PROPOSED CHANGE OF USE OF THE RETAIL UNIT AT 1 VINE STREET, SPALDING, PE11 1DY
FLOOD RISK ASSESSMENT



View of front of property

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This flood risk assessment has been prepared solely to support the planning application for the proposed change of use at 1, Vine Street, Spalding. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete, or if it is used for any other purposes other than for which it was originally commissioned.

Introduction

An application is due to be made to South Holland District Council for Planning Permission to change the use of part of the existing retail unit at 1 Vine Street, Spalding and retain only the part of the ground floor of the building for retail use and convert the rear part of the ground floor, the first floor and second floor for residential use.

The site is within Flood Zone 3 as shown on the Environment Agency's Flood Zone Map. These maps do not take into account existing flood defences.

The Planning Application requires a Flood Risk Assessment to be carried out as specified in the Practice Guidance to the National Planning Policy Framework Development and Flood Risk. The site is shown within the defended area of the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located within the Welland and Deepings Internal Drainage Board district.

Environment Agency (EA) Flood Zones

The map below is taken from the Environment Agency website and shows the flood zones in the area.



It can be seen that the whole of the central area of Spalding is in Flood Zone 3.

Application Site

The development is located on the western side of the River Welland. The National Grid Reference of the site is 524805 322500.

The location and extent of the site is shown on the plan at the end of this document.

As the site of the proposed development is within a defended area it can be considered to be within Flood Zone 3(a) "High Probability", as defined in Table 1 of the Technical Guidance.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, a development consisting of dwelling houses is classified as “more vulnerable”.

Table 3 of the Guidance is shown below:

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Therefore it can be seen that for “More vulnerable” development the sequential and the exception tests need to be applied to the development.

Sequential Test

The aim of the Sequential Test, as set out in the Planning Practice Guidance, is to ensure that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The flood zones as defined in the Strategic Flood Risk Assessment for the area provide the basis for applying the Test. The aim is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Taking into account the guidance, it can be seen that it is extremely unlikely that an alternative site with a lower flood risk could be found in the Spalding area. The safety of the development will be delivered by demonstrating that the floor level of this building is above predicted residual flood levels for this area.

The South Holland District Council Core Strategy states that there is a limited number of sites in the South Holland DC area available for residential development. Additional residential sites will need to be identified to enable the Council to meet the RSS and

Structure Plan requirement for 2021. The emerging Spalding Local Plan states there is a need for this type of residential property in the central area of Spalding.

Therefore I consider that the sequential test has been passed.

Exception Test

The Sequential Test has demonstrated that it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding. Therefore the Exception Test must be applied and for this to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risks, informed by the Strategic Flood Risk Assessment; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking into account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

Both parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

The first section will be demonstrated by the Supporting Planning Statement and compliance with South Holland District Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

Strategic Flood Risk Assessment

A Strategic Flood Risk Assessment (SFRA) was produced for the South Holland District Council (SHDC) in 2010. This document provides details of the flood risk in the Council's area. The maps showing the residual flood risk were updated in 2016. Reference to the maps in this document give the following information for the flood risk and hazard at the site for the 1% fluvial event and 0.5% tidal event.

The maps illustrate the actual flood hazard which is as follows:

For the present day	Depth of flooding … Zero
	Extent of flooding .. Low or medium flood probability
	Flood Hazard…….Zero
	Peak Velocity ……. Nil
For year 2115	Depth of flooding … Zero
	Extent of flooding…. Low or medium flood probability
	Flood Hazard…….Zero
	Peak Velocity …… Nil

The maps showing the residual flood hazard were revised in the 2016 update of the South Holland District Council Strategic Flood Risk Assessment which can be found on the website of the South East Lincolnshire Joint Planning Committee. The hazards are as follows:-

a) For the 1% fluvial or 0.5% tidal event probability:

For the present day
Depth of flooding…. zero
Extent of flooding …Low or Medium
Hazard ……. None
Velocity …….. zero

For the year 2115
Depth of flooding ….zero
Extent of flooding …Low or Medium
Hazard …… None
Velocity ……. zero

b) For the 0.1% fluvial or tidal event probability:

For the present day
Depth of flooding…. zero
Extent of flooding … Low or Medium
Hazard ……. None
Velocity …….. zero

For the year 2115
Depth of flooding …. zero
Extent of flooding … Low or Medium
Hazard …… None
Velocity ……. Zero

Figure 16 of the general maps show that the site is not within the rapid inundation zone for the present day and in 2115.

