

**PROPOSED CHANGE OF USE OF THE BULLS NECK AT PENNY
HILL, HOLBEACH, SPALDING PE12 8DN**
FLOOD RISK ASSESSMENT



View looking South from Washdyke Lane

S M Hemmings B Sc C Eng MICE MIWEM,
13 Lea Gardens,
Peterborough,
PE3 6BY

This flood risk assessment has been prepared solely to support the planning application for a change of use at The Bulls Head, Holbeach. 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

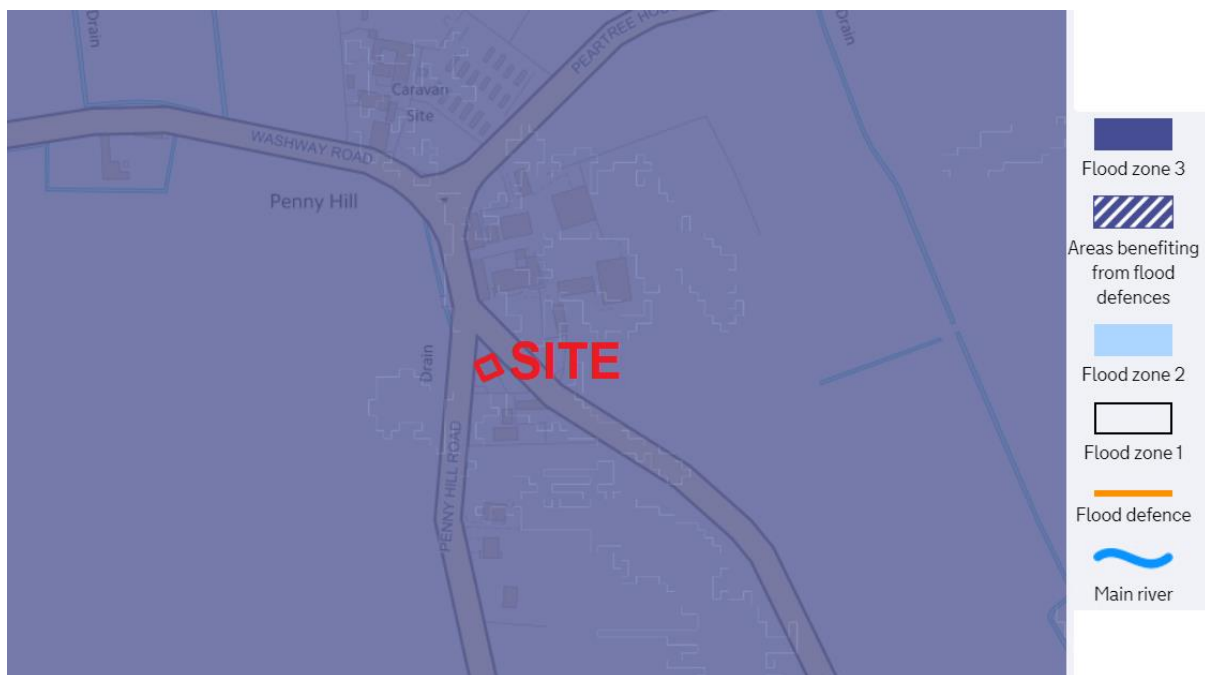
An application is due to be submitted to South Holland District Council for planning permission to change the use of the Bulls Head at Holbeach to residential use. The building was a public house which has now been closed for a number of years. The site is 1 km north of the centre of Holbeach.

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 in the South Holland 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 this area on the north western side of Holbeach is in Flood Zone 3.

Application Site

The existing building is located north of Holbeach and the Wash banks are north of the site. The National Grid Reference of the site is 536080 326565.

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

As the site is within a defended area the proposed development can be categorised as within Flood Zone 3(a) as detailed on the Environment Agency's flood zone maps without defences, 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 a dwelling house is classified as "more vulnerable".

Table 3 of the Guidance is shown below:

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

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.

As this proposal is for a change of use of an existing building then it is not possible to locate the building at an alternative location.

The change of use of this building to residential complies with Policy 23 in Section 5.15 (the re-use of buildings in the countryside for residential use) of the South East Lincolnshire Local Plan 2011 – 36.

Chapter 3.5 of the South East Lincolnshire Local Plan explains the approach to flood risk. Section 1 of Policy 4 states that the sequential test is not required for a change of use.

