PROPOSED CONVERSION OF HOUSE AT 37, SPRING GARDENS, SPALDING, PE11 2XL INTO TWO FLATS

FLOOD RISK ASSESSMENT

View of site

S M Hemmings B Sc C Eng MICE MIWEM,
13 Lea Gardens,
Peterborough,
PE3 6BY.

Tel: 01733 566966 or 07804 189365
stuart.hemmings@btinternet.com

This flood risk assessment has been prepared solely to support the planning application for the proposed conversion at 37, Spring Gardens, 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

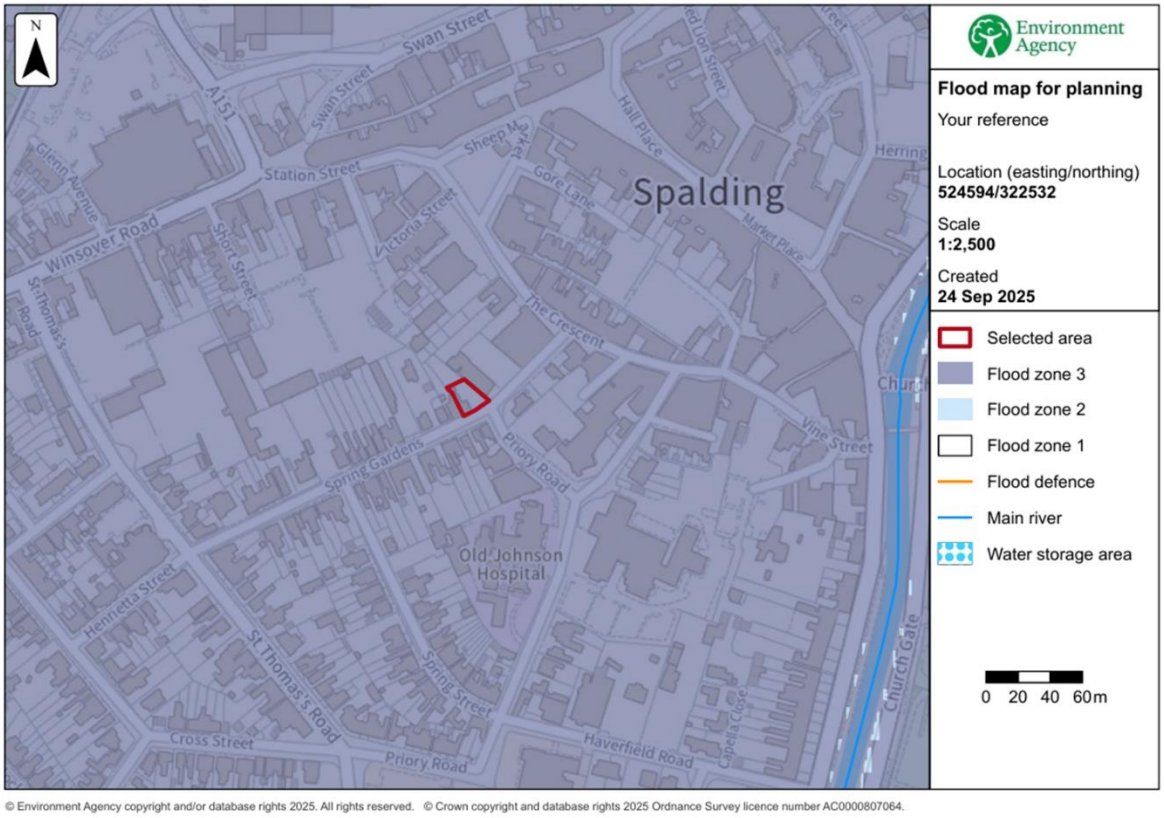
A planning application is due to be submitted to South Holland District Council for permission to convert the existing house at 37 Spring Gardens, Spalding, PE11 2DX into two flats.

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 requires a Flood Risk Assessment to be carried out as specified in the Practice Guidance to the National Planning Policy Framework Development and Flood Risk. 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.

