FLOOD RISK ASSESSMENT FOR RESIDENTIAL DEVELOPMENT AT WHARF STREET, SUTTON BRIDGE, LINCS

REVISED FINAL REPORT

GEOFF BEEL CONSULTANCY

MAY 2011

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CONTENTS

1.0 INTRODUCTION

2.0 LOCATION

3.0 THE SITE

4.0 EXISTING FLOOD ALLEVIATION MEASURES

5.0 POTENTIAL SOURCE OF FLOODING

6.0 EXTENT OF KNOWN FLOODING

7.0 PROBABILITIES AND TRENDS OF FLOODING

8.0 IMPACTS OF FLOODING

9.0 RESIDUAL RISKS – EXTREME EVENTS

10.0 CONCLUSIONS AND RECOMMENDATIONS

Fig 1 - Location Plan – OS Map

Fig 2 - Plan and Elevations – David Broker Design Services drg. no. 1419-2a

Fig 3 - Environment Agency Flood Zone Map

Fig 4 - Environment Agency Tidal Breach Hazard Mapping 1 in 200 year event (2006) - CCN/2010/27350

Fig 5 - Environment Agency Tidal Breach Hazard Mapping 1 in 200 year event (2115) – CCN/2010/27350

Fig 6 - South Holland Internal Drainage Board district plan.

1.0 INTRODUCTION

1.1 A full planning application is to be submitted by David Broker Design Services on behalf of ML Construction for proposed residential development at Wharf Street/Nene Quay, Sutton Bridge.

1.2 Planning approval requires a Flood Risk Assessment to be submitted to the Environment Agency to meet the requirements of Planning Policy Statement 25 (PPS25) – Development and Flood Risk.

The site is located within Flood Zone 3a 'High probability' as detailed on the Environment Agency's Flood Zone Maps. The latest Agency Flood Zone Maps have been created as a tool to raise awareness of flood risk with the public and partner organisations, such as Local Authorities, Emergency Services and Drainage Authorities. The Maps do not take into account any flood defences.

Furthermore, the site is also shown to be within the Tidal Zone 3a of the South Holland Strategic Flood Risk Assessment Maps and located in the South Holland Internal Drainage Board's area.

1.3 Geoff Beel Consultancy was appointed on 21st April 2011 to undertake a Revised Flood Risk Assessment.

1.4 A Flood Risk Assessment prepared by the author in February 2007 did not meet the Environment Agency's approval and further exchange of design details with South Holland District Council and the Environment Agency has taken place.

The Environment Agency letter of 30th March 2011 sets out the specific details for inclusion in the Revised Flood Risk Assessment .

- Reference to the risk identified by the South Holland Strategic Flood Risk Assessment and the implications for the site:
- Confirmation of the finished floor levels for the development in metres above Ordnance Datum;
- Details of the safe refuge afforded to the development
- Confirmation that the building can withstand the potential hydrostatic pressures resulting from flooding.
- A Flood Warning and Evacuation Plan. We recommend that this is approved by the Emergency Planner at South Holland District Council.

2.0 LOCATION

2.1 The development site is located at the junction of Wharf Street and Nene Quay being west of the River Nene tidal defences at Sutton Bridge. The National Grid Reference of the central point of the site is TF 48132118.

2.2 The position and extent of the site is shown on Fig 1 – Location Plan at the end of the document.

2.3 The site, located within the South Holland Internal Drainage Board area is shown within Flood Zone 3a as detailed on the Environment Agency Flood Zone Maps and the Council's Strategic Flood Risk Assessment Flood Zone Maps.

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently waste ground having previously been car park to the adjoining hotel.

3.2 The area of development is approximately 300 square metres with vehicular access to Wharf Street. Land level at the site is 4.00m aOD.

3.3 The proposed site layout consists of a pair of semi-detached town houses. A previous planning application reference H18/1334/04 for adjoining residential development was approved by South Holland District Council on 8th February 2005. Proposed habitable accommodation floor level of the development is shown at a minimum of 6.50m aOD.

The Exception Test will require to be applied to the proposed development as summarised in PPS25 Table D3.

4.0 EXISTING FLOOD ALLEVIATION MEASURES

4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agencys 'Policy for the Protection of Floodplains' and is considered to be passive until such time as a flood greater than that for which the defences were designed occurs. The likelihood of flooding due to overtopping or failure of a flood defence embankment is considered to be small.

The South Holland Internal Drainage Board area at Sutton Bridge is protected by the west embankment of the River Nene tidal defences.

