

**PROPOSED GAMES ROOM AND ANNEX TO THE REAR OF 18  
FISHPOND LANE, HOLBEACH, SPALDING, PE12 7DE.**

**FLOOD RISK ASSESSMENT**



View of site looking south west

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This flood risk assessment has been prepared solely to support the planning application for the construction of a games room and an annex to the rear of 18 Fishpond Lane 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

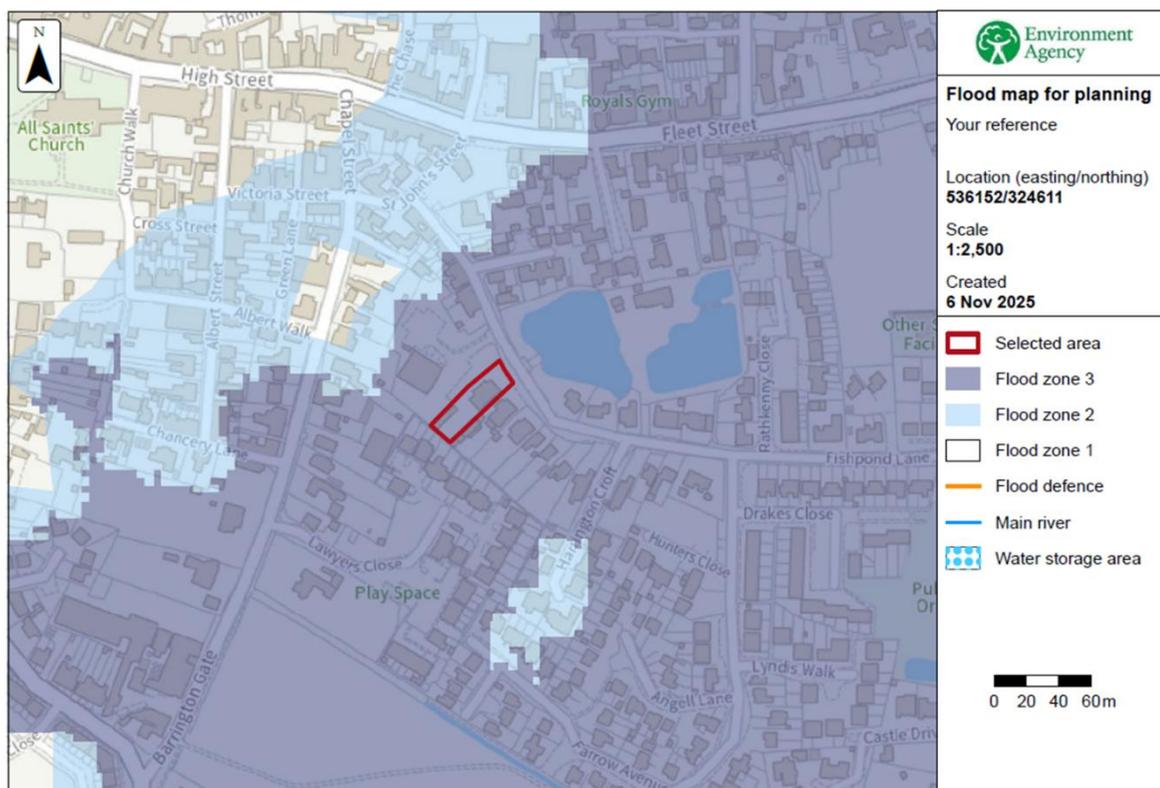
A planning application is due to be submitted to South Holland District Council to construct a games room and an annex to the rear of the existing bungalow at 18 Fishpond Lane, Holbeach, Spalding, PE12 7DE. The ground floor of the building will be a games room and there will be a self contained annex on the first floor.

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

For the Planning Application to be valid a flood risk assessment needs to be carried out to conform with the requirements of the Technical Guidance to the National Planning Policy Framework Development and Flood Risk. The site is within a defended area as specified in the South Holland District Council's Strategic Flood Risk Assessment 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.