1. **The maximum flood levels in the fluvial section of the Spalding Welland is shown in the reports as follows:**

	Peak 1 in 100		Peak 1 in 1000	
Year	2007	2115	2007	2115
Level	4.43	4.67	4.45	4.68

The defence level of left bank of Spalding Welland is 5.50m OD

2. **The extreme tide levels in the section of the River Welland north of Fulney Lock is shown in the report as follows:**

	2007	2055	2115
1 in 100 year	5.98	6.31	7.12
1 in 1,000 year	6.32	6.65	7.46

The lowest bank level occurs 200 metres north of Fulney Lock, where a section 300 metres long has a minimum level of 6.98m OD.

Site Levels

The level of Vine Street alongside the property is approximately 5.35m OD, which is approximately the same level as the area in front of the front door to the shop. The existing floor level of the shop is approximately 100mm above the level of the forecourt.

Existing Flood Alleviation Measures

The site is within a defended flood plain, as defined in Appendix 1 of the Environment Agency's "Policy and Practice for the Protection of Flood Plains" and is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding due to overtopping or failures of the defences is considered to be very low.

The site is approximately 40 metres from the bank of the fluvial section of the River Welland, which is main river and maintained by the Environment Agency.

This area west of the River Welland is drained by surface water sewers maintained by Anglian Water, which discharge either into the River Welland or into drainage channels maintained by Welland and Deepings Internal Drainage Board. The water levels in the IDB channels are controlled by the water level in South Drove Drain which also is operated by Welland and Deepings IDB.

Potential Sources of Flooding

The following sources of flooding will be considered:

1. Failure or overtopping of the tidal defences.
2. Overtopping of the River Welland.
3. From IDB watercourses
4. Surface water flooding

1. Failure or overtopping of tidal defences.

The River Welland is tidal north of Fulney Lock, which is approximately 2.0km north of the site. The SFRA states that the defences are adequate to withstand a 1 in 200 year (0.5%) probability event for present day. In the future in 2115 some of the banks would be overtopped with a 0.5% probability event. However if overtopping or a breach occured water would flow westwards from the tidal Welland and lower land to the west of the River Welland would be flooded. The central area of Spalding would remain unaffected, even if a tide of extreme proportions occurred.

It is reasonable to presume that within the next one hundred years works will be undertaken on this section of the bank to ensure that there will be a 1 in 200 year standard of defence continuing into the future, especially considering the value of the industrial and residential properties protected by these defences.

2. Overtopping of the River Welland.

The west bank of the River Welland is at a level of 5.50m OD east of Vine Street. This is not a raised defence at this point. The area around the Robert Goddard shop is at a slightly lower level of 5.35 OD. The predicted level in the Fluvial River Welland in a 1 in 1000 year event in 2115 is 4.68m OD. If this level increases siphons are activated to spill water onto Cowbit and Crowland Washes. Also water will begin to flood over lower banks around Crowland. Therefore, the risk of flooding from this source reaching the area north of Westlode Street is extremely low.

Therefore, this source of flooding can be almost be discounted.

3. Flooding from IDB watercourses

The highest predicted water levels in IDB drainage channels in the area are in Vernatts Drain which are 3.79m OD. As the floor level of the existing building is 5.45m OD this source of flooding can be discounted.

Maximum predicted water levels in the IDB catchment controlled by Pode Hole Pumping Station in a 1 in 100 year event in 2115 are below 1.00m OD and therefore this source of flooding can also be discounted.

4. Surface Water Flooding

The road and path level in this part of Vine Street and Bedford Place is 5.35m OD, and the existing ground floor level of the existing shop is 5.45m OD. If there is any accumulation of surface water in Vine Street after a heavy storm it is likely to flow westwards onto lower areas of Vine Street to the west, and therefore significant flood depths from this source are unlikely to occur.

Therefore the risk of flooding from this source can be considered remote.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of any surface water flooding having occurred in this area of Spalding. This is not surprising as the land levels are some of the highest in the area.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low. In an extreme event any effect on this location would not be sudden and there would be time for residents to take precautionary measures to limit the impact of any flooding that may occur.

