PROPOSED RESIDENTIAL DEVELOPMENT NORTH OF 68 SILTSIDE, GOSBERTON RISEGATE, SPALDING, PE11 4ET.
FLOOD RISK ASSESSMENT



View of proposed site looking south

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This flood risk assessment has been prepared solely to support the planning application for a residential development at 68, Siltside, Gosberton. 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

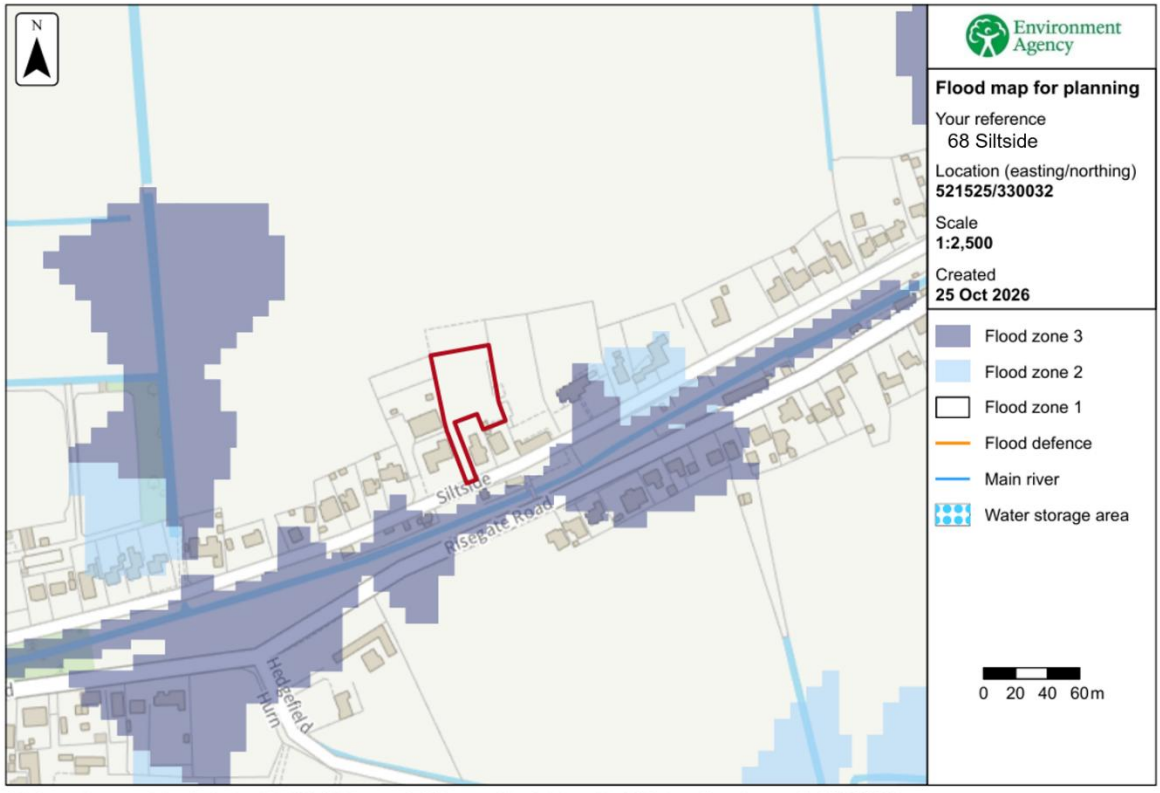
A planning application is due to be submitted to South Holland District Council to carry out a residential development north of 68, Siltside, Gosberton, Spalding PE11 4ET. Planning permission was granted in March 2025 (reference H08-0665-24) for residential development on the site. The site is situated 4.2km north of the River Glen and 2.9km south west of Gosberton.

The site is within within Flood Zone 1 as shown on the Environment Agency's Flood Zone map. The flood zone 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 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 Welland and Deepings 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 within flood zone 1.

Application Site

The site is located 6.3 km from the tidal section of the River Welland. The National Grid Reference of the site is 521525 330030.

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, a residential development 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 “More Vulnerable” development is satisfactory in flood zone 1.

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 flood risk and hazard at the site for the 1% fluvial event and 0.5% tidal event.

