FLOOD RISK ASSESSMENT
FOR PROPOSED RESIDENTIAL DEVELOPMENT
OFF ROMAN BANK,
HOLBEACH BANK, SPALDING, LINCS.

FINAL REPORT

GEOFF BEEL CONSULTANCY

NOVEMBER 2017

GCB/MERCHANT

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Fig 1 - Location & Site Layout Plans – G.R. Merchant Ltd drg. no. – 3250-17-01

Fig 2 - Environment Agency Flood Map for Planning

Fig 3 - South Holland District Council Updated Strategic Flood Risk Assessment (2016) Residual Flood Extent District 2116

Fig 4 - Environment Agency Tidal Hazard Mapping 1 in 200 & 1 in 1000 year events (2115) – CCN-2015-38526

Fig 5 - South Holland Internal Drainage Board district plan

1.0 INTRODUCTION

1.1 A full planning application is to be submitted by G.R. Merchant Ltd on behalf of M & W Mack Ltd for proposed residential development off Roman Bank, Holbeach Bank, Spalding, Lincs.

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

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

The site however is also shown in Flood Zone 1 and outside of any Hazard Zone of the South Holland District Council's Updated Strategic Flood Risk Assessment Maps (2016).

The site is also located in the South Holland IDB drainage district.

1.3 Geoff Beel Consultancy was appointed on 14th November 2017 to undertake a Flood Risk Assessment.

2.0 LOCATION

2.1 The development site is located south of Roman Bank, Holbeach Bank. The National Grid Reference of the central point of the development is TF 35302725.

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

2.3 The site, located within the South Holland Internal Drainage Board district is shown within Flood Zone 3 as detailed on the Environment Agency Flood Map for Planning but in Flood Zone 1 of the Council's Updated Strategic Flood Risk Assessment Maps (2016) as defended by the Agency's tidal defences and the Internal Drainage Board system.

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently an agricultural storage building and surrounding land.

3.2 The area of development is approximately 0.36 hectare.

3.3 The proposed site layout consists the construction of four two storey houses after demolition of the agricultural storage building with existing land level generally at 3.00m aOD.

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 200 year return period tidal event and the 1 in 100 year return period fluvial event. The Sequential Test is met as the site is in Flood Zone 1 of the Council's Strategic Flood Risk Assessment Maps (2016).

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 development site within the South Holland Internal Drainage Board is protected by the Wash tidal defences to the Holbeach Marsh frontage with embankment levels of a minimum of 7.00m aOD.

4.2 The site and the surrounding land drains by gravity to the Board's Peartree Drain and via the Peartree Drain Pumping Station to the Holbeach River Outfall Sluice.

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 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 IDB main drain system.
b) storm return period of 1 in 50 years being exceeded
c) failure of Peartree Drain Pumping Station
d) overtopping and breaching of defences of the Wash tidal defences

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

The probability of flooding from b) 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.

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 developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

5.3 Failure of Peartree Drain Pumping Station may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such as to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment. The probability of such an occurrence is also considered to be low.

5.4 The flood embankments to the Wash tidal defences provide a 1 in 200 year return period level of protection.

The 1 in 200 year tidal event to the Holbeach Marsh frontage inclusive of climate change to 2115 is estimated to be 7.20m aOD as against existing embankment levels of a minimum of 7.00m aOD.

There is a low risk during such an event for wave and wind action to cause overtopping and/or breaching of the first line defences. However, the site is further protected by second line defences with embankment levels of 6.00m aOD.

More recent Tidal Hazard mapping produced by the Environment Agency in Fig 4 and included in the Council's Updates Strategic Flood Risk Assessment shows the site could be affected by floodwaters of up to 500mm as a result of a breach to The Wash primary defences.

It is necessary to mitigate against this remote risk and finished floor levels have been raised 500mm above existing ground level with flood resilient construction incorporated to a height of 300mm above finished floor level.

5.5 The Environment Agency has recently published The Wash Shoreline Management Plan 2 from Gibraltor Point to Old Hunstanton. The summary of the plan between Gibraltor Point and Wolferton Creek is as follows:-

The intent of management for this Policy Development Zone (PDZ) is to sustain flood defence for the communities and their hinterland on the low-lying areas around The Wash. This includes an increase of management as needed to sustain the current level of flood risk in the face of climate change.

