PROPOSED CONTINUED USE OF CONTAINERS AT 197a NENE TERRACE ROAD, CROWLAND, PETERBOROUGH, PE6 0LD.

FLOOD RISK ASSESSMENT



View of site from north of site

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 continued use of containers at 197a, Nene Terrace Road, Crowland. 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

A planning application is due to be submitted to South Holland District Council for permission to continue the use of containers at 197a, Nene Terrace Road, Crowland, Peterborough, PE6 0LD. The containers are owned by Property Clearance Co Ltd and are located with a number of other containers on the south east side of this small industrial site.

The site is within Flood Zone 3 as shown on the Environment Agency's Flood Zone map.

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 within a defended area as specified on the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the North Level 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 this area.



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It can be seen that all of the site is in Flood Zone 3.

Application Site

The National Grid Reference of the site is 525890 308040.

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

Applying the flood risk vulnerability classification in Table 2 of the Guidance, the siting of containers is classified as “less vulnerable”.

Table 3 of the Guidance is shown on the next page:

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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

It can be seen that “Less vulnerable” development is considered to be satisfactory in flood zone 3.

Strategic Flood Risk Assessment

The Strategic Flood Risk Assessment (SFRA) written for the South Holland District Council (SHDC) in 2010 provides details of the actual flood risk in the Council’s area. This information has not been updated and 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 flood probability
Peak Velocity ……. Nil

For year 2115
Depth of flooding … zero
Extent of flooding…. Low or medium flood probability
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 flood probability
Hazard rating…… No Hazard
Peak Velocity .. Zero

For the year 2115
Depth of flooding … Zero
Extent of flooding .. Low or medium flood probability

Hazard rating…… No Hazard
Peak Velocity .. zero

The hazards are as follows for the 0.1% fluvial or tidal event probability:

For the year 2115
Depth of flooding … Zero
Extent of flooding .. Low or medium flood probability
Hazard rating…… No Hazard
Peak Velocity .. zero

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

Maximum flood level and bank levels in the tidal section of the River Welland

Tables in the SFRA show the following details of the defence bank on the east side of the tidal section of the River Welland north of the A16 road bridge and 15.3km north of the development site, between chainage 19.8km and 20.8km.

	2007	2055	2115
Peak 1 in 200 year extreme tide level	5.98m OD	6.31m OD	7.12m OD
Peak 1 in 1,000 year extreme tide level	6.27m OD	6.60m OD	7.41m OD

With an average defence crest level between 7.80 and 7.90 m OD the freeboards are as follows:

	2007	2055	2115
Peak 1 in 200 year freeboard	1870mm	1540mm	730mm
Peak 1 in 1,000 year freeboard	1580mm	1250mm	440mm

Tables in the SFRA show the following details for the defence bank on the east side of the fluvial section of the River Welland at chainage 13.0 km.

	2007	2115
Peak 1 in 100 year flood level	4.93m OD	4.96m OD
Peak 1 in 1,000 year flood level	4.96m OD	4.97m OD

The bank levels on this section are 6.35m OD. Therefore it can be seen there is a minimum freeboard of 1300mm to the predicted design maximum levels in 2115.

Information on Surface Water Flooding on Environment Agency Website

The map on the next page 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 the map shows there is no predicted risk of surface water flooding on the site.

Existing Ground Levels

The level of Nene Terrace Road south west of the site is 3.6m OD and the site is approximately at the same level.

