RETROSPECTIVE APPLICATION TO RETAIN A BUNGALOW CALLED AKITA PLACE, CLAY LAKE, SPALDING, PE12 6BL

FLOOD RISK ASSESSMENT



View from road

S M Hemmings B Sc C Eng MICE MIWEM,

69 Charlotte Way

Peterborough

PE3 9ER

Revision A 20/03/2019 1 in 1000 year residual flood map updated and recommendations amended

This flood risk assessment has been prepared solely to support the planning application for the retention of the property called Akita Place at Clay Lake, 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, or if it is used for any other purposes other than for which it was originally commissioned.

Introduction

A planning application is due to be submitted to South Holland District Council to retain a factory made bungalow on a site called Akita Place at Spalding Drove, Clay Lake, Spalding, PE12 6BL.

The site is in Flood Zone 3 as shown on the Environment Agency's Flood Zone map. The flood zone 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 Development and Flood Risk. The site is within a defended area as specified in the South Holland District Council's Strategic Flood Risk Assessment and is located in the South Holland Internal Drainage Board District.

Environment Agency (EA) Flood Zones

The map below is taken from the Environment agency website and shows the whole area is within flood zone 3.



Application Site

The site is located 450 metres south of the Coronation Channel and 1km east of the River Welland.

The National Grid Reference of the site is 525278 321062, and the extent of the site is shown on the plan at the end of this document.

As the site is within a defended area the proposed development can be considered to be within Flood Zone 3(a) "High Probability" as defined in Table 1 of the Technical Guidance.

The Planning Practice Guidance to the National Planning Policy Framework Development and Flood Risk table 2 has the following definitions for “highly vulnerable” and “more vulnerable” development.

Highly vulnerable: Caravans, mobile homes and park homes intended for permanent residential use.

More Vulnerable: Buildings used as Dwelling houses.

The building that has been erected on the site is a factory constructed bungalow that was delivered to the site and lifted onto the foundations. If the building is placed on a concrete slab supported by brick or block walls which are founded on traditional strip concrete foundations founded on suitable sub soil probably 750mm deep, and the building is securely fastened to this sub structure, then the building can be considered to be a bungalow and therefore “More vulnerable”.

As the bungalow is classified as “more vulnerable”, Table 3 of the Guidance states that residential development is only permitted in Flood Zone 3(a) after the sequential and exception test has been followed.

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 defined 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.

As can be seen from the map on page 2 of this report the whole of the area of Spalding, except for the central area, is in Flood Zone 3(a).

Taking into account the guidance, it can be seen that it is extremely unlikely that an alternative site with a lower flood risk could be found for this development in Spalding. It is located in a row of similar bungalows along Clay Lake. The safety of the bungalow will be delivered by ensuring the floor level of the proposed new dwelling is above predicted residual flood levels for this area.

The South Holland District Council Core Strategy states that there is a limited number of sites in the South Holland DC area available for this type of development. Some further land will need to be identified to enable the Council to meet the RSS and

Structure Plan requirement for 2021. Therefore the removal of one residential building would not seem to be following the policy of increasing the number of dwellings available in the Spalding area.

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

Consultants have produced a Strategic Flood Risk Assessment (SFRA) for the South Holland District Council (SHDC). This document provides details of the flood risk in the Council's area. Reference to the maps in this document give the following information for the flood risk and hazard at the site.

The maps illustrate the actual flood hazard for the 1% fluvial event and 0.5% tidal event, and for the 0.1% event.

