ROY LOBLEY CONSULTING
Specialists in Flood Risk Management

FLOOD RISK ASSESSMENT

CHANGE OF USE TO EDUCATIONAL ESTABLISHMENT AND OFFICES MINERVA HOUSE, PARK ROAD, HOLBEACH

Lincolnshire County Council
April 2024

DOCUMENT ISSUE RECORD

Document Reference	RLC/1499/FRA01

Revision		Date of Issue
1	Issued	22/04/2024

Author

Roy Lobley
07847 482244
Roy.Lobley@outlook.com
http://www.roylobleyconsulting.com/

Limitations

The conclusions drawn by Roy Lobley Consulting are based on information supplied and could differ if the information is found to be inaccurate or misleading. In which case Roy Lobley Consulting accepts no liability should additional information exist or becomes available with respect to this project.

The information in this report is based on statistical data and qualitative analysis which are for guidance purposes only. This study provides no guarantee against flooding or of the absolute accuracy of water levels, flows and associated probabilities.

This report has been prepared for the sole use of Lincolnshire County Council and no other third parties may rely upon or reproduce the contents of this report without the written permission of Roy Lobley Consulting.

EXECUTIVE SUMMARY

This Flood Risk Assessment is compliant with the requirements set out in the National Planning Policy Framework, and the associated online Planning Practice Guidance. It has been produced on behalf of Lincolnshire County Council. This report demonstrates that the proposed development is not at significant flood risk, and will not increase flood risk to others, subject to the recommended flood mitigation strategies being implemented.

Policy

Development Type	Flood Zone	Vulnerability	Sequential Test
EDUCATIONAL ESTABLISHMENTS AND OFFICES	3	MORE VULNERABLE AND LESS VULNERABLE	NOT REQUIRED

Climate Change Allowance

Peak River Flow

WELLAND MANAGEMENT CATCHMENT	
Allowance Category	Percentage Increase
CENTRAL	26

Sea Level Rise

Area of England	Allowance	2000-2035 (mm/year)	2036-2065 (mm/year)	2066-2095 (mm)/year	2096-2125 (mm/year)
Anglian	Higher Central	5.8	8.7	11.6	13.0
	Upper End	7.0	11.3	15.8	18.1

Flood Risk and Mitigation

Flood Risk Source	Level of Risk Without Mitigation	Proposed Mitigation
Fluvial/tidal	Medium	1st floor safe refuge. Flood resilience to 3.70m AOD. Flood emergency plan.
Groundwater Sewers	Low	
Pluvial Reservoir Canal/Artificial	None	

CONTENTS PAGE

DOCUMENT ISSUE RECORD i

EXECUTIVE SUMMARY ii
Policy ii
Climate Change Allowance ii
Flood Risk and Mitigation ii

CONTENTS PAGE iii

1.0 INTRODUCTION 1
Data Used 1
Existing Site 1
Proposed Development 2

2.0 FLOOD RISK PLANNING POLICY 3
National Planning Policy Framework 3
Sequential Test 3
Flood Zone Definition 3
Flood Risk Vulnerability Classification 4
Appropriate Development 5
Exception Test 5
Development Proposals 6

3.0 CLIMATE CHANGE 7
Peak River Flow Allowances 7
Peak Rainfall Intensity Allowance 7
Sea Level Allowances 8

4.0 FLOOD RISK SOURCES 9
Fluvial and Tidal 9
South East Lincolnshire Strategic Flood Risk Assessment (March 2017) 9
Pluvial 11
Groundwater 11
Sewers 12
Reservoirs 12
Canals and Artificial Water Bodies 12

5.0 MITIGATION 13
Site Layout 13

6.0 CONCLUSIONS 14

TABLES

Table 3.1 Climate Change Allowances for Peak River Flow....7
Table 3.2 Climate Change Allowances for Sea Level Rise....8
Table 6.1 Summary of Risk and Mitigation....14

FIGURES

Figure 1.1 Site Location....1
Figure 1.2 Proposed Plan....2
Figure 2.1 Flood Zones....6
Figure 4.1 Residual Peak Flood Depths including Climate Change....9
Figure 4.2 Residual Flood Hazard including Climate Change....10
Figure 4.3 Surface Water Flooding Extents....11

1.0 INTRODUCTION

1.1 This Flood Risk Assessment, (FRA), is compliant with the requirements set out in the National Planning Policy Framework, (NPPF), and the associated online Planning Practice Guidance.

