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From: Remway Design - Jason Wilson <jason@remwaydesign.co.uk>
Sent: 05 February 2015 10:02
To: _planningadvice
Subject: H16-0029-15 Windsor Drive, Spalding
Attachments: 2506 Planning FRA.pdf

Please find attached FRA to accompany application

Many thanks,

Best Regards,

Jason Wilson

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**PROPOSED DWELLING ADJACENT TO 36 WINDSOR DRIVE,
SPALDING, PE11 2RP**

FLOOD RISK ASSESSMENT



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This flood risk assessment has been prepared solely to support the planning application for the proposed new dwelling adjacent to 36 Windsor Drive 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

This Flood Risk Assessment (FRA) is written to support a planning application for the construction of a new dwelling immediately east of 36 Windsor Drive, Spalding. The proposed building plot is at present used as a garden area alongside the existing bungalow.

The site is within Flood Zone 3(a) as high probability having a 1 in 200 year or greater annual probability of tidal flooding from the River Welland, as shown on the Environment Agency's (EA) 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 required in the Technical Guidance to the National Planning Policy Framework (NPPF) Development and Flood Risk. The site is within a defended area as specified on the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA) map and is located in the South Holland Internal Drainage Board District.

Application Site

The site is located approximately 1 km south of the centre of Spalding. It is 400 metres east of the River Welland and 140 metres north of the north bank of the Coronation Channel. The National Grid Reference of the site is 524980 321810, and the extent 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 to the National Planning Policy Framework. Applying the flood risk vulnerability classification in Table 2 of the Guidance the development is classified as "more vulnerable" and the Table 3 states that the development of a new dwelling requires the sequential and exception test to be considered.

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 for this type of development. This site may be considered as a windfall site and there may be some others available in Spalding. However they are unlikely to have a lower flood risk than the site proposed, as the whole of this area is within Flood Zone 3(a), is at a similar level and therefore will have the same flood risk.

Exception Test

For the Exception Test to be passed:

- a) It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA;
- b) The development should be on developable previously developed land or, if not, it must be demonstrated there is no such alternative land available; and
- c) A FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall.

All three 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.

Section (a) and (b) will be demonstrated by the supporting planning statement.

This flood risk assessment will demonstrate that Section (c) is passed.

Strategic Flood Risk Assessment

The following information about the flood risk at the location of 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 for the present day 1% fluvial and 0.5% tidal event probability.
- Map 6 indicates the peak depth is zero for the present day 1% / 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 low but reliant upon protection by flood defences.
- Map 12 indicates the actual risk extent for the year 2055 for the 1% fluvial / 0.5% tidal event probability is high.
- Map 13 indicates the site is within the high probability band for the year 2115 for the 1% fluvial / 0.5% tidal event probability.
- Map 14 indicates the actual risk extent for the year 2115 for the 0.1% event probability is low, and indicates that any flooding which may occur would commence approximately half hour after the defences began to overtop or after the start of a breach.
- Map 16 indicates the site is within the 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 ... 1.0 – 1.5 metres Extent of flooding ... High commences half hour from start of flooding Hazard ... Significant Velocity ... 0 - 0.1 metres/second

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

For the present day	Depth of flooding ... Greater than 1.5 metres Extent of flooding .. Medium to High probability Hazard ... Significant Velocity .. 0 to 0.1m / sec
For the year 2115	Depth of flooding ... Greater than 1.5 metres Extent of flooding .. Medium/High probability Hazard ... Extreme Velocity .. 0 to 0.1m / sec

3. Maximum flood levels:

Maximum fluvial flood levels in the River Welland and the Coronation Channel are shown in the reports as follows:

	Present	Present + Climate Change
1 in 100 year	4.32	4.69
1 in 1,000 year	4.34	4.69

The lowest level of the left bank of the Coronation Channel stated in the SFRA for this section range from 5.49m OD to 6.0m OD.

The levels of the right bank of the Spalding Welland adjacent to the site stated in the SFRA are between 5.50m OD and 5.80m OD along this section of river north of Cowbit Road Sluice. The lowest levels of the right bank of the Welland through Spalding itself stated in the SFRA are approximately 5.00m OD.

