

FLOOD RISK ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT

To the rear of
35 Horncastle Road, Boston,
Lincolnshire, PE21 9JA

DATE: SEPTEMBER 2014
PROJECT NO. 12-321

CONTENTS

		<i>Page Number</i>
<i>Section 1.0</i>	Introduction	1
<i>Section 2.0</i>	Existing Site Location & Topography	2
<i>Section 3.0</i>	The Proposal	2
<i>Section 4.0</i>	Flood Sources & Existing Defences	3
	4.2 Tidal	3
	4.3 Fluvial	4
	4.4 Flooding from Groundwater	5
	4.5 Flooding from Sewers	5
	4.6 Climate Change	5
<i>Section 5.0</i>	The Risk	5
<i>Section 6.0</i>	Effect Upon The Flood Plain	7
<i>Section 7.0</i>	Recommendations	7
<i>Section 8.0</i>	Conclusions	8
<i>Section 9.0</i>	Appendices	

<i>Appendix A</i>	Ordnance Survey Extract
<i>Appendix B</i>	Flood Evacuation Plan

1.0 INTRODUCTION

- 1.1 Studio 21 Design Ltd has been commissioned by Mr C Spanos to undertake a Flood Risk Assessment (FRA) for proposed residential development to the rear of 35 Horncastle Road, Boston, PE21 9JA (Appendix A) to consist of a proposed development for the erection of 2 semi-detached dwellings located with the existing yard area.
- 1.2 The development site lies within an area designated as Flood Zone 3a – High probability as detailed on the Environment Agency’s Flood Zone Maps and as defined in Table D1 of PPS25. The development site lies within an area that the Environment Agency’s Coastal Hazard Mapping predicts would suffer significant flooding should a failure occur in the raised tidal defences once the effects of climate change are taken into account. Based on the predicted speeds and depths of water, the site is classified as ‘Dangerous for Some’ with a low probability of tidal and fluvial flooding.
- 1.3 It is usual for the Environment Agency to raise an objection to development applications at this location unless the Local Planning Authority wishes to take the findings of the Lincolnshire Coastal Study into account. Planning Policy Statement 25 (PPS25) advises that proposals within such areas should be the subject of a Flood Risk Assessment carried out by the applicant.
- 1.4 PPS25 aims to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk.
- 1.5 According to the Environment Agency’s flooding maps the annual probability of flooding from the North Sea is 0.5% (1 in 200) or less assuming no flood defences exist. This takes into account the effect of any flood defences that may be in this area.
- 1.6 The flooding maps also show the extent of the Extreme Flood outline which represents the extent of a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial flooding.
- 1.7 Flood defences reduce but do not completely remove the likelihood of flooding and can be over topped or fail in extreme weather conditions.

2.0 EXISTING SITE LOCATION & TOPOGRAPHY

- 2.1 The proposed site is located on Norfolk Street, Boston to the rear of 35 Horncastle Road. Location plans for the site (Ordnance Survey Grid Reference: 533073E 344919N) are shown in Appendix A.
- 2.2 The site extends to approximately 273m² (0.01 Hectares).
- 2.3 Access to the site is off Norfolk Street (A1173), a minor road linking the east and west sides of the town via Sluice bridge, thus making it easily accessible to the immediate road network serving the town and main link roads leading out of the town.
- 2.4 The site is surrounded by residential properties to the north, south and west and the Maud Foster Drain to the east.
- 2.5 The site is located within the Witham Fourth Internal Drainage Board District and shown to be within the indicative flood risk area as per the Environment Agency's flood plain maps.
- 2.6 Current O.S. maps of the surrounding area indicate levels in the middle of Norfolk Street adjacent to the site at 3.0m AOD, rising to 3.4m AOD at the junction of Norfolk Street and Horncastle Road. Site levels stand at approximately 3.1m AOD.
- 2.7 It should be noted that there is no history of flooding at this location. The Environment Agency's Flood Zone Map shows the whole of the area to be in Flood Zone 3. However the data shown on the Relative Probability of Flooding Map shows the whole of the area to be at a low probability of flooding.