1.2 The FRA has been produced on behalf of Lincolnshire County Council in respect of a planning application for a change of use to educational establishment and offices at Minerva House, Park Road, Holbeach.

Data Used

1.3 This FRA is based on the following information:

- LiDAR 2m DTM
- Proposed Plans
- British Geological Survey Drift & Geology Maps
- Environment Agency Data
- South East Lincolnshire Strategic Flood Risk Assessment (March 2017)
- British Geological Survey Hydrogeology Data

Existing Site

1.4 The site is located at grid reference TF3604125513 as shown in **Figure 1.1** below.

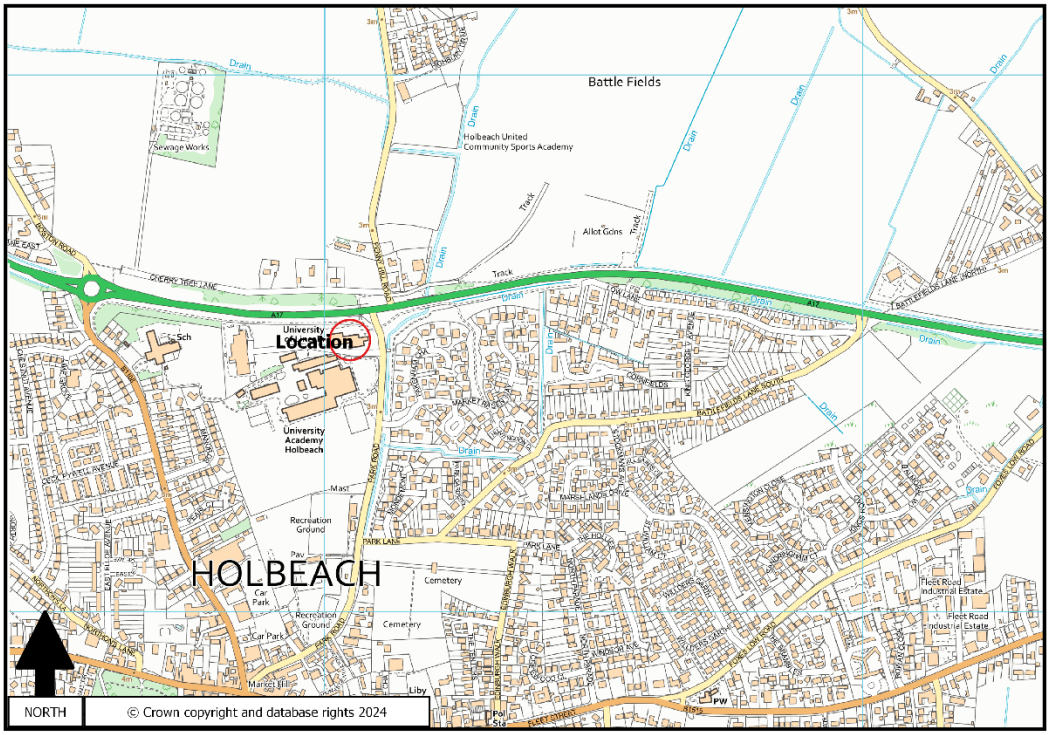


Figure 1.1 Site Location

1.5 LiDAR 2m DTM shows that the existing land level is approximately 3.20m AOD adjacent to the building.

1.6 The online British Geological Survey maps indicates that the site is located on superficial deposits of clay and silt over a bedrock of mudstone.

