

**PROPOSED CONVERSION OF A VACANT HAIRDRESSING SALON TO
RESIDENTIAL USE AT 144 WINDSOR BANK, BOSTON, PE21 0HR**
FLOOD RISK ASSESSMENT



View from Fishtoft 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 conversion of an existing building at 144 Windsor Bank Road, Boston. 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

An application has been made to Boston Borough Council (Reference No B/19/0408) for planning permission to convert the existing vacant hairdressing salon on the ground floor at 144 Windsor Bank, Boston, PE21 0HR to residential use. The site is situated approximately 1.0 km north of the centre of Boston.

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 in the Boston Borough Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the Witham Fourth 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 Boston area is in Flood Zone 3.

Application Site

The site is located 400 metres from the tidal section of the Haven. The National Grid Reference of the site is 533515 343265.

The position and extent of the site is shown on the plan at the end of this document.

As the site is within a defended area the proposed development can be considered to be within Flood Zone 3(a) as defined in Table 1 of the Technical Guidance.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, a development consisting of dwelling houses 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 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 proposed development is a conversion of the ground floor of an existing building, and as such cannot be located anywhere else except at this location in the Fishtoft Road area.

The guidance gives the following advice where an alternative location is not possible, which can be also applied to developments such as these:

When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.

The proposed development complies with all Boston Borough Council's planning policies, and there is a requirement for additional accommodation such as this in the Borough 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 Boston Borough Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

Strategic Flood Risk Assessment

Consultants produced a Strategic Flood Risk Assessment (SFRA) for the Boston Borough Council (SHDC) in January 2010. This document provided details of the flood risk in the Council's area. This was superseded by the Strategic Flood Risk Assessment carried out by the South East Lincolnshire Planning Committee (issued March 2017) and is shown on their website.

Both SFRA's contain maps showing the predicted hazard from flooding in the Boston Borough area. These maps show that the greatest hazard in the Skirbeck Road area of Boston is from a potential breach in the bank of the Haven 400 metres south of the site.

The SFRA also give more general maps on the relative probability of flooding in this area. As there is now available more detailed mapping from the Environment agency these will be considered in detail.

Information Supplied by the Environment Agency

The Environment Agency have provided maps showing the maximum hazard, depth of flooding and velocity for the 1 in 200 year and 1 in 1000 year breaching events in 2006 and 2115, and the results of these are shown below:

	Hazard	Flood Depth	Velocity
1 in 200 year event in 2006	zero	zero	zero
1 in 1000 year event in 2006	zero	zero	zero
1 in 200 year event in 2115	0.75 – 1.25	0 – 250mm	0 – 0.3m/sec
1 in 1000 year event in 2115	0.75 – 1.25	250 – 500mm	0.3 – 1.0m/sec

The Agency have also provided maps showing the maximum hazard, depth of flooding and velocity for the 1 in 200 year and 1 in 1000 year overtopping events in 2115, and the results of these are shown below:

	Hazard	Flood Depth	Velocity
1 in 200 year event in 2115	zero	zero	zero
1 in 1000 year event in 2115	1.25 – 2.0	500mm – 1.0m	0 – 0.3m/sec

The maps of the flood risk supplied by the Environment Agency are reproduced on pages 13 – 18 of this report.

The Environment Agency has provided predicted flood levels for the Maud Foster Drain. The levels quoted below are immediately east of the site.

	Present Day	Present Day + 20% climate change
Peak 1 in 100 year flood level	2.16m OD	2.24m OD
Peak 1 in 1,000 year flood level	2.27m OD	2.29m 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 400 metres from the north bank of the Haven which is maintained by the Environment Agency.

There are no watercourses in the Skirbeck Road area that are maintained by Witham Fourth IDB.

Existing Ground Levels

The level of the pavement outside the property is approximately 3.75m OD outside the side door and 3.90m OD outside the front door. The level of the manhole in the road approximately 6.0 metres from the front door is 3.89m OD. Levels have been taken to establish the existing floor level of the building which is 3.79m OD.

All of these levels are shown on the plan on page 12 of this report.

Potential Sources of Flooding

The following sources of flooding have been identified:

- 1) Tidal Flooding due to overtopping or breaching of the north bank of the Haven
- 2) High water levels in the Maud Foster Drain
- 3) Flooding from local surface water systems.

1. Tidal Flooding due to overtopping or breaching of the north bank of the Haven

The north bank of the Haven is 400 metres south of the site. The Environment Agency have stated that the predicted tide levels along this section of coastline are as shown below.

	1 in 200 year event	1 in 1000 year event
Burgh Sluice	5.03	5.34
Hobhole	5.93	6.27

The maps produced by the Environment Agency predict that flood depths would be between 500mm and 1.0 metre in the 1 in 200 year overtopping event in 2115. However further investigation which are detailed later in this report will calculate an actual maximum flood level which is lower than 500mm. The overtopping maps may assume that no improvements are carried out to the defences over the next one hundred years.

The Environment Agency have agreed a one hundred year strategy for the length of the Haven from Tabs Head as far as Grand Sluice. This involves the construction of a Barrier to prevent flooding upstream of Black Sluice Pumping Station, and to raise bank levels along the Haven as predicted tide levels increase with climate change to ensure that there is always a 1 in 200 year standard of defence along both banks of the Haven.

2. High Water Levels in the Maud Foster Drain

The Maud Foster Drain, which is located 15 metres west of the site, is an Environment Agency watercourse. It is designed to convey highland water from the north of the Witham Fourth IDB District to the Haven. All of the surface water from the fenland area is conveyed into the Hobhole Drain which is a part of the Witham Fourth IDB pumped drainage system.

The Environment Agency have provided maximum predicted water levels for the Drain, and the maximum predicted water level in a 1 in 200 year event in 2115 is 2.24m OD. As the existing level of the property is approximately 3.89m OD the risk of flooding from this source can be considered to be adequately mitigated.

3. Surface Water Flooding

Fishtoft Road falls eastwards away from the site and therefore surface water accumulations by blockages of gullies are unlikely to cause flooding to the property.

As the floor levels will be raised by at least 310mm then this source of flooding can be considered to be adequately mitigated.

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 thirty years.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low.

At the present time the areas at greatest risk of flooding in Boston are west of the River Witham further upstream and between the River and the Maud Foster Drain near to St Botolph's church. The extent of the areas flooded in December 2013 are shown on the map reproduced on page 13 of this report.

