PROPOSED ERECTION OF TWO DWELLINGS AT RECTORY FARM, RECTORY ROAD, TYDD ST MARY, SPALDING, PE13 5QL.

FLOOD RISK ASSESSMENT



View of site from Rectory Road

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This flood risk assessment has been prepared solely to support the planning application for the proposed dwellings at Rectory Farm, Rectory Road, Tydd St Mary. 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 construct two dwellings north of the property named Rectory Farm, Rectory Road, Tydd St Mary, Wisbech, PE13 5QL. The site was originally part of the farmyard and is located in the southern part of the village of Tydd St Mary. It is approximately 2.7km west of the tidal section of the River Nene.

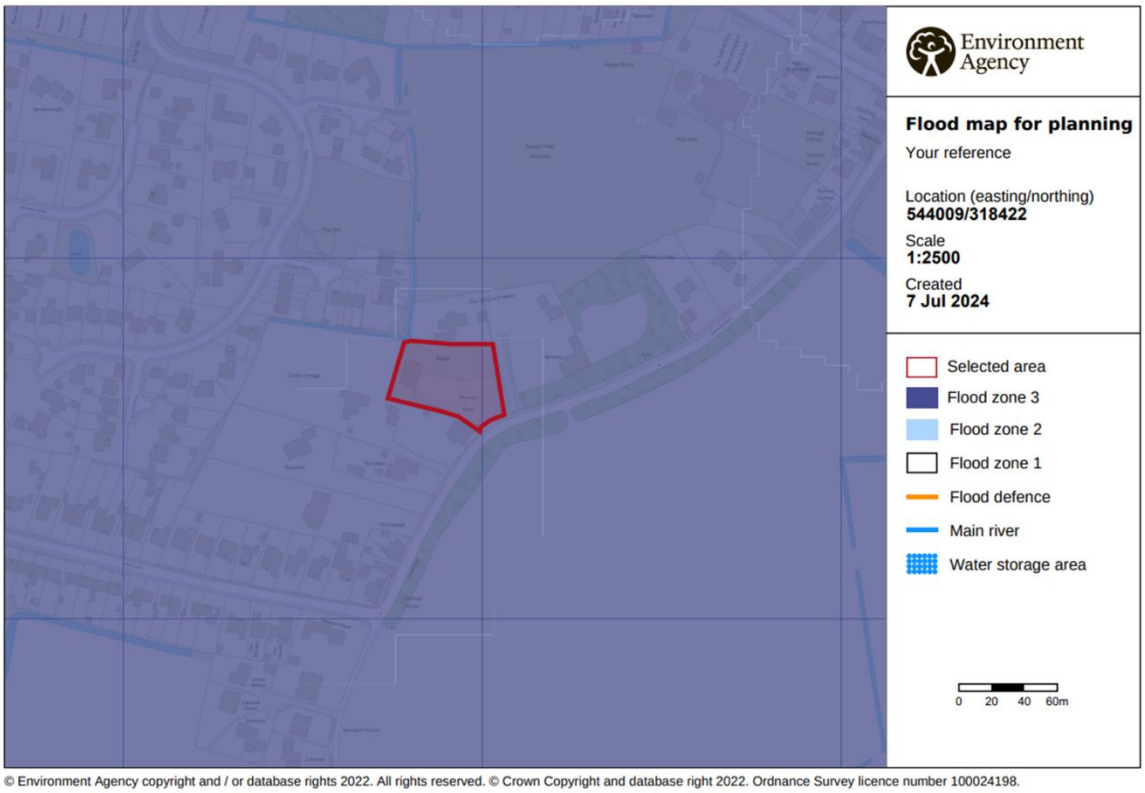
The site is within Flood Zone 3 as shown on the Environment Agency's Flood Zone Map. These maps do not take into account existing flood defences.

The Technical Guidance to the National Planning Policy Framework Development and Flood Risk states that if a development lies within Flood Zone 3 a flood risk assessment should be carried out to accompany any Planning Application.

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 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 the area.



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It can be seen that the site is shown to be within flood zone 3, and all of this area of Tydd St Mary is also within flood zone 3.

Application Site

The site is located on the north western side of Rectory Road in Tydd St Mary. The National Grid Reference of the site is 544010, 315420.

The position and extent 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 considered to be within Flood Zone 3(a) 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 extensions to a dwelling house can be 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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

As can be seen from the above table residential development in flood zone 3(a) is satisfactory subject to the application of the sequential and exception test.

