# FLOOD RISK ASSESSMENT

# PROPOSED DWELLING AT
# 297 PENNYGATE SPALDING PE11 1LQ



View from Pennygate

S M Hemmings B Sc C Eng MICE MIWEM,
69 Charlotte Way,
Peterborough,
PE3 9ER

This flood risk assessment has been prepared solely to support the planning application for the proposed dwelling at 297 Pennygate, Spalding. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete.

## Introduction

An application has been made for Planning Permission to demolish the existing building at 297 Pennygate, Spalding PE11 1LQ and construct a pair of semi-detached dwellings on the site.

The site is within Flood Zone 3 as shown on the Environment Agency's Flood Zone Map. These maps do not take into account existing flood defences.

The Technical Guidance to the National Planning Policy Framework Development and Flood Risk states that if a development lies within Flood Zone 3 a Flood Risk Assessment should be carried out to accompany any Planning Application.

The site is shown within the defended area of the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the Welland and Deepings Internal Drainage Board district.

## Application Site

The development is located on the western side of the River Welland. The National Grid Reference of the site is 523265 322535.

The location of the site is shown on the plan at the end of this document.

The proposed development is within Flood Zone 3(a) "High Probability" as detailed on the Environment Agency's flood zone maps without defences, as defined in Table 1 of the Technical Guidance.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, the development is classified as "more vulnerable" in Table 3 of the Guidance, which states that residential use is only permitted after the sequential and exception test is followed.

## Sequential Test

As the proposed development is located in Flood Zone 3(a) the NPPF requires the sequential test to be applied to determine if there are any reasonably available and suitable alternative sites in a lower flood risk zone for this type of development. This development can be classed to be on a brownfield site as it will be a replacement for an old building which has reached the end of its life, and therefore complies with the South Holland District Council's policy on these types of sites.

All of the Spalding area is classified by the Environment Agency as being in Flood Zone 3(a) and therefore development cannot be located in an area within Flood zone 2. Although the central area of Spalding is at a slightly higher level, the outskirts of to the west of Spalding are at a similar level to other areas outside the central area and all these areas are within flood zone 3. Therefore it is unlikely that a residential site would be found with a lower flood risk that has not already been developed.

Therefore it can be considered that the sequential test is passed.

## Exception Test

The Sequential Test has demonstrated that it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding. Therefore the Exception Test must be applied and for this to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risks, informed by the Strategic Flood Risk Assessment; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking into account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

Both parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

The first section will be demonstrated by the Supporting Planning Statement and compliance with South Holland District Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

## Strategic Flood Risk Assessment

The following information about the flood risk to the proposed development has been gained from the maps produced for the South Holland District Council Strategic Flood Risk Assessment:

### 1. Report Maps

- Map 5 indicates the site to be low or medium risk and protected by flood defences.
- Map 6 indicates the peak depth is zero for the present day 1% fluvial / 0.5% tidal event probability.
- Map 7 indicates the peak velocity is zero for the present day 1% fluvial / 0.5% tidal event probability.
- Map 8 indicates the risk extent is zero for the present day 1% fluvial / 0.5% tidal event probability.
- Map 10 indicates the actual risk extent for the 0.1% event probability is zero.
- Map 12 indicates the actual risk extent is zero.
- Map 13 indicates the 1% fluvial / 0.5% tidal event probability for 2115 for the site is zero.
- Map 14 indicates the actual risk extent for the year 2115 for the 0.1% event probability is zero.

- Map 16 indicates the site is not within a rapid inundation zone.