4.2 The site and surrounding areas of development drain in a generally northerly direction to discharge into the tidal River Nene as part of the Westmere catchment of the Internal Drainage Board.

4.3 The existing standard of drainage for the South Holland Internal Drainage Board is 1 in 50 years return period, compatible with the Department of the Environment, Food and Rural Affairs target level of service for rural drainage and flood defence works. Freeboard of 900mm is provided to the lowest land levels.

4.4 Current maintenance standards within the South Holland Internal Drainage Board and of the Environment Agency tidal defences are generally very good.

During the operation and maintenance of its pumping stations, associated structures and channel systems, particularly those that could affect property, the Board seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought. However, bank slips, blocked culverts etc may occur from time to time and these matters are usually dealt with promptly.

5.0 POTENTIAL SOURCES OF FLOODING

5.1 Four potential sources of flooding have been identified as a result of this assessment:

a) local blockages to existing sewerage
b) local blockages to IDB main drain
c) storm return period of 1 in 50 years being exceeded
d) overtopping of River Nene tidal defences at Sutton Bridge

5.2 The probability of flooding from source a) and b) are low due to the maintenance standards already achieved and managed by Anglian Water and the IDB.

The probability of flooding from c) is also low due to the South Holland IDB main drain design standard incorporating a minimum 900mm freeboard to the lowest land level which provides adequate storage in events greater than 1 in 50 years.

5.3 Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1 in 100 year events, caused no flooding to any residential properties at the time and the Boards policy is to provide a standard of drainage which satisfies PPS25 requirements of a 1 in 100 year return period for fluvial protection inclusive of the effects of climate change and development. The Boards policy regarding the connection of future developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

5.4 The possible overtopping and breaching of the tidal River Nene defences at Sutton Bridge is also considered to be low. The Environment Agency has carried out the River Nene Strategic Study Report and concluded that the defences provide a level of protection against the 1 in 200 years period tidal event.

5.5 Further hydraulic modelling has been carried out by the Enviornmen Agency of the impacts of a breach occurring to the Sutton Bridge tidal defences. The present day scenario is such the maximum depth of flooding would be up to 0.5m with a low to medium Danger Hazard rating.

By the year 2115, with no further improvements carried out to the Sutton Bridge tidal defences the scenario deteriorates such that the maximum depth of flooding would be up to 2.0m with a High Danger Hazard rating.

5.6 The potential maximum velocity of the floodwaters in 2115 is shown as at least 1.0m/sec and the dwellings will be designed to withstand the hydrostatic pressures resulting from the floodwaters.

5.7 Safe refuge is provided in the roof space with access through an escape roof window for any evacuation of people.

6.0 EXTENT OF KNOWN FLOODING

6.1 During the preparation of this assessment, evidence was discovered of part of the site being flooded and adjoining properties during the tidal surge event of January 1978 since when tidal defences have been raised and strengthened to a 1 in 200 year standard of protection.

7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is low.

7.2 The probability of the site flooding with water from any South Holland main drain is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and the location of the site.

7.3 The probability of the site flooding with tidal waters from the River Nene is less than 0.5% because of the standards of the existing flood defences and the location of the site. If the trend of climate change anticipated to occur continues over the next 100 years, the defences are considered adequate to sustain the 1 in 200 year standard of protection.

7.4 If under very extreme events, levels of floodwater from the South Holland main drains or arterial systems rose to such an extent that the site was affected, the situation would not be sudden. It is very probable that sufficient time would be available to take precautionary actions to limit the extent and potential impact of flooding.

7.5 The water levels in the drainage channels will tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the raising of floor levels above existing ground level will be appropriate for the design life of the development (ie 100 years).

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated due to the existing standards of tidal defence, however a precautionary approach has been adopted to protect against the remote possibility of tidal overtopping to the River Nene tidal defences.

8.2 Habitable floor levels of the development will be above existing ground level at a minimum of 6.50m aOD offering additional protection against impacts arising from any extreme short duration, localised events.

8.3 The general location of the site within the catchment is such that if flooding occurred from any of the South Holland main drain systems, then probably 2 to 3 days warning time would be available.

8.4 No displacement of water from the site will affect any adjoining properties as being discharged to existing public surface water sewerage.

8.5 The developer will ensure that the eventual occupiers of the properties are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high. Indirect warnings are provided to all flood risk areas, even those at low risk of flooding. The main method is media broadcasts via local radio and also by television including teletext.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding, contact tel. no: 0845 988 1188 and the occupiers will be required to register with the Floodline Direct Warning Service to receive any future flood warnings.