The maps illustrate the actual flood hazard which is as follows:

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 …… zero

The maps showing the residual flood hazard were revised in the 2016 update of the South Holland District Council Strategic Flood Risk Assessment and these are now shown on the website of the South East Lincolnshire Joint Planning Committee. The hazards are as follows:

For the present day Depth of flooding .. zero
Extent of flooding .. Low or medium flood probability
Hazard…… None
Peak Velocity .. zero

For the year 2115 Depth of flooding …zero

Extent of flooding .. Low or medium flood probability

Hazard…… None

Peak Velocity .. zero

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

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 River Glen outfall sluice, between chainage 15.0km and 16.1km.

	2007	2055	2115
Peak 1 in 200 year extreme tide level	5.99m OD	6.32m OD	7.13m OD
Peak 1 in 1,000 year extreme tide level	6.32m OD	6.65m OD	7.46m OD

With an average defence crest level between 7.50 and 7.70 m OD, apart from one low recorded level of 7.30m OD, the minimum freeboards are as follows:

	2007	2055	2115
Peak 1 in 200 year freeboard	1510mm	1180mm	370mm
Peak 1 in 1,000 year freeboard	1180mm	850mm	40mm

Tables in the SFRA show the following details for the predicted flood levels in the River Glen at chainage 4.5 km.

	2007	2115
Peak 1 in 100 year flood level	4.29m OD	4.65m OD
Peak 1 in 1,000 year flood level	4.43m OD	4.68m OD

The bank levels on this section vary between 4.33m OD and 5.3m OD on this length of the River Glen. Therefore it can be seen there is a risk of overtopping of the lower lengths of bank of the River Glen overtopping in the 1 in 100 year event in 2115.

Information from the Environment Agency

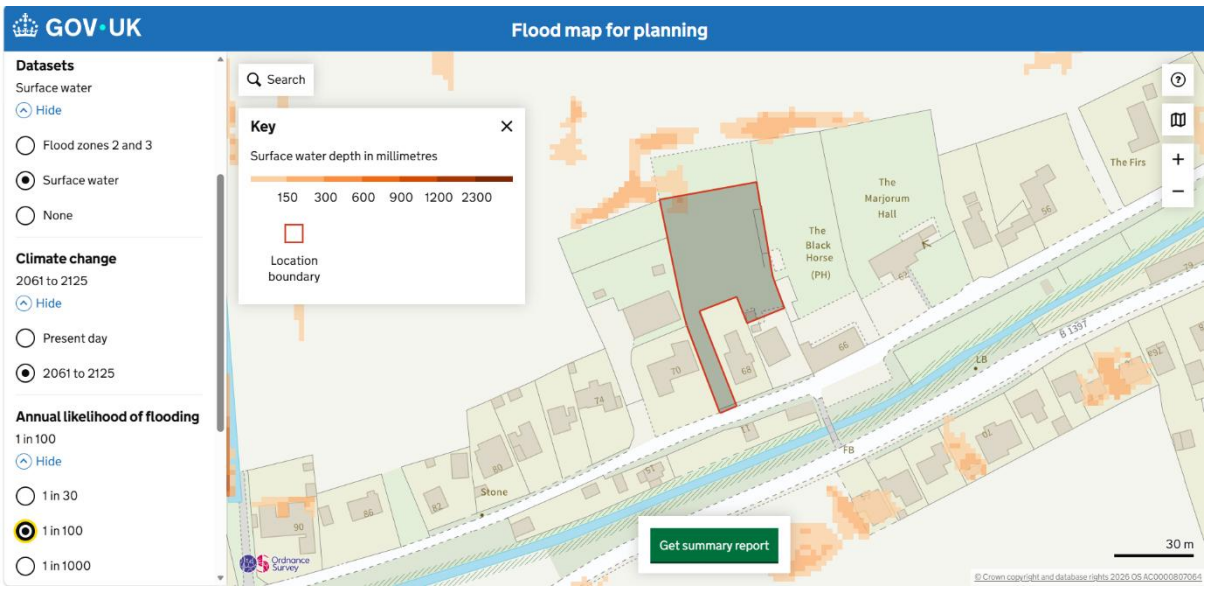
The Environment Agency has provided predicted flood levels for the River Glen which are taken from the Welland Catchment Model. These levels are approximately 1km south (upstream) of the nearest point of the River Glen to the development site.

	2007	2115
Peak 1 in 100 year flood level	4.32m OD	5.12m OD
Peak 1 in 1,000 year flood level	4.47m OD	5.30m OD

The predicted flood levels for 2115 seem to have been computed ignoring any effect of overtopping that will occur between Bourne and the outfall once the river levels rise above 4.80m OD.

Information on Surface Water Flooding on Environment Agency Website

The map below shows the predicted extent of surface water flooding in this area of Spalding between 2061 and 2025 in a 1 in 100 year event.



