

# Flood Risk Assessment

For the proposed change of use to Studio Four,  
37 Broadwater Road, WGC, AL7 3AX

Prepared by

Dr Robin Saunders

Innervision Design Ltd

For the client, Mr Mick Sandford

August 2016



All rights reserved. No part of this report may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise – without the prior written permission of Innervision Design.

Contains Environment Agency information © Environment Agency and database right

# Contents

<b>Contents</b> . . . . .	<b>i</b>
<b>List of Figures</b> . . . . .	<b>ii</b>
<b>List of Tables</b> . . . . .	<b>ii</b>
<b>1 Executive Summary</b> . . . . .	<b>1</b>
<b>2 Introduction</b> . . . . .	<b>2</b>
2.1 Site location . . . . .	2
2.2 Proposed development description . . . . .	2
<b>3 Policies</b> . . . . .	<b>3</b>
3.1 NPPF; para. 103 . . . . .	3
3.2 Lead Local Flood Authority . . . . .	3
<b>4 Flood risk analysis</b> . . . . .	<b>5</b>
4.1 Sources of potential flooding . . . . .	5
4.2 Flood risk from sea and rivers . . . . .	5
4.2.1 Historic flooding . . . . .	5
4.2.2 Flood risk from groundwater . . . . .	5
4.2.3 Flood risk from sewer and highway drains . . . . .	5
4.2.4 Flooding risk from surface water . . . . .	6
4.3 Flood risk from infrastructure failure . . . . .	8
4.4 Off site impacts . . . . .	8
4.4.1 Impact on flood risk elsewhere . . . . .	8
4.4.2 Generation of Runoff . . . . .	8
4.5 Existing SW strategy . . . . .	9
4.6 Flood risk vulnerability and flood zone “compatibility” . . . . .	9
<b>5 Flood risk mitigation measures</b> . . . . .	<b>10</b>
5.1 Flood resistance and resilience measures . . . . .	10
5.2 Residual Risks . . . . .	11
5.2.1 System failure of existing SW system . . . . .	11
5.2.2 Safe access and egress . . . . .	11
5.2.3 Flood warning scheme . . . . .	12
5.2.4 Flood Plans . . . . .	12
<b>6 Conclusions</b> . . . . .	<b>12</b>

References . . . . . 13

## Appendix

A Proposal plans . . . . . 14

B Emergency flood plan (example) . . . . . 15

## List of Figures

1 Site location plan . . . . . 2

2 Risk of surface water flooding to the site . . . . . 6

3 LiDAR composite . . . . . 7

4 Image showing circa 150mm deep kerblin surrounding the building . . . . . 8

5 Flood risk vulnerability and flood zone compatibility<sup>[5]</sup> . . . . . 9

## List of Tables

1 Summary of Material Suitability for Building Components . . . . . 11

## Disclaimer

This document has been prepared solely as a flood risk assessment on behalf of the client. Innervision Design Ltd maintains that all reasonable care and skill have been used in the compilation of this report. However, Innervision Design Ltd shall not be under any liability for loss or damage (including consequential loss) whatsoever or howsoever arising as a result of the use of this report by the client or his agents. If any un-authorised third party comes into possession of this report they rely on it at their own risk and Innervision Design Ltd owes them no duty, care or skill whatsoever.

# 1 Executive Summary

- A. The proposal is a change of use of an existing office unit to residential units. The vulnerability classification of the building changes from “Less Vulnerable” to “More Vulnerable”.
- B. The site lies in an equivalent of fluvial Flood Zone 1.
- C. Flood resilience methods will be implemented on site, safe access and egress routes are immediately available.
- D. The change of use does not impact on flood risk elsewhere.
- E. The change of use of the site to residential is considered viable as long as the mitigation, any warning and evacuation procedures can be maintained over the lifetime of the development.

## 2 Introduction

### 2.1 Site location

The site is Studio Four, 37 Broadwater Road, Welwyn Garden City, AL7 3AX. (see Figure 1.

