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FLOOD RISK ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT CRADGE BANK ROAD, SPALDING, LINCS

REVISED FINAL REPORT

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GCB/bdAr

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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 Site Plan – bdAr drg. no. 0686-51

Fig 2 - Proposed Lower Ground Floor – bdAr drg. no. 0686-C2A

Fig 3 - Proposed Upper Ground Floor Plan – bdAr drg. no. 0686-C3A

Fig 4 - Proposed First Floor Plan – bdAr drg. no. 0686-C4A

Fig 5 - Proposed Second Floor Plan – bdAr drg. no. 0686-C5A

Fig 6 - Proposed Roof Plan – bdAr drg. no. 0686-C6A

Fig 7 - Proposed Section B-B – bdAr drg. no. 0686-C7

Fig 8 - Proposed Section A-A – bdAr drg. no. 0686-C8A

Fig 9 - Proposed Section C-C – bdAr drg. no. 0686-C9A

Fig 10 - Proposed North and South Elevations – bdAr drg. no. 0686-C10A

Fig 11 - Proposed Front and Rear Elevations – bdAr drg. no. 0686-C11A

Fig 12 - Site Plan within Welland & Deepings IDB district

1.0 INTRODUCTION

1.1 A full planning application is to be submitted by bdAr architects and designers on behalf of Criterion Asset for proposed residential development at Cradge Bank Road, Spalding, Lincs.

1.2 Planning approval requires a Flood Risk Assessment to accompany the application to meet the requirements of Planning Policy Statement 25 (PPS25) - Development and Flood Risk for approval by the Environment Agency.

The site is shown within Flood Zone 3 of the Environment Agency's Flood Zone Map. The latest 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.

The site is also shown within a defended area of the South Holland District Council's Strategic Flood Risk Assessment Map and located in the Welland and Deepings Internal Drainage Board district.

1.3 Geoff Beel Consultancy was appointed on 28th October 2009 to undertake a Flood Risk Assessment.

1.4 Correspondence from the Environment Agency dated 24th November, file ref. no. AN/2009/108651 identified the following amendments should be made to the submitted Flood Risk Assessment.

- Detail the proposed flood resilient and resistance construction methods
- State whether the lower ground floor of the development will be tanked
- Recommend that the occupiers register with the Environment Agency's Floodline Warnings Direct service

This Revised Flood Risk Assessment addresses all the foregoing issues.

2.0 LOCATION

2.1 The development site is the redundant Golden Ball Public House, Cradge Bank Road, Spalding. The National Grid Reference of the central point of the site is TF 24252130.

2.2 The position and extent of the site are shown on Fig 1 – Existing Site Plan at the end of the document.

2.3 The site, located within the Welland and Deepings Internal Drainage Board district is shown within Flood Zone 3 as detailed on the Environment Agency Flood Zone Maps and in a defended area of the Council's Strategic Flood Risk Assessment Map.

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is the redundant Golden Ball Public House.

3.2 The area of development is approximately 0.02 hectare.

3.3 The proposed site layout consists the construction of two dwellings after demolition of the Golden Ball Public House with access to Cradge Bank Road.

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 the 1 in 100 year fluvial event by a combination of defences, pumping stations and sluice gates meeting the requirements of PPS25.

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 and Practice 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 embankments is considered to be small.

4.2 The site is located within the Welland and Deepings Internal Drainage Board protected by the River Welland defences to the 1 in 100 year return period flood event. The nearest 'main drain' open watercourse, the Little London Pipeline is located north of the site. Road level of Cradge Bank Road on the site frontage is 5.30m aOD.

4.3 The site and surrounding land drains to the Little London Pipeline and hence the Hills Drain to the South Drove Drain some 1750 metres upstream of Pode Hole Pumping Station. The Pode Hole Pumping Station discharges into the Vernatts Drain which ultimately flows into the tidal River Welland.

4.4 The Vernatts Drain is an embanked high level carrier conveying the surface water run-off from some 16165 hectares of land into the tidal River Welland at Surfleet Seas End.

The Welland and Deepings IDB have recently completed a three year programme to raise and strengthen the Vernatts Drain embankments to accommodate with 450mm freeboard, the design flood level of 3.96 metres aOD, estimated to be a 1 in 100 year return period event.

