

**PROPOSED RESIDENTIAL DEVELOPMENT AT OLD BREWERY
LANE, LONG SUTTON, PE12 9GW**
FLOOD RISK ASSESSMENT



View of site from Old Brewery Lane

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This flood risk assessment has been prepared solely to support the planning application for a development at Old Brewery Lane, Long Sutton. 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

A Planning application is due to be made to South Holland District Council to construct two pairs of semi detached houses on a site at Old Brewery Lane, Long Sutton.

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 Technical 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.

Application Site

The site is located nearly 1 km east of the centre of Long Sutton, 4.6 km from the tidal defences of the River Nene at Sutton Bridge, and at least 10km south of the tidal defences of the Wash.

The National Grid Reference of the site is 543860 322550, 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.

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 sequential and exception test is followed.

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 in a lower flood risk zone for this type of development. The location of this development can be considered as a brownfield site. The development complies with the South Holland District Council's policy on these developments on infill sites, and it is also likely to have a lower flood risk than others in this area, and all of this area is within Flood Zone 3(a).

Exception Test

The Sequential Test has demonstrated that it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding. Therefore the Exception Test must be applied and for this to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risks, informed by the Strategic Flood Risk Assessment; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking into account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible will reduce flood risk overall.

Both parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

The first section will be demonstrated by the Supporting Planning Statement and compliance with South Holland District Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

Strategic Flood Risk Assessment

The following information about the flood risk in the location of this development has been sourced from the maps and reports in the South Holland District Council's Strategic Flood Risk Assessment (SHDC SFRA).

Report Maps

Map 3 shows that site is within flood zone 3.

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

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

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

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

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

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

Flood Maps Table D1

The actual flood hazard for the present day and 2115 is as follows:

Depth of flooding.....	zero
Extent of flooding.....	low or medium, reliant on flood defences
Velocity	nil

The residual flood hazard for the present day is as follows:

Depth of flooding..... zero
Extent of flooding..... low or medium, reliant on flood defences
Velocity nil

The residual flood hazard for 2115 is as follows:

Depth of flooding..... 500 – 1000mm
Extent of flooding..... high
Velocity 0 – 0.1 m/sec

Maximum flood level and bank levels in the River Nene

The maximum levels in this tidal section of the River Nene 3km east of the site are as follows:

	2007	2115
Peak 1 in 200 year level	5.86	6.20
Peak 1 in 1000 year level	7.00	7.35

The defence level (top of left bank) between at Long Sutton is approximately 7.00m OD. However there is a low section adjacent to the bridge itself at a level of 5.95m OD. Levels of the defence north of the A17 bridge are approximately 6.30m OD.

Environment Agency Tidal Breach Hazard Mapping

The Environment Agency has published Breach Hazard Mapping which predicts the depths, velocities and hazard following a breach in the tidal defences for a 1 in 200 and 1 in 1000 year event in 2115. The maps have been produced by modelling breaches along the whole length of the tidal defences and combining these into one map. The predicted depths of flooding for the site are as follows:

Present day	1 in 200 year scenario	zero
	1 in 1000 year scenario	zero
2115	1 in 200 year scenario	1.0m – 1.25m
	1 in 1000 year scenario	1.0m – 1.25m

With the original ground level of the site being about 3.20m OD, this gives a predicted flood level of between 4.20 and 4.45m OD.

A level of 3.25m OD was recorded in the field west of Roman Bank. The predicted flood depths on the EA maps are between 0.75 metres and 1.0 metre. From this we can interpolate the predicted flood level at this location to be between 4.0 and 4.25m OD.

Therefore it can be concluded that the maximum flood level would be 4.25m 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", 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 approximately 4.6 km from the tidal section of the River Nene and 10.0km from the Wash defences at the nearest point. The tidal defence banks to all of these are maintained by the Environment Agency.

The major watercourses in the area are maintained by South Holland IDB, which has carried out improvement schemes so that IDB watercourses generally provide at least a 1 in 50 year standard against flooding of agricultural land and aim to provide a 1 in 100 year standard to urban areas.

Existing Ground Levels and Proposed Levels of Buildings

The level of the development site is approximately 3.40m OD, varying slightly to the front and rear. The level of Old Brewery Lane is between 3.41 and 3.50m OD north of the proposed development site and the ground floor level of the existing houses on the site is approximately 3.66m OD. A plan showing all the levels is shown on sheet 11 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 Nene.
2. High water levels in IDB drainage channels.
3. High water levels in the Common Pit
4. Localised flooding in the area.

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

The west bank of the River Nene is approximately 4.6 km east of the site of the proposed development, and the Wash Banks are 10km north of the site at their nearest point. The hazard from the River Nene east of the development site if a breach occurred will be considered to be the major risk to the site. If the banks north of the A17 bridge or the Wash banks breached the flood water would be extremely unlikely to flow as Little Sutton.