4. Extreme tide levels

The extreme tide levels in the tidal section of the Coronation Channel and River Welland between Fulney Lock and Marsh Road Sluice are shown in the report as follows:

	2007	2055	2115
1 in 200 year	5.98	6.31	7.12
1 in 1,000 year	6.32	6.65	7.46

The lowest bank level indicated in the SFRA on the left bank of the Coronation Channel is 6.88m OD and the lowest bank level on the right bank of the tidal River Welland is 7.57m OD.

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 400 metres from the River Welland, which is the main river and maintained by the Environment Agency.

The site is approximately 140 metres north of the bank of the Coronation Channel.

The site is 2.5km south of the tidal defences of the River Welland and Coronation Channel.

The area between the River Welland and the Coronation Channel is drained by surface water sewers maintained by Anglian Water, which discharge either into the River Welland or into drainage channels maintained by South Holland Internal Drainage Board. The water levels in the IDB channels are controlled by Clay Lake Pumping Station, which is operated by South Holland IDB, and discharges into the Coronation channel.

Existing Ground Levels and Proposed Levels of Buildings

The existing ground level of the site is between 2.60m OD and 2.70m OD and the ground floor level of No 36 Windsor Drive is approximately 2.86m OD. The client has stated that due to other planning issues the maximum level for the ground floor level of the proposed building should be 3.20m OD, which is approximately 500mm above the ground level of the plot.

Potential Sources of Flooding

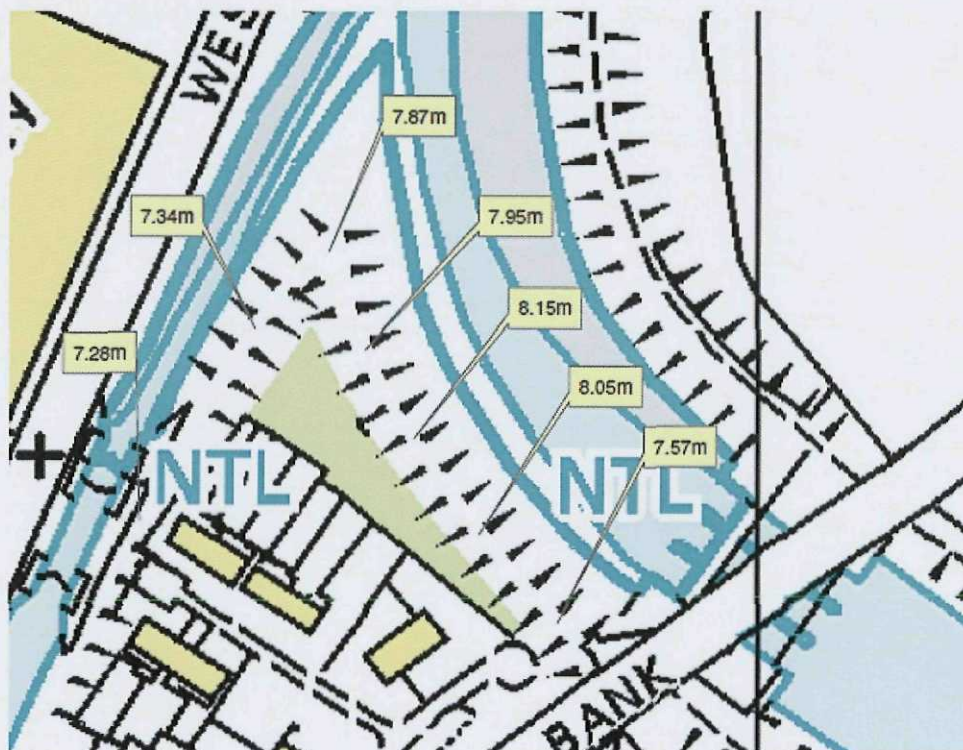
The following sources of flooding have been identified:

1. Failure or overtopping of the tidal defences.
2. Overtopping of the River Welland.
3. Overtopping or breaching of the Coronation Channel.
4. Failures of Clay Lake Pumping Station (IDB)
5. Blockages in Exeter Drain (IDB)
6. Blockages in local surface water sewers (highway or Anglian Water)

1. Failure or overtopping of tidal defences.

There is a short length of tidal defences on the Coronation Channel west of Marsh Road Sluice and on the River Welland north of Fulney Lock that defends the area between the River Welland and the Coronation Channel from tidal flooding. The SFRA states that the defences are adequate to withstand a 1 in 200 year (0.5%) probability event for present day and in the future in 2115 some of the banks would be overtopped with a 0.5% probability event.

Crest levels of this bank have been surveyed and these are shown below. These levels range from 7.28m OD near Fulney Lock to above 8.00m OD on the main section of bank. The low level of 6.88m OD mentioned in the SFRA was not found. All the surveyed levels are higher than the 1 in 200 year extreme tide level of 7.12m OD stated in the SFRA.



These banks are well maintained and have a top width of at least 4.0 metres, and it is reasonable to assume that during the next one hundred years, considering the assets that are protected by this bank, further maintenance and capital works will be carried out on the tidal banks to ensure a continuing minimum defence standard of 1 in 200 years.

If a breach occurred in the tidal bank during a 1 in 200 year event in the year 2115 flood water would flow southwards and start to flood the whole area between the Coronation Channel and the River Welland. The proposed development is approximately 2.5km south of these defences. The hazards of this will be considered later in the report.

2. Overtopping of the River Welland.

The west bank of the River Welland is at a minimum level of 5.5m O.D. east of the development site. The highest predicted fluvial level for a 1 in 1000 year event in the fluvial River Welland in 2115 is 4.69m OD. Further north the banks have a minimum level of 5.20m OD and the land levels then gradually fall away eastwards.

The banks on this length are at least 15 metres wide with a road and footpaths parallel to the river. Therefore it almost impossible for a breach to occur in this section of the bank of the river and flood the site from this source.

3. Overtopping or Breaching of the Coronation Channel

The area between the River Welland and the Coronation Channel is protected from flooding by banks on the north and west side of the channel, which are approximately 2.0m to 3.0m above the land. The nearest section of bank is 140 metres south of the development site. The top level of these banks is approximately 5.4m OD, which gives a freeboard of at least 700 mm above the 1 in 1,000 year maximum design level in the channel.

If a breach occurred in the channel the maximum water level in the flooded area could reach between 4.0 m and 4.1 m OD for the present day situation and between 4.3m and 4.4 m OD if climate change is allowed for. With a proposed floor level of 3.20m OD if a breach occurred the depth of flooding would be between 800mm and 900mm at present and between 1100mm and 1200mm if climate change is allowed for.

4. Failure of Clay Lake Pumping Station

The South Holland IDB estimate that the Clay Lake Pumping Station provides a 1 in 50 year standard with a freeboard, which in effect provides a 1 in 100 year protection against flooding. The pumping station is maintained in good condition and should a failure occur the Drainage Board would quickly deploy temporary pumps to alleviate the situation. It is highly unlikely that any flooding from this source would extend as far as this part of Windsor Drive, as the flood water would need to rise above 2.75m

OD, which is higher than the ground levels around the pumping station itself which would flood first.

Therefore the risk of flooding from this source is low.

5. Blockages in Exeter Drain

The South Holland IDB has a regular annual maintenance programme and they remove weed growth from channels such as these twice each year. However, any flooding from this channel will not cause any flooding to the development site, as explained in (4) above.

Therefore flooding from this source can be discounted.

6. Blockages in local surface water sewers

Both Anglian Water and the Highways Authority maintain surface water drainage systems in this area. If there is a blockage in an underground pipe surface water would in the first instance cause localised flooding in Windsor Drive. However any flood water would flow eastwards where land levels are lower, which would prevent flooding from this source affecting the property.

Therefore this source can be discounted.

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties having been flooded in the last 50 years.

