PROPOSED CHANGE OF USE FROM HOTEL TO RESIDENTIAL USE AT THE BRIDGE HOTEL, 4 BRIDGE ROAD, SUTTON BRIDGE, SPALDING, PE12 9UA

FLOOD RISK ASSESSMENT

View of building from Bridge Road

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This flood risk assessment has been prepared solely to support the planning application for the change of use of the Bridge Hotel, Sutton Bridge. 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

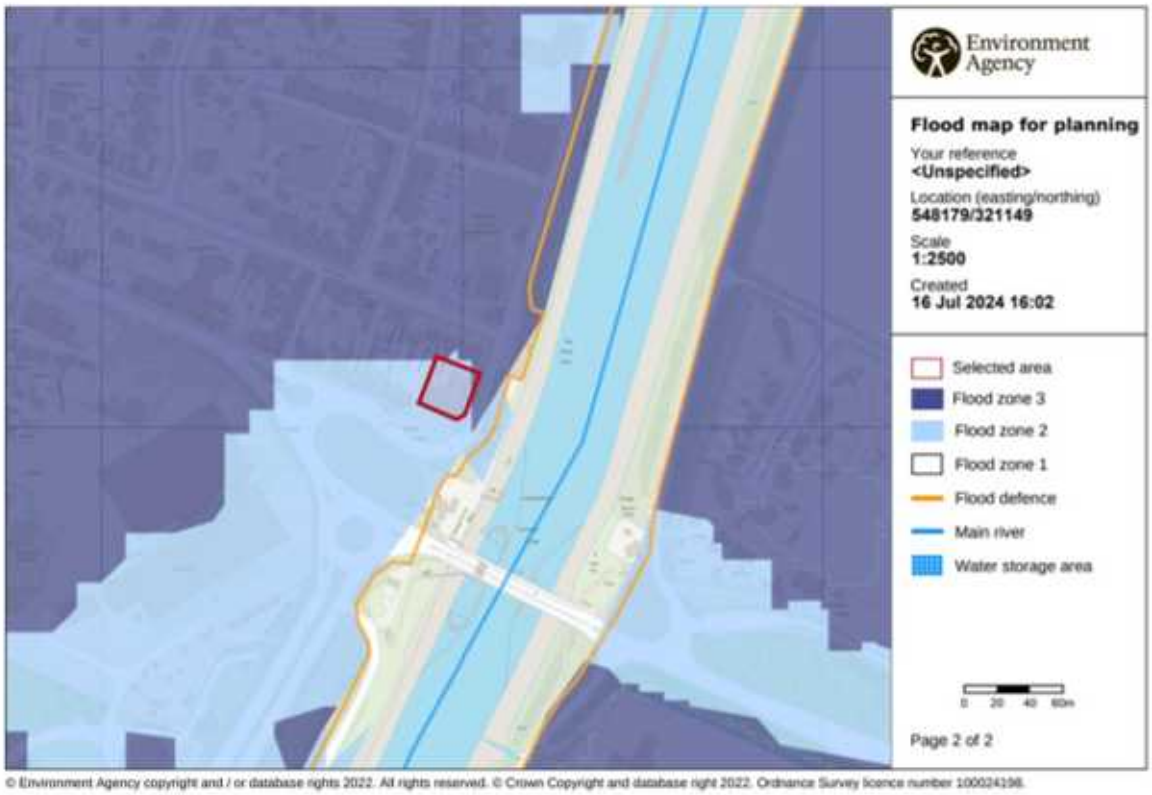
An application has been submitted (reference no H18-0463-24) to South Holland District Council for planning permission to change the use of the Bridge Hotel at 4 Bridge Road, Sutton Bridge, PE12 9UA to residential. The application includes for 15 new residential units in the refurbished building. The building is located approximately 30 metres from the top of the bank of the River Nene, which is tidal at this location.

The site is within Flood Zone 3 as shown on the Environment Agency's Flood Zone Map.

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 South Holland 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 at least 95% of the area of the hotel building is within flood zone 2, and a very small area is within flood zone 3.

It can also be seen that most of the area of Sutton Bridge is in Flood Zone 3.

Application Site

The development is located on the western side of the River Nene. The National Grid Reference of the site is 548180, 321150.