8.6 A Flood Evacuation Plan will b prepared for approval by the South Holland District Council Emergency Planner. The Plan will identify access to Bridge Road in an easterly direction to land in Flood Zone 1.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is low on this site, because of its location, existing tidal flood defences and the standard of surface water drainage already provided.

9.2 Although within Flood Zone 3a according to PPs25 classification, the site actually has a low risk of flooding due to the current standards of drainage and flood defence and land levels. The site is not located within a Functional Flood Plain of any 'main river' or 'main drain' as defined in PPS25. The Environment Agency Flood Zone maps have been produced irrespective of existing flood defences and standards of protection.

9.3 South Holland District Council in conjunction with the Environment Agency and the local IDB's within the Council area have carried out a Strategic Flood Risk Assessment of the whole District by appointed Consulting Engineers.

The Strategic Flood Risk Assessment has produced more definitive Flood Risk Maps than those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences for years 2002 and 2052 to account for the effects of climate change.

9.4 As a result of the Strategic Flood Risk Assessment the South Holland IDB area has been determined as providing protection against a 1 in 100 year return period event whilst the River Nene tidal defences at Sutton Bridge provide protection against a 1 in 200 year return period event.

9.5 The development site is therefore, as a result of the flood risk assessment for the IDB areas, classified as being protected to 100 year standard, putting it in PPS25 Zone 2, unless the land is otherwise affected by potential flooding from main river or The Wash.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 As a result of the assessment, the following conclusions have been reached:-

- The proposed development is not in a Functional Floodplain as defined by PPS25. It is located in the Passive Floodplain protected by tidal defences to a 1 in 200 year return period, (0.5%) and fluvial defences of 1 in 100 year return period (1.0%).

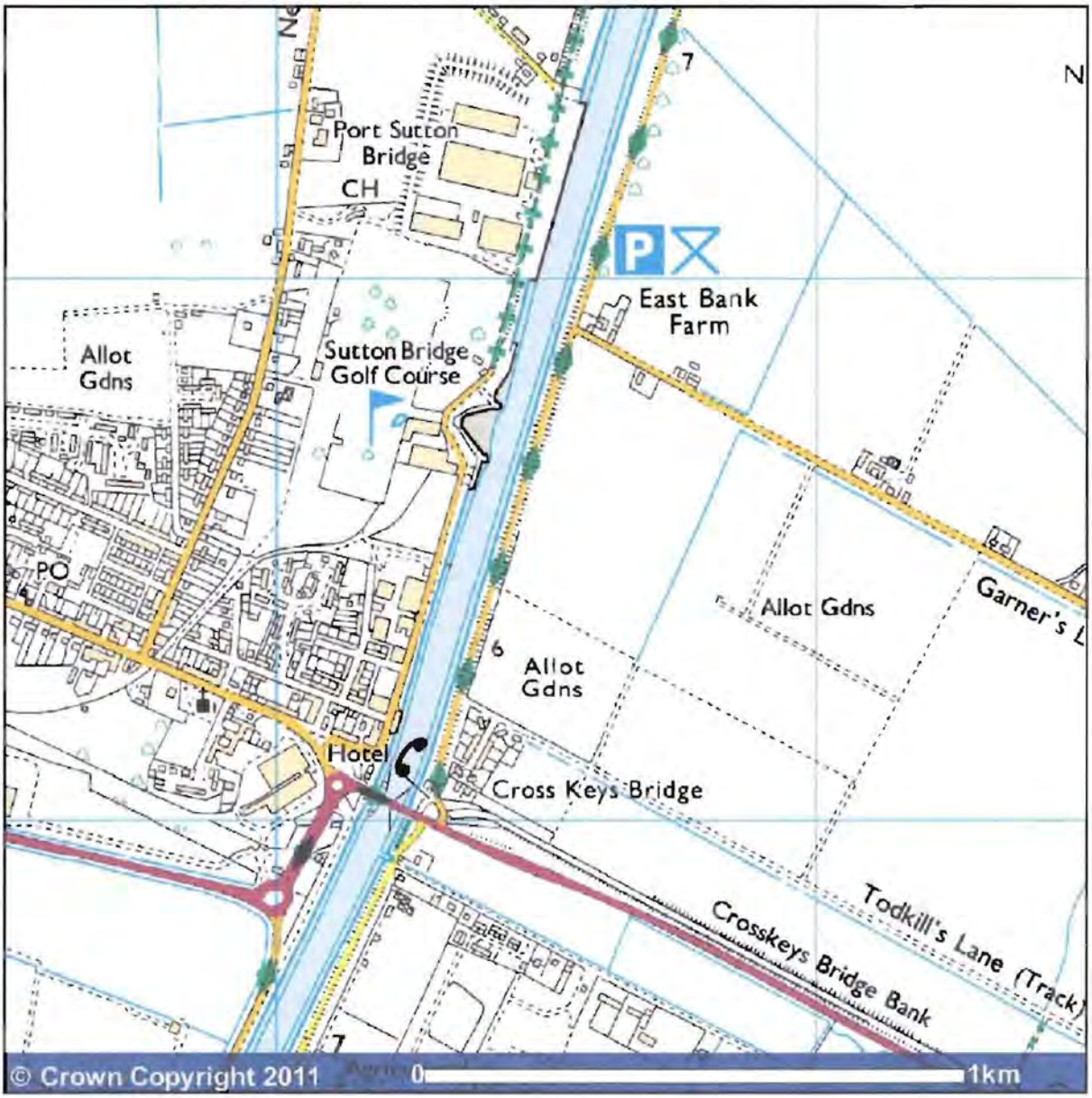
- As a result of the South Holland District Council Strategic Flood Risk Assessment the site is in Flood Zone 2 for fluvial flood events and the actual risk of site flooding from any South Holland IDB main drain system is very low.

- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.
  The Boards policy is to continue to provide a standard of drainage of 1 in 100 year return.

- On site surface water drainage will be discharged via an existing combined sewer of Anglian Water Services Ltd and hence to a South Holland IDB main drain.

- Habitable floor levels of the development will be positioned at a minimum of 6.50m aOD offering 2.50m freeboard above existing ground levels.

- Access and egress to and from the site in the event of predicted tidal flooding would be via Wharf Street to Nene Quay and hence the higher ground of Bridge Road.



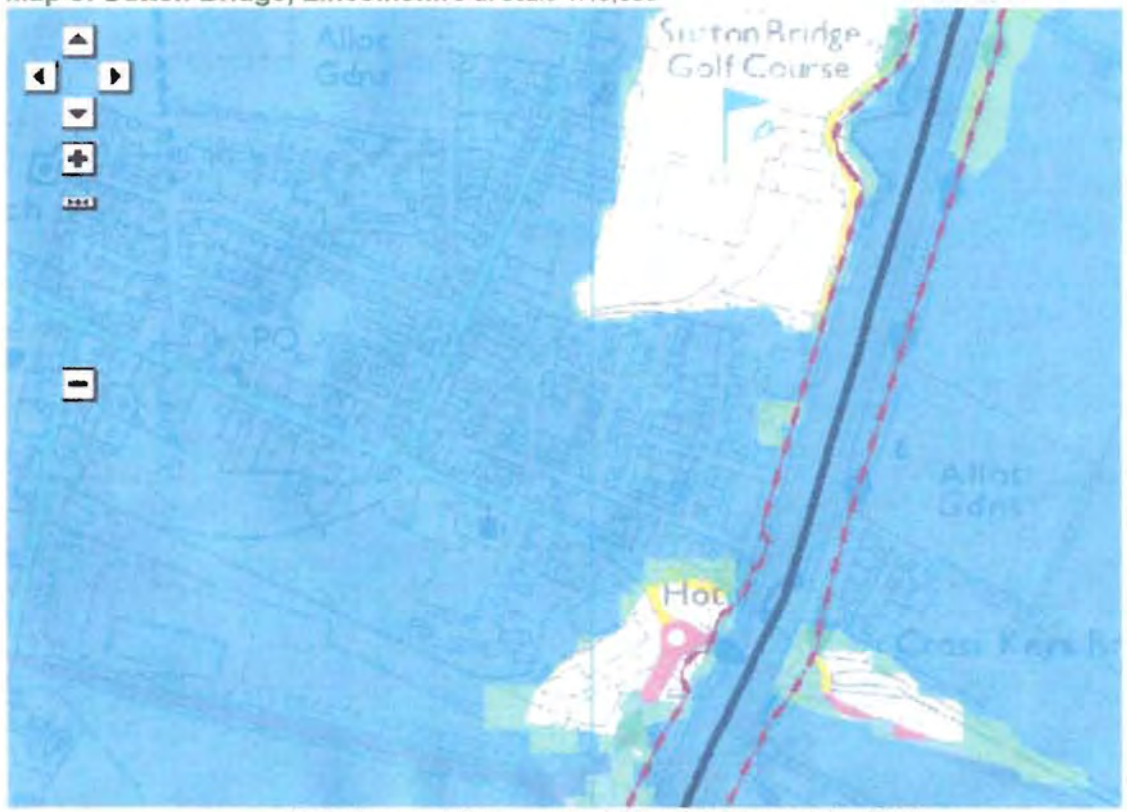
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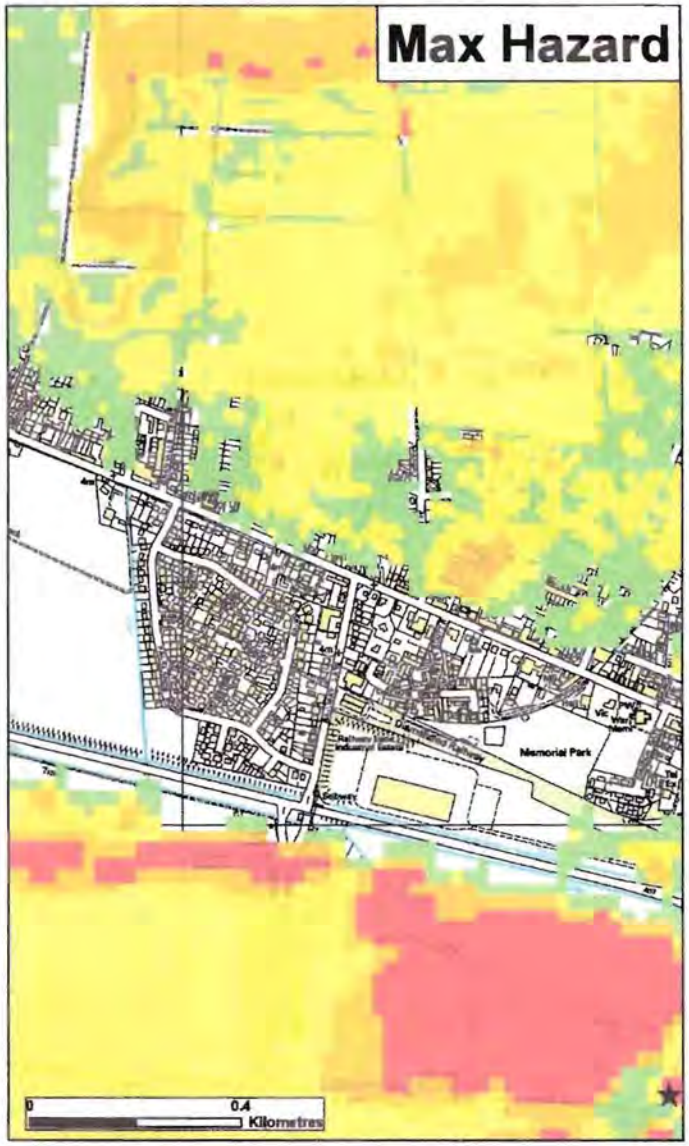
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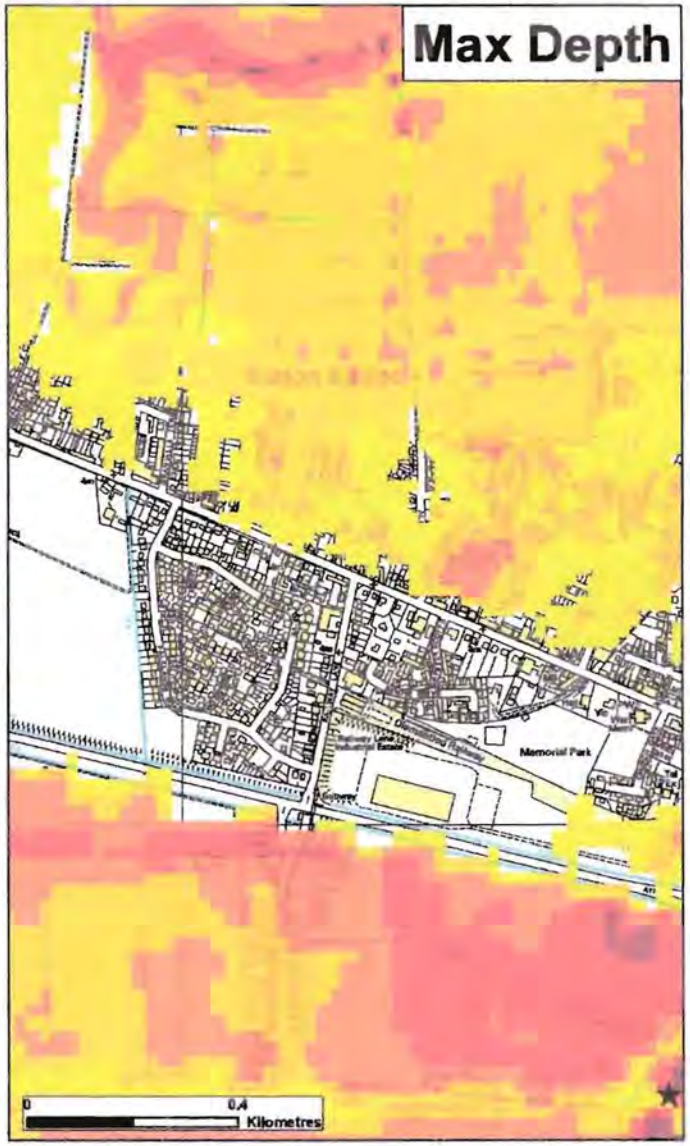
Map of Sutton Bridge, Lincolnshire at scale 1:10,000