Residual Risk – Extreme Events

The residual risk from extreme events is very low on this site. The major risk to the site is from a breach or overtopping of the tidal defences

The risk of this happening in this case is low and the hazard from any flooding is also low.

Although this site is within Flood Zone 3 according to the initial classification because of the current standards of drainage and flood risk in this part of Spalding there is a very low risk of flooding to this site.

The flood zones were designated a number of years ago by the EA when little modelling had been carried out. Since then much work has been carried out by the EA which gives much better predictions of flood levels. If the designations were revisited this area would be at least designated in flood zone 2.

Climate Change

The recommendations for flood depths for this flood risk assessment use information mostly taken from the South Holland DC SFRA which was last updated in 2010. The EA have issued new guidance on recommended contingency allowances for predicted sea rises, fluvial flows and rainfall intensities which from 19th February 2016 needs to be considered in the FRA. The effects of these new recommendations are considered in Appendix A of this report (pages 12 to 15). It is concluded that no extra mitigation measures are necessary to comply with the new guidance on climate change.

South East Lincs Advice Matrix

Advice can be found on the recommended mitigation required by referring to a spreadsheet on the South East Lincolnshire website.

As the development is in flood zone 3 and there is no predicted flood hazard reference should be made to Category G7 which states that the Environment Agency have no recommendations or comment on the proposal.

Summary of Risk of Flooding to the Site

The map in the SFRA (shown below) of the residual peak depth in 2115 for the 0.1% (1 in 1000 year) event probability in 2115 shows there is no predicted flooding in this area of Spalding west of the River Welland.



Even in an extreme tidal event with multiple breaches occurring in the west bank of the tidal Welland it is difficult to foresee flooding occurring at this location, as lower land to the north would flood in preference to the higher central area of Spalding.

Conclusions

The proposed development is not in a functional flood plain as defined by the Technical Guidance.

Although the site is in flood zone 3, the actual risk of the site flooding from any Environment Agency watercourse is extremely low.

The SFRA indicates that no actual or residual flooding is predicted to the area for the 0.1% event possibility in 2015, as shown on the map reproduced above taken from the SHDC SFRA.

The risk of the site becoming flooded from any source is extremely low.

The flood risk to the proposed building is extremely low and therefore it is considered to be acceptable for the use as small flats with sleeping accommodation on the ground floor.

In a flood risk area there is always a risk of an event occurring of greater magnitude than has been considered in this flood risk assessment.

Recommendations

In any area at risk of flooding it is preferable that a proposed building should be of at least two story construction with all bedrooms at first floor level. This will provide a refuge for residents if the building becomes flooded after a major breach, and ensure there is no danger to residents when they are asleep. However as the risk of any flooding occurring is so low that it could almost be discounted then accommodation with bedrooms on the ground floor is considered satisfactory.

The existing ground floor level of 5.45m OD is considered satisfactory for accommodation on the ground floor.

If any flooding did occur it would happen extremely slowly over many hours and occupants of the flats would have adequate time to prepare themselves for the event.

