PROPOSED FISHERMANS LODGE AT CLAY DROVE, PODE HOLE, SPALDING, PE11 3ND.

FLOOD RISK ASSESSMENT



View from southern side of site

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This flood risk assessment has been prepared solely to support the planning application for the proposed Fishermans Lodge at Clay Drove, Pode Hole, 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

An application is due to be submitted to South Holland District Council for planning permission to construct a Fishermans Lodge at Clay Drove, Pode Hole, Spalding. The site is behind the property called "Homelea", Dozens Bank, Pinchbeck and will be sited immediately west of the pond or lake east of the above property.

The site is all 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 therefore requires a Flood Risk Assessment to be carried out as required in the Planning Practice 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 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 all of this site is within Flood Zone 3.

Application Site

The development is located 4km west of the village of Pinchbeck and the National Grid Reference of the site is 521370 322355.

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

As the site is within a defended area and is not in a flood plain it can be designated to be within Flood Zone 3(a) as defined in Table 1 of the Technical Guidance.

The flood risk vulnerability classification of the development can be assessed using Table 2 of the Guidance, which is reproduced below:

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable • Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development • Flood control infrastructure. • Water transmission infrastructure and pumping stations.

- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Applying the flood risk vulnerability classification in Table 2 of the Guidance, this development can be categorised as "holiday or short-let caravans" which is classified as "more vulnerable". The Guidance informs us that "more vulnerable" development is only satisfactory in Flood Zone 3 after the Sequential and Exception Test has been passed.

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

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 refined 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.

If a larger scale map showing the flood zones is considered, it can be seen that most of the area around West Pinchbeck is in Flood Zone 3(a).

The proposed development is situated on a rural site and as such could not be located anywhere else except at this location adjacent to the existing pond, or lake south of Clay Drove.

The guidance gives the following advice where an alternative location is not possible, which can be also applied to developments such as these:

> When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.

Policy 9 of the South East Lincolnshire Plan states that small scale developments to support fishing lakes which promote tourism and the stronger visiter economy will be supported.

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

A Strategic Flood Risk Assessment (SFRA) was produced for the South Holland District Council (SHDC) in 2010. This document provides details of the flood risk in the Council's area. 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
	Hazard rating…… No hazard
	Peak velocity ……. Nil
For year 2115	Depth of flooding … 1 – 1.5m
	Extent of flooding….High
	Hazard rating……. Significant
	Peak velocity …… 0 – 0.1 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 …1.0 – 2.0m.
	Extent of flooding .. High
	Hazard rating…… 1.25 – 2.0 (Danger for Most)
	Peak Velocity ….. 0 – 0.3m/sec
For the year 2115	Depth of flooding … 1.0 – 2.0m
	Extent of flooding .. High
	Hazard rating…… Greater than 2.00 (Danger for all)
	Peak Velocity .. 0 – 0.3m/sec

Figure 16 of the general mapsin the 2010 SFRA show that the site is within the rapid inundation zone for the present day and 2115.

Maximum flood level and bank levels in the River Glen

Maximum flood levels in the River Glen at chainage 10.2 km are shown in the 2010 SFRA as follows:

	Present	Including Climate Change
1 in 100 year	4.66	4.93
1 in 1,000 year	4.94	5.16

The defences of the River Glen between the A151 bridge and Money Bridge consist of a bank with a road along the top and a wall between the road and the river. The defence level along this length is approximately 5.95m ODN.

Information from the Environment Agency

The Environment Agency has provided predicted flood levels for the River Glen. The levels quoted below are approximately 100 metres downstream of the road bridge at West Pinchbeck.

	2007	2115
Peak 1 in 100 year flood level	4.68m OD	5.23m OD
Peak 1 in 1,000 year flood level	4.96m OD	5.49m OD

The Environment Agency has provided the following predicted fluvial flood flows measured in cumecs for the River Glen at the same location.

	2007	2115
Peak 1 in 100 year flow	32.35	39.11
Peak 1 in 1,000 year flow	39.83	49.54

Site Levels

A survey of the existing land levels in the area of the proposed development has been carried out. The land levels adjacent to the lake where the lodge will be located are between 1.80m and 2.00m ODN. The levels around the lake are higher than levels in the area west of the lake which are between 1.25m and 1.40m ODN.

A plan with all the levels taken on the site is shown on page 14 of this report.

These levels are referenced to a level of 2.10m approximately 100 metres west of the site on Clay Drove.

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". The area 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 to the River Welland is very low.