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It can be seen that this site in Holbeach is within flood zone 3. The central area of Holbeach where land levels are higher is within flood zones 1 and 2.

## Application Site

The development is located on the eastern side of Holbeach. The National Grid Reference of the site is 536150, 324610.

The location 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, a development of a games room and an annex 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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

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

### **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 can be seen from the map on page 2 of this report the central area of Holbeach is in Flood Zones 1 and 2. The site is approximately 100 metres south of the boundary between flood zones 2 and 3(a) and is categorised therefore in flood zone 3(a).

It is assumed that the games room and the annex will provide accommodation similar to an extension to the existing house. As such it is not possible to locate these on an alternative site.

The safety of the site will be delivered by ensuring the ground floor level is above the predicted flood level in 2115.

Therefore it is considered that the sequential test is 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**

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 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 ...0 – 250mm
	Extent of flooding .. Low or medium flood probability
	Hazard..... Low hazard
	Peak Velocity .. 0 – 0.3m/sec

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

**Maximum flood level and bank levels in the River Welland**

The maximum levels in this tidal section of the River Welland 8.9 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 12.5km 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 levels of the River Nene north of the outfall sluice of the South Holland Main Drain are between 7.00m and 7.30m OD.

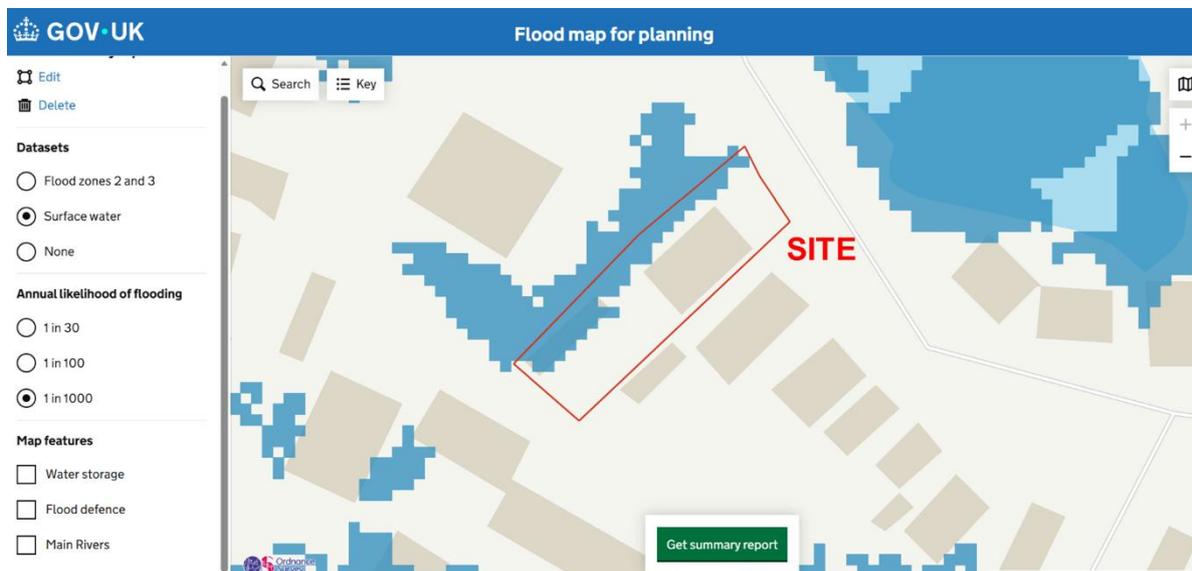
**Environment Agency Tidal Breach Hazard Mapping**

The Environment Agency has published mapping which predicts the depths, velocities and hazard following a breach in the tidal defences for a 1 in 200 and 1 in 1000 year event in 2115. The maps have been produced by modelling breaches along the whole length of the tidal defences and combining these into one map.