Environment Agency (EA) Flood Zones

The map below is taken from the Environment Agency website and shows the flood zones in the area.



It can be seen that the whole of the central area of Spalding is in Flood Zone 3.

Application Site

The development is located on the western side of the River Welland. The National Grid Reference of the site is 524595 322530.

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

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

Applying the flood risk vulnerability classification in Table 2 of the Guidance, the development of residential properties is classified as “more vulnerable”.

Table 3 of the Guidance is shown below:

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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

From the above table it can be seen that “More Vulnerable” development is only satisfactory within flood zone 3 if the sequential and exception test is passed.

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 central Spalding is in Flood Zone 3. Therefore it would be difficult to find a similar site for this type of development that is in a lower flood zone.

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 Strategic Flood Risk Assessment (SFRA) written for the South Holland District Council (SHDC) in 2010 provides details of the actual flood risk in the Council's area. This information has not been updated and reference to the maps in this document give the following information for the actual flood risk and hazard at the site for the 1% fluvial event and 0.5% tidal event.

For the present day	Depth of flooding … zero
	Extent of flooding .. Low or medium flood probability
	Peak Velocity ……. zero
For year 2115	Depth of flooding … zero
	Extent of flooding…. Low or medium flood probability
	Peak Velocity …… zero

The maps showing the residual flood hazards 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:

For the present day	Depth of flooding …zero
	Extent of flooding .. Low or medium flood probability
	Hazard rating…… None

Peak Velocity .. zero

For the year 2115 Depth of flooding … zero

Extent of flooding .. Low or medium flood probability

Hazard rating…… None

Peak velocity ……. zero

The hazards for the 0.1% tidal and fluvial event probability are as follows:

For the year 2115 Depth of flooding … zero

Extent of flooding .. Low or medium flood probability

Hazard rating…… None

Peak velocity ……. zero

Figure 16 of the general maps show that the site is not within the rapid inundation zone for the present day or 2115.

1. **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 is 5.20m OD

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

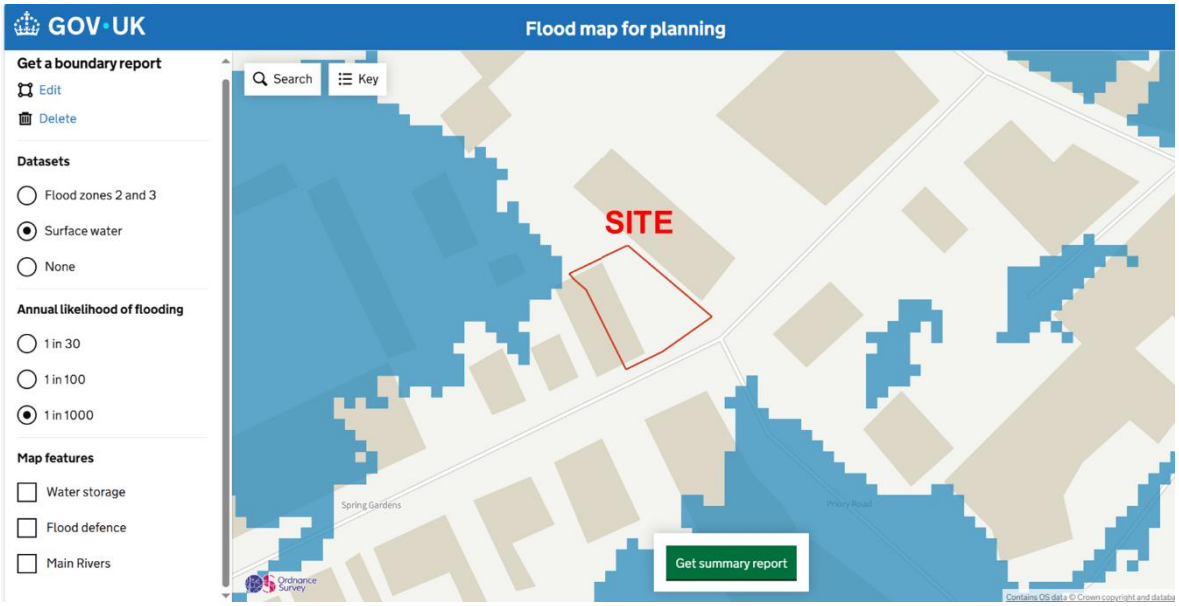
	2007	2055	2115
1 in 100 year	5.98	6.31	7.12
1 in 1,000 year	6.32	6.65	7.46