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 refined 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.

All of the area of the village of Tydd St Mary is within flood zone 3(a).

The site of this proposed development is within the village boundary and the South East Lincolnshire Local Plan adopted in March 2019 recognises in paragraph 5.3.5 that infill and speculative applications will come forward within the South Holland District Council area. It states that there will be numerous opportunities for infill developments which it is not practical to identify, and the plan encourages these type of developments provided that the material considerations of the Local Plan and particular sites are met.

The safety of the development will be delivered by demonstrating that the ground floor level of the proposed buildings are above the predicted flood levels in this area.

Therefore I consider that the sequential test has been passed.

Exception Test

The Exception Test must be applied to this development 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 the 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) dated January 2010. This document provides details of the flood risk in the Council's area.

The maps in this report illustrate the following actual flood hazard 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 residual 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…….. None
Peak Velocity .. Nil

For the year 2115
Depth of flooding …zero
Extent of flooding .. Low or medium flood probability
Hazard……. None
Peak Velocity .. Nil

Figure 16 of the general maps shows that the site is not within the rapid inundation zone.

Tables in the SFRA show the following details of the defence bank on the west side of the tidal section of the River Nene north of the North Level Main Drain, between chainage 7.6km and 7.8km.

	2007	2055	2115
Peak 1 in 200 year extreme tide level	5.79m OD	6.12m OD	6.93m OD
Peak 1 in 1,000 year extreme tide level	6.13m OD	6.46m OD	7.27m OD

With an average defence crest level between 7.33 and 7.58 m OD, the minimum freeboards are as follows:

	2007	2055	2115
Peak 1 in 200 year freeboard	1540mm	1210mm	400mm
Peak 1 in 1,000 year freeboard	1200mm	870mm	60mm

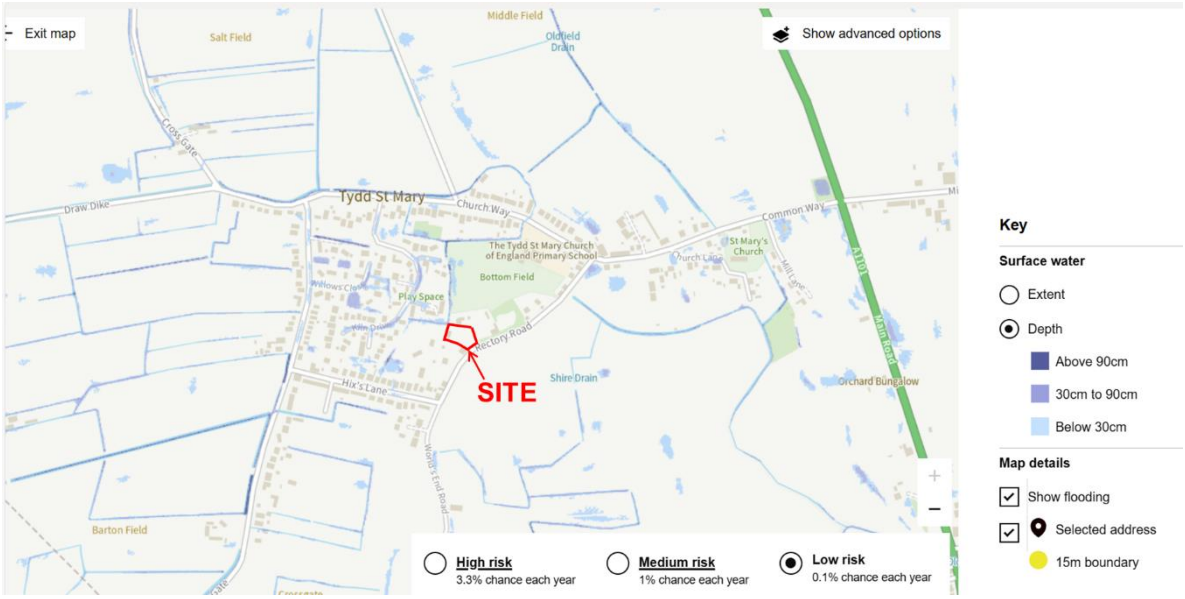
Information from the Environment Agency

The Environment Agency has provided Tidal Breach Mapping for this area which shows the predicted flood hazard for the 1 in 200 year and the 1 in 1000 year breach event in 2115.

