

**FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
104 BARRIER BANK, COWBIT**

FINAL REPORT

ECL1275a/JOHN DADGE

DATE JULY 2024

ELLINGHAM CONSULTING LTD

Email: tim@ellinghamconsulting.co.uk

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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 Mr T Hicks in respect of a development that consists of the change of use of a building to form one dwelling at Barrier Bank, Cowbit.

A planning application for the proposed development is to be submitted by Mr J Dadge.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at 104 Barrier Bank, Cowbit, Spalding, PE12 6AQ. The National Grid Reference of the site is 52586/31812.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the northern side of Barrier Bank. The site consists of a large store building, the surrounding land, and an access through the site. The storage building is to the north of a dwelling and an ancillary outbuilding that has a commercial use.

A topographic survey has been undertaken and is provided in Attachment 1. Ground levels within the site range from +5.0m OD at the site access to +1.6m OD. Around the large storage building ground levels are typically between +1.8m OD and +1.9m OD and the threshold level is +1.95m OD. Ground levels in a paddock to the north of the storage building are generally between +1.2m OD and +1.6m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water drainage from the site discharges to the Board's main drain system. There are riparian drains on the boundary of the site that discharge to an IDB High Priority Watercourse approximately 150m north of the site.

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 Proposed Development

The proposed development consists of the change of use of the storage building to form one residential dwelling. The dwelling will be single storey. A Site Plan is provided in Attachment 1.

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.

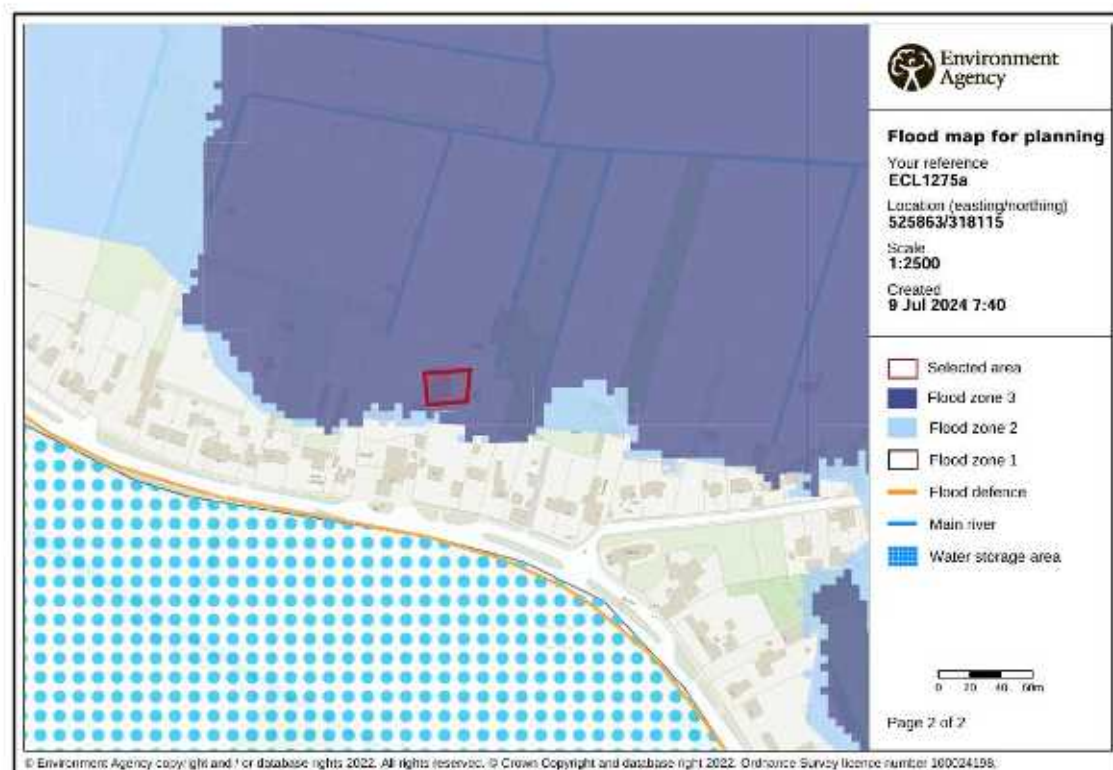


Figure 2 – Environment Agency Flood Map for Planning

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 of less than 0.1%); and
- the site is within an area at risk of reservoir flooding when river levels are normal.

