

PROPOSED RESIDENTIAL DEVELOPMENT WEST OF 190
HALLGATE, HOLBEACH, SPALDING, PE12 7HS.
FLOOD RISK ASSESSMENT



View of site from Hallgate

S M Hemmings B Sc C Eng MICE MIWEM,
13 Lea Gardens,
Peterborough,
PE3 6BY

stuart.hemmings@btinternet.com

This flood risk assessment has been prepared solely to support the planning application for the residential development at Hallgate, 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

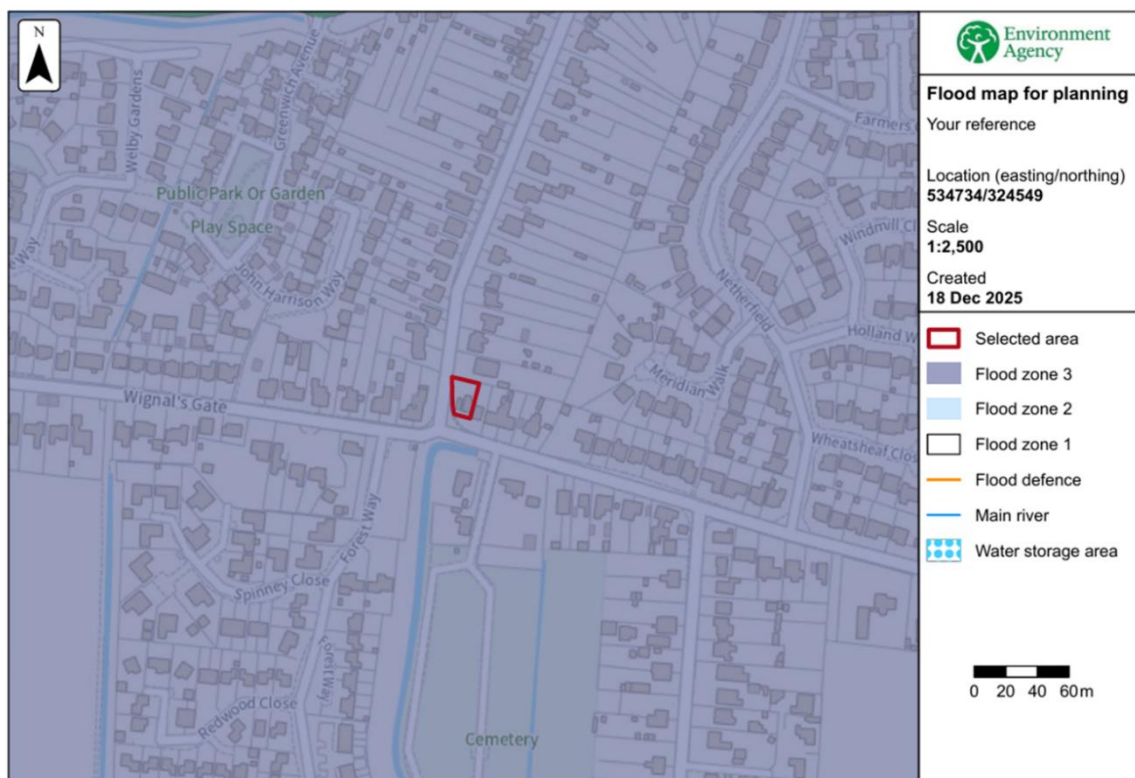
A residential development is proposed alongside the existing house at 190 Hallgate, Holbeach, Spalding. The land is at present part of the side garden of the property, and the existing single storey side extension will be demolished as part of the proposed development.

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.



It can be seen that all of this area south west of the central area of Holbeach is within Flood Zone 3. There is a small area in the centre of Holbeach which is higher and 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 534735, 324550.

The location 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 detailed on the Environment Agency's flood zone maps without defences, 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 a dwelling house 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	✓*

It can be seen that for "More vulnerable" development the sequential and the exception tests need to be applied to the development.