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

As the site is within a defended area the small area of the building within flood zone 3 can be considered to be within Flood Zone 3(a) 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, a development of a dwelling house 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	✓*

Therefore it can be seen that for "More vulnerable" development the sequential and the exception tests need to be applied to the development.

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.

The Environment Agency Guidance states that it is not necessary to carry out the sequential test for a change of use.

Therefore I consider that the sequential test has been passed.

Maps Showing Predicted Flood Hazards

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
	Hazard……. zero
	Velocity ……. Nil
For year 2115	Depth of flooding …1.0m – 1.5 metres
	Extent of flooding .. high
	Hazard…….. Significant
	Peak Velocity …… 0.1 – 0.25 m/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:

For the present day	Depth of flooding…. 0 – 500mm
	Extent of flooding … High
	Hazard ……. Danger for some (1.25 – 2.0)
	Velocity …….. 0.3 – 1.0 m/sec
For the year 2115	Depth of flooding …500mm – 1.0m
	Extent of flooding …High
	Hazard …… Danger for all (greater than 2.0)
	Velocity ……. 0.3 – 1.5 m/sec

Figure 16 of the general maps shows that the site is not within the rapid inundation zone for the present day but will be in the predicted rapid inundation zone in 2115.

Existing Tide Levels and Climate Change in the River Nene.

The maximum levels in this tidal section of the River Nene 30 metres east of the site are shown in the January 2010 South Holland SFRA as follows:

	2007	2115
Peak 1 in 200 year level	5.88m OD	6.22m OD
Peak 1 in 1000 year level	7.02m OD	7.36m OD

Levels of the defence north of the A17 bridge are stated in the 2010 SFRA to be approximately 6.30m OD. However there is a low section shown adjacent to the bridge itself with a level shown of 5.95m OD.

The 2010 South Holland SFRA adopted a sea level rise of 1.14 metres to 2115.

The Environment Agency quoted the following predicted levels for the tidal River Nene for the present day in provision of information in 2019. The quoted levels are for West Lighthouse and Wisbech only and the levels for Sutton Bridge have been estimated.

	1 in 200 year	1 in 1000 year
West lighthouse	6.01m OD	6.35m OD
Sutton Bridge (estimate)	5.93m OD	6.27m OD
Wisbech	5.78m OD	-

The Environment Agency quoted the following predicted levels for the tidal River Nene for the present day in provision of information in 2019. The quoted levels are for West Lighthouse and Wisbech only and the levels for Sutton Bridge have been estimated.

	1 in 200 year			1 in 1000 year		
	Confidence bound			Confidence bound		
	2.5%	50%	97.5%	2.5%	50%	97.5%
West lighthouse	5.66	5.82	6.21	5.86	6.14	6.81
Sutton Bridge (estimate)		5.80			6.20	
Wisbech		5.78			-	

The following table showing recommended sea level allowances is taken from the Environment Agency website.

Table 1: sea level allowances by river basin district for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Anglian	Higher central	5.8 (203)	8.7 (261)	11.6 (348)	13 (390)	1.20
Anglian	Upper end	7 (245)	11.3 (339)	15.8 (474)	18.1 (543)	1.60

The higher central allowance is based on the 70th percentile.

The upper end allowance is based on the 95th percentile.

Information on Surface Water Flooding on Environment Agency Website

The map on the next page shows areas around the site where there is a low risk of surface water flooding. The light blue areas indicate the low risk of up to 300mm of surface water flooding, and the darker blue areas indicate that between 300mm and 900mm of surface water flooding could occur.

It can be seen that there is no surface water flooding predicted around this building.

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 site is located approximately 30 metres from the tidal section of the River Nene, which is maintained by the Environment Agency. There is an existing flood defence wall on the east side of Wharf Road with a crest level measured as 6.25m OD.

Levels of Existing Building and Surrounding Area.

Levels have been taken on the site and these levels are shown on the plan reproduced page 11 of this report.

The ground floor level on the west side of the building is 7.10m OD and the floor level on the east side of the building is 6.3m OD.

The level of the footpath immediately in front of the building falls from approximately 6.00m OD near the south east corner of the building to 5.40m OD on the south west corner. The level of the ground behind the building is approximately 5.30m OD.

The level of the flood defence was measured at 6.25m OD.

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. Localised flooding from failure of on site drainage.

The main flood risk to the building is from overtopping of the tidal defences immediately east of the building and the risk from IDB channels and localised flooding can be discounted when compared with the main risk.