Present Day	Depth of flooding..... zero
	Extent of flooding..... Low but reliant on defences
	Hazard …….. None
	Velocity ..... nil
2115	Depth of flooding..... 1.0m – 1.5m
	Extent of Flooding……...Medium or High
	Hazard …….. Significant
	Velocity ..... 0 – 0.1m/sec

The maps showing the residual flood hazard were revised in the 2016 update of the South Holland District Council Strategic Flood Risk Assessment which can be found on the website of the South East Lincolnshire Joint Planning Committee. The hazards are as follows for the 1% fluvial or 0.5% tidal event probability:

Present Day	Depth of flooding..... 1.0m – 2.0m
	Extent of Flooding……. High
	Hazard …….. 1.25 – 2.0 (Danger for most)
	Velocity .....0 – 0.3m/sec
2115	Depth of flooding..... 1.0m – 2.0m
	Extent of Flooding……. High
	Hazard …….. Greater than 2.0 (Danger to all)
	Velocity .....0 – 0.3m/sec

The hazards for the 0.1% event probability in 2115 are shown below:

Depth of flooding..... 1.0m – 2.0m
Extent of Flooding……. High
Hazard …….. Greater than 2.0 (Danger to all)
Velocity .....0 – 0.3m/sec

Tables in the SFRA show the following details of the predicted flood levels in the tidal section of the River Welland north of Fulney Lock at chainage 22.0km.

	2007	2055	2115
Peak 1 in 200 year extreme tide level	5.98m OD	6.31m OD	7.12m OD
Peak 1 in 1,000 year extreme tide level	6.27m OD	6.60m OD	7.41m OD

The crest levels of the defences, which are earth banks along this length, vary between 7.69 and 8.00 m OD. With a minimum crest level of 7.69m OD the freeboards are as follows:

	2007	2055	2115
Peak 1 in 200 year freeboard	1020mm	690mm	-120mm
Peak 1 in 1,000 year freeboard	680mm	350mm	-460mm

Tables in the SFRA show the following details for the predicted flood levels in the Coronation Channel at chainage 6.3 km.

	2007	2115
Peak 1 in 100 year flood level	4.37m OD	4.68m OD
Peak 1 in 1,000 year flood level	4.40m OD	4.68m OD

The level of the earth banks on this section of the south side of the Coronation Channel vary between 5.77m OD and 5.97m OD.

Information from the Environment Agency

The Environment Agency has provided predicted flood levels for the Coronation Channel which are taken from the Welland Catchment Model. The 2115 figures assume a 20% allowance for climate change.

	2007	2115
Peak 1 in 100 year flood level	4.37m OD	4.68m OD
Peak 1 in 1,000 year flood level	4.39m OD	4.69m OD

The flows in the Coronation Channel in the same events in cubic metres / second are as follows.

	2007	2115
Peak 1 in 100 year fluvial flood flows	90.94	90.89
Peak 1 in 1,000 year fluvial flood flows	92.59	92.34

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", which is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding occurring due to overtopping or failures of the defences is considered to be very low.

The site is located 450 metres south of the Coronation Channel which is maintained by the Environment Agency.

The site is located approximately 3.2 km south of the tidal section of the River Welland, which is maintained by the Environment Agency.

The site is located 1.0 km east of the fluvial section of the River Welland which is maintained by the Environment Agency.

The low level watercourses in the area are maintained by South Holland IDB.

Existing Ground Levels

Levels were taken on the site to establish the floor level of the existing building, and the ground level on the site. The road level in front of the building is 2.45m OD and the ground level on the site is 2.60m OD. The ground floor level of the building at the present time is 3.50m OD

Levels have also been investigated along the road north and south of the site and these have been reproduced on the flood depth maps on page 10 of this report.

Potential Sources of Flooding

The potential sources of flooding to the site are:-

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

2. Failure or overtopping of the Coronation Channel.
3. Failure or overtopping of the banks of the fluvial section of the River Welland.
4. Flooding from the IDB drainage system
5. Surface Water Flooding

1. Failure or overtopping of tidal defences

The tidal River Welland is 3.2km north of the site. The predicted water levels in this watercourse show that the defences will not be overtopped in a 1 in 200 year event in 2115. If a breach occurred in the east bank of the tidal Welland water would flow westwards and would be held up by the A16 road. It would then flow southwards towards the site of the proposed building.

Therefore it is very unlikely that flood water from this source would reach as far as the site of the building and the risk of flooding from this source is extremely low.

It is considered that the precaution of raising floor levels by 1.25 metres above the road level will adequately mitigate the risk of flooding to the building from this source.