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	Part of the site is in the 'Danger for Most' hazard area	The majority of the site is in the 'Danger for Most' hazard area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The peak flood depth within the site is between 0.5m and 1.0m	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 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 Test and Exception 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.

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. In summary the site is protected to the appropriate standard and the residual risk is mitigated. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.0km north east of the River Welland. Cowbit Wash is the floodplain to the River Welland and the village of Cowbit is protected from the River Welland by the Cowbit Wash Barrier Bank.

The site is 3.5km south of the Coronation Channel, a bypass channel of the River Welland. The embankments of the Coronation Channel were 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. The Cowbit Wash Barrier Bank 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 150m north of the site. The site and surrounding land are part of the Wisemans catchment and drain by gravity to Wisemans Pumping Station. The pumped water enters the South Holland Main Drain that discharges to the tidal River Nene at the Sutton Bridge Outfall Sluice.

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 reservoir flooding 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.

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 Cowbit Wash Barrier Bank is at a level of +5.90m OD and therefore provides 0.45m of freeboard above the flood level during the 1% annual probability (1 in 100 chance each year) event with climate change. The Cowbit Wash Barrier Bank falls within the Reservoirs Act 1975 legislation. As such it is regularly inspected by a Supervising Engineer who will assess its structural integrity to provide protection to people and property.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

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 flood levels in the River Welland.

The River Welland tidal defences have been designed to include an allowance for climate change.

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

4.6 Residual Risk

There is a residual risk of flooding at the site should a breach occur. The South East Lincolnshire SFRA includes maps demonstrating the impact of a breach in 2116. 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 site is at risk. An extract from this map is shown in Figure 3.

