PROPOSED RESIDENTIAL DEVELOPMENT ON THE SITE OF THE NEW SARACENS HEAD, WASHWAY ROAD, HOLBEACH, SPALDING, PE12 8AY
FLOOD RISK ASSESSMENT



Existing buildings looking west from Washway Road

S M Hemmings B Sc C Eng MICE MIWEM,

13 Lea Gardens

Peterborough

PE3 6BY

This flood risk assessment has been prepared solely to support the planning application for a development on the site of The New Saracens Head at 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 purposes other than for which it was originally commissioned.

Introduction

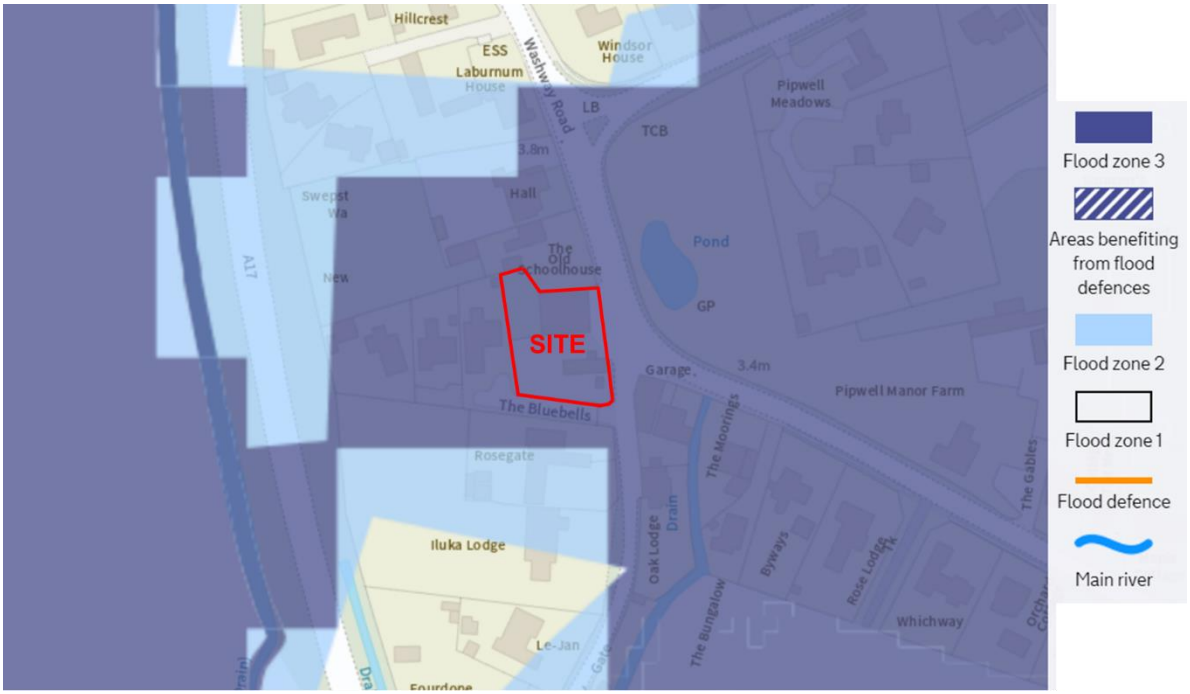
A planning application is due to be submitted to South Holland District Council to demolish the existing public house and adjoining building called “The New Saracens Head” on Washway Road, Holbeach and carry out a residential development on the site, which is located in the village of Saracens Head east of the A17.

The site is within 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.

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 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 this area.



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

Application Site

The site is located 5.5 km from the tidal section of the River Welland. The National Grid Reference of the site is 534050 326980.

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 it can be defined as being 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 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 †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

From the table above 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 much of the area east of Gosberton is within flood zone 3(a), although there is a small area immediately east of the site that is classified within flood zone 2. Therefore it would be difficult to find a similar site for development that is in a lower flood zone.

It is not possible to locate the development in an alternative location because it is for the conversion of an existing building.

Referring to the South East Lincolnshire Local Plan 2011-2036 adopted in March 2019, Policy 23 states the re-use and conversion of redundant buildings in the

countryside for residential use will be permitted, subject to conditions on the state of the building and the design of the proposed development.

The safety of the development will be delivered by ensuring the floor level of the proposed new dwelling is above predicted residual flood levels for this area.

Therefore I consider that the sequential test 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
	Velocity ……. Nil
For year 2115	Depth of flooding … zero
	Extent of flooding .. Low or medium
	Peak Velocity …… Nil

The maps showing the residual flood hazard were revised in the 2016 update of the South Holland District Council Strategic Flood Risk Assessment which can be found on the website of the South East Lincolnshire Joint Planning Committee. The hazards are as follows for the 1% fluvial or 0.5% tidal event probability:

For the present day	Depth of flooding…….	zero
	Extent of flooding ……....	low or medium
	Hazard …….	zero
	Velocity …….....	zero
For the year 2115	Depth of flooding ……...	0 - 250mm
	Extent of flooding ……..	High
	Hazard ……	0.75 – 1.25 (danger for some)
	Velocity ……. ……	0 – 0.3 m/sec

Figure 16 of the general maps shows that the site is not within the rapid inundation zone for the present day or in 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

Information from the Environment Agency

The Environment Agency have provided maps showing the following predictions for hazard, maximum depth and maximum velocity at the development site if a breach occurred in the tidal defences:

	Maximum Hazard	Maximum Depth	Maximum Velocity
1 in 200 year in 2006	zero	zero	zero
1 in 1000 year in 2006	zero	zero	zero
1 in 200 year in 2115	zero	zero	zero
1 in 1000 year in 2115	0 – 0.75	0 – 250mm	0 – 0.3m/sec

