

# **FLOOD RISK ASSESSMENT**

**Change of use to HMO  
70 Princes Road, Hull**

**Mr J Coupland  
October 2020**



## DOCUMENT ISSUE RECORD

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## EXECUTIVE SUMMARY

This Flood Risk Assessment is compliant with the requirements set out in the National Planning Policy Framework 2019 and the associated online Planning Practice Guidance. It has been produced on behalf of Mr J Coupland. 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
Dwelling Houses	3	More Vulnerable	Not Required

### Climate Change Allowance

#### Peak River Flow

HUMBER RIVER BASIN DISTRICT	
Allowance Category	Percentage Increase
Upper End	50
Higher Central	30

#### Sea Level Rise

Area of England	Allowance	2000-2035 (mm/year)	2036-2065 (mm/year)	2066-2095 (mm)/year	2096-2125 (mm/year)
Humber	Higher Central	5.5	8.4	11.1	12.4
	Upper End	6.7	11.0	15.3	17.6

### Flood Risk and Mitigation

Flood Risk Source	Level of Risk Without Mitigation	Proposed Mitigation
Residual	Medium	Existing FFL 2.00m AOD. Water resistant external doors to 2.60m AOD Flood Resilience to 2.60m AOD Safe refuge above 3.00m AOD and flood response plan
Fluvial Tidal Groundwater Sewers	Low	
Pluvial Reservoir Canal/Artificial	None	

## CONTENTS PAGE

<b>DOCUMENT ISSUE RECORD</b>	<b>i</b>
<b>EXECUTIVE SUMMARY</b>	<b>ii</b>
Policy	ii
Climate Change Allowance	ii
Flood Risk and Mitigation	ii
<b>CONTENTS PAGE</b>	<b>iii</b>
<b>1.0 INTRODUCTION</b>	<b>1</b>
Data Used	1
Existing Site	1
Proposed Development	2
<b>2.0 FLOOD RISK PLANNING POLICY</b>	<b>3</b>
National Planning Policy Framework 2019	3
Sequential Test	3
Flood Zone Definition	3
Flood Risk Vulnerability Classification	4
Appropriate Development	4
Exception Test	4
Development Proposals	5
<b>3.0 CLIMATE CHANGE</b>	<b>6</b>
Peak River Flow Allowances	6
Peak Rainfall Intensity Allowance	6
Sea Level Allowances	7
<b>4.0 FLOOD RISK SOURCES</b>	<b>8</b>
Fluvial	8
Tidal	8
Climate Change	8
Residual Risk	9
Pluvial	10
Groundwater	10
Sewers	10
Reservoirs	11
Canals and Artificial Water Bodies	11
<b>5.0 MITIGATION</b>	<b>12</b>
Site Layout	12
<b>6.0 CONCLUSIONS</b>	<b>13</b>

### TABLES

Table 3.1 Climate Change Allowances for Peak River Flow .....	6
Table 3.2 Climate Change Allowances for Sea Level Rise .....	7
Table 6.1 Summary of Risk and Mitigation .....	13

### FIGURES

Figure 1.1 Site Location .....	1
Figure 1.2 Proposed Plan .....	2
Figure 2.1 Flood Zones.....	5
Figure 4.1 Flood Depths.....	9
Figure 4.2 Surface Water Flooding Extents .....	10



## 1.0 INTRODUCTION

- 1.1 This Flood Risk Assessment, (FRA), is compliant with the requirements set out in the National Planning Policy Framework 2019, (NPPF), and the associated online Planning Practice Guidance.
- 1.2 The FRA has been produced on behalf of Mr J Coupland in respect of a planning application for a change of use to a HMO at 70 Princes Road, Hull.

### 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
  - Hull City Council Strategic Flood Risk Assessment
  - British Geological Survey Hydrogeology Data

### Existing Site

- 1.4 The existing building is number 70 Princes Road, Hull and is located at grid reference TA0840830858 as shown in **Figure 1.1** below



**Figure 1.1 Site Location**

- 1.5 The building is currently a dwelling with a ground floor bedroom and bathroom.
- 1.6 LiDAR 2m DTM shows that Princes Street adjacent to the building and the open yard to the rear of the property is at approximately 1.70m AOD. The ground floor of the property is approximately 0.30m higher at 2.00m AOD
- 1.7 The online British Geological Survey maps indicates that the site is located on superficial deposits of clay and silt over a bedrock of chalk.