.

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.

<u>Information on Surface Water Flooding on Environment Agency Website</u>

The map on the next page shows the annual likelihood of surface water flooding in this area of Spalding in a 1 in 1000 year event.



It can be seen there is no predicted risk of surface water flooding to the site in a 1 in 1000 year event.

Site Levels

The level of the road at the junction of Spring Gardens and Priory Road is 4.00m OD. This is approximately 5 metres from the site. The site is at approximately the same level. The floor level is approximately 50mm above the level of the pavement on the north side of Spring Gardens.

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 280 metres west the fluvial section of the River Welland, which is main river and maintained by the Environment Agency.

The site is approximately 2.1 km south the tidal section of the River Welland, which is main river and maintained by the Environment Agency.

This area west of the River Welland is drained by surface water sewers maintained by Anglian Water, which discharge either into the River Welland or 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 which also is operated by Welland and Deepings IDB.

Potential Sources of Flooding

The following sources of flooding will be considered:

1. Failure or overtopping of the tidal defences.

2. Overtopping of the River Welland.
3. From IDB watercourses
4. Surface water flooding

1. Failure or overtopping of tidal defences.

The River Welland is tidal north of Fulney Lock, which is approximately 2.1km north 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 would be overtopped with a 0.5% probability event. However if overtopping or a breach were to occur water would flow westwards from the tidal Welland and lower land to the west of the River Welland would be flooded. The central area of Spalding would remain unaffected, even if a tide of extreme proportions occurred.

It is reasonable to presume that within the next one hundred years works would be undertaken on this section of the bank to ensure that there will be a 1 in 200 year standard of defence continuing into the future, especially considering the value of the industrial and residential properties protected by these defences.

Therefore the flood risk from this source can be considered to be adequately mitigated.

2. Overtopping of the River Welland.

Bridge Street on the west side of the River Welland is at a level of 5.20m O.D. There is no raised bank at this location. The predicted level in the fluvial River Welland east of the site in a 1 in 1000 year event in 2115 is 4.68m OD. If this level increases siphons are activated to spill water onto Cowbit and Crowland Washes. Also water will begin to flood over lower banks around Crowland. Therefore, the risk of flooding from this source reaching the area around Spring Gardens is extremely low.

Therefore the flood risk from this source can be considered to be adequately mitigated.

3. Flooding from IDB watercourses

The nearest IDB drainage channel in this area of Spalding is the Towns Drain, which is located north of Regents Street. All of this drain is piped and flows under South Parade and flows into the open channel called Railway Delph, which flows south. This discharges into Hills Drain which flows into the South Drove Drain. Maximum predicted water levels in the IDB catchment controlled by Pode Hole Pumping Station in a 1 in 100 year event in 2115 are below 1.00m OD.

The highest predicted water levels in IDB drainage channels in the area are in Vernatts Drain which are 3.79m OD. As the existing ground level of the site is approximately 4.00m OD the risk of flooding can be considered extremely low.

Therefore the flood risk from IDB watercourses can be considered to be adequately mitigated.

4. Surface Water Flooding

The road and path level in this part of Spalding is 4.00m OD, and the existing ground floor level of the house is 50mm above this level.

Therefore the flood risk from surface water flooding can be considered to be adequately mitigated.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of any flooding having occurred in this area of Spalding, during the last forty years.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low.

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.

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.