Proposed Development

1.7 The proposed development consists of a change of use to educational establishment and offices as shown on the extract of the proposed ground floor plan below in **Figure 1.2**

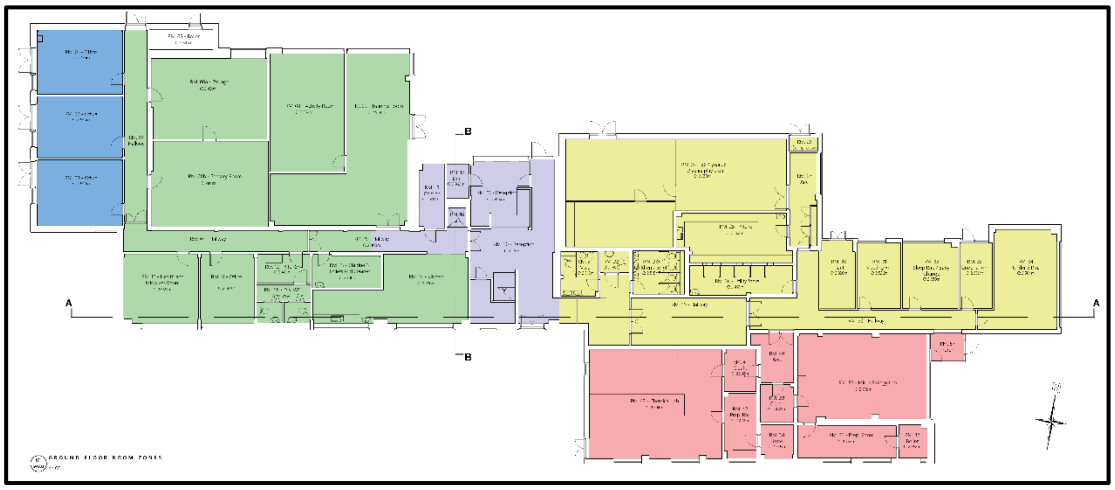


Figure 1.2 Proposed Plan

2.0 FLOOD RISK PLANNING POLICY

National Planning Policy Framework

2.1 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. A supporting web-based Planning Practice Guidance is also available.

2.2 The guidance uses four Flood Zones to characterise flood risk which refer to the probability of river and sea flooding, ignoring the presence of defences.

Sequential Test

2.3 The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding and the Flood Zones provide the basis for applying the Test.

Flood Zone Definition

Flood Zone 1	Low probability (1 in 1000 annual probability of river or sea flooding (<0.1%)).
Flood Zone 2	Medium probability (between 1 in 100 and 1 in 1000 annual probability of river flooding (1.0%.-.0.1%) or between 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%.-.0.1%) in any given year).
Flood Zone 3a	High probability (1 in 100 or great annual probability of river flooding (>1.0%) or 1 in 200 or greater annual probability of sea flooding (>0.5%) in any given year).
Flood Zone 3b	This zone comprises land where water must flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 30 (3.3%), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

2.4 The Flood Zones do not consider the projected effects of climate change and may not represent potential flooding from smaller watercourses.

2.5 The aim is to steer new development to Flood Zone 1 and where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required.

2.6 Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the Exception Test if required.

2.7 The guidance also sets out the vulnerability to flooding of different land uses and this land use is highlighted below.

Flood Risk Vulnerability Classification

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 infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood.
- Wind turbines.
- Solar farms

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.
- Car parks.

Water Compatible

- 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 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

Appropriate Development

2.8 Based on the vulnerability of a development the guidance states what Flood Zone(s) the development is appropriate within. The flood risk compatibility is summarised below.

Flood Zone 1	Appropriate Development – All.
Flood Zone 2	Exception Test - Highly vulnerable. Appropriate Development - Essential Infrastructure; More vulnerable; Less vulnerable and Water Compatible.
Flood Zone 3a	Should not be permitted – Highly vulnerable. Exception Test – Essential Infrastructure, More vulnerable. Appropriate Development – Less vulnerable; Water compatible.
Flood Zone 3b	Should not be permitted – Highly vulnerable; More vulnerable; Less vulnerable. Exception Test – Essential Infrastructure. Appropriate Development –Water compatible.