2. Failure or overtopping of the Coronation Channel

The Coronation Channel is 450 metres north of the site. The predicted water levels in this watercourse show that the defences will not be overtopped in a 1 in 100 year event in 2115.

However if a breach were to occur then flood water would flow southwards and flood the site of the development. The predicted depth of flooding shown on the maps in the SFRA is between 1.0 metre and 2.0 metres. This risk can be considered to be the greatest risk to the building.

Suitable mitigation should be provided by raising the ground floor level of the building 1.25 metres above the road level. Details on how this has been estimated are shown in the conclusions on pages 10 and 11 of this report.

3. Failure or overtopping of the River Welland

The fluvial section of the River Welland is 1.0 km west of the site. The predicted water levels in this watercourse show that the defences will not be overtopped in a 1 in 100 year event in 2115.

However if a breach were to occur then flood water would flow and flood the site of the development. The predicted depth of flooding would be no greater than from the Coronation Channel and as shown on the maps in the SFRA this is between 1.0 metre and 2.0 metres. Therefore the mitigation recommended in (2) above will be satisfactory to prevent flooding to the bungalow from this source.

4. Flooding from IDB System

South Holland IDB maintain drainage channels in this area. There is a large IDB drain immediately west (behind) the site of the development. This flows in a southerly direction and discharges into the Wheatmere Drain (B35) which flows southwards into the South Holland Main Drain (B30). The water level in the South Holland Main Drain is controlled by Wisemans Pumping Station which is approximately 5 km south east of the site.

IDB drains were designed to provide at least a 1 in 10 year standard of service with a freeboard of at least 900mm. This normally provides at least a 1 in 50 year standard of service against overtopping and in many cases a 1 in 100 year standard at the present time.

South Holland IDB have a policy of monitoring standards of protection in all their catchments and will carry out improvements to pumping stations, sluices and drainage channels to ensure they do not fall due to higher run-offs predicted with climate change.

It is unlikely that any failure of assets such as pumping stations, sluices or drainage channels would lead to overtopping of the watercourse because South Holland IDB have an excellent maintenance regime and monitor all assets with a modern telemetry system.

As the floor level of the bungalow is to be raised a minimum of 1.25 metres above the road level then flooding from IDB drains can be discounted.

5. Flooding from Surface Water

The raising of floor levels by at least 1.25 metres above the road level will mitigate any risk of flooding to the bungalow from this source.

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 risk of this happening in this case is low and the hazard from any flooding is also low.

Climate Change

The recommendations for flood depths for this flood risk assessment use information mostly taken from the South Holland DC SFRA which was last updated in 2010. The EA have issued new guidance on recommended contingency allowances for predicted

sea rises, fluvial flows and rainfall intensities which from 19th February 2016 needs to be considered in this FRA. The effects of these new recommendations are considered in Appendix B of this report (pages 14 to 17). It is concluded that no extra mitigation measures are necessary to comply with the new guidance on climate change.

Conclusions

1) Classification of Building.

The previous planning application (H16-0030-17) was refused by South Holland DC because the Environment Agency objected to the application. The Agency considered the building should be classed as "highly vulnerable" and therefore it was considered not appropriate in Flood Zone 3.

However this is different to the response the Environment Agency gave to planning application No H16-0367-16, which was for residential caravans on a site on the eastern side of Spalding Drove. The Agency initially objected to the application but after discussions with the applicant and the Council this objection was lifted and planning permission was granted for the application. Further details of the applications are shown in Appendix A on page 13.

Therefore not only is there some doubt whether this application should be classed as "More vulnerable" or "highly vulnerable", but the Agency have not objected to a similar application for 12 mobile homes only 100 metres from this site.

Therefore it is considered that this application should be judged in the same way as planning application No H16-0367-16 and no objection should be made because of the classification of the building in flood zone 3.

