PROPOSED CONVERSION OF THE BARNS AT REEDSHOALS FARM, DOZENS BANK, WEST PINCHBECK, SPALDING, PE11 3BE.

FLOOD RISK ASSESSMENT



View of farmyard looking north

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 conversion of the existing barns at Reedshoals Farm, Dozens Bank, West Pinchbeck, 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 is due to be made to South Holland District Council for planning permission to convert existing barns for residential use at Reedshoals Farm, Dozens Bank, West Pinchbeck, Spalding.

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 Planning Application therefore requires a Flood Risk Assessment to be carried out as required in the Planning Practice Guidance to the National Planning Policy Framework.

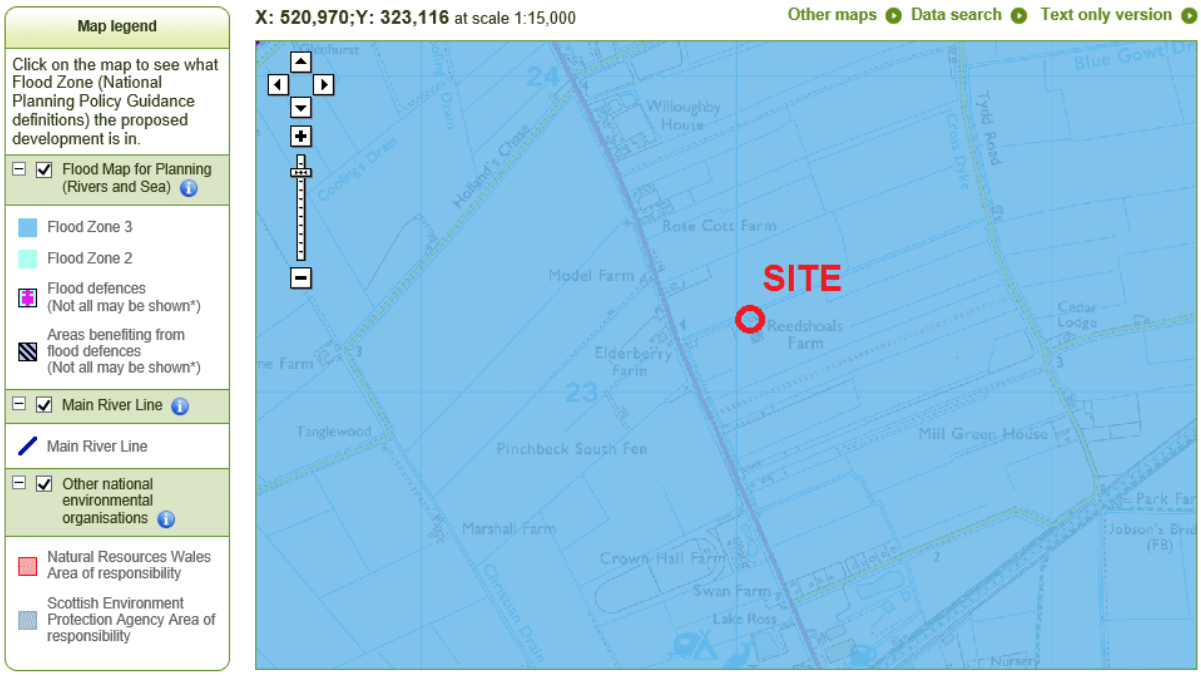
The site is shown within the defended area of the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the Welland and Deepings Internal Drainage Board district.

Application Site

The development is located 1km north of Pode Hole and the National Grid Reference of the site is 521050 323240.

The position and extent of the site is shown on the plan at the end of this document.

