FLOOD RISK ASSESSMENT FOR RESIDENTIAL DEVELOPMENT AT 103 NEW ROAD, SUTTON BRIDGE, LINCS.

FINAL REPORT

GEOFF BEEL CONSULTANCY

SEPTEMBER 2016

GCB/MERCHANT

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Fig 1 - Location Site Layout Plans (Existing) – G R Merchant drg. no. 2992-16-01

Fig 2 - Location & Site Layout Plans (Proposed) – G R Merchant drg. no. 2992-16-02

Fig 3 Environment Agency Flood Zone Map

Fig 4 - South Holland District Council Strategic Flood Risk Assessment Residual Flood Depth Map (2010)

Fig 5 - Environment Agency Tidal Hazard Mapping 1 in 200 year event (2015) – CCN/2013/34827

Fig 6 - South Holland Internal Drainage Board District Plan

1.0 INTRODUCTION

1.1 An outline planning application is to be submitted by G R Merchant Ltd on behalf of Mrs S Gerova for proposed residential development at 103 New Road,
Sutton Bridge.

1.2 Planning approval requires a Flood Risk Assessment to accompany the planning application for approval by the Environment Agency and meet the requirements and general principles contained in the Planning Practice Guidance to the National Planning Policy Framework (NPPF).

The site, as situated is shown within Flood Zone 3 of the Environment Agency Flood Zone Maps. The latest Agency Maps have been created 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 existing flood defences.

The site is also shown as liable to flooding due to a breach in the River Nene tidal defences of between 1.00m -1.50m on the South Holland District Council's Strategic Flood Risk Assessment Maps and located in the South Holland Internal Drainage Board district.

1.3 Geoff Beel Consultancy was appointed on 24th August 2016 to undertake the Flood Risk Assessment.

2.0 LOCATION

2.1 The development site is located on the west side of New Road being west of the River Nene tidal defences at Sutton Bridge. The National Grid Reference of the central point of the site is TF 48002240.

2.2 The position and extent of the site is shown on Fig 1 – Location Plan & Site Layout Plans (Existing) at the end of the document.

2.3 The site, located within the South Holland Internal Drainage Board area is shown within Flood Zone 3 as detailed on the Environment Agency Flood Zone Maps and liable to flooding as a result of a breach to the River Nene tidal defences of between 1.00 - 1.50m on the Council's Strategic Flood Risk Assessment (2010).

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently a landscaped area and garden to 103 New Road.

3.2 The area of development is 0.30 hectare with proposed vehicular access to New Road. Land level at the site is generally at 4.00m aOD.

3.3 The proposed site layout consists the construction of 2 no. two-storey dwellings.

3.4 The Sequential Test and Exception Test will require to be applied by the Local Planning Authority but the development may be permitted as the site is protected against both the 1 in 100 year fluvial and 1 in 200 year tidal events meeting the requirements of NPPF.

No other development site in Sutton Bridge is at a lower risk of flooding and hence the Sequential Test is met with flood mitigation measures incorporated to satisfy the Exception Test.

4.0 EXISTING FLOOD ALLEVIATION MEASURES

4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agency's '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 at a level of 6.30m aOD.

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 riparian drains
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 sources a) and b) is low due to the maintenance standards already achieved and managed by landowners.

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 NPPF 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 (1995) and concluded that the defences provide a level of protection against 1 in 200 years period tidal event.

5.5 Breach and overtopping analysis has been carried out by consulting engineers preparing the South Holland District Council Strategic Flood Risk Assessment (2010). The Residual Flood Depth affecting the site as a result of the 1% Fluvial/0.5% Tidal event in 2115 shown in Fig 4 is between 1.0m and 1.5m.

Floor level of the proposed two-storey dwellings will be raised 1.00m above existing ground level with flood resilient measures incorporated into the design and construction up to 500mm above finished floor level. Safe refuge will be available at first floor level in the event of flooding.

5.6 More recent Tidal Hazard mapping produced by the Environment Agency in Fig 5 shows the site as flooded between 0.50 – 1.00m depth of water.

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.

The more recent tidal surge event of 5th December 2013 reached a level of 6.10m aOD and the town was protected by the improved defences.