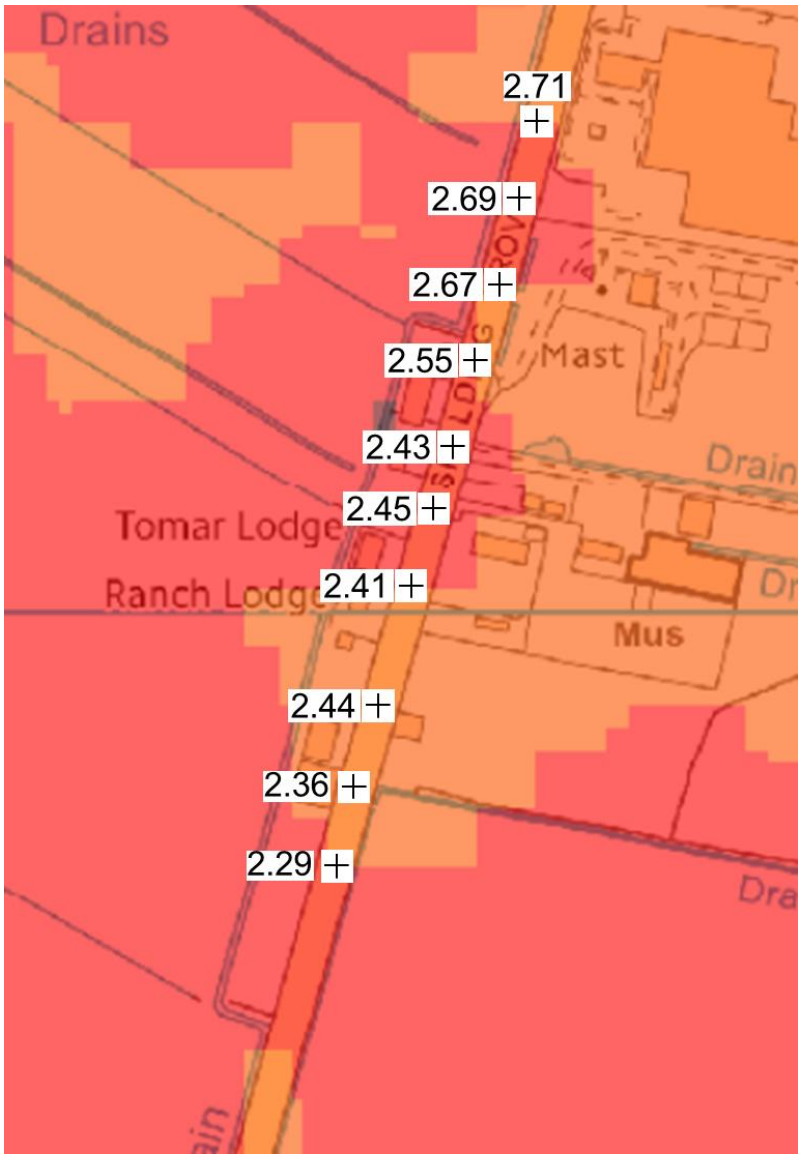
2) Predicted flood depth

As the building has bedrooms on the ground floor then the ground floor level should be raised above the predicted 1 in 1000 year level. An extract of the map in the SHDC SFRA showing the residual flood depths in a 1 in 1000 year event in 2115 is reproduced below.