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



Applying the flood risk vulnerability classification in Table 2 of the Guidance, residential development is classified as "more vulnerable". Reference to Table 3 (shown below)

of the Guidance informs us that more vulnerable development is only satisfactory in Flood Zone 3 after the Sequential and Exception Test has been passed.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Sequential Test

The aim of the Sequential Test, as set out in the Planning Practice Guidance, is to ensure that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The flood zones as refined in the Strategic Flood Risk Assessment for the area provide the basis for applying the Test. The aim is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

If a larger scale map showing the flood zones is considered, it can be seen that all of the area north of Vernatts Drain is in Flood Zone 3. Most of the urban area of Spalding is classified as being all within Flood Zone 3.

The proposal will be an effective use of an old barn which is not used at the present time. As this conversion can only be carried out on this site, then it is difficult to carry out the requirement to consider if there are suitable alternative sites in the area. However there are no sites in the immediate area that have a lower flood risk.

Therefore I consider that the sequential test has been 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 in the location of this development has been sourced from the maps and reports in the SHDC SFRA.

1. Report Maps

   Map 5 shows that the site is at low or medium risk, but reliant on flood defences for this standard.

   Map 6 indicates the peak depth is zero for the present day 1% fluvial and 0.5% tidal event probability.

   Map 7 indicates the peak velocity is zero for the present day 1% fluvial and 0.5% tidal event probability.

   Map 12 indicates the actual risk is high for the year 2055 1% fluvial and 0.5% tidal event probability.

   Map 13 indicates the actual risk is high for the year 2115 1% fluvial and 0.5% tidal event probability.

   Map 14 indicates it will be at least 3 hours, and possibly at least 6 hours, from the start of an event before flood water would reach the site.

   Map 16 shows that the site is not within a rapid inundation zone.

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 .. Low or medium flood probability
Peak Velocity ……. Nil

For year 2115 Depth of flooding … 0 – 500mm
Extent of flooding…. High flood probability
Peak Velocity …… 0 – 0.1 m/sec

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

For the present day Depth of flooding …0 – 500mm
Extent of flooding .. High flood probability
Peak Velocity .. 0 – 0.1 m/sec

For the year 2115 Depth of flooding … 0 – 500mm
Extent of flooding .. High flood probability
Peak Velocity .. 0 – 0.1m/sec

Maximum flood level and bank levels in the River Glen

Maximum flood levels in the River Glen at chainage 10.2 km are shown in the reports as follows:

	Present	Including Climate Change
1 in 100 year	4.66	4.93
1 in 1,000 year	4.94	5.16

There is a road with a wall alongside the River giving a protection level of 5.95m OD at this location.

Maximum flood level and bank levels in Vernatt's Drain

The maximum levels in Vernatt's Drain at chainage 10.0km are shown in the reports as follows:

	2007	2115
Peak 1 in 100 year level	3.95	3.95
Peak 1 in 1000 year level	3.95	3.95

The defence level (top of right bank) is 4.39m OD at this location.

Information Provided by the Environment Agency

The Environment Agency have provided information on the latest predicted flood levels in the River Glen 100 metres downstream of the A151 bridge as follows:

	Present	Including Climate Change
1 in 100 year	4.66	5.22
1 in 1,000 year	4.94	5.48

Site levels

Levels of the farmyard vary between 2.51m OD and 2.88m OD. There is an area on the west side of the farmyard which is lower at 2.15m OD but this is assumed to be a small area. The ground floor level of the house is 2.88m OD and the level of the barn is 2.81m OD.

The water level in Blue Gowt Drain on the northern boundary of the farmyard was 0.22m OD.

A plan showing all these levels is shown on page 10 of this report.

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". The area 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 to the River Welland is very low.

The site is approximately 1.8 km south of the River Glen, which is main river and maintained by the Environment Agency.

Potential Sources of Flooding

The following sources of flooding have been identified:

1) Failure or overtopping of the south bank of the River Glen.
2) Due to high levels in Vernatts Drain.
3) Failure or overtopping of tidal defences of the River Welland
4) Overtopping of IDB drainage systems.
5) Flooding from local surface water systems.