It can be seen that there is a predicted risk of surface water flooding near the northern boundary of the site in this event, but the area which is located on the northern boundary is small.

Existing Ground Levels

A topographical survey has been produced showing levels of the existing house and of the proposed site which will be submitted as part of the planning application.

The levels of Siltside is 3.50m OD. The existing house has a finished floor levels of 3.89m OD and the ground levels immediately around this house are between 3.65m OD and 3.80m OD.

The grassed area at the rear of the existing house is between 3.40m OD and 3.55m OD.

The proposed site has existing ground levels of between 3.0m and 3.20m OD, with the southern part between 3.20m and 3.40m OD.

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 6.3 km from the tidal section of the River Welland north of Surfleet, which has a tidal defence bank which is maintained by the Environment Agency.

The site is located approximately 4.2 km from the River Glen, which has a fluvial defence bank which is maintained by the Environment Agency.

The site is located 5.2km east of the South Forty Foot Drain, which is maintained by the Environment Agency.

The site is located 120 metres north of the Risegate Eau, which is a watercourse maintained by Welland and Deepings IDB.

Potential Sources of Flooding

The potential sources of flooding to the site are:-

1. Failure or overtopping of tidal defences of the River Welland.
2. Overtopping or breach in the River Glen.
3. A breach or overtopping of defences of South Forty Foot Drain.
4. Flooding from IDB watercourses.
5. Surface water flooding

1. Failure or overtopping of tidal defences

The west bank of the tidal River Welland, which is approximately 6.3 km east of the site and north of Surfleet Sluice, has at least a 1 in 200 year standard of protection. It is extremely unlikely that flood water from a breach in the west bank of the River Welland south of the outfall sluice from the River Glen would cause flooding to the development site. The higher land and old sea banks, as well as Vernatt's Drain, would prevent flood water reaching the new A16

if a breach occurred south of the outfall sluice. It is possible that flood water from a breach in the River Welland north of the outfall sluice could flow westwards and could affect the site in an extreme event. However if the flooding extended as far as the railway line this would reduce the possibility of any flooding occurring to the site.

The map in the SFRA does not predict any flooding on the site in a 1 in 200 year event in 2115. Flood depths of between 0 and 500mm are predicted on low land south of Hedgefield Hurn but this flooding will possibly be as a result of a breach in the River Glen.

Adequate mitigation from this source of flooding will be provided by raising the floor level of the proposed dwellings by approximately 300mm above the existing ground level.

2. Failure or overtopping of the banks of the River Glen

The SFRA gives predicted levels for the River Glen of 4.65m OD and 4.68m OD for the 1 in 100 year and 1 in 1000 year events in 2115. However the Environment Agency advise that the levels will be much higher at 5.12 and 5.30m OD for the 1 in 100 year and 1 in 1000 year events in 2115.

The levels of the earth bank on the north side of the River Glen between chainage 3.5km and 4.0 km, which is south east of the development site are shown below:

Chainage (km)	4.2	4.3	4.4	4.5	4.6	4.7	4.8
Bank level (m OD)	5.07	4.79	4.65	4.59	4.70	4.89	4.92

Therefore it would seem very unlikely that maximum levels in the River Glen could actually rise to the levels above 5.00m OD predicted by the EA.

Peak water levels occur in the River Glen when the outfall into the tidal River Welland is tide locked. During this time the levels in the River Welland are higher than levels in the River Glen, even when the latter levels are very high. This closes the large timber doors at the sluices and prevents discharge from the River Glen into the River Welland for approximately 3 to 4 hours. Immediately upstream of the sluices is an area called Surfleet Reservoir where the area between the banks is much wider where excess water is stored.

In a 1 in 100 year event in 2115 water in the river would be overtopping the earth banks in numerous places between Surfleet and Bourne which would prevent river levels rising much above the levels predicted in the 2010 SFRA.

The map in the latest SFRA does not predict any flooding on the site in a 1 in 200 year event in 2115. Some flooding is predicted south of Hedgefield Hurn and it is assumed this will be caused by a breach in the north bank of the River Glen.

Adequate mitigation from this source of flooding will be provided by raising the floor level of the proposed dwellings by approximately 300mm above the existing ground level.