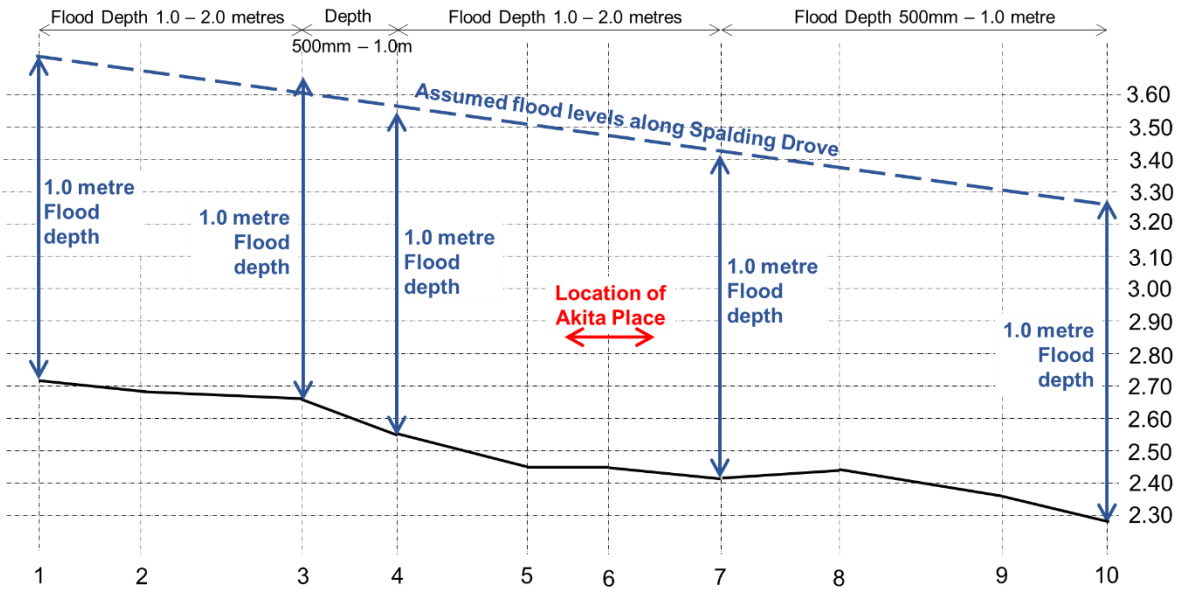


It can be seen that the predicted flood depth on the site is between 1.0 metre and 2.0 metres. It can also be seen that the predicted flood depth along Spalding Drove north and south of the site varies in bands between flood band 1.0 – 2.0 metres (shown in red) and 500mm – 1.0 metre (shown in orange).

Levels haver been taken along Spalding Drove and these have been superimposed onto the flood depth map below.



At the boundaries between the red band and the orange band the flood depth can be considered to be approximately 1.0 metre. A long section has been drawn along Spalding Drove and this shows the grounds levels, the positions where the flood depth is 1.0 metres and an estimated line which is the flood depth in a 1 in 1000 year event in 2115. This section is shown on the next page.



Therefore it can be concluded that the predicted flood level at the location of the application site is 3.50m OD. It can be accepted that as this is only an estimate, and to allow for a greater climate change allowance than the 20% allowance that was used when producing the maps, that the finished floor level of the building should be raised to a level of 3.70m OD.

Recommendations

In any area at risk of flooding it is recommended that new dwellings should be of two story construction with all bedrooms at first floor level. This will provide a refuge for residents if the building becomes flooded after a major breach of the tidal bank, and ensure there is no danger to residents when they are asleep.

As this is a single story building then the advice is that it should be constructed with a finished ground floor level of 3.70m OD. This level is approximately 1250mm above the level of the road (2.45m OD) outside the site.

The building should be placed on a concrete slab supported by brick or block walls which are founded on traditional strip concrete foundations founded on suitable sub soil probably 750mm deep, and the building should be securely fastened to these foundations.

Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service.