Probabilities and Trends of Flooding

The probability of this site 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

The SFRA has calculated the consequences arising from a possible breach occurring at any point along the raised defences. Also considered were scenarios in which gates or other assets fail to operate allowing water to flow inland and cause flooding.

If the potential sources of fluvial flooding are considered again, it can be seen that all of the consequences of river flooding and failures in the internal drainage will not lead to the water level rising above 4.70m OD. Therefore the maximum depth of flooding from this source to the property would be 1500mm.

The consequences of a breach of the tidal defences would cause greater flood depths at this location. From the levels taken of the bank it can be seen that the bank will not be overtopped in a 1 in 200 year event in 2115.

If a breach occurred in the tidal bank of the River Welland or the Coronation Channel between Fulney Lock and Marsh Road Sluice flood water would flow into the area between the Coronation Channel and the River Welland. It is possible that the water level could reach 3.20m OD after approximately three hours and start to flood the property. The maximum level the flood water could reach would be 5.20m OD when it would start to flow into the fluvial section of the River Welland. This would flood the property to a depth of nearly 2.0 metres. However the risk of a breach occurring in this short length is extremely low. Breaches are more likely to occur during an event with return period of 1 in 200 years or greater. However a breach could occur in any part of the tidal defences, and this would reduce water levels in the tidal Welland during the event.

Conclusions

The following conclusions can be made:

- The proposed development is not in a functional flood plain as defined by the Guidance.
- Although the site is in flood zone 3, the actual risk of the site flooding from any Environment Agency water course is very low.
- There is no actual risk of flooding at the present time.
- There is a residual risk that the site could flood if a breach occurs in the short length of tidal defences north of the site. Although the risk of a breach occurring is very low, if there was a breach flood levels of approximately 5.20m OD could occur in the area, which would flood the building to a depth of 2.0 metres. However the risk of this happening is extremely low.
- There is a risk of flooding occurring to the property in approximately half hour if the north bank of the Coronation Channel were to breach.
- The risk if breaches occurring in locations that would cause flooding to the property is extremely low, and are considerably less than 0.1% in any year.
- 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.

Recommended Flood Mitigation Measures

- In any area at risk of flooding it is preferable that a proposed building 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, or a breach of the bank of the Coronation Channel, and ensure there is no danger to residents when they are asleep.
- The ground floor level of the proposed building should be raised at least 500mm above the existing ground level of the plot.
- Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service. If a very high tide is predicted (greater

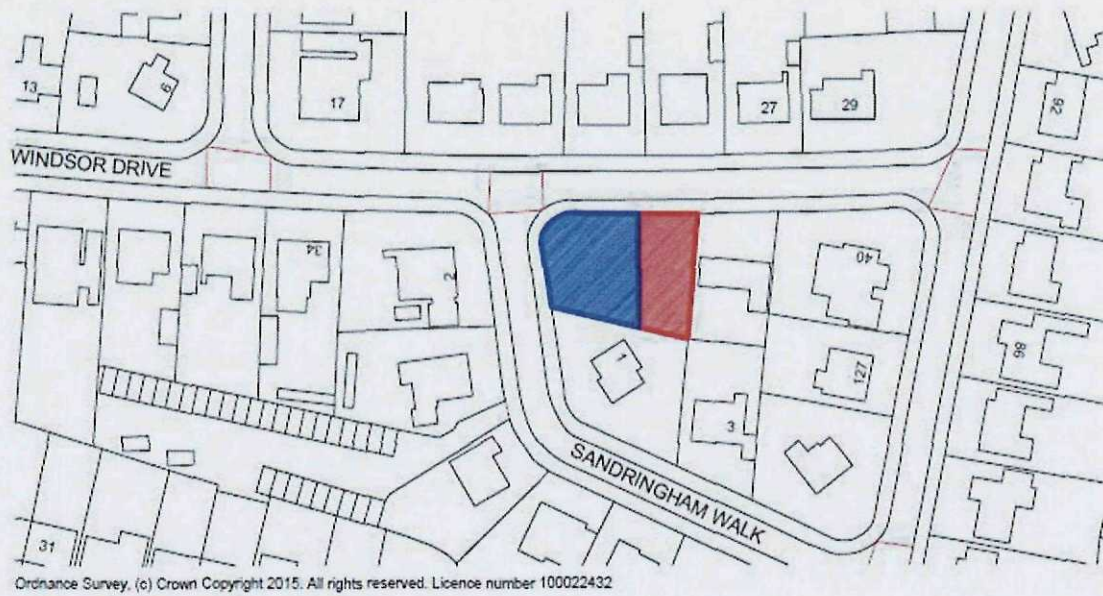
than 6.00m OD) then the occupiers are advised that they should make preparations to monitor the situation and evacuate the building for the duration of the very high tide. They should drive or walk westwards along Windsor Drive and Balmoral Avenue to Cowbit Road and then be advised by the emergency services on a safe place to be accommodated. Further details of these recommendations are detailed in the suggested Flood Warning and Evacuation Plan included as Appendix 2 on pages 13 and 14 of this report.