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 all of the area on the south west side of Holbeach is in Flood Zone 3. Therefore it would be difficult to find a similar available site for the development in Holbeach that is in a lower flood risk zone.

The site can be considered to be an infill site within the town boundary of Holbeach. Clause 5.3.5 on page 61 of the South East Lincolnshire Local Plan 2011-2036, adopted in March 2019 states the following:

Within the defined boundaries there will be numerous opportunities for infill and larger-scale housing development that will be available to the local builder, self-builder, custom-builder and larger house-building companies. It is not practical to identify or anticipate all such opportunities; however, the positive tone of the Local Plan encourages such development provided that the material considerations of the Local Plan and particular sites are met.

The safety of the development will be achieved by ensuring the finished floor level of the proposed property is raised above the relevant predicted flood level.

Therefore taking into account the above I consider that the sequential test for this site has been 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 .. High
	Hazard..... Low Hazard
	Peak Velocity .. 0 – 0.3m/sec

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

For the year 2115	Depth of flooding0 – 250mm
	Extent of flooding ...High
	Hazard Low Hazard
	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 the tidal section of the River Welland 8.5 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 the tidal section of the River Nene 13.5km 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 7.30mOD.

Information from the Environment Agency.

The Environment Agency has provided flood risk information for this site. This states that

- The site is not considered to be at risk from main rivers
- The site is considered to be at risk from tidal flooding. This could be from the tidal sections of the River Welland or the River Nene, or from the Wash directly north of Holbeach.

The information provides tidal hazard mapping if a breach occurs in the defences for the following scenarios

Year 2115	0.5% (1 in 200 year) chance
Year 2115	0.5% (1 in 200 year) chance

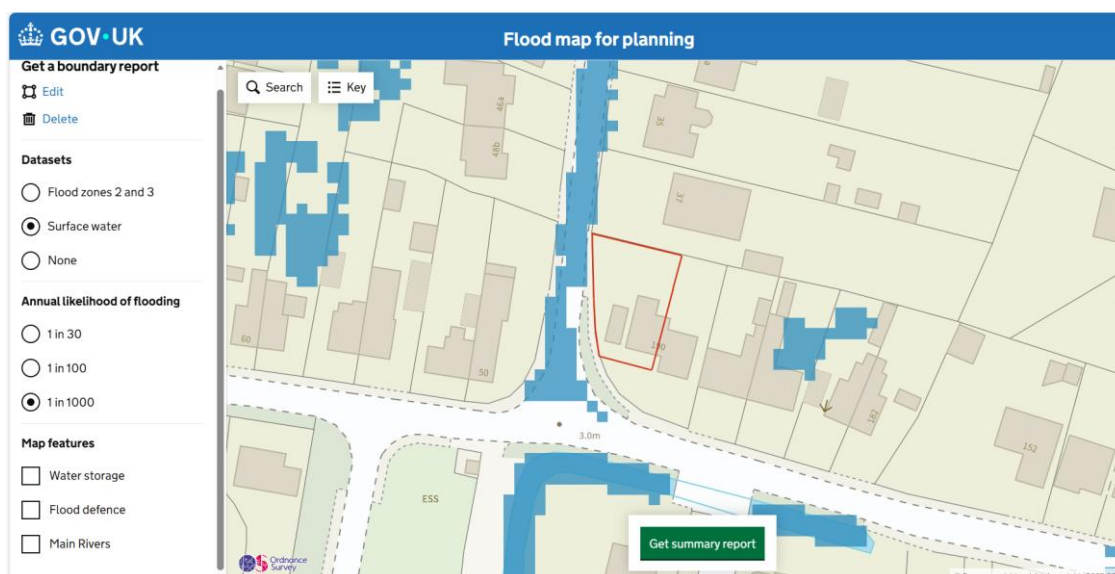
If overtopping only of defences occurs the site is not predicted to be affected.

For both of the above scenarios the actual hazards are:

Hazard	Less than 0.75 (low hazard)
Maximum Depth	0 – 250mm
Velocity	0 – 0.3m/sec

Information on Surface Water Flooding on Environment Agency Website

The map below shows the predicted extent of surface water flooding in this area in a 1 in 1000 year event.