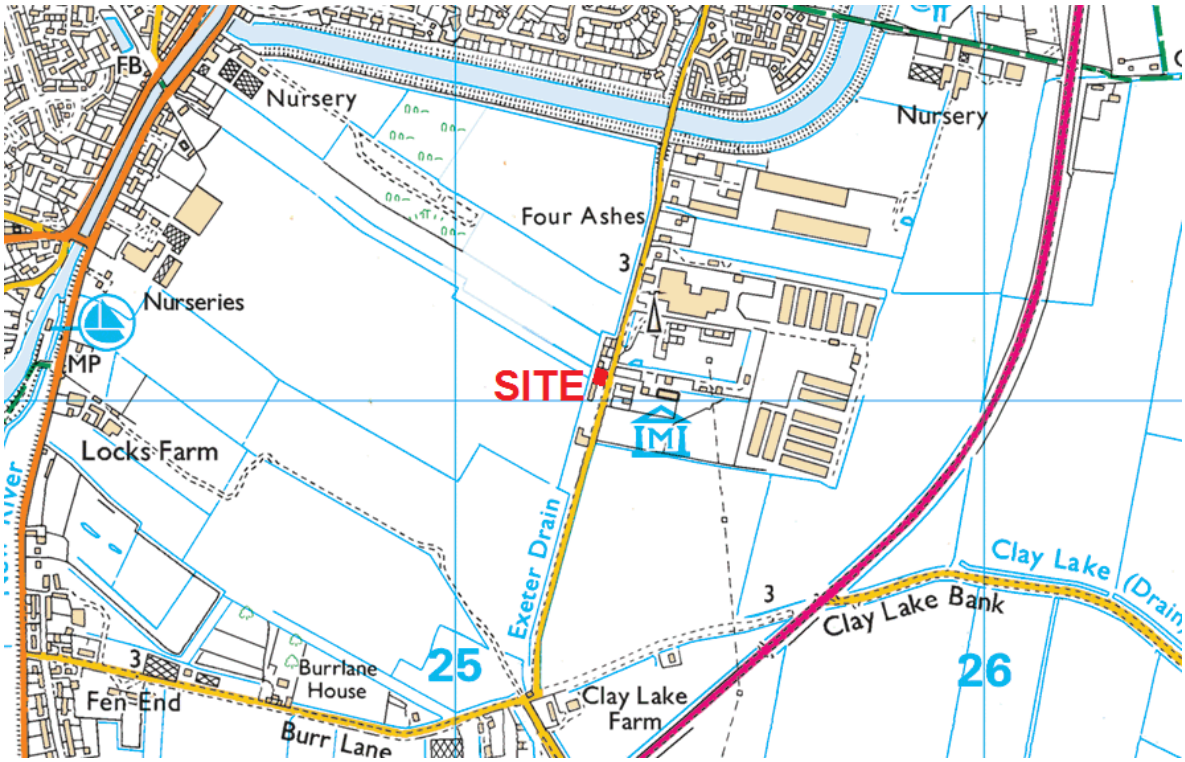
On site surface water drainage should be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.

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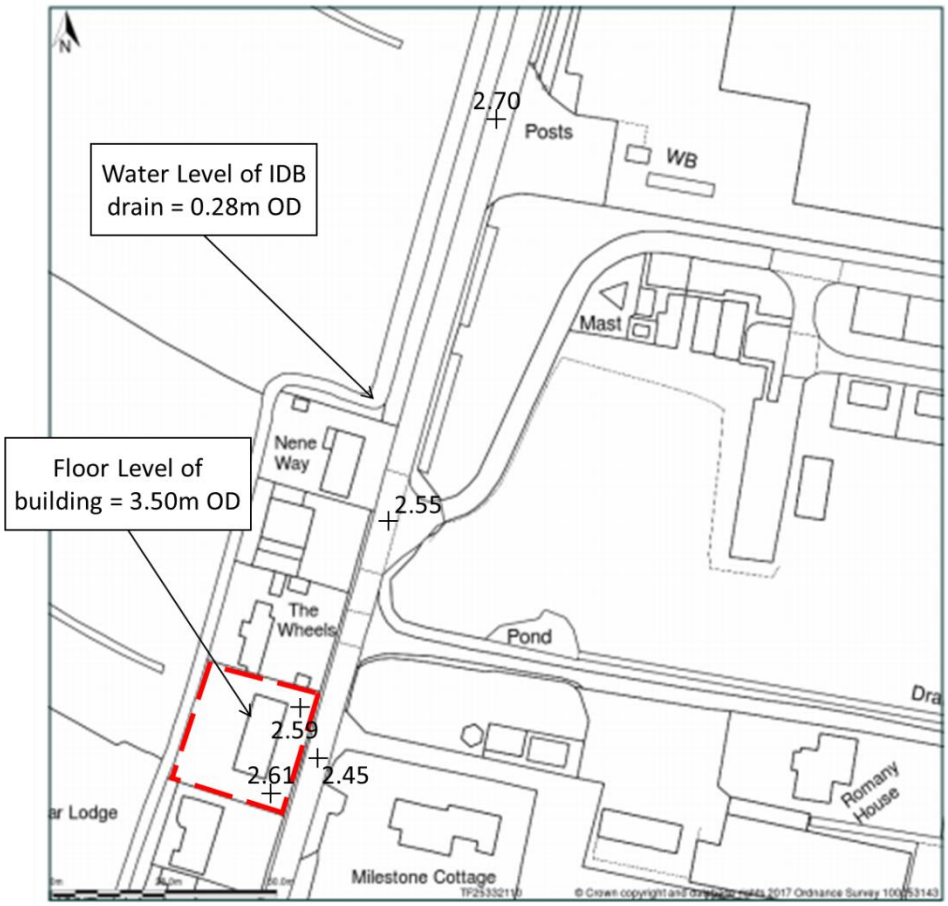
stuart.hemmings@btinternet.com