**2. Flood Maps Table D1**

- The maps illustrate the actual flood hazard which is as follows:

| | |
|---|---|
| For the present day | Depth of flooding … zero |
| | Extent of flooding .. zero |
| | Hazard …. Nil |
| | Velocity … Nil |
| For year 2115 | Depth of flooding … zero |
| | Extent of flooding .. Low or medium flood probability |
| | Hazard … Nil |
| | Velocity .. Nil |

- The maps also illustrate the residual flood hazard which is as follows:-

| | |
|---|---|
| For the present day | Depth of flooding … zero |
| | Extent of flooding .. Low or medium flood probability |
| | Hazard … zero |
| | Velocity .. zero |
| • For the year 2115 | Depth of flooding … zero |
| | Extent of flooding .. Low or medium flood probability |
| | Hazard … zero |
| | Velocity .. zero |

**3. The maximum flood levels in the fluvial section of the Spalding Welland is shown in the reports as follows:**

| | Peak 1 in 100 | | Peak 1 in 1000 | |
|---|---|---|---|---|
| Year | 2007 | 2115 | 2007 | 2115 |
| Level | 4.43 | 4.67 | 4.45 | 4.68 |

The defence level of left bank of Spalding Welland = 5.20m OD

**4. The extreme tide levels in the section of the River Welland north of Fulney Lock is shown in the report as follows:**

| | 2007 | 2055 | 2115 |
|---|---|---|---|
| 1 in 100 year | 5.98 | 6.31 | 7.12 |
| 1 in 1,000 year | 6.32 | 6.65 | 7.46 |

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The lowest bank level occurs 200 metres north of Fulney Lock, where a section 300 metres long has a minimum level of 6.98m OD.

**5. The maximum levels in Vernatts Drain**

| | Peak 1 in 100 | | Peak 1 in 1000 | |
|---|---|---|---|---|
| Year | 2007 | 2115 | 2007 | 2115 |
| Level | 3.92 | 3.92 | 3.92 | 3.92 |

The bank levels on the south side of Vernatt's Drain vary between 4.30m OD and 4.40m OD.

## Site Levels

The floor level of the existing bungalow is approximately 2.8m OD, and levels in the front and rear garden vary between 2.53 and 2.70m OD.

The house to the west of the site (No 299) has a floor level of 2.95m OD and the floor level of the bungalow east of the site (No 295) is 3.00m OD.

It is recommended that the new houses should have a level of 3.20m OD, 500mm above the level of Pennygate.

## Existing Flood Alleviation Measures

The site is within a defended flood plain, as defined in Appendix 1 of the Environment Agency's "Policy and Practice for the Protection of Flood Plains" and is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding due to overtopping or failures of the defences is considered to be very low.

The site is approximately 1.5km from the River Welland, which is main river and maintained by the Environment Agency.

This area west of the centre of Spalding is drained by surface water sewers maintained by Anglian Water, which discharge into drainage channels maintained by Welland and Deepings Internal Drainage Board. The water levels in the IDB channels are controlled by the water level in South Drove Drain Drain which also is operated by Welland and Deepings IDB.

## Potential Sources of Flooding

The following sources of flooding have been identified:

1. Failure or overtopping of the tidal defences.

2. Overtopping of the River Welland.
3. Flooding from Vernatts Drain
4. Flooding from IDB drainage channels
5. Blockages in local surface water sewers (highway or Anglian Water)

**1. Failure or overtopping of tidal defences.**

The River Welland is tidal north of Fulney Lock, which is approximately 3.1 km north east of the site. The SFRA states that the defences are adequate to withstand a 1 in 200 year (0.5%) probability event for present day. In the future in 2115 some of the banks could be overtopped with a 0.5% probability event. However one would expect that during the next one hundred years defences will be raised to maintain a 1 in 200 year standard of defence. If overtopping or a breach allowed water to flow westwards from the tidal Welland lower land to the west of the River Welland would be flooded and the central area of Spalding would remain unaffected, unless a high tide of extreme proportions occurred.

The maps in the SFRA indicate that no flooding should occur in a 1 in 1000 year event in 2115 even if a breach develops (residual flooding)

**2. Overtopping of the River Welland.**

The west bank of the River Welland is at a level of 5.20m O.D. at London Road. This is not a raised defence at this point. The land and the Road are at 5.20m OD and the ground level gradually falls away from the River. Therefore, there is no possibility of failure of the bank. There is a freeboard of at least 500mm above the 1 in 1,000 year maximum design level in the River.

Therefore, as the river is 1.5 km from the development, this source of flooding can be discounted.