2.9 The Planning Practice Guidance also states that all sources of flooding should be considered when preparing a FRA.

Exception Test

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

2.11 The first part of the Exception Test is to show that the proposed development will provide wider sustainability benefits to the community that outweigh flood risk. The second part is the requirement for a FRA to demonstrate that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

Development Proposals

2.12 The proposed development consists of an educational establishment and offices.

Flood Zones

2.13 The Flood Zones are shown on **Figure 2.1** below which shows the site to be in Flood Zone 3.

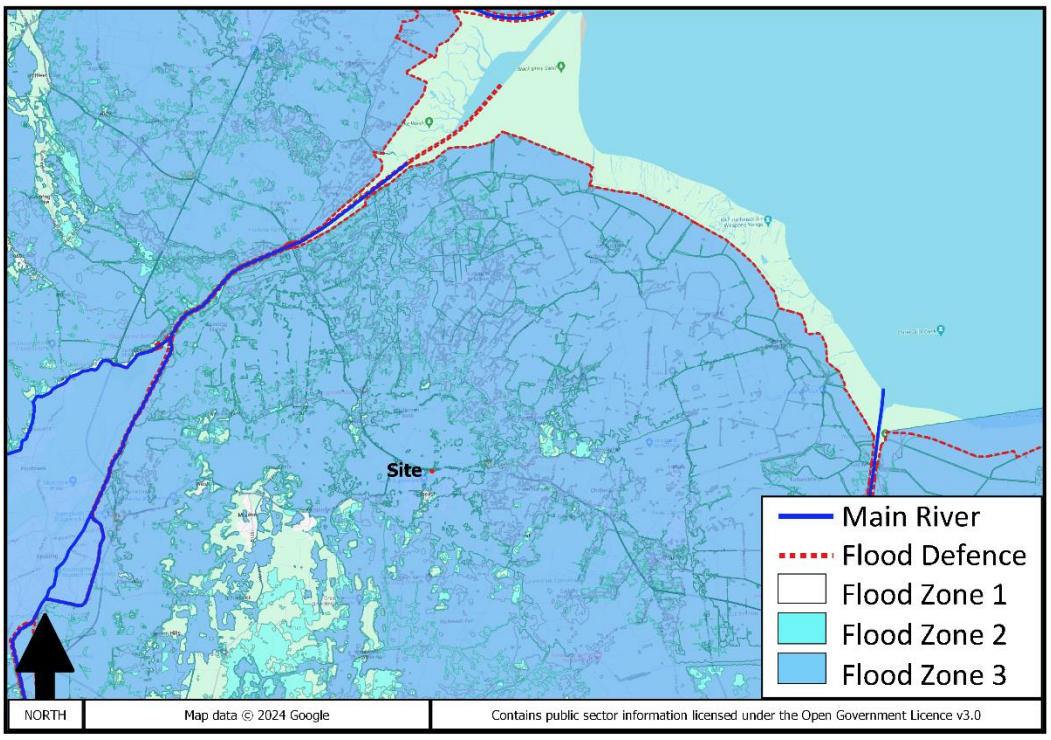


Figure 2.1 Flood Zones

Development Vulnerability

2.14 Educational establishments are more vulnerable and offices are less vulnerable.

2.15 The NPPF states that *"Applications for some minor development and changes of use should not be subject to the Sequential or Exception Tests but should still meet the requirements for site-specific flood risk assessments."*

2.16 The proposed development is for a change of use and therefore not subjected to the Sequential and Exception Tests.

2.17 A FRA is required to ensure the development will remain safe over its lifetime from all sources of flooding and not increase flood risk elsewhere.

3.0 CLIMATE CHANGE

3.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change.

3.2 As the Government's expert on flood risk on 19th February 2016 the Environment Agency, (EA), published revised climate change allowances to support the NPPF. The sea level rise allowances were revised on the 17th December 2019, the peak river flows revised on the 20th July 2021 and the peak rainfall allowances were revised on 10th May 2022.

3.3 The climate change allowances are based on projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere and provide predictions of anticipated change for:

- peak river flow and peak rainfall intensity by river Management Catchment;
- sea level rise;
- offshore wind speed and extreme wave height.

Peak River Flow Allowances

3.4 The peak river flow allowances show the anticipated changes to peak flow by Management Catchment with three allowances; central; higher central and upper end. This proposed development is in the Welland Management Catchment.