The above map predicts the areas coloured blue to be at risk from surface water flooding in a 1 in 1000 year event.

It can be seen that the mapping predicts that there may be some surface water flooding to Wignals Gate west of the site but the proposed development will not be affected.

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 8.4 km from the tidal section of the River Welland, 14.0km from the tidal part of the River Nene and 12.6km 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 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 and Proposed Levels of Buildings

The level of Hallgate in front of the property is 3.00m OD. The ground level in front of the property is approximately 200mm above the road and the ground floor level of the existing property is approximately 150mm above ground level.

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 is approximately 8.4 km west of the site of the proposed development, and the Wash Banks are approximately 12.6km north of the site at their nearest point. The hazard from the River Welland north of Fosdyke Bridge 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 banks west of the site.

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, it will be overtopped in a 1 in 1000 year event.

The maps supplied by the Environment Agency indicate that the maximum predicted residual depth of flooding in both the 1 in 200 year and the 1 in 1000 year event in 2115 in this area will be between 0 and 250mm.

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 property 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.

There is an open watercourse immediately south of the property. This is called the Holbeach New River and it flows southwards to join Horns Dyke which discharges into the South Holland Main Drain which is approximately 6.0 km south of the site.

The water level in the South Holland Main Drain 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

The Environment Agency map of surface water risk predicts some flooding to the road called Wignals Gate west of the site. However it does not predict any flooding in Hallgate south of the site. Any excess surface water on Hallgate will drain immediately into the open IDB drain immediately south of Hallgate. Therefore the risk of flooding due to surface water on the site can be considered to be extremely low and satisfactorily mitigated as the floor levels of the property will be raised by at least 300mm above the existing ground level.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the existing house or garden 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 16 to 19). 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 flood hazard is “low hazard” (less than 0.75) across all of the site reference should be made to Category F8 which shows that the matrix reference for this category is as follows:

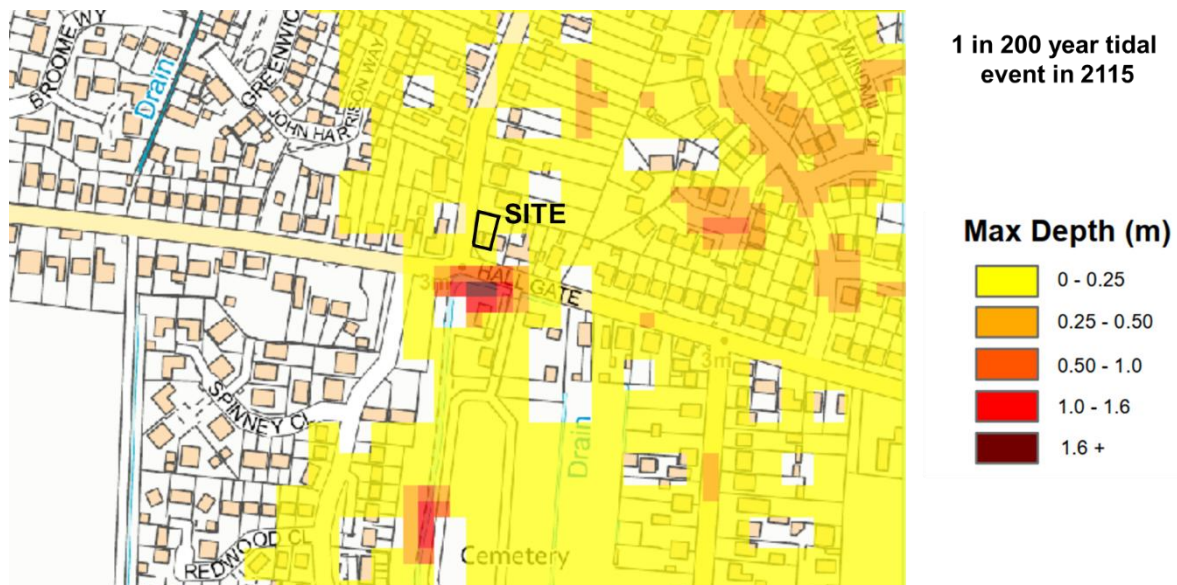
The NPPF requires that proposals are accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures / flood resilience techniques have been incorporated into the development.