The maps indicate that a predicted flood depth of up to 250mm deep could occur in a 1 in 200 year tidal event in 2115.

## **Information on Surface Water Flooding on Environment Agency Website**

The map below shows the annual likelihood of surface water flooding in this area west of Friday Bridge in a 1 in 1000 year event.



The above map predicts that surface water flooding could occur on the north west side of the site in a 1 in 1000 year event.

## **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 9.0 km from the tidal section of the River Welland, 12.3km from the tidal part of the River Nene and approximately 11.6km from the Wash defences to the north at the nearest point. The tidal defence banks to all of these are maintained by the Environment Agency.

The South Holland Main Drain, which is the main fluvial watercourse south of Holbeach, is 6.1km south of the site. This drain, and the major watercourses in the area are maintained by South Holland IDB, which has carried out improvement schemes so that IDB watercourses generally provide a standard of 1 in 100 years with a freeboard of 300mm in urban areas.

## **Existing Ground Levels**

The level of Fishpond Lane directly north east of the site is 2.65m ODN, and the site is approximately 100mm higher than this.

## **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 River Welland north of Pinchbeck is approximately 8.9 km west of the site of the proposed development, and the Wash Banks are approximately 11.6km north of the site at their nearest point. The tidal section of the River Nene is 12.5km east of the site and the risk of flooding from this watercourse can be considered to be lower than the risk from the River Welland. The hazard from the River Welland will be considered to be the major risk to the site. If the Wash banks breached the flood water could reach the site but the resulting flood depths should not be as high as if a breach occurred in the bank of the River Welland.

The predicted levels in the SFRA indicate that the east bank of the River Welland will not be overtopped unless there is an event greater than 1 in 1000 years at the present time and in 2115 although it will not be overtopped in a 1 in 200 year event, although it could be overtopped in a 1 in 1000 year event.

The maps supplied by the Environment Agency indicate that there could be up to 250mm depth of flooding in either the 1 in 200 year or the 1 in 1000 year event in 2115.

The EA breach mapping assumes no attempt is made to immediately repair the breach. It is also likely that the EA will undertake further bank raising within the next 100 years to ensure that there is a continuing 1 in 200 year defence to the areas east of the River Welland.

Mitigation against flooding of the proposed building will be delivered by raising the finished floor level by a minimum of 300mm above the existing ground level.

### **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 site is located south east of the central area of Holbeach and is on the north west boundary of the "Free Discharge" catchment of the South Holland IDB district which discharges directly into the Little South Holland Drain. It is probable that surface water in this immediate area discharges into the ponds located on the north east side of Fishpond Lane. The level of the pond is controlled by a sluice and excess water flows into the IDB piped drain which flows southwards from the pond. This piped drain flows

into an open IDB watercourse which flows southwards and discharges into the Little South Holland Drain which is approximately 6.1 km south of the site.

The water level in the Little South Holland Drain is controlled by Little Holland Pumping Station which is located approximately 6km south of Holbeach. The water is pumped into the South Holland Main Drain and the level of this watercourse is controlled by the sluice alongside Nene Way 1.5km south of Sutton Bridge, where the water discharges into the tidal River Nene at low tide.

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.

Therefore the risk of flooding from IDB drainage channels can be considered to be adequately mitigated.

### **3. Localised Flooding in the area**

Reference to the Environment Agency map of predicted surface water flooding indicates that there may be some flooding on the north western boundary of the site. There is an existing large garage on this side of the plot which would prevent any surface water flooding on this side of the plot.

This risk will be mitigated as the floor levels of the proposed building will be raised by 300mm above the existing ground level to mitigate against tidal flooding.

#### **Extent of known Flooding**

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

#### **Probabilities and Trends of Flooding**

The probability of 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 19<sup>th</sup> February 2016 needs to be considered in the FRA. The effects of these new recommendations are considered in Appendix A of this report (pages 13 to 16). 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.

The development is in flood zone 3 and the hazard is “low hazard”. Reference should be made to Category F8 which shows the following matrix advice for this category.