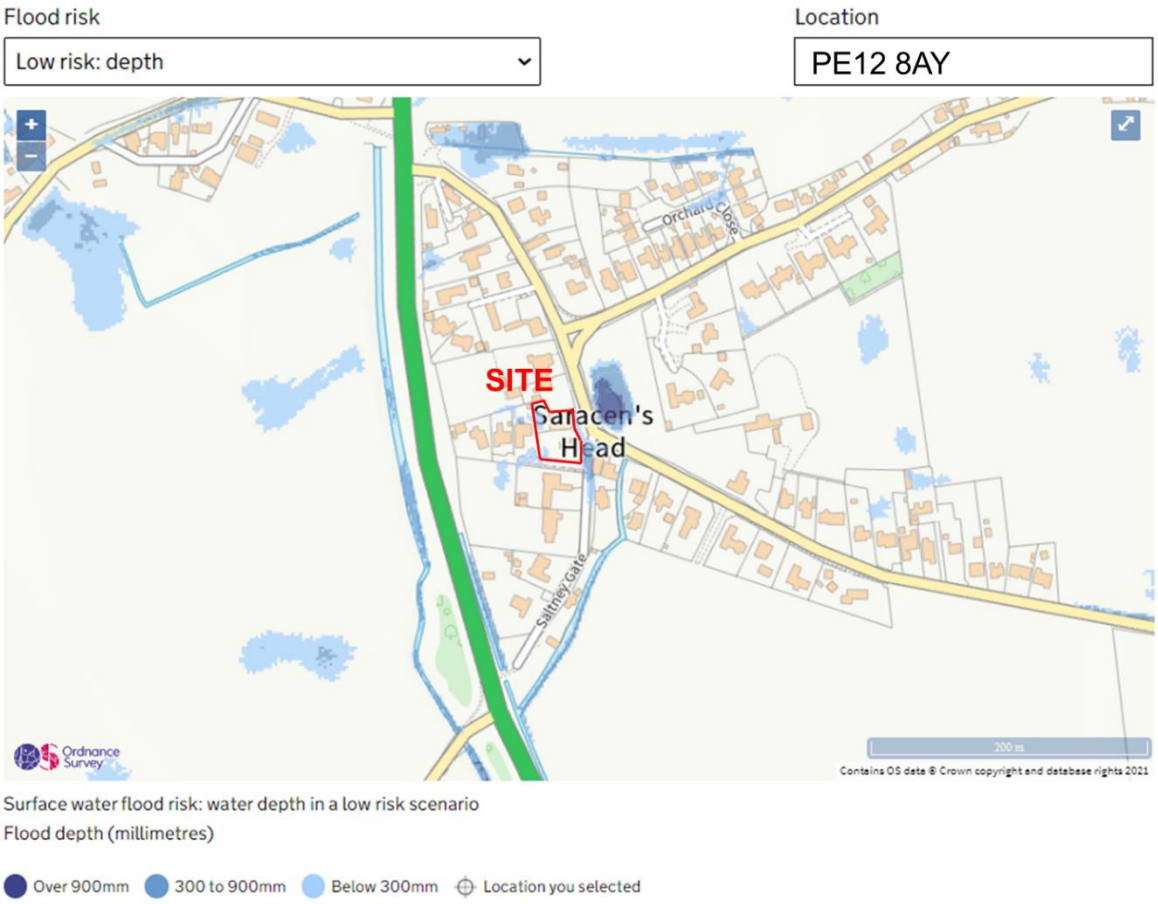
The maps supplied by the Environment Agency are reproduced on pages 13 to 16 of this report.

The Environment Agency have also provided maps showing the following predictions for hazard, maximum depth and maximum velocity at the development site if overtoppingof the tidal defences were to occur. These maps do not show any hazard for the 1 in 200 year or 1 in 1000 year event in 2115 (see pages 17 and 18).

The Environment Agency website shows maps of the surface water flooding, and there are three maps showing predicted flood depths for high risk, medium risk and low risk. The table below summarises the predictions on these maps for surface water flooding:

High Risk	Greater than 3.3%	Less than 1 in 30 years	NO FLOODING
Medium Risk	Between 1% and 3.3%	Between 1 in 30 and 1 in 100 years	NO FLOODING
Low risk	Between 0.1% and 1%	Between 1 in 100 and 1 in 1000 years	Depth 0 - 300mm

The low risk map is reproduced below.



Existing Ground Levels

The level of Washway Road in front of the existing building is approximately 3.5m ODN and the gravel parking areas on the site are at levels between 3.4m and 3.5m ODN.

The ground floor level of the existing building is approximately 3.6m ODN.

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 5.5 km south of the tidal section of the River Welland, which has a tidal defence bank which is maintained by the Environment Agency.

There are watercourses in the area that are maintained by South Holland 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. Flooding from watercourses maintained by South Holland IDB
3. Flooding due to excess surface water run off from the development.

1. Failure or overtopping of tidal defences

The west bank of the tidal River Welland, which is approximately 5.5 km north west of the site, has at least a 1 in 200 year standard of protection. It is extremely unlikely that flood water from a breach in the south bank of the River Welland near Fosdyke Bridge would cause flooding to the development site.

The mapping provided by the Environment Agency predicts up to 250mm depth of flooding in a 1 in 1000 year event in 2115.