The maps in the SFRA indicate that the depth of flooding in a 1 in 200 year event in 2115 will be between 500mm and 1000mm and the more recent breach mapping undertaken by the EA predicts flood depths between 1000mm and 1250mm.

Therefore from this evidence it seems likely that flood water from a breach could reach the site in an extreme event when climate change is factored in. It is likely that this flood water will take at least 12 hours to reach the site, during which time residents will have been warned of the eventuality. The EA breach mapping also assumes no attempt is made to immediately repair the breach. It is also likely that the EA will undertake further bank raising within the next 100 years to ensure that there is a continuing 1 in 200 year defence to Long Sutton and Sutton Bridge.

2. High Water Levels in IDB drains

Although the whole of this area is below high tide level and levels in the rivers, the retained water levels in the drainage channels ensure that the risk of flooding is extremely low. South Holland IDB maintains a system of sluices, pumping stations, and drainage channels which convey surface water into the River Nene and the Wash and control water levels throughout the South Holland IDB area.

The watercourse on the northern side of Bridge Road is maintained by South Holland IDB. This flows north eastwards through a network of drainage channels and discharges into Tidal River Nene through Lutton Sluice, which is maintained by South Holland IDB.

The channels maintained by South Holland IDB in urban areas are classified as high priority watercourses and as such receive a higher maintenance priority.

There are possibilities of failure of outfall sluices, but these are mitigated by the high level of maintenance given to these structures by the IDB. If a failure did occur the IDB would immediately be warned of the problem by their telemetry system and take action to repair the fault or to bring in temporary pumps to reduce the risk of any flooding in the area. Similarly any failures of culverts or other blockages would be dealt with immediately.

IDB systems are designed to provide a freeboard of between 600mm and 1000mm to all land in a 1 in 10 year return period rainfall event. This normally provides a standard of service of between 1 in 50 years and 1 in 100 years against flooding. In an extreme event water levels will rise but this will be a slow process and it would be at least 24 hours before levels were high enough to begin to flood low land in the area, and after this the level of the flood water would need to rise at least another 500mm before the development site would be affected.

Therefore the risk of flooding from IDB drainage channels can be considered to be extremely low.

3. Flooding from Common Pit

If the water levels in Long Sutton Common Pit south west of the site were to become very high there may be a chance of flooding of the proposed properties. The normal water level in the pit is between 1.5 metres and 2.0 metres below the existing level of

the site. There are a number of surface water outlets into the pit which would indicate there are unlikely to be any problems with discharge arrangements into the IDB system north of Bridge Road from the pit. Considering this and the fact that floor levels are recommended to be 500mm above ground level the risk of flooding from this source can almost be discounted.

4. Localised Flooding in the area

There is a possibility that surface water on Old Brewery Lane could accumulate and flood the properties. However as the road highest road level is 3.50 compared with the new properties with a floor level of 3.90m OD, then flooding from 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 past.

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.

Conclusions

The risk of flooding caused by overtopping or breaching of the east bank of the tidal River Nene can be considered to be extremely low.

The depth of flooding that would ensue from a breach in the bank is shown in the maps in the SFRA and more recently on maps that are issued by the EA.

The SFRA predicts that the depth of flooding if a breach occurred during a 1 in 200 year event in 2115 would be between 500mm and 1000mm. However the more recent maps from the EA indicate the depth of flooding following a similar event would be between 1000mm and 1.25 metre. Both the SFRA and the EA maps indicate that there is not a risk of flooding at the present time.

It can be reasonably expected that at some time during the next 100 years the EA will make further improvements to the defences to protect the substantial infrastructure in this area. This will further reduce the risk of breaches.

The raising of the floor levels to 3.90m OD will ensure that the risk of flooding if there is a serious failure of the IDB drainage system is extremely low, and is only likely to occur in a greater than 1 in 100 year event.

The existing houses in Old Brewery Lane which were built less than ten years ago have a ground floor level of 3.66m OD, and road levels have been set at an appropriate level for these floor levels. It will be difficult providing suitable access to the houses with a ground floor level of 3.90m OD and almost impossible if the level is set above the predicted flood level following a breach in 2115.

It is considered that residents will be safe if a breach were to occur in 2115 during a 1 in 200 year tidal event as:

- In this type of event all residents would be warned that a tidal surge was likely at least 24 hours before the event.
- Residents then would be able if they wished to evacuate the area.
- If residents stayed in the houses they would take measures to minimise damage to the houses as set out below.
- If the residents were still in the house when this type of event occurred then they would be safe by staying on the first floor.

Recommendations

In any area at risk of flooding it is preferable that new dwellings should be of two story construction with all bedrooms at first floor level. This is to 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.