5.6 Surface water drainage from the development site will be to soakaways designed to BRE365 requirements and Building Regulations approval.

6.0 EXTENT OF KNOWN FLOODING

6.1 During the preparation of this assessment, no evidence was discovered of the site being flooded or of any adjoining properties.

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 IDB 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 any main river system is less than 1% 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 IDB 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 proposed floor levels at 500mm above surrounding ground level will be appropriate for the design life of the development (i.e. 100 years). Safe refuge is available with all sleeping accommodation at first floor level.

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor levels of the development will be at 500mm above surrounding ground levels which together with the proposed soakaway drainage system will offer 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 IDB 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 existing soakaway drainage system will be utilised.

8.5 Safe and dry access/egress is available to and from the site onto Roman Bank in a southerly direction to Holbeach town centre where land and facilities are located in Flood Zone 1.

8.6 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: 0345 988 1188 and the occupiers of the new dwellings should register with the Floodline Direct Warnings Service to receive future flood warnings.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is very low on this site, because of its location, within the South Holland IDB area and its location 7.00kms from The Wash tidal defences with secondary defences between the marsh frontage and the site.

9.2 The site is within Flood Zone 1 according to NPPF classification, the site actually has a 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 Map for Planning has 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 an Updated Strategic Flood Risk Assessment (2016) of the whole District by appointed Consulting Engineers.

The Updated Strategic Flood Risk Assessment (2016) has produced more definitive Flood Risk Maps similar to those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences 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. As a result of the Updated Strategic Flood Risk Assessment (2016) the site is outside any Hazard Zone and defended by tidal defences and tidal doors.

10.0 CONCLUSIONS AND RECOMMENDATIONS

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

- The proposed development is in a Defended Floodplain. It is located in the Passive Floodplain protected by defences to a 1 in 200 year return period, (1.0%)

- The site is in Flood Zone 1 with the actual risk of site flooding from any Environment Agency river system being very low (less than 0.5%).

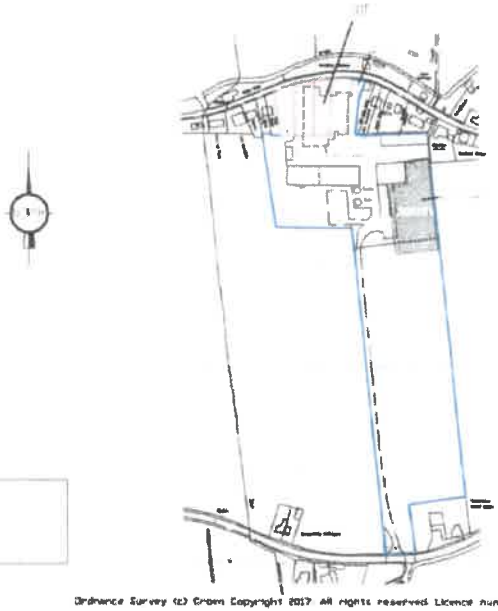
- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing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

- On site rainwater from the development will be discharged via soakaway drainage to BRE365 design requirements.

- Floor levels of the development will be at a minimum of 500mm above existing ground level with flood resilient construction up to 300mm above finished floor level and all sleeping accommodation with safe refuge at first floor level.



NOTE -
Dimensions approximate only.