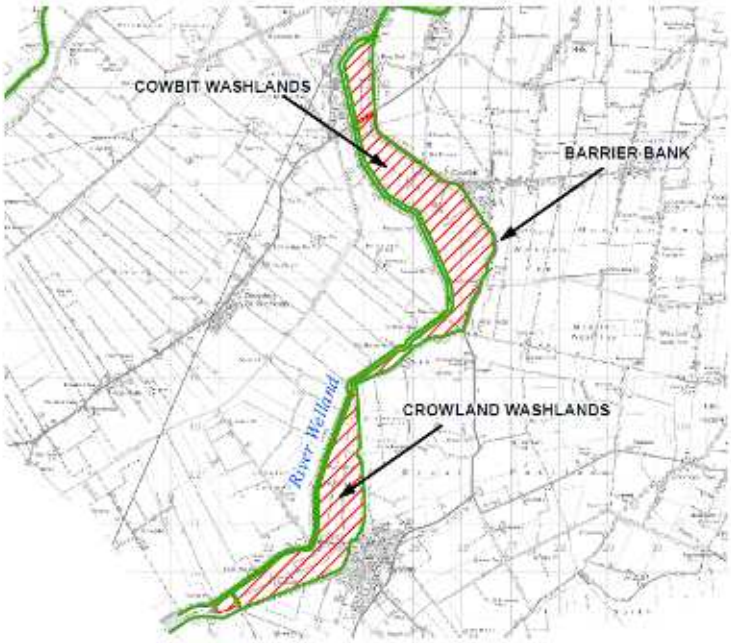
Existing Flood Alleviation Measures

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 16.5 km south of the tidal section of the River Welland, which has a tidal defence bank which is maintained by the Environment Agency. The site is not considered to be at risk from tidal flooding.

The site is located approximately 3.1km metres south east of the bank of the Crowland Washes, which is the main flood defence bank of the River Welland.

The section of the River Welland from south of Crowland to the southern outskirts of Spalding has two washlands located on the east side of the River, called Crowland Washlands and Cowbit Washlands. These areas are designed to alleviate very high flows in the River Welland. When the water level in the River Welland reaches a level of approximately 5.00m OD large syphons are activated which discharge excess water onto the Washes. The Barrier Bank is located on the east side of the Washes to contain the water in the Washlands and is the main flood defence bank on the east side of the river.



The internal watercourses in the area are maintained by North Level IDB.

Potential Sources of Flooding

The potential sources of flooding to the site are:-

1. Failure or overtopping of the Barrier Bank
2. High water levels in IDB drainage channels.
3. Localised flooding in the area.

1. Overtopping of the Barrier Bank.

The Barrier Bank is the eastern bank of the Crowland Washes. The Washes are only flooded in extreme conditions (around 1 in 50 years) and are used the rest of the time as agricultural land. There are two syphons which operate automatically to allow water to flood on to the Washes and alleviate high water levels in the River Welland. When this occurs the level of water in the washes will quickly rise to approaching 5.00m OD.

If a breach occurred in the Barrier Bank in this scenario then flood water would flow eastwards towards this industrial site.

The predicted flood depths shown on the maps available on the South Lincolnshire Planning website of the Crowland area are the consequence of a possible breach in the banks of the River Welland and the Barrier Bank. The maps predict that no flooding will occur on the site from this source in a 1 in 1000 year event in 2115.

2. Flooding from IDB Drains

The New South Eau is located on the northern boundary of the industrial site and the containers are approximately 60 metres from this watercourse. The Catswater Drain is on the south eastern boundary of the site where the containers are located. This drain flows north eastwards and flows into the New South Eau.

The New South Eau flows eastwards to the North Level Main Drain and the levels of all these watercourses are controlled by the large pumping station at Tydd which is approximately 24 km east of Crowland.

IDB drains were designed to provide at least a 1 in 10 year standard of service with a freeboard of at least 900mm. This normally provides at least a 1 in 50 year standard of service against overtopping and in many cases a 1 in 100 year standard at the present time.

North Level IDB have a policy of monitoring standards of protection in all their catchments and will carry out improvements to pumping stations, sluices and drainage channels to ensure they do not fall due to higher run-offs predicted with climate change.

It is unlikely that any failure of assets such as pumping stations, sluices or drainage channels would lead to overtopping of the watercourse because North Level IDB have an excellent maintenance regime and monitor all assets with a modern telemetry system.

As the normal water levels of these IDB drains are approximately 0.00m OD then it is unlikely that any overtopping from the IDB drain would affect the containers, as the ground level on the site is approximately 3.6 metres above the normal water level in the New South Eau.