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

Climate Change

The recommendations for flood depths for this flood risk assessment use information provided by the Environment Agency which was produced in 2006. 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 20 to 23). 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 shown on the Environment Agency flood map for overtopping is 1.25 to 2.0. However it will be shown that the maximum flood depth around the site is only 300mm and by reference to Table 13.1 of FD2320 it will be shown that with this predicted flood depth on the site and a flood velocity is 0 – 0.3

m/sec the hazard would be 0.69 (low hazard). Therefore using this hazard rating the recommended mitigation can be found under Category F7 which states:

The Environment Agency recommends that the proposal is accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures / flood resilience techniques have been incorporated into the development.

Please refer to the following document for information on flood resilience and resistance techniques to be included “Improving Flood Performance of New Buildings – Flood Resilient Construction (DCLG 2007)”

FFL’s must be set 300mm above ground level for two storey proposals. Single storey proposals must set FFL’s above the 0.1% event breach depth in the 2115 scenario.

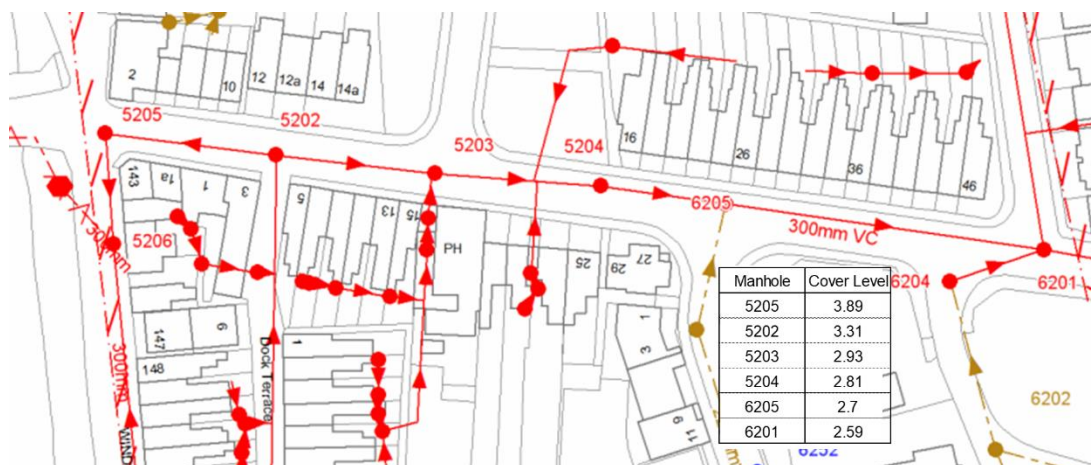
Therefore for a building with bedrooms on the ground floor the matrix advises that levels should be raised by a minimum of 300mm above ground level.

Summary of Risk of Flooding to the Site

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

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

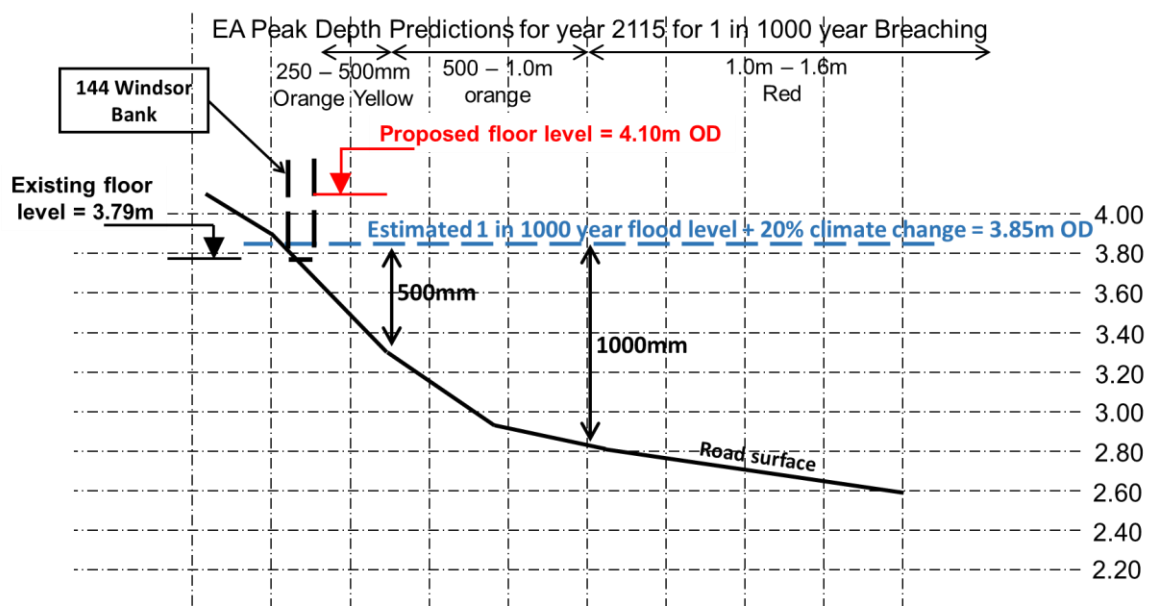
The Environment Agency maps of flood risk from breaching advise that there is no flooding predicted in the area immediately north west of the existing front door of the property. It is possible to obtain a level of the predicted flood level by comparing the road levels along Fishtoft Road (established by using the cover levels of the Anglian Water manholes shown below) with the predicted depths of flooding on the Environment Agency map showing flood depths.



The Environment Agency map of the 1 in 1000 year predicted flood depths for breaching in 2115 shown on the next page:



Using both maps a section along Fishtoft Road can be drawn showing these levels.