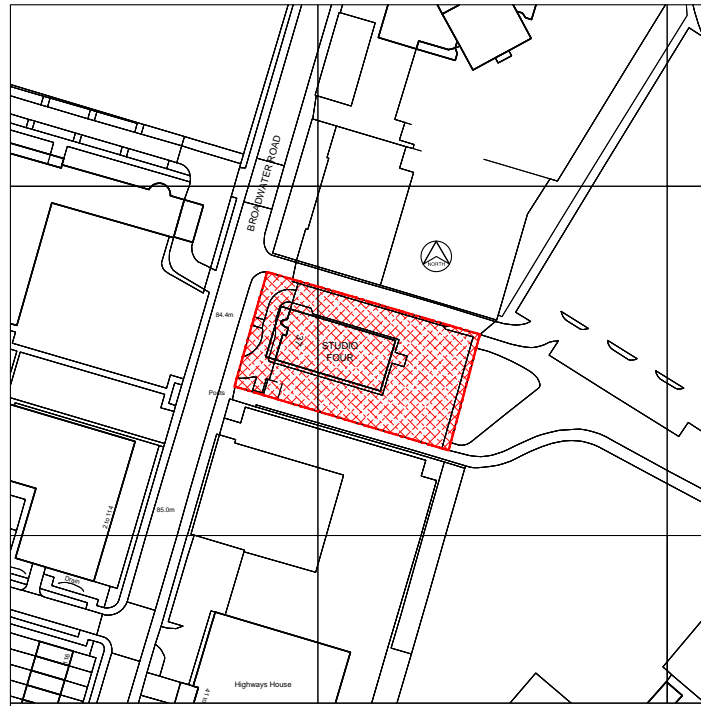


Figure 1: Site location plan, in red, North to top (source: As provided by Architect)

### 2.2 Proposed development description

The proposal is a change of use of an existing office unit to residential units. See ground floor proposals at Appendix A.

## 3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework<sup>[4]</sup> and British Standards on Assessing and Managing Flood Risk<sup>[2]</sup> were reviewed, and their related policies were referred to in this report.

Furthermore, the Environment Agency was consulted in order to establish the flood zone of the proposed site.

In addition, planning policies from the Local Authority were also reviewed including its Strategic Flood Risk Assessment<sup>[6]</sup> and its earlier responses, including consultees, to the clients application for Change of Use under planning ref. 6/2016/1318/PN11.

Some of key planning policies and comments are summarised as below.

### 3.1 National Planning Policy Framework (NPPF) Paragraph 103

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and
- development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

A site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

### 3.2 Lead Local Flood Authority

As formal consultees to Welwyn Hatfield Borough Council, the County engineer has commented as:

“We have been consulted on the application above. We note that as it is a change of use to a more vulnerable class, flood risk is one of the factors that has to be considered when determining the application.

We have no records of flooding in the location, however the Environment Agency maps of surface water flooding show that there is a risk of surface water flows coming into the YMCA from Broadwater Road, flowing alongside the building seeking the change of use.

The applicant has not provided any information regarding surface water drainage or flood risk. Given that the map shows the site may be at risk of flooding from surface water, we advise the LPA to seek further details about any proposed mitigation measures in order to ensure that there is no flooding to the property during the 1 in 100 year return period event.”



## **4 Flood risk analysis**

### **4.1 Sources of potential flooding**

Flood risk from various sources at the site is analysed in this section. It is concluded that from the Flood risk from all sources is Low

### **4.2 Flood risk from sea and rivers**

Flooding can occur from the sea due to a particularly high tide or surge, or combination of both. Flooding can also take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.

With reference to the Environment Agency online Flood Map the proposed site lies in Flood Zone 1. This means that the proposed site has a Low probability from river flooding (Less than a 1 in 1000 annual probability of river flooding in any year).

#### **4.2.1 Historic flooding**

The site lies outside any area of recorded local flood events. No other reports of historic flooding to the site have been identified.

#### **4.2.2 Flood risk from groundwater**

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather.

With reference to SFRA from the Council, the flood risk from ground water in the area is uncertain since there is currently limited understanding of this in the area. However, the mapping available within the 2016 SFRA<sup>[6]</sup> shows the site in an area with no associated risk. The site has no documented evidence of flood risk from ground water.

#### **4.2.3 Flood risk from sewer and highway drains**

Flooding occurs when combined, foul or surface water sewers and highway drains are temporarily over-loaded due to excessive rainfall or due to blockage.

There is no documented evidence of flood risk from highway drainage or sewage networks at the proposed site.

Hence, the risk of sewer and highway flooding to the site can be considered to be Low.

#### 4.2.4 Flooding risk from surface water

Flooding occurs when combined, foul or surface water drains are temporarily over-loaded due to excessive rainfall or due to blockage.

