

Flood Risk Assessment

To accompany a planning application for a
change of use to

Pellings Barn, Northend Lane,
Sayers Common, BN6 9HL

Prepared by

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Rev A October 2024



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Contents

Contents	i
List of Figures	ii
List of Tables	ii
1 Executive Summary	1
2 Introduction	2
2.1 Site location	2
2.2 Development description	2
3 Policies	2
3.1 Sequential test	3
3.2 Vulnerability classification	3
4 Flood risk analysis	4
4.1 Flood risk from sea and rivers	4
4.2 Flood risk from groundwater	4
4.3 Flood risk from sewer and highway drains	5
4.3.1 Flood risk from infrastructure failure	5
4.4 Flooding risk from surface water	6
4.4.1 SW Flood Zone 3b (the functional floodplain)	7
4.5 Surface water management	8
4.5.1 Generation of Run-off	8
4.5.2 Impact on flood risk elsewhere	8
5 Levels	9
5.1 Site level data	9
5.2 External ground level	10
5.3 Flood level data	10
5.4 Floor level data	11
5.5 Sleeping accommodation	11
6 Management of flood risk	12
6.1 Improving the existing SW flow path	12
6.2 Flood risk resilience measures	12
6.3 Flood mitigation measures	15

7	Management of residual risk	19
7.1	Safe access and egress routes	19
7.2	Flood warning schemes	19
7.2.1	Flood Plan	19
8	Conclusions	21
	References	22

Appendix

A	Emergency flood plan (example)	23
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List of Figures

1	Site location plan	2
2	EA Flood mapping	4
3	Flood risk from reservoir flooding	5
4	SW flood risk mapping	6
5	1 in 100yr SW flood depth mapping	7
6	Site nodes	9
7	Site nodes relative to the proposal	9
8	Surface water flow paths	12
9	Design strategies for resistance and resilience	14
10	UPVC doors under flood conditions	16
11	Flood gate example.	17
12	Sand bag defence.	17
13	Anti flood air brick	18
14	Air brick covers	18
15	Access and Egress routes	19

List of Tables

1	Site levels and SW flood depths	10
2	Summary of Material Suitability for Building Components	15

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1 Executive Summary

- A The site is at a High risk from surface water flooding;
- B The existing building is a “solid building”, surface water on site has somewhere else to drain to and hence in alignment with the council’s SFRA, the proposal should not to be considered as new development in the functional floodplain.
- C The proposal is change of use of an existing building and is non major development;
- D Flood resilience and mitigation methods will be required, detailed and implemented on site;
- E Sleeping accommodation will be designed to provide a minimum 600mm freeboard over design period flood events;
- F The immediately available access/egress route carries a hazard rating no greater than Caution;
- G There is no documented evidence of flood risk from any other sources;
- H The development does not impact on flood risk elsewhere;
- I Assuming the mitigation and evacuation procedures can be maintained over the lifetime of the development, the proposed non-major development to form a dwelling out of an existing barn is considered viable subject to recommendations made in this report.

Client actions required

- I Prepare an emergency flood plan for the development to hand over to new owners.
- II Ensure existing ditches in the vicinity of the site are fully maintained and remain fully maintained.

Designer actions required

- 1 Ensure plans and specification are updated to incorporate flood resilience and resistance measures prior to submission.

2 Introduction

2.1 Site location

The project is at Pellings, Northend Lane, Sayers Common, Hurstpierpoint, BN6 9HL (see Figure 1).

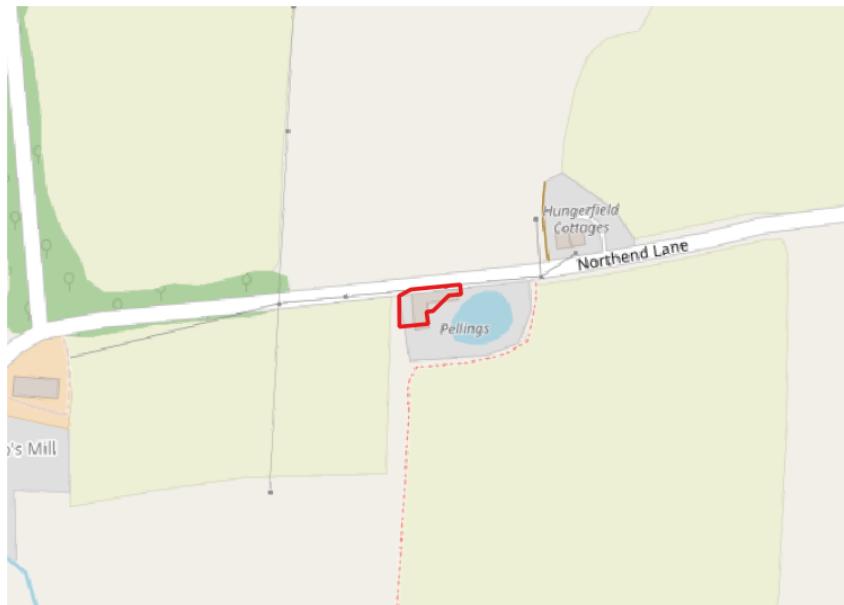


Figure 1: Site location plan, as indicated with North topmost. (source: Open Streetmap)

2.2 Development description

The proposal is for a change of use from agricultural barn to a dwelling. The proposed work is classed as non-major development.