1. Failure or Overtopping of the South Bank of the River Glen

   The River Glen is located 1.8km north of the site. The maximum predicted 1 in 1000 year water level in 2115 in the SHDC SFRA is 5.16m OD, but advice from the Environment Agency based on later modelling of the River Glen predicts a

higher 1 in 1000 year level of 5.48m OD. All of these levels are below the actual level of the wall alongside the road on the bank which has an average level of 5.95m OD.

Therefore any predicted flooding from the River Glen would be caused by a failure of the defence on the southern side of the river.

The risk of flooding from this source can be considered to be low.

2. Due to High Levels in Vernatt's Drain

Vernatt's Drain is located 1.1 km south of the site. This watercourse is maintained by Welland and Deepings IDB and the watercourse takes the outfall from Pode Hole Pumping station and the Counter Drain.

The maximum 1 in 1000 design level in Vernatt's Drain in 2115 is predicted to be 3.95m OD, and the defence bank on the north side of the drain is 4.39m OD.

The risk of flooding from this watercourse is extremely low. If a breach were to occur the Wellandf and Deepings IDB could reduce the level of the drain quickly by reducing pumping at Pode Hole Pumping station and other pumping stations, which would enable a temporary repair to be quickly carried out.

3. Failure or overtopping of tidal defences of the River Welland

The tidal defences are 8 km north east of the site, to the north of Spalding. It is most unlikely that a breach of these defences would spread this distance inland, and therefore this source can be discounted.

4. Overtopping of IDB Systems

The Blue Gowt Drain to the north of the site is a watercourse maintained by Welland and Deepings IDB. The water levels in this drain are controlled by Pode Hole Pumping Station which is approximately 1.2km south of the development. The water flows eastwards then south to the low level drain north of the Vernatts Drain and then through a syphon under Vernatts Drain to discharge into South Drove Drain. Welland and Deepings IDB stated that although this system operates well at the present time if more development is approved in the area further improvements will be carried out to ensure that the standard of drainage is maintained in the future.

Drainage channels maintained by the Welland and Deeping IDB generally have a 1 in 10 year standard with up to 1.0 metre of freeboard, which generally provides between 1 in 50 and 1 in 100 year standard against flooding.

The risk of water levels rising to above 3.00m OD in the IDB drain are remote but as land levels in the area are lower than 3.00m OD a large area of land would be flooded before the proposed development was affected.

5. Flooding from local foul or surface water systems

It is assumed that the foul water from the existing house discharges into a septic tank or a similar system. As the ground floor level of the proposed development will be raised above the ground level outside any malfunction of this or an accumulation of surface water around the building would not cause any flooding to the development or the existing house or the proposed development.

Summary of Risk of Flooding to the Site

There are no records of the site ever having been flooded in the past.

The maps in the SFRA indicate that the flood depth on the site is between 0 and 500mm in a 1 in 1000 year residual event in 2115.

It is assumed that this flooding is as the result of a breach in the south bank of the River Glen, and the risk of this is extremely low.

However the consequence of this possible event needs to be considered in any recommendations for the proposed floor level for the conversion of the barn.

Land levels across the site vary between 2.5m OD and 2.88m OD. A low level of 2.15m OD was identified west of the farmyard but it is assumed this is an isolated area. Therefore it can be concluded that the predicted flood level if a breach occurred in a 1 in 1000 year event in 2115 would be a maximum of 500mm above this at a level of 3.00m OD.

The Environment Agency guidance states that if a new development has sleeping accommodation on the ground floor the floor levels should be set 300mm above the highest 1 in 1000 year flood level. Therefore to comply with that guidance the ground floor level of the new development should be a minimum of 3.30m OD.

As the floor level will be set at 3.30m OD this will be at least 500mm to 750mm above the surrounding ground and therefore the development will be above any foreseeable flood levels in the IDB drains.

The effect of flooding from Vernatt's Drain or a major breach in the banks of the River Welland has been investigated and the possibility of flooding extending to the site near Dozens Bank is remote. If the site were to be affected in an extreme event it is unlikely that the depth of flooding would be greater than 500mm.