7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is very 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 within the next 100 years with tidal waters from any main river system is less than 0.5% because of the standards of the existing flood defences and the location of the site

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 1.00m above existing ground level will be appropriate for the design life of the development (i.e. 100 years).

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor levels of the development will be 1.00m above existing ground levels 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 The developer should ensure that the eventual occupiers of the dwellings 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.

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 of the dwellings should register with the Floodline Direct Warning Service to receive any future flood warnings.

8.5 If any future flood warning is received, safe access/egress to evacuate the property would be available onto New Road in a southerly direction to Bridge Road and Sutton Bridge town centre where land is located in Flood Zone 1.

8.6 A Flood Warning and Evacuation Plan will be agreed with the Local Authority's Emergency Planner.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is medium to high 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 3 according to NPPF classification, the site actually has a present day very 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'. 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 recently completed 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 2115 to account for the effects of climate change.

Breach scenarios of embankments failing and/or being overtopped have also been carried out to establish Flood Risk Zones.

9.4 As a result of the Strategic Flood Risk Assessment the South Holland IDB area has been determined as providing present day 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.

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. It is located in the Passive Floodplain protected by River Nene tidal defences to a 1 in 200 year return period, (0.5%) and fluvial defences of 1 in 100 year return period (1.0%).

- 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.

- Floor level of the dwellings will be raised 1.00m above existing ground level with sleeping accommodation only on the first floor. Flood resilient measures will be incorporated into the design and construction of the dwelling up to 500mm above finished floor level.

- Safe refuge in the event of flooding will be available at first floor level.

- Safe access/egress to evacuate the property is available onto New Road in a southerly direction to Bridge Road and Sutton Bridge village centre where land is in flood Zone 1.

- A Flood Warning and Evacuation Plan will be agreed with the local Authority's Emergency Planner.



SITE PLAN
1/500



LOCATION PLAN
1/2500

G. R. MERCHANT
LEng AMICE FIWO

ARCHITECTURAL, STRUCTURAL
AND LAND DRAINAGE
CONSULTANTS

Unit 4, Wrights Mews
124 Park Road, Holbeach,
Spalding, Lincs, PE12 7EE
Tel 01406 490900
Fax 01406 425744
E-Mail: G. R. Merchant @ Merchant. Fb.
Co. UK

Project

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LOCATION PLAN
1/2500

G. R. MERCHANT
LENG AMICE FIWO

ARCHITECTURAL, STRUCTURAL AND LAND DRAINAGE CONSULTANTS

Unit 4, Wrights Mews
18A Park Road, Holbeach,
Spalding, Lincs, PE12 7DE
Tel: 01406 490890
Fax 01406 422744
E-Mail: G. R. Merchant @ Merchant. Fsnet.Co.Uk

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Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