The proposed layouts and proposed sections are as provided under separate cover.

3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework^[5] and British Standards on Assessing and Managing Flood Risk^[2] were reviewed, and their related policies are, where applicable, referred to in this report.

The Environment Agency has been 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.

3.1 Sequential test

This test does not apply to change of use applications.

3.2 Vulnerability classification

The proposed use is “More Vulnerable”.

4 Flood risk analysis

Flood risk from various sources to the site are analysed in this section.

4.1 Flood risk from sea and rivers

Flooding can occur from the sea due to a particularly high tide or surge, or combination of both.

The site is not at risk from tidal flooding.

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 Flood Map, Figure 2, the site lies in Flood Zone 1. Hence the site is not at risk from fluvial flooding.



Figure 2: Zone 1 Flood Mapping from the EA online data

4.2 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. The site's geology is classified as having a Low susceptibility to groundwater flooding.

Since the proposed development does not involve any basement elements, the impact of groundwater flooding on the proposed site will be minimal.

Hence, the risk of groundwater flooding on the proposed site can be considered to be negligible.

4.3 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 are no indicators to Sewer flooding at the site.

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

4.3.1 Flood risk from infrastructure failure

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

The site is not at flood risk due to reservoir failure, as shown in Figure 3.

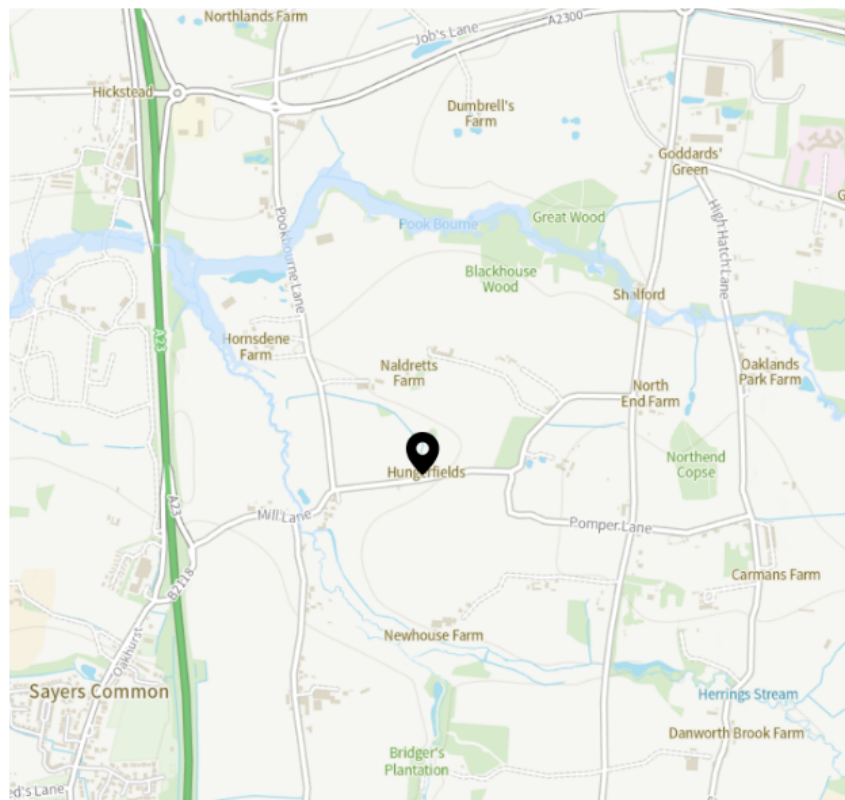


Figure 3: Flood risk from reservoir flooding. (Source: EA flood mapping)

Hence the flood risk to the site from reservoir failure is considered to be negligible.

4.4 Flooding risk from surface water

Flooding occurs when rainfall fall on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.

With reference to the E.A online mapping, the site is in an area at a High risk of surface water flooding (>1 in 30yr which equates to Zone 3b) as indicated by the hatched areas in Figure 4 with predicted surface water depths to 600mm above relative ground levels for the design 1 in 100yr event as shown in Figure 5.

