# FLOOD RISK ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT AVENUE FARM ROAD, SUTTON BRIDGE, LINCS.

**FINAL REPORT**

**GEOFF BEEL CONSULTANCY**

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**GCB/MERCHANT**

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**CONTENTS**

1.0 INTRODUCTION

2.0 LOCATION

3.0 THE SITE AND SEQUENTIAL TEST

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 - Existing Floor Plans & Elevations – G R Merchant drg. no. 2706-14-02

Fig 2 - Proposed Floor Plans & Typical Section – G R Merchant drg. no. 2706-14-03B

Fig 3 - Location Plan, Site Plan & Proposed Elevations – G R Merchant drg. no. 2706-14-04B

Fig 4 - Environment Agency Flood Zone Map

Fig 5 - South Holland District Council Strategic Flood Risk Assessment Flood Zone Map Residual Flood Depths (2115)

Fig 6 - South Holland Internal Drainage Board District Plan

## 1.0 INTRODUCTION

1.1 A full planning application has been submitted by G R Merchant Ltd for proposed residential development on behalf of Mr & Mrs Karadia at Avenue Farm House, Avenue Farm Road, Sutton Bridge, Lincs.

1.2 A Flood Risk Assessment is required to meet the requirements and general principles contained in Paragraph 9 of the Technical Guidance to the National Planning Policy Framework (NPPF) for approval by the Environment Agency.

The site, as situated, is located within Flood Zone 3, of the Environment Agency's Flood Zone Maps. 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 is also shown in Flood Zone 3 of the South Holland District Council's Strategic Flood Risk Assessment Maps (2115) and is also located in the South Holland IDB drainage district.

1.3 Geoff Beel Consultancy was appointed on 17th June 2015 to undertake a Flood Risk Assessment.

## 2.0 LOCATION

2.1 The development site is located at Avenue Farm House, Avenue Farm Road, Sutton Bridge. The National Grid Reference of the central point of the development is TF46902405.

2.2 The position and extent of the site is shown on Fig 3 – Location Plan, Site Plan & Proposed Elevations 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 both the Environment Agency Flood Zone Maps and the Council's Strategic Flood Risk Assessment Map (2115).

## 3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is a redundant barn at Avenue Farm House, Avenue Farm Road, Sutton Bridge.

3.2 The area of development is approximately 0.04 hectare.

3.3 The proposed site layout consists the conversion of a redundant barn, alterations and construction of a swimming pool as part of a residential dwelling.

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 development is for a barn conversion with a known risk of flooding but mitigation measures have been incorporated into the design and construction to meet NPPF requirements.

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 is protected by a combination of the River Welland tidal defences downstream of Spalding, the River Welland fluvial embankments as well as the River Nene tidal defences downstream of Foul Anchor.

4.2 The site and the surrounding land drains by gravity to the Kings Creek north of the site to the Lutton Leam Outfall to discharge into the tidal River Nene downstream of the West Lighthouse.

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 Lutton Leam Outfall Sluice
d) overtopping and breaching of defences of the tidal River Nene

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 Lutton Leam Outfall Sluice may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such to put properties and land at risk of flooding, the South Holland IDB would take emergency action to maintain the drainage level of service by utilising temporary equipment. The probability of such an occurrence is also considered to be low.

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

The Environment Agency has pointed out in its letter of objection dated 11th June that the site is shown as affected by floodwaters of up to 1.00m when considering the 1 in 1000 year 2115 breach scenario. This is the correct scenario to consider for single storey development, although two-storey proposals can consider the 1 in 200 year 2115 breach scenario.

It is necessary to mitigate against the impact of such depths of floodwaters and the following mitigation measures are proposed.

The barn conversion incorporates an indoor swimming pool; garage and access lobby at ground level with all habitable accommodation at first floor level which meets the following Environment Agency flood mitigation measures.

- For areas where flood depths are 0.50-1.00m
  Finished floor levels should be set a minimum of 1.00m above ground level, with flood resilient construction incorporated to a minimum height of 300mm above the predicted flood level.

In summary the habitable accommodation of the barn conversion will be protected against any floodwaters to a level of a minimum of 2.00m above existing ground level.

5.5 The developer should ensure that the eventual occupiers of the property are sufficiently aware of the risk of flooding and the standard of the existing defences. The Environment Agency provides a Flood Warnings 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 a low risk of flooding. The main method is media broadcasts via local radio and also by television.

In addition to direct ad indirect food warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding by contacting 0845 988 1188 and the occupiers should register with the Floodline Direct Warnings Service to receive any future flood warnings.

## 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 fluvial 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 and other flood mitigation measures as identified 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 Finished ground floor levels of the development will be above existing barn ground floor slab level which together with the flood resilient construction and other mitigation measures will offer additional protection against impacts arising from any extreme short duration, localised events. All habitable accommodation will be at first floor level.

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. It is intended to provide soakaways drainage to BRE365 design requirements and Building Regulations approval.

8.5 Safe and dry access/egress is available to the site from Avenue Farm Road in a south-westerly direction to Long Sutton where land is in Flood Zone 1.

## 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 from the Wash and River Nene tidal defences.

9.2 Although within Flood Zone 3 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 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 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.

## 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%)

- Although the site is in Flood Zone 3, the actual risk of site flooding from any Environment Agency river system is 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 soakaways to BRE 365 design requirement and Building Regulations approval.

- Finished habitable accommodation floor levels of the barn conversion have been raised some 2.00m above original ground floor slab level with flood resilient construction incorporated. Only the swimming pool, garaging and lobby access to the property are located at ground level.