## Proposed Development

- 1.8 The proposed development consists of a change of use to a HMO as shown on the extract of the proposed plan below in **Figure 1.2**



**Figure 1.2 Proposed Plan**



## 2.0 FLOOD RISK PLANNING POLICY

### National Planning Policy Framework 2019

- 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

<b>Flood Zone 1</b>	Low probability (1 in 1000 annual probability of river or sea flooding (<0.1%)).
<b>Flood Zone 2</b>	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).
<b>Flood Zone 3a</b>	High probability (1 in 100 or greater annual probability of river flooding (>1.0%) or 1 in 200 or greater annual probability of sea flooding (>0.5%) in any given year).
<b>Flood Zone 3b</b>	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 20 (5.0%), 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 some of these are detailed below.

## Flood Risk Vulnerability Classification

<b>Essential Infrastructure</b>	Transport Infrastructure; Utility Infrastructure; Wind Turbines.
<b>Water Compatible</b>	Flood Control Infrastructure; Water and Sewage Infrastructure; Navigation Facilities.
<b>Highly Vulnerable</b>	Emergency Services (which are required in times of flood); Basement Dwellings; Caravans, Mobile Homes and Park Homes, (intended for permanent residential use); Installations requiring Hazardous Substances Consent.
<b>More Vulnerable</b>	Hospitals and other Health Services; Residential Institutions; Dwelling Houses, Drinking Establishments; Nightclubs; Hotels; Non-residential uses for Health Services; Nurseries; Educational Establishments; Landfill and Hazardous Waste Management Facilities; Sites used for Holiday or short-let Caravan and Camping sites, (subject to a specific warning and evacuation plan).
<b>Less Vulnerable</b>	Commercial Establishments; Emergency Services not required in times of flood; Land and Buildings used for Agriculture and Forestry. Waste Treatment; Minerals Working; Water Treatment Works; Sewage Treatment Works.

## 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.

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

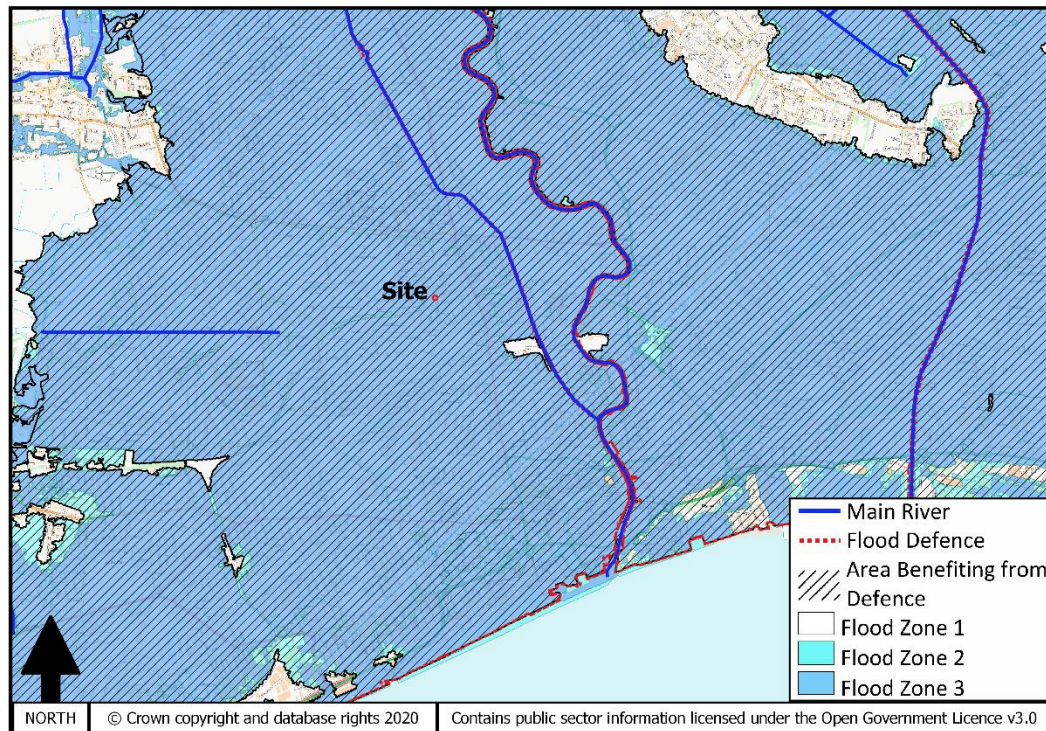
- 2.10 The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.
- 2.11 The first part of the Exception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

### 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 Dwelling Houses are More Vulnerable.

### Site Sequential Test

- 2.15 Paragraph 164 of the NPPF states that “Applications for 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.