20th March 2019

LOCATION PLAN



SITE LEVELS



APPENDIX A

REPORT ON PLANNING APPLICATIONS AT CLAY LAKE

A planning application (reference no H16-0367-16) was submitted to South Holland District Council for the Change of use of an existing transit caravan site to a Residential Site for 12 units at Hawthorns Caravan Park, Clay Lake, Spalding, PE12 6BL.

The Environment Agency responded to the SHDC on 6th January 2017 (Reference No AN/2016/124888/01-L01) objecting to the planning application for the following reason:

> **Reasons**
> The application site lies within Flood Zone 3 defined by the NPPF as having a high probability of flooding. Table 3 of the Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF) clearly states that development classified as 'highly vulnerable' (which includes caravans intended for permanent residential use) **should not be permitted** in areas of Flood Zone 3. The resulting development, if approved, would therefore be contrary to the NPPF.

However on the 13th February 2017 the Environment Agency made the following response to SHDC.

> I refer to our previous response AN/2016/124888/01-L01, dated 06 January 2017 where we related our objection to this application as the proposed development falls into a flood risk vulnerability category that is inappropriate to the Flood Zone in which the application site is located. Furthermore, we also objected to this application as the supporting FRA failed to show how the development complied with the National Planning Policy Framework (NPPF) by demonstrating that it was 'safe' over its lifetime.
>
> In an email to us on the 13 February 2017 you advised that you intend to present this application to the Planning Committee on 01 March 2017 with a favourable recommendation. We understand that the above application constitutes improvements to an existing site and that there is betterment proposed by the reduction in the number of pitches from 20 to 12. We are also mindful of Government Policy introduced in respect of Gypsey and Traveller sites (DCLG, August 2015) and the impact this has on the application submitted. In this instance, if your Authority is minded to approve the application we would not wish to pursue our first objection even though it is contrary to Government Policy on flood risk.

A planning application (reference no H16-0030-17) was submitted to South Holland District Council for the Siting of a Mobile Home (retrospective) at Akita Place, Clay Lake, Spalding, PE12 6BL.

The Environment Agency responded to the SHDC on 6th January 2017 (Reference No AN/2016/124888/01-L01) objecting to the planning application in a similar way to the previous application for the following reason:

> **Reasons**
> The application site lies within Flood Zone 3 defined by the NPPF as having a high probability of flooding. Table 3 of the Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF) clearly states that development classified as 'highly vulnerable' (which includes mobile homes intended for permanent residential use) **should not be permitted** in areas of Flood Zone 3. The resulting development, if approved, would therefore be contrary to the NPPF.

APPENDIX B CLIMATE CHANGE

The Environment Agency has issued revised guidance on climate change and have now stated that the new predictions should be considered and incorporated into all flood risk assessments produced after 19th February 2016.

Listed below are the climate change allowances in three documents:

- South Holland SFRA
- EA guidance (2013)
- Revised EA guidance

The recommendations in each document are shown below.

2010 South Holland DC SFRA

The SHDC SFRA states that the the following allowances have been made for climate change:

4.4 Climate Change

Scenarios for the years 2055 and 2115 include for climate change contingency allowances to the amount suggested by PPS25[1]. These allowances are expressed in *Table 2*. Percentage increases are relative to the present-day.