The ground floor level of the proposed replacement building should be a minimum of 500mm above existing ground level at a level of 3.90m OD and should have all bedrooms at first floor level.

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 or into the Common Pit alongside the site. If soakaways are used these should be designed to BRE Digest 365 and approved under Building regulations. If the water is to be discharged into the Common Pit consent should be sought from both the South Holland IDB and the District Council.

The developer should consider installing demountable defences 600mm in depth on all doors and windows if appropriate and if a flood warning is received these should be put in place.

The building should be designed incorporating flood resistant and resilient techniques to allow it to be refurbished after being flooding to a depth of approximately 800mm above the floor level of the new building. 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 a few days. Further details are given in Appendix A on page 11.

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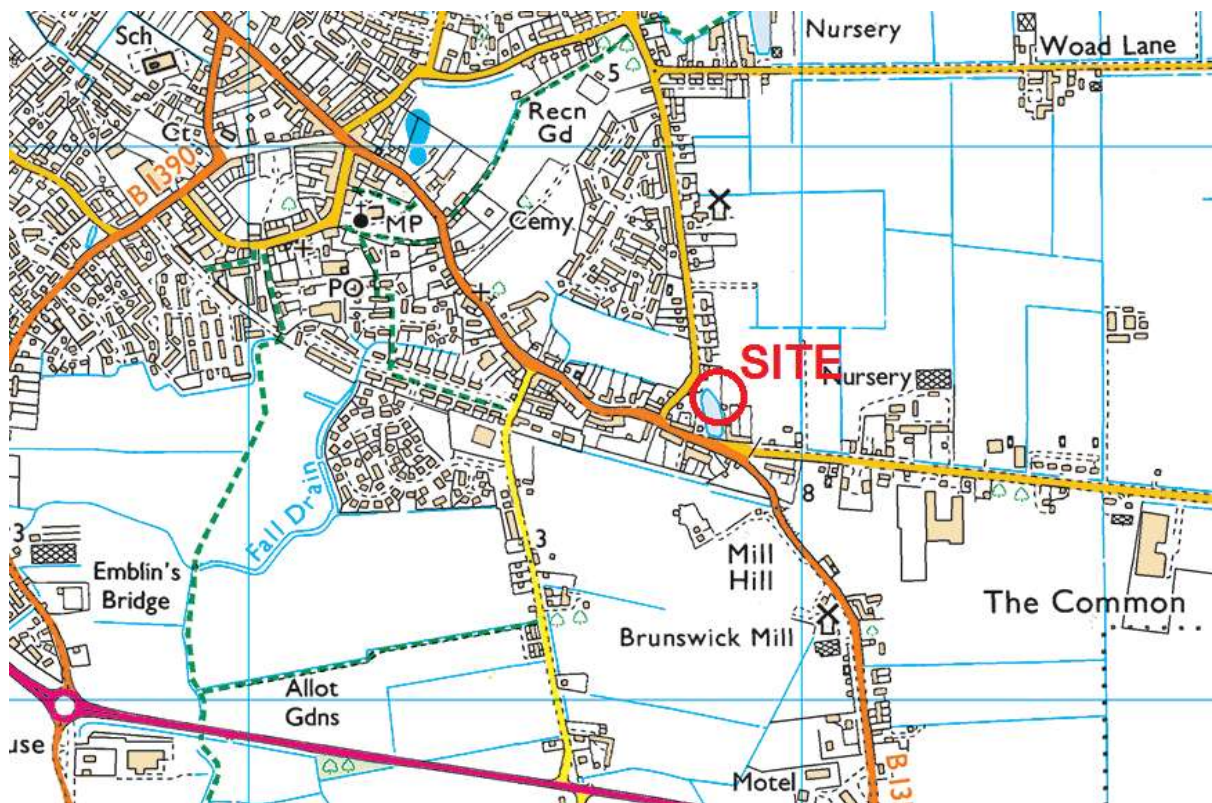
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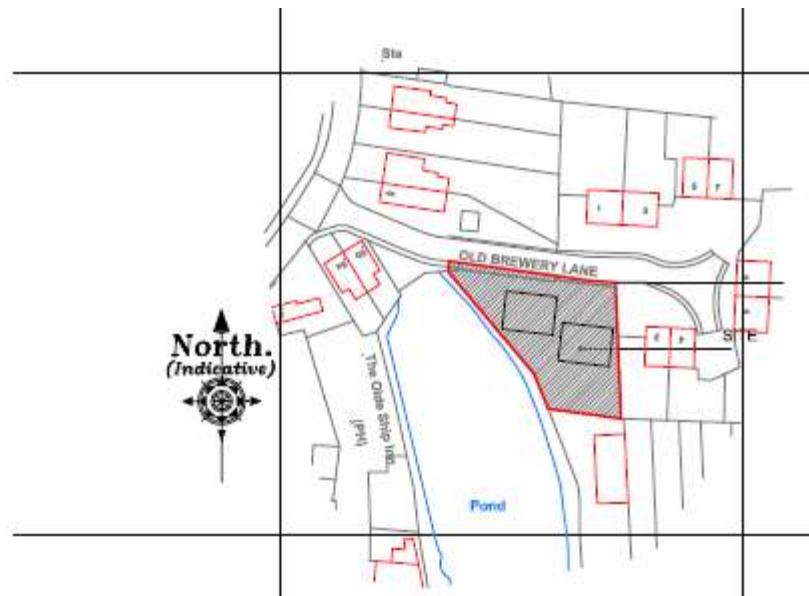
PLAN OF AREA SHOWING IDB WATERCOURSES