The flood defence east of the building are between 250mm and 600mm above the level of the road between the building and the defence. It is unlikely that these will fail as the back of the defence consists of a concrete wall. The recommendations in this report will assume that adequate mitigation will be provided by raising the floor levels of all the habitable accommodation above the predicted level of the flood water in a 1 in 1000 year overtopping event in 2115.

The existing building has four floors as shown on the existing plan of the building.

a) The basement has a level of approximately 4.5m OD and would immediately suffer from flooding if the river overtopped the defences during a very high tide.

b) The ground floor levels are 7.1m OD and 6.31m OD. The west bank of the River Nene is approximately 30 metres east of the building, and the Wash Banks are approximately 7km north of the site at their nearest point. The hazard from the River Nene east of the building if overtopping occurred in the length of bank north of the A17 bridge will be considered to be the major risk to the site.

The maps in the 2010 SFRA predicts flood depths of between 500mm and 1.0 metre to this area of Sutton Bridge in a 1 in 1000 year event for the present day. In the same event in 2115 the predicted flood depth is greater than 1.5 metres.

The maps in the updated SFRA (available on the South East Lincolnshire Joint Strategic Planning website) predict flood depths of between 250mm and 500mm on the area around the building is in a 1 in 1000 year event at present. In 2115 the predicted flood depth is between 500mm and 1.0 metre to the area in front of the west end of the building and between 1.0 metre and 2.0 metres in front of the east end of the building. It is likely that the EA will undertake further bank raising within the next 100 years to ensure that there is an adequate continuing defence to the village of Sutton Bridge.

The predicted hazard will be mitigated by raising ground floor levels of the proposed building above the predicted flood level in a 1 in 1000 year event in 2115.

Extent of known Flooding

There is evidence that some flooding took place after the high tide levels in 1953 and 1977. Defence levels were raised after each of these events.

Probabilities and Trends of Flooding

It can be seen that the probability of the defences being overtopped in a 1 in 1000 year event at the present is quite low. However if defences are not raised then they are more likely to be overtopped causing flooding in this area of Sutton Bridge.

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 the development is a change of use in flood zone 3 and the flood hazard is "danger for all" (greater than 2.0) for the 1 in 1000 year event in 2115 reference should be made to Category C7 which states:

The proposal should be referred to the Environment Agency with a supporting Flood Risk Assessment which demonstrates that the proposal will be safe for its lifetime.

The Environment Agency is likely to object to proposals including ground floor habitable accommodation.

The FRA should aim to identify mitigation measures in line with those required for new build development of the same type, as far as practicable.

Summary of Risk of Flooding to the Site

The main risk of flooding to the site is if the water level in the tidal River Nene exceeds 6.25m OD. If a tide level greater than 6.25m OD were to occur then water would start to flood onto Wharf Road and then flow westwards from the river both south and north of the existing building.

In a 1 in 1000 year event at the present time the predicted maximum flood level is between 6.20m and 6.25m OD, which is approximately the same level as the crest of the flood bank east of the building. Therefore at present in a 1 in 1000 year event any flooding that were to occur would be small.

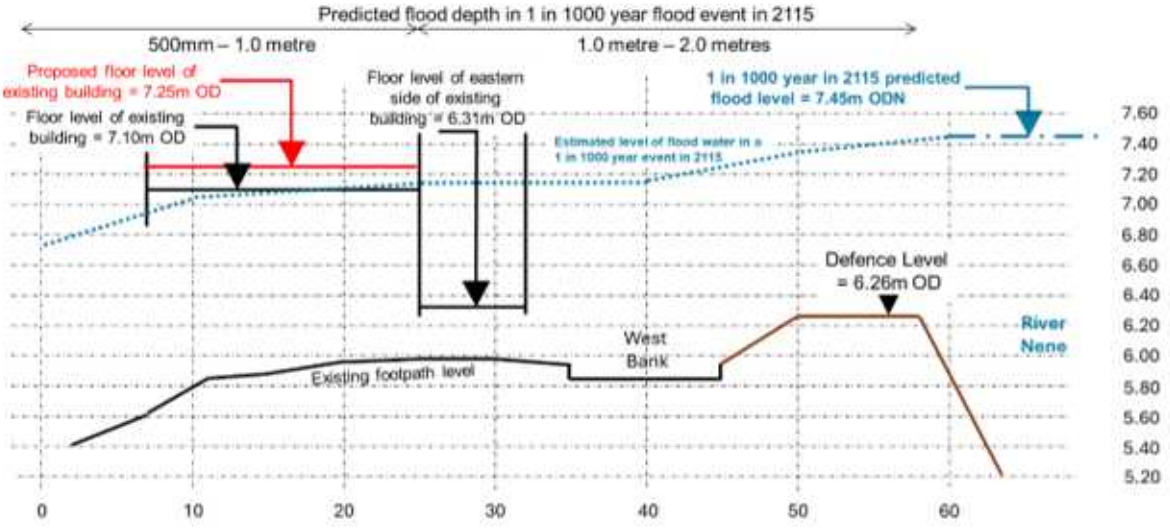
The map available on the South East Lincolnshire Planning website showing the predicted flood depths in a 1 in 1000 year event at the present time is shown below.