The site is approximately 2.7 km south of the River Glen, which is main river and maintained by the Environment Agency.

The site is approximately 5.2 km south west of the tidal section of the River Welland north of Spalding, which is main river and maintained by the Environment Agency.

The site is approximately 3.0 km west of the fluvial section of the River Welland south of Spalding, which is main river and maintained by the Environment Agency.

The site is approximately 175 metres north of the Main Drain and 200 metres north of Vernatts Drain which are both maintained by Welland and Deepings IDB.

Potential Sources of Flooding

The following sources of flooding have been identified:

1) Failure or overtopping of the south bank of the River Glen.
2) Failure or overtopping of tidal defences of the River Welland
3) Failure or overtopping of fluvial defences of the River Welland
4) Failure or overtopping of Vernatts Drain.
5) Overtopping of IDB drainage systems.
6) Flooding from local water systems and the pond.

1. Failure or Overtopping of the South Bank of the River Glen

The River Glen is located 2.2km north of the site. The maximum predicted 1 in 100 year water level in 2115 in the SHDC SFRA is 4.93m OD, but advice from the Environment Agency based on later modelling of the River Glen predicts a higher 1 in 1000 year level in 2115 of 5.23m OD. All of these levels are below the defence level of 5.95m ODN east of the A151 bridge.

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

2. Failure or overtopping of tidal defences of the River Welland

The tidal defences of the River Welland are at least 6.5 km north east of the development site. If the defence bank breached north of Spalding east of the site it is unlikely that flood water would reach the site as it would have to flow over Vernatts Drain.

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

3. Failure or overtopping of fluvial defences of the River Welland

The north and west bank of the fluvial section of the River Welland is a minimum of 3.5 km from the site. If the bank breached the flood water would be firstly intercepted by North or South Drove Drain and secondly by Vernatts Drain. Therefore is unlikely that flood water would reach the site as it would have to flow over these large IDB channels.

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

4. Failure or Overtopping of Vernatts Drain

Vernatts Drain is located 200 metres south of the site. This watercourse is maintained by Welland and Deepings IDB. The Drain is embanked along the section east of Pode Hole. The maximum water levels in the Drain is approximately 3.96m OD, and the bank level is 4.39m OD. The IDB can regulate the flow in the drain by reducing the

flow into the drain from Pode Hole Pumping Station, and would carry out this operation, in the event of a breach in the north bank of the Drain.

If levels exceed 3.0m OD water will overtop the banks of the Drain and the embanked highland watercourses that lead into the Drain from the west.

This source of flooding will be adequately mitigated by raising the floor level of the lodge by 300mm above the ground level adjacent to the pond.

5. Overtopping of IDB Systems

There is an IDB watercourse on the eastern side of the area surrounding the pond, which continues along the north side of Vernatts Drain. The drain is called Main Drain on the southern side of the site but becomes part of the Blue Gowt No 2 Drain on the eastern side of the site.

Water in the Main Drain flows westwards through a culvert under Dozens Bank and eventually south through a syphon under Vernatts Drain to discharge into South Drove Drain. The water levels in this drain are controlled by Pode Hole Pumping Station which is approximately 600 metres south of the site. Welland and Deepings IDB stated that although this system operates well at the present time if more development is approved in the area further improvements will be carried out to ensure that the standard of drainage is maintained in the future.

Drainage channels maintained by the Welland and Deeping IDB generally have a 1 in 10 year standard with up to 1.0 metre of freeboard, which generally provides between 1 in 50 and 1 in 100 year standard against flooding.

The general level of the land in this area is approximately 1.3m ODN and the area immediately surrounding the pond is approximately 700mm higher. This is presumed to be because excavated material from digging or deepening the pond was deposited around the perimeter of the pond.

This source of flooding will be adequately mitigated by raising the floor level of the lodge by 300mm above the ground level adjacent to the pond.

6. Flooding from local foul or surface water systems

It is assumed that the foul water from the proposed accommodation will be discharged a septic tank or a treatment system. It is assumed that the surface water from the roof of the lodge will be discharged into the pond.

It is assumed that there is an overflow from the pond into the IDB drain that will prevent the water level in the pond from becoming too high. This would not happen quickly as there does not seem to be any way that any surface water is fed into the pond.

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

Extent of known Flooding

During the preparation of this assessment, no evidence was discovered of the site or any of the adjoining properties being flooded.

Probabilities and Trends of Flooding

The probability of this development flooding from Environment Agency main river is very low. If any flooding started to occur water levels would rise very slowly over a number of hours.