These maps are reproduced on pages 13 – 14 of this report. No flooding is predicted to the site in Rectory Road in either of the above scenarios.

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 there is a no predicted risk of surface water flooding around this site.

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 2.75 km from the tidal section of the River Nene, which has a tidal defence bank which is maintained by the Environment Agency.

The site is located 1.1 km north west of the North Level Main Drain which is maintained by North Level IDB.

There are additional smaller watercourses in the area that are maintained by North Level IDB.

Existing Ground Levels

There is a bench mark on the north face of Rectory Farm which is 300mm above ground level and has a known level of 4.07m OD. Therefore the southern part of the yard and Rectory Road east of the site can be assumed to be at a level of approximately 3.77m OD.

There are lower land levels on the northern boundary of site.

Potential Sources of Flooding

The potential sources of flooding to the site are:-

1. Failure or overtopping of tidal defences of the River Nene.
2. Failure or overtopping of the North Level Main Drain.
3. High water levels in IDB drains.
4. Surface Water Flooding

1. **Failure or overtopping of tidal defences of the River Nene**

The west bank of the tidal section of the River Nene is approximately 2.75 km east of the site in Rectory Road.

The existing tidal defences between Wisbech and Sutton Bridge consist mainly of strengthened and heightened earth embankments with a riverside berm. Crest levels are between 7.00m ODN and 7.20m ODN. There is a section of bank immendiately north of the North Level Main Drain where the levels are higher at between 7.33m ODN and 7.58m ODN.

On the 11th January 1978 the recorded tidal surge level reached 5.60m ODN at Wisbech when extensive areas of the town were flooded.

More recently the surge event on 5th December 2013 reached a level of 6.10m ODN and the town and the surrounding areas were protected by the improved defences.

More recent studies by the Environment Agency have concluded that the defences are sufficiently high to withstand a 1 in 200 year event for the next 50 years with a suitable freeboard.

Therefore there is adequate mitigation against the risk of flooding from this source.

2. **Failure or overtopping of the North Level Main Drain**

The water level in the Main Drain and the areas alongside this large watercourse are controlled by Tydd Gott Pumping Station, which is the outfall for a greater part of the North Level IDB district with a total area of 34,000ha. This pumping station pumps the flow into the tidal River Nene south of Sutton Bridge.

The maximum predicted flood level at Tydd Pumping Station is -1.65m ODN which is more than 5.00 metres lower than the Lodge Farm site.

Therefore there is adequate mitigation against the risk of flooding from this source.

3. **High Water Levels in Internal Drainage Board Drains**

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

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. This normally provides a standard of service of between 1 in 50 years and 1 in 100 years against flooding. 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.

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 continue to provide satisfactory standards of protection with higher run-offs predicted with climate change.

There are two partly piped IDB drains (School Drain and Hix's Lane Drain) which control the water levels in the dykes near the proposed development site. These flow into the section of School Drain which flows southwards to discharge into the North Level Main Drain south of Eaudyke Bank.

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.

Therefore the IDB system provides an adequate control of water levels in the area to mitigate against any flooding in a 1 in 100 year event.

4. Surface Water Flooding

It is assumed that excess existing surface water from the site drains into the dyke located on the northern boundary of the site.

Surface water from the proposed buildings should if possible be disposed of by the use of soakaways.

As the ground floor levels will be raised at least 300mm above the existing level this will provide adequate mitigation against the risk of flooding from this source.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of this part of Tydd St Mary having been flooded in the past fifty years. The site did not flood during the tidal surge event in 1978 or in the event in December 2013 when the recorded level of the river in Wisbech was 6.10m ODN.

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 people on the site to make arrangements to protect the dwelling and 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 of the River Nene.