The safety of the development will be delivered by demonstrating that the existing floor level of the building is above the predicted residual flood level for this area.

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

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

For the present day	Depth of flooding ... zero
	Extent of flooding .. Low or medium
	Velocity Nil
For year 2115	Depth of flooding ... zero
	Extent of flooding .. Low or Medium
	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 for the 1% fluvial or 0.5% tidal event probability:

For the present day	Depth of flooding.... Zero
	Extent of flooding ...low or medium, reliant on flood defences
	Hazard None
	Velocity zero
For the year 2115	Depth of floodingzero
	Extent of flooding ...low or medium, reliant on flood defences
	Hazard None
	Velocity zero

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

Maximum flood level and bank levels in the River Welland

The maximum levels in this tidal section of the River Welland 7.8 km west of the site are as follows:

	2007	2115
Peak 1 in 200 year level	5.98	7.12
Peak 1 in 1000 year level	6.27	7.41

The lowest levels of the east bank of the River Welland around chainage 18km are 7.50m OD, with average levels between 7.60m and 7.70m OD.

Maximum flood level and bank levels in the River Nene

The maximum levels in this tidal section of the River Nene 13.3km east of the site are as follows:

	2007	2115
Peak 1 in 200 year level	5.79m OD	6.93m OD
Peak 1 in 1000 year level	6.13m OD	7.27m OD

The defence level (top of left bank) at chainage between the South Holland Main Drain and the North level Main Drain is between 7.00m and 7.30mOD.

Information from Environment Agency

The Environment Agency has produced mapping which shows the maximum hazard, depth and velocity predicted following breaching of the tidal defences of the tidal River Nene east of the site. The EA have stated that the site would not be affected by overtopping of the defences.

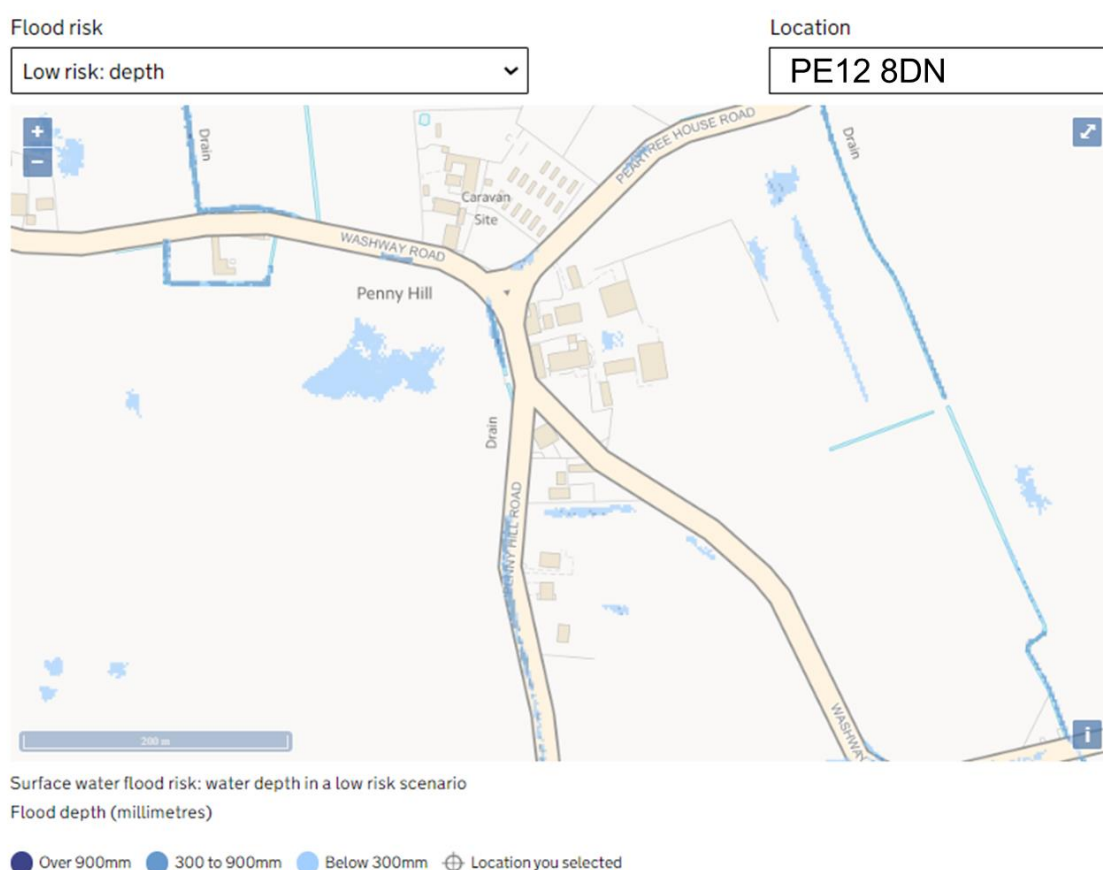
The maps of breaching show the following predictions for hazard, maximum depth and maximum velocity at the development site:

	Maximum Hazard	Maximum Depth	Maximum Velocity
1 in 200 year in 2115	none	zero	zero
1 in 1000 year in 2115	none	zero	zero

The maps supplied by the Environment Agency are reproduced on pages 14 and 15 of this report.

Information on Surface Water Flooding on Environment Agency Website

The following map shows areas around the site where there is a low risk of surface water flooding. The light blue areas indicate the low risk of up to 300mm of surface water flooding, and the darker blue areas indicate that between 300mm and 900mm of surface water flooding could occur.



It can be seen that the map indicates that there is no predicted surface water flooding on the roads adjacent to the site or to the site itself.

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", which is considered to be passive until such time that a flood greater than the defences can withstand

occurs. The likelihood of flooding occurring due to overtopping or failures of the defences is considered to be very low.

The site is located approximately 9.5 km from the Wash banks which are maintained by the Environment Agency.

The site is located approximately 7.1 km from the tidal section of the River Welland, which is maintained by the Environment Agency.

The site is located approximately 13.5 km from the tidal section of the River Nene, which is maintained by the Environment Agency.

The main watercourses in this area are maintained by South Holland IDB.

Existing Ground Levels

The ground floor level inside the building is 3.90m ODN which is 100mm above the level of concrete hardstanding in front of the building. The road outside the building is at a level of 3.70m ODN.

Potential Sources of Flooding

The potential sources of flooding to the site are:-

1. Failure or overtopping of tidal defences of the River Welland or the Wash.
2. High water levels in IDB drainage channels.
3. Localised flooding in the area.

1. Failure or overtopping of tidal defences of the River Welland or the Wash

The east bank of the tidal River Welland east of Fosdyke, which is approximately 7.1 km from the site, provides at a 1 in 200 year standard of protection in 2115. The Wash banks which are 9.5km north of the site also provide this level of protection. If the eastern bank of the tidal section of the River Welland breached then the latest EA flood maps indicate that the site will not be flooded in a 1 in 1000 year event in 2115. Lower land in the surrounding area will be flooded but this site is slightly higher.

Therefore this building has adequate mitigation against flooding caused by a breach or overtopping of the tidal defences.

2. High Water Levels in IDB drains

Although the whole of this area is below high tide level and levels in the rivers, the retained water levels in the drainage channels ensure that the risk of flooding is extremely low. South Holland IDB maintains a system of sluices, pumping stations, and drainage channels which convey surface water into the River Nene, the Wash and the River Welland and control water levels throughout the South Holland IDB area.

The Bulls Neck is located in the Holbeach River catchment of the South Holland IDB area. There is a Board's watercourse flowing north from Washway Road north west of the site. This conveys the drainage from this area into the open watercourse alongside Sluice Road north of Holbeach Clough which then flows into the large drain called Holbeach River. This discharges into the tidal River Welland at the Holbeach

River Sluice located on the south east bank of the tidal River Welland east of Fosdyke bridge.

The channels maintained by South Holland IDB in urban areas are classified as high priority watercourses and as such receive a higher maintenance priority.

There are possibilities of failure of outfall sluices, but these are mitigated by the high level of maintenance given to these structures by the IDB. If a failure did occur the IDB would immediately be warned of the problem by their telemetry system and take action to repair the fault or to bring in temporary pumps to reduce the risk of any flooding in the area. Similarly any failures of culverts or other blockages would be dealt with immediately.