Map legend

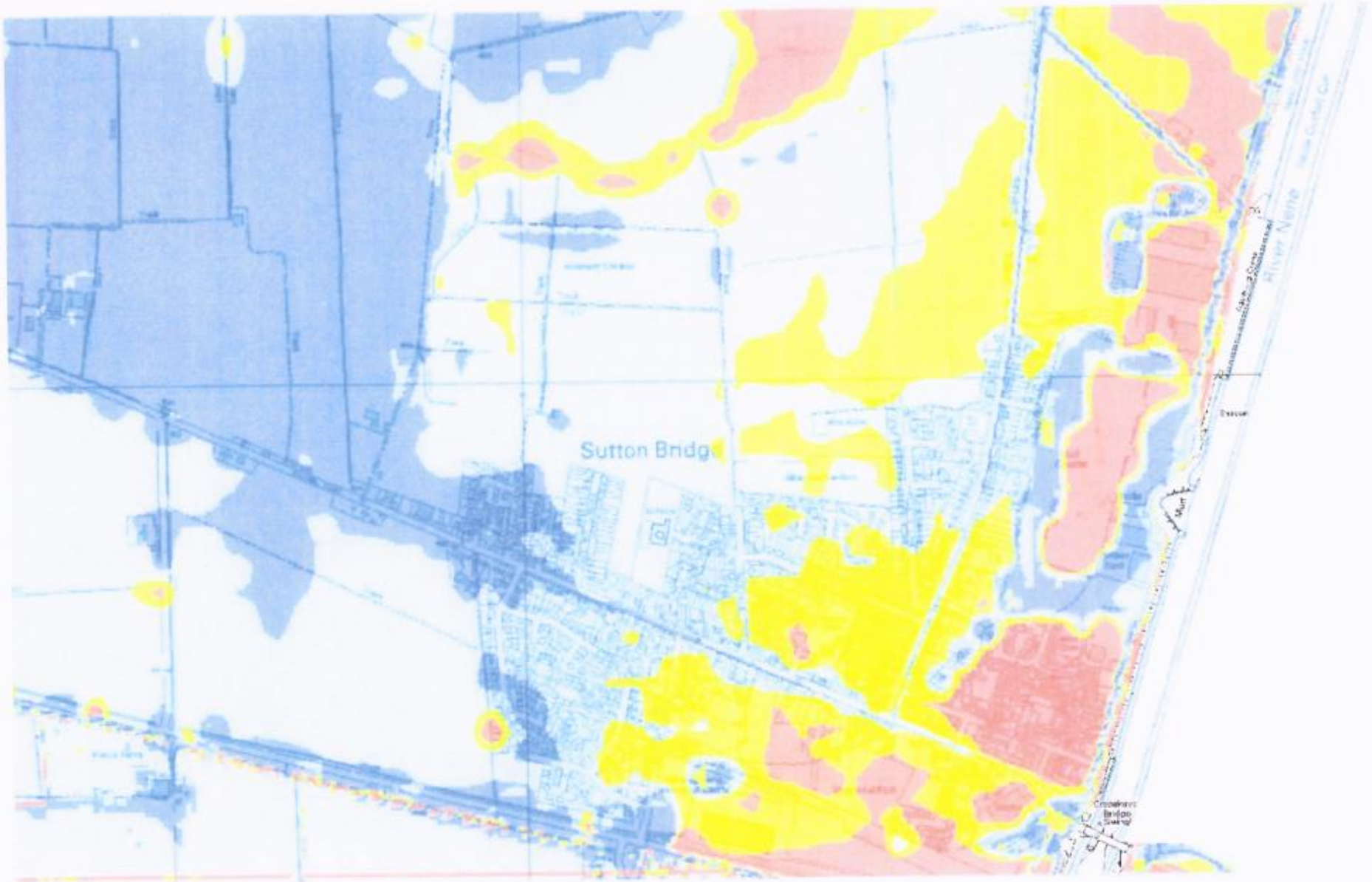
Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in

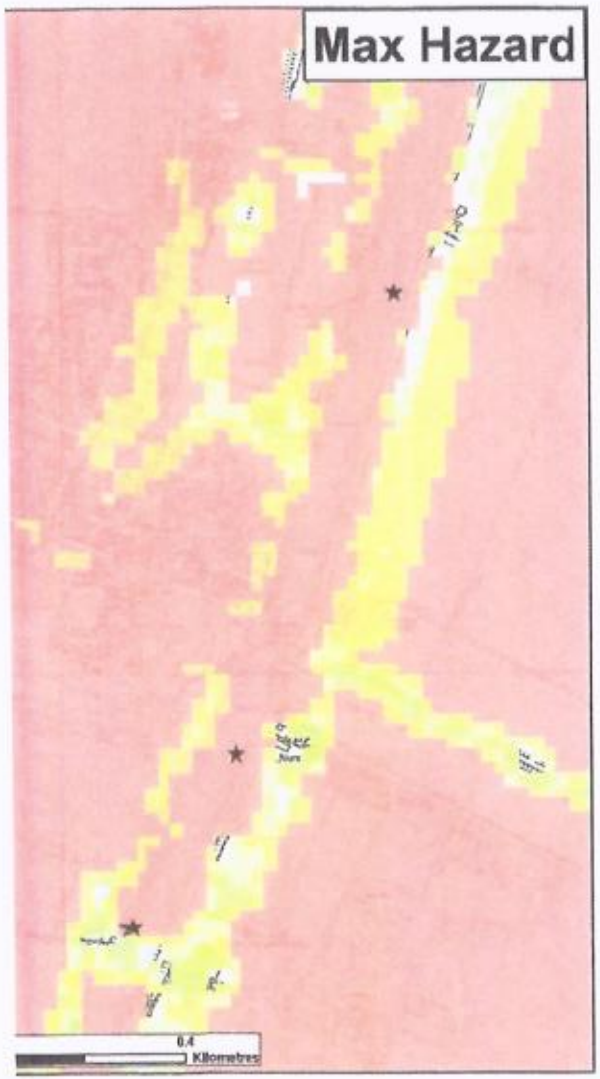
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- Flood Zone 3
- Flood Zone 2
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main River Line
- Main River Line
- Other national environmental organisations
- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