Residual Risk – Extreme Events

The residual risk from extreme events is very low on this site.

There are no records of this area around Dozens Bank having been flooded in the last 60 years.

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 16 to 19). 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 the development site is in flood zone 3 and the flood hazard in the area of the proposed Fishermans Lodge is “danger for all” reference should be made to Category C5 which shows that the following standing advice is:

The NPPG requires that all proposals for holiday or short-let caravans and camping sites are accompanied by a flood warning and evacuation plan, undertaken and agreed in consultation with the LPA’s Emergency Planning Officer.

It is recommended that static caravans are secured to the ground using an adequate mechanism such as chains and ground anchors and the finished floor level should be set at a minimum of 300mm above ground level.

The Environment Agency requires the imposition of the following condition:

CONDITION: No caravans/chalets/log cabins on the site shall be occupied between 1st November (or the following Sunday if half terms extend into November) in any one year and 14 March in the succeeding year.

REASON: To reduce the impact of flooding

If the application is for occupancy outside these dates, please refer the application to the Environment Agency, together with the FRA, for site specific assessment of the risks and the bespoke advice.

If the lodge is considered to be residential holiday accommodation with access throughout the year reference should be made to Category C8 which shows that the following standing advice is:

The Environment Agency requires direct consultation on proposals in this hazard zone. The NPPF requires that the proposal is accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures/flood resilience techniques have been incorporated into the development.

The applicant is advised to refer to the document "Improving Flood Performance of New Buildings Flood Resilient Construction (DCLG2007).

Finished floor levels (FFL) should be informed by the predicted flood depth maps (refer to the relevant 2115 1% fluvial or 0.5% tidal maximum depth map) and set as required below (single storey proposals must use the 0.1%event, 2115 scenario, for setting FFLs)

Depths of greater than 1.6 metres:

It is unlikely that mitigation measures would prevent flood water from entering the building at ground floor level. Therefore proposals must have two stories with no ground floor habitable accommodation. First floor living accommodation must be above the highest predicted flood depth.

Depths of 1 – 1.6 metres

Proposals must have a minimum of 2 storeys, with FFL set a minimum of 1 metre above existing ground level, and flood resilient construction should be used to a height of 300mm above the predicted flood depth, and demountable defences to 600mm above FFL.

Therefore it is recommended that the application should be considered to be holiday accommodation with no occupation allowed between 1st November each year and 14th March in the succeeding year.

Summary of Risk of Flooding to the Site

Part of the map in the South East Lincolnshire SFRA of the residual peak depth in 2115 for the 0.1% fluvial and tidal event probability in 2115 is shown on the next page and this indicates the predicted depths of flooding in the area of the development in this area north of Pode Hole.

There are no records of the site ever having been flooded in the past.



The map indicates that all of the area west of the lake and the levels of Clay Drove north of the site is predicted to have between 1.0 and 2.0 metres depth of flooding in a 1 in 1000 year tidal or fluvial event in 2115.

The levels taken on the site vary between approximately 1.20m and 2.00m ODN and the levels taken along Clay Drove were 2.10, 2.24 and 2.40m ODN. It is assumed that the highest flood level will be caused if a breach occurred in the River Glen in a 1 in 100 year fluvial event in 2115 and it can be estimated that the maximum flood level in this event would be between 2.80m and 3.0m OD.

Conclusions

The following conclusions can be made:

- The proposed development is not in a functional flood plain as defined by PPS25.
- The risk of the site flooding from any Environment Agency watercourse is very low.
- The risk of flooding from IDB watercourses is also extremely low.

Recommendations

In any area where there is a risk of flooding, although the risk at this site is low, it is preferable that any sleeping accommodation should be placed on the on the first floor, in order that the first floor can provide a safe refuge if any flooding were to occur.

However as the proposed lodge will be used for holiday accommodation then the South East Lincolnshire Matrix recommends that this type of accommodation is satisfactory subject to the following conditions:

- A flood warning and evacuation plan should be undertaken and agreed in consultation with the LPA's Emergency Planning Officer.

- The lodge shall not be occupied between 1st November (or the following Sunday if half terms extend into November) in any one year and 14 March in the succeeding year.

Occupiers of the Property should register with the Environment Agency's Floodline Warnings Direct Service to receive automated early warnings of potential flooding.

The operator of this site should draw up a comprehensive flood plan, which should include plans for evacuation and ensuring all people staying in the lodge will be safe.