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 2011. 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

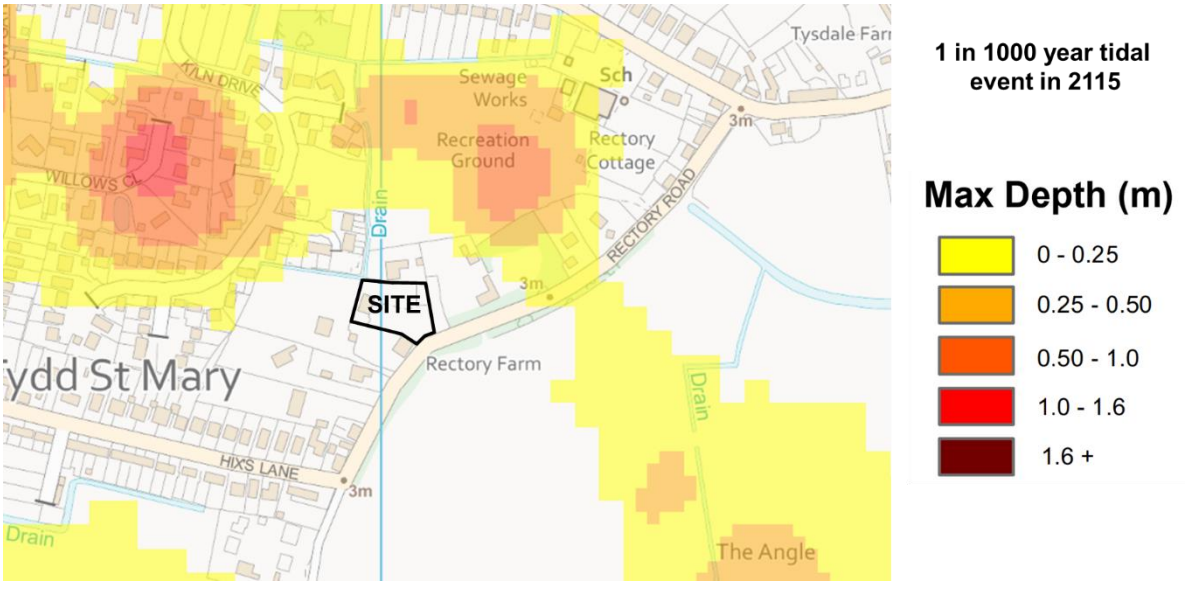
Advice can be found on the recommended mitigation required by referring to a spreadsheet on the South East Lincolnshire website.

As the development is in flood zone 3 and there is no flood hazard reference should be made to Category G8 which shows that the matrix reference for this category 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 Nene. The risk of this happening along this section of bank can be considered to be low. The bank has a wide top and bank slopes are not steep.

The relevant part of the map showing the predicted peak depths of flooding in this area if a breach occurred in the west bank of the River Nene in 2115 in a 0.1% tidal event probability is shown on below.



The map shows that no flooding is predicted to the site in a 1 in 1000 year tidal event in 2115.

It can be concluded that the risk of flooding from IDB drains and from surface water is adequately mitigated.

Conclusions

Although this site is designated as being in flood zone 3 the map supplied by the Environment Agency advises that there is no predicted risk of flooding to the site from the River Nene in a 1 in 1000 year event in 2115.

The proposed ground floor level of the buildings is not considered to be at risk from flooding from the nearby IDB watercourses.

The proposed development is not in a functional flood plain as defined by PPS25.

Recommendations

In any area where there is a risk of flooding, although the risk at this site is low, it is preferable to construct new buildings with two stories with all sleeping accommodation on the first floor, in order that the first floor can provide a safe refuge if any flooding were to occur.

However as there is no predicted risk of flooding in a 1 in 1000 year event in 2115 then it is considered satisfactory to allow residential development on this site with sleeping accommodation on the ground floor.

The ground floor level of the proposed dwellings should be at least 300mm above the existing ground level on the southern part of the site and 300mm above the level of Rectory Road at the entrance to the site.

Occupiers of the properties should register with the Environment Agency's Floodline Warnings Direct Service to receive automated early warnings of potential flooding.