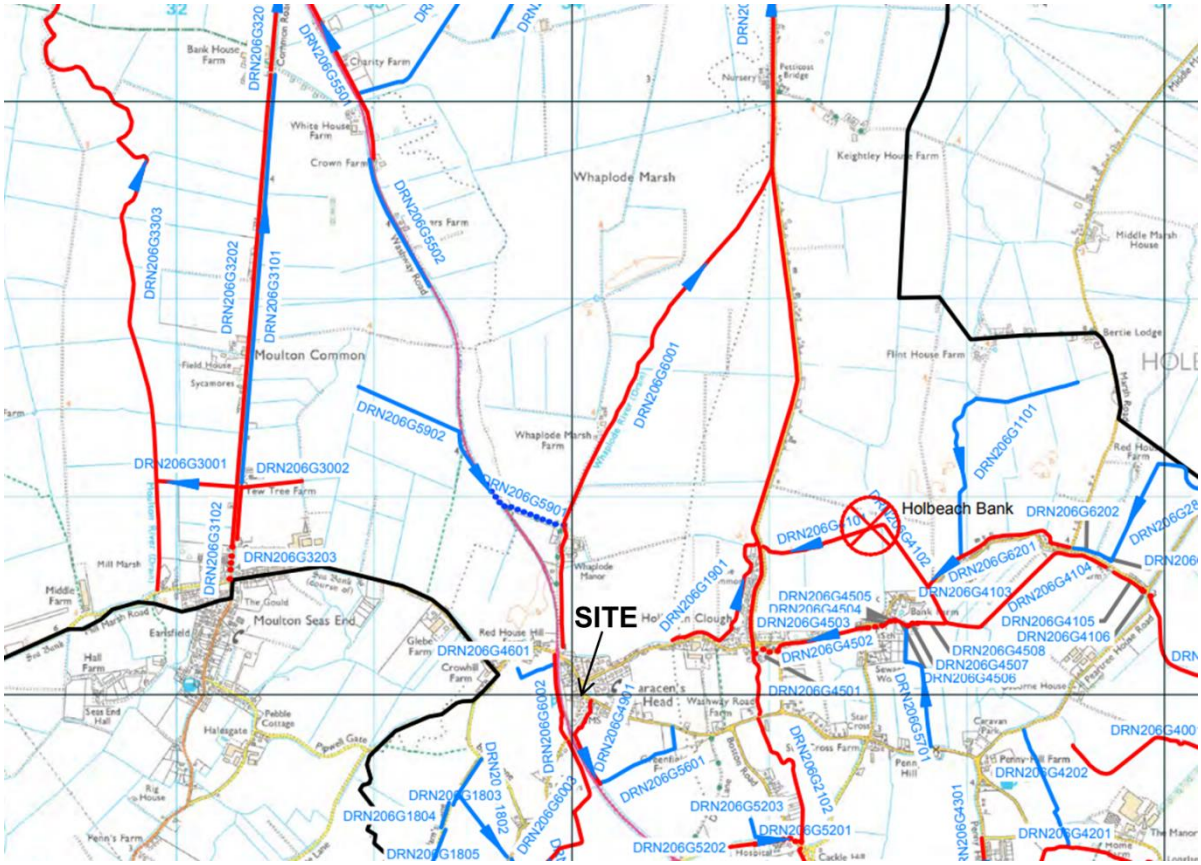
Therefore this risk will be adequately mitigated by raising the finished ground floor level of the proposed dwellings above the predicted flood level.

2. Flooding from IDB watercourses

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 New Saracens Head is located in the Holbeach River catchment of the South Holland IDB area. The Whaplode River which is major IDB watercourse flows northwards from Saracens Head and provides drainage for this area. This discharges into the tidal River Welland at the Holbeach River Sluice located on the south east bank of the tidal River Welland east of Fosdyke bridge.

A plan of the IDB drains in this area is shown on the next page.



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.

There is adequate mitigation against the risk of flooding on this site from this source because the floor level of the building will be raised by a minimum of 300mmabove the existing ground level on the site.

3. Flooding due to excess surface water run off from the development

The maps on the Environment Agency website only indicate a low risk of surface water flooding to this site. There is no flooding indicated on the development site on the high risk, medium risk or maps.

Adequate mitigation will be provided by ensuring that the finished ground floor levels of the houses are at least 300mm above the existing ground levels on the site.

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.

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 this FRA. The effects of these new recommendations are considered in Appendix A of this report (pages 19 to 22). 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 the flood hazard in a 1 in 1000 year event is 0 - 0.75 (low hazard) reference should be made to Category F8 in the matrix which shows the advice for this category is as follows:

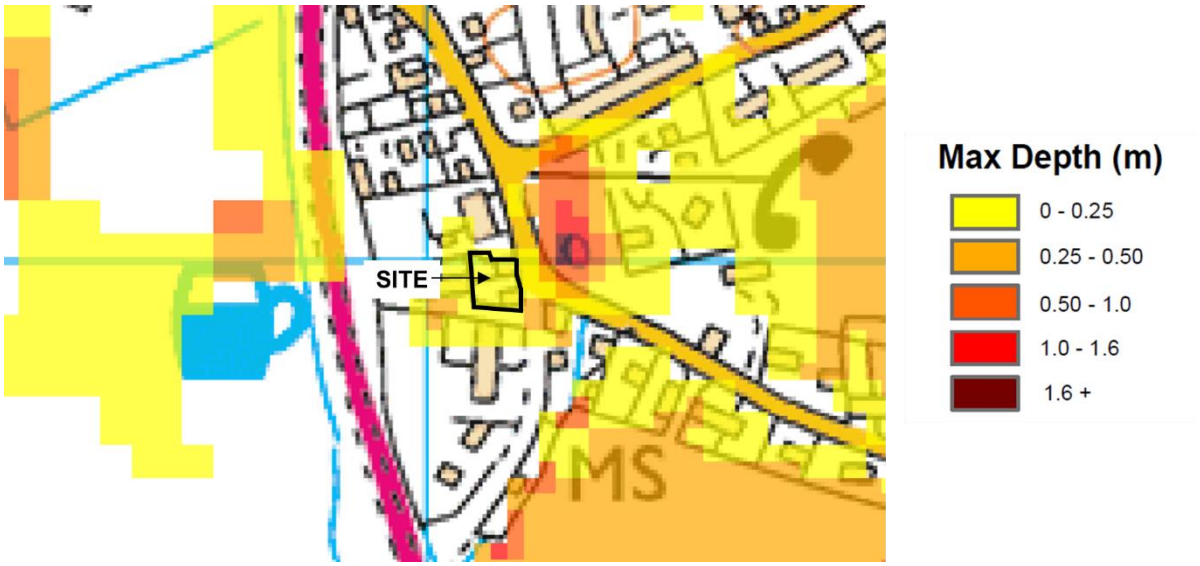
The NPPF requires that proposals are accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures / flood resilience techniques have been incorporated into the development.