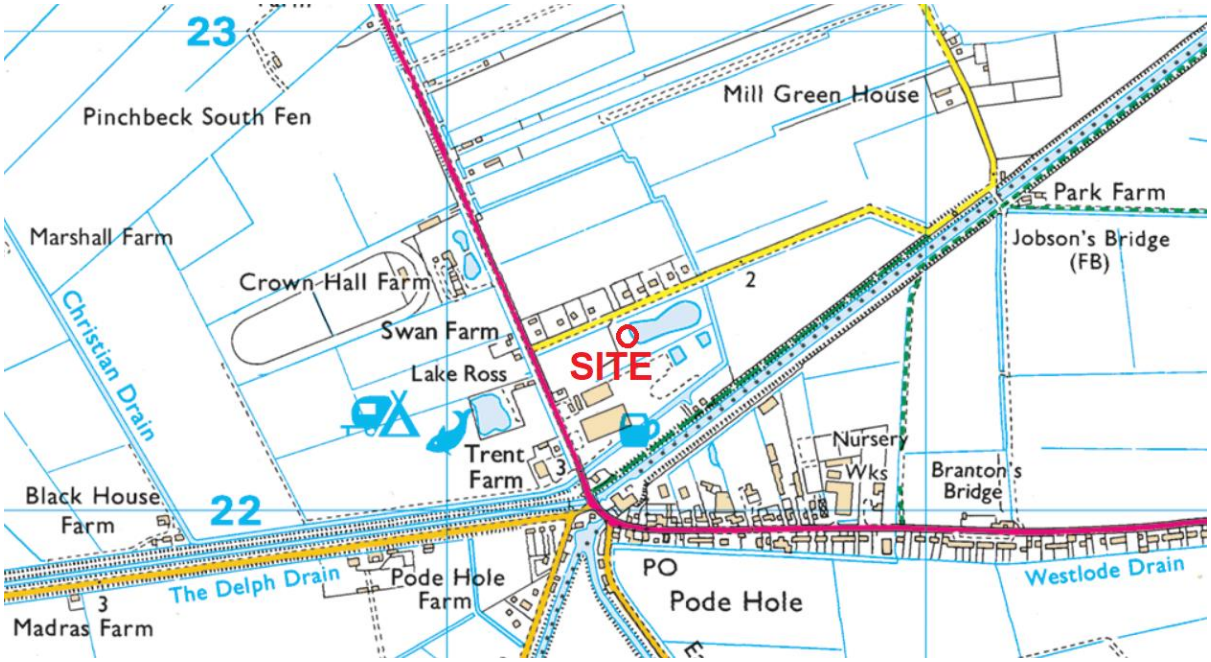
Although the risk of flooding is extremely low, if through a set of circumstances acting together any flooding were to begin to occur, residents would have adequate time to evacuate the area and remain safe.

