PROPOSED CONSTRUCTION OF BUILDING ADJACENT TO

2 OSIER ROAD, SPALDING. PE11 1UU

FLOOD RISK ASSESSMENT



Site from Osier Road

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This flood risk assessment has been prepared solely to support the planning application for the proposed development at 2 Osier Road, 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 erect a building on a plot of land south east of 2 Osier Road, Spalding. There is a large shed and garage at present on this plot which will be demolished.

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 required in the Technical 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 South Holland Internal Drainage Board district.

Application Site

The development is located on the eastern side of the River Welland. The National Grid Reference of the site is 525325 323090.

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(a) "High Probability" as detailed on the Environment Agency's flood zone maps without defences, as defined in Table 1 of the Technical Guidance.

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

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.

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Sections (a) and (b) are for the most part demonstrated in the Design and Access Statement, and will be confirmed by the planning authority in their determination of the proposed planning application.

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.
- 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 not start until at least 3 hours after the defences began to overtop or the start of a breach.
- Map 16 indicates the site is not 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 … zero
	Extent of flooding …zero
	Hazard … Nil
	Velocity ... Nil

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

For the present day	Depth of flooding ...Between 0.5m and 1.0m
	Extent of flooding .. High probability
	Hazard … Significant
	Velocity .. 0 to 0.1m / sec
For the year 2115	Depth of flooding ...Approximately 1.5m
	Extent of flooding .. High probability
	Hazard … Significant
	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 is 5.28m OD.

The levels of the right bank of the Spalding Welland adjacent to the site stated in the SFRA are 5.20m OD at 1.1km, 5.84m OD at 1.2km and 5.18m OD at 1.3km. The lowest levels of the right bank of the Welland through Spalding stated in the SFRA are 4.90m OD.

4. Extreme tide levels

The extreme tide levels in the 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

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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.

<u>Existing Flood Alleviation Measures</u>

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

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

The site is approximately 1100 metres 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 approximately 4.0m OD and the ground floor level of No 2 Osier Road is 4.28m OD. The ground levels adjacent to the River are approximately 5.20m OD and fall to the east, and the level further down Osier Road is approximately 3.0m OD. A plan showing these levels is shown on page 12 of this report. It is recommended that the floor level of the new building should be 4.35m OD, which is at least 300mm above the road level outside the property.

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.

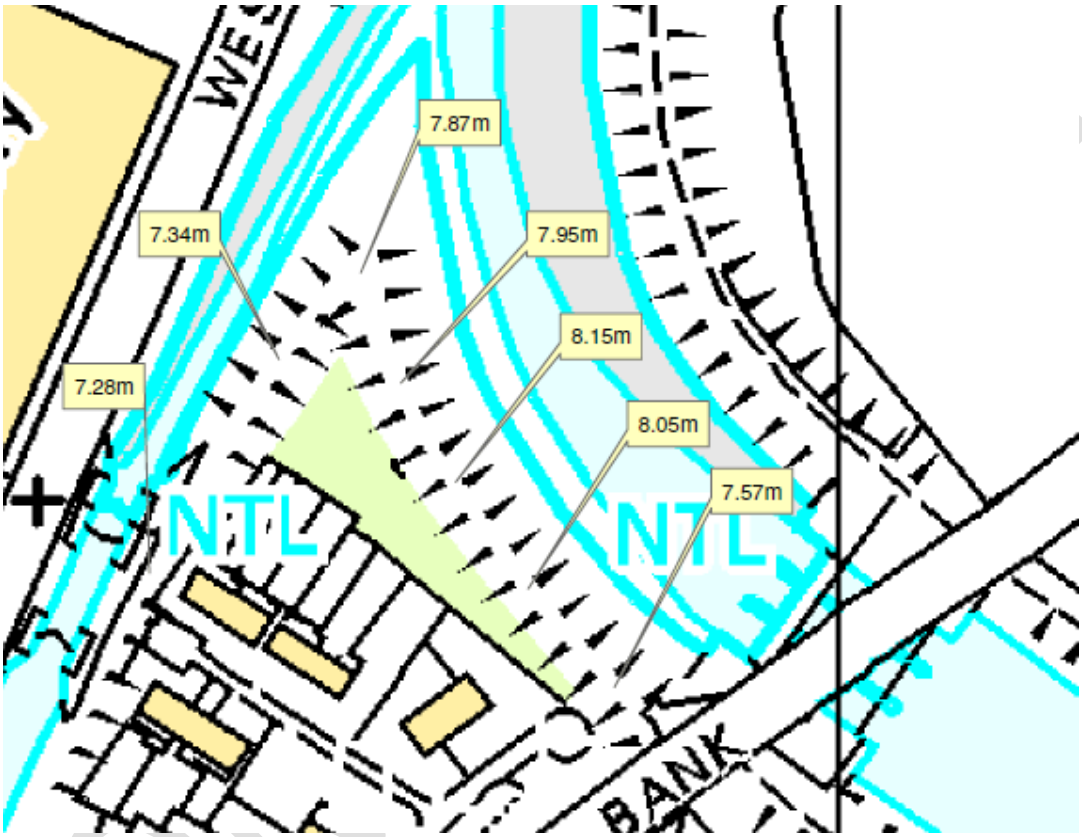
There is a short length of tidal defences on the Coronation Channel west of Marsh Road Sluice and on the River Welland north of Fulney Lock that defends the area between the River Welland and the Coronation Channel from tidal flooding. The SFRA states that the defences are adequate to withstand a 1 in 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