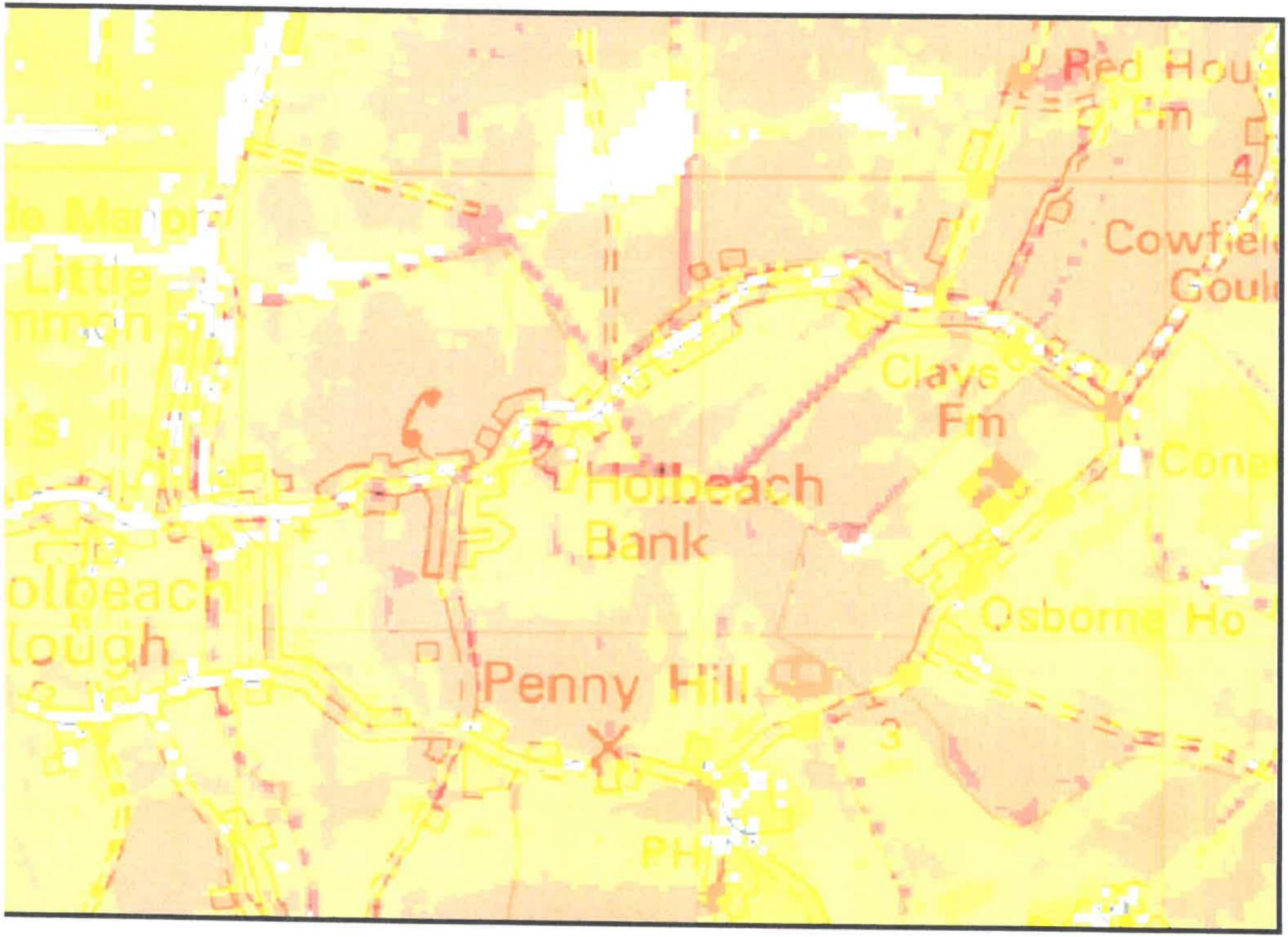
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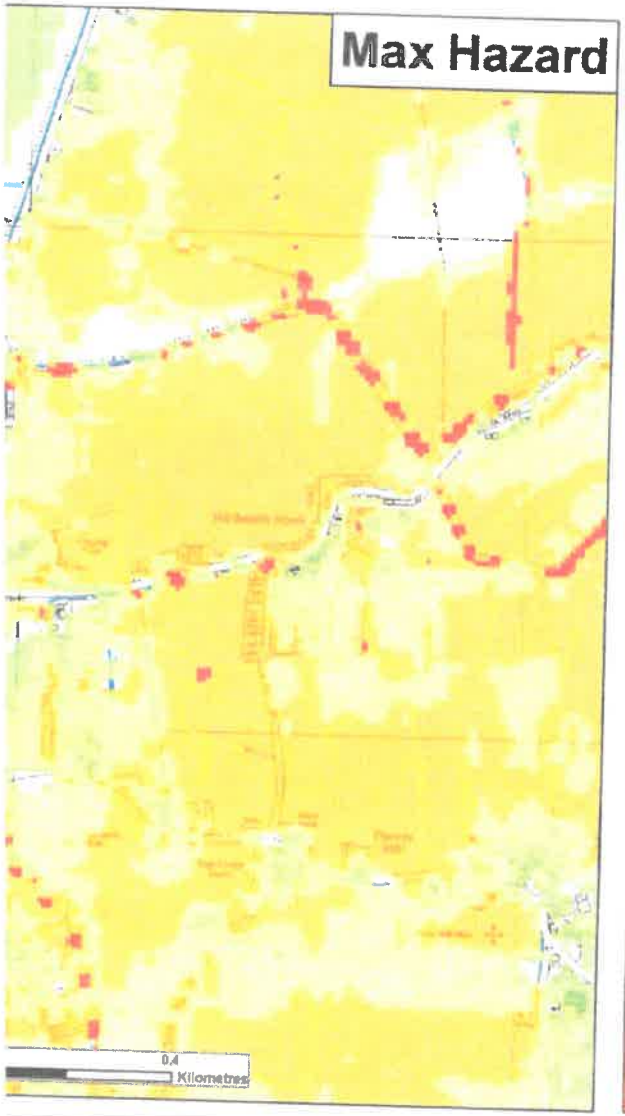