**3. Flooding from Vernatts Drain**

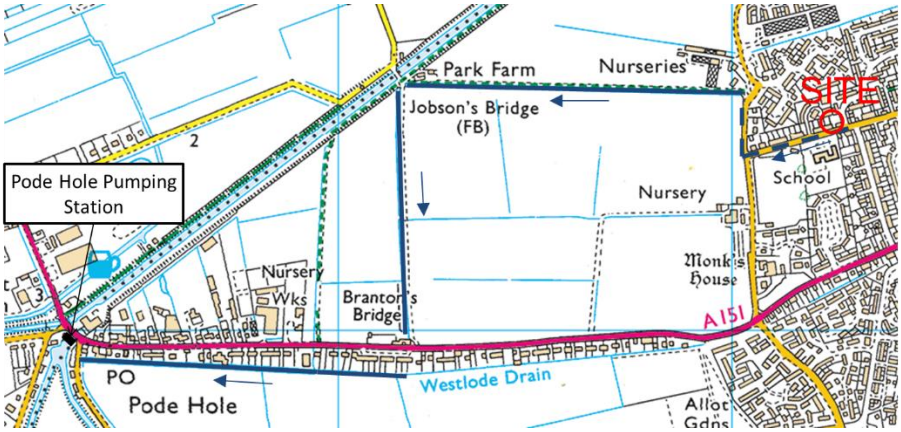
Vernatts Drain is 750 metres north west of the site. It is an embanked watercourse which mainly conveys water discharged from the pumping station at Pode Hole to the River Glen.

The SFRA states the maximum design water level in Vernatt's Drain to be 3.92m OD which is below the lowest bank level of 4.30m OD. If a breach occurred in Vernatt's Drain Welland and Deepings IDB would be able to reduce the level of water in the Drain by reducing the pumping rate at Pode Hole to prevent extensive flooding and enable a repair of the breach to be undertaken quickly.

Therefore as the proposed level of the building is only 1.1 metres below the maximum design water level of Vernatt's Drain the risk of flooding from this source can be considered to be extremely low.

## 4. Flooding from IDB watercourses

Pennygate and the adjoining area is drained by a piped drain under Pennygate. This drain runs westwards into Park Drain and then flows southwards to discharge into Westlode Drain. It then flows westwards to discharge into North Drove Drain near Pode Hole, which is the main pumped outfall for this area west of Spalding. All of these watercourses are maintained by Welland and Deepings IDB. These watercourses are shown below.




The water level in North Drove Drain, which is maintained by W & D IDB is controlled by Pode Hole Pumping Station. There are both electrically operated and diesel powered pumps which are operated at this location to control water levels. W & D IDB have stated that the normal pumping level is -1.20m OD and the maximum design water level in a 1 in 100 year event would be 0.18m OD. With climate change this could increase to around 0.7m OD.

Welland and Deepings IDB continue to monitor how climate change will affect the standard of service of drainage channels, especially those protecting urban areas. If these fall below the required level the IDB will carry out improvements to the system to ensure the standard of service remains at 1 in 100 years.

Although the likelihood of water levels rising to 2.00m OD in North Drove Drain is remote, if this happened low land around Deeping St Nicholas would start to flood and so the level in the Drain would be unlikely to increase further.

All of the IDB channels and piped drains are maintained in good condition. Therefore the risk of flooding from this source can be considered to be extremely low.

## 5. Blockages in local surface water drainage systems

Both Anglian Water and the Highways Authority maintain surface water drainage systems which discharge into the piped IDB drain alongside Pennygate. If a blockage occurs in any highway outfalls or pipes surface water could flow onto the site from

Bourne Road. If any flooding occurred from this source the depth of flooding would be only in the region of 100mm and the precaution of raising ground floor levels by approximately 500mm above levels of the site should prevent flooding from this source.

Therefore the risk of flooding from this source is extremely low.

## Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties being flooded in the last thirty years.

## Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low. In an extreme event any effect on this location would not be sudden and there would be time for residents to take precautionary measures to limit the impact of any flooding that may occur.