### Exception Test

- 2.17 Whilst the development is considered appropriate 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 19<sup>th</sup> February 2016 the Environment Agency, (EA), published revised climate change allowances to support the NPPF. The sea level rise allowances were further revised on the 17<sup>th</sup> December 2019.
- 3.3 The climate change allowances are based on projections and different scenarios of carbon dioxide (CO<sub>2</sub>) emissions to the atmosphere and provide predictions of anticipated change for:
- peak river flow by river basin district;
  - peak rainfall intensity;
  - 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 River Basin District, (RBD), with three allowances; central; higher central and upper end.
- 3.5 This proposed development is in the Humber RBD.
- 3.6 The appropriate allowance depends on the Flood Zone and vulnerability classification of the development and for this proposal it is appropriate to use the upper end and higher central allowances.
- 3.7 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 residential that is 100 years.
- 3.8 The following climate change allowances in peak river flows therefore need to be applied:

HUMBER RIVER BASIN DISTRICT	
Allowance Category	Percentage Increase
Upper End	50
Higher Central	30

**Table 3.1 Climate Change Allowances for Peak River Flow**

### Peak Rainfall Intensity Allowance

- 3.9 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

- 3.10 There is a range of allowances for each region and epoch or time frame for sea level rise.

Area of England	Allowance	2000-2035 (mm/year)	2036-2065 (mm/year)	2066-2095 (mm)/year	2096-2125 (mm/year)
Humber	Higher Central	5.5	8.4	11.1	12.4
	Upper End	6.7	11.0	15.3	17.6

**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

#### Main River

- 4.2 The nearest EA Main River to the site is the Beverly and Barmston Drain approximately 0.87km to the east of the site. This drain is a tributary of the River Hull which is approximately 1.50km to the east.
- 4.3 Flood risk from the River is reduced due to the presence of raised defences. Information provided in the Hull City Council Strategic Flood Risk Assessment, (SFRA), shows that existing defences on the River Hull consist of steel piling, timber wharfs, concrete walls and masonry walls within the city.
- 4.4 The current standard of protection of the River Hull defences through Hull, excluding freeboard allowance, is greater than 1 in 200 (0.5% annual probability), assuming the Hull Barrier operates as intended.
- 4.5 The Hull Tidal Surge Barrier, located at the mouth of the River Hull where it joins the Humber, prevents high sea levels caused by surge tides overtopping the River Hull defences.
- 4.6 The risk of flooding from fluvial sources is low.

### Tidal

- 4.7 The site is approximately 3.20km from the Humber Estuary to the south.
- 4.8 Flood risk from the Humber is reduced due to the presence of raised defences. Information provided in the SFRA shows that within the city the defences consist of a mixture of vertical sea walls and concrete revetments. Some of the defences have been raised by the construction of new wave return walls along the length of the crest of the existing structure.
- 4.9 The current standard of protection of the Humber defences, excluding freeboard allowance, adjacent to Kingston upon Hull varies from 1 in 200 or greater in the west to less than 1 in 5 adjacent to Victoria Pier and the western part of Victoria Dock Village.
- 4.10 The risk of flooding from tidal sources is low.

### Climate Change

- 4.11 The SFRA includes modelling using the upper end allowance of 50% for the River Hull and Holderness Drain “with defences” situation.



## Residual Risk

- 4.12 Whilst the fluvial and tidal flood risk to the site is reduced by the presence of defences there is a residual flood risk should those defences be overtopped or breached.
- 4.13 The SFRA includes mapped information for use in applying the Exception Test showing maximum flood depths from the sources listed below;
- Overtopping with current defence levels for 1% fluvial event and 0.5% tidal event for present day climate.
  - Overtopping with current defence levels for 1% fluvial event with allowance for climate change to 2116. The upper end fluvial flow increase (50% increase) scenario is used where available. Note there is no significant overtopping of the River Hull in Hull City Council.
  - Breaching of defences for 1% fluvial event and 0.5% tidal event with allowance for climate change to 2116.
  - Surface water for 0.1% rainfall event for present day climate.
- 4.14 An extract of the SFRA map is shown below in **Figure 4.1** which identifies that Princes Road adjacent to the site and the open yard to the rear to be subject to depths of between 0.30m and 0.60m.