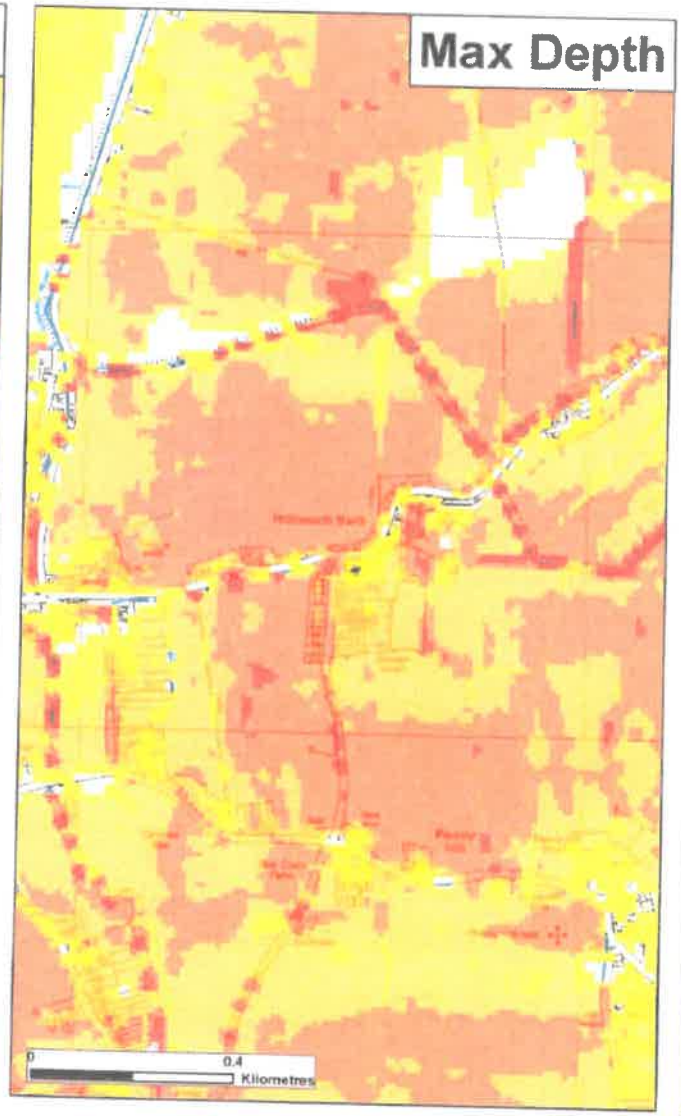
NOTE -
2 metre high ACOUSTIC FENCE to the rear boundary of the site.