3. Failure or Overtopping of South Forty Foot Drain

The South Forty Foot Drain is located 5.2km west of the site. This watercourse is maintained by the Environment Agency. The Drain is embanked from the southern end at Black Hole Drove Pumping station to north of Donington. The SFRA states that the maximum predicted water level in the Drain in a 1 in 100 year event in 2115 is 3.41m OD. However later reports by the EA have concluded that the watercourse only has a standard of service between 1 in 25 and 1 in 50 years and overtopping will occur in events larger than these. Therefore in practice the water level is not expected to exceed 3.25m OD in any event, and flooding will occur with overtopping of the banks of the Drain and the embanked highland watercourses that lead into the Drain from the west.

Adequate mitigation from this source of flooding will be provided by raising the floor level of the proposed dwellings by approximately 300mm above the existing ground level.

4. Flooding from IDB watercourses.

The Drain on the southern side of Siltside is the Risegate Eau. The area of the proposed development is drained by the Risegate Eau which is an IDB watercourse maintained by Welland and Deepings IDB. A photograph of this drain is shown below.



This section of Risegate Eau flows in easterly direction and the water level in this drain is controlled at the outfall near Fosdyke Bridge with an outfall sluice and a pumping station, which is 10km east of the development site. Chesboule Lane is the boundary between Welland and Deepings and Black Sluice IDB areas. On the west side of Carter's Bridge the water flows in a westerly direction to be pumped into the South Forty Foot Drain.

Risegate Eau provides drainage for the whole fen area of Gosberton and Quadring. For most situations the water is discharged into the tidal River Welland through the sluices at low tide. However in high flow situations after heavy rainfall the pumps need to be operated to control the water levels in the catchment.

The Welland and Deeping IDB drains have been designed to a 1 in 10 year standard with a freeboard of between 800mm and 1.0 metres. This generally provides a standard of at least 1 in 50 years for flooding of the lowest land. Much of the land in the catchment is below 3.00m OD and therefore even if the pumps fail to operate for a considerable time during a rainfall event the site of the development is unlikely to flood. The normal water level in the Risegate Eau is 0.00m OD at the outfall, and the water level in the drain south of the development site on 5th January was 1.13m OD. The maximum design level in the Risegate Eau at Wargate Bridge, which is 2.0 km east of the development site, is 1.05m OD and it is estimated that the water level in Risegate Eau at Carters Bridge could rise to as high as 2.50m OD in a 1 in 100 year event.

Black Sluice IDB have carried out computer modelling of this catchment in 2011 and the predicted levels in Risegate Eau on the east side of Carter's Bridge are as follows

1 in 100 years	1.69m OD
1 in 100 years + climate change	1.81m OD

Adequate mitigation from this source of flooding will be provided by raising the floor level of the proposed dwellings by approximately 300mm above the existing ground level.

5. Surface Water Flooding

The Environment Agency map showing areas of predicted flood risk from surface water does not indicate any flooding on the site, except for a very small area on the northern boundary.

There is some flooding indicated in the field north of the site indicating areas at a lower level than the site.

Adequate mitigation from this source of flooding will be provided by raising the floor level of the proposed dwellings by approximately 300mm above the existing ground level.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties being flooded in the last fifty years.

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 River Glen.

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 East Lincolnshire which was last updated in 2017. 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 14 to 17).