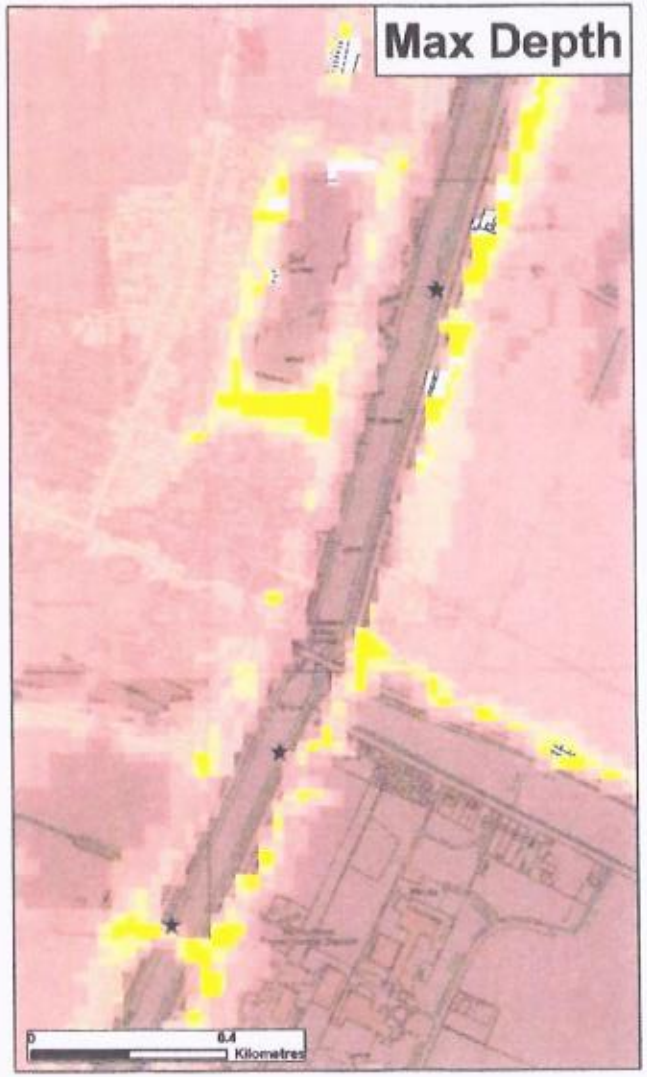
Sutton Bridge, Lincolnshire at scale 1:10,000