The site has been flagged up by the Lead Local Flood Authority as possibly being at risk from surface water flooding - “maps of surface water flooding show that there is a risk of surface water flows coming into the YMCA from Broadwater Road, flowing alongside the building”, see Figure 2.

Currently the entire site lies in, from a risk potential, what would be classified as fluvial Flood Zone 1 (i.e. at lowest risk). However, the observation of flow pathways has been raised.

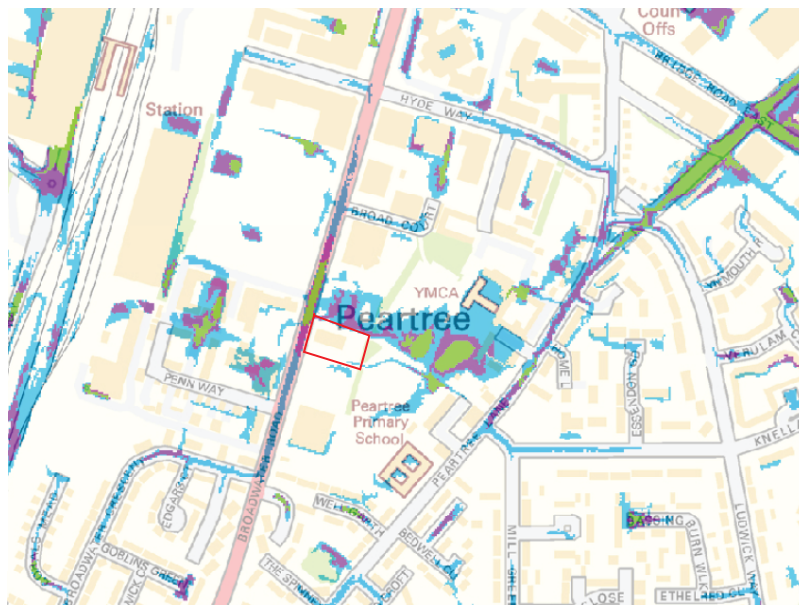


Figure 2: Risk of surface water flooding to the site as taken from the 2016 SFRA<sup>[6]</sup>. The blue shaded areas are denoted as areas with between a 1 in 100 and 1 in 1000 yr risk of SW flooding in any one year - the equivalent of EA Flood Zone 2. The purple shaded denote areas with risk between 1 in 30 and 1 in 100 yr (EA Flood zone 3).

Flow directions are generally SW to NE through this area as highlighted by the LiDAR composite for the site, Figure 3

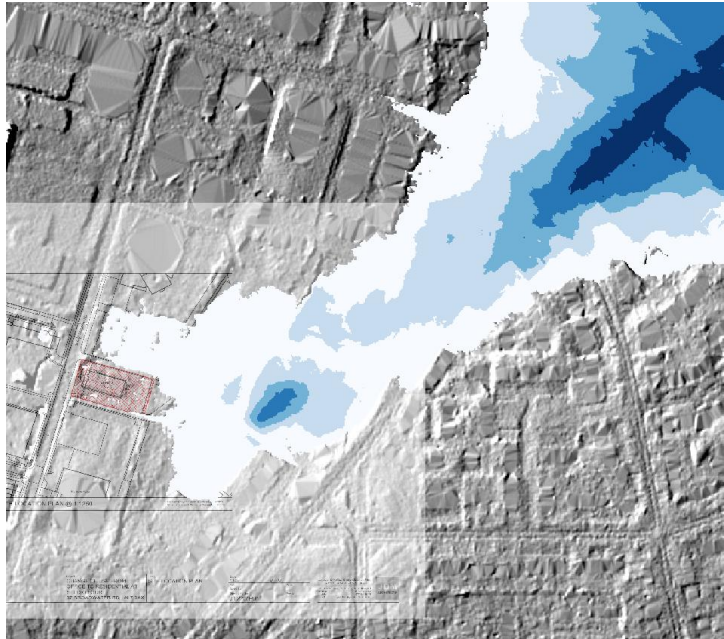


Figure 3: LiDAR composite showing lower ground generally to the NE of the site, and directly to the North of the site. The white areas represent all levels below 84.2m AOD with tones of blue at 1m lower intervals

LiDAR data also shows the lowest point of Broadwater Road lies circa 30m North from the site, consistent with the SFRA SW mapping. A paved access exists from Broadwater Road to the area directly North of the site. This currently offers the line of least resistance for any SW flooding arising from Broadwater Road to the area of lower ground immediately to the North of the site (a car park). However, should this become developed land or blocked for any reason, then it is possible that this flow pathway will be removed. In this instance the project site, typically along the Northern and Eastern edges of the site, will become the flow pathway. This is however unlikely to occur, since any application to develop this adjacent site would be required to demonstrate that flood risk was not increased to this proposal site (in line with core policy).