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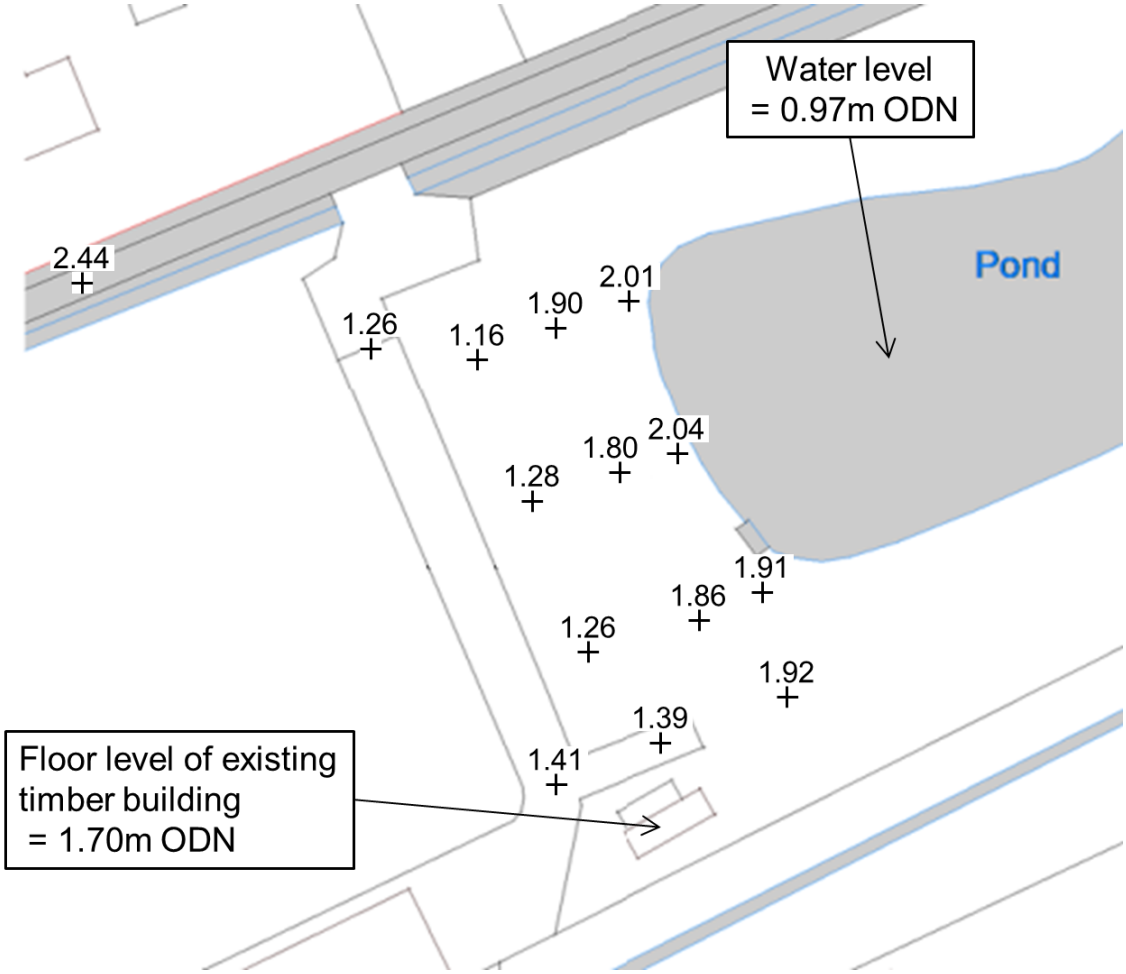
stuart.hemmings@btinternet.com

