SUPPLEMENTARY REPORT UPDATING ORIGINAL FLOOD RISK ASSESSMENT

CROWTREE FARM BARN CONVERSION, WHITE CROSS LANE, SURFLEET, SPALDING, PE11 4AJ



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This supplementary report has been prepared solely to support the planning application for the Crowtree Farm Barn Conversion, Surfleet, 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 for Prior Approval for the conversion of Crowtree Farm Barns, at White Cross Lane, Surfleet was approved by South Holland District Council on 7th April 2017.

Condition 6 of the approval referred to flood risk and this is shown below:

The development hereby permitted shall be carried out in accordance with the measures set out in the Flood Risk Assessment (Geoff Beel, Feb 2017) forming part of this planning application, unless otherwise agreed in writing by the Local Planning Authority, in particular the following measures shall be fully implemented before the property is first occupied:

Finished floor levels 500mm above existing barn levels.

Flood resilient construction 300mm above finished floor levels.

Safe refuge to be provided in the roof space.

A full planning application is now being submitted to South Holland District Council who have asked for a supplementary report to be produced which will include updated maps and advice set out on the South East Lincolnshire Planning website.

Flood Risk Assessment (Geoff Beel, Feb 2017)

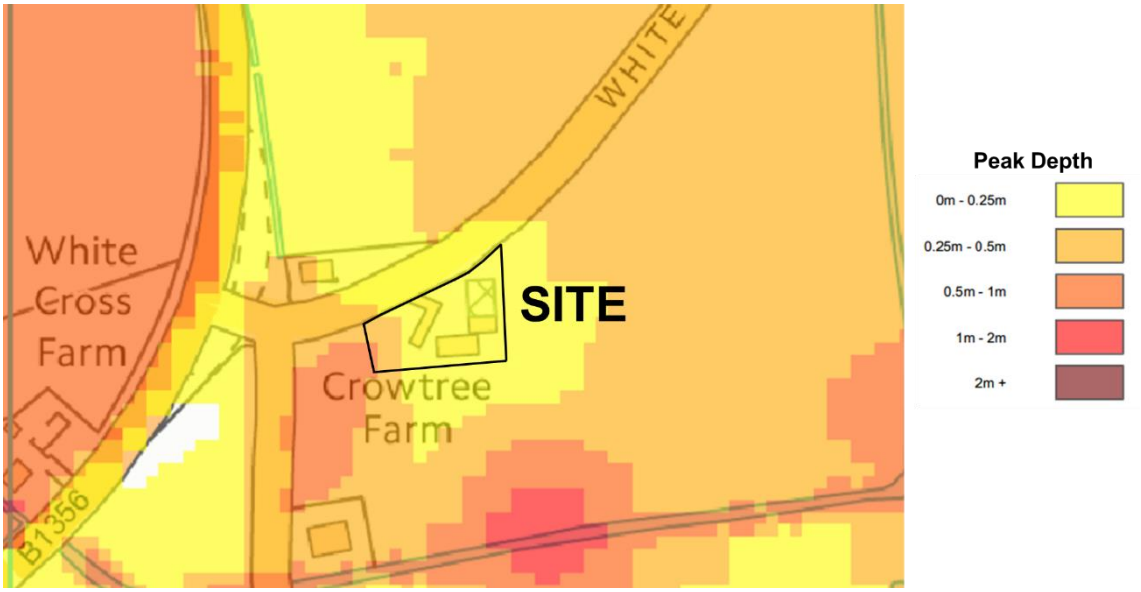
The flood risk assessment produced in 2017 set out the flood risks to the site,which are:

- Local blockages to IDB Main Drain system
- Storm return period of 1 in 50 years being exceeded
- Failure of Surfleet Sluice
- Overtopping and Breaching of the River Glen and River Welland defences

Paragraph 5.5 of the flood risk assessment refers to the South Holland DC Strategic Flood Risk assessment which was produced in January 2010. This was superceded by the Strategic Flood Risk Assessment which was produced in March 2017, along with updated maps of flood hazard. Extracts from these maps are shown below to demonstrate that a revised recommendation can be made with regards to the height the finished ground floor level needs to be raised above the existing ground level.

