FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
BARRIER BANK, COWBIT

FINAL REPORT

ECL0809/SEVEN22 ARCHITECTURE LTD

DATE JULY 2022

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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 Mrs T Laxton in respect of a development that consists of three dwellings at Barrier Bank, Cowbit.

A planning application for the proposed development is to be submitted by Seven22 Architecture Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is at 178 Barrier Bank, Cowbit, Spalding, PE12 6AL. The National Grid Reference of the site is 52636/31754.

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 eastern side of Barrier Bank. The site consists of a dwelling, garage, and the surrounding garden. There are dwellings to the north and south of the site. The area of development is approximately 0.20 hectares.

Environment Agency LIDAR information shows that the site is typically between +2.7m OD and +4.7m OD with the higher ground to the west. The carriageway level of Barrier Bank adjacent to the site is approximately +5.5m 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 is a riparian drain 250m north of the site which discharge to an IDB High Priority Pipeline approximately 300m 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 three residential dwellings. The dwellings will be two storey. The existing dwelling will be demolished. 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. Part of the site is located within Flood Zone 2, an area with a medium probability of flooding.

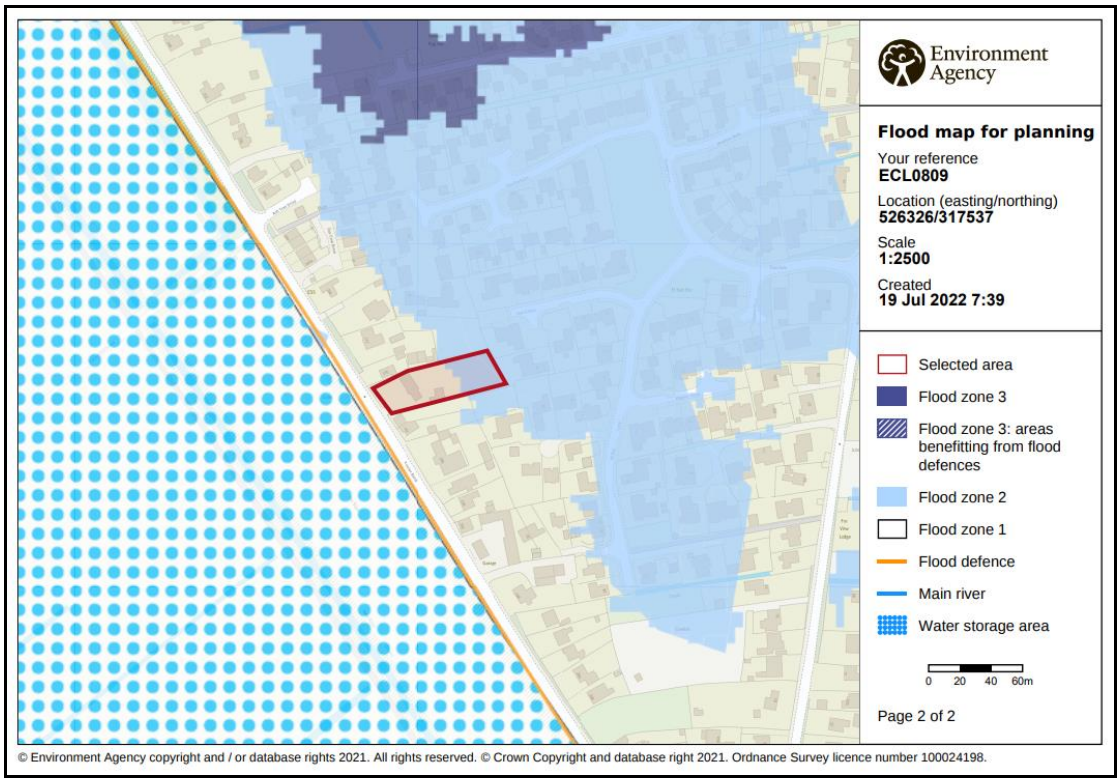


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the eastern part of the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- most of the site has a very low risk of surface water flooding (annual probability of less than 0.1%) however the eastern boundary has a high risk of surface water flooding (annual probability greater than 3.3%); 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 outside of the 'Low Hazard' area	The site is outside of the 'Low Hazard' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The site is outside the area at risk of flooding	The site is outside the area at risk of flooding

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.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such opportunities to undertake the development at an alternative site with a lower flood risk are limited. The River Welland has defences that provide protection during the 1% annual probability (1 in 100 chance each year) fluvial event. The site therefore has a low probability of flooding.

The SFRA states that it is necessary to use the refined flood risk information (hazard and depth maps) to assist with the application of the Sequential Test. The refined flood risk information contained within the SFRA demonstrates that the site is not at risk of flooding. Together with the standard of protection provided by the Environment Agency defences the site is considered to pass the Sequential Test.