IDB systems are designed to provide a freeboard of between 600mm and 1000mm to all land in a 1 in 10 year return period rainfall event. South Holland IDB watercourses generally state that their watercourses provide a standard of 1 in 100 years with a freeboard of 300mm in urban areas. In an extreme event water levels will rise but this will be a slow process and it would be at least 24 hours before levels were high enough to begin to flood low land in the area, and after this the level of the flood water would need to rise another 1.0 metre before the development site would be affected.

There is adequate mitigation against the risk of flooding on this site because the floor level of the building is significantly above any predicted flood levels in this IDB drainage system.

3. Localised Flooding in the area

The Environment Agency indicative surface water flooding maps show that there is no predicted risk of surface water flooding to this site..

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties having been flooded in the past.

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.

Climate Change

The predictions of flood depths for this flood risk assessment use information provided by the Environment Agency which was produced in 2006. The EA have issued new guidance on recommended contingency allowances for predicted sea level 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 15 to 18). 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 site is in flood zone 3 and the flood hazard is zero then the advice on the matrix is “No Comment”.

Summary of Risk of Flooding to the Site

The main risk of flooding to the site is if a breach were to occur in the east bank of the tidal River Welland or in the Wash banks.

The relevant part of the Environment Agency map showing the predicted peak depths in this area if a breach were to occur in 2115 in a 1% fluvial and 0.5% tidal event probability is shown below.



It can be seen that there is no predicted flooding to the area around the building. As the level of the road is 3.70m ODN then it can be assumed that the maximum level of the flooding to the south of the site would be 3.60m ODN, which is 300mm below the level of the building.

The risk of flooding from high water levels in the IDB system is extremely low as the ground floor level of the property is above all predicted flood levels in the IDB system.

Recommendations

In any area at risk of flooding it is recommended that dwellings should be of 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 of the tidal bank, and ensure there is no danger to residents when they are asleep.

The ground floor level of this building is above the predicted flood level in the area and therefore no further flood risk measures are required.

There is an existing storage room where beer barrels were stored when the public house was open. This floor level of this room is approximately 900mm below the ground floor level in the rest of the building and therefore this room should only be used for storage.

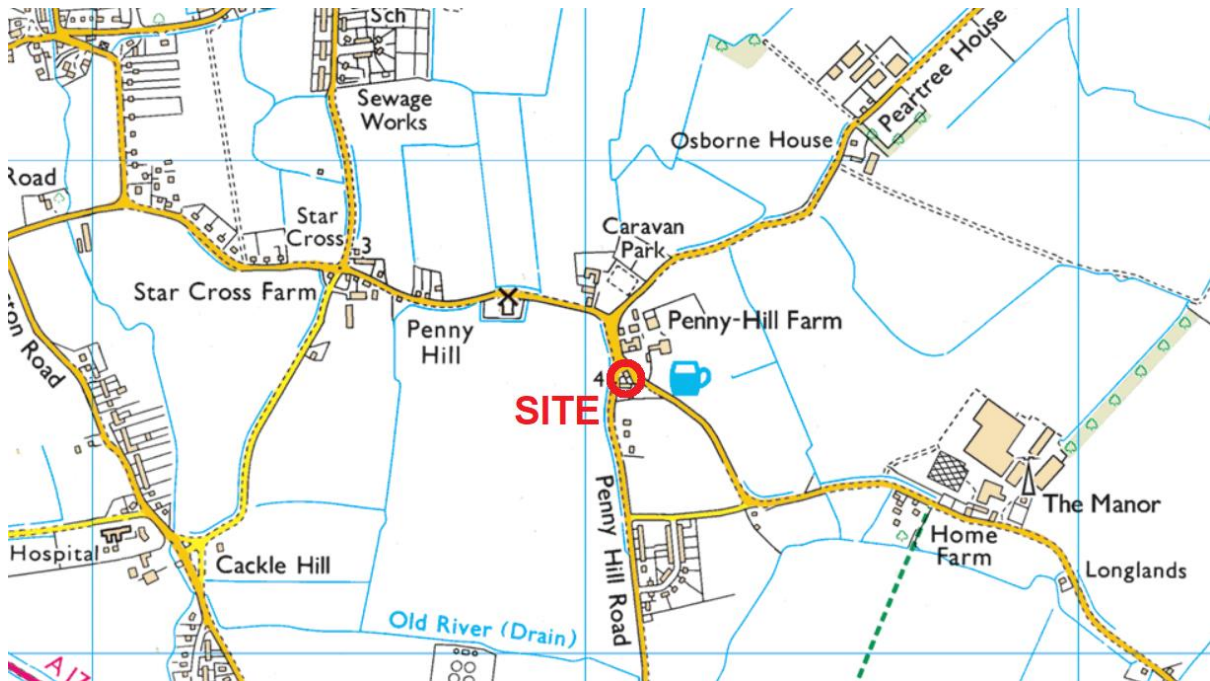
Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service.