Table 2 – Adopted Climate change contingency allowances

Parameter	Year 2055	Year 2115
Sea level rise (m)	+ 0.33	+ 1.14
Extreme wave height	+ 10%	+ 10%
Peak river flow and volume	+ 20%	+ 20%
Peak rainfall intensity	+ 20%	+30%

Where flows arise from pumping rather than natural run-off, notably in the Vernatt's Drain and for the Fenland subcatchments of the South Forty Foot Drain, peak flow rates for future eras have been taken as equal to current rates since this SFRA assumes all flood risk management measures will remain in their current state.

2013 Guidance to Planners

Guidance to planners was issued by EA in September 2013

Table 1: Recommended contingency allowances for net sea level rises (Net sea level rise (mm per year) relative to 1990)

	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, east midlands, London, south-east England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South-west England	3.5	8.0	11.5	14.5
North-west England, north-east England (north of Flamborough Head)	2.5	7.0	10.0	13.0

document is out of date

Table 2: Recommended national precautionary sensitivity ranges for peak rainfall intensity, peak river flow, offshore wind speed and wave height

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

s been withdrawn (19

Revised 2016 EA Guidance

Table 1 peak river flow allowances by river basin district (use 1961 to 1990 baseline)

River basin district	Allowance category	Total potential change anticipated for '2020s' (2015 to 39)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

For more vulnerable development in flood zone 3(a) the higher central and upper end should be used to assess the range of allowances.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 3 sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

Area of England	1990 to 2025	2026 to 2050	2051 to 2080	2081 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 (140 mm)	8.5 (212.5 mm)	12 (360 mm)	15 (525 mm)	1.24 m

Table 4 offshore wind speed and extreme wave height allowance (use 1990 baseline)

Applies around all the English coast	1990 to 2050	2051 to 2115
Offshore wind speed allowance	+5%	+10%
Offshore wind speed sensitivity test	+10%	+10%
Extreme wave height allowance	+5%	+10%
Extreme wave height sensitivity test	+10%	+10%

Effects on Predictions of Flood Risk in FRA

Fluvial Flooding from the Coronation Channel or the River Welland

As the development is in flood zone 3 and is classed as more vulnerable, the upper end climate change allowance, which is 35%, should first be considered. After considering the effects of this increase the upper end allowance, which is 65%, should be considered to assess the effect of this.

The EA have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. The SHDC SFRA also has used this figure of 20%. The increase to 35% will not significantly change the conclusion in the SFRA of what might happen if a breach occurred in the bank of the River Welland. If there are additional flows along this part of the River Welland and the Coronation Channel it will lead to the storage systems of the Cowbit and Crowland Washes operating and additional overtopping over lower banks rather than any significant increase in levels in the river.

The upper end allowance predicting a 65% increase in flows above the 1 in 100 year predicted flows now needs to be considered. The River Welland is an embanked

watercourse between Spalding and Market Deeping. There are flood reservoirs on the east side of the River called the Cowbit and the Crowland Washes. Excess water would flow into these Washes through two large syphons. In this scenario the Washes would fill up and also water would be flooding over lower banks of the River. The increases in rainfall leading to this would also lead to significant flooding in the upper part of the River Welland Catchment. It is unlikely that there will be any significant increase in the water level in the River. Therefore the consequence will not be significantly different to the maps produced in the SFRA.

Effect on IDB Systems

South Holland IDB, and all IDB's, are aware that climate change will affect the operations of pumping stations, sluices and drainage channels. Pumping stations and sluices only have a 30 year life and will need to be refurbished or rebuilt within this timespan. It is assumed that South Holland IDB will continue to review the modelling they have already carried out and when the Board consider these refurbishments adequate arrangements will be made to incorporate the latest climate change projections in order that Board continues to provide the same standard of service as the present day.

Therefore it is considered that the mitigation proposed for the development, with the recommendation that the floor level of the proposed building should be a minimum level of 3.70m OD is satisfactory.