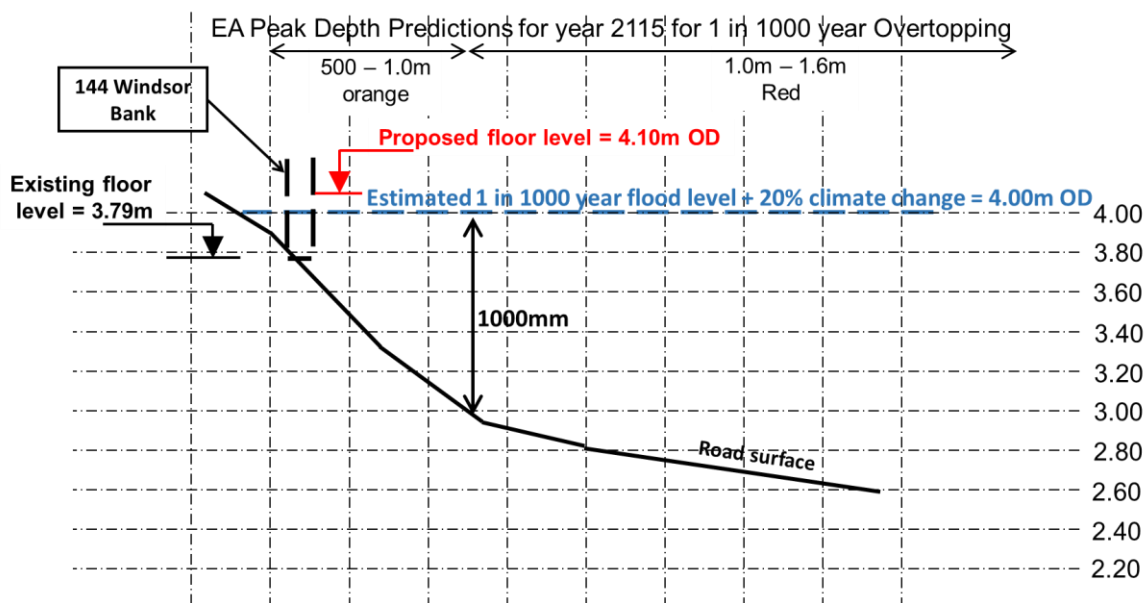


This shows the predicted flood level is approximately 60mm above the existing floor level in 144 Windsor Bank.

The Environment Agency map of the 1 in 1000 year predicted flood depths for overtopping in 2115 shown on the next page:



Using both maps a section along Fishtoft Road can again be drawn showing these levels.



This shows the predicted flood level is approximately 210mm above the existing floor level in 143 Windsor Bank. The map of predicted flooding does not seem to be very clear in this area but it does seem to indicate that the predicted flood depth due to overtopping is 150mm higher than the level indicated due to breaching.

Therefore it is recommended that the floor levels of the proposed flat should be raised by 310mm to a level of 4.10m OD, which will be 100mm above the 1 in 1000 year predicted flood level (overtopping) in 2115, and 250mm above the 1 in 1000 year predicted flood level (breaching) in 2115.

In practice flood water would flow into the Maud Foster Drain and this would probably prevent flood levels rising to the levels predicted.

Also, as can seem below, the bank protecting this site has a very wide top with a tarmac road on part of it. Therefore the risk of this breaching, even if it is overtopped for a short length of time at high tide, can be considered low.



The proposal to raise floor levels will ensure the risk of flooding from the Maud Foster Drain, or from surface water accumulations in Fishtoft Road would be remote.

Recommendations

In an area where there is a flood risk it is preferable for all the buildings to have all sleeping accommodation located on the first floor.

This planning application is for a change of use for the ground floor of a building presently used as a commercial property where it is not possible to find a tenant and where the first floor of the property has already been converted to residential use. The existing ground floor level of the property should be raised by approximately 310mm to a minimum level of 4.10m OD which will be approximately 350mm above the footpath level in front of the side door which will become the main entrance door to the proposed flat.

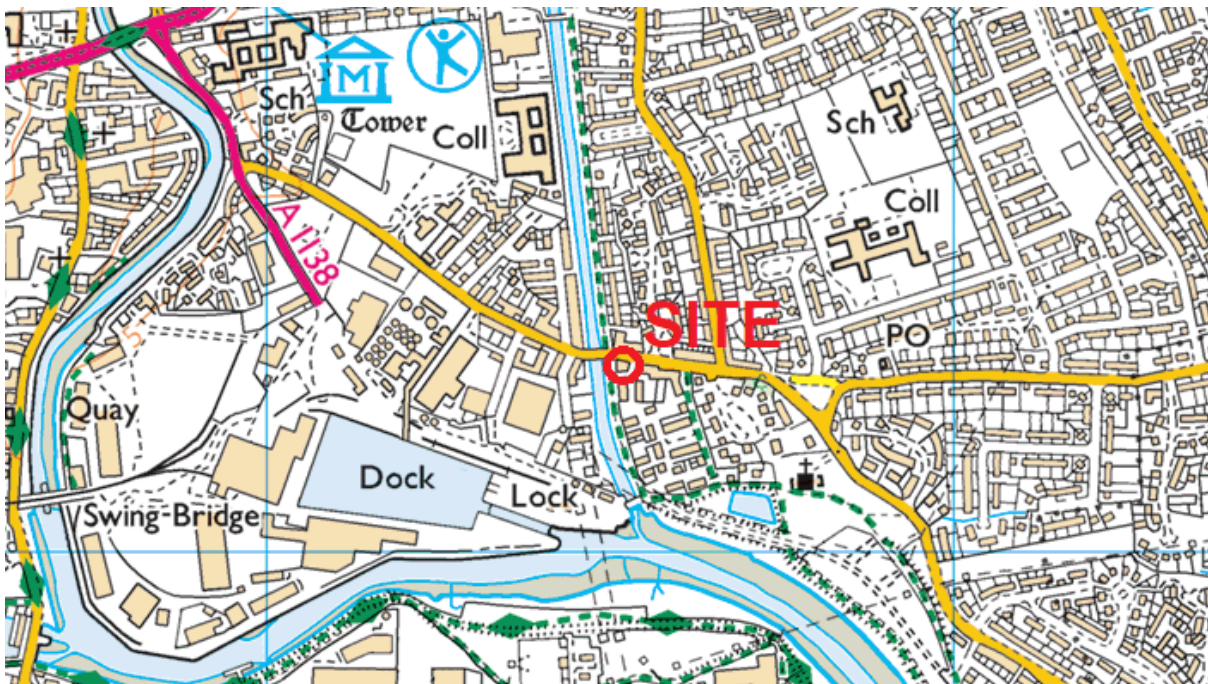
All future occupiers of the properties should register with the Environment Agency's Floodline Warnings Direct Service.