Noting the change in levels of >2m to the East of the site and hence the resulting relatively steep gradient, it is not expected that the surface water depth will encroach ground floor levels, which are, and will remain, circa 150mm above external levels (the adjacent roadway around the building is set at this lower level and a further 150mm would be expected for Building Regulation compliance at the time of construction), Figure 4. Note also that the existing site is drained to the existing Thames Water network.



Figure 4: Image showing circa 150mm deep kerb line surrounding the building (Source: Google Earth)

Hence, while the risk of surface water flooding to the site is potentially high (in the event of blockage of existing flow pathways) the risk of surface water flooding to the building itself is Low.

### **4.3 Flood risk from infrastructure failure**

Flooding occurs because of canals, reservoirs, industrial processes, burst water mains or failed pumping stations.

There is no documented evidence of flooding from other infrastructure failure at the proposed site therefore the flood risk from infrastructure failure at the site is classed as Low.

### **4.4 Off site impacts**

#### **4.4.1 Impact on flood risk elsewhere**

Since the re-development is a Change of Use to an existing building the situation is being made no worse than before. Compensatory measures are therefore not required.

#### **4.4.2 Generation of Runoff**

The post-development surface water run-off volume will not increase when compared to the pre-development level because there are no planned changes to impermeable/permeable areas.

## 4.5 Existing SW strategy

The site is generally 100% impermeable with all SW drained to an existing, Thames Water sewer in the adjacent highway, via a series of rainwater gulleys set into the hard standing. These pre date this application and would have been under the control of the Building Regulations in place at the time of construction. Without evidence to the contrary, this existing system appears to be functioning as designed. It is not known however, whether there is any exceedence capacity within the existing system.

## 4.6 Flood risk vulnerability and flood zone “compatibility”

Based on 2016 model data<sup>[6]</sup> the site itself lies in an area with a Flood Risk equivalent to Fluvial Zone 1

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

**Key:** ✓ Development is appropriate.  
✗ Development should not be permitted.

Figure 5: Flood risk vulnerability and flood zone compatibility<sup>[5]</sup>

With reference to Figure 5, the proposed re-development of the site changes the vulnerability classification of the building from “Less Vulnerable” to “More Vulnerable”. This is considered to be appropriate development.

## **5 Flood risk mitigation measures**

Because the site is located in an area at (an albeit Low) risk from short term surface water flooding, flood risk mitigation measures should be considered during the proposed internal fit-out.

In accordance with the document “Improving the Flood Performance of New Buildings - Flood Resilient Construction”<sup>[3]</sup> a series of design approaches are recommended to mitigate the flood risk.

### **5.1 Flood resistance and resilience measures**

Table 1 provides guidance on which materials are most suitable, suitable and unsuitable, when considering construction work involved in this project. This report recommends the use of materials from the “most suitable” column were this is at all possible on site, however they are not mandatory requirements.

Component	Most suitable	Suitable	Unsuitable
Flooring	Concrete, pre-cast or in situ	Timber floor, fully sealed, use of marine plywood.	Untreated timber, Chipboard
Floor Covering	Clay tiles, Rubber sheet floors, Vinyl sheet floors	Vinyl tiles, Ceramic tiles	
External Walls - to max flood level	Engineering brick, Reinforced concrete	Low water absorption brick	Large window openings
Doors	Solid panels with waterproof adhesives, Aluminium, plastic or steel	Epoxy sealed doors	Hollow core plywood doors
Internal Partitions	Brick with waterproof mortar, Lime based plasters	Common bricks	Chipboard, Fibreboard panels, Plasterboard, Gypsum plaster
Insulation	Foam or closed cell types	Reflective insulation	Open cell fibres
Windows	Plastic, metal	Epoxy sealed timber with waterproof glues and steel or brass fittings.	Timber with PVA glues and mild steel fittings

Table 1: Summary of Material Suitability for Building Components<sup>[1]</sup>

## 5.2 Residual Risks

### 5.2.1 System failure of existing SW system

The existing Surface water drainage strategy is one area that requires ongoing maintenance and inspection. Hence the sites new occupants be required to pay a service charge to cover all on-going maintenance for the site as a whole which will include regular inspection and maintenance of the existing SW drainage infrastructure.