The map predicts flood depths of between 0 and 500mm around the building. It is assumed that these depths are computed assuming a breach in the defences, the risk of which is very low at this location.

Using the higher central allowance to compute the increase in tidal level in 2115 the maximum predicted flood level in the River Nene would be 7.45m OD (6.25m + 1.25m allowance). If this event were to occur then there would be extensive flooding to the whole area of Sutton Bridge with flood depths in excess of 1.0 metre.

The map available on the South East Lincolnshire Planning website showing the predicted flood depths in a 1 in 1000 year event in 2115 is shown below.

The map shows between 500mm and 1.0 metre depth of flooding to the land around the west side of the building and between 1.0 metre and 2.0 metres around the east side of the building. All of the above levels have been shown on the cross section below.



The section shows the estimated flood levels along the front of the building and indicates a level of approximately 7.10m OD along the larger west end of the building.

Recommendations

The lower ground floor, or basement of the existing building should not contain any habitable accommodation and should only be used for storage and other similar rooms.

The minimum level of the ground floor of the building should be 7.25m OD. The existing level of the larger western part of the building is approximately 7.10m OD and the increase of 150mm will be achievable within the existing height of the ground floor of the building. This part of the ground floor will then be above the predicted 1 in 1000 year level of the flood water in 2115 and be suitable for habitable accommodation.

The existing level of the smaller eastern part of the building is approximately 6.30m OD and the developer will need to confirm whether it is possible to increase the floor level by 950mm to a level of 7.25m OD so that it will be above the predicted 1 in 1000 year level of the flood water in 2115 and be suitable for habitable accommodation.

Residents who live in the proposed accommodation on the ground floor should have access via a communal staircase to the first floor so that they can stay safe in an emergency flood situation.

Proposed residential accommodation will be satisfactory on the first and second floors of the building.

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

A flood warning and evacuation plan should be written which will include information for residents on the ground floor of the building on how to stay safe, in the event of flood warnings being issued by the Environment Agency.

All future owners and occupiers of the building should be given a copy of the Flood Risk Assessment and the flood and evacuation plan so that they are fully aware of the risk of flooding in this area.