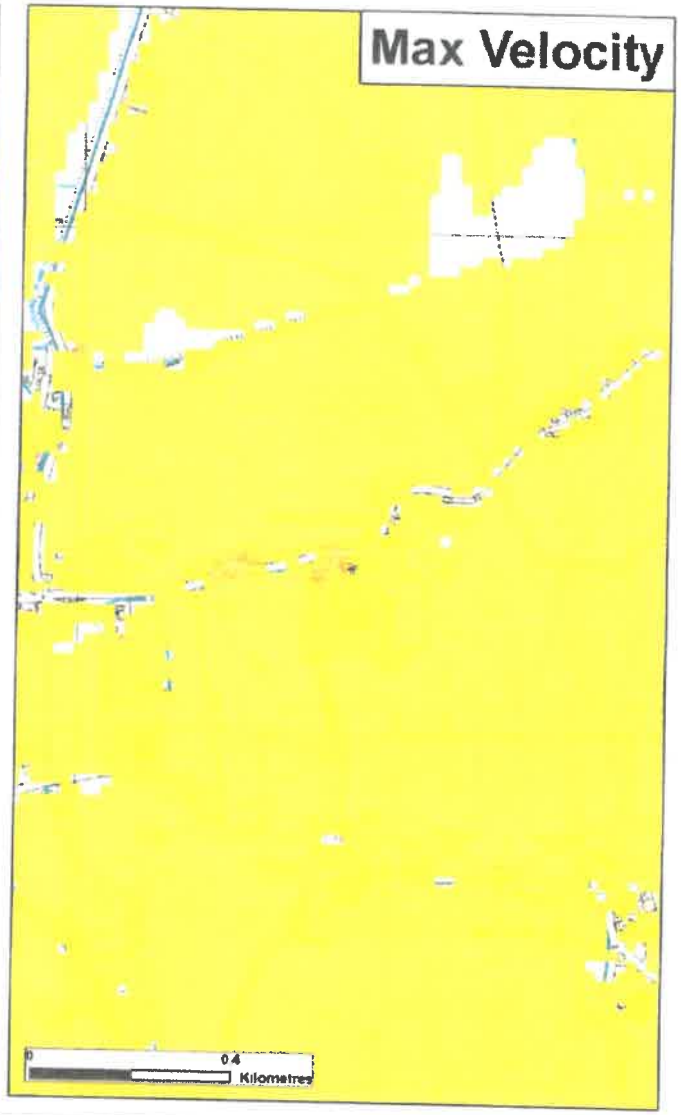
D. R. MERCHANT LTD.
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ARCHITECTURAL, STRUCTURAL AND LAND DRAINAGE CONSULTANTS


Little Common
Holbeach Bank
Holbeach Clough
Saracen's Head


Red Hou
Fm
Cowfiel
Goul
Clays
Fm
Holbeach
Bank
Osborne Ho
Penny Hill
PH







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

Max Hazard	Max Depth (m)	Max Velocity (m/s)
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.5
Between 0.75 and 1.25 (Danger for Some)	0.25 - 0.50	0.5 - 1.0
Between 1.25 and 2.0 (Danger for Many)	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 +

nted	January 2015	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.