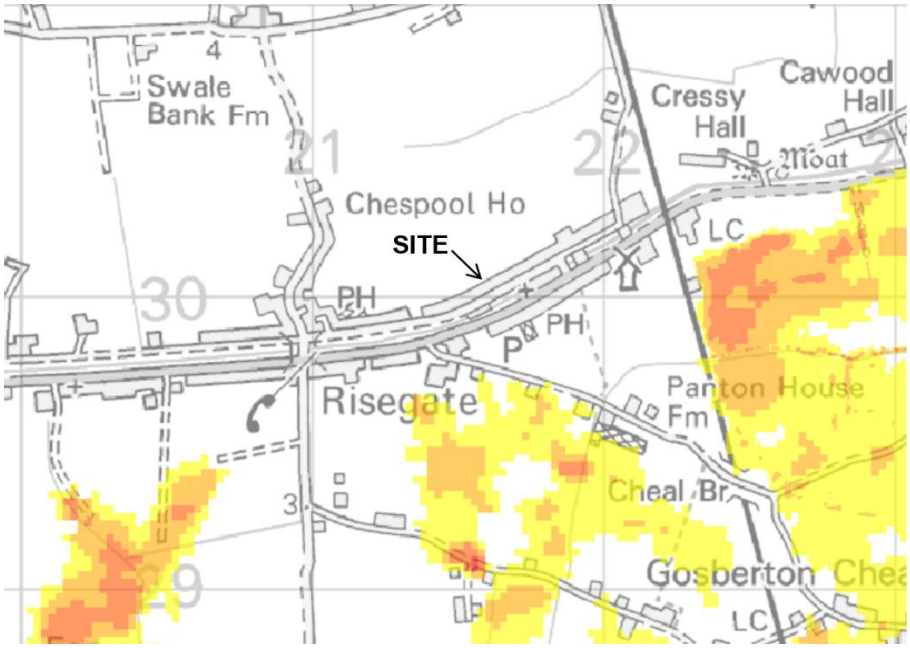
South East Lincs Advice Matrix

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 1 and there is no flood hazard reference should be made to Category H7 which states “No Comment”.

Conclusions

The map of predicted flood depths produced by the EA in the SFRA do not predict any flooding on the site. An extract from this map is shown below. South of Hedgefield Hurn the flood depths of 0 – 250mm and 250mm – 500mm are predicted for a 1 in 200 year tidal or 1 in 100 year fluvial event in 2115.



The recommended floor level for the proposed dwellings will be above the predicted 1 in 100 year level of Risegate Eau, and above any small accumulation of surface water that might occur on the site.

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.

The site is within flood zone 1, which is defined by the Environment Agency as land with less than a 0.1% annual probability of flooding from rivers or the sea.

The sequential test was considered in the course of the previous planning application (granted in March 2025 reference H08-0665-24) and it was concluded that given that

the application is located within flood zone 1 with a low probability of flooding a sequential test is not required.

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.

The finished ground floor level of the proposed dwellings with bedrooms on the first floor should be at a minimum level of 3.50m OD, which will be approximately 350mm above the existing ground level on the area of the site where the dwellings are proposed.