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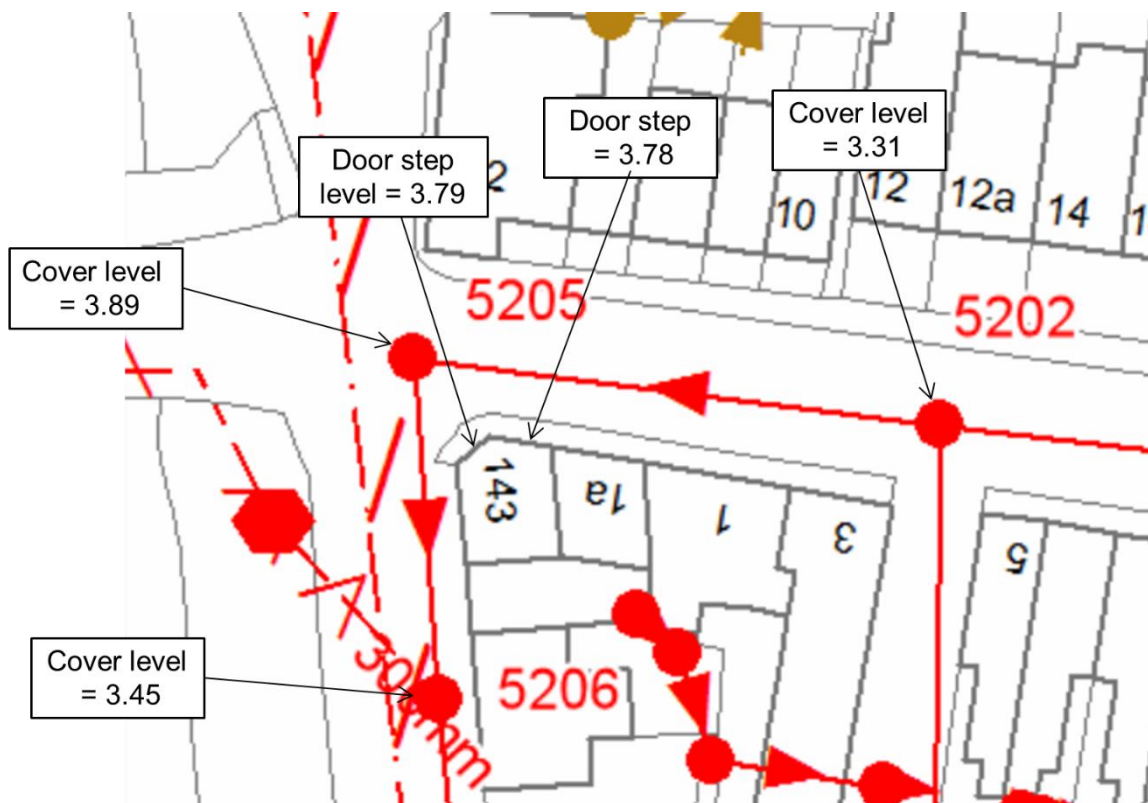
stuart.hemmings@btinternet.com