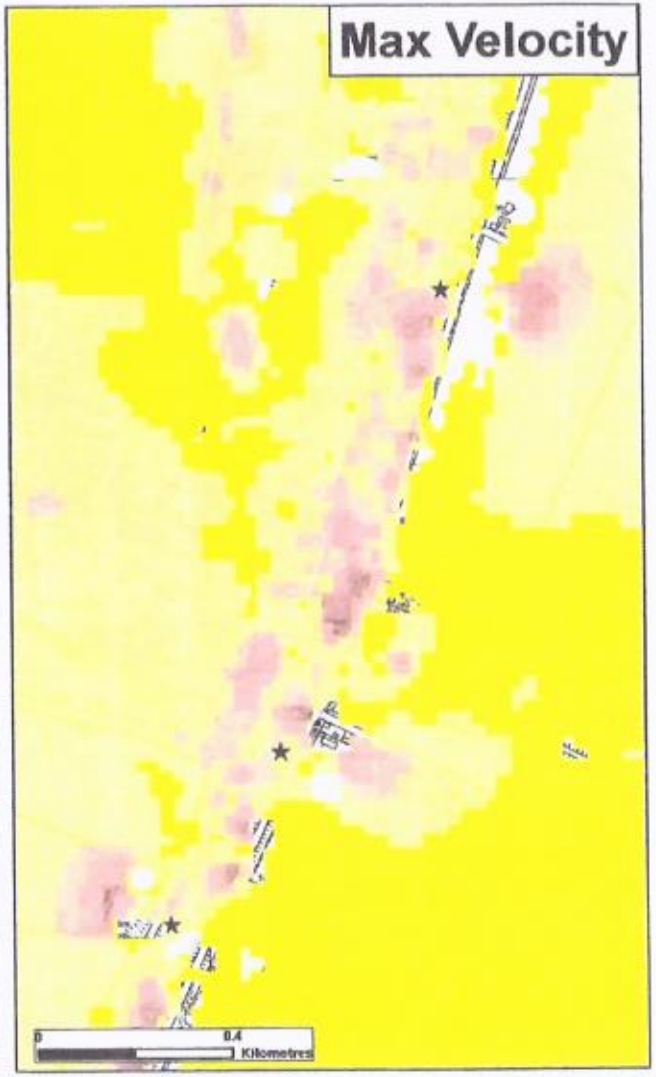
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Sutton Bridge
River Nene







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 +

Printed	August 2013	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.

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.