29th October 2020

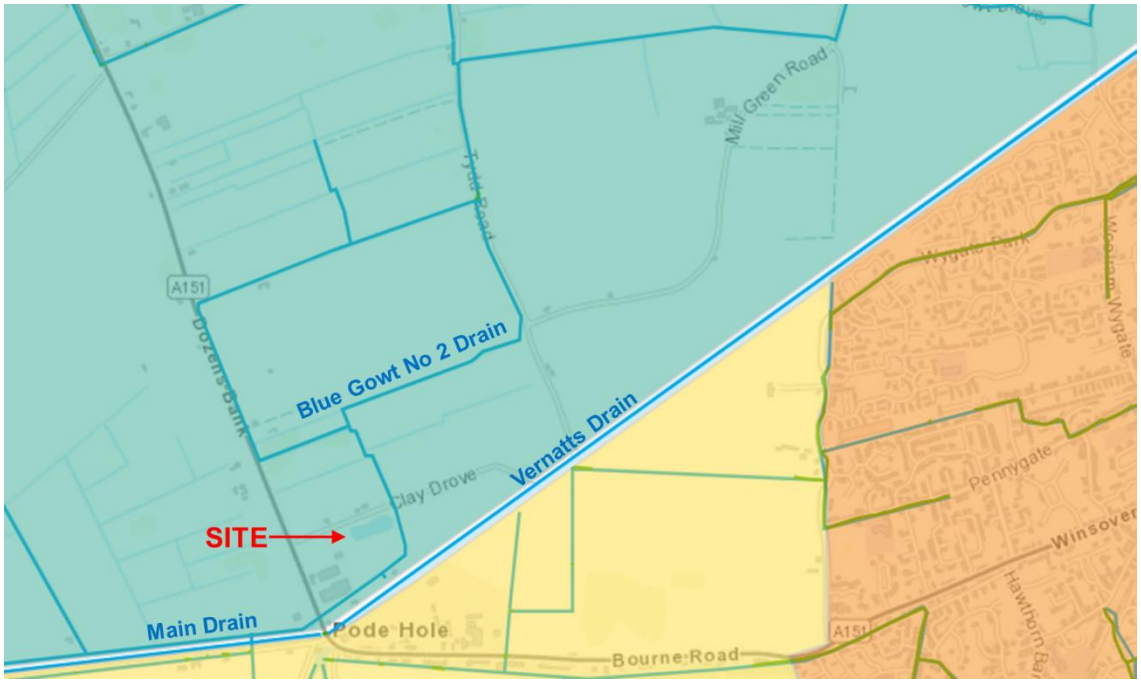
LOCATION PLAN



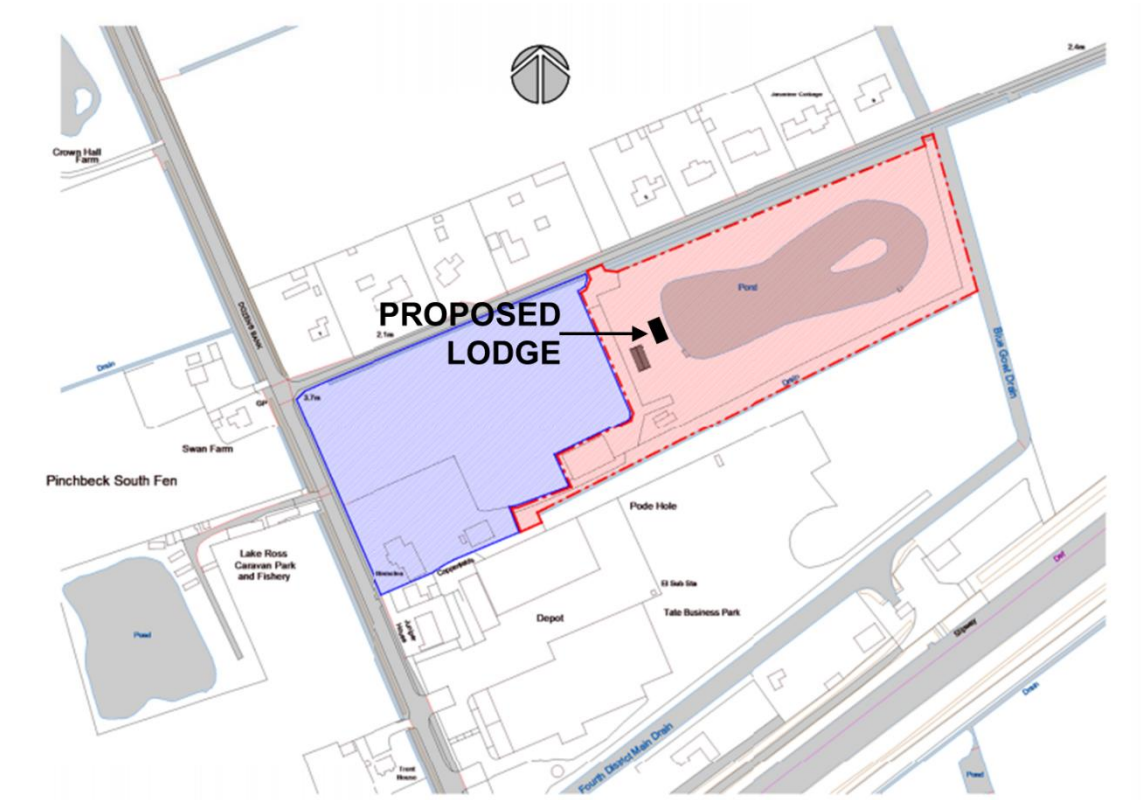
PLAN OF SITE LEVELS



PLAN OF IDB WATERCOURSES



PLAN OF PROPOSED DEVELOPMENT



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

document is out of date'a'

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%	

s been withdrawn (19

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

Fluvial Flooding from River Glen.

As part of the development is in flood zone 3 and is classed as more vulnerable, the upper end climate change allowance, which is 35%, should first 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.

The EA have been using an allowance of 20% for climate change over the past few years in their assessments and modelling of their systems. The increase to 35% will not significantly change the conclusion in the SFRA of what might happen if a breach occurred in the bank of the River Glen. If there are additional flows along this part of the River Glen it will lead to overtopping of banks in numerous places between Bourne and the outfall at Surfleet Sluice. This will prevent the water level rising much above the predicted levels for the present day.

The upper end allowance predicting a 65% increase in flows above the 1 in 100 year predicted flows now needs to be considered. This level of predicted river flows again

will not lead to increased river levels as the river will be overtopping the banks in numerous places.

To conclude a breach in the north bank of the River Glen will not lead to a depth in excess of 1.0 metres on the fenland west of the site and cause flooding to the proposed lodge even with the significant prediction of 65% for river flows.

Effect on IDB Systems

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 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 floor levels should be raised by 300mm above ground level and the implementation of a flood warning and evacuation plan is satisfactory.