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

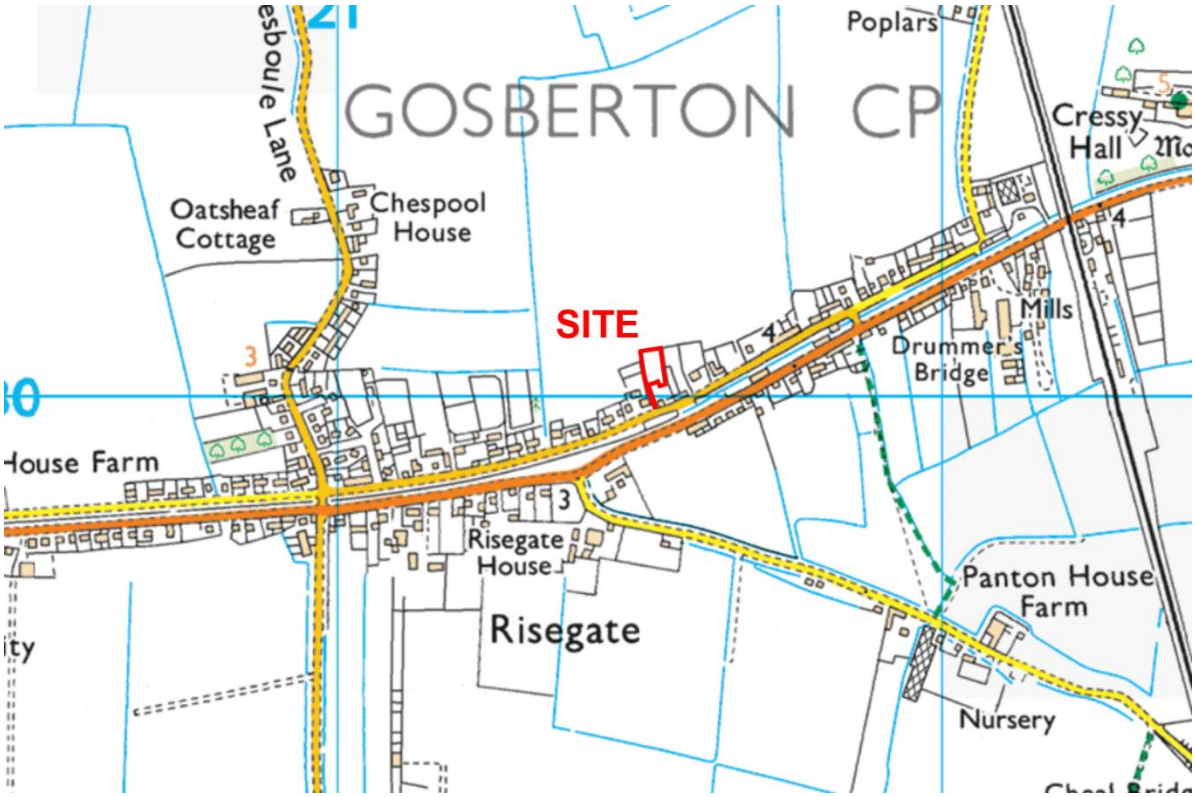
On site surface water drainage should be ideally discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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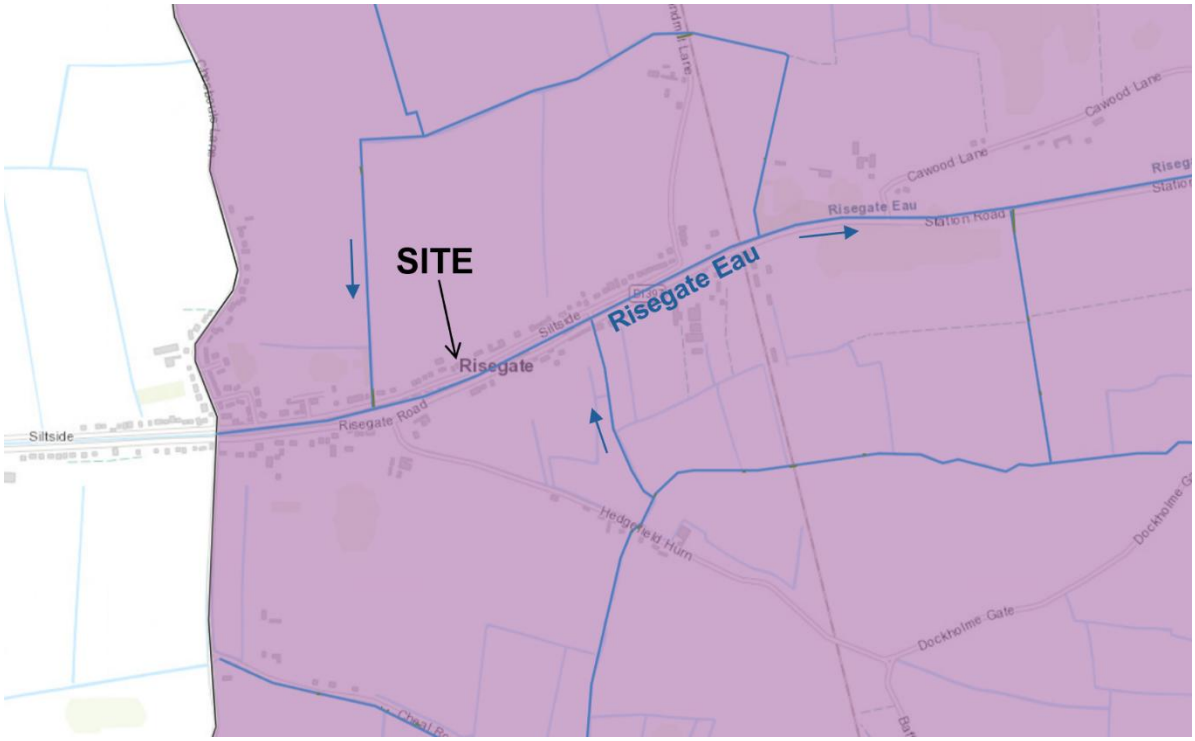
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12th November 2026

LOCATION PLAN



PLAN OF IDB DRAINS



PLAN OF PROPOSED DEVELOPMENT



APPENDIX 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 more vulnerable development in flood zone 1 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 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
2) Flooding from the River Glen
3) Flooding from IDB Watercourses

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 a maximum any residual flooding on any part of the site in a 1 in 200 year event in 2115. The risk of flooding from the tidal River Welland is extremely low due to the reasons set out on page 6 of this report.

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 new building should have a minimum ground floor level of 3.45m OD should ensure that the risk of flooding to the building is extremely low in a 1 in 200 year event in 2115.

2) Flooding from the River Glen

Fluvial flooding from the River Glen is considered to be the major flood risk to the site. As the development is in flood zone 2 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.

Maximum flood levels in the River Glen will not be increased by the increase in flows projected in the new climate change allowances. If flows increase by between 35% and 65% in this river systems it will have the effect of flooding over the long sections of bank between Bourne and Surfleet Reservoir and the maximum levels will not increase significantly.

3) Flooding from IDB drains

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.

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 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 levels should be a minimum level of 3.50m OD, is satisfactory.