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

*The applicant is advised to refer to the document “Improving Flood Performance of New Buildings Flood Resilient Construction (DCLG2007).*

*Finished floor levels (FFL) should be set 300mm above ground level for two storey proposals. Single storey proposals must set FFL’s above the 0.1% event breach in the 2115 scenario.*

## **Conclusions**

The Environment Agency map showing the predicted depth of flooding in a 1 in 200 year event in 2115 is shown below.



It can be seen that up to 250mm depth of flooding is predicted on the site in a 1 in 200 year tidal event in 2115. It can be shown that this level of flooding is also predicted in a 1 in 1000 year event in 2115.

The Environment Agency have stated that their policy is to continue to maintain tidal banks in the future with at least a 1 in 200 year standard of service.

The risk of flooding to the building from IDB drains can be considered low, especially as the floor levels of the proposed building will be raised a minimum of 300mm above the existing ground level.

The IDB have adequate arrangements to bring in contractors and use their own staff if a failure of any part of the sluices occurred. If drains become full any flooding that occurs would happen very slowly and affect land at levels lower than 3.00m ODN before the development site. It would be very unlikely to reach a level of above 3.65m ODN and put the proposed house at risk of flooding.

The proposed development is not in a functional flood plain as defined by PPS 25.

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

### **Recommendations**

In any area at risk of flooding it is preferable that new dwellings should be of two storey construction with all bedrooms at first floor level. This is to 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 finished ground floor level of the proposed new building should be raised by 300mm above the existing ground level.

The future occupier of this property should register with the Environment Agency's Floodline Warnings Direct Service to receive automated early warnings of potential flooding.