16th February 2020

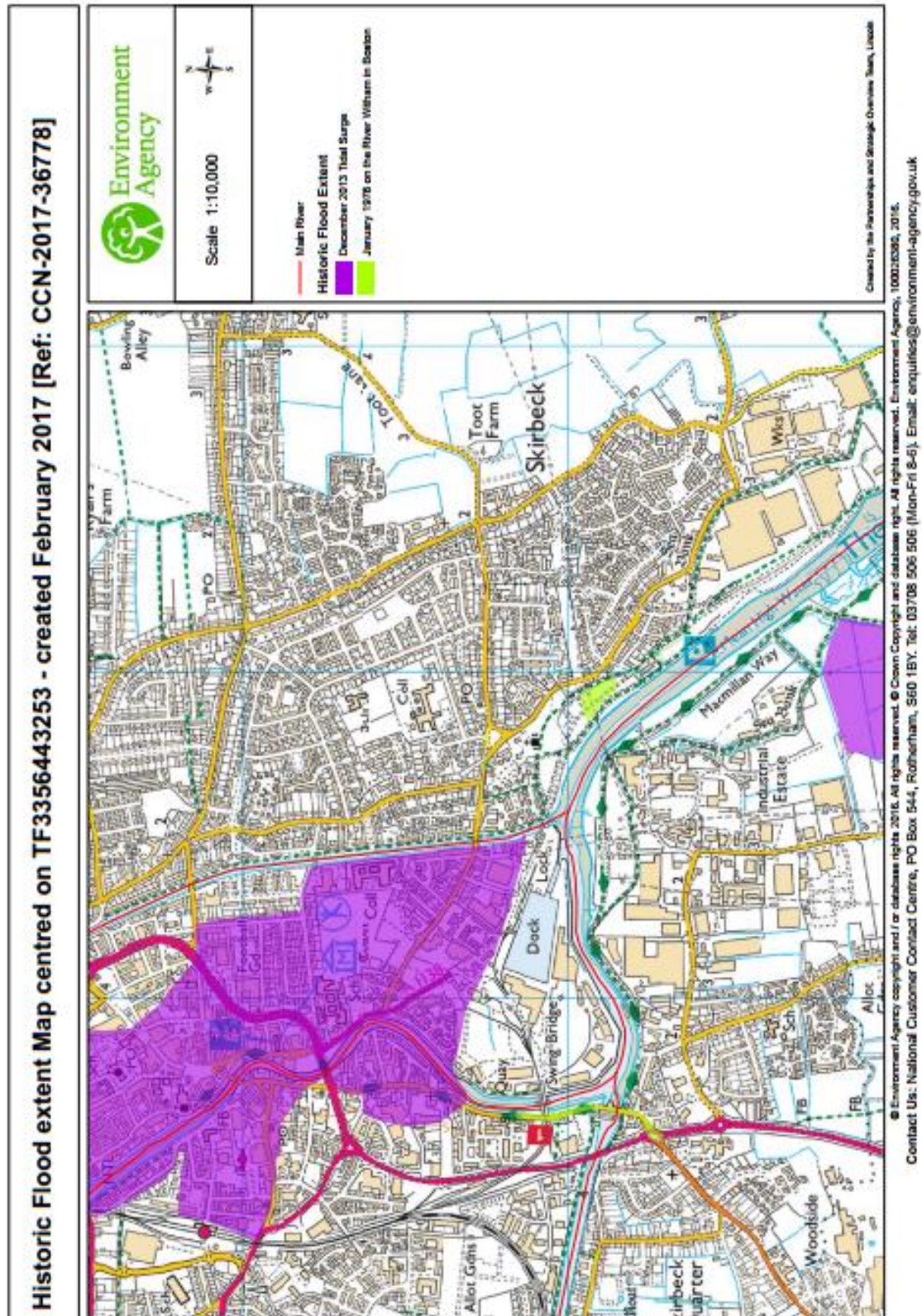
Location Plan



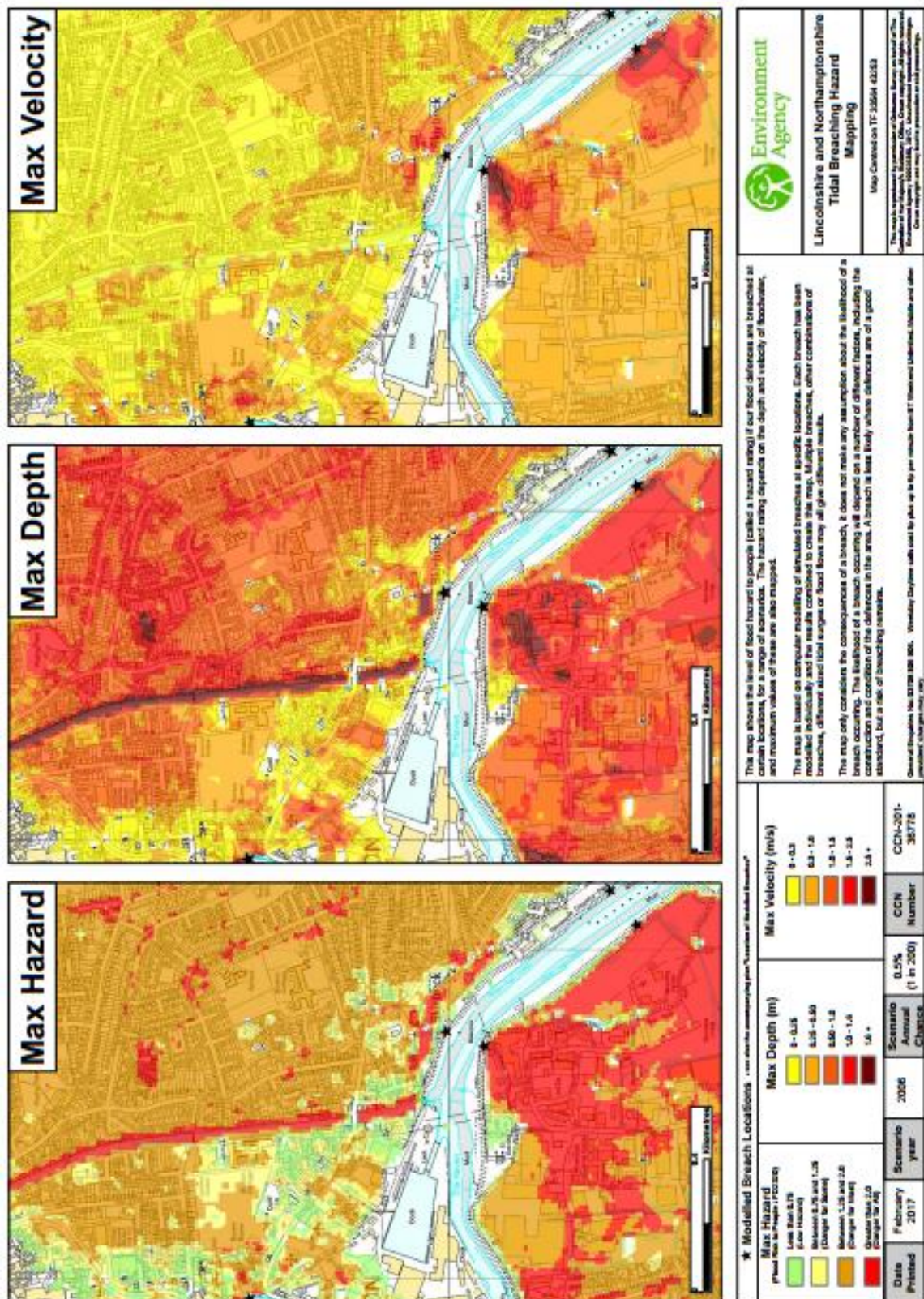
Plan of Levels Around Property