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 site is 1.1km 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 4.0km 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 Pipeline approximately 300m 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

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

- local blockages to the South Holland IDB drainage system;
- an event in the local drainage network greater that exceeds the standard of protection;
- failure of Wisemans Pumping Station;
- overtopping and breaching of the fluvial Coronation Channel defences; and
- overtopping and breaching of the Cowbit Wash Barrier Bank.

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 not at risk. An extract from this map is shown in Figure 3 below.

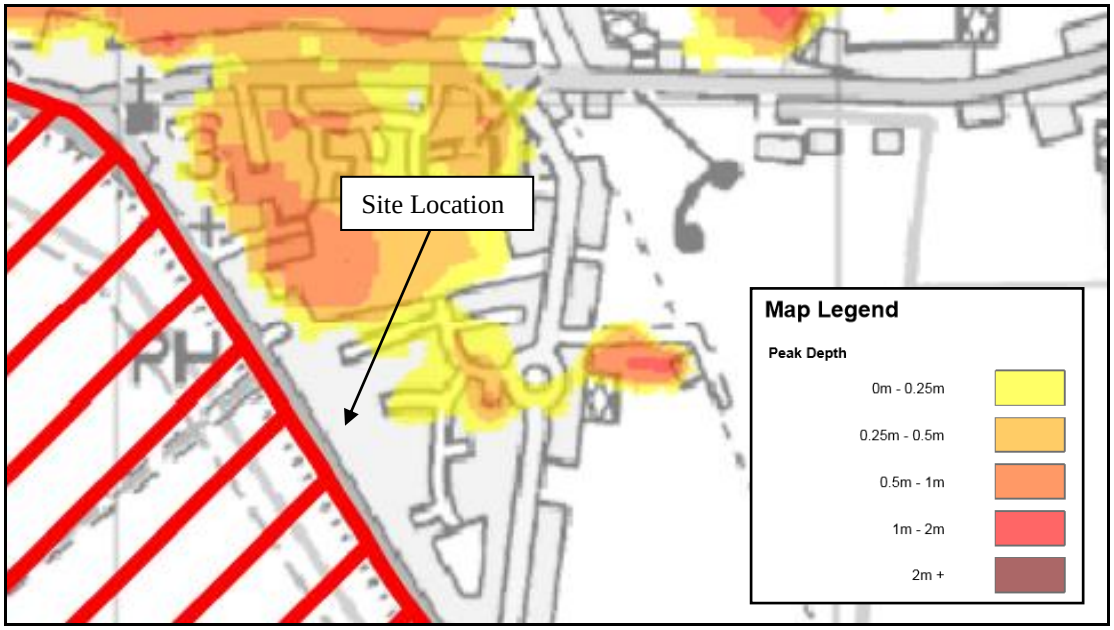


Figure 3 – SFRA 2116 Residual Peak Depth Map

The residual peak depth maps are based upon breaches at specific locations. In some cases, the risk to a site may be greater if the breach within the barrier bank occurred adjacent to the site. Based upon LiDAR data the crest width of the bank adjacent to the site is 14m. The minimum crest width of the bank for 100m north of the site and 100m south of the site is 12m. It is considered that the crest width at the site and in the vicinity of 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. The maps show that the site is not at risk during a breach.

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 dwellings is a minimum of 0.3m above ground level. It is recommended that there is 0.3m of flood resilient construction above finished floor level.

The risk of flooding is also mitigated by the proposed development having two storeys. Sleeping accommodation will be on the first floor above the potential flood level.

The developer should ensure that the eventual occupiers of the dwellings are 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 dwellings 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 three 2 storey residential dwellings at 178 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 eastern part of the proposed development extends in to Flood Zone 2. The site benefits from defences on the River Welland and Coronation Channel that 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 site is not at risk.

- It is recommended that the floor level of the dwellings is a minimum of 0.3m above ground level 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 LAYOUT
(Dwg 058 P01)

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REV DATE NOTES

TEAL GROVE

172

176

182

186

5

4

3

10

8

B A R R I E R B A N K

2x45m Visibility Splay

BCP

5m

Private Drive

6m

Plot 1

Plot 2

Plot 3

1.5m

17m

27.2m

10.2m

2m

Dashed Outline of Existing House & Garage

N

0 1 2 3 4 5 10 15 20
Scale 1:200

Legend

Bin Collection Point BCP

Landscaped Area

Private Drive/Parking

Visibility Splay

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PROJECT
RESIDENTIAL DEVELOPMENT
178 BARRIER BANK
COWBIT
LINCOLNSHIRE
PE12 6AL

CLIENT
Mrs T LAXTON

TITLE
PROPOSED SITE LAYOUT

DRAWING No.
058 P01

SCALE	DATE	REV
1:200 @ A1	JUNE 2022	