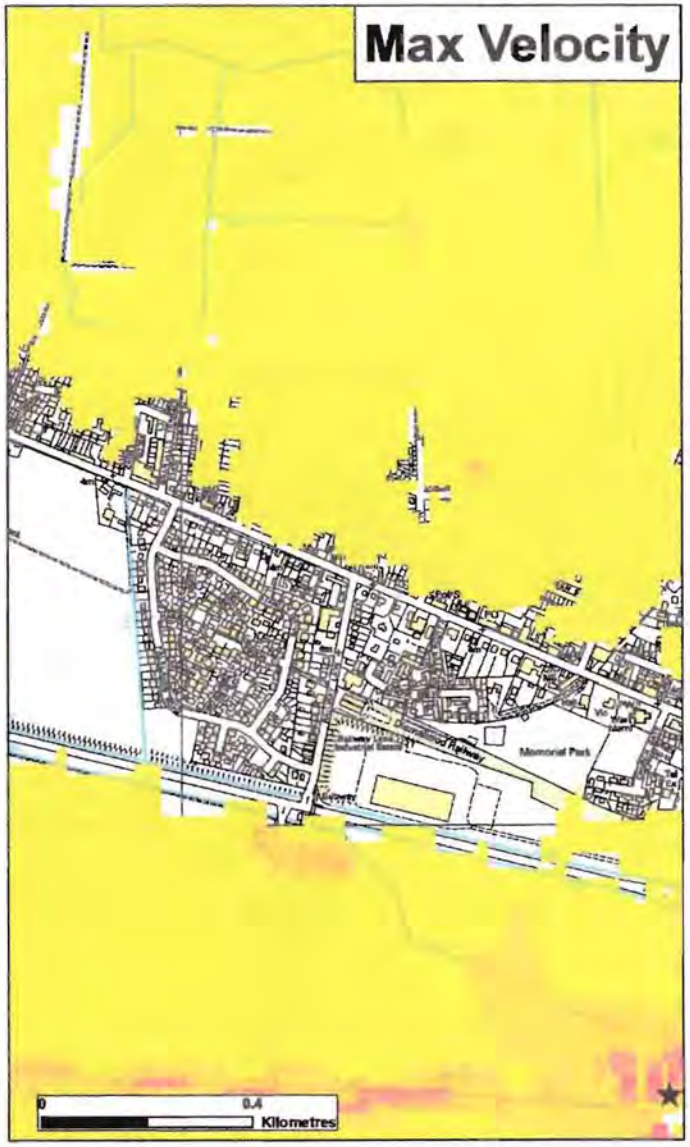
Map Legend



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★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard (Flood Risk to People FD2320)	Max Depth (m)	Max Velocity (m/s)
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.3
Between 0.75 and 1.25 (Danger for Some)	0.25 - 0.50	0.3 - 1.0
Between 1.25 and 2.0 (Danger for Most)	0.50 - 1.0	1.0 - 1.5
Greater than 2.0 (Danger for All)	1.0 - 2.0	1.5 - 2.5
	2.0 +	2.5 +

Date Printed	April 2011	**Scenario year**	2006	**Scenario Annual Chance**	0.5% (1 in 200)

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.