4.5 The South Drove Drain forms part of the comprehensive system of gravity and part pumped drainage providing an outfall from land and property situated between Spalding and Market Deeping.

4.6 Current maintenance standards within the Welland and Deepings Internal Drainage Board 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.

4.7 The fluvial River Welland is located approximately 100 metres to the east of the site with a standard of protection of 1 in 100 years return period. The Crowland and Cowbit Washes are situated upstream on the opposite bank of the River Welland offering integrated protection to Spalding and the surrounding district.

4.8 Fluvial flood levels of the River Welland at Little London Road Bridge are as follows:

	Present	Present + Climate Change
1%	4.39	4.68
0.1%	4.40	4.68

4.9 Maintenance standards of the Environment Agency's main rivers and defences are well maintained and regularly inspected for their asset condition.

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 IDB main drain system.
b) storm return period of 1 in 25 years being exceeded
c) failure of Pode Hole Pumping Station
d) overtopping and breaching of the fluvial River Welland 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 Welland and Deepings 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 25 years.

5.3 Failure of Pode Hole Pumping Station 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 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.

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". The probability of the site flooding from this potential source is also considered to be low.

5.4 The possible overtopping and breaching of the fluvial River Welland flood defences which may affect the site under extreme conditions is also considered to be very low. The present standard of defence of 1 in 100 years would most probably have to be exceeded to create such conditions. The site frontage is protected with steel sheet piling and it is estimated that the floodwaters would not affect the development site, as there is 620mm freeboard above the 1 in 100 year flood level inclusive of climate change.

5.5 It is therefore proposed that floor levels of the development are to be 300mm below existing ground level at 5.00m aOD to safeguard against the remote possibility of overtopping of the River Welland defences. Flood resistant/resilient measures will also be incorporated into the design and construction of the dwellings. Basement storage has been created below existing ground level. Drawing No. 0686-C7 of Fig 4 shows a red line denoting flood resilient construction below this level and all electrics above this level. The lower ground floor of the development will be tanked and the following flood resilient and constructions methods incorporated into the development wherever applicable.

- concrete flooring
- tiled floor covering
- engineering brick/reinforced concrete external walls to maximum flood level
- common brick with waterproof mortar internal partitions
- all electric fittings a minimum of 450mm above floor level

5.6 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 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 contacting 0845 988 1188.

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. It is also intended to construct floor levels 300mm below ground level at 5.00m aOD with flood resistant/resilient measures incorporated.

7.2 The probability of the site flooding with water from any Welland and Deepings river system 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. Similarly the same standard is provided by the Environment Agency's main river and defences.

7.3 If under very extreme events, levels of floodwater from any Environment Agency or Welland and Deepings river 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.

7.4 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 proposed floor levels at 5.00m aOD will be appropriate for the design life of the development (ie 100 years).

7.5 Safe and dry access to and from the site would be available in a north easterly direction via Cradge Bank Road to Little London Road Bridge.

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor levels of the development will be at 5.00m aOD offering additional protection against impacts arising from any extreme short duration, localised events. Surface water drainage will be discharged to soakaway designed to BRE365 specification and Building Regulations approval.

8.3 The general location of the site within the catchment is such that if flooding occurred from any of the Environment Agency or Welland and Deepings river 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 and agricultural land.

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 a pumped sub-catchment of the Welland and Deepings IDB area and its location 100 metres from the River Welland fluvial defences consisting of vertical steel sheet piling and concrete capping beam.

9.2 Although within Flood Zone 3 according to PPS25 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' 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.

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 Drove Drain has been determined as providing protection against a 1 in 100 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 as defined by PPS25. It is located in the Passive Floodplain protected by defences to a 1 in 100 year return period.
- Although the site is in Flood Zone 3, the actual risk of site flooding from any Environment Agency river system is very low.
- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 25 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 25 years providing further storage within the drainage channels.
- Floor levels will be at 5.00m aOD and flood resistant/resilient techniques incorporated into the design and construction of the proposed dwellings.
- On site surface water drainage will be discharged to soakaway to BRE365 specification and Building Regulations approval.
- Future occupiers of the properties should register with the Environment Agency's Floodline Warnings Direct service.