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

An extract from the maps supplied by the Environment Agency is shown below. This map shows the predicted flood depth if a breach were to occur in a 1 in 1000 year event with 20% allowance for climate change. The hazard at this location is 0 - 0.75 (low hazard).



The site is 5.5km from the tidal defences of the River Welland and therefore the risk of flooding if a bank breached in a 1 in 200 year event in 2115 is extremely low.

The risk of flooding from IDB drains can be considered low, because the minimum recommended floor level of the proposed dwellings is at approximately 3.0 metres above the normal level of the Whaplode River and its tributaries.

The risk of surface water flowing onto the site from Washway Road will be adequately mitigated by raising the floor level a minimum of 300mm above the existing ground level on the site.

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

Although all of the site is in flood zone 3, 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 story construction with all bedrooms at first floor level. This is to provide a refuge for residents if the building becomes flooded in the unlikely event of flood water from a serious failure of the bank of the River Welland reaching the site and ensure there is no danger to residents when they are asleep

The standing advice states that if single storey buildings (bungalows) are proposed on this site then the finished floor levels should be above the predicted flood depth in the 1 in 1000 year event in 2115.

As the maximum predicted flood depth on this site in the above scenario is 250mm, then it is recommended that the finished floor level of all new dwellings (houses or bungalows) should be a minimum of 300mm above the existing ground level on the site.

All future owners and occupiers of the dwellings should register with the Environment Agency's Floodline Warnings Direct Service.

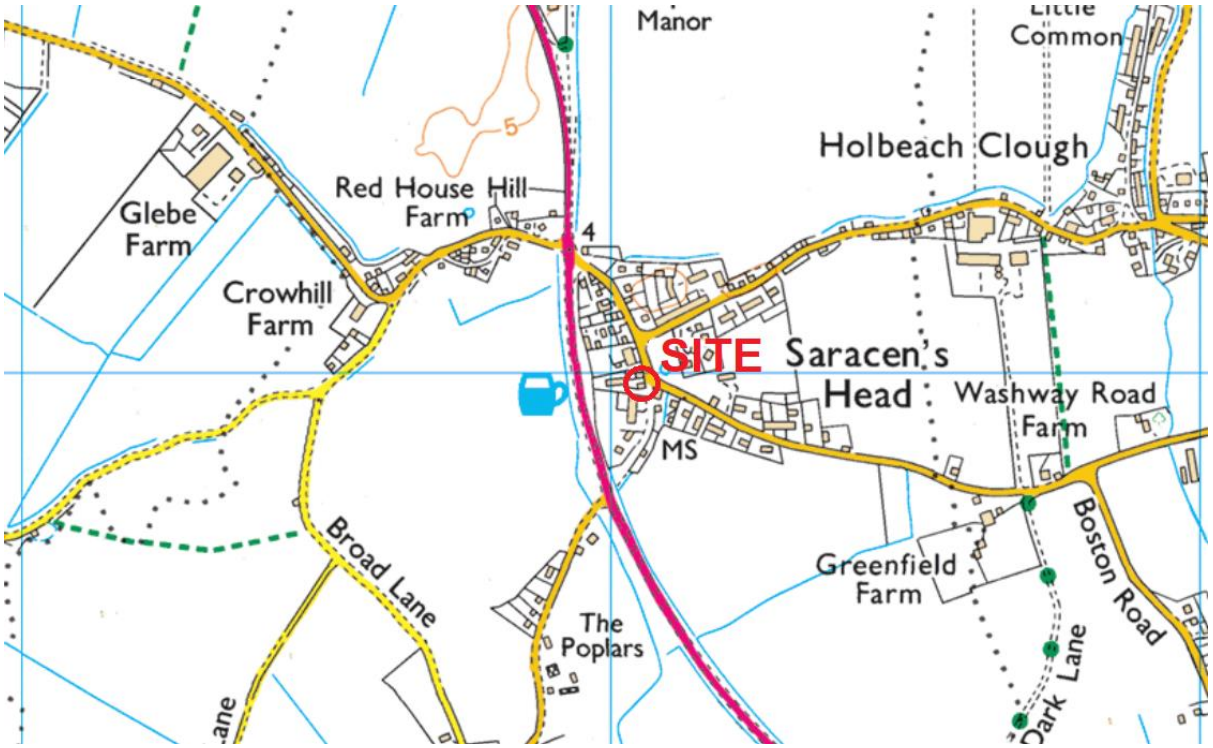
Rainwater from the roofs of the buildings should be discharged if possible into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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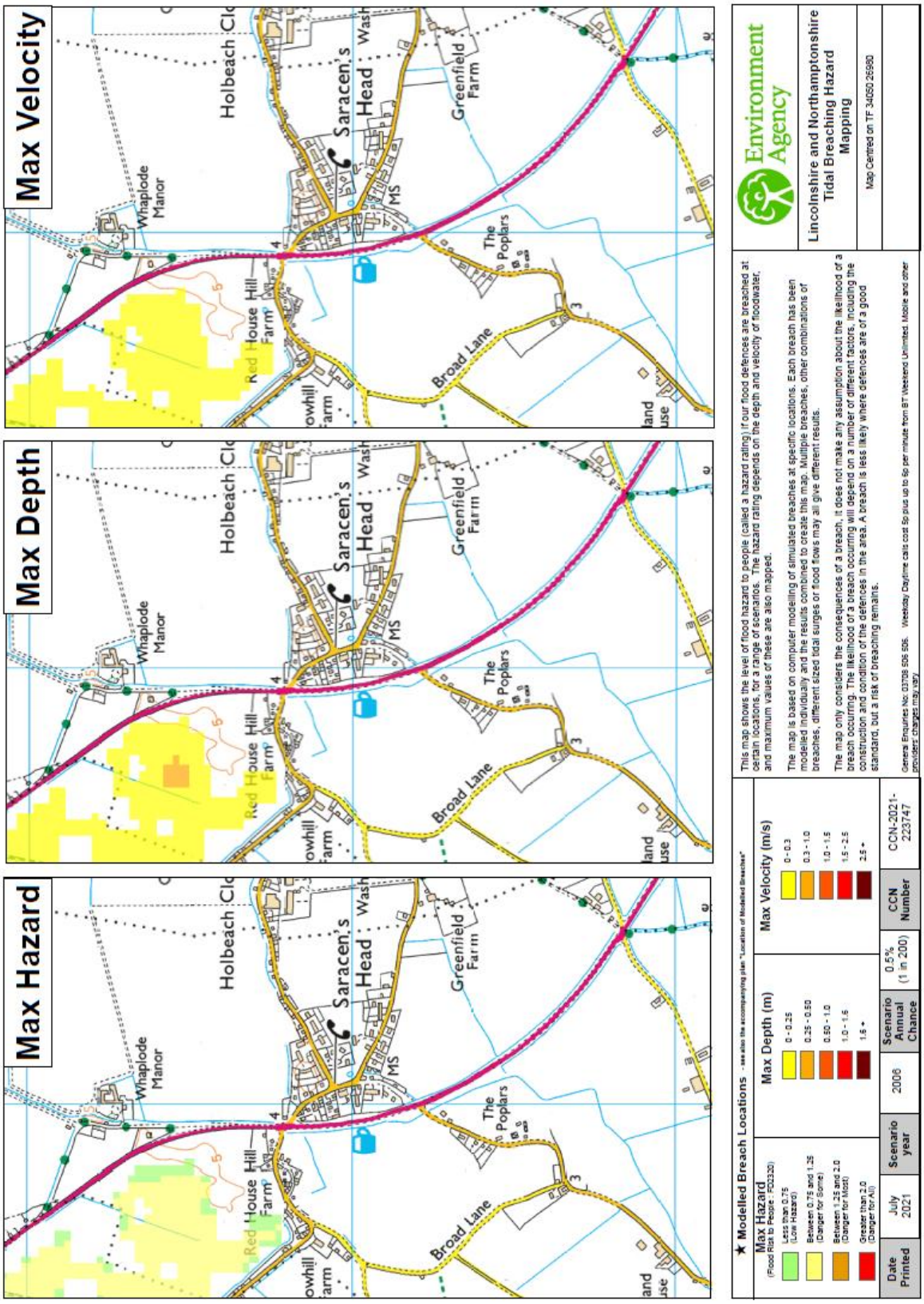
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28th July 2021