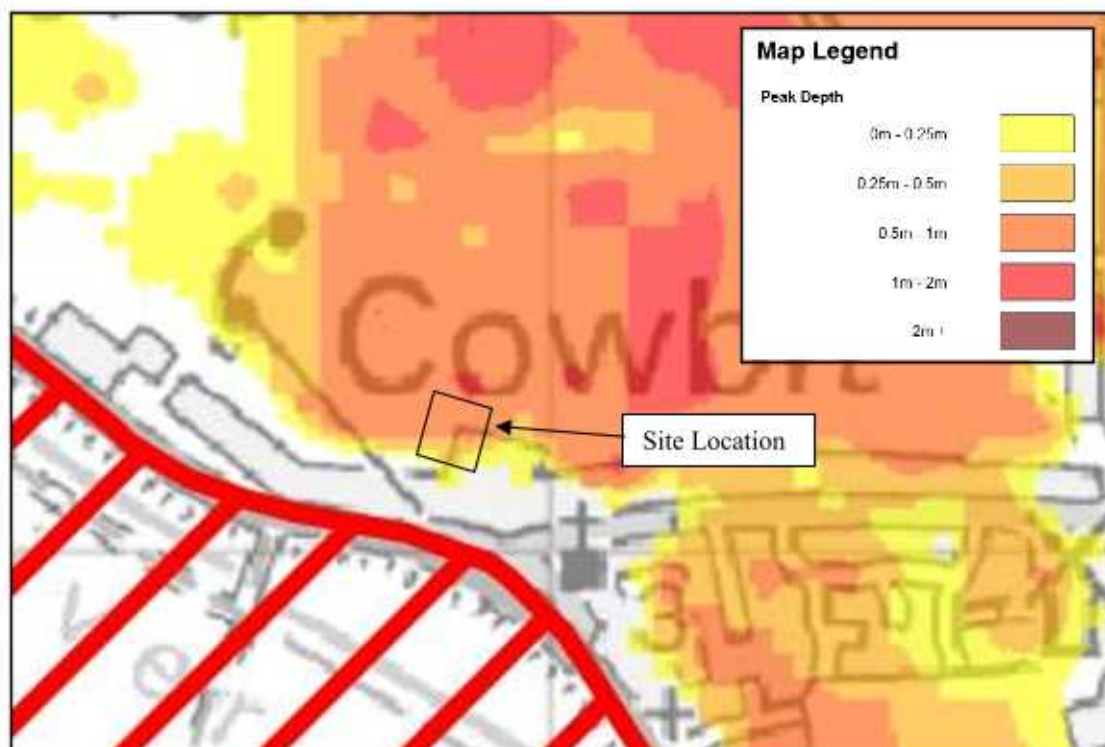


Figure 3 – SFRA 2116 Residual Peak Depth Map

An area to the north of the site is at risk with depths between 1m and 2m. Based upon the topographic survey, the area at risk with depths greater than 1m is below +1.4m OD. A flood level of +2.4m OD can therefore be estimated.

The proposed development is a single storey dwelling and therefore the finished floor level needs to consider the 0.1% annual probability (1 in 1000 chance each year) event in 2115. The South East Lincolnshire SFRA includes 0.1% annual probability (1 in 1000

chance each year) maps for specific locations, but these do not cover the site. Through a comparison of the flood depths in the areas covered by the maps during the 0.5% and 0.1% annual probability events for 2115 it can be estimated that flood depths are 0.1m higher for the more extreme event. A breach flood level of +2.5m OD has therefore been estimated. This is a depth of 0.6m – 0.7m around the storage building.

The risk to the site could potentially be higher if the breach of the Barrier Bank occurred adjacent to the site. Environment Agency LiDAR data shows that the crest width of the Barrier Bank adjacent to the site is in excess of 20m. The crest width at the site significantly reduces the probability of a breach in this area.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Wisemans 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 1% annual probability (1 in 100 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.

The SFRA considers the residual risk associated with a breach in the defences. A breach level of +2.5m OD has been estimated, this is a depth of 0.6m – 0.7m above the ground levels surrounding the storage building.

The proposed arrangement increases the impermeable area and therefore there will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

The site has a low 'actual risk' of flooding. Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwelling is not lower than +2.6m OD. It is recommended that there is 0.3m of flood resilient construction above finished floor level.

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 operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupier of the dwelling should register to receive flood warnings.

Should there be a failure of Wisemans 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 using 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 the change of use of a storage building to form one single storey dwelling at 104 Barrier Bank, Cowbit.
- 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 site is partly in Flood Zone 3. The site benefits from defences on the River Welland and Coronation Channel and provide protection during the 1% annual probability (1 in 100 chance each year) fluvial event including climate change.
- During a breach of the defences the maximum flood level within the site is estimated to be +2.5m OD.
- It is recommended that the floor level of the dwelling is not lower than +2.6m OD with 0.3m of flood resilient construction above finished floor level.
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

PROPOSED SITE PLAN (Dwg BB-PR-PL-01A)



Proposed Site Plan

Rev A - Redline revised.	
Jon Richards Architectural Design	
Joanne House	info@jrad.co.uk
1 Red House, Puddock	www.jrad.co.uk
Tattington, PE12 6AQ	+44 (0) 7979 090298
CLIENT:	
Hicks	
PROJECT:	
104 Barrier Bank	
Cowbit	
Spalding	
PE12 6AQ	
DRAWING TITLE:	
Proposed Site Plan	
SCALE:	
1:250 @ A0	
DATE:	
March 2024	
DRAWING NO:	
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	A