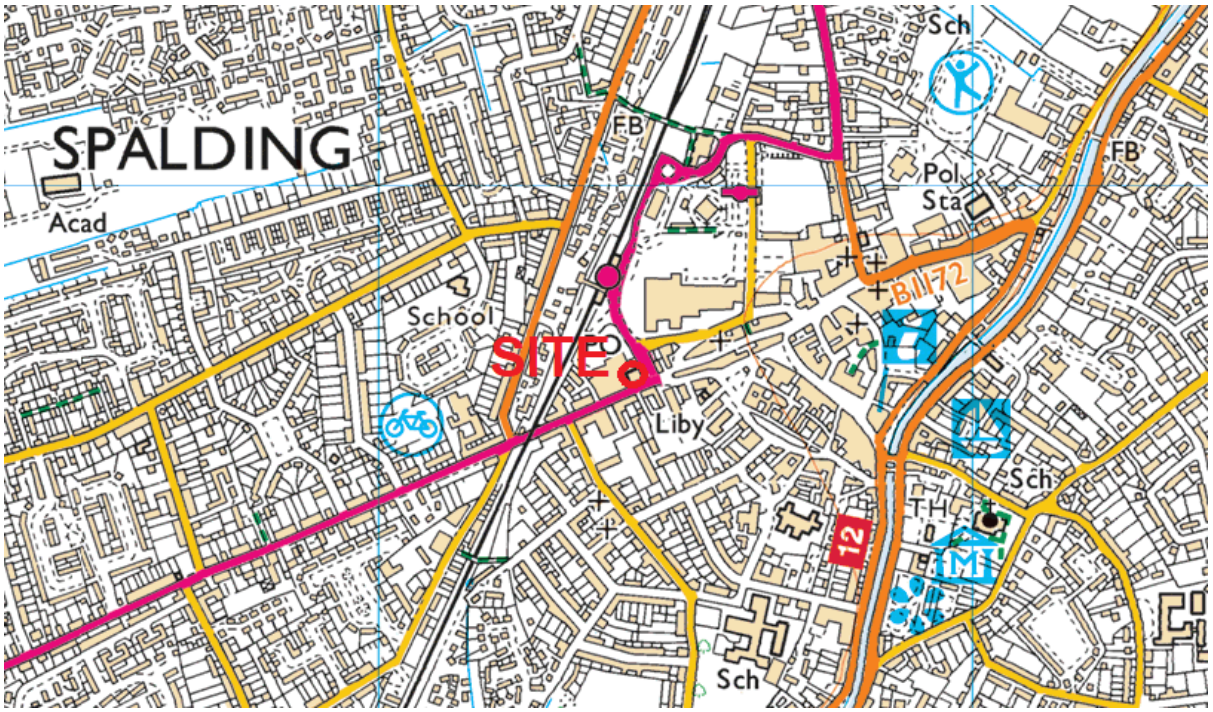
The owner of the building should advise all tenants that they should register with the Environment Agency's Floodline Warnings Direct Service.