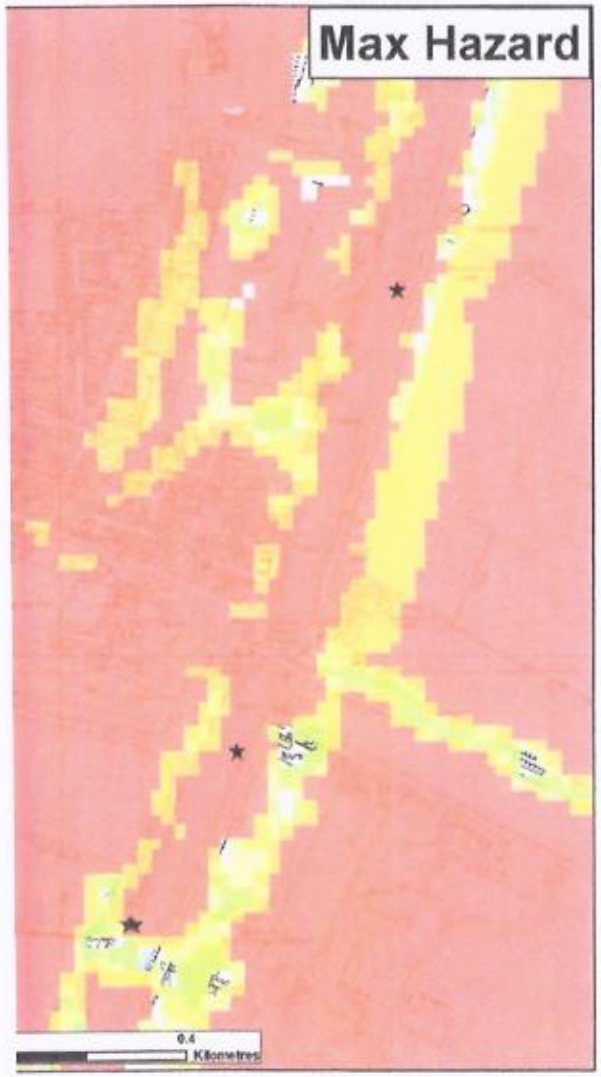
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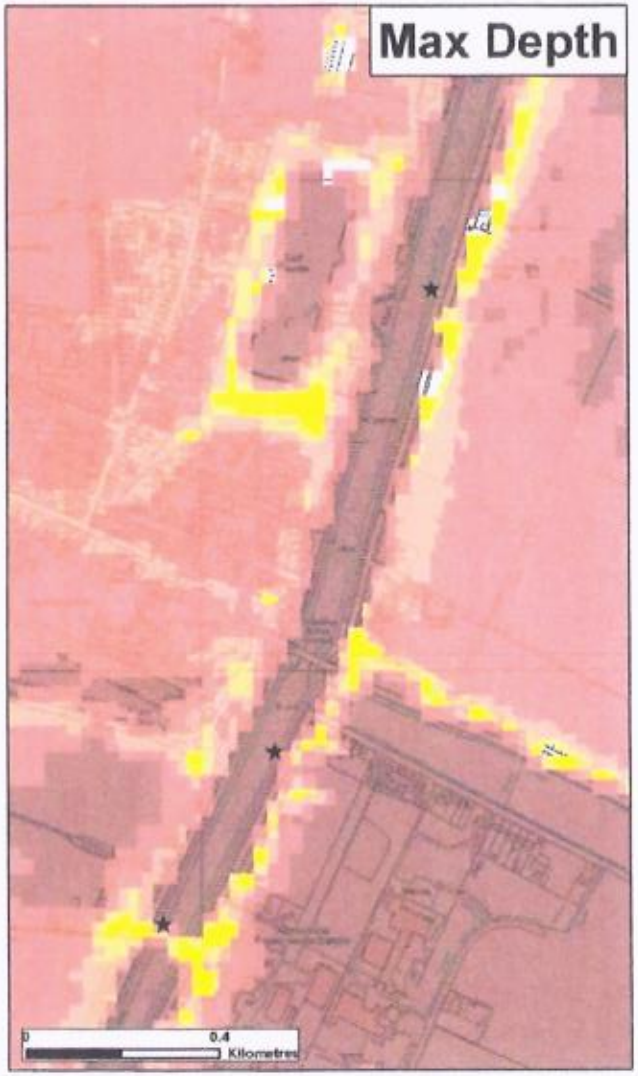
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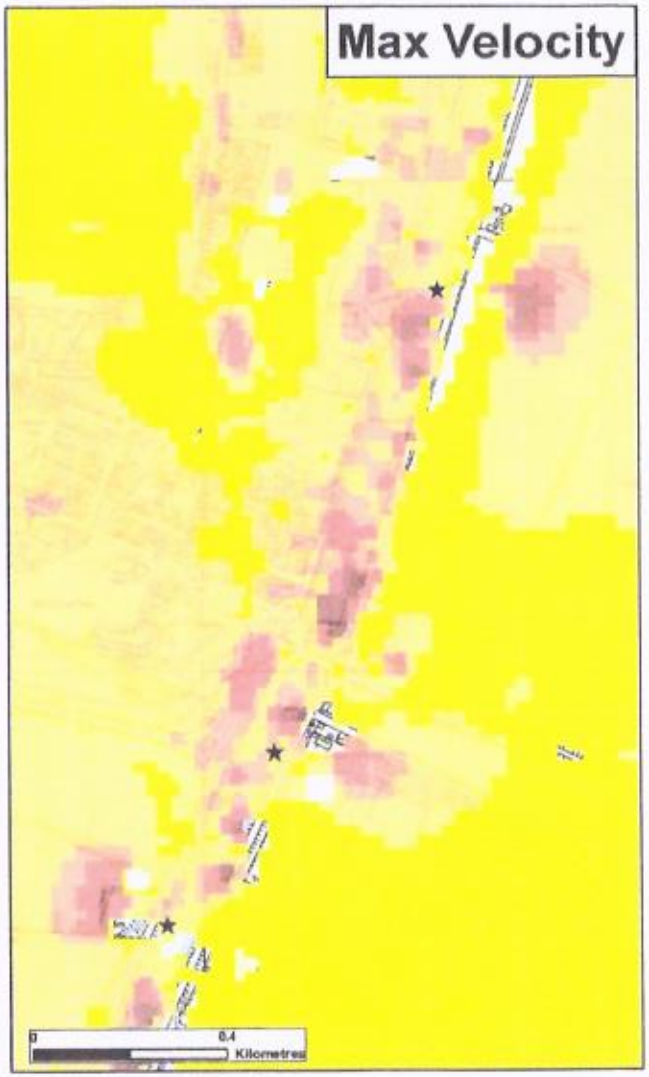
Northern Area Tidal Breach Hazard Mapping