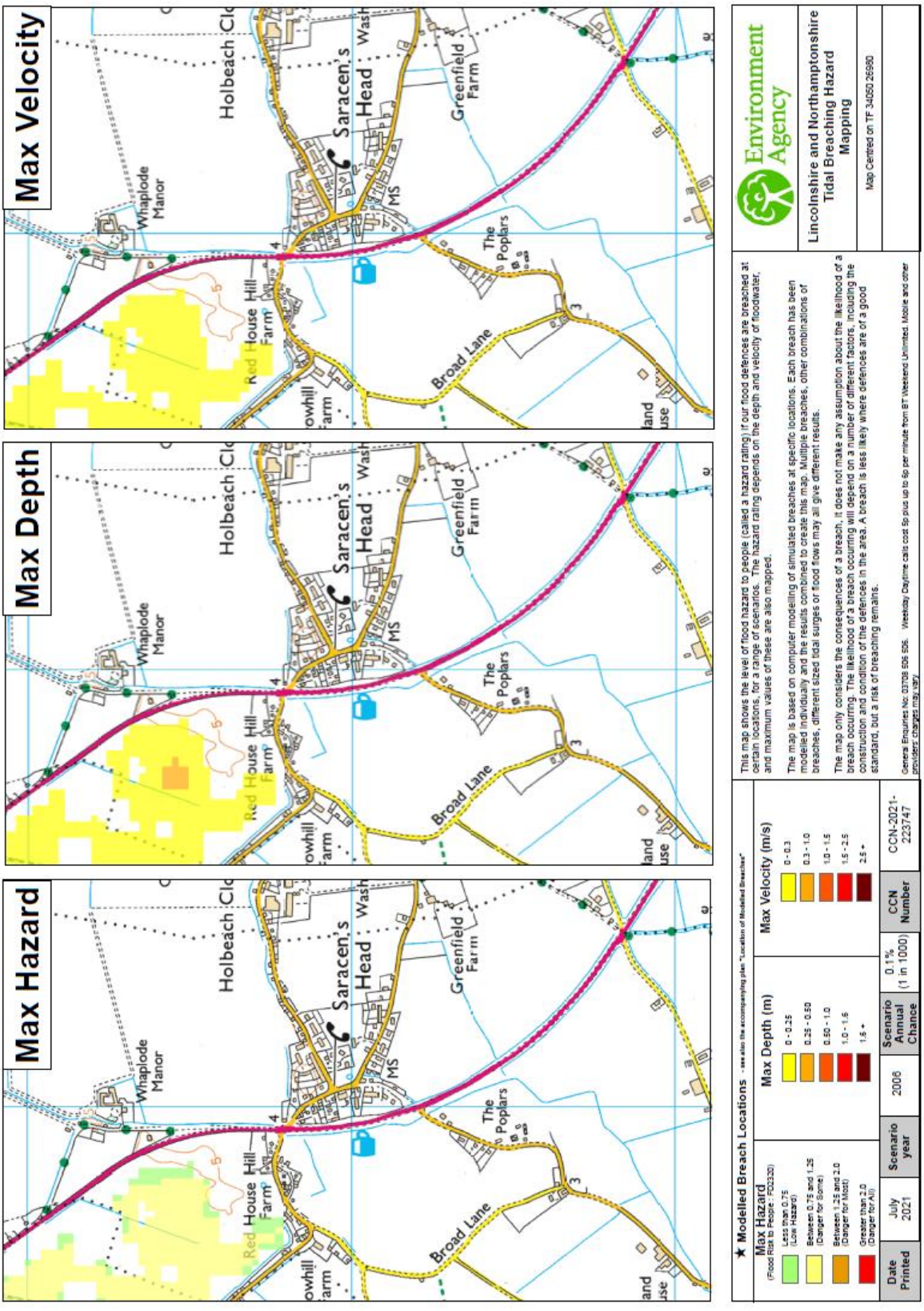
LOCATION PLAN



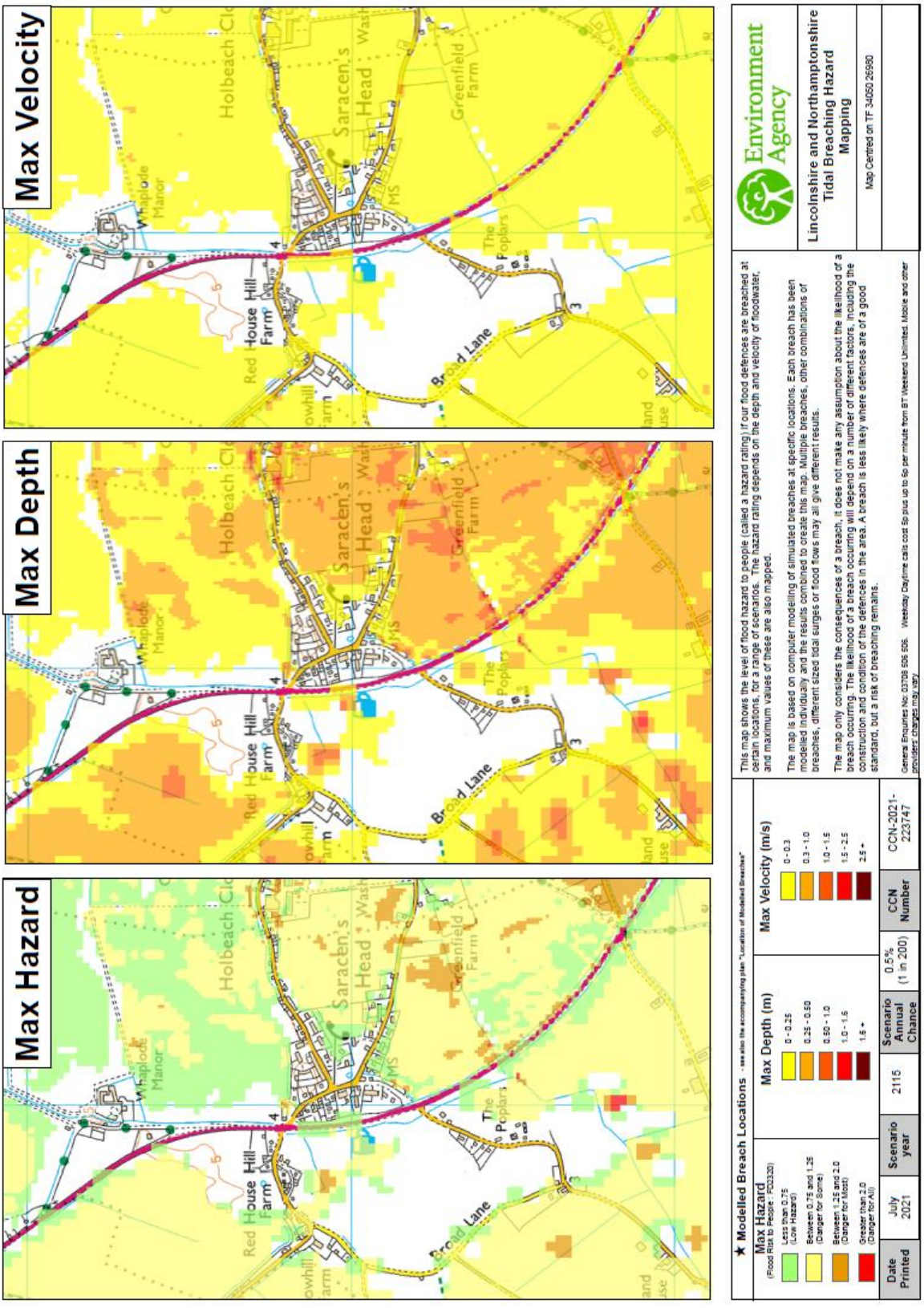
ENVIRONMENT AGENCY MAP SHOWING TIDAL BREACHING HAZARDS IN 1 in 200 YEAR EVENT IN 2006