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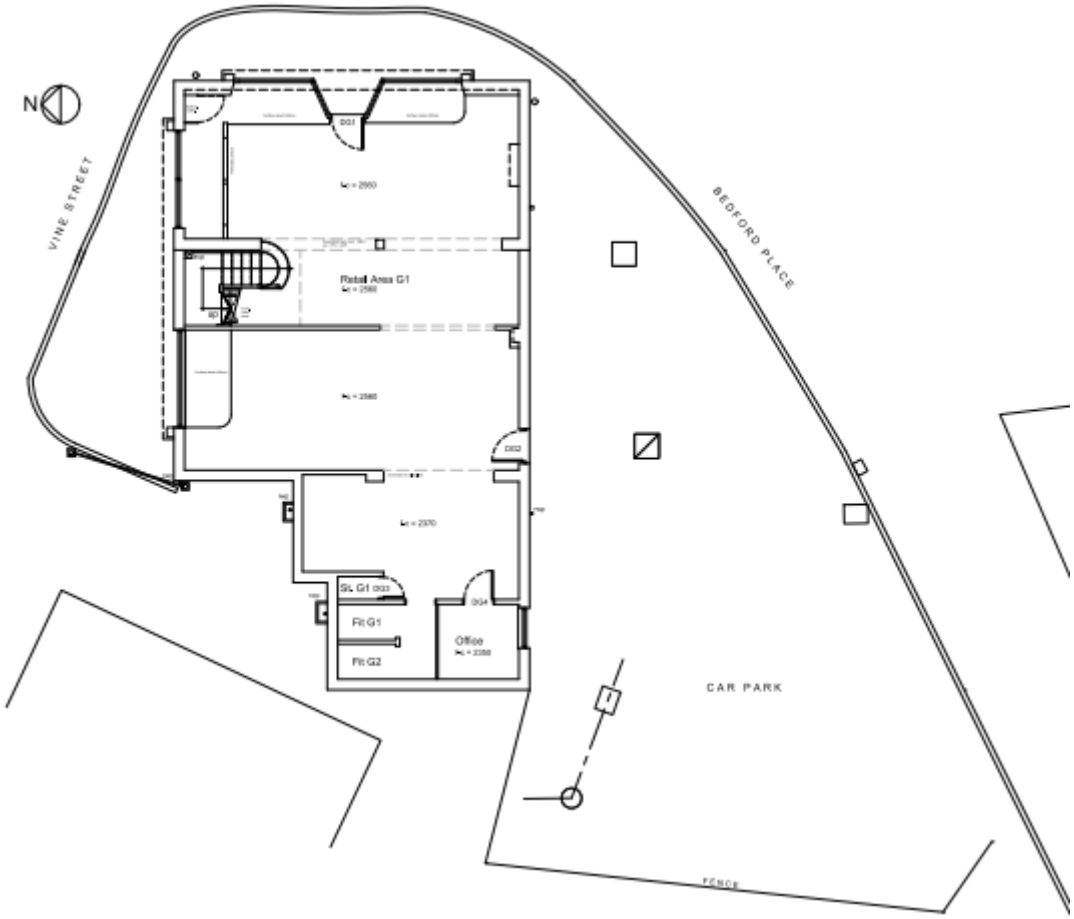
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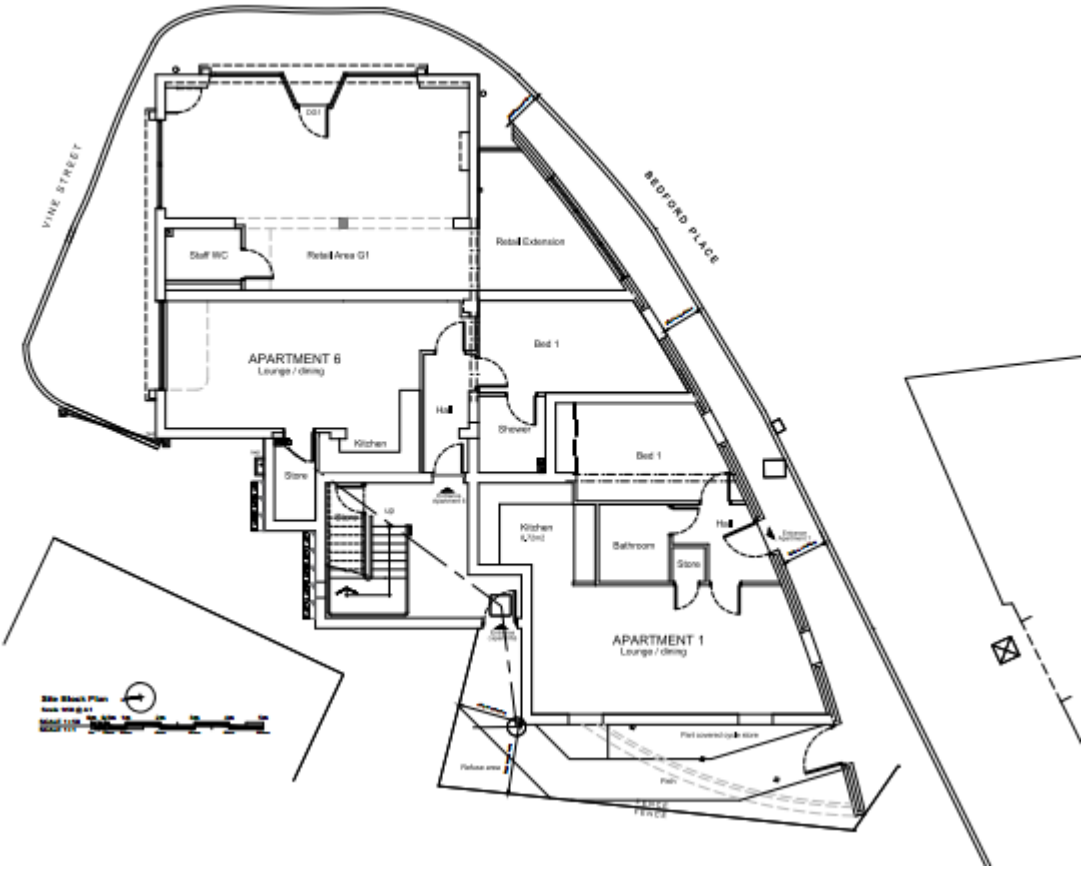
LOCATION PLAN



SITE PLAN



PROPOSED GROUND FLOOR PLAN



APPENDIX A CLIMATE CHANGE

The Environment Agency has issued revised guidance on climate change and have now stated that the new predictions should be considered and incorporated into all flood risk assessments produced after 19th February 2016.

Listed below are the climate change allowances in three documents:

- South Holland SFRA
- EA guidance (2013)
- Revised EA guidance

The recommendations in each document are shown below.