## Residual Risk – Extreme Events

The residual risk from extreme events is very low on this site. The major risk to the site is from a breach or overtopping of the tidal defences

The SFRA maps indicate that if a breach occurred in the sea defences during a 1 in 1000 year event in 2115 the site would not be flooded. Therefore the risk of any flooding occurring at this location is very low.

Therefore although this site is within Flood Zone 3 according to the initial classification because of the current standards of drainage and flood risk in Spalding there is a very low risk of flooding to this site.

## Summary of Risk of Flooding to the Site

In an extreme tidal event with multiple breaches occurring in the west bank of the tidal Welland it is just feasible that flooding could start to occur in this area of Spalding. If flooding from this source, or from a major failure in the IDB system, did lead to the level of flood water rising to a level of 3.20m OD then it would do so very slowly, and future residents of the proposed dwelling would have adequate time to be warned and to make plans to evacuate the area or keep safe on the first floor of the building.

## Conclusions

The following conclusions can be made:

- The proposed development is not in a functional flood plain as defined by the Technical Guidance.

- Although the site is in flood zone 3, the actual risk of the site flooding from any Environment Agency watercourse is very low.
- The SFRA indicates that no actual or residual flooding is predicted for the 1% fluvial / 0.5% tidal event probability in 2115, or for the 0.1% event probability in 2115.
- The risk of the site becoming flooded from any source is extremely low.
- In a flood risk area there is always a risk of an event occurring of greater magnitude than has been considered in this flood risk assessment.

**Recommendations**

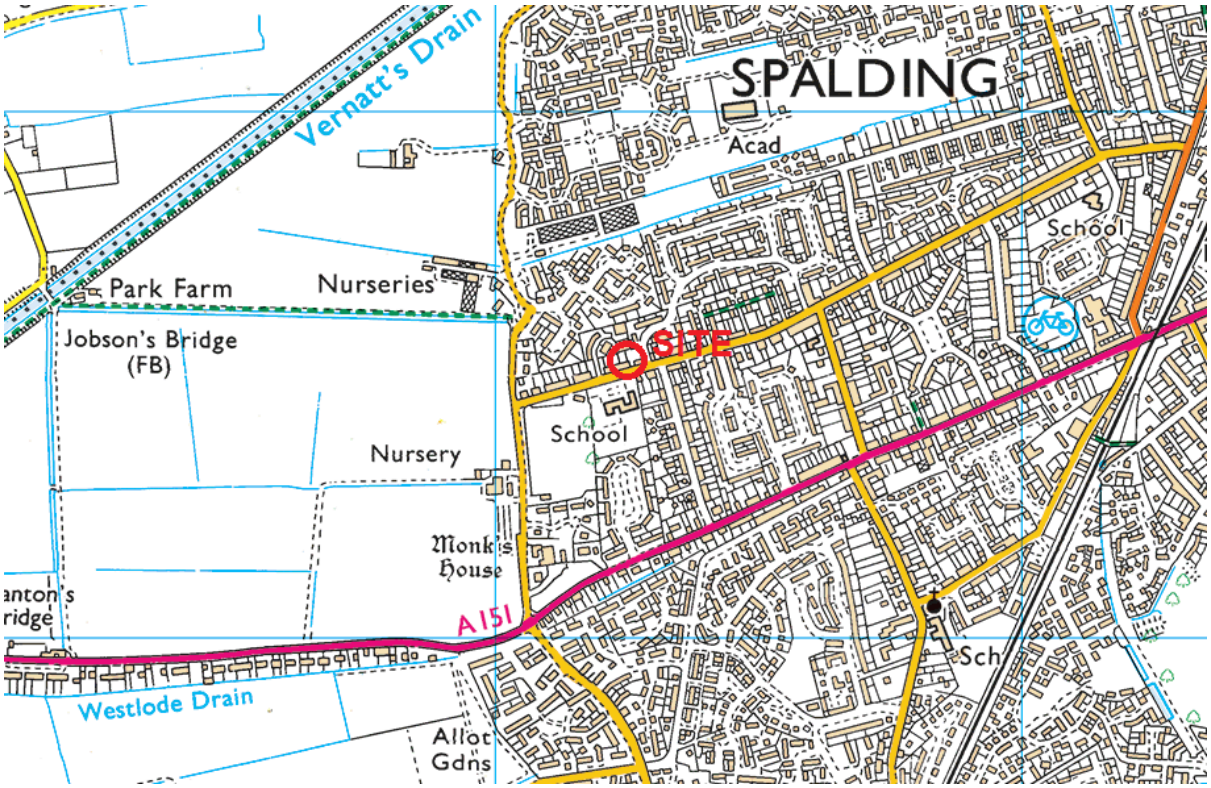
- It is recommended that the ground floor level of the proposed building should be 3.20m OD. This is 200mm above the level of the adjoining property.
- The buildings should have two stories with all of the sleeping accommodation on the first floor.
- If any flooding did occur it would happen extremely slowly over many hours and the Local Authorities and emergency services would have adequate time to warn residents that flooding might occur, and residents would have adequate time to prepare themselves for the event.
- Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service.
- If the developer considers it cost effective, considering the level of risk is so low, he could consider designing the new building incorporating flood resistant/resilient techniques to allow it to be refurbished after being flooding to a depth of approximately 300mm. Consideration could be given to the electrics and heating pipes being distributed at ceiling level rather than at floor level.
- On site surface water drainage will be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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7th December 2015.