3. Localised Flooding in the area

The area where the containers are located and the site access seems to be constructed with hardcore and gravel with no positive surface water drainage. Therefore there is a risk of some surface water flooding to this area. The existing surfacing will have some permeability and any large accumulations of surface water will flow into the nearby IDB drain.

Extent of known Flooding

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

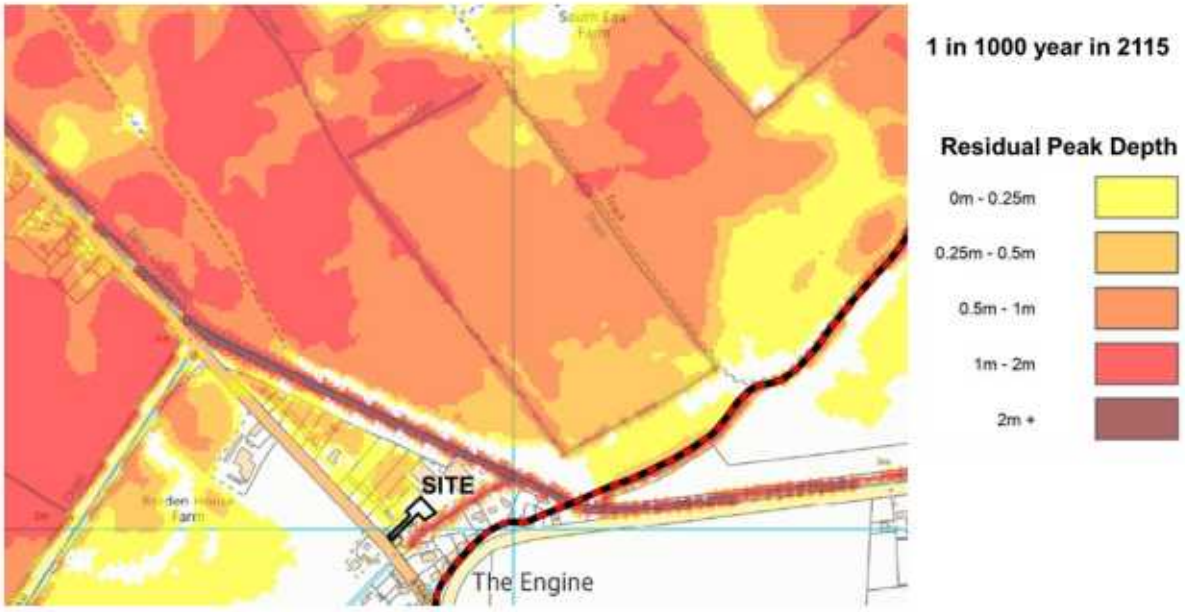
South East Lincs Advice Matrix

Advice can be found on the recommended mitigation required by referring to a spreadsheet on the South East Lincolnshire website. As there is no flood hazard reference should be made to category G4 and the advice in the Matrix for this category in flood zone 3 is "No Comment".

Conclusions

The maps available on the South East Lincolnshire Planning website do not predict any actual or residual flooding will occur in this area of Nene Terrace in a 1 in 1000 year tidal or fluvial event in 2115.

An extract from the map of the residual peak flood depths in a 1 in 1000 year fluvial or tidal event in 2115 is shown below:



The risk of flooding to the site from IDB drains can be considered very low, as the normal water level in the New South Eau and Catswater Drain is below 0.00m OD and the predicted 1 in 100 year water levels are estimated to be no higher than 2.0m OD.

The IDB have adequate arrangements to bring in contractors and use their own staff if a failure of any part of the pumping stations or the sluices occurred. If drains become full any flooding that would occur would happen very slowly and affect lower land in

the area before the development site. It would be very unlikely to reach a level above 3.60m OD and flood this industrial site.

Therefore it can be concluded that the risks of flooding from the River Welland or from nearby IDB watercourses is adequately mitigated. The access road onto the site could be at risk from surface water flooding but the depths will be low and are unlikely to flood into the containers.