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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 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 an approximate level of 5.2m 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 south the banks have a minimum level of 5.00m 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 west side of the channel, which are approximately 2.0m to 3.0m above the land. 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. As the proposed level of the proposed building is 4.35m OD the risk of flooding from this source is extremely low.

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 Osier Road, as the flood water would need to rise above 4.35m OD, which is higher than the ground levels around the pumping station itself which would flood first.

Therefore flooding from this source can be discounted.

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 Osier Road. However any flood water would flow eastwards to the lower sections of Osier Road, which would prevent flooding from this source affecting the property.

Therefore this source can be discounted.

<u>Extent of known Flooding</u>

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.

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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 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 to the property would be 350mm.

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 4.35m OD after about four 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 850mm. 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 or in 2115.
- 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

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5.20m OD could occur in the area, which would flood the building to a depth of 850mm. However the risk of this happening is extremely low.

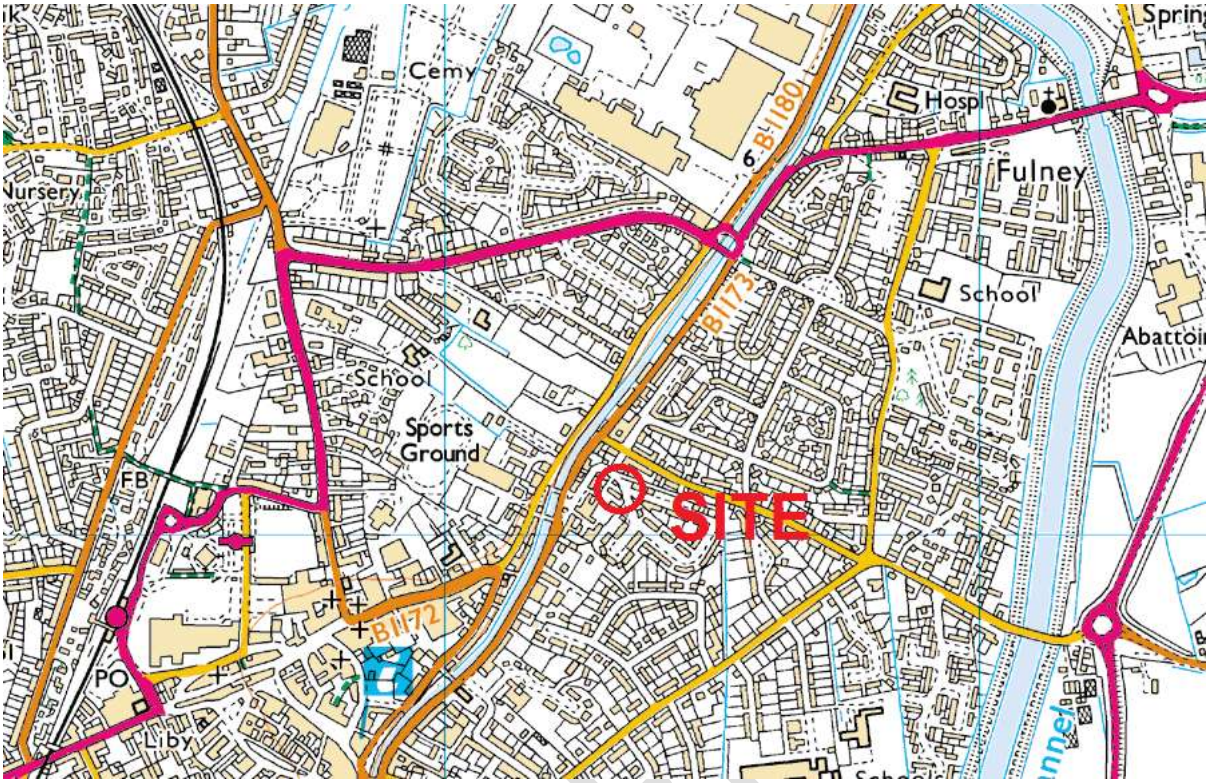
- If a breach in the tidal defences occurs then the whole area between the River Welland and the Coronation Channel is at risk of flooding to a level of approximately 5.20m OD.
- In a flood risk area there is always a risk of an event occurring of greater magnitude than has been considered in this flood risk assessment.