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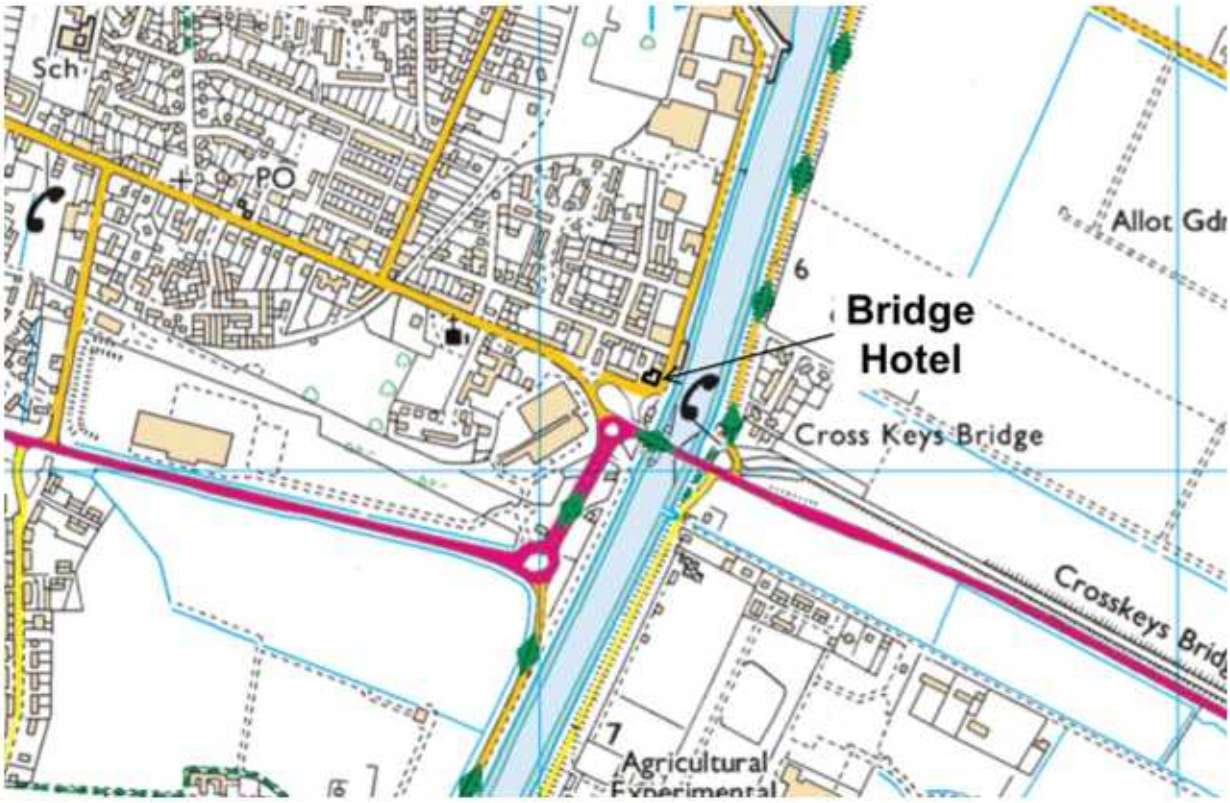
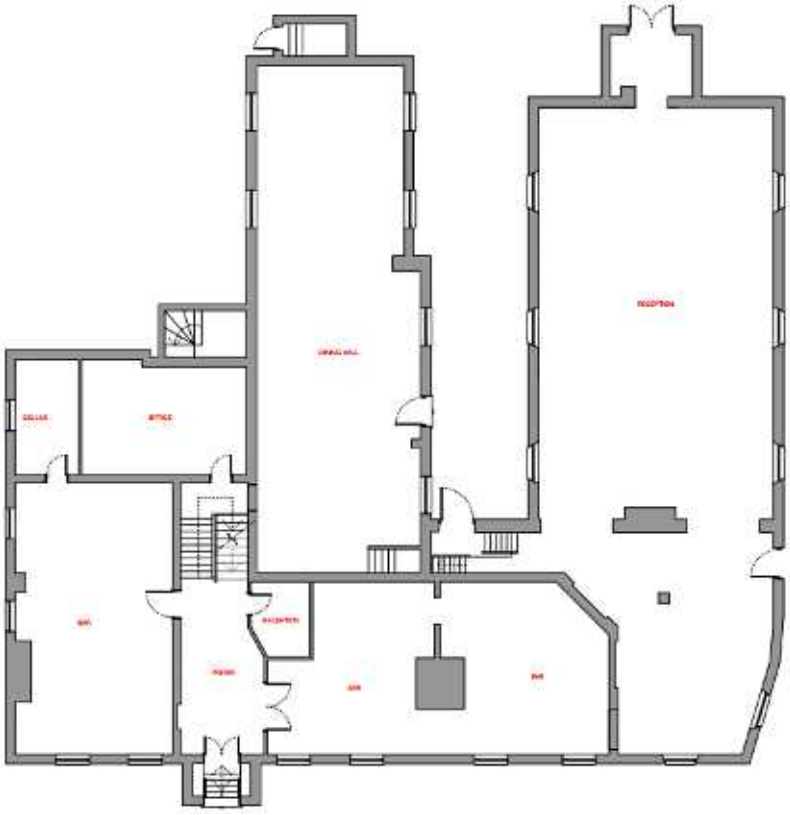
23rd July 2024.

LOCATION PLAN



GROUND FLOOR PLAN OF BUILDING



LEVELS AROUND THE SITE