2010 South Holland DC SFRA

The SHDC SFRA states that the the following allowances have been made for climate change:

4.4 Climate Change

Scenarios for the years 2055 and 2115 include for climate change contingency allowances to the amount suggested by PPS25[1]. These allowances are expressed in *Table 2*. Percentage increases are relative to the present-day.

Table 2 – Adopted Climate change contingency allowances

Parameter	Year 2055	Year 2115
Sea level rise (m)	+ 0.33	+ 1.14
Extreme wave height	+ 10%	+ 10%
Peak river flow and volume	+ 20%	+ 20%
Peak rainfall intensity	+ 20%	+30%

Where flows arise from pumping rather than natural run-off, notably in the Vernatt's Drain and for the Fenland subcatchments of the South Forty Foot Drain, peak flow rates for future eras have been taken as equal to current rates since this SFRA assumes all flood risk management measures will remain in their current state.

2013 Guidance to Planners

Guidance to planners was issued by EA in September 2013

Table 1: Recommended contingency allowances for net sea level rises (Net sea level rise (mm per year) relative to 1990)

	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, east midlands, London, south-east England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South-west England	3.5	8.0	11.5	14.5
North-west England, north-east England (north of Flamborough Head)	2.5	7.0	10.0	13.0

document is out of date

Table 2: Recommended national precautionary sensitivity ranges for peak rainfall intensity, peak river flow, offshore wind speed and wave height

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

s been withdrawn (19

Revised 2016 EA Guidance

Table 1 peak river flow allowances by river basin district (use 1961 to 1990 baseline)

River basin district	Allowance category	Total potential change anticipated for '2020s' (2015 to 39)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

For more vulnerable development in flood zone 3(a) the higher central and upper end should be used to assess the range of allowances.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 3 sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

Area of England	1990 to 2025	2026 to 2050	2051 to 2080	2081 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 (140 mm)	8.5 (212.5 mm)	12 (360 mm)	15 (525 mm)	1.24 m

Table 4 offshore wind speed and extreme wave height allowance (use 1990 baseline)

Applies around all the English coast	1990 to 2050	2051 to 2115
Offshore wind speed allowance	+5%	+10%
Offshore wind speed sensitivity test	+10%	+10%
Extreme wave height allowance	+5%	+10%
Extreme wave height sensitivity test	+10%	+10%

Effects on Predictions of Flood Risk in FRA

The FRA has identified two sources of flooding where the new climate change recommendations could affect the predictions of flood levels in 2115 at the development site:

1) Flooding from the tidal River Welland
2) Flooding from the fluvial section of the River Welland, or the IDB drainage system

1) Flooding from the tidal River Welland

The contingency allowance in metres for the years 2055 and 2115 using 1990 as a baseline in the SFRA compared with the guidelines is as follows

Year	SFRA	2013 guidance	Revised 2016 guidance
2055	0.33	0.395	0.412
2115	1.14	1.205	1.24

Therefore it can be seen that the revised guidance increases the maximum allowance for sea rise in 2115 by 100mm. This may slightly increase the risk of a breach occurring in the tidal bank north of the site. It may also slightly increase the flow of water into the area between the Coronation Channel and the River Welland. However it will not change the conclusions and recommendations in this report.

Fluvial Flooding.

As the development is in flood zone 3 and is classed as more vulnerable, the advice from the Environment Agency is that the higher central climate change allowance, which is 35%, should be considered. After considering the effects of this increase the upper end allowance, which is 65%, should be considered to assess the effect of this.

Maximum flood levels in the River Welland will not be increased by the increase in flows projected in the new climate change allowances. If flows increase by 65% in these systems it will have the effect of flooding over the long sections of bank between Spalding and Market Deeping and the maximum levels in Spalding will not increase significantly.

IDB's have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. Generally IDB's are happy that their systems provide a 1 in 100 year standard to most urban areas at the present time.

Welland and Deepings IDB, and all IDB's, are aware that climate change will affect the operations of pumping stations, sluices and drainage channels. Pumping stations and sluices only have a 30 year life and will need to be refurbished or rebuilt within this timespan. It is assumed that Welland and Deepings IDB will continue to review the modelling they have already carried out and when the Board consider these refurbishments adequate arrangements will be made to incorporate the latest climate change projections in order that the Board continues to provide the same standard of service as the present day.

Therefore it is considered that the mitigation proposed for the development, with the conclusion that the existing floor level of 5.45m OD for use as habitable accommodation, is satisfactory.