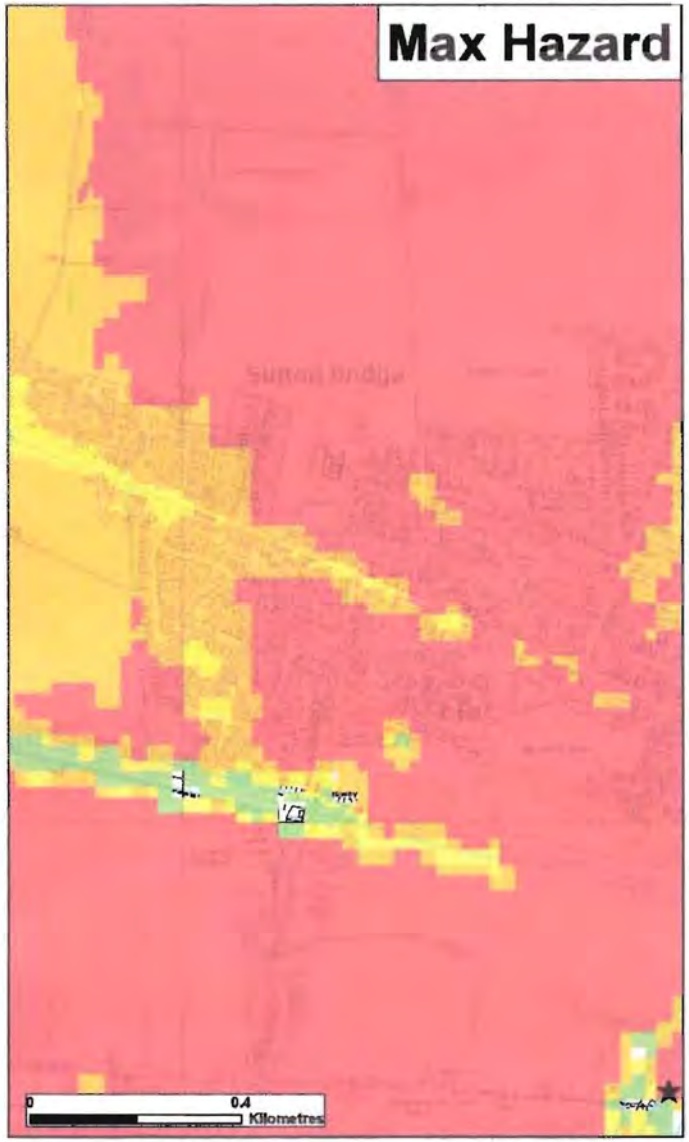
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

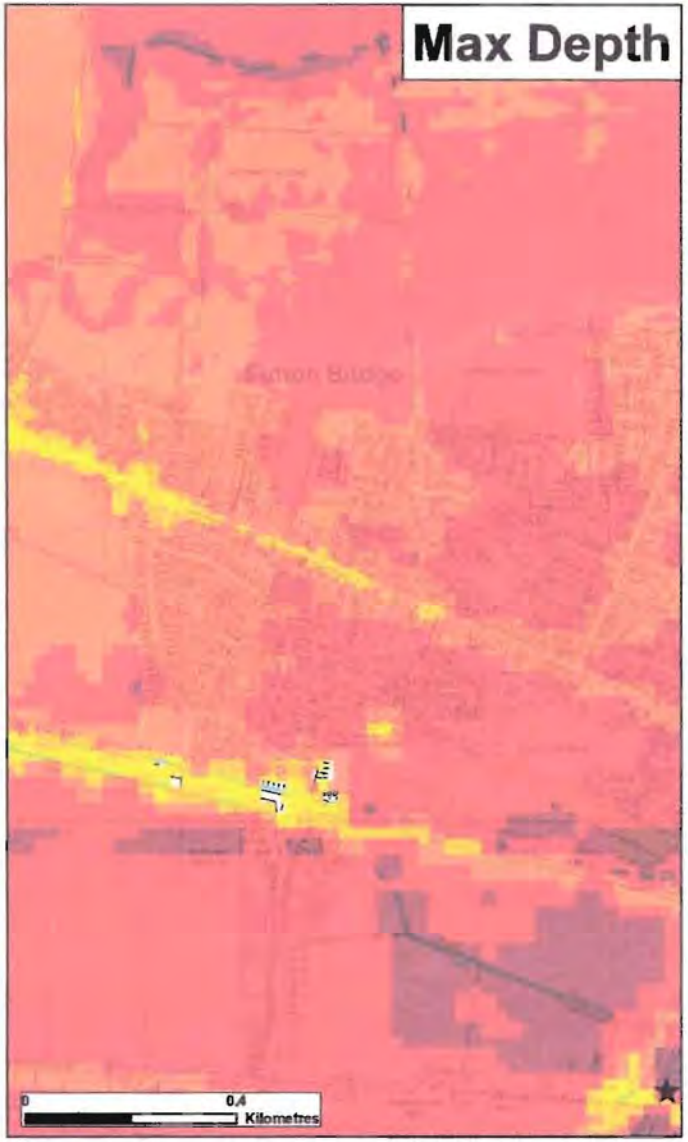
Environment Agency

Northern Area Tidal Breach Hazard Mapping

Map Centered on TF 4731 2148

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Greater than 2.0 (Danger for All)	1.0 - 2.0	1.5 - 2.5
	2.0 +	2.5 +