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

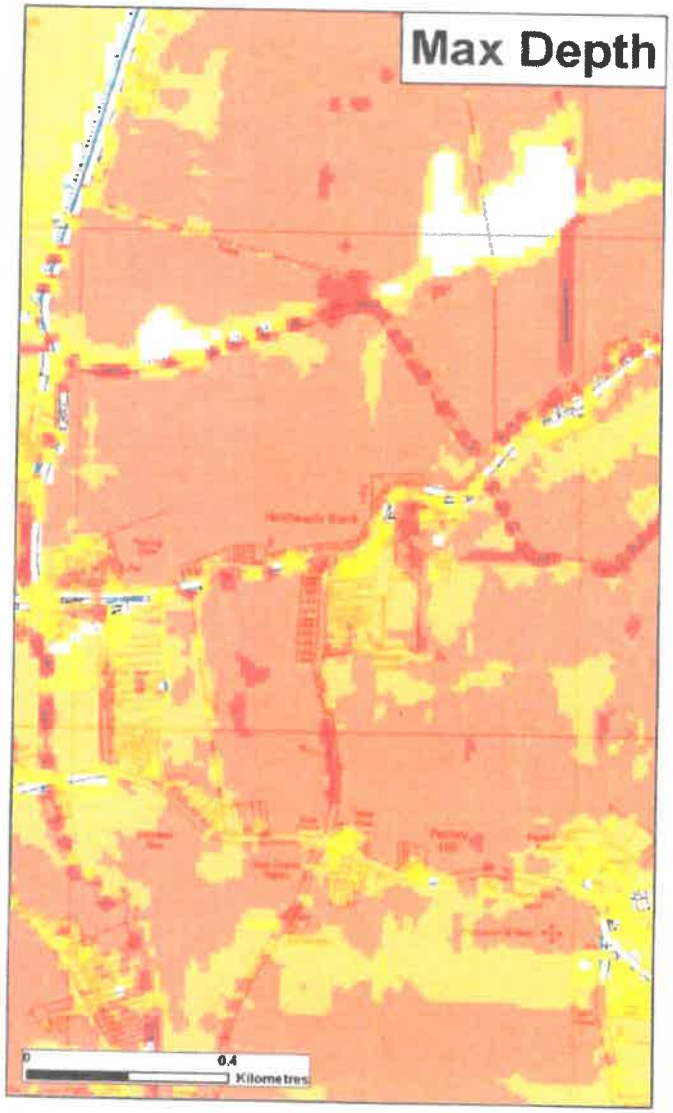
Environment Agency

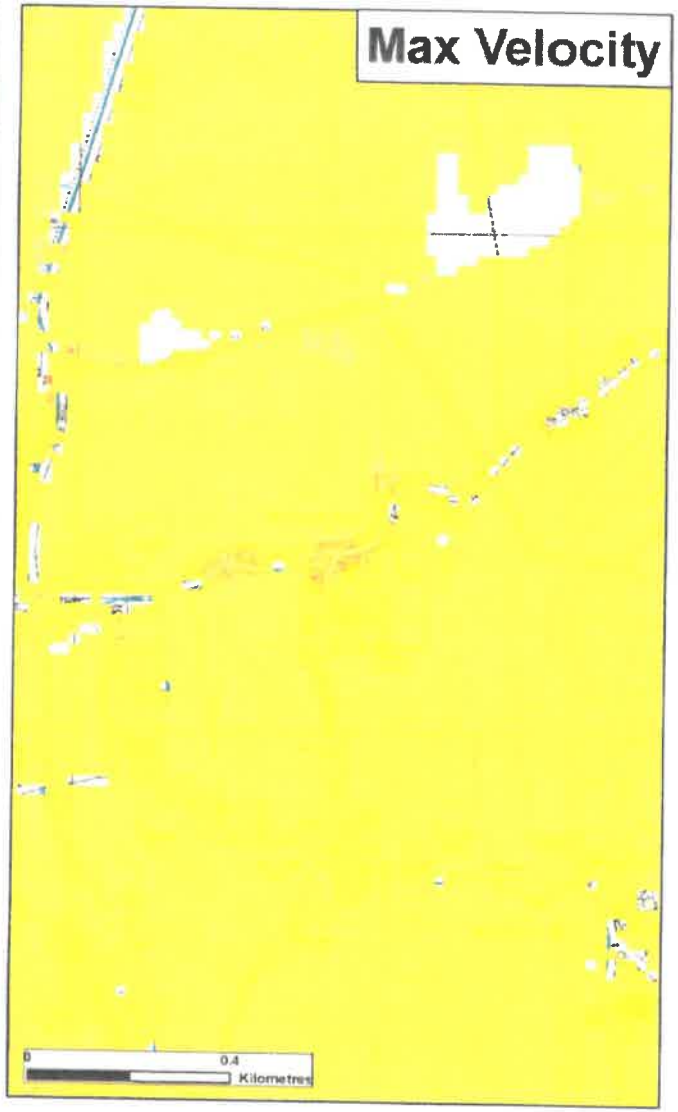
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 35519 ,7354