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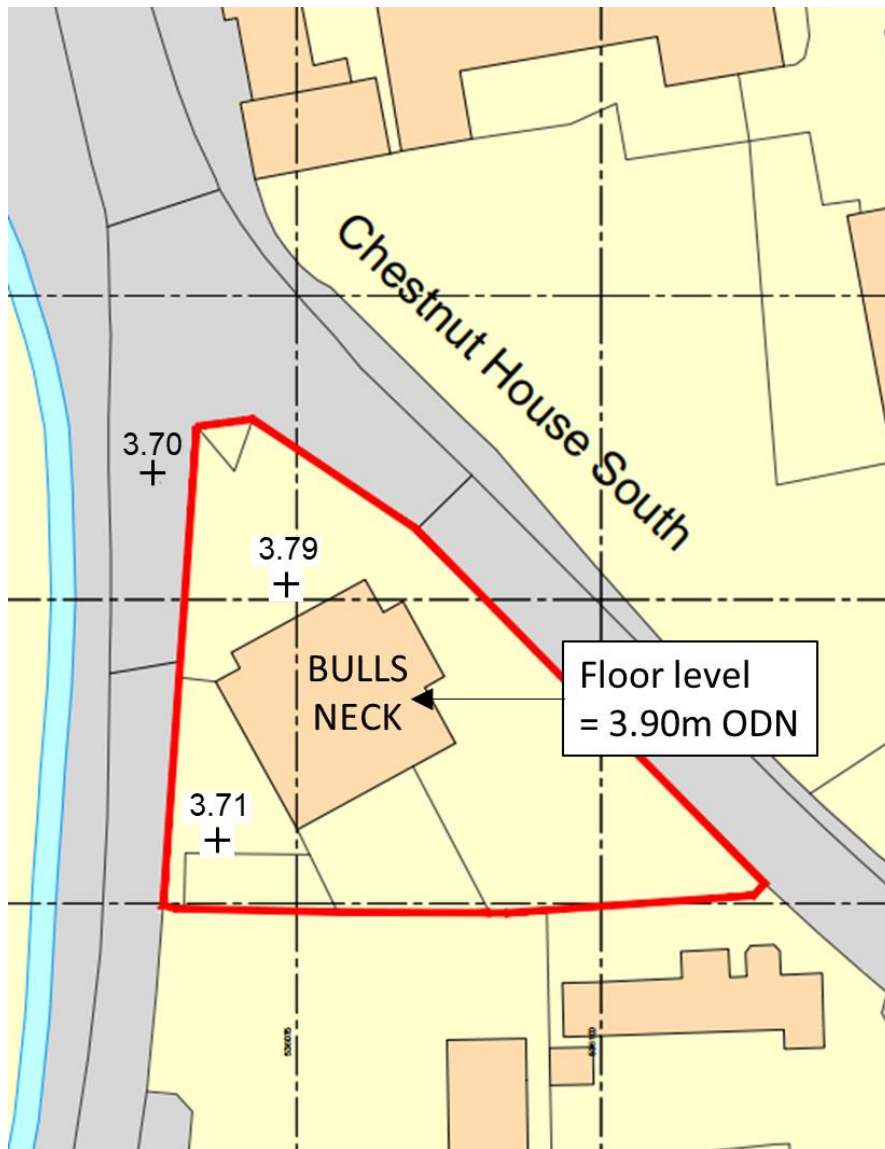
stuart.hemmings@btinternet.com

