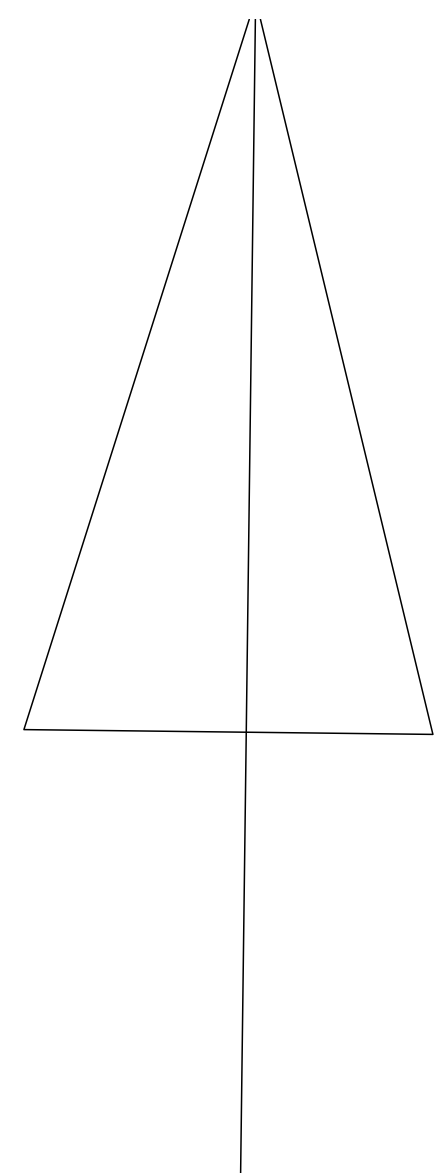
6.0 CONCLUSIONS

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

- The proposed development consists of two commercial storage units at Beacon Farm, Wiseman's Gate, Weston, Spalding.
- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.
- The proposed development is in Flood Zone 3. The site benefits from defences on the 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 including climate change.
- During a breach in the defences in 2116 the peak flood depth at the site is between 0.5m and 1.0m.
- It is recommended that flood resilience measures are adopted to manage the risk of a breach. These include a water entry strategy, elevating services above the flood level, and reducing the vulnerability of people.
- The development passes the Sequential Test and is therefore suitable.

ATTACHMENT 1

PROPOSED SITE PLAN (Dwg 539SK01 B)



0 5 10 15 20 25 30
METERS

DENOTES 8M PLANTING
STRIP WITH APPROPRIATE
SOUTH EAST LINCOLNSHIRE
NATIVE TREE AND HEDGE
PLANTING MIX.