3.0 THE PROPOSAL

- 3.1 The proposal is to seek full planning permission for a pair of 3 bedroom semi-detached dwellings within the existing yard area to the west of 35 Horncastle Road.
- 3.2 It is proposed that the new dwellings would be constructed off concrete strip footings incorporating concrete suspended floors with a finished floor level of at least 400mm above ground level. (3.5m AOD)

- 3.3 The following sections aim to analyse the flood risk inherent with the site and the effect it may have upon our proposal.

4.0 FLOOD SOURCES & EXISTING DEFENCES

- 4.1 The proposed site is potentially at risk, to a greater or lesser degree, from failure of any of the existing flood alleviation measures in the area. The defences come in the form of ‘hard’ floodwalls and raised embankments lining the potential flood sources.

4.2 Tidal:

- 4.2.1 If a breach in the nearest point on the banks of the River Witham and Haven tidal defences occurred throughout the town centre (800m from the SW boundary of the study area) the majority of land would be in the ‘Danger to Some’ category. This is shown on the Flood Hazard Zone Map within the Boston Borough Council SFRA.
- 4.2.2 The majority of the Sea Defences in this area have substantial concrete floodwalls which are elevated approximately 1-1.5m above the natural ground level. Over the years the flood defences have been maintained and improved to withstand tidal surges. Without these defences the core area of the town would be at risk of flooding at frequent intervals and the Environment Agency have permissive powers to provide, maintain and improve these defences.
- 4.2.3 The Agency’s flood defences are subject to inspection at regular intervals. During an inspection the physical condition of each component of a defence line is assessed and a condition grade from 1 to 5 is allocated to that component. These components include not only flood defence embankments and floodwalls but also sluice, weirs, culverts etc. or any structure whose failure could jeopardise the physical integrity or derogate the standard of protection provided by the defence line.
- 4.2.4 The Haven provides the outfall for the entire fluvial River Witham Catchment, but is defended to reduce the risk of tidal flooding. Downstream of the Black Sluice and Maud Foster Sluice the defences are primarily earth embankments with extensive toe revetments to minimise tidal scour. Upstream of these sluices a range of hard defences are utilised to provide a standard of protection of 0.66% (1 in 150 years). The Boston Combined Strategy is an on-going project to investigate the provision of

a tidal barrier to provide an improved standard of protection for Boston. Maintenance on the Haven is routine with repairs, mechanical and electrical maintenance and frequent revetment replenishment works being carried out. Many of the embankments downstream of the town of Boston were historically grazed, but this practice appears to be in decline.

- 4.2.5 Clearly if weather conditions (such as Spring neap tide cycle, storm surges, strong on shore winds etc.) were such that they caused there to be a significant rise in high tide level above the maintained standard, there would be some overtopping for a period of time until the tide levels dropped as was the case during the flooding of Boston in December 2013.

4.3 Fluvial:-

- 4.3.1 Fluvial flooding can occur as a result of the overflowing or breaching of river or stream banks when the flow in the watercourse exceeds the capacity of the river channel to accommodate that flow.

- 4.3.2 The potential fluvial source of flooding which is considered to present a significant flood risk within this part of Boston Town area is the Maud Foster Drain located approximately 35m to the east of the site.

- 4.3.2.1 The Maud Foster Drain is connected to The Haven River to the south and is controlled by a sluice to restrict tidal flow.

- 4.3.4 Witham Fourth Internal Drainage Board operates in the lower parts of the county where the drainage is often pumped into the higher level main rivers. Land in 'pump-drained' catchments is subject to two main types of flood risk. The first and more serious is inundation resulting from the overtopping or breaching of the flood defences of the high-level embanked watercourse, into which the catchments are pumped. The second is flooding which can arise if the runoff entering the arterial drainage system exceeds the capacity of the pumps, or that of the drainage channels leading to the pumping station. Residual risk flooding could also occur as a result of a mechanical or electrical failure at the pumping station.

4.3.5 There are a number of smaller IDB drains linked to The Maud Foster to the north of Boston town, many of which are wholly or partly culverted. These are all branches of either The Maud Foster or Cowbridge Drains and they all drain the local land and flow to the south.

4.4 Flooding from Groundwater:

4.4.1 The sites position indicates that flooding from groundwater is not likely to present a problem to the proposal since any potential for groundwater flooding would tend to be abated by the land drainage infrastructure within the town.