- The building will need to be designed incorporating flood resistant/resilient techniques to allow it to be refurbished after being flooding to a depth of approximately 2100mm above floor level. Consideration should be given to the electrics and heating pipes being distributed at ceiling level rather than at floor level. Materials used for the floor and walls should be able to withstand flooding for a period of at least a week. Recommendations for this are shown in Appendix 1 on page 13.
- On site surface water drainage should be discharged into soakaways and these should be designed to BRE Digest 365 and approved under Building regulations.
- The developer should finalise and implement the Flood Warning and Evacuation plan which is included on pages 14 and 15 of this report.
- All future owners and occupiers of the building should be given a copy of the Flood risk Assessment and the Flood Warning and Evacuation Plan so that they are fully aware of the risk of flooding in this area.

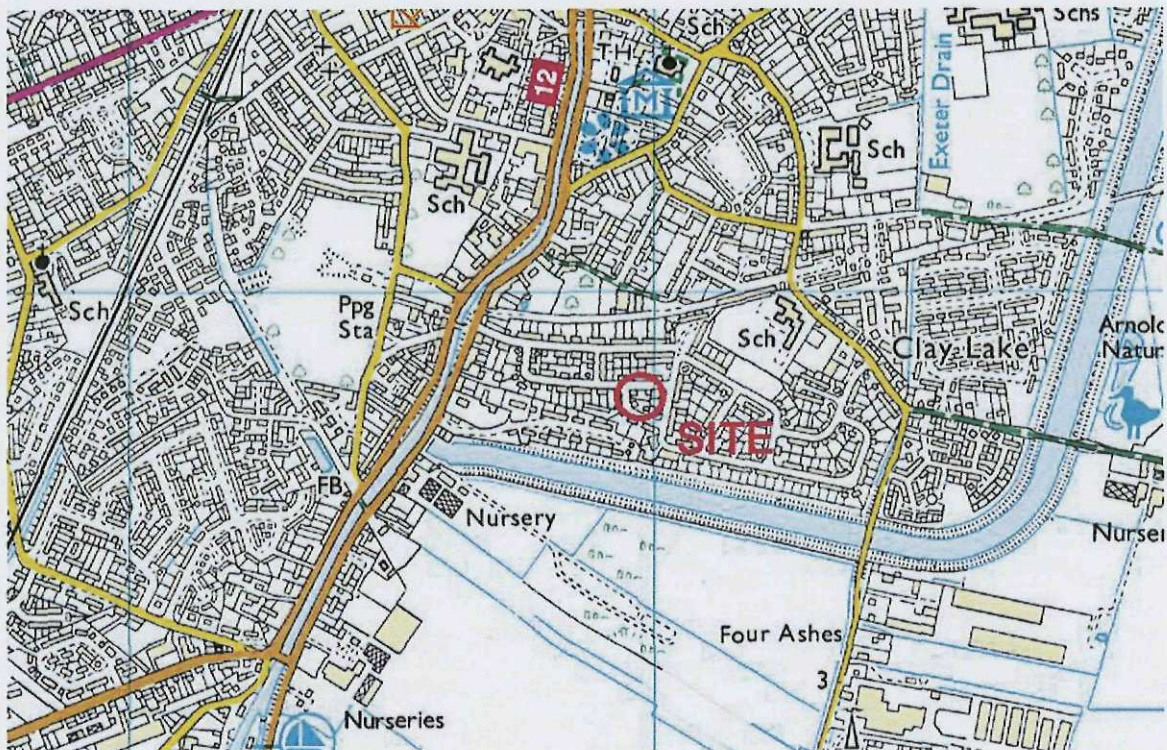
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29th January 2015