### 5.2.2 Safe access and egress

The NPPF stipulates that, where required, safe access and escape routes should be available to/from new developments in flood risk areas. Access routes should be such that

occupants can safely access and exit the building in design flood conditions.

The site lies at the very edge, on the “dry” side, of the SW flood zone and the LiDAR data also shows the front of the site, adjacent to the front entrance, to be at a generally elevated height when compared to the rear hence safe and dry access and egress routes are immediately available.

On the site itself, the developer will look to remove any possible submerged hazards e.g. relocating or fitting bolt down inspection covers on any m/holes, removal of any hidden drops/steps etc. on access/egress routes.

### **5.2.3 Flood warning scheme**

Currently no flood warning schemes are available for surface water flooding in the area.

### **5.2.4 Flood Plans**

It is widely recommended that households are “reasonably prepared” to deal with a flooding incident. Hence the developer will provide a Flood Plan (in line with the EA guidance) for this development (See Appendix B for an example). The plan will provide guidance on emergency response procedures in the event of flooding to the site. This will:

- Provide details of who to contact and how (insurers, energy suppliers, immediate family and friends etc);
- Provide details of how to turn off gas, electricity and water mains supplies;
- Provide details of designated safe egress routes out of the building and out of the local area at risk;
- Provide details of local radio stations;
- Provide a check list of essential items.

It is also suggested that such a plan could be saved securely on smartphones, webmail or in the cloud so that residents can access it anywhere they can use their phone or computer.

## **6 Conclusions**

Given that:

- This is a change of use re-development;



- The site lies in an equivalent of fluvial Flood Zone 1 based on the current risk associated with SW flooding, with Low flood risk from other sources;
- That flood resilience measures will be implemented on site,
- Safe and dry access/egress routes exist;
- The maintenance and inspection of the existing SW network will be ongoing;
- The re-development does not impact on flood risk elsewhere;

and assuming the risk is fully understood, mitigation, any warning and evacuation procedures can be maintained over the lifetime of the development then the proposed change of use of the site to residential is considered viable.

Signed: 

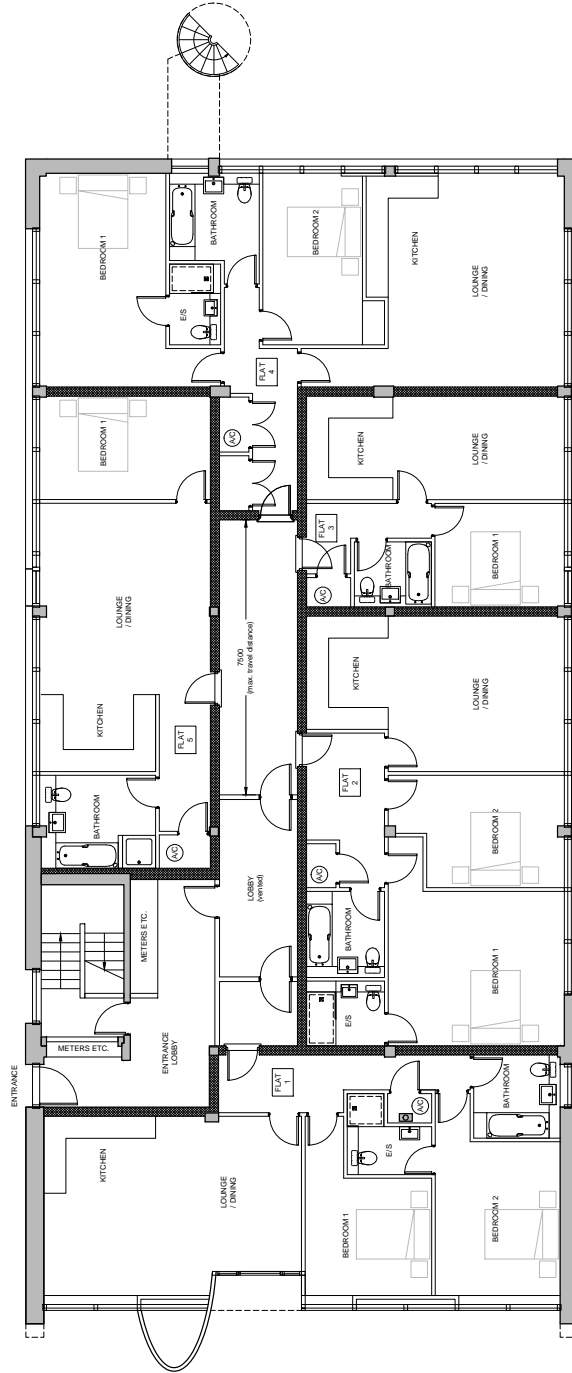
Dr. R. D. Saunders C. Build E, MCABE, BEng(Hons), PhD