Map Centred on TF 48239 21269

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

Printed	August 2013	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)

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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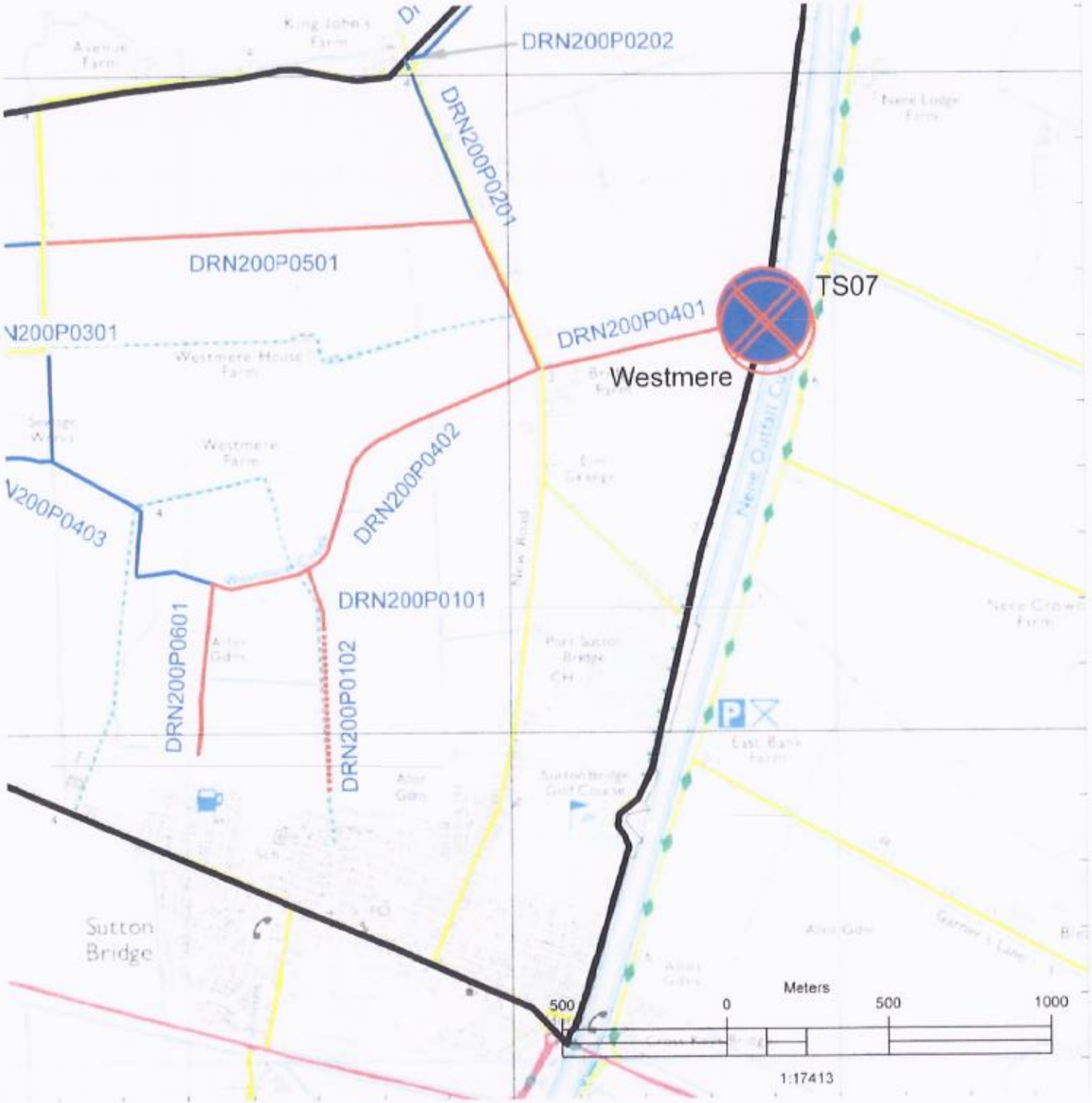
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Northern Area Tidal Breach Hazard Mapping

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