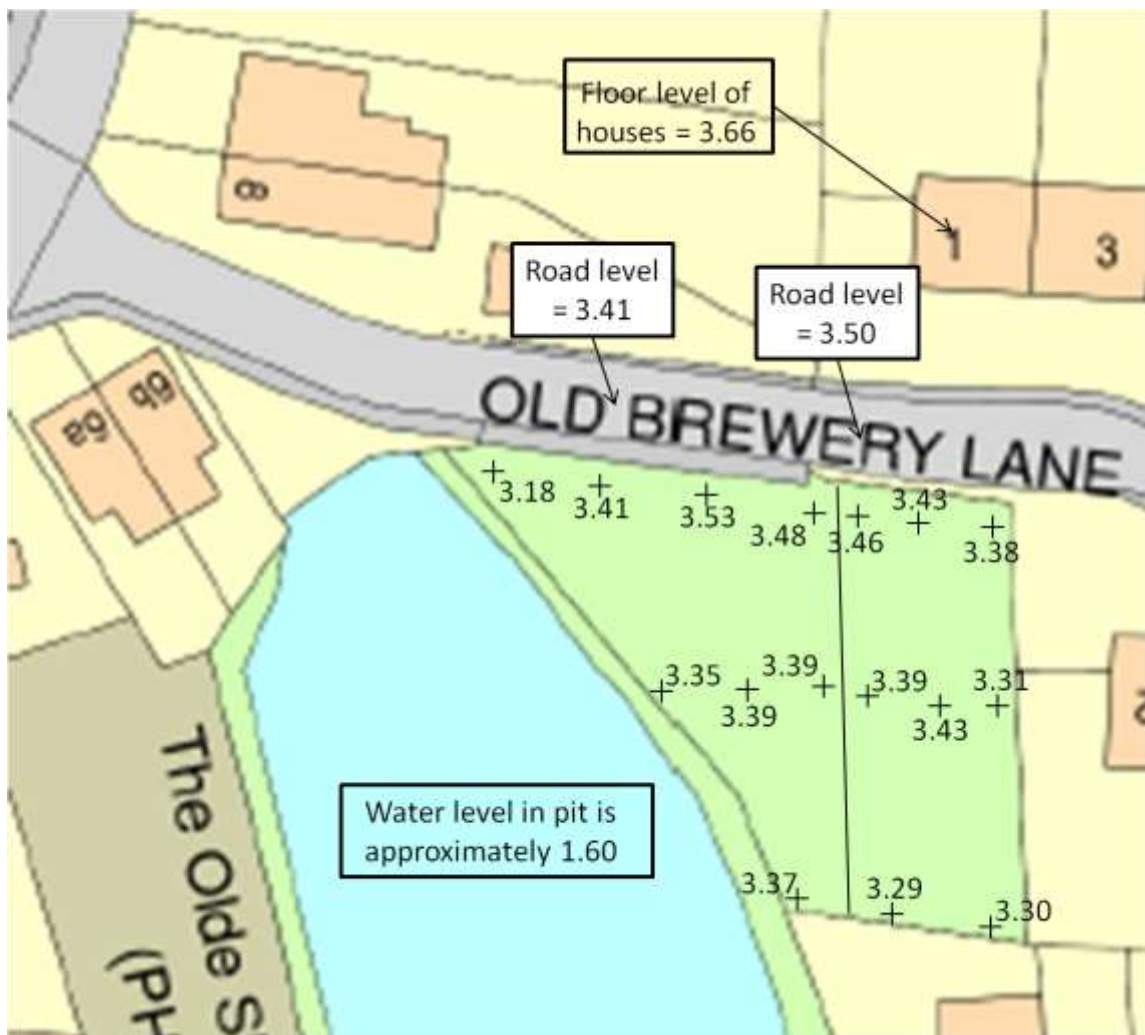
PLAN OF AREA



LOCATION PLAN



SITE LEVELS



APPENDIX A

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 1.0 metre above ground level.

