

**FLOOD RISK ASSESSMENT FOR  
PROPOSED RESIDENTIAL DEVELOPMENT AT  
FOLGATE LANE, WALPOLE ST. ANDREW, NORFOLK**

**FINAL REPORT**

**GEOFF BEEL CONSULTANCY**

**OCTOBER 2022**

**GCB/ BARSBY**

***DISCLAIMER***

*This document has been prepared solely as a Flood Risk Assessment in support of a planning application for proposed Residential Development at 6 Folgate Lane, Walpole St. Andrew, Norfolk.. “Geoff Beel Consultancy” accepts no responsibility or liability whatsoever for any use made of this document other than by the client, “Mr T Eaton”, for the purposes it was originally commissioned and prepared. All comments and opinions made are based upon information available to “Geoff Beel Consultancy” during the necessary investigate process, and the conclusions and recommendations could therefore, differ in the event of material subsequently being found erroneous, incomplete or misleading. “Geoff Beel Consultancy” therefore, accepts no liability should this prove to be the case.*

## 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 - Location Plan 1:1250

Fig 2 - Indicative Site Plan 1;500

Fig 3 - Environment Agency Flood Map for Planning

Fig 4 - Environment Agency Hazard Mapping; Depth, Hazard & Velocity of 1 in 200 year event plus climate change (2115) – 83934

Fig 5 - Kings Lynn Internal Drainage Board district plan

## 1.0 INTRODUCTION

- 1.1 An outline planning application is to be submitted on behalf of Mr T Eaton for residential development at 6 Folgate Lane, Walpole St Andrew, Norfolk.
- 1.2 Planning approval requires a Flood Risk Assessment to accompany the application to meet the requirements of the National Planning Policy Framework (NPPF) and for approval by the Environment Agency.

The site is shown located within defended Flood Zone 3 of the Environment Agency Flood Map for Planning. The latest Agency 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 take into account existing flood defences.

The site is also located in the Kings Lynn Internal Drainage Board district.

- 1.3 Geoff Beel Consultancy was appointed on 5<sup>th</sup> October 2022 to undertake a Flood Risk Assessment.

## 2.0 LOCATION

- 2.1 The development site is located at 6 Folgate Lane south of its junction with Pigeon Street, Walpole St. Andrew. The National Grid Reference of the central point of the site is TF 49650 16550.
- 2.2 The position and extent of the site are shown on Fig 1 – Location Plan at the end of the document.
- 2.3 The site, located within the Kings Lynn Internal Drainage Board district is shown within a defended Flood Zone 3 as detailed on the Environment Agency Flood Map for Planning.

## 3.0 THE SITE AND SEQUENTIAL TEST

- 3.1 The site is currently an existing bungalow dwelling.
- 3.2 The area of development is approximately 0.04 hectare with vehicular access to Folgate Lane.
- 3.3 The proposed site layout consists the construction of a replacement bungalow and garage following demolition of the existing dwelling.

## 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 Kings Lynn Internal Drainage Board district which is protected by the River Great Ouse Tidal and Sea Defences against a minimum flood return period of up to 1 in 200 years. The nearest ‘main drain’ is located 70 metres south west of the development site with land levels generally at 3.00 m aOD.
- 4.3 The Kings Lynn IDB drainage system at present achieves a target standard of protection to residential properties of 1 in 100 years return period with a minimum freeboard of 900mm elsewhere in the district to lowest agricultural land levels.

As a result of the Strategic Drainage Study recently carried out by the Boards Consulting Engineers with hydraulic modelling of the Islington Pump West Lynn outfall catchments to include allowances for future development and climate change, the following conclusions have been reached:-

- the freeboard criteria of 900mm is not achieved for all studied return periods with overtopping at isolated locations along the lengths of the Islington Pump, Smeeth Lode and West Lynn main drains and tributary drains, giving rise to reducing standards of service over the next 50 years.
  - the Board has resolved to continue its policy regarding the connection of future developments to the arterial system which enables a flexible approach to be adopted and meet the criteria for “sustainable urban drainage”. The Board has adopted a target level of service for all urban properties of 1 in 100 years plus freeboard.
  - the Board has resolved to carry out improvements to the Islington Pump and West Lynn Outfall Sluice districts by way of seeking developers contribution to provide a level of protection of a future 1 in 100 years return period event with 900mm freeboard.
- 4.4 The site and surrounding land drains by gravity in a generally southerly direction to outfall into the tidal River Great Ouse at the new Islington Pumping Station operated and maintained by the Kings Lynn Internal Drainage Board.
- 4.5 Current maintenance standards within the Kings Lynn Internal Drainage Board and of the Environment Agency tidal defences are generally 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 IDB main drain system
  - b) storm return period of 1 in 100 years being exceeded
  - c) failure of the Islington Pumping Station
  - d) overtopping and breaching of the River Great Ouse 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 Kings Lynn 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 100 years. Flooding of some agricultural land would occur but no properties.