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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 +

nted	January 2015	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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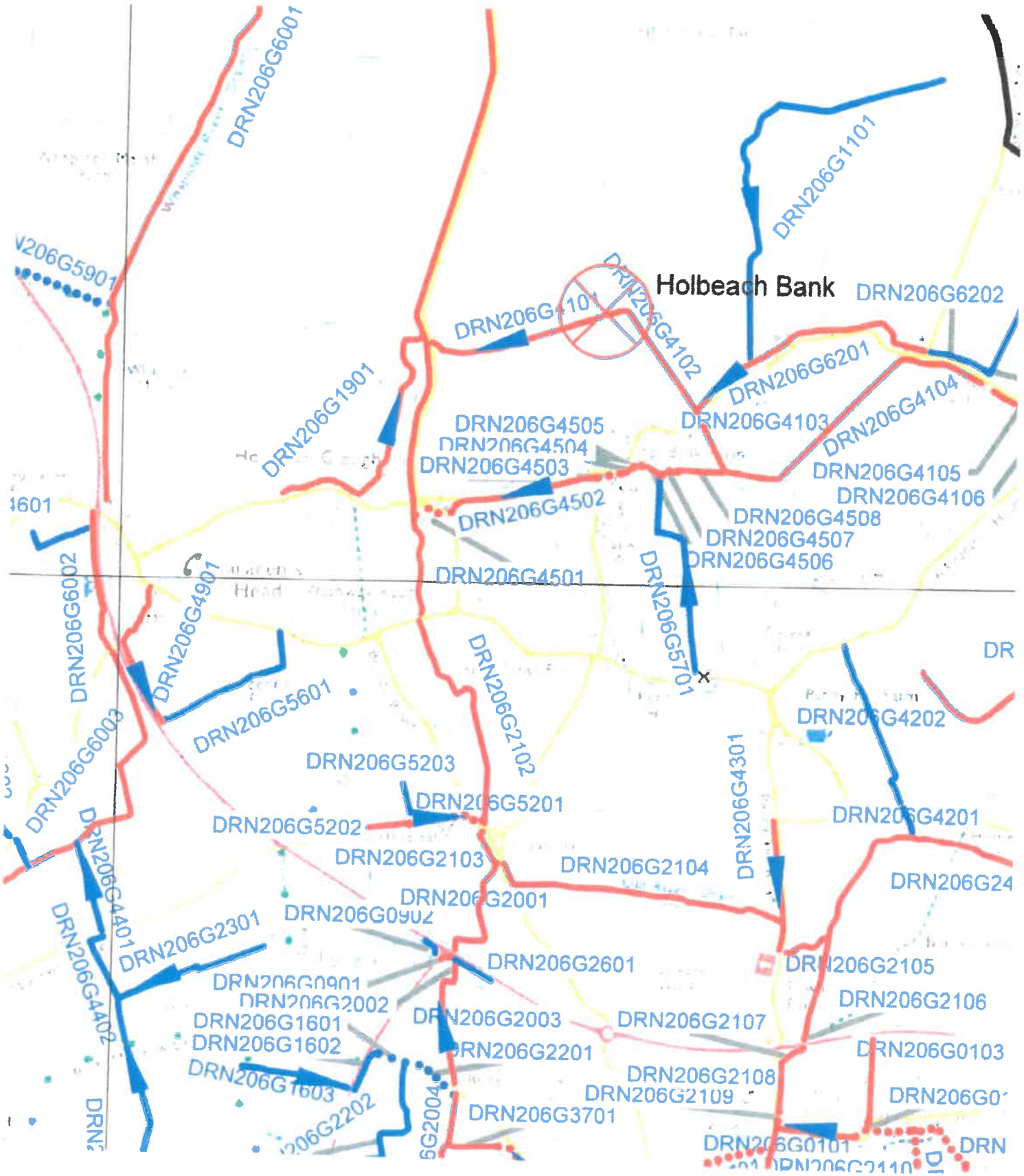
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Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 35519 27351

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Holbeach Bank
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