FLOOD RISK ASSESSMENT
FOR COMMERCIAL DEVELOPMENT
AT WEST BANK, SUTTON BRIDGE

FINAL REPORT

ECL0665-1/PETER HUMPHREY ASSOCIATES

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Sutton Bridge Golf Club in respect of a development that consists of a green keepers hut at West Bank, Sutton Bridge.

A planning application for the proposed development is to be submitted by Peter Humphrey Associates.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at Sutton Bridge Golf Club, West Bank, Sutton Bridge, Lincolnshire, PE12 9RQ. The National Grid Reference of the site is 54839/32190.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the western side of West Bank. The site consists of a rectangular area of land that is part of Sutton Bridge Golf Course. The site is on the northern side of the existing access. The area of development is approximately 0.13 hectares.

Environment Agency LiDAR data shows that the site is flat with ground levels between +6.0m OD and +6.2m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water at the site naturally drains through soakaway and hence to the IDB drain system. There is a network of riparian drains to the north west of the site that drain to the Westmere Creek, an IDB Board Drain approximately 1200m north west of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by Ampthill Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of a green keepers hut. Details of the proposed development are provided in Attachment 1.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding.

2.5 Flood Zones

The site is located within Flood Zone 2, an area with a medium probability of flooding, of the Environment Agency Flood Maps for Planning as shown in Figure 2.

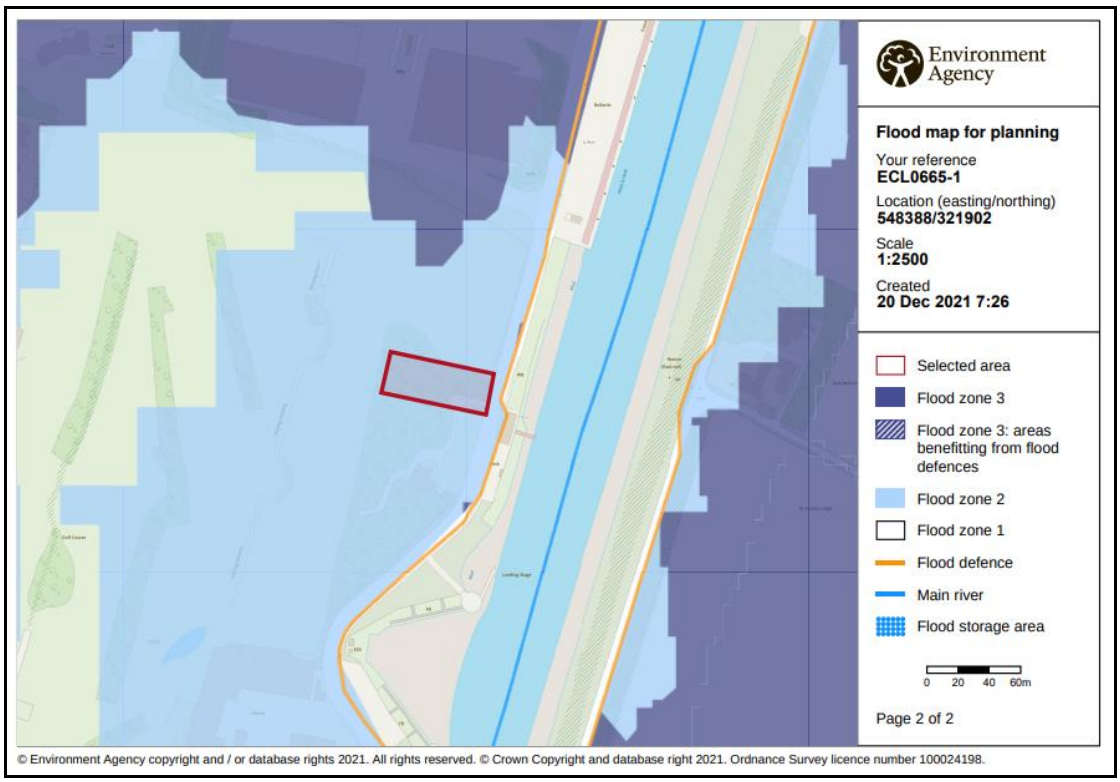


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- the site has a very low risk (annual probability less than 0.1%) of surface water flooding; and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is in the 'Danger for Most' area	The site is in the 'Danger for All' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The peak flood depth is between 0.25m and 0.5m.	The peak flood depth is between 1.0m and 2.0m.

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for leisure and is classified as 'Less Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 2 and the development is 'Less Vulnerable' therefore the development is appropriate, and it is not necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

Large parts of the South Holland district that are near the River Nene lie within Flood Zone 3. As such, the opportunities to undertake the development at an alternative site with a lower flood risk are limited. At this location it is not possible to position the development on higher ground within the proposed site.

The River Nene has defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event including climate change. Therefore the 'actual risk' of flooding at the site is low. The development is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is separated from the tidal River Nene by the West Bank carriageway. The site is protected by the River Nene tidal defences through Sutton Bridge. The River Nene is a main river and the responsibility of the Environment Agency.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by South Holland IDB. There is an IDB High Priority Watercourse approximately 1200m north west of the site. The site and the surrounding land are within the Westmere catchment and discharge to the tidal River Nene at the Westmere Tidal Sluice.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the South Holland Internal Drainage Board and the Environment Agency are generally good.

4.2 Sources of Flooding

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the South Holland IDB drainage system;
- an event in the local drainage network greater that exceeds the standard of protection;
- failure of Westmere Tidal Sluice; and
- overtopping and/or breaching of the tidal River Nene.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the South Holland IDB drainage system is low due to the maintenance standards achieved and managed by the IDB.

The standard of drainage provided by South Holland IDB is assessed at 2% annual probability (1 in 50 chance each year), compatible with the Department of the Environment, Food and Rural Affairs (DEFRA) target level of service for rural drainage and flood defence works. The risk associated with flooding due to events greater than 2% annual probability (1 in 50 chance each year) is lowered due to the South

Holland IDB high priority watercourses incorporating a freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

The site benefits from defences on the River Nene that provide protection during a 0.5% annual probability (1 in 200 chance each year) tidal event and a 1% annual probability (1 in 100 chance each year) fluvial event.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased flood levels in the River Nene.

The River Nene tidal defences have been designed to include an allowance for climate change. In summary the site is not at risk for the design life of the development (i.e., 100 years).

4.6 Residual Risk

There is a residual risk of flooding at the site should a breach of the tidal defences occur. The South East Lincolnshire SFRA includes maps demonstrating the residual peak depth in 2115. When climate change allowances are applied to the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event the peak depth at the site from direct overtopping together with breach failure is between 1.0m and 2.0m. An extract from this map is shown in Figure 3 below.

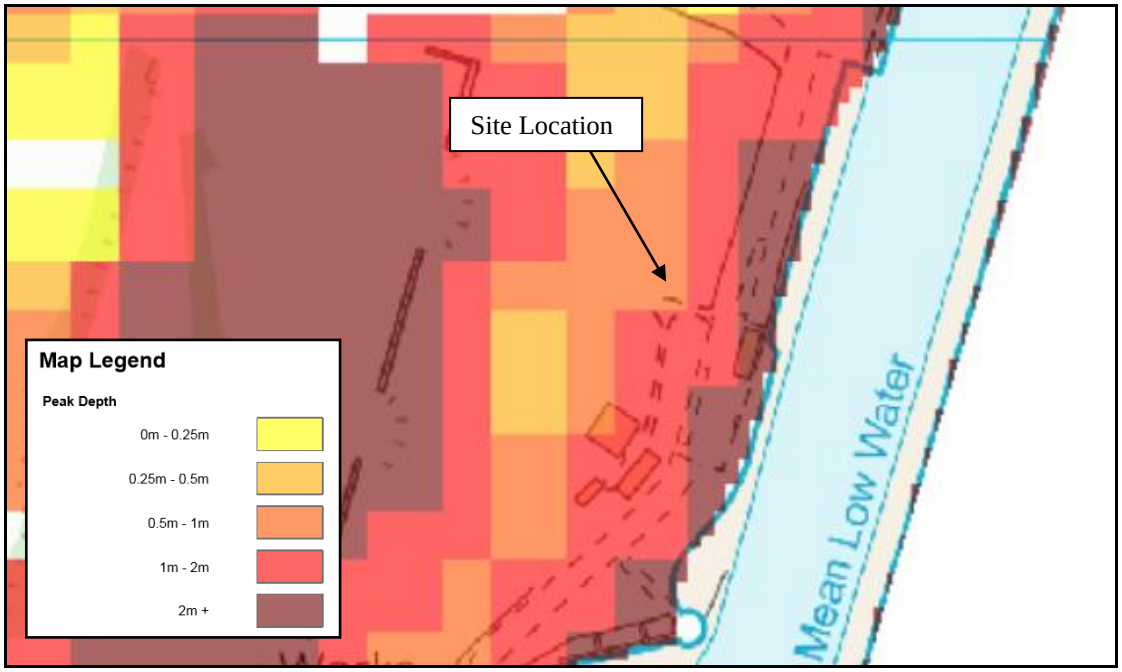


Figure 3 – SFRA 2115 Residual Peak Depth Map

In the area of the proposed green keepers hut the breach depth is estimated to be 1.0m.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Westmere Tidal Sluice could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 1% annual probability (1 in 100 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development, it is not anticipated that the site would flood.

The SFRA considers the residual risk associated with overtopping and a breach in the defences in 2116. A peak flood depth of 1.0m has been estimated around the green keepers hut.

The proposed arrangement increases the impermeable area so there will be an increased volume of surface water. This has the potential to increase flood risk.

5.2 Mitigation Measures

The site has a low 'actual risk' of flooding. Considering the development is a green keepers hut it is recommended that there is a water entry strategy that allows flood water to enter the building and drain from it and there is 1m of flood resilient construction above floor level.

The developer should ensure that the user of the site is sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high. In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding.

Should there be a failure of Westmere Tidal Sluice and conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment.

It is recommended that surface water run-off is managed so that stormwater from the development will not affect any adjoining properties or increase the flood risk elsewhere.

6.0 CONCLUSION

As a result of the assessment, the following conclusions have been reached.

- The proposed development consists of a green keepers hut at Sutton Bridge Golf Club, West Bank, Sutton Bridge.

- The site is located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the South Holland IDB high priority watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

- The proposed development is in Flood Zone 3. The River Nene tidal defences provide protection during the 0.5% annual probability (1 in 200 chance each year) event. During the design life of the development, including an allowance for climate change, it is not anticipated that there would be flooding at the site.

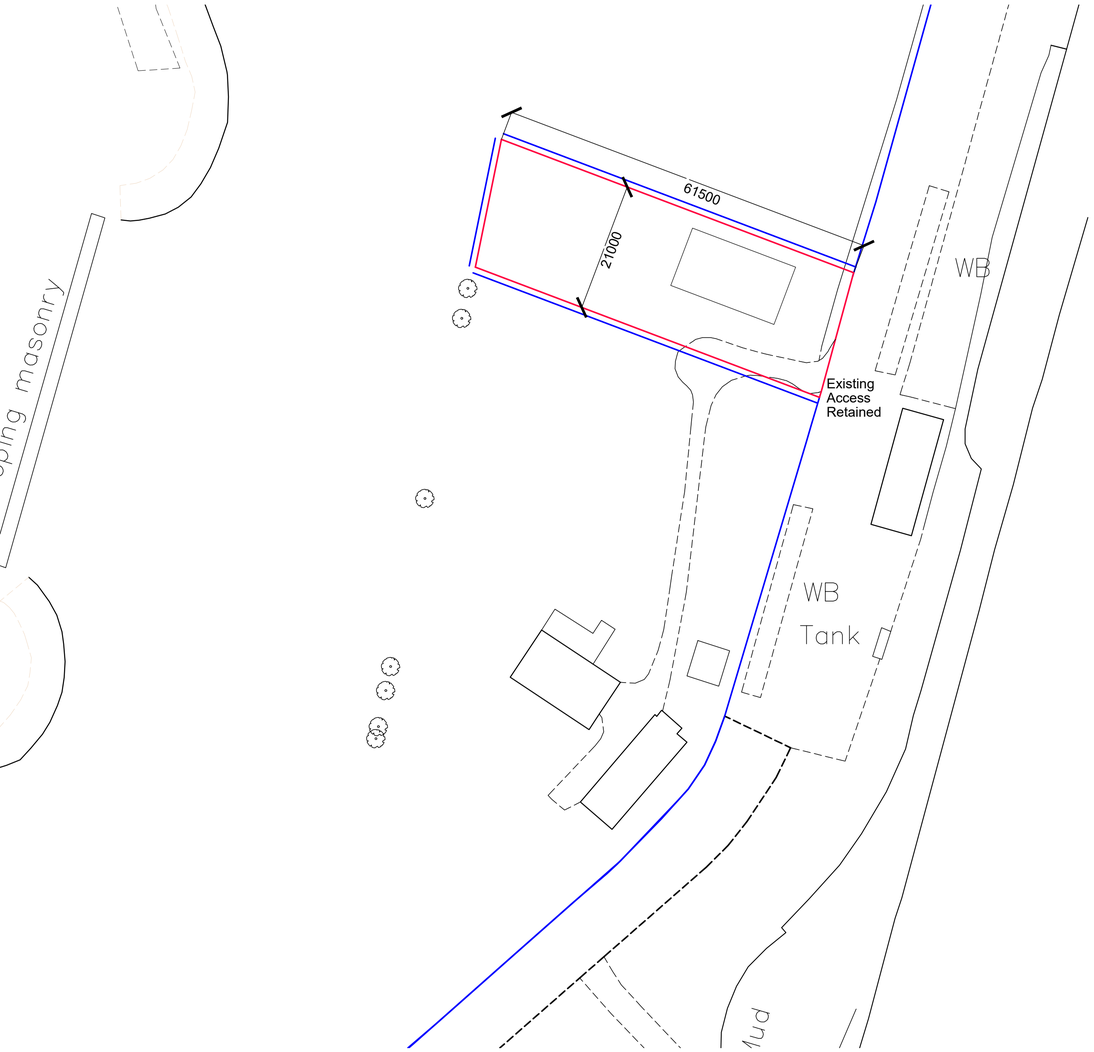
- The site is at risk of a breach with depths up to 1.0m around the proposed green keepers hut.

- It is recommended that there is a water entry strategy and that there is 1.0m of flood resilient construction above floor level.

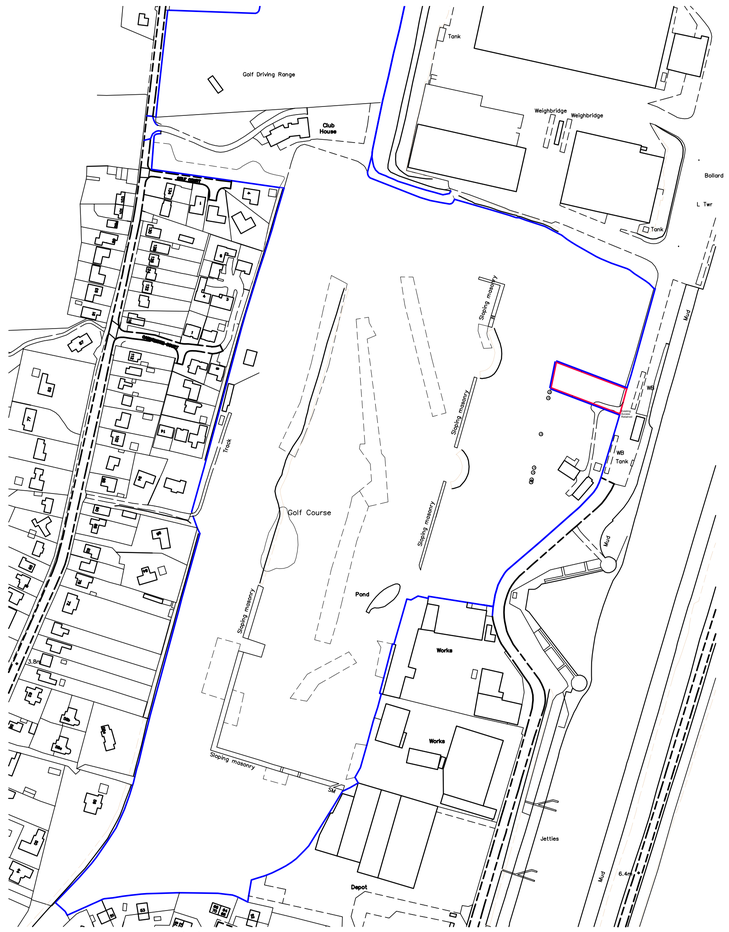
- The development passes the Sequential Test and is therefore suitable for the proposed location.

ATTACHMENT 1

ELEVATIONS, LOCATION AND SITE PLANS
(Dwg 6456 PL01)



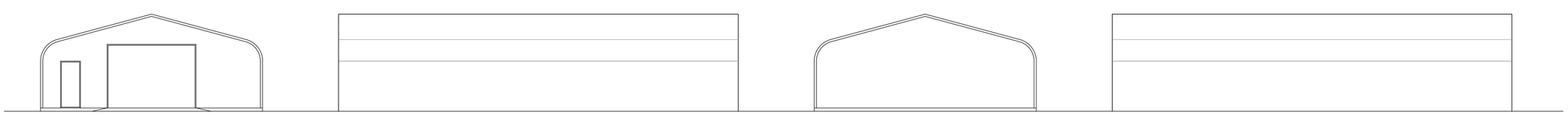
SITE PLAN 1:500



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LOCATION PLAN 1:2500

Green keepers hut



Front Elevation 1:100

Side Elevation 1:100

Rear Elevation 1:100

Side Elevation 1:100

A -

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CLIENT

SUTTON BRIDGE GOLF COURSE

PROJECT

GREEN KEEPERS HUT

SITE

WEST BANK
SUTTON BRIDGE
LINCS

DRAWING

PLANNING

JOB NO.	PAPER SIZE	DATE
6456 PL01	A1	NOV 2021

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