3.5 The appropriate allowance depends on the Flood Zone and vulnerability classification of the development and for this proposal it is appropriate to use the Central allowance.

3.6 The allowances change over three periods of time over the next century. The appropriate period should be chosen based on the expected lifetime of the development and for commercial that is 50 years.

3.7 The following climate change allowances in peak river flows therefore need to be applied:

WELLAND	
Allowance Category	**Percentage Increase**
Central	26

Table 3.1 Climate Change Allowances for Peak River Flow

Peak Rainfall Intensity Allowance

3.8 Increased rainfall affects river levels and land and urban drainage and should be applied to surface water drainage systems. However, the proposed development does not increase the impermeable area for these allowances to apply.

Sea Level Allowances

3.9 There is a range of allowances for each region and epoch or time frame for sea level rise as follows:

Area of England	Allowance	2000-2035 (mm/year)	2036-2065 (mm/year)	2066-2095 (mm)/year	2096-2125 (mm/year)
Anglian	Higher Central	5.8	8.7	11.6	13.0
	Upper End	7.0	11.3	15.8	18.1

Table 3.2 Climate Change Allowances for Sea Level Rise

4.0 FLOOD RISK SOURCES

4.1 The following flood risk sources have been identified and where mitigation is required to reduce the flood risk this is discussed in **Section 5**.

Fluvial and Tidal

Main River

4.2 The nearest EA Main Rivers to the site are the River Welland and River Nene approximately 8.00km and 13.00km to the north and east of the site.

Ordinary Watercourses

4.3 The site lies within the district of the South Holland Internal Drainage Board, (IDB).

4.4 The site is approximately 10.00km from the Wash Estuary to the north east.

South East Lincolnshire Strategic Flood Risk Assessment (March 2017)

4.5 The South East Lincolnshire Strategic Flood Risk Assessment, (SFRA), includes mapping showing the residual peak flood depths for both fluvial and tidal flooding including the climate change allowances. An extract of that map is shown below in **Figure 4.1** which shows the site to be affected by flood depths between **0.25m and 0.50m**.

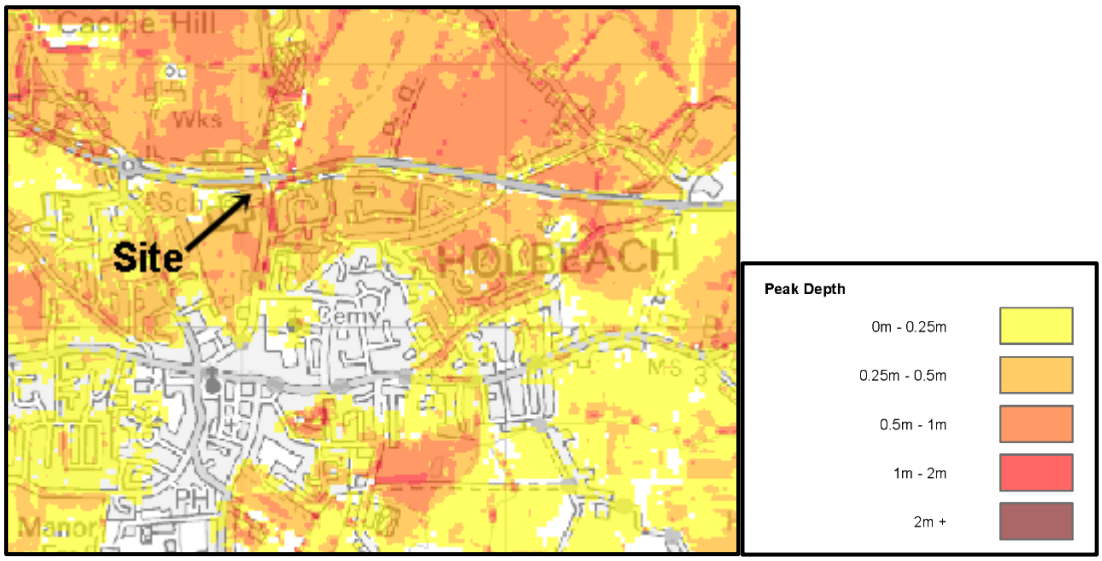


Figure 4.1 Residual Peak Flood Depths including Climate Change

4.6 The SFRA also includes mapping showing the residual flood hazard for both fluvial and tidal flooding including the climate change allowances. An extract of that map is shown below in **Figure 4.2** which shows the site to be at a **Danger for Some** hazard.