4.5 Flooding from Sewers:

4.5.1 There is nothing to indicate that flooding from sewers is a particular problem in the area concerned.

4.6 Climate Change

4.6.1 The effects of climate change, namely a rise in sea levels and/or an increase in rainfall intensity during storms, could also lead to increased flooding from surface water in the area overtopping existing defences.

4.6.2 It is likely that the Environment Agency and Internal Drainage Board would monitor and make improvements in the intervening period to prevent an increase in the occurrence of flooding in response to these predicted effects of climate change.

5.0 THE RISK

5.1. Up-to-date maps by the Environment Agency provide Tidal Breach and Tidal Overtopping Hazard Mapping for 2115 scenario year and for 1in200 flooding events.

5.2 The ground level within the existing site lies at a level of 3.1m AOD. As such the estimated flood level of the Maud Foster does not form a concern within this site. The site is currently defended to the appropriate standard; however, consideration will need to be given to the

effects of climate change over the design life of the development, a breach of the defences and overtopping during an extreme flood event (1 in 1000 year)

- 5.3 Clearly if tidal surges caused there to be a significant rise in high tide level above the existing flood defence levels, there would be some overtopping or potentially a breach.
- 5.4 Given the general level nature of the site and the distance and obstacles between the proposed site and the sources of flooding, it is suggested that the risk and inherent damage caused at the site would be minimal if breached water ever did become a major threat.
- 5.5 The Maud Foster drain is the responsibility of the Witham Fourth Internal Drainage Board who claim there is no history of flooding in the area. However, there have been some instances of high water levels in the area but they were not sufficient to overtop the river banks.
- 5.6 The 1 in 100 year plus climate change flood level for the Maud Foster Drain local to the site has been estimated to be 2.52m AOD. The site levels of 3.1m AOD would indicate that the 1 in 100 year plus climate change flood event is unlikely to affect the site.
- 5.7 Likewise, overtopping of other fluvial drains identified would only result in localised flooding to a relatively shallow depth. Taking into account the distance of the site from these sources, the mixture of permeable catchment areas beyond the urban envelope together with obstacles in between (houses and gardens) and height of land in relation to the surroundings, the effect of flooding is likely to be minimal if at all.
- 5.8 We would consider that any potential flood risks to the proposed site would be minimised by positioning the finished floor level of the new dwellings 450mm above existing ground level, and that all sleeping accommodation be allocated to first floor areas only, which we feel would reduce the risk further. The result would be ground floor accommodation of 3.55m AOD and 1st floor sleeping accommodation at 5.95m AOD.
- 5.9 It is proposed that a Flood Warning and Evacuation Plan would be in place (see Appendix B). In the event of an extreme event causing a real threat to the property it is very unlikely that there would be any risk to life at this location since the dwellings would already be evacuated.

- 5.10 The risk of rising groundwater and over-spilling drains is unlikely to have an adverse effect upon the site in a high intensity storm. Any overflow is likely to be intercepted by the existing drainage system and controlled by the IDB pumps and defence systems.
- 5.11 PPS25 requires consideration of the effects of climate change on the flood risk at the proposed site. The predicted increase of rainfall intensities from 5% by 2025 to 30% by 2115 means that surface run-off may increase. However given the level and potential improvement of existing defences, this predicted increase should not significantly increase the flood risk at the site.

6.0 EFFECT UPON THE FLOOD PLAIN

- 6.1 The construction of buildings within the flood plain can potentially have an adverse effect upon other properties. The addition of the two new dwellings would also have no adverse effect due to surface water being disposed of via an effective rainwater drainage system within the town and the level of existing permeable surfaces within the site, being increased by means of new garden areas. Where necessary, measures would be taken to assist effective surface water control.