Recommendations

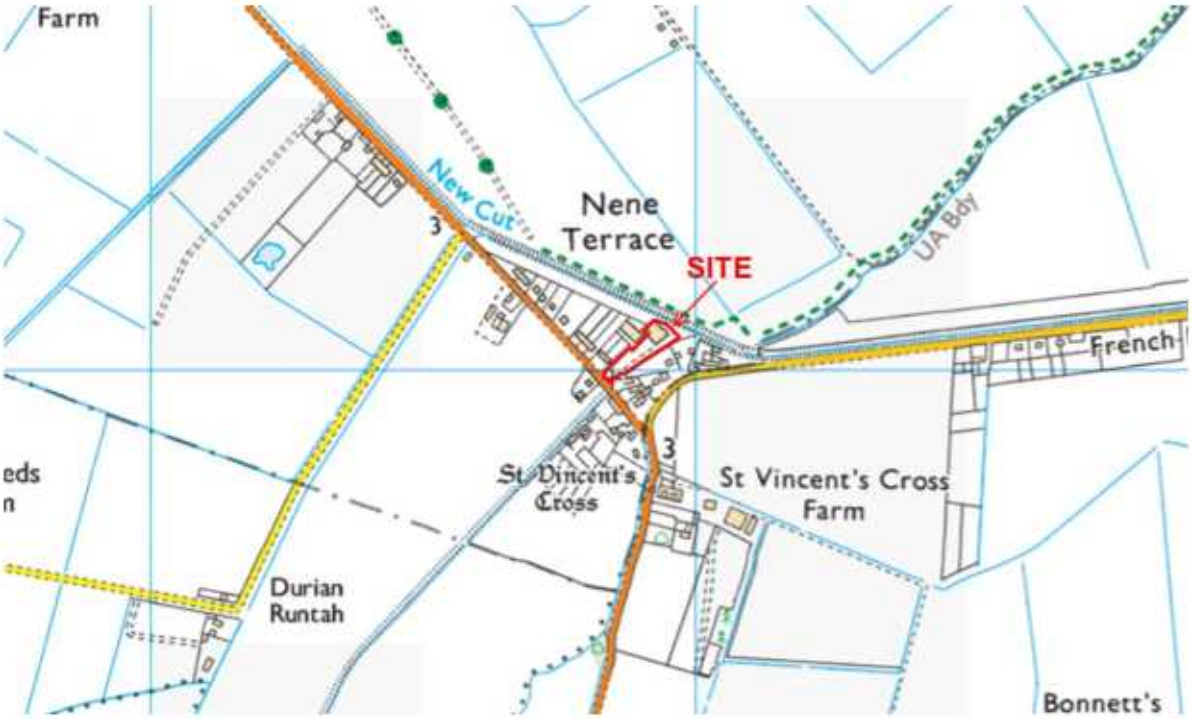
The owners of the containers are advised to register with the Environment Agency's Floodline Warnings Direct Service.