The flood zones were designated a number of years ago by the EA when little modelling had been carried out. Since then much work has been carried out by the EA which gives much better predictions of flood levels. If the designations were revisited this area would be designated in flood zone 1.

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 the FRA. The effects of these new recommendations are considered in Appendix A of this report (pages 13 to 16). It is concluded that no extra mitigation measures are necessary to comply with the new guidance on climate change.

South East Lincs Advice Matrix

Advice can be found on the recommended mitigation required by referring to a spreadsheet on the South East Lincolnshire website. As all of the development is in flood zone 3 and there is no flood hazard reference should be made to Category G8 which shows that the advice in the matrix for this category is “No Comment”.

Summary of Risk of Flooding to the Site

The extract from the map in the SFRA (shown below) showing the predicted residual peak depth in 2115 for the 0.1% (1 in 1000 year) event probability in 2115 shows the extent of the flooding in this area.

The map also shows that there is no predicted flooding in this area of Spalding in the above scenario.

The finished floor level of the existing ground floor of the building is 4.05m OD. Even in an extreme tidal event with multiple breaches occurring in the west bank of the tidal Welland it is difficult to foresee flooding occurring at this location, as lower land to the north would flood in preference to the higher central area of Spalding. Flood water would flow westwards through lower land rather than causing flooding in the Spring Gardens area.

Conclusions

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 risk of the site flooding from any Environment Agency watercourse is extremely low.

The SFRA indicates that no actual or residual flooding is predicted to the area for the 0.1% event possibility in 2015, as shown on the map reproduced above taken from the SHDC SFRA.

There is no predicted risk of flooding from IDB watercourses.

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 should be designed and constructed with flood resilient measures incorporated. These measures will include;

- All electrical services should be placed at first floor level and cables dropped down to the sockets, which should be a minimum of 600mm above the floor level.
- Skirting boards and plaster finishes should be able to withstand flood damage if 600mm of water entered the building and remained for a few days.
- Suitable tiles should be used as flooring in the new extension.

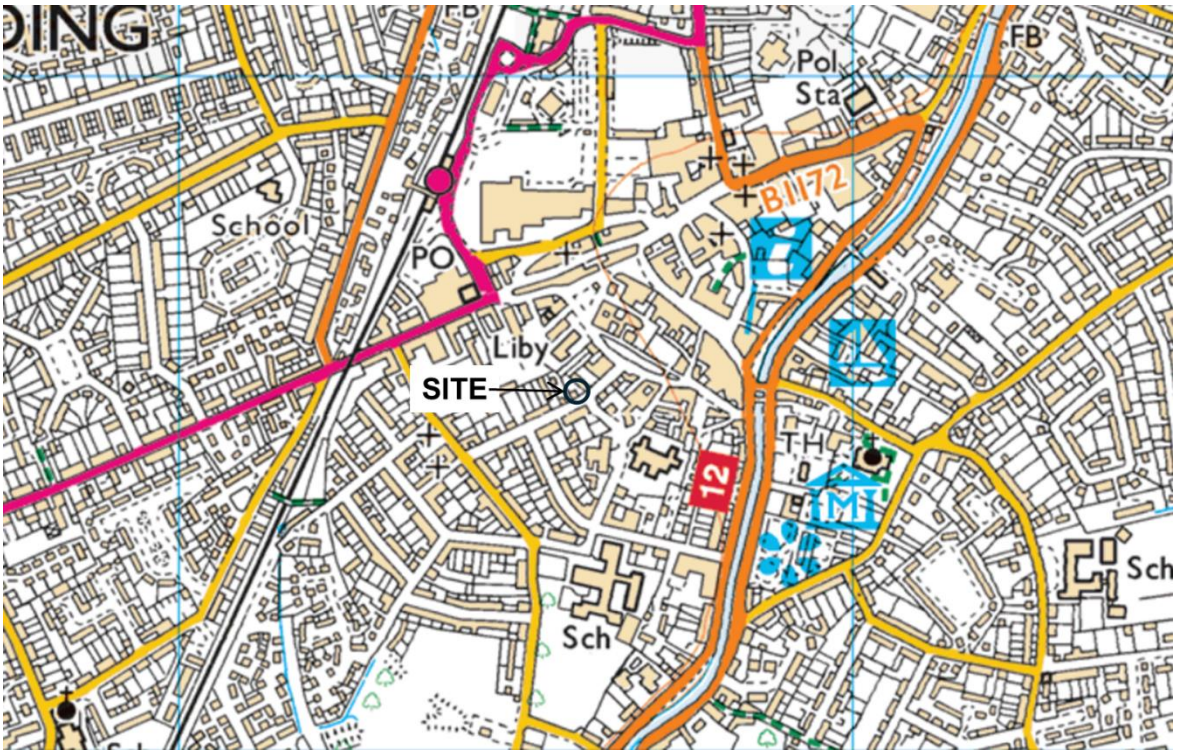
The owners of the building should ensure that tenants of the flats register with the Environment Agency's Floodline Warnings Direct Service.