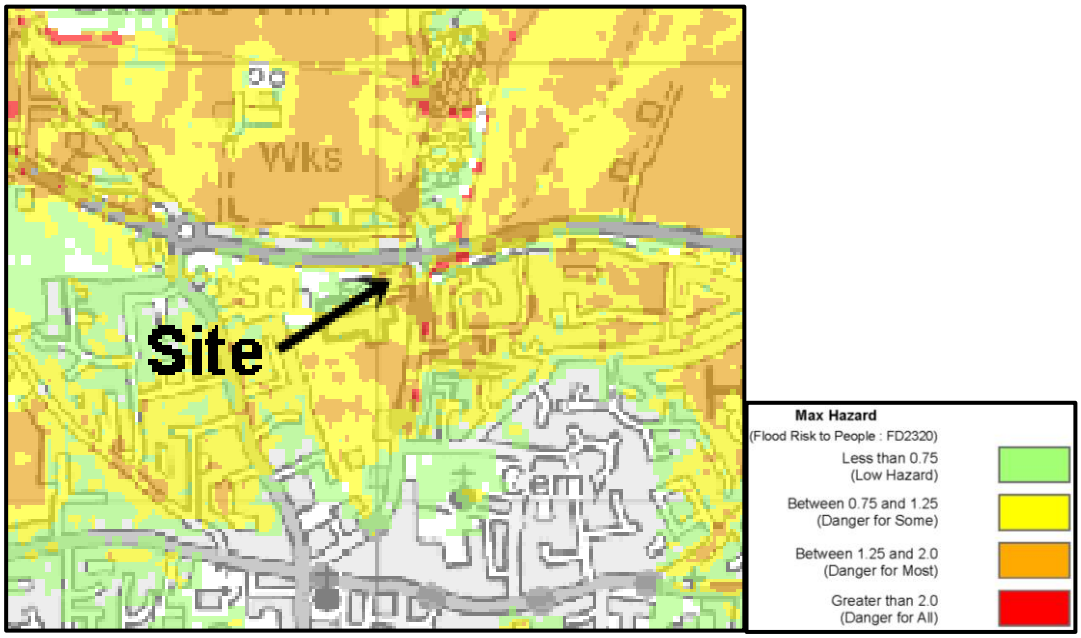


Figure 4.2 Residual Flood Hazard including Climate Change

4.7 The risk of flooding from fluvial and tidal sources is medium.

Pluvial

4.8 The EA have produced maps showing flooding when rainwater lies or flows over the ground. The surface water flooding extents are shown below in **Figure 4.3**. Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area.

4.9 There is a caveat, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they are indicative these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