Date Printed	April 2011	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

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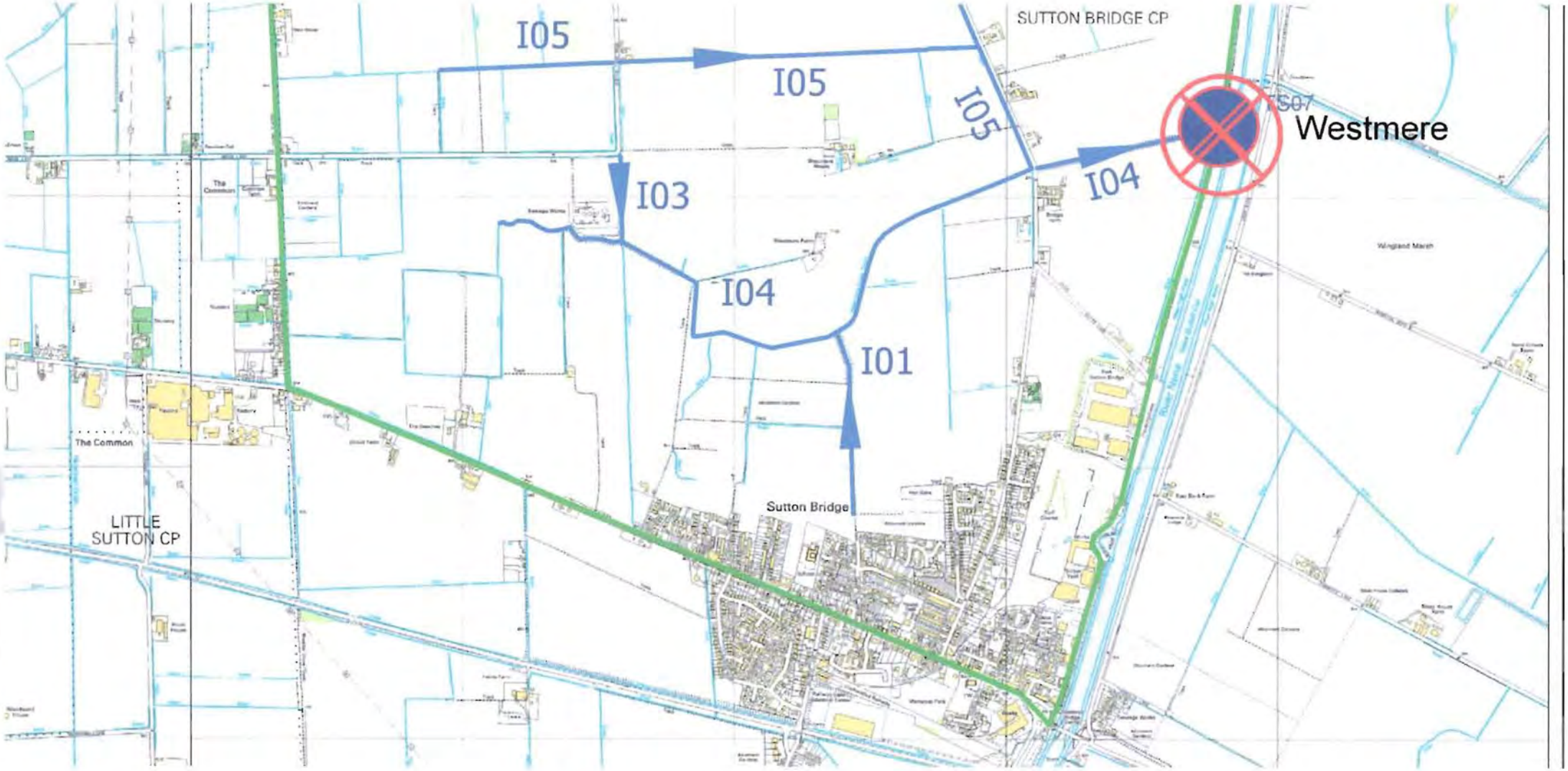
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The Common
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