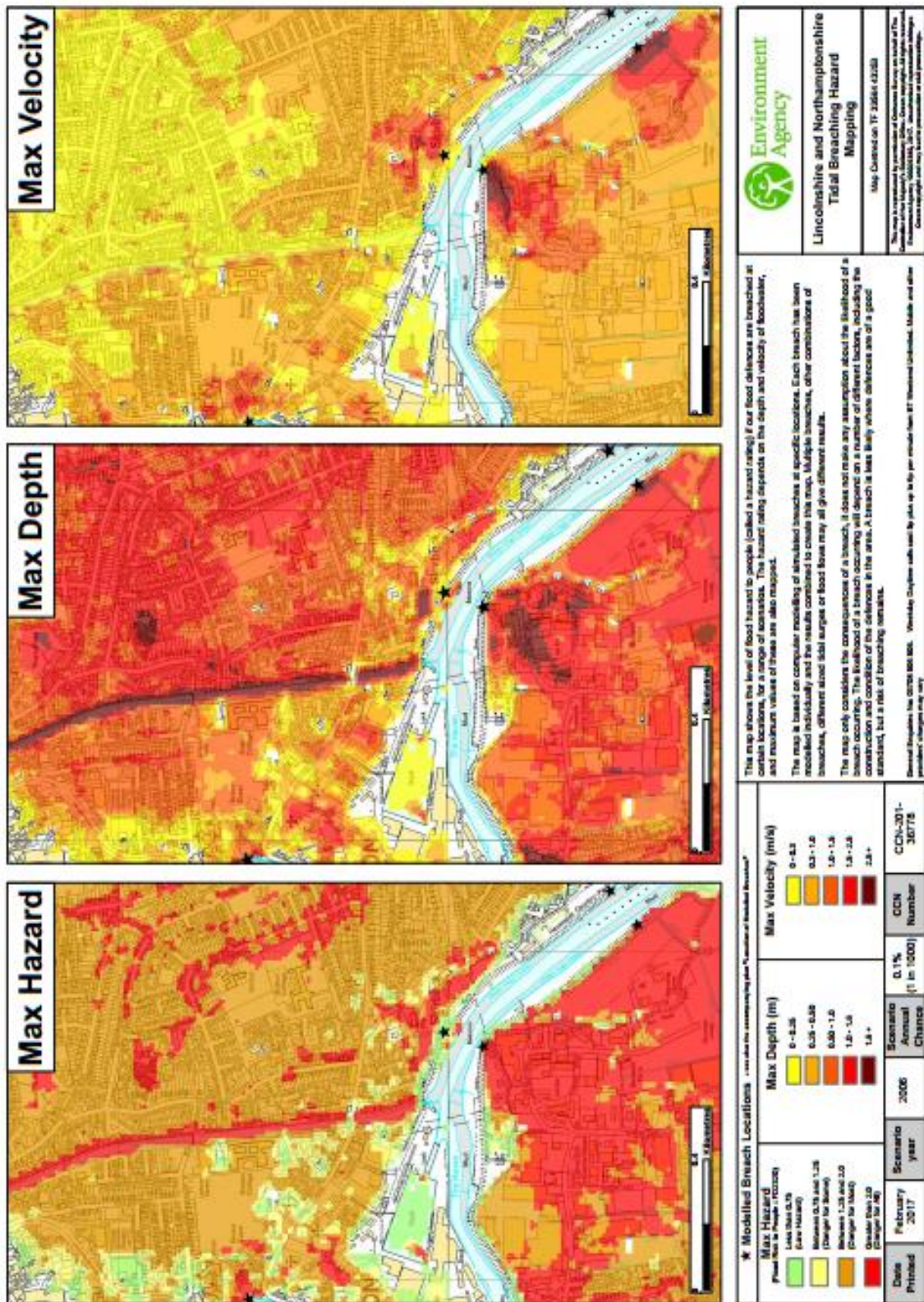
EA MAP OF HISTORIC FLOODING



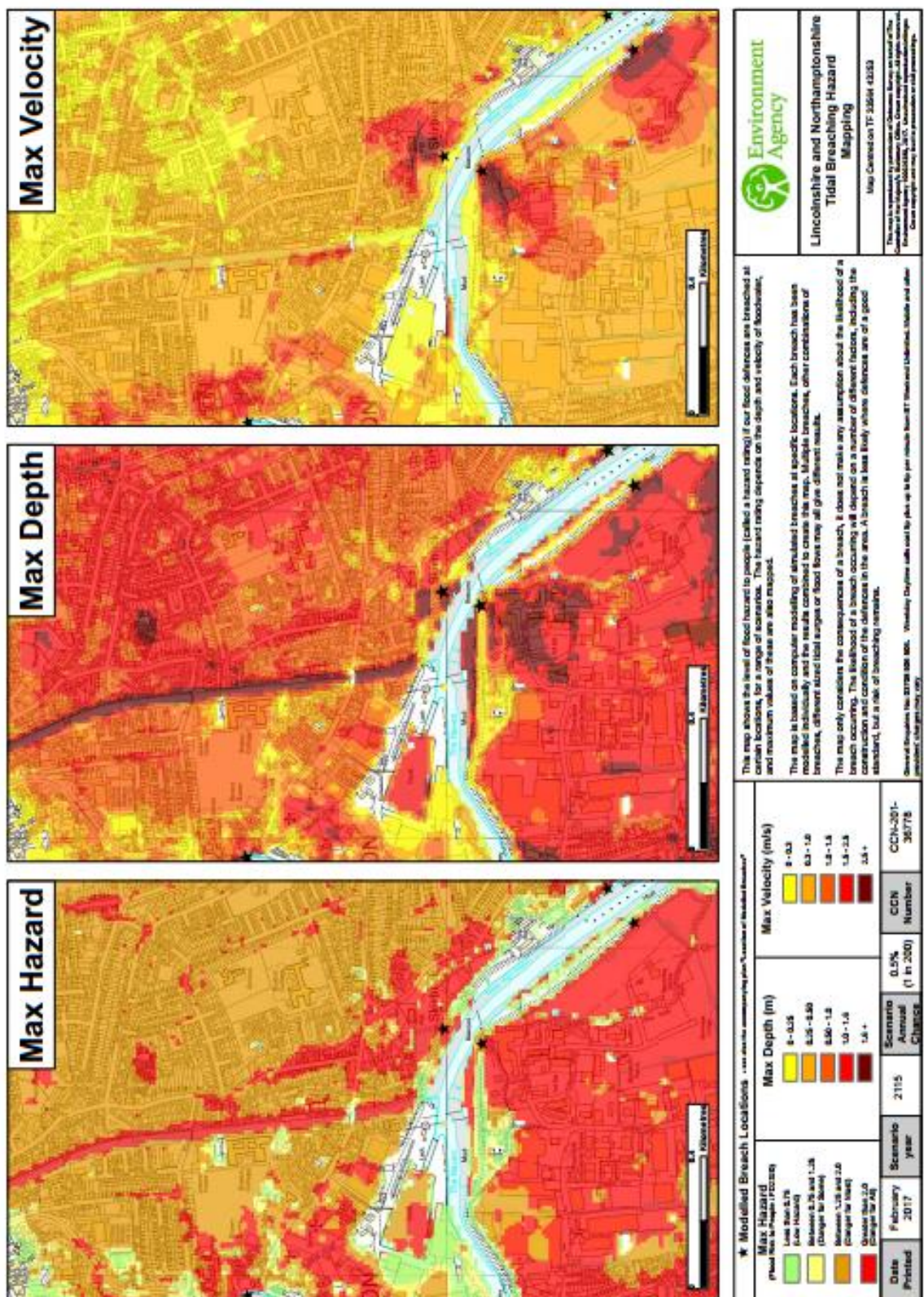
1 in 200 year Flood Risk from Breaching in 2006