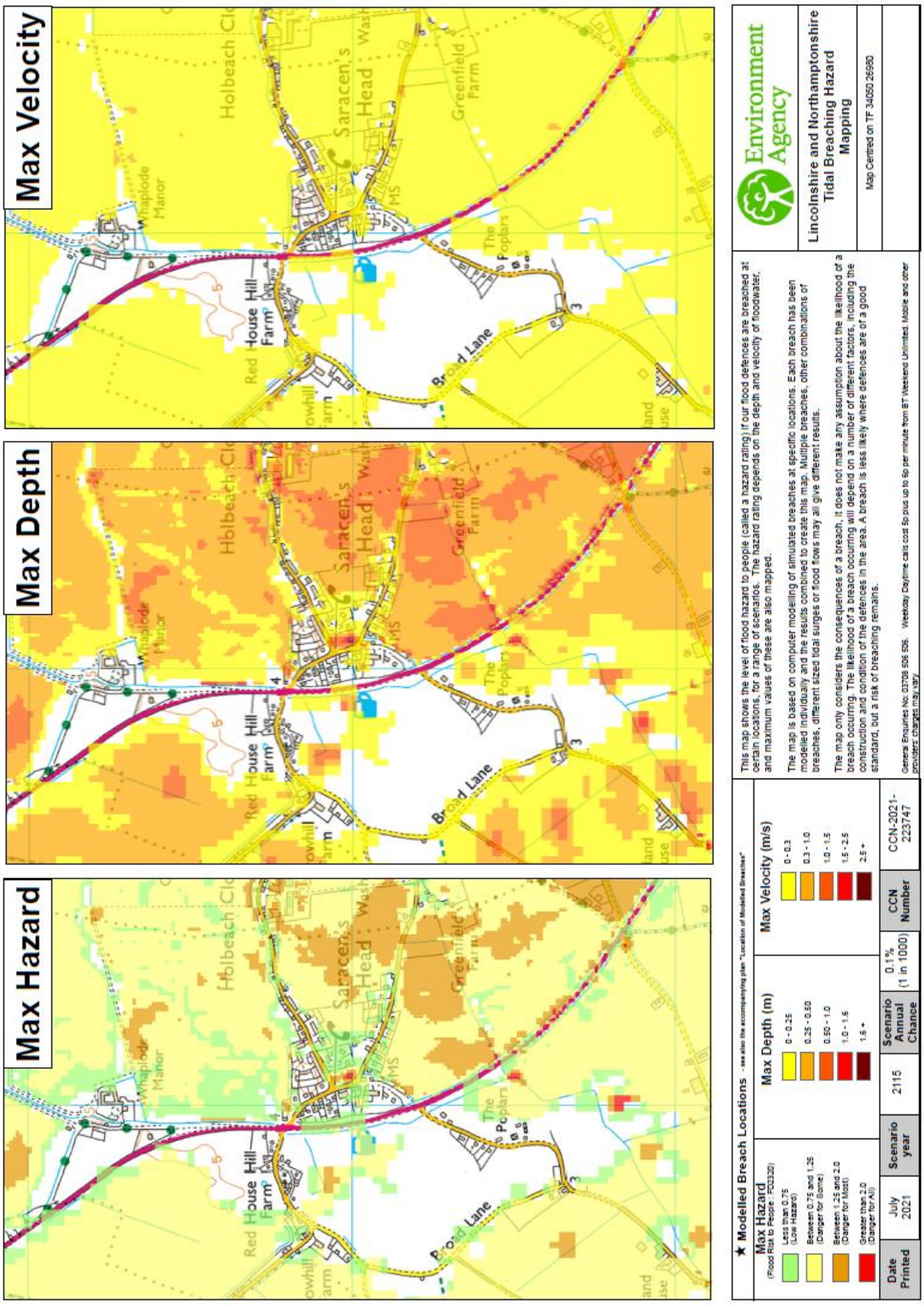
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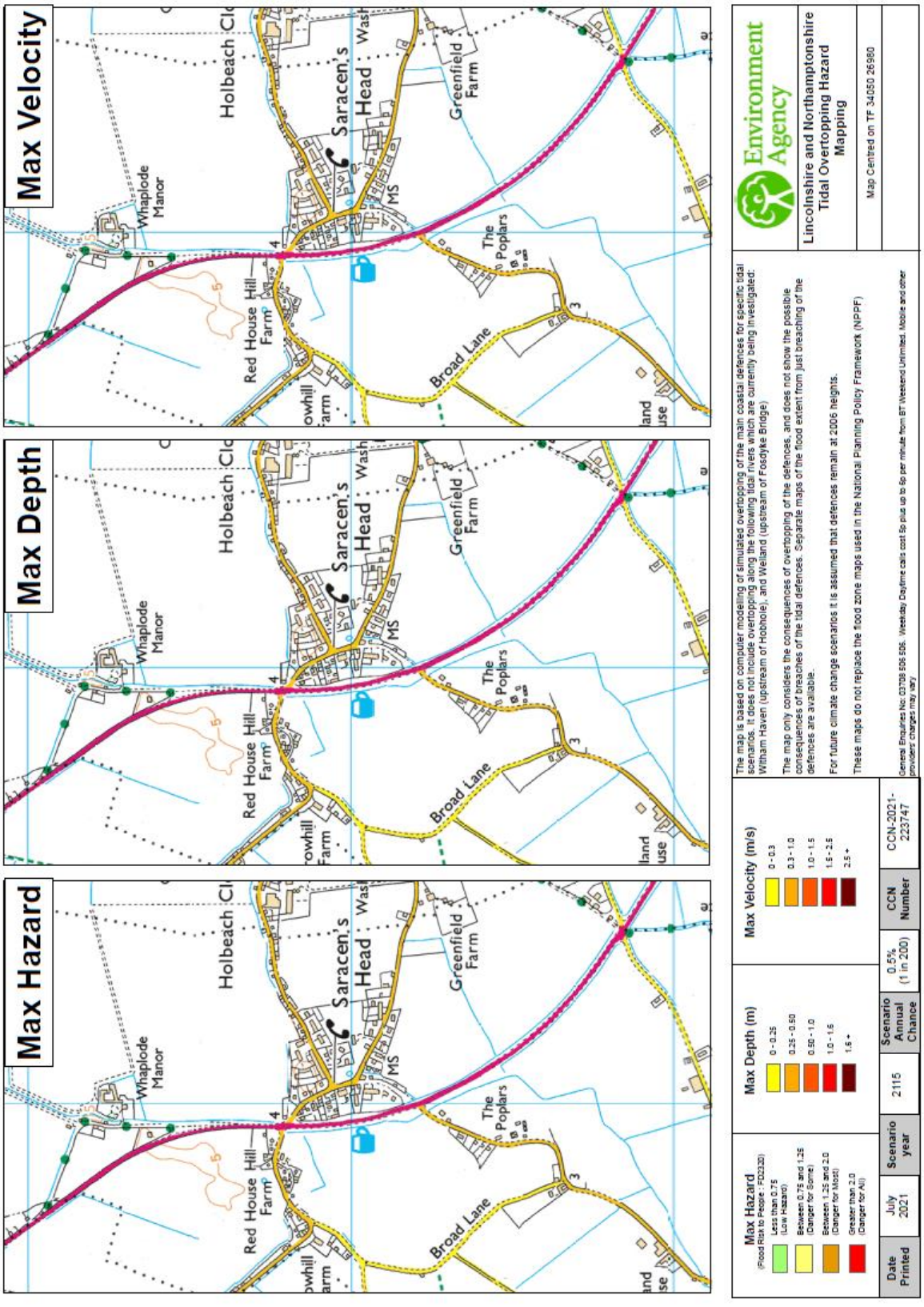
ENVIRONMENT AGENCY MAP SHOWING TIDAL BREACHING HAZARDS IN 1 in 200 YEAR EVENT IN 2115