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 1000 year event in 2115 is shown below.



It can be seen that up to 250mm depth of flooding is predicted on the site and over this whole area around Hallgate.

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 with the floor levels of the proposed dwelling being raised at least 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 3.00m 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. The site is only at risk of flooding if a breach occurs in the east bank of the River Welland or the west bank of the River Nene during a 1 in 200 year or 1 in 1000 year high tide in 2115. No flooding would be likely to occur if a breach did not occur.

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 dwelling should be raised by approximately 300mm above the existing ground levels on the site.

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.

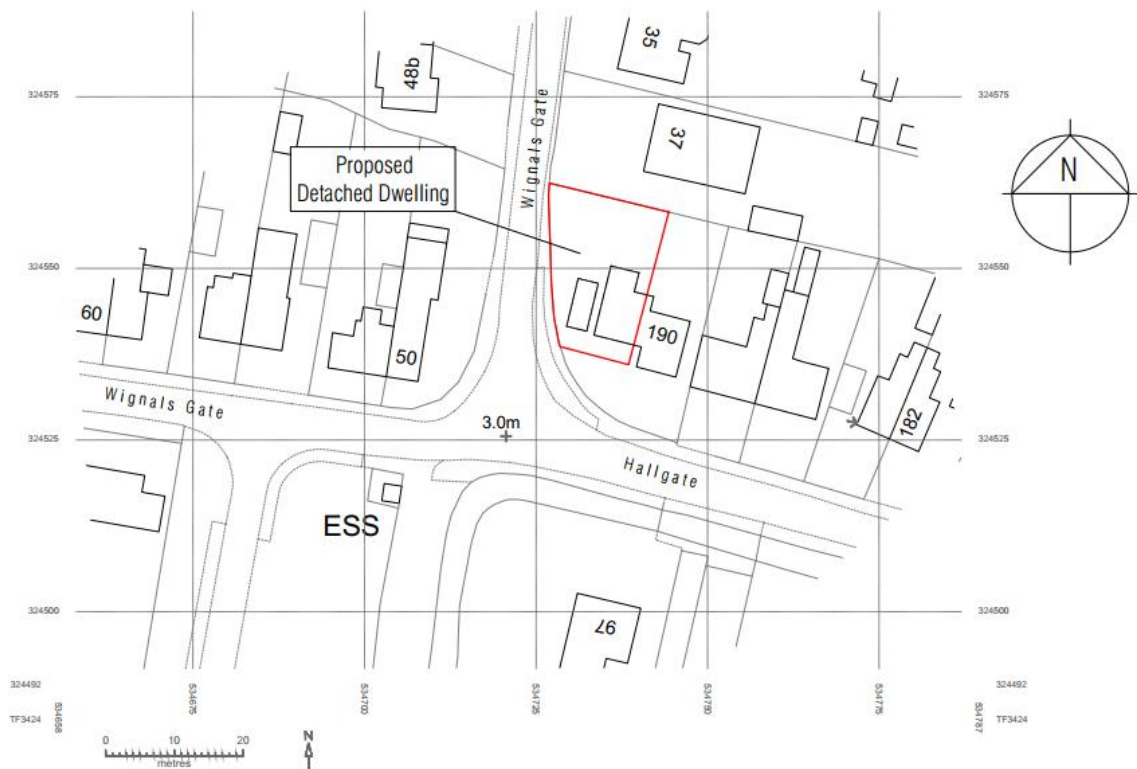
Rainwater from the roofs of the proposed house should if possible be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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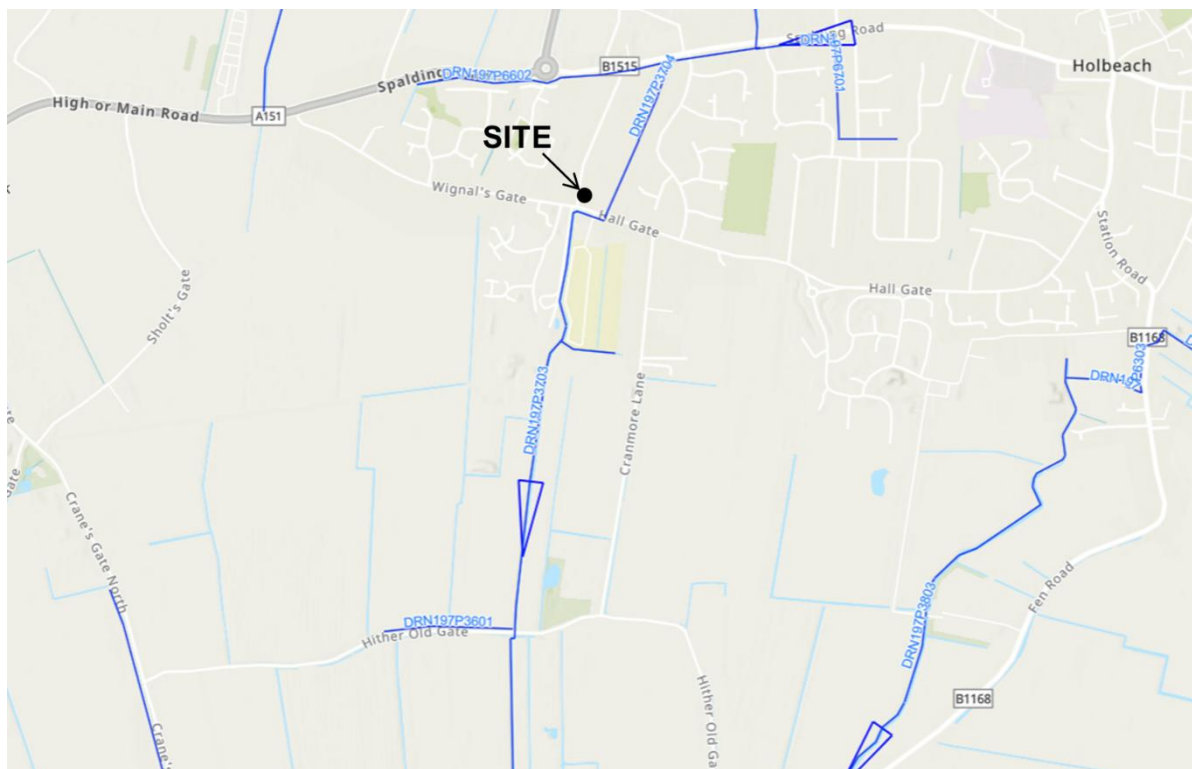
stuart.hemmings@btinternet.com