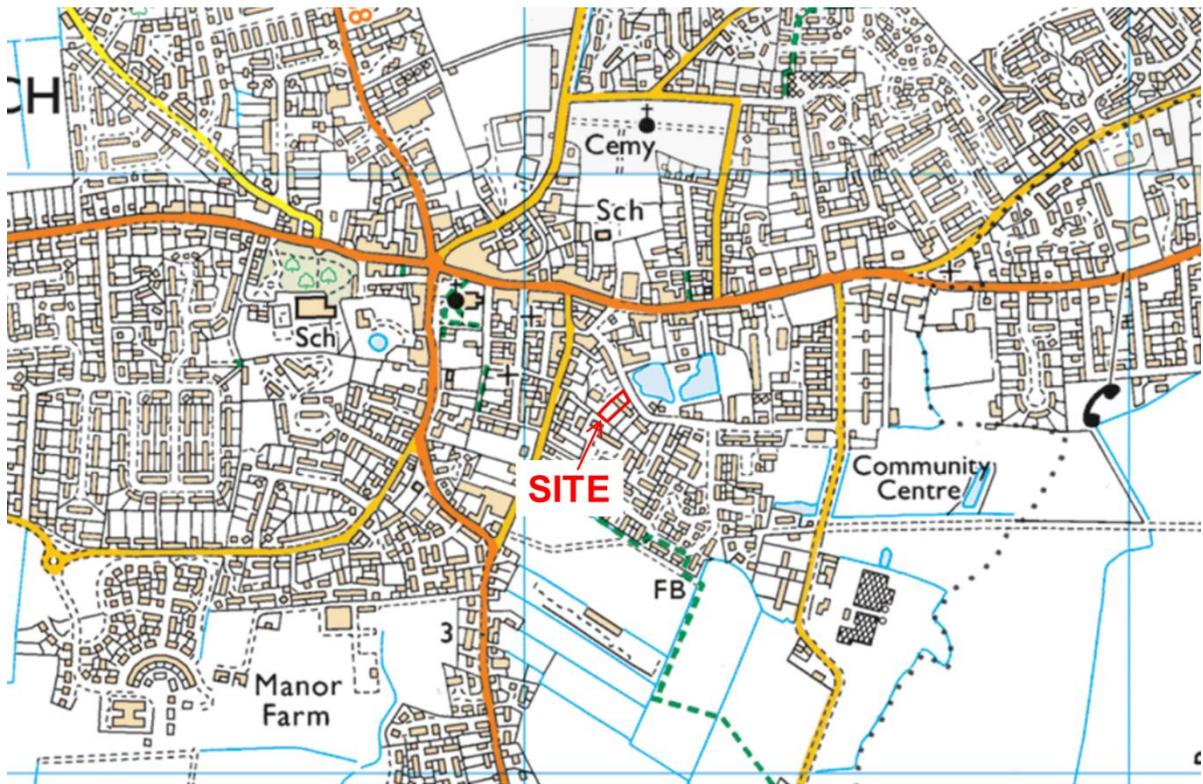
Rainwater from the roofs of the proposed building should if possible be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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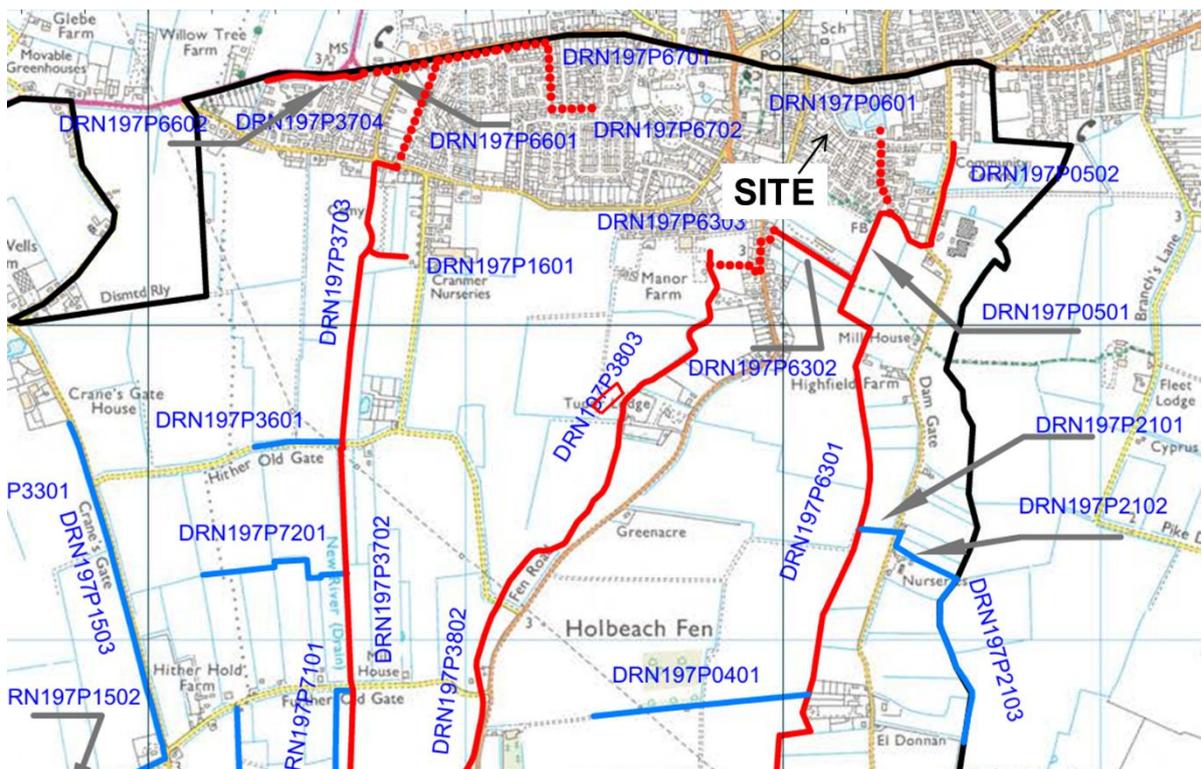
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19<sup>th</sup> November 2025