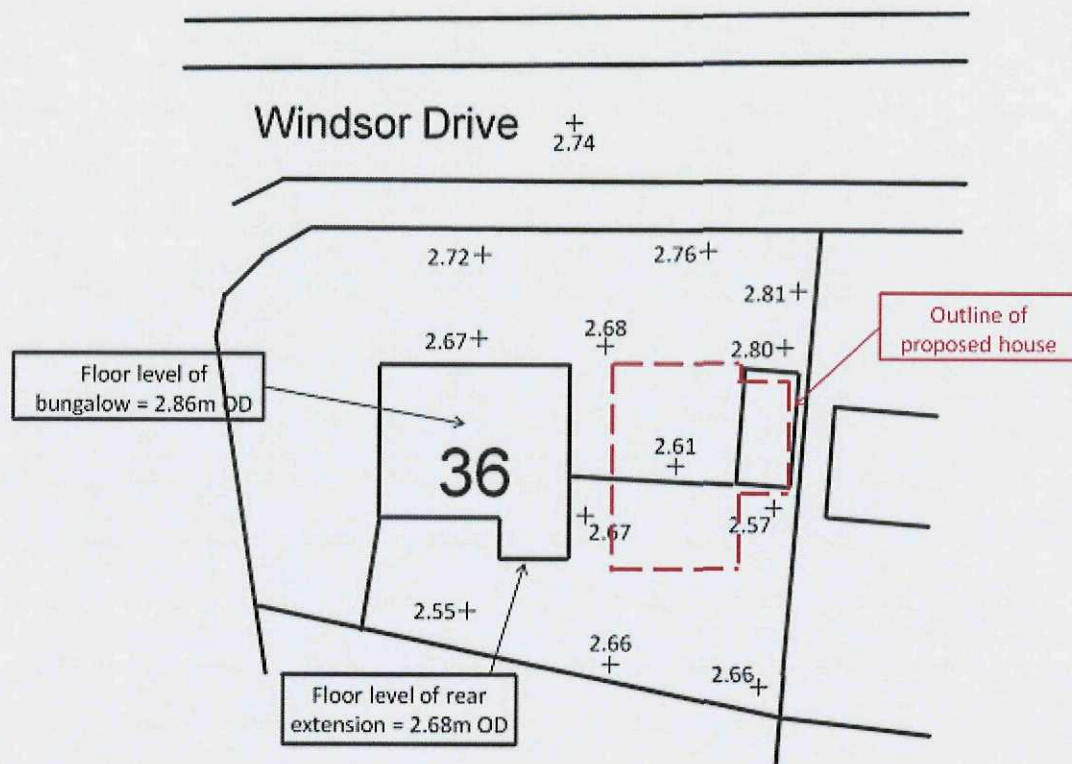
SITE PLAN



LOCATION PLAN



SITE LEVELS



APPENDIX 1

RECOMMENDATIONS ON LIMITING FLOOD DAMAGE TO BUILDING

- Walls:** Construction to first floor level should be carried out with good quality brickwork. Specification for blockwork should be checked and only blockwork that does not absorb water should be used. If possible brickwork should be used instead of blockwork to first floor level. Construction below DPC should be carried out with engineering brickwork.
- Ground Floor:** Either precast concrete beams with concrete infill, or concrete above made up ground should be used. Dense concrete screeds should be used.
- Doors:** Doors should be solid construction, or plastic should be considered. Butt hinges should be fitted to allow doors to be removed and placed in a dry area prior to any flooding.
- Kitchens:** Install plastic base feet and if possible other plastic items to reduce damage from low level flooding. Raise fitted ovens as high as possible.
- Electrical Services:** Place all of electrical wiring at first floor level and drop wiring down to sockets at least 900mm above ground level.