Date: 26<sup>th</sup> August, 2016

## References

- [1] J Wingfield; M Bell; P Bowker. Improving the flood resilience of buildings through improved material, methods and details. Technical Report WP2c, CIRA, 2005.
- [2] BSI. BS 8533:2011. Technical report, 2011.
- [3] CIRIA, CLG, EA and DEFRA. Improving the flood performance of new buildings. Flood resilient construction, 2007.
- [4] Department for Communities and Local Government. National planning policy framework. 2012.
- [5] Department for Communities and Local Government. Technical guidance to the national planning policy framework. 2012.
- [6] JBA consulting. Level 1 and 2 Strategic Flood Risk Assessment. Technical report, Welwyn Hatfield Council, 2016.

# A Proposal plans



FLAT	ACCOMMODATION	m2	sq.ft.
1	2 bed / 2 bath	82.5	888
2	2 bed / 2 bath	82.0	882
3	1 bed / 1 bath	40.4	435
4	2 bed / 2 bath	89.7	966
5	1 bed / 1 bath	59.4	639

PROPOSED GROUND FLOOR PLAN

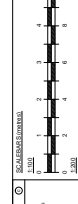
**JDM**  
 ARCHITECTS  
 ARCHITECT NAME: BARRYDANIEL WMA  
 CHARTERED ARCHITECT  
 245, St. Raphael, St. Marys, WY12 2JG  
 TEL: 01904 710000  
 FAX: 01904 710001  
 www.jdmarchitects.co.uk

DATE	BY	DATE	BY
15 MAR 15	JAS		
15 MAR 15	JAS		
15 MAR 15	JAS		
15 MAR 15	JAS		

THE PROPOSED GROUND FLOOR PLAN  
 PROJECT NO: JT220/P07

CHANGE OF USE FROM  
 STUDIO EQUIP  
 TO RESIDENTIAL AT  
 37 BROADWATER RD. AL7 3AX

SCALE: 1:200  
 DATE: 15 MAR 15



NOTES:  
 1. THIS PLAN IS A PROPOSED GROUND FLOOR PLAN.  
 2. THE PROPOSED GROUND FLOOR PLAN IS SUBJECT TO THE APPROVAL OF THE LOCAL AUTHORITY.  
 3. THE PROPOSED GROUND FLOOR PLAN IS SUBJECT TO THE APPROVAL OF THE LOCAL AUTHORITY.  
 4. THE PROPOSED GROUND FLOOR PLAN IS SUBJECT TO THE APPROVAL OF THE LOCAL AUTHORITY.

## B Emergency flood plan (example)

### Personal Flood Plan

#### Checklist *Things to do before a flood*

Find out if you are at risk of flooding	<input type="checkbox"/>
Find out if you can receive flood warnings	<input checked="" type="checkbox"/>
Prepare and keep a list of all your important contacts to hand or save them on your mobile phone	<input checked="" type="checkbox"/>
Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment	<input checked="" type="checkbox"/>
Know how to turn off gas, electricity and water supplies	<input checked="" type="checkbox"/>
Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.	<input checked="" type="checkbox"/>
Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property	<input type="checkbox"/>

#### Checklist *Things to do during a flood*

Tune into your local radio station on a battery or wind-up radio	<input checked="" type="checkbox"/>
Fill jugs and saucepans with water	<input checked="" type="checkbox"/>
Grab your flood kit - if you have prepared one	<input checked="" type="checkbox"/>
Collect blankets, torch, first aid kit, medication and food	<input checked="" type="checkbox"/>
Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves	<input checked="" type="checkbox"/>
Raise large items of furniture, or put them in large bags if you have them	<input checked="" type="checkbox"/>
Move people, outdoor belongings, cars and pets to higher ground	<input type="checkbox"/>
Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water	<input checked="" type="checkbox"/>
Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags	<input type="checkbox"/>
Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil	<input type="checkbox"/>