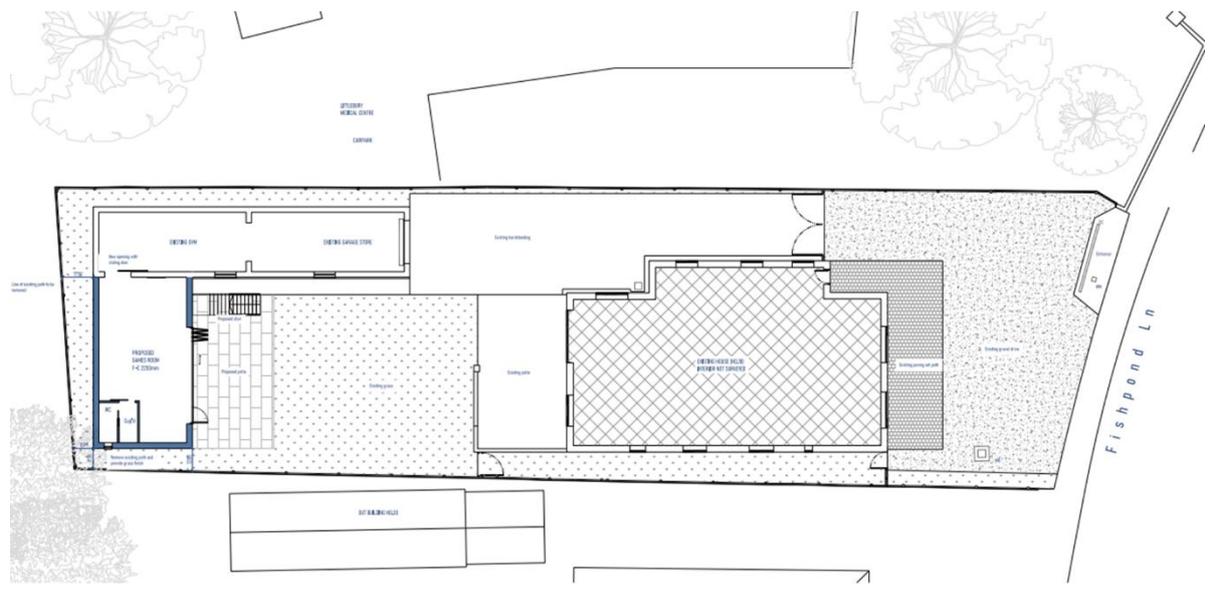
## LOCATION PLAN



## PLAN OF AREA SHOWING IDB WATERCOURSES



# PROPOSED BLOCK 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 19<sup>th</sup> 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<sup>1</sup>. 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**

**The current peak river flow allowances for the Welland Management Catchment are as follows:**

	2020's (2015 – 39)	2050's (2040 – 69)	2080's (2070 – 2115)
Upper End	22%	26%	53%
Higher central	10%	10%	28%
Central	5%	4%	17%

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

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)**

<u>Area of England</u>	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 or the Wash,.
  - 2) Flooding from IDB drainage system.
- 1) Flooding from a breach in the tidal banks.

The FRA has identified the main source of flooding to be from the tidal River Welland or the Wash. The new climate change recommendations could affect the predictions of flood levels in 2115 at the development site:

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 the new guidance increases the maximum predicted sea level in 2115 by 100mm compared with the allowance made in the SFRA, and presumably in the subsequent maps produced by the Environment Agency.

A 100mm increase of maximum tide levels is unlikely to increase flood depths on the site by as much as 100mm. When the flood maps are revised it is unlikely that the predicted flood depths are likely to change in the Holbeach area.

## 2) Flooding from IDB watercourses

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 28%, should be considered. After considering the effects of this increase the upper end allowance, which is 53%, should be considered to assess the effect of this.

IDB's have generally 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 the allowance provides 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 recommendation that the floor level of the proposed building should be raised a minimum of 300mm above the existing ground level, is satisfactory.