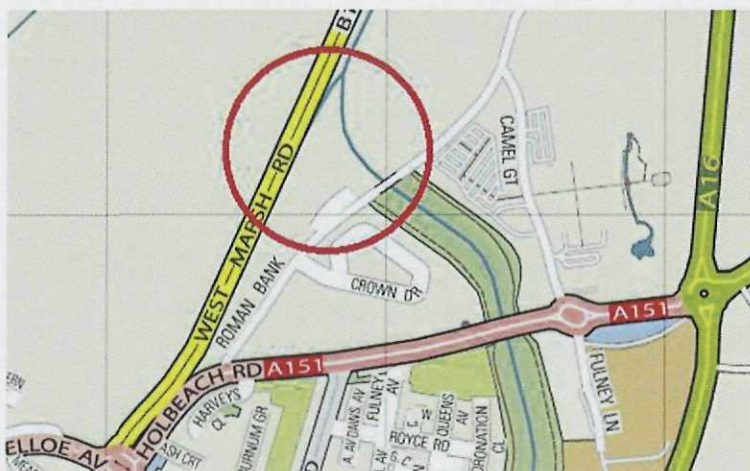
APPENDIX 2

FLOOD WARNING AND EVACUATION PLAN FOR DWELLING

ADJACENT TO 36 WINDSOR DRIVE SPALDING

There is a risk of flooding to the dwelling adjacent to 36 Windsor Drive if either of the following were to happen:-

- 1) If the bank of the Coronation Channel were to be breached flood water would start to reach the proposed house in approximately half an hour and if the bank is not quickly repaired the flood water could reach a depth of 1450mm.
- 2) If the bank of the tidal part of the River Welland or Coronation Channel, which is located near Roman Bank (see map below) were to be breached flood water would flow southwards and could start to reach the proposed house in approximately 2 – 3 hours and if the bank is not quickly repaired the flood water could eventually reach a depth of 2.0m.



The safest course of action is to evacuate the building and leave this area of Spalding if a very high tide is forecast by the Meteorological office and the Environment Agency, or if very high water levels are predicted in the Coronation Channel.

Occupiers of the house should sign up to receive the Environment Agency's (EA) Floodline Warnings Direct Service. This service will telephone them to give them warnings of either FLUVIAL (from the Coronation Channel) or TIDAL flooding (from the River Welland).

Three levels of warning are sent by the EA:

- 1) Flood Alert: This will give between 2 days and 2 hours warning of very high water levels in the area.

2) Flood Warning: This will be given out when there is a greater chance of very high water levels occurring, typically between 1 day and half an hour before these high levels are likely to occur.

3) Severe Flood Warning: When the flooding poses a danger to life.

Residents should have a plan to prepare for this eventuality. A guide to the things they need to include in their plan are detailed on the EA website at:-

<http://www.environment-agency.gov.uk/homeandleisure/floods/38329.aspx>

If these warnings are received then residents should prepare themselves, using their plan that they have devised.

Residents should particularly listen to local radio which will give information on the situation.

High levels in the Tidal part of the River Welland will be caused by very high tides. These will be predicted by the Meteorological Office and the EA and details of the situation will be widely broadcast on radio. If an extreme high tide is predicted then the residents will receive a "Severe Flood Warning" and the residents should evacuate the area until the high tide situation has passed. High levels in the Coronation Channel will occur after a continuing period of very heavy rainfall.

A safe area to evacuate to is to drive or walk westwards along Windsor Drive and Balmoral Avenue to Cowbit Road and then be advised by the emergency services on a safe place to be accommodated. If no other guidance is given by the emergency services then proceed to central Spalding where ground levels are higher than the maximum flood level possible in the area.

If residents remain in the building when flooding begins to occur they should shelter in the refuge on the first floor of the building and not attempt to leave the building until the levels have receded.

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