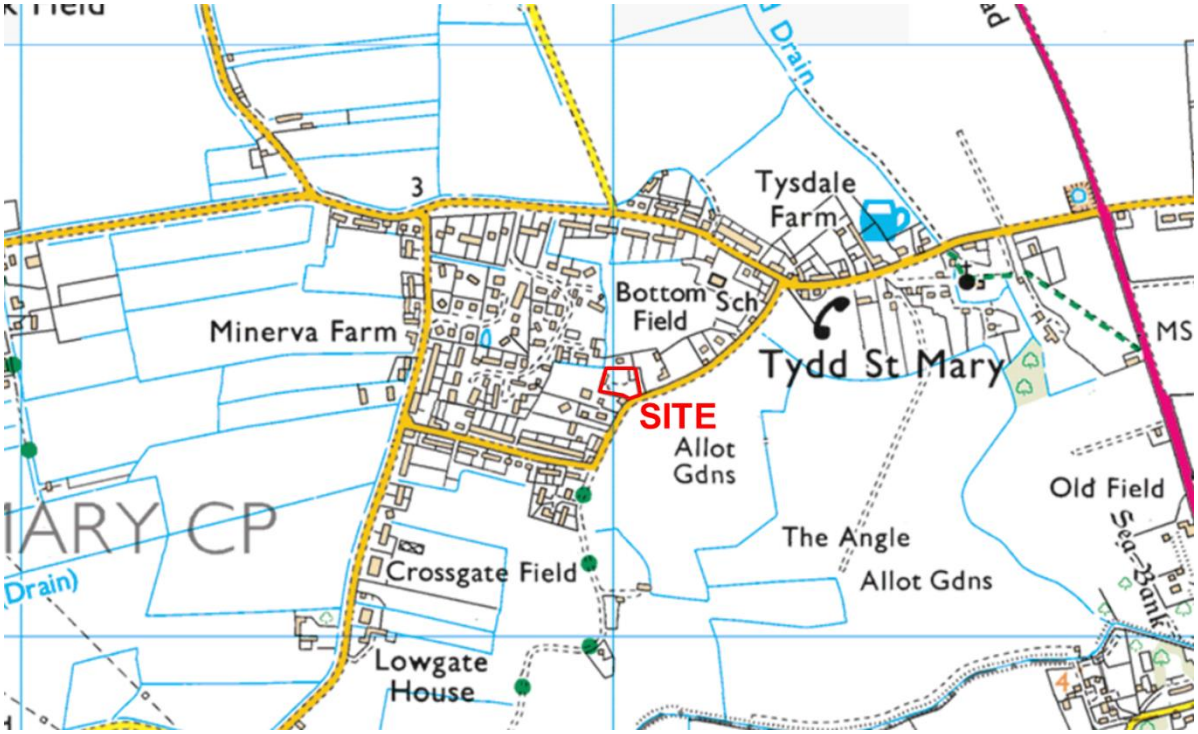
The surface water from the roof of the property should if possible be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