S M HEMMINGS B Sc C Eng MICE MIWEM

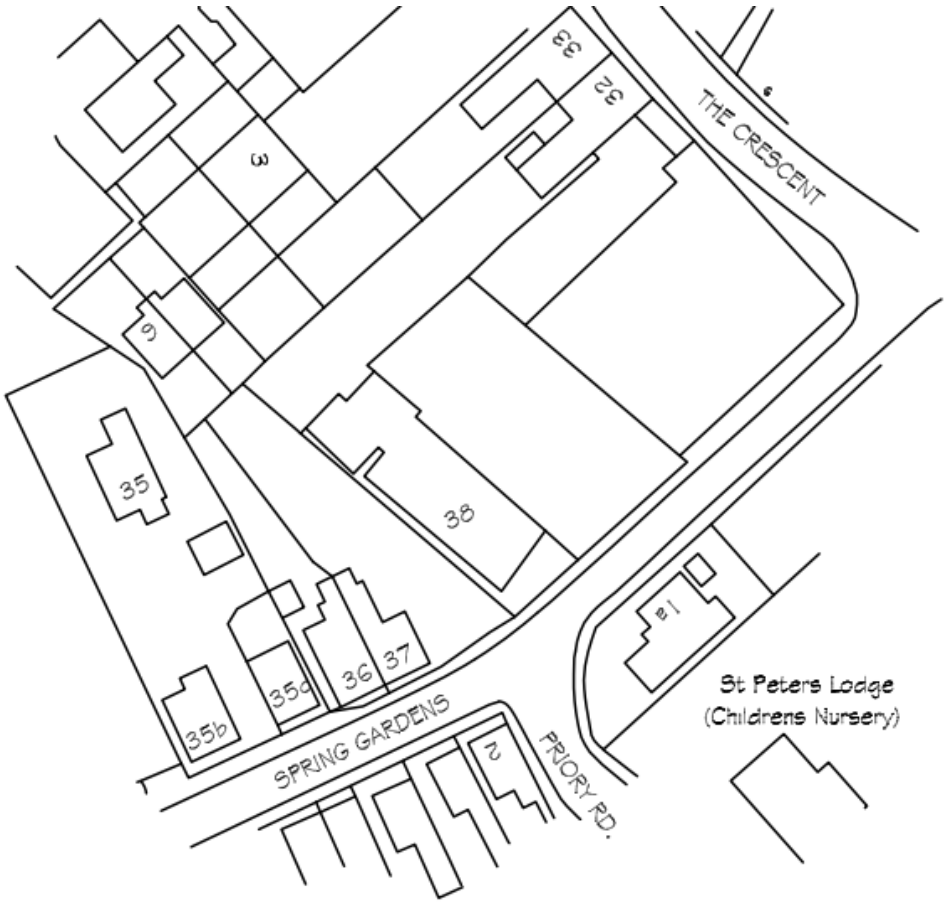
stuart.hemmings@btinternet.com

16th October 2025

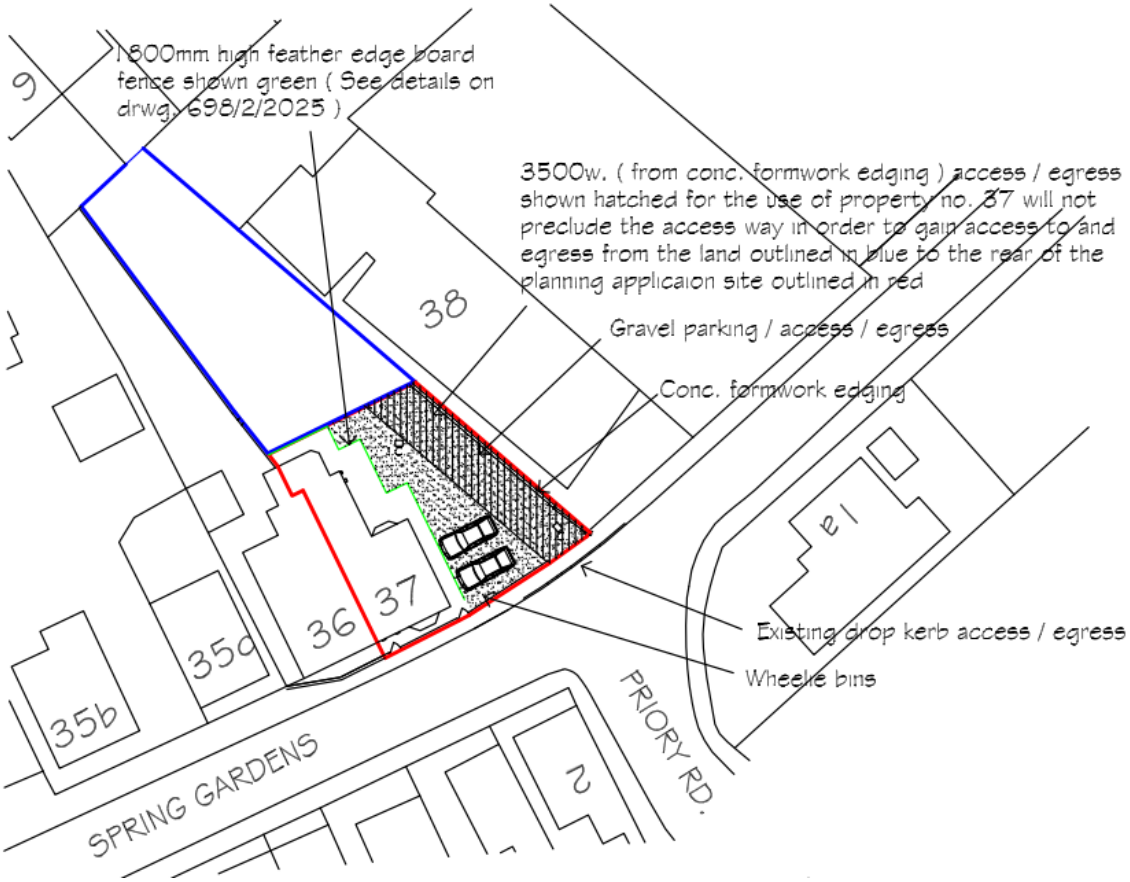
LOCATION PLAN



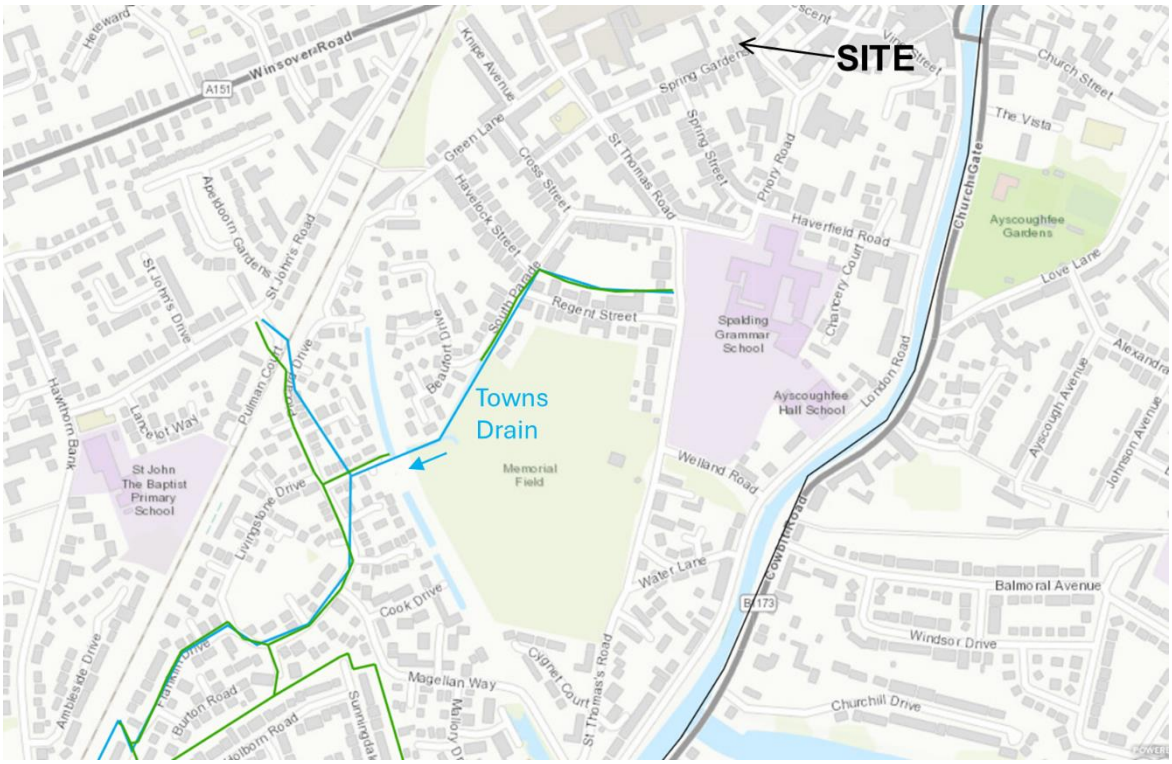
SITE LOCATION PLAN



PROPOSED BLOCK PLAN



IDB WATERCOURSES



APPENDIX A 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

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%	

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

The FRA has identified that there is a possibility of flooding from both tidal and fluvial sources where the new climate change recommendations could affect the predictions of flood levels in 2115.

Tidal Flooding.

The contingency allowance in metres for the years 2055 and 2115 using 1990 as a baseline in the SFRA compared with the guidelines is as follows

Year	SFRA	2013 guidance	Revised 2016 guidance
2055	0.33	0.395	0.412
2115	1.14	1.205	1.24

The updated SFRA does not predict any residual flooding on any part of the site in a 1 in 1000 year event in 2115. The lowest land level on the site is approximately 5.20m OD.

The increase of 100mm in maximum levels in the tidal River Welland will not have the effect of causing flooding to the site.

Fluvial Flooding.

As the development is in flood zone 3 and is classed as more vulnerable, the advice from the Environment Agency is that the higher central climate change allowance, which is 35%, should 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.

Maximum flood levels in the fluvial section of the River Welland will not be raised by the increase in flows projected in the new climate change allowances. If flows increase by 65% in the river it will have the effect of flooding over the long sections of bank between Spalding and Market Deeping and the maximum levels will not increase significantly.

IDB's have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. Generally IDB's are happy that their systems provide a 1 in 100 year standard to most urban areas at the present time.

Welland and Deepings 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 Welland and Deepings 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 the 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 ground floor should be designed and constructed with flood resilient measures incorporated, is satisfactory.