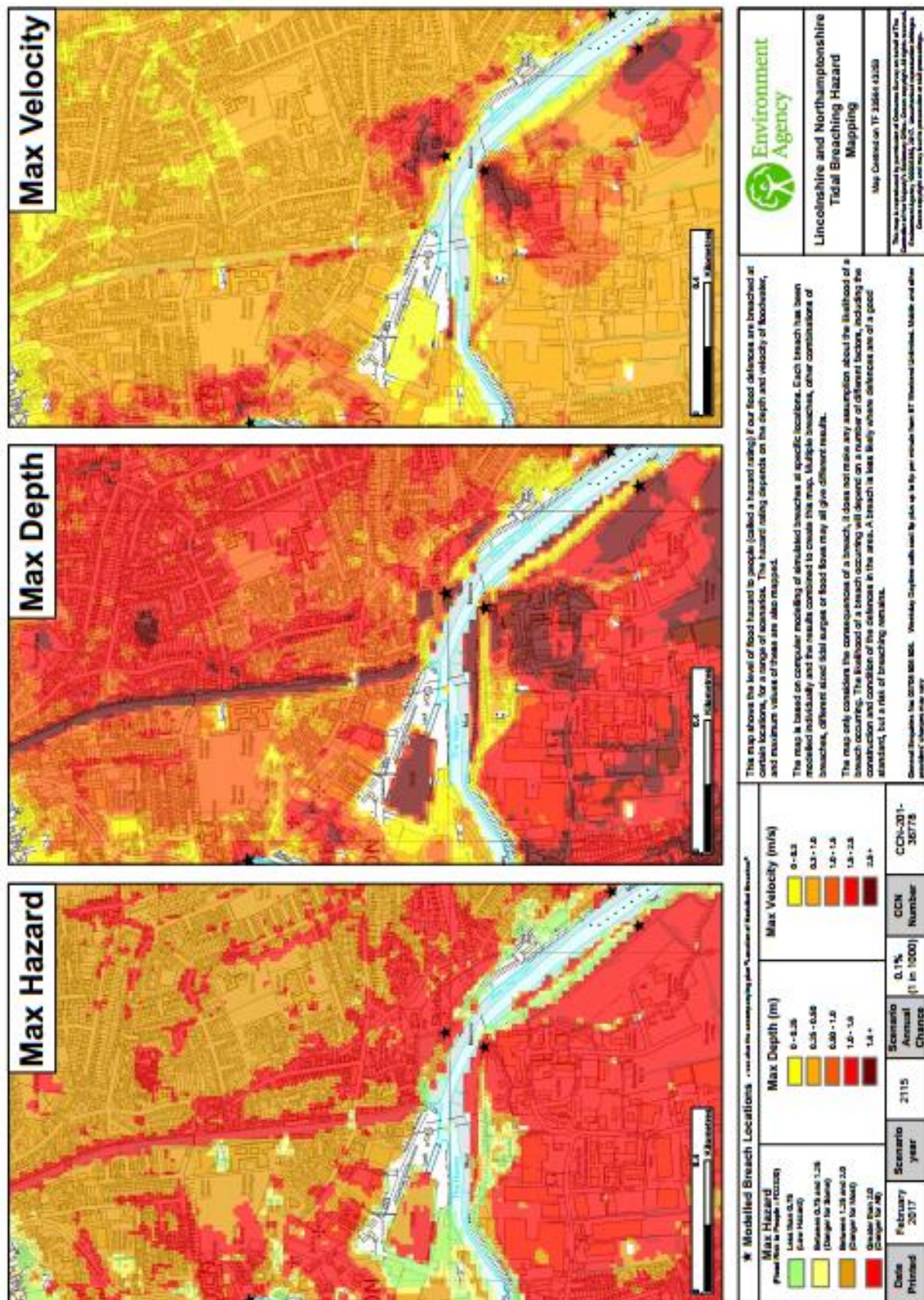
1 in 1000 year Flood Risk from Breaching in 2006



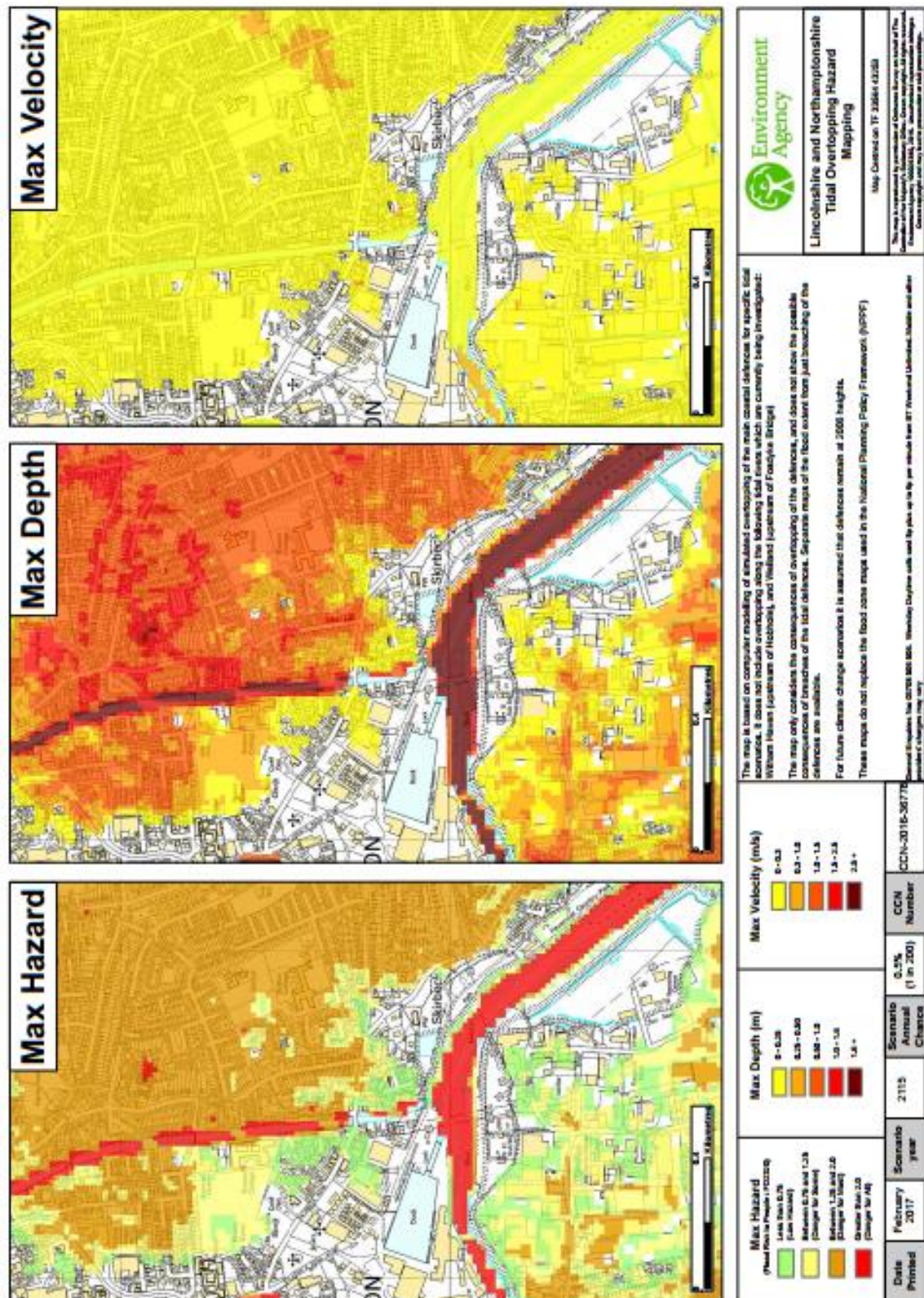
1 in 200 year Flood Risk from Breaching in 2115