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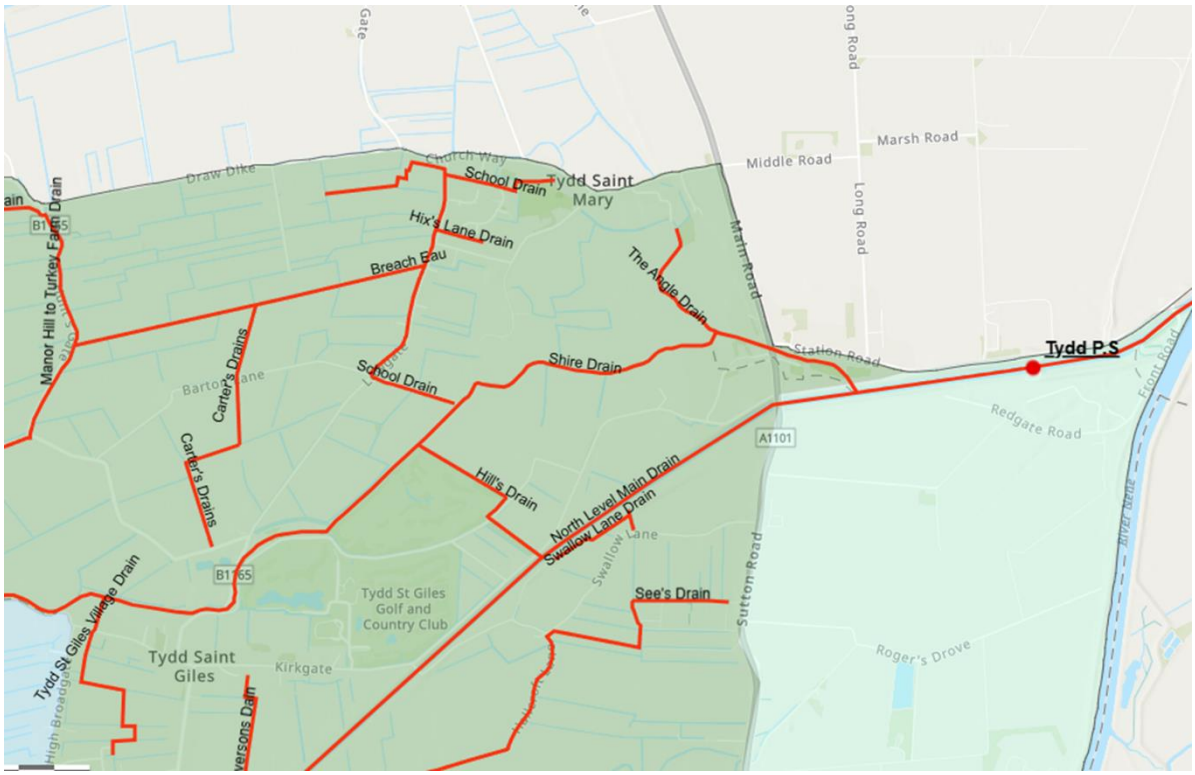
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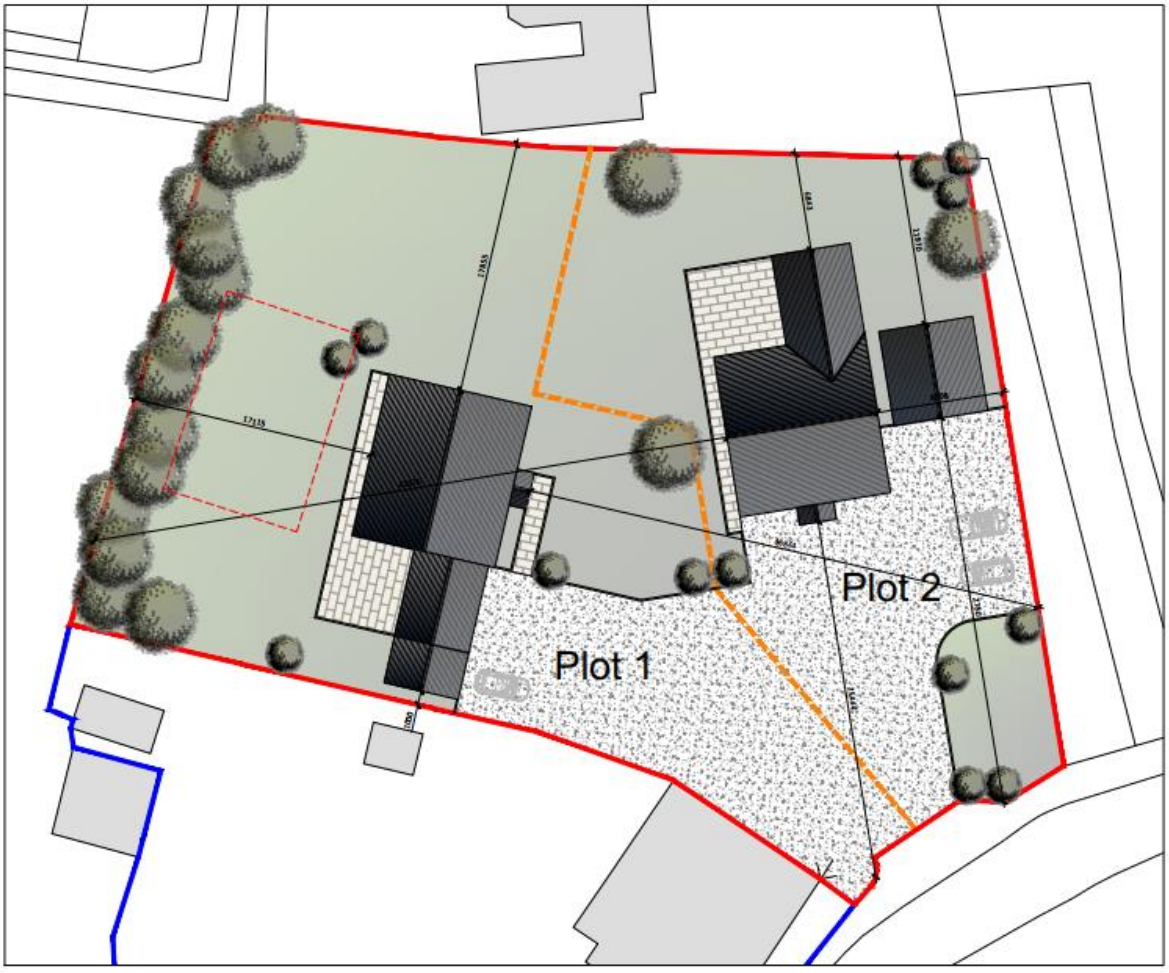
LOCATION PLAN