Conclusions

The following conclusions can be made:

- The proposed development is not in a functional flood plain as defined by PPS25.
- The risk of the site flooding from any Environment Agency watercourse is very low.
- The risk of flooding from IDB watercourses is also extremely low.

- Velocities, and therefore the hazard of any flood water in the area would be low.

Recommendations

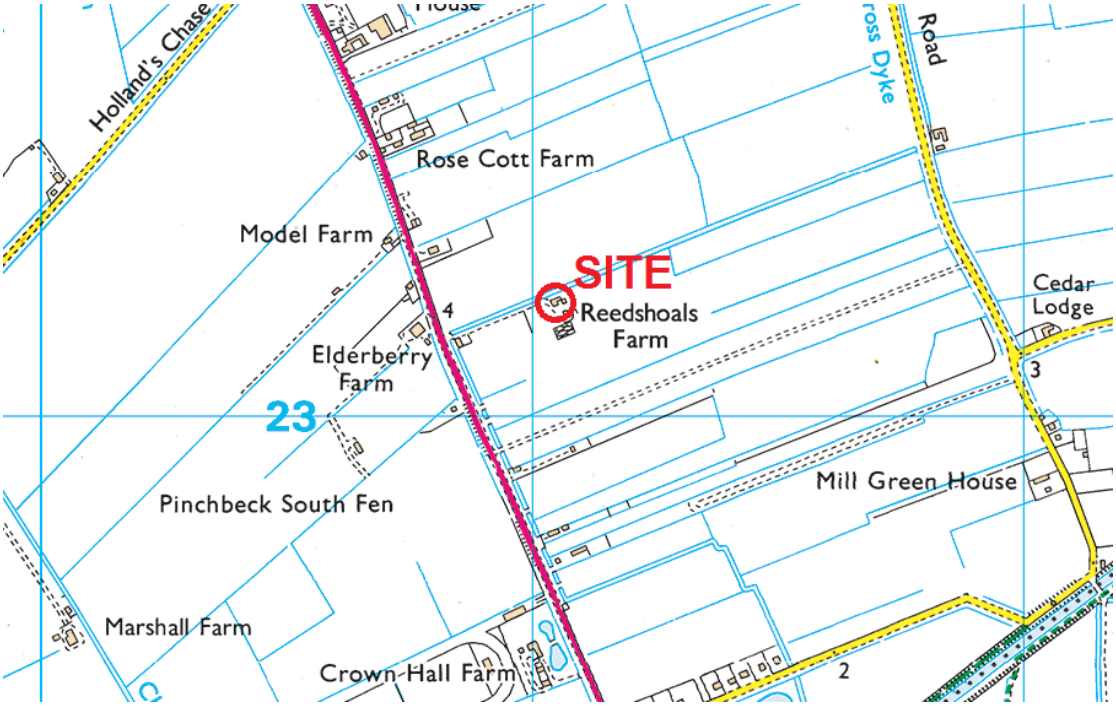
- In any area where there is a risk of flooding, although the risk at this site is low, it is preferable to construct new buildings with two stories with all sleeping accommodation on the first floor, in order that the first floor can provide a safe refuge if any flooding were to occur.
- As the development is a conversion of an existing single story building bedrooms need to be on the ground floor and therefore the ground floor level should be raised to a level to keep residents as safe as possible in the future.
- The ground floor level of the proposed barn conversion should be no lower than 3.30m OD, which is 500mm above the existing level of the existing floor in the barn.
- Occupiers of the Property should register with the Environment Agency's Floodline Warnings Direct Service to receive automated early warnings of potential flooding.
- Although the risk of flooding is extremely low, if through a set of circumstances acting together any flooding were to begin to occur, residents would have adequate time to evacuate the area and remain safe.
- On site surface water drainage will be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

S M Hemmings B Sc C Eng MICE MIWEM

stuart.hemmings@btinternet.com

17th March 2016

LOCATION PLAN



PLAN OF SITE LEVELS