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16th May 2024

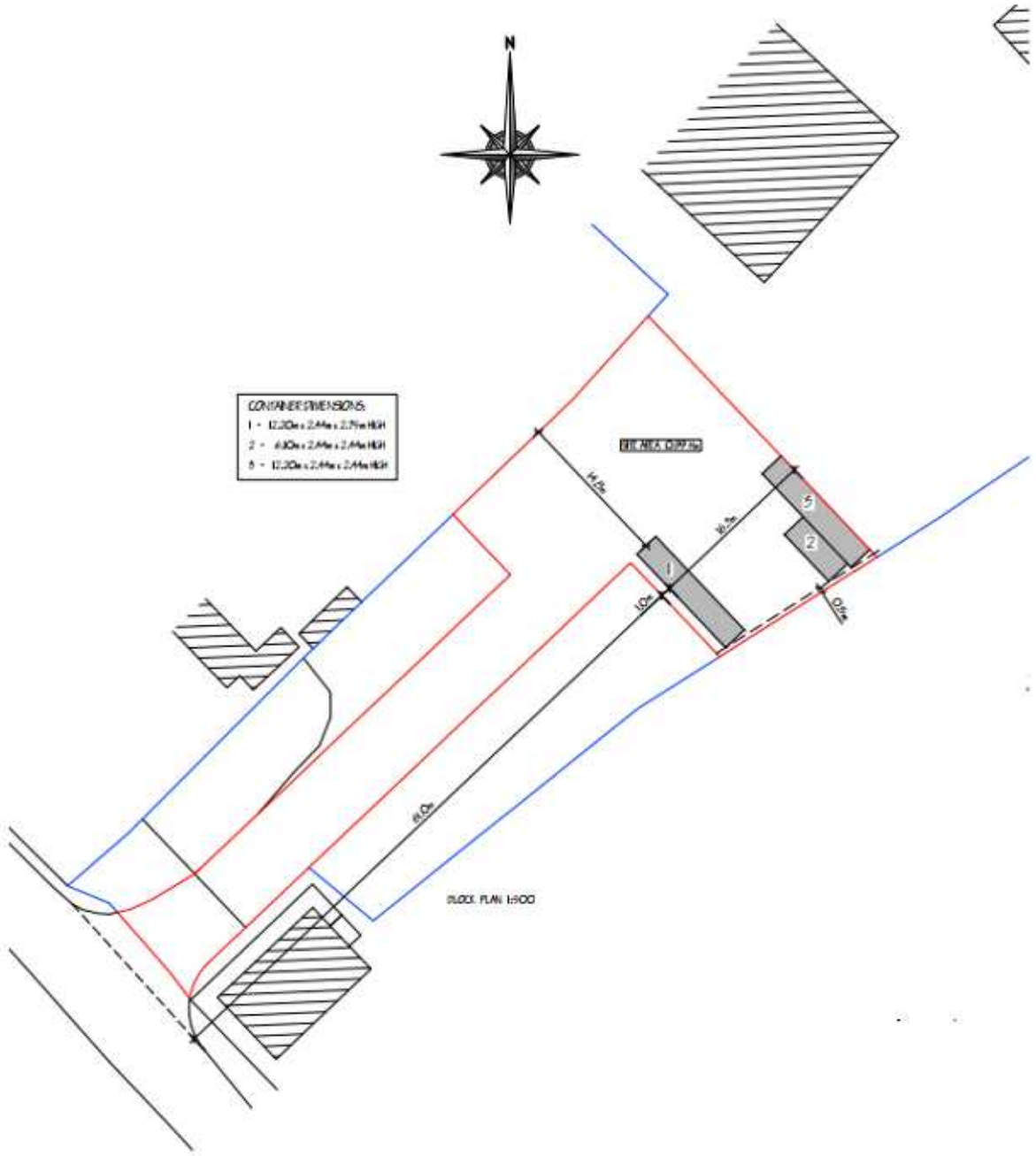
LOCATION PLAN



PLAN OF IDB DRAINS



BLOCK PLAN


N
CONTAINER DIMENSIONS
1 - 12.20m x 2.44m x 2.59m HIGH
2 - 6.00m x 2.44m x 2.44m HIGH
5 - 12.20m x 2.44m x 2.44m HIGH
BUILDING OFFICE
14.25m
10.0m
1.0m
0.5m
65.0m
1
2
5
BLOCK PLAN 1:500

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 less vulnerable development in flood zone 3 the central and higher central 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 report has identified that the main sources of flooding to the proposed development are from the River Welland and the IDB drainage system

As the development is in flood zone 1 and is classed as more vulnerable, the central climate change allowance, which is 25%, should firstly be considered. After considering the effects of this increase the higher central, which is 35%, 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 SHDC SFRA also has used this figure of 20%. The increase to 25% and 35% will not significantly change the conclusion in the SFRA of what might happen if a breach occurred in the bank of the the Barrier Bank. If there are additional flows along this part of the River Welland it will lead to the storage systems of the Cowbit and Crowland Washes operating and additional overtopping over lower banks rather than any significant increase in levels in the river.

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.

North Level 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 North Level 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.

It is concluded that the climate change allowances are not sufficiently significant to amend any of the conclusions set out in the report.