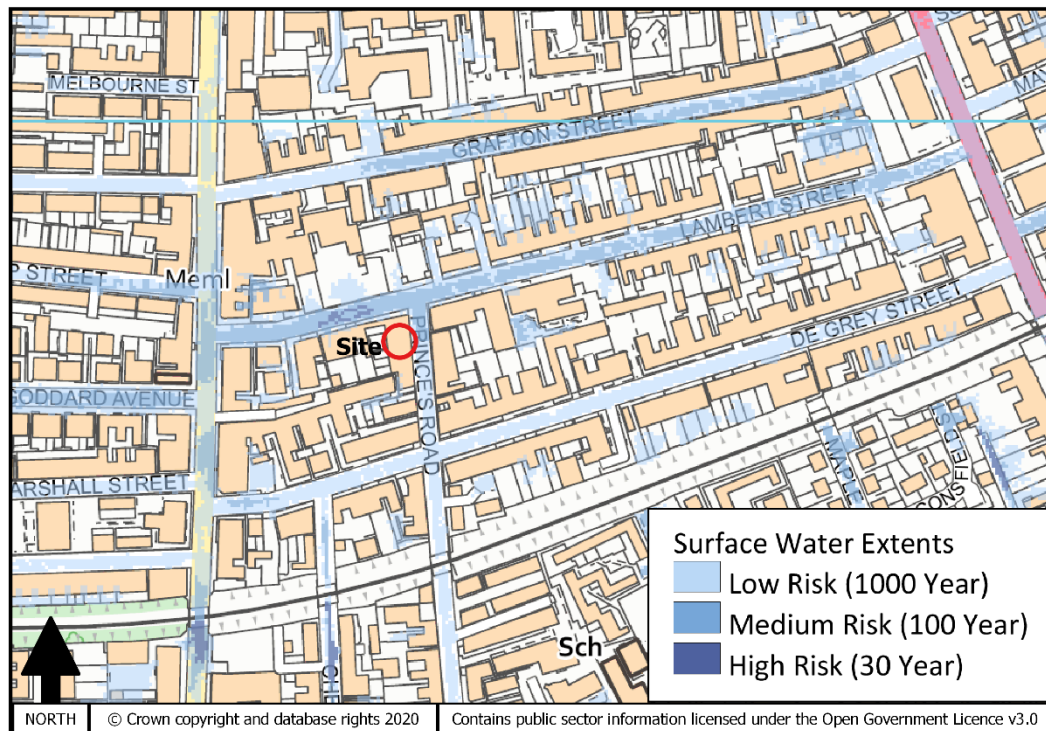


**Figure 4.1 Flood Depths**

- 4.15 The residual flood risk is medium.

## Pluvial

- 4.16 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 4.2**.



**Figure 4.2 Surface Water Flooding Extents**

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

## Groundwater

- 4.18 The site is located on a high productivity aquifer as shown on the British Geological Survey hydrogeology map below and there are no known instances of groundwater flooding in the area.

- 4.19 The risk of flooding from groundwater is low.

## Sewers

- 4.20 A combined sewer runs adjacent to the site but is unlikely to pose a significant flood risk as it is well maintained.

- 4.21 The risk of flooding from existing sewers is low.



### **Reservoirs**

- 4.22 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. The mapping displays a worst-case scenario and is only intended as a guide.
- 4.23 The site is not at risk of flooding from reservoir failure.

### **Canals and Artificial Water Bodies**

- 4.24 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 residual flood risk to the site is medium with potential flood depths of between 0.30m and 0.60m based on a 50% increase for climate change adjacent to the site on Princes Street. LiDAR 2m DTM shows that Princes Street and the open yard to the rear of the property has levels of approximately 1.70m AOD.
- 5.3 To accompany the SFRA the EA have issued Local Flood Risk Standing Advice which, for changes of use of More Vulnerable uses, with flood depths of between 0.30m and 0.60m, recommends that in order to exclude potential flood water, finished floor levels shall be raised a minimum of 0.60m above average site level or adjacent road frontage level, whichever is higher. An additional 0.30m of flood resilience measures above finished floor levels, shall be included to speed the rate of recovery and minimise the impacts should flood waters enter the property.
- 5.4 However, given the proposed development is a change of use from an existing dwelling, it is not possible to raise floor levels. The existing floor level is approximately **2.00m AOD** and the maximum flood level is 1.70m AOD + 0.60m = **2.30m AOD**.
- 5.5 Therefore, passive flood proofing measures in the form of the ground floor external doors being water resistant to a depth of 0.60m will be incorporated. These will exclude water to a minimum of 0.60m to a level of approximately **2.60m AOD**.
- 5.6 0.30m of flood resilience measures above the flood level will be included, to speed the rate of recovery and minimise the impacts should flood waters enter the property. The flood resilience measures will include water resisting airbricks, backwater valves and non-return valves and all electrical installation to be above 2.60m AOD.
- 5.7 The first floor will be used as a place of safety which will be above 3.00m AOD and it is recommended that the future occupants sign up to the EA flood warning service and a flood emergency 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;
  - 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 Mr J Coupland.
- 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
Residual	Medium	Existing FFL 2.00m AOD. Water resistant external doors to 2.60m AOD Flood Resilience to 2.60m AOD Safe refuge above 3.00m AOD and flood response plan
Fluvial Tidal Groundwater Sewers	Low	
Pluvial Reservoir Canal/Artificial	None	

**Table 6.1 Summary of Risk and Mitigation**

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