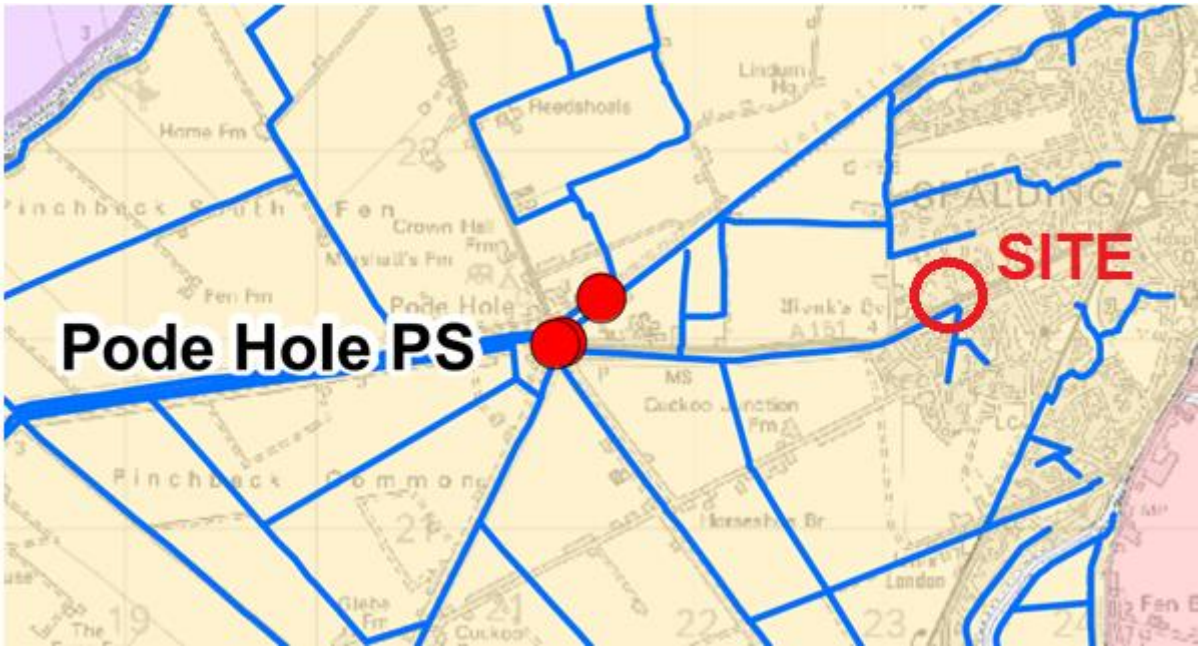
## LOCATION PLAN




## PLAN OF SITE



## PLAN OF IDB DRAINS




## PLAN OF SITE LEVELS