14th December 2020

LOCATION PLAN

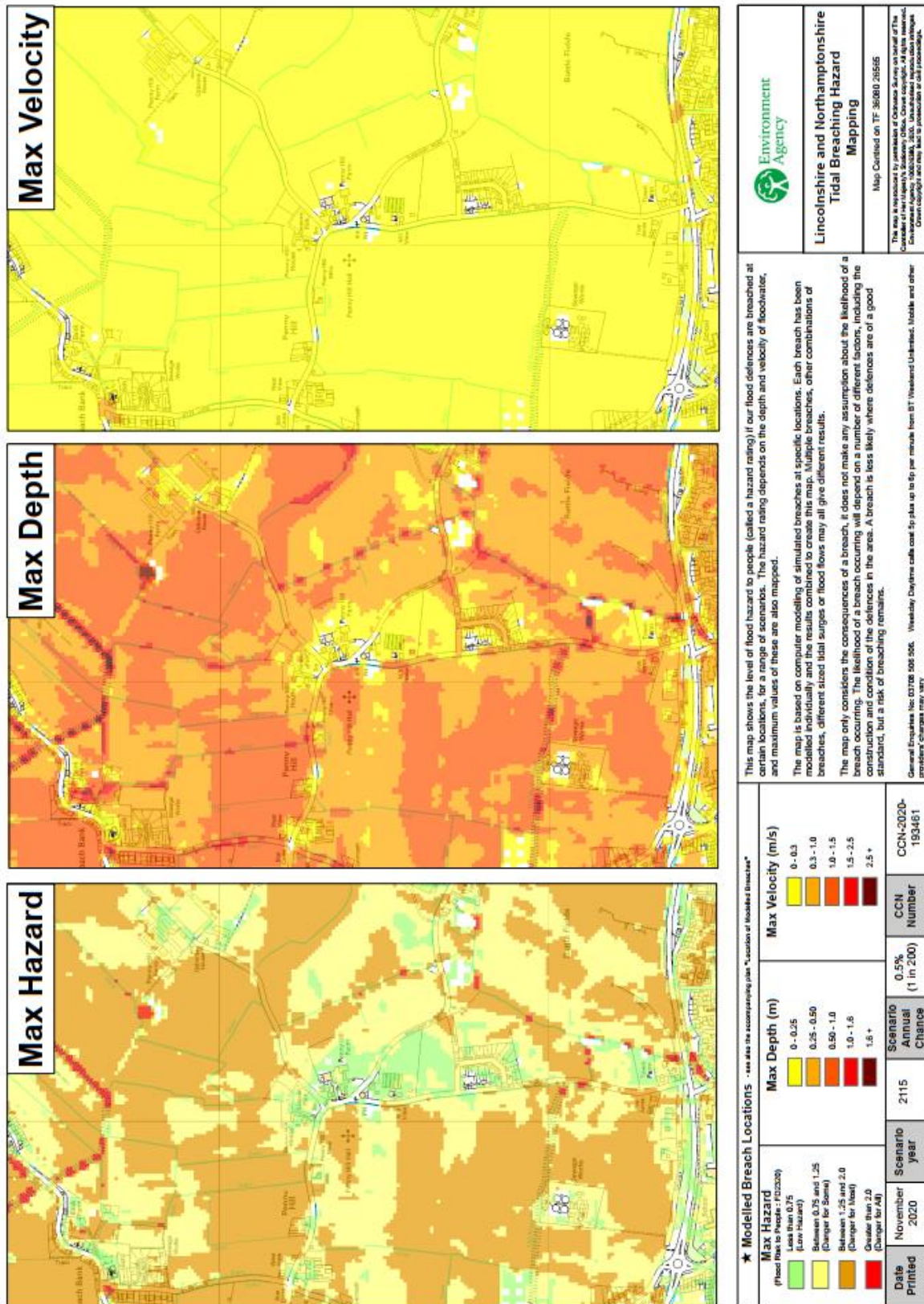


PLAN OF IDB DRAINS



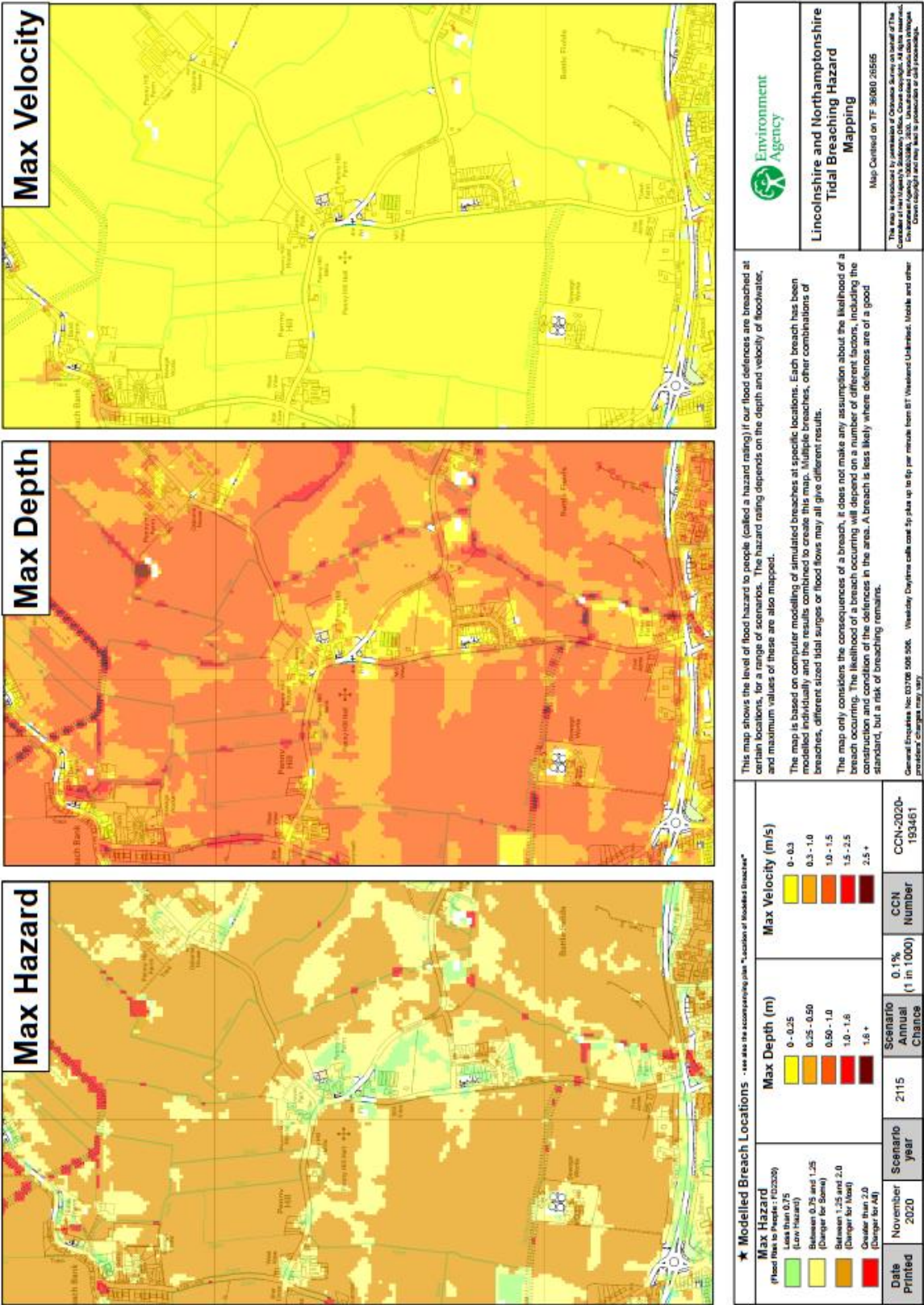
EA MAP SHOWING TIDAL BREACHING HAZARDS IN

1 in 200 YEAR EVENT IN 2115



EA MAP SHOWING TIDAL BREACHING HAZARDS IN

1 in 1000 YEAR EVENT IN 2115



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 PPS25¹. 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

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%	

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 the main source of flooding where the new climate change recommendations could affect the predictions of flood levels in 2115 at the development site is tidal flooding from the River Welland or the Wash.

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 will not have the effect of increasing the predicted flood level at the site in a 1 in 200 year breach event in 2115 by the maximum of 100mm, but it will probably be only between 10mm and 50mm. It is unlikely that this increase will significantly change the maps of flood risk at present issued by the Environment Agency.

Flooding from IDB drainage system

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.

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.

South Holland 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 South Holland 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 is above the 1 in 1000 year predicted flood level in 2115, will still be satisfactory when the above amendments for climate change are taken into consideration.