PLAN OF IDB DRAINS

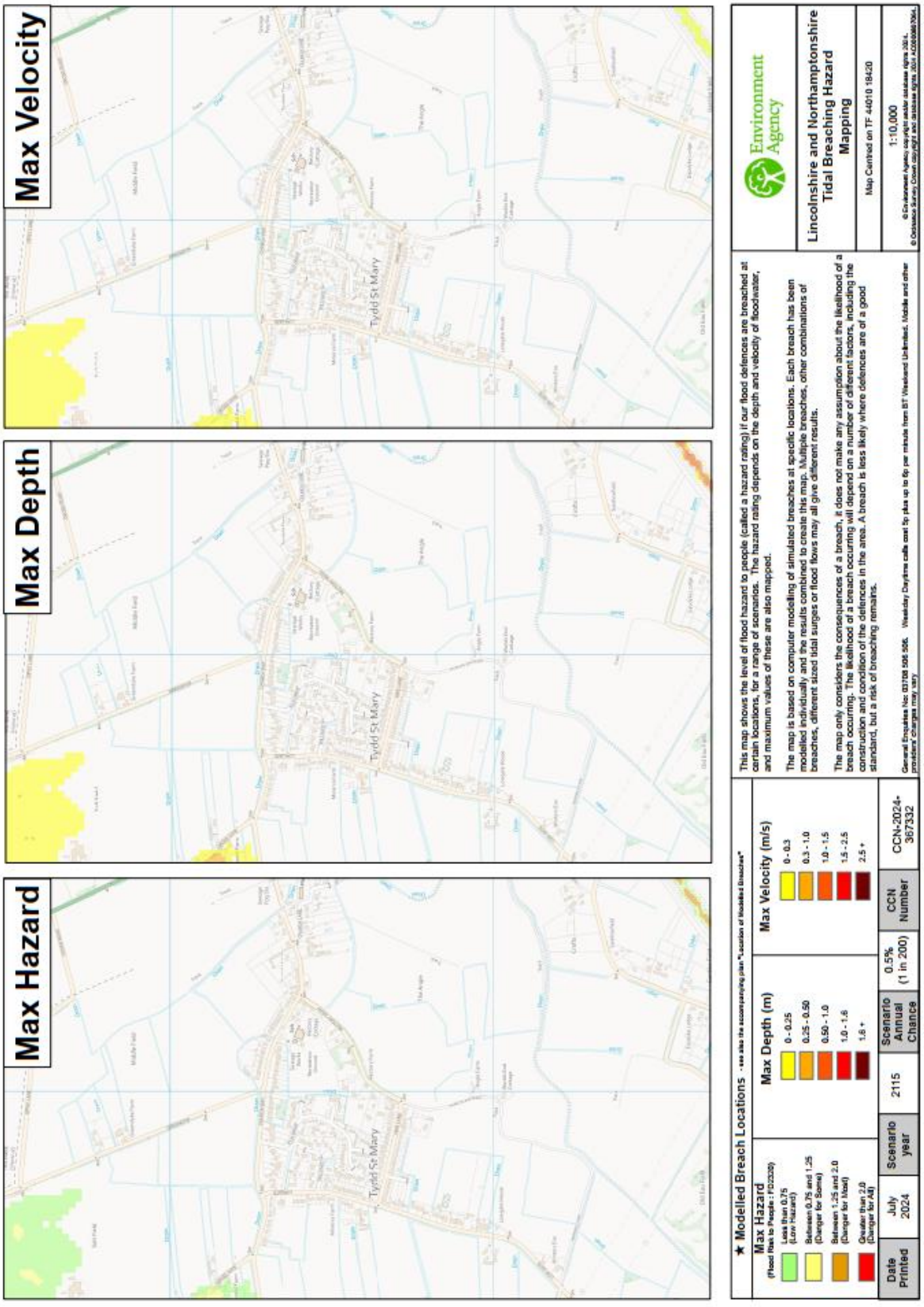


BLOCK PLAN



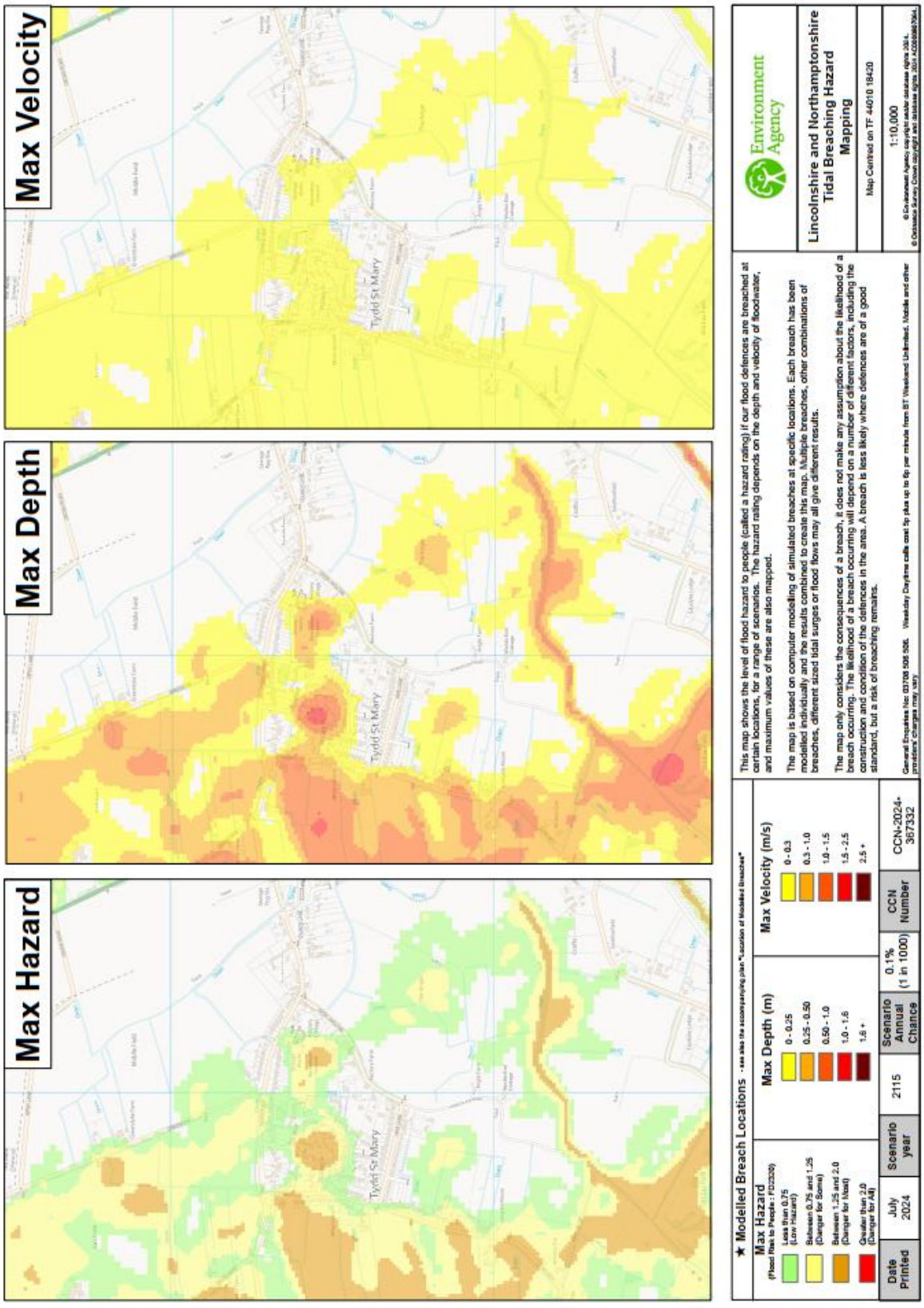
EA MAP SHOWING TIDAL BREACHING HAZARDS IN

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 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'a

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 the 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

1) Flooding from Tidal River Nene

The FRA has identified the first source of flooding where the new climate change recommendations could affect the predictions of flood levels in 2115 at the development site is flooding from the tidal River Nene.

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 that are available on the South East Lincolnshire website.

2) Flooding from the IDB drainage system

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

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.

Therefore it is considered that the mitigation proposed for the development, with the recommendation that the proposed ground floor level should be at least 300mm above the existing ground level on the southern part of the site and 300mm above the level of Rectory Road at the entrance to the site, is satisfactory.