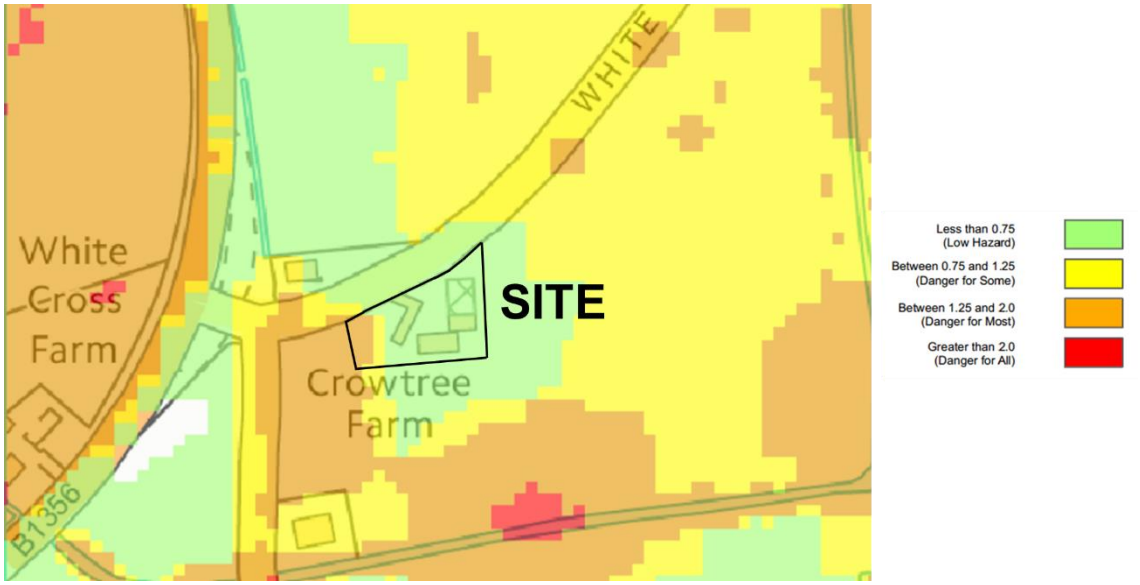
Updated Maps of Predicted Flood Depth and Hazard

An extract from the map on the South East Lincolnshire Planning website showing the predicted flood depths in this area in a 1 in 1000 year event in 2115 is shown on the next page.



It can be seen that all of the buildings that will be converted to residential accommodation on the site lie within the “yellow” zone where the predicted flood depth is between zero and 250mm.

An extract from the map on the South East Lincolnshire Planning website showing the predicted flood hazard in this area in a 1 in 1000 year event in 2115 is shown below.



It can be seen that all of the buildings that will be converted to residential accommodation on the site lie within the “green” zone where the predicted flood hazard is less than 0.75 (Low Hazard).

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 the flood hazard is low reference should be made to Category F8 which states:

The NPPF requires that the proposal is accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures / flood resilience techniques have been incorporated into the development.

Please refer to the following document for information on flood resilience and resistance techniques to be included "Improving Flood Performance of New Buildings – Flood Resilient Construction (DCLG 2007)"

FFL's must be set 300mm above ground level for two storey proposals. Single storey proposals must set FFL's above the 0.1% event breach depth in the 2115 scenario.

Therefore for a single storey building with bedrooms on the ground floor levels should be raised a minimum of 300mm above ground level.

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 this FRA. The effects of these new recommendations are considered in Appendix A of this report (pages 12 to 15). Updated SFRA maps were issued on the South East Lincolnshire Local Plan website in March 2017. The modelling and mapping note advises that the new maps do not take into account of the new climate change guidance (February 2016) issued by the Environment Agency. The notes in Appendix A conclude that no extra mitigation measures are necessary to comply with the new guidance on climate change.

Revised Conclusions and Recommendations

The proposed development is not in a functional flood plain. It is located in the passive floodplain of the River Welland and River Glen defences and within Welland and Deepings Internal Drainage Board.

The site is in flood zone 3, with the actual risk of flooding from the River Glen system being low.

Although the site is located within an Internal Drainage Board district with a minimum standard of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within drainage channels.

Finished ground floor levels should be raised by a minimum of 300mm above the existing ground level on the site.

On site surface water drainage should be discharged into soakaways designed to BRE365 specification and Building Regulations approval.

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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 e.g.

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 three 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 River Glen.
3) Flooding from IDB systems.

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

The SFRA predicts up to 250mm depth of flooding on the site in a 1 in 1000 year event in 2115. The risk of flooding from the tidal River Welland is extremely low due to the reasons set out in the previous flood risk assessment.

An increase of 100mm in maximum tidal levels is only likely to increase the maximum flood depths by around 10mm at the location of the development site, and is unlikely to significantly change the predicted flood depths indicated on the maps in the SFRA.

The precaution of recommending that the proposed property should be a minimum of 300mm above existing ground level is considered to satisfactory.

2) Fluvial Flooding from River Glen.

As part of the development is in flood zone 3 and is classed as more vulnerable, the upper end climate change allowance, which is 35%, should first 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.

The EA have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. The increase to 35% will not significantly change the conclusion in the SFRA of what might happen if a breach occurred in the bank of the River Glen. If there are additional flows along this part of the River Glen it will lead to overtopping of banks in numerous places between Bourne and the outfall at Surfleet Sluice. This will prevent the water level rising much above the predicted levels for the present day.

The upper end allowance predicting a 65% increase in flows above the 1 in 100 year predicted flows now needs to be considered. This level of predicted river flows again will not lead to increased river levels as the river will be overtopping the banks in numerous places.

To conclude a breach in the south bank of the River Glen is not predicted to lead to a depth in excess of 250mm at this site with the significant increase of 65% in river flows.

3) Effect on IDB Systems

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 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 recommendation that the finished ground floor levels should be a minimum of 300mm above the surrounding ground level is satisfactory.