Recommendations

- The 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 and ensure there is no danger to residents when they are asleep.
- If a floor level of 4.35m OD is specified then the building may suffer flooding if a breach of the tidal defences occurs to a depth of 850mm. The flooding could be extensive and cover the whole area between the River Welland and the Coronation Channel, and the area might suffer flooding to a level of 5.00m OD for many days. Therefore if the house is only to be at risk from short term flooding after a breach of the tidal defences during the first tide then the ground floor level should be increased to 5.00m OD.
- Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service. If a very high tide is predicted (greater than 6.50m 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 to the central area of Spalding or be advised of a safer place to go. 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 1000mm 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.
- All future owners and occupiers of the building should be given a copy of the Flood risk Assessment so that they are fully aware of the risk of flooding in this area.

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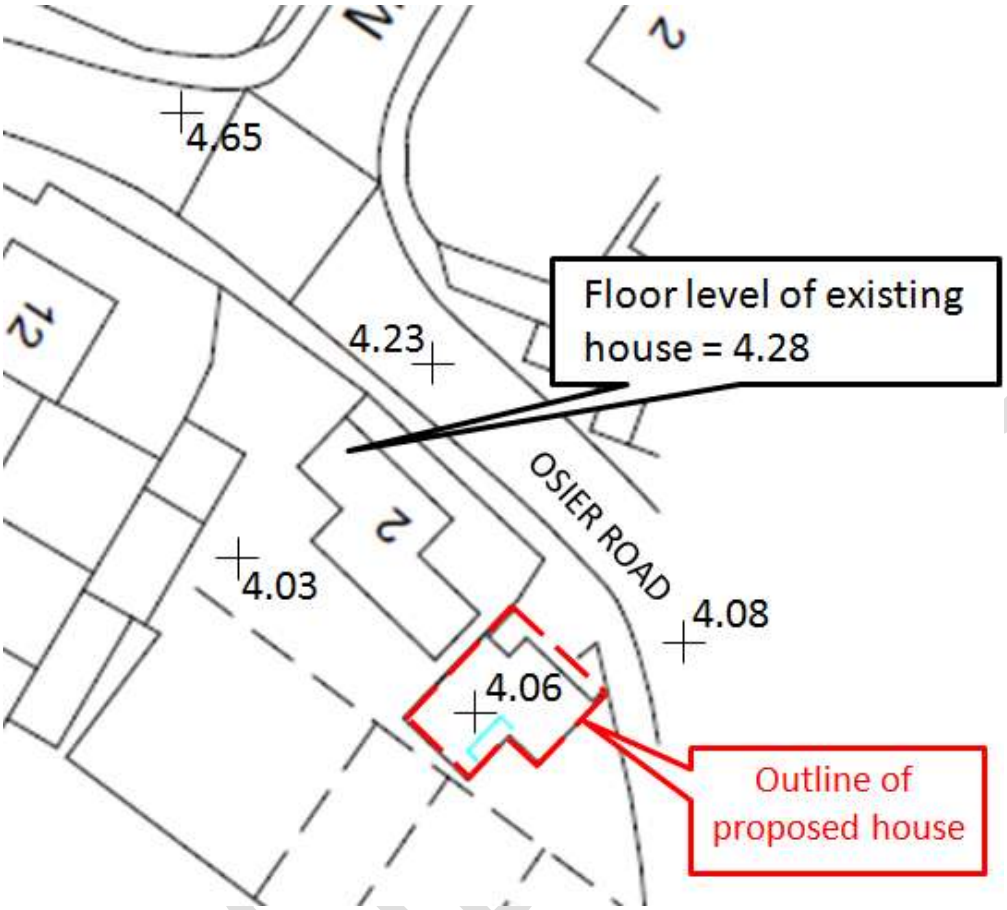
LOCATION PLAN



SITE PLAN



PLAN OF PROPOSED SITE WITH LEVELS



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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.

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APPENDIX 2

FLOOD WARNING AND EVACUATION PLAN FOR DWELLING AT OSIER ROAD SPALDING

There is a risk of flooding to the dwelling at 2 Osier Road if water flows over the top of the bank of the tidal section of the River Welland or a breach in the bank happened, as this is likely to flood the house.

Residents should understand that the ground floor of the house could be flooded to a depth of 850mm if a bank breaks. 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 Meteorlogical office and the Environment Agency.

It is recommended that 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 or TIDAL flooding.

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 Meterological 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.

A safe area to evacuate to is central Spalding where ground levels are higher than the maximum flood level possible in the area.

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

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