19th January 2026

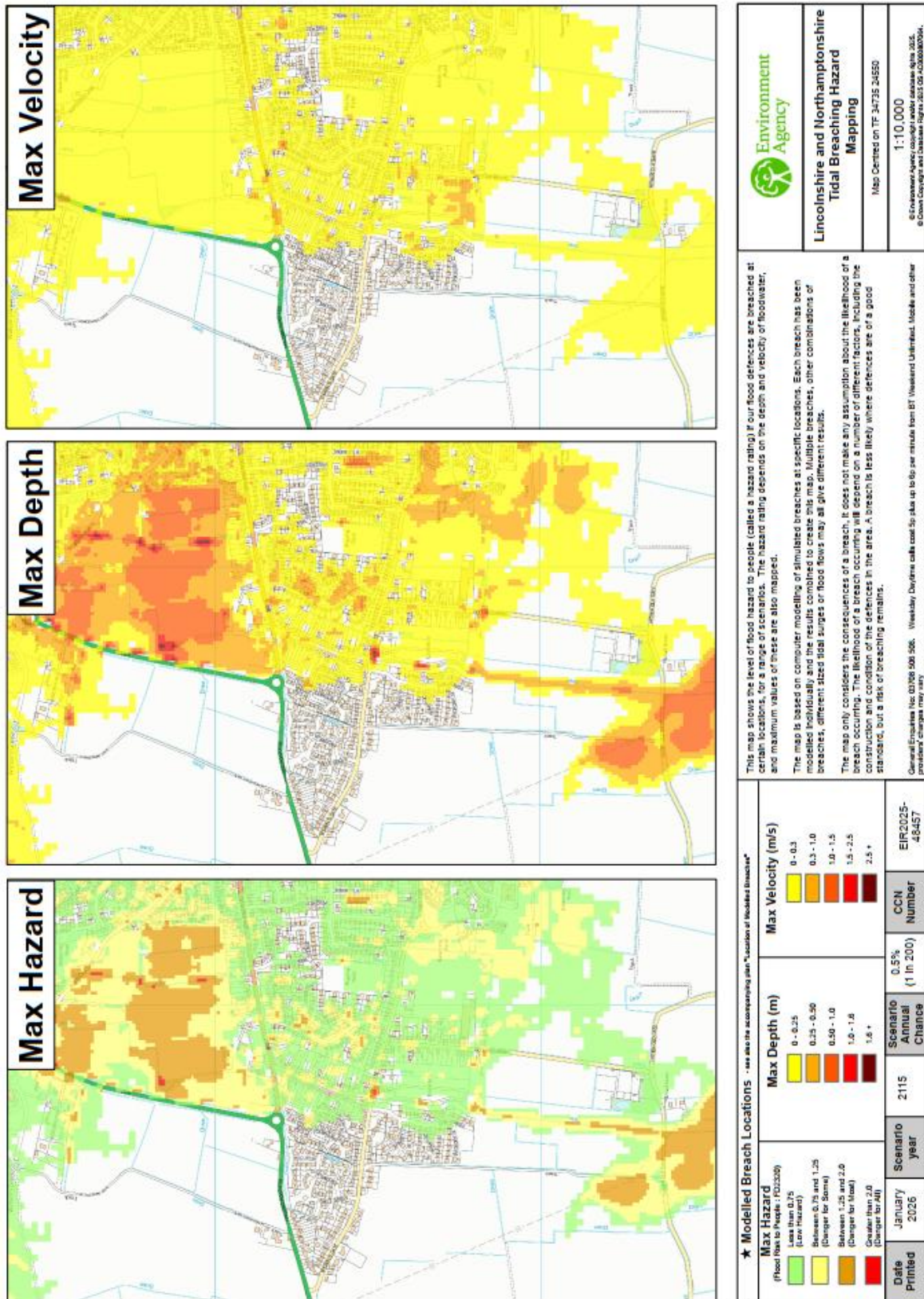
LOCATION PLAN



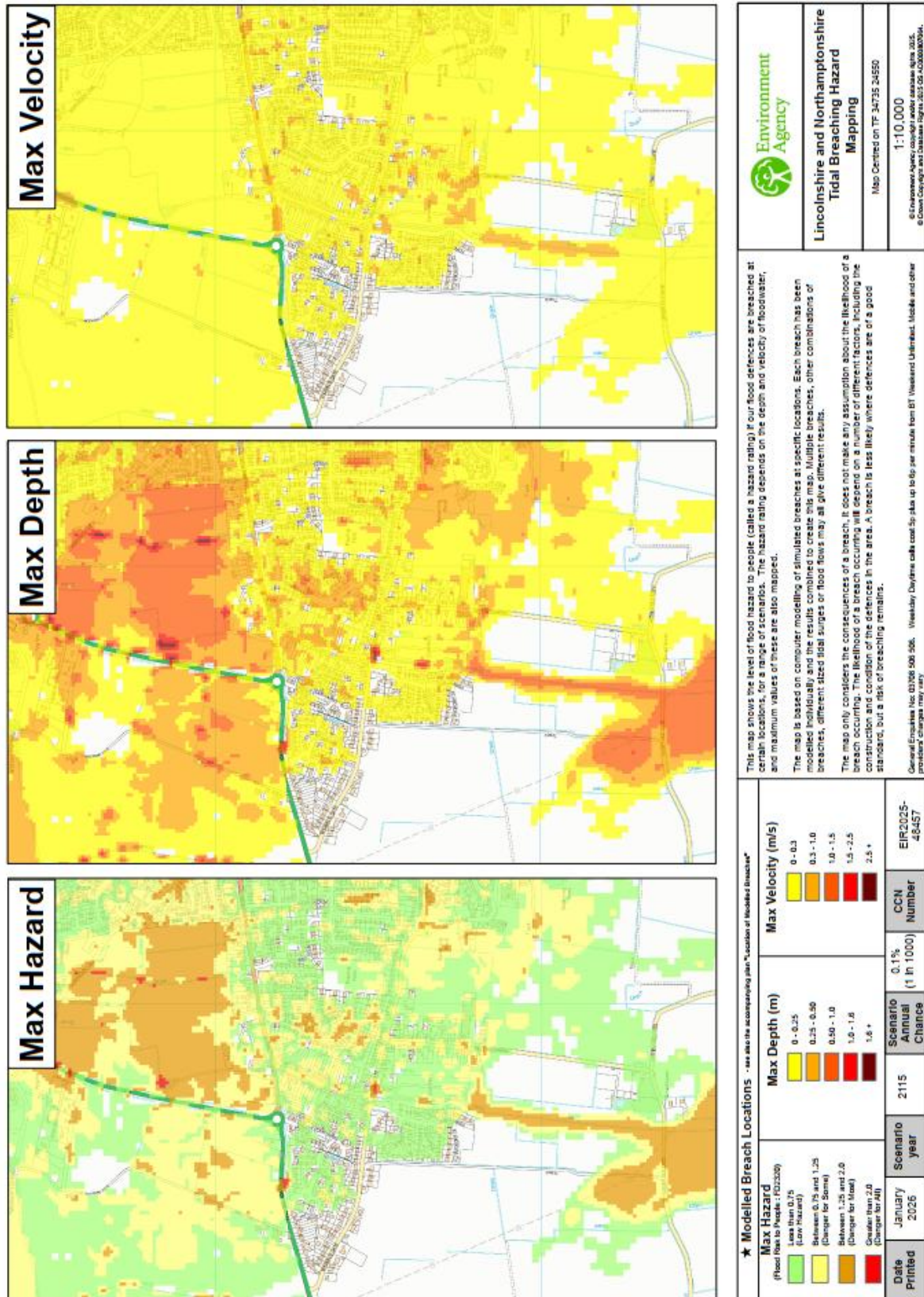
PLAN OF AREA SHOWING IDB WATERCOURSES



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 PPS25¹. 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

Table 1 peak river flow allowances by river basin district (use 1961 to 1990 baseline)

River basin district	Allowance category	Total potential change anticipated for '2020s' (2015 to 39)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

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

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 3 sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

Area of England	1990 to 2025	2026 to 2050	2051 to 2080	2081 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 (140 mm)	8.5 (212.5 mm)	12 (360 mm)	15 (525 mm)	1.24 m

Table 4 offshore wind speed and extreme wave height allowance (use 1990 baseline)

Applies around all the English coast	1990 to 2050	2051 to 2115
Offshore wind speed allowance	+5%	+10%
Offshore wind speed sensitivity test	+10%	+10%
Extreme wave height allowance	+5%	+10%
Extreme wave height sensitivity test	+10%	+10%

Effects on Predictions of Flood Risk in FRA

The FRA has identified 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 flood depths are likely to significantly change.

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 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.

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.

to ensure that they have adequate plans to comply with the latest recommendations on climate change.

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 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 property should be raised a minimum of 300mm above the existing ground level, is satisfactory.