- 5.3 Failure of the new Islington 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 Kings Lynn IDB 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 site is shown to be within defended Flood Zone 3 of the River Great Ouse as detailed on the Environment Agency Flood Map for Planning. The maps have been prepared taking account of existing defences which in this location are the tidal defences to the west embankment of the River Great Ouse improved after the 1978 tidal surge event.
- 5.5 The recorded tide level at Kings Lynn was 5.92m aOD in 1978 since which improvements to 6.30m aOD for hard defences and 7.00m aOD for soft defences have been carried out. The more recent tidal surge event of 5<sup>th</sup> December 2013 reached a level of 6.17m aOD and the town and surrounding area were protected by the improved defences.

A more recent report prepared by Consulting Engineers in 1999 for the Environment Agency has confirmed that the defences would withstand a 1 in 200 year return period still water level of 6.14m aOD (estimated) NPPF states that development should be safe from flooding for its lifetime of 100 years; after taking into account sea level rise due to climate change the predicted 1 in 200 year tide level at Kings Lynn would be 7.16m aOD. This would overtop existing hard defences by 0.86 metre and be 0.16 metre above soft defence level.

Any overtopping of existing defences at Kings Lynn would not affect the development at Walpole St. Andrew which is situated 9.00 kms from the River Great Ouse Tidal Defences. This evidence is all confirmed by the latest Tidal Hazard mapping produced by the Environment Agency contained in Fig. 4 of this assessment which shows the site could be affected by floodwaters up to 0.25m in year 2115.

## 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 within the last 100 years.

## 7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is very low. The nearby main drain provides adequate standard of protection for up to 1 in 50 years return period plus freeboard to lowest land levels.

7.2 The probability of the site flooding with water from the tidal River Great Ouse main river is between 0.5% and 1%. If the trend of climate change anticipated to occur continues over the next 100 years, without any further improvements to the main river tidal defences, there is a risk of overtopping at the 1 in 200 year return period event.

7.3 If under very extreme events, levels of floodwater from main 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 also tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the proposed development of the site with floor level 300mm above existing Folgate Lane carriageway level and above surrounding land 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 due to the existing standards of tidal defence, however a precautionary approach has been adopted to protect against the possibility of overtopping or a tidal breach occurring to the tidal defences.

8.2 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.

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 occupier of the property should register with the Floodline Warning Direct Service.

The occupants of the replacement dwelling should register with the Flood line Direct Warning Service to receive any future flood warnings.

## 9.0 RESIDUAL RISK – EXTREME EVENTS

- 9.1 The residual risk from extreme fluvial events is low on this site, because of the existing standard of drainage provided by the Kings Lynn IDB. The discharge of surface water from the development will be to soakaway designed to BRE 365 and approved as part of Building Regulations.
- 9.2 Although within defended tidal Flood Zone 3 according to NPPF 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'. The Environment Agency Flood Map for Planning has been produced taking account of existing flood defences and standards of protection.
- 9.3 Safe access and egress are available under extreme conditions in an easterly direction to Walpole St.Peter village where land is located in Flood Zone 1.

## 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 NPPF. It is in the Passive Floodplain of the River Great Ouse.
- Although the site is in defended tidal Flood Zone 3, the actual risk of the site flooding from tidal main river is very low at less than 0.5%.
- Although the site is located within Kings Lynn 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.
- Land levels at the site are generally at 3.00m aOD and safeguard against the risk of tidal defences being overtopped or breached.
- Flood resilient/resistant measures will be incorporated into the replacement dwelling wherever appropriate with proposed floor level at 300mm above Folgate Lane carriageway level.
- The IDB has confirmed its policy of carrying out improvements to the Islington Pumping Station Outfall catchment to sustain a level of protection of 1 in 100 years over the asset life of the development.