7.0 RECOMMENDATIONS

- 7.1 Given the potential for flooding on the site and the classification of use under PPS25, it would be prudent to adopt a precautionary approach with regard to the proposed development, to minimise structural damage and to safeguard human life. Such aspects can be addressed by implementing the following mitigation measures:-
- 7.1.1 It is considered that there is low risk of flooding from both fluvial and tidal flooding mechanisms. However, it is recommended that finished ground floor levels in the proposed new dwellings to be at least 450mm above the existing levels at the site, hence 3.1m AOD plus 450mm equals 3.55m AOD. In addition, ensuring all sleeping accommodation is located on the first and second floors, will allow each property to have a safe refuge area.
- 7.1.2 Flood proofing and flood resilience measures at least 300mm above ground level such as:

- 7.1.2.1 Installation of electrical fittings (including consumer units and meters) set at 1.1m above the finished flood levels.
 - 7.1.2.2 Constructing in masonry and consideration of moisture resistant coatings to lower level walls.
 - 7.1.3 An effective surface water drainage system including limiting impermeable surfaces and consideration of permeable paving, water retention systems etc.
- 7.2 There are currently flood warning provisions in place for the Boston area under which telephoned warnings can on request be sent to any property considered to be at risk of flooding. This is achieved by means of the Environment Agency's Automatic Voice Messaging (AVM) "Warnings Direct" flood warning system and permits residents to take precautionary measures in advance of possible flooding. One of the mitigation measures could be for the new dwellings to be registered with this service to enable an early warning of any potential flooding danger.
- 7.2 Serious flooding in Boston and the surrounding area could trigger the declaration of a major incident. Should a major incident be declared, the Lincolnshire County Council (LCC)'s Emergency Plan and Boston Borough Council's Emergency Plan would both be implemented.

8.0 CONCLUSION

- 8.1 According to information sought from the Boston Borough Council Strategic Flood Risk Assessment, the Environment Agency and Internal Drainage Board, the standard of tidal and fluvial defences appropriate to the proposed site will provide adequate protection against flooding to a 1in200 year standard of protection both now and for the lifetime of the development. Therefore, we feel there is a low risk of flooding due to overtopping and breach at the proposed development site.
- 8.2 We have no reason to doubt that the appropriate organisations will continue to monitor, maintain and improve the existing drainage network in the prevention of flooding in response to the predicted effects of climate change. Such organisations have a responsibility to inform the public if these circumstances change.

- 8.3 Although the site has been classified as being a high flood risk area, the site actually has a relatively low risk of flooding from tidal breaching and fluvial sources due to the location, topography, standards of defence and natural processes occurring along the coastline to the East of the site. The site is not within a functional flood plain of the coast or a main river.
- 8.4 It has been established that if a breach of the sea defences to the East or West was to occur it could take several hours for the flood waters to reach the site by which time the evacuation plan (Appendix B) would have been employed and if necessary the dwellings evacuated. The plan should be displayed within the dwellings so that all occupants are aware of the correct procedures to follow.
- 8.5 The site is located entirely in flood zone 3 and the flood hazard is 'Danger to Some'. The overall risk of flooding to the site is low.

APPENDIX A

ORDNANCE SURVEY PLAN

ORDNANCE SURVEY LOCATION PLAN

SCALE : 1:1250

Address:

Kings Fish & Chips
Horncastle Road
Boston
Lincolnshire
PE21 9JR

Client:

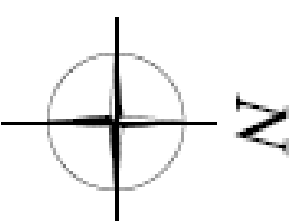
Mr C Spanos

Project:

Proposed Residential Development

Date:

June 2013



APPENDIX B

EVACUATION PLAN

Proposed Flood Evacuation Plan

- The dwelling owners will sign up to the Environment Agency's free Warnings Direct System. Flooding from tidal events are predictable and if a flooding event is imminent the EA would advise the owners accordingly. A flood warning alarm will also be sounded.
- Upon the designated telephone number receiving the warning that the site is at risk of flooding, the assigned person will inform all occupants of the situation within the shortest time possible.
- There are four stages of warning which will be issued:
 1. Flood Alert – Flooding expected. Two hours to two days in advance of flood
 2. Flood Warning – Flooding expected. Issued ½ hour to one day in advance
 3. Severe Flood Warning – severe flooding. Danger to life
 4. All Clear
- If the 'Severe Flood Warning' is issued the occupants will be evacuated to safe ground as recommended by the appropriate authority.
- Regular contact will be made with the Environment Agency flood control centre to ensure that all current information is available to those affected.
- Upon receipt of the all clear message from the Environment Agency or the Police, the owners/occupiers may return to their dwellings once a visual inspection of the site conditions and determines it safe to do so.