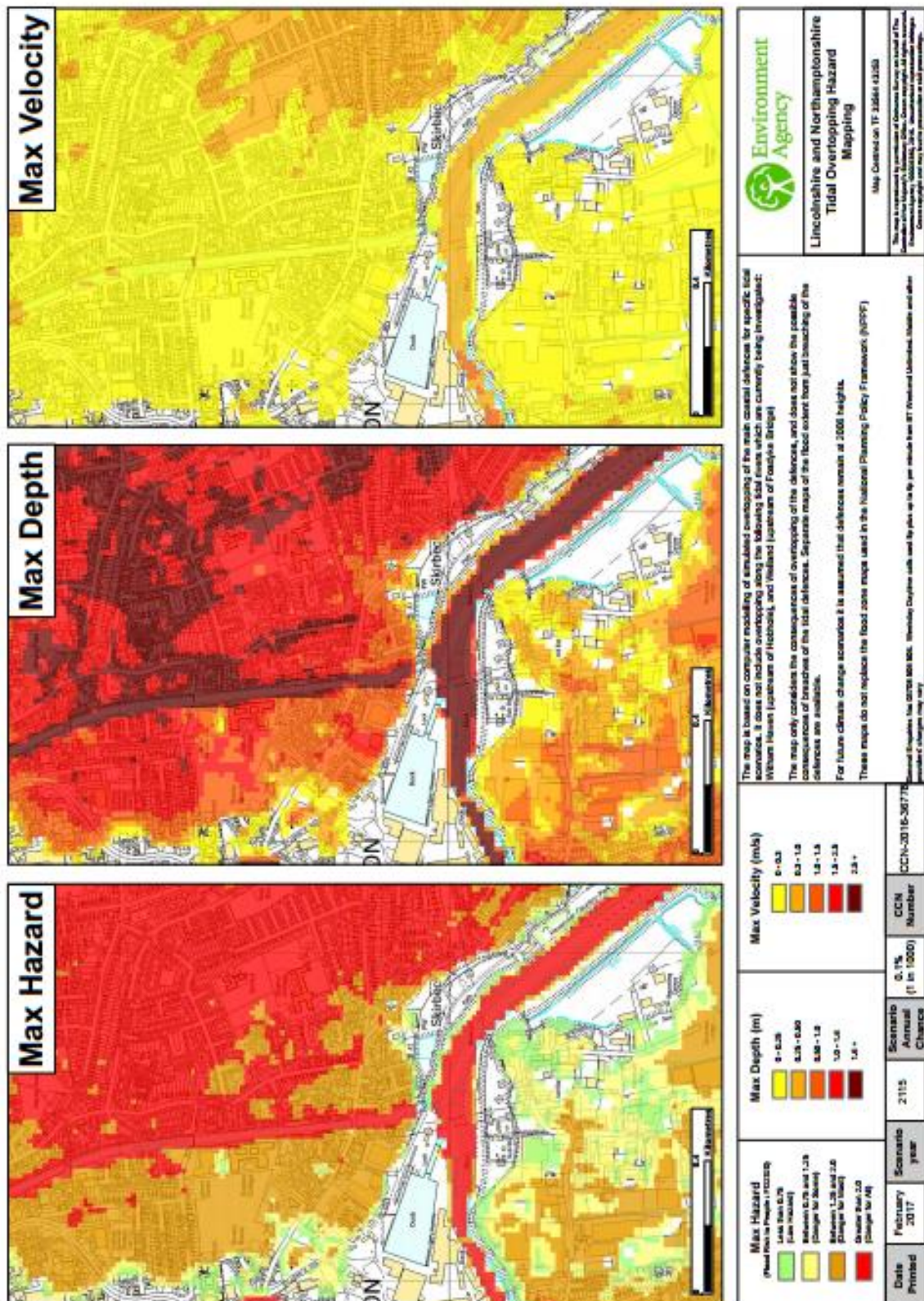
1 in 1000 year Flood Risk from Breaching in 2115



1 in 200 year Flood Risk from Overtopping in 2115



1 in 1000 year Flood Risk from Overtopping 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.

The maps issued by the EA were produced in 2006 and used the climate change impacts published by Defra in October 2006 which are reproduced below.

Table 1: Regional net sea level rise allowances

<i>Administrative or Devolved Region</i>	<i>Assumed Vertical Land Movement (mm/yr)</i>	<i>Net Sea-Level Rise (mm/yr)</i>				<i>Previous allowances</i>
		<i>1990-2025</i>	<i>2025-2055</i>	<i>2055-2085</i>	<i>2085-2115</i>	
East of England, East Midlands, London, SE England (south of Flamborough Head)	-0.8	4.0	8.5	12.0	15.0	6mm/yr* constant

Table 2: Indicative Sensitivity Ranges

<i>Parameter</i>	<i>1990-2025</i>	<i>2025-2055</i>	<i>2055-2085</i>	<i>2085-2115</i>
Peak rainfall intensity (preferably for small catchments)	+5%	+10%	+20%	+30%
Peak river flow (preferably for larger catchments)	+10%	+20%		
Offshore wind speed	+5%		+10%	+10%
Extreme wave height	+5%		+10%	+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 Haven (Tidal)
- 2) Flooding from the Maud Foster (Fluvial)

1) Flooding from the Haven

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	2006 guidance	Revised 2016 guidance
2055	0.395	0.412
2115	1.205	1.24

It is unlikely that an increase of 35mm in maximum levels in the Wash will have a significant impact on the predicted flood levels for the development site. The range of predicted flooding on the site is between 500mm and 1.0 metre, and a very small increase in the maximum flood level in the Wash is not going to change this prediction significantly.

2) Flooding from the Maud Foster

As the development is in flood zone 3 and is classed as more vulnerable, the upper end climate change allowance, which is 35%, should first 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.

The EA have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. The SFRA also has used

this figure of 20%. The increase to 35% will not significantly change the predictions of the water levels in the Maud Foster Drain at this location near the outfall sluice. The main flows in the Drain are from highland flows which are discharged into the drain at least 10 miles north of Boston. Any additional flows will overtop the upper reaches of the drain and no significant extra flows will be seen at the outfall.

The upper end allowance predicting a 65% increase in flows above the 1 in 100 year predicted flows now needs to be considered. It is unlikely that there will be any significant increase in the water level in the Drain. Therefore the maximum predicted water levels will not increase significantly above the levels predicted by the EA.

Therefore it is considered that the mitigation proposed for the development, with the recommendation that the floor level of the proposed ground floor flat should be a minimum level of 4.10m OD is satisfactory.