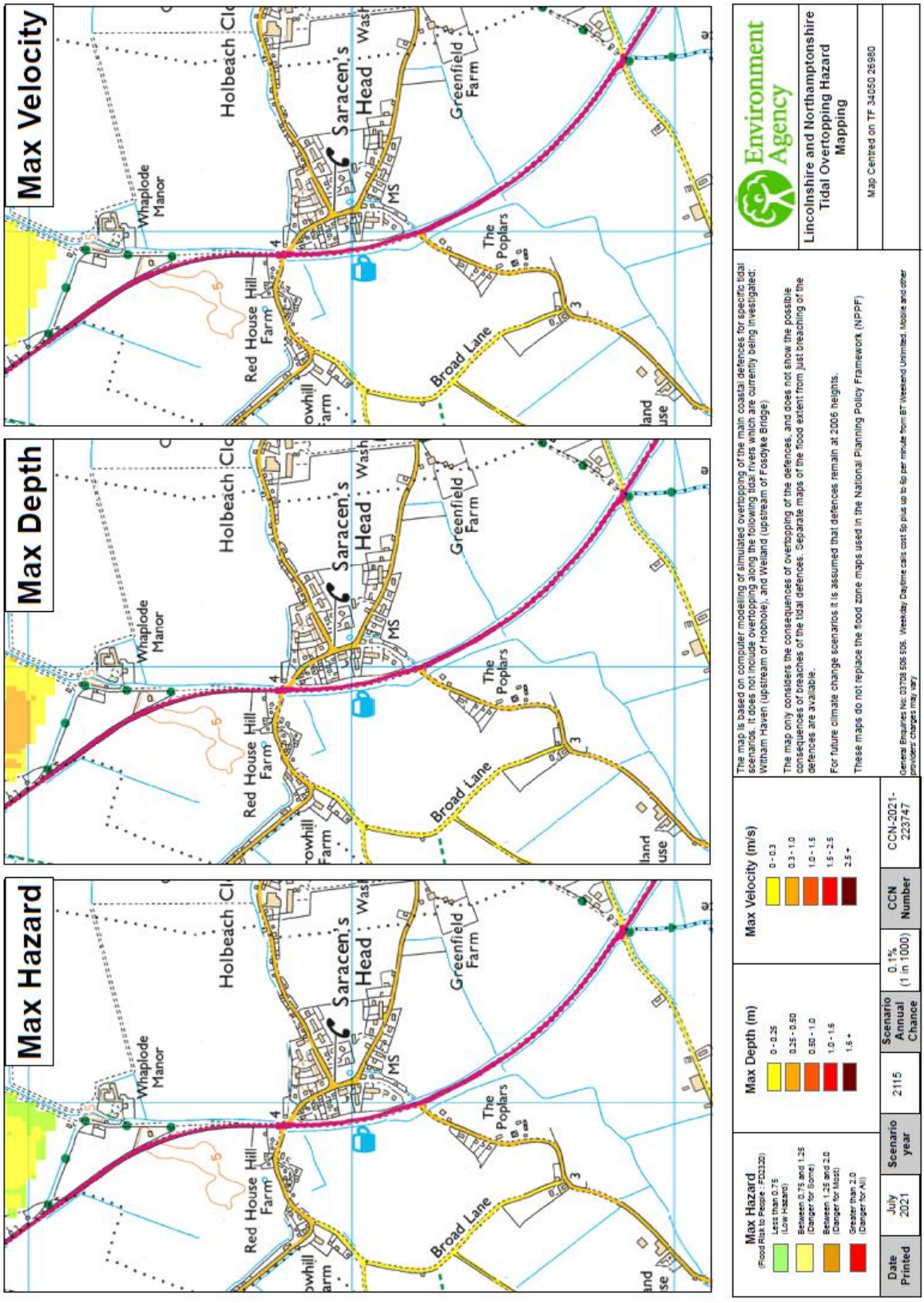
ENVIRONMENT AGENCY MAP SHOWING TIDAL BREACHING HAZARDS IN 1 in 1000 YEAR EVENT IN 2115



ENVIRONMENT AGENCY MAP SHOWING TIDAL OVERTOPPING HAZARDS IN 1 in 200 YEAR EVENT IN 2115



ENVIRONMENT AGENCY MAP SHOWING TIDAL OVERTOPPING 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

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 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.
2) Flooding from IDB systems.

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 does not predict 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 7 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 property should be a minimum of 300mm above existing ground level is considered to satisfactory.

2) Flooding from IDB Systems

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 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 small increases in predicted flood levels that the latest climate change guidance shows will not affect the conclusions in this report, and the mitigation proposed for the development, with the recommendation that the finished ground floor level of the proposed houses or bungalows should be a minimum of 300mm above the existing ground level on the site, is satisfactory.