The predicted surface water flooding is associated with a South to North flow pathway¹ that includes the Pond on site together with a network of field ditches to the North and South of the site.

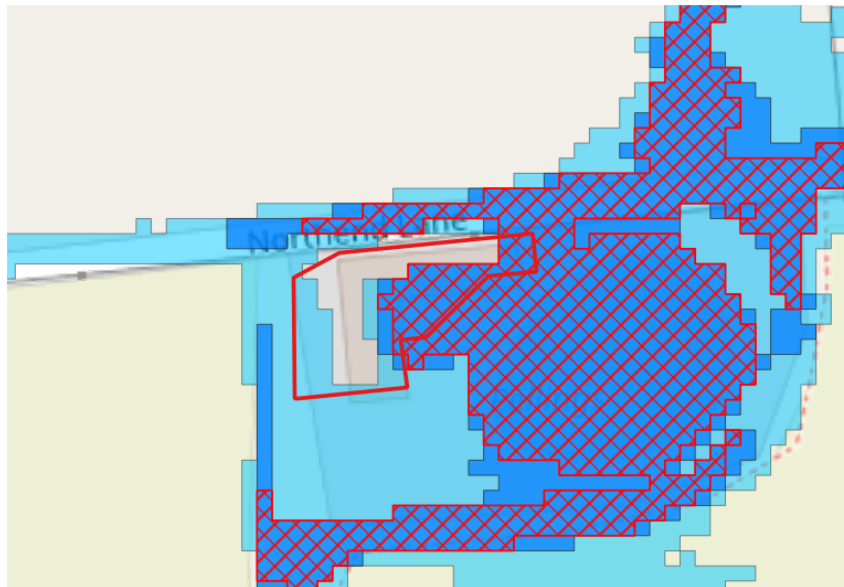


Figure 4: 1 in 1000yr (light tone blue), 1 in 100yr (blue) and 1 in 30yr (hatching) SW flood extent mapping.

¹The case officer has also correctly identified this pathway however they have assessed the flow direction incorrectly. They have stated: "the site is within a surface water flooding risk flow path going north to south" where this should read "flow path going South to North".

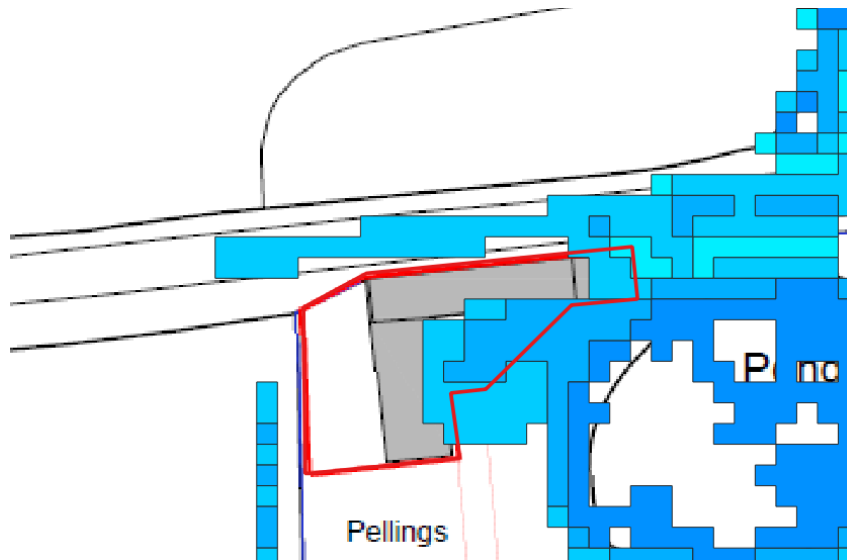


Figure 5: 1 in 100yr SW flood depth mapping. The “courtyard” area adjacent to the pond is at risk from 1 in 100yr surface water flood depths in the range 300mm to 600mm at the barn.

4.4.1 SW Flood Zone 3b (the functional floodplain)

The council’s SFRA states:

“There are also areas of high surface water flood risk (1 in 30 annual probability) that should be considered as the functional floodplain, particularly in locations where there is nowhere else for the water to drain to.”

Generally no new development is permitted on the functional floodplain.

However this barn is an existing solid building and other than internal works there are no planned extensions or similar physical external development. We therefore refer again to the SFRA which also states:

“Areas which would naturally flood, but which are prevented from doing so by existing defences, infrastructure and/or solid buildings, will not normally be identified as functional floodplain.”

Given the existing building is a “solid building” and the fact that surface water on site does have somewhere else to drain to, namely the ditch network to the North we suggest