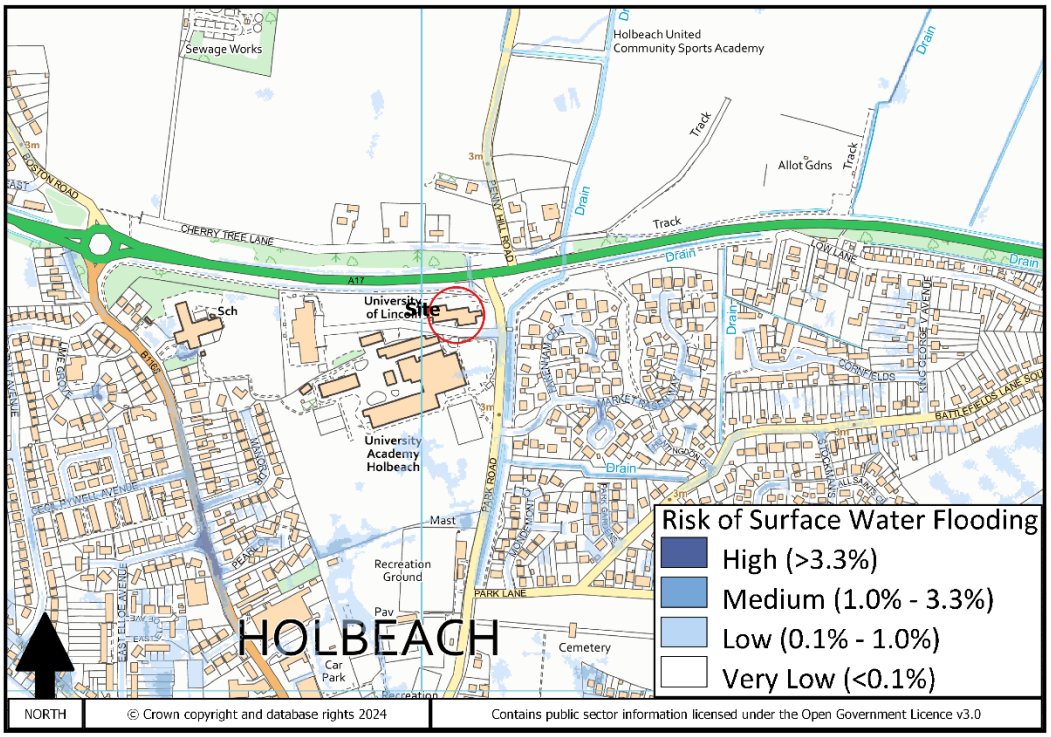


Figure 4.3 Surface Water Flooding Extents

4.10 The site is not at risk of flooding from pluvial sources.

Groundwater

4.11 The site is located on rocks with essentially no groundwater and there are no known instances of groundwater flooding in the area.

4.12 The risk of flooding from groundwater is low.

Sewers

4.13 Public maintained sewers run adjacent to the site but are unlikely to pose a significant flood risk as they are well maintained.

4.14 The risk of flooding from existing sewers is low.

Reservoirs

4.15 The EA has prepared reservoir failure flood risk mapping to show the largest area that might be flooded if a reservoir were to fail and release the water it holds.

4.16 The site is not at risk of flooding from reservoirs.

Canals and Artificial Water Bodies

4.17 The site is not at risk of flooding from canals.

5.0 MITIGATION

5.1 Section 4.0 has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Site Layout

5.2 The proposed development is at a medium risk of flooding from fluvial/tidal sources.

5.3 The existing land level is approximately 3.20m AOD adjacent to the building.

5.4 The residual flood depths are between 0.25m and 0.50m.

5.5 The 1st floor includes areas which can be used as a safe refuge, including toilet facilities.

5.6 Flood resilience measures will be included, where required, as follows;

- Water resisting airbricks.
- Backwater valves and non-return valves.
- New electrical installation to be above **3.70m AOD**.

5.7 It is recommended that the future occupants sign up to the EA flood warning service and a flood evacuation plan be the subject of a condition which includes as a minimum;

- Potential sources of flooding and severity;
- Flood warning trigger level;
- Actions to be taken by staff on receipt of warning;
- Identification of escape routes and potential flood depths, (see below);
- Deploying flood protection and safe refuge;
- Reoccupation of the Site;
- Training and Exercising;
- Emergency contact information.

6.0 CONCLUSIONS

6.1 This FRA is compliant with the requirements set out in the NPPF and the associated online Planning Practice Guidance.

6.2 The FRA has been produced on behalf of Lincolnshire County Council.

6.3 This report demonstrates that the proposed development is not at significant flood risk, and will not increase flood risk to others, subject to the recommended flood mitigation strategies being implemented.

6.4 The identified risks and mitigation measures are summarised below;

Flood Risk Source	Level of Risk Without Mitigation	Proposed Mitigation
Fluvial/tidal	Medium	1st floor safe refuge. Flood resilience to 3.70m AOD. Flood emergency plan.
Groundwater Sewers	Low	
Pluvial Reservoir Canal/Artificial	None	

Table 6.1 Summary of Risk and Mitigation

ROY LOBLEY CONSULTING

Roy.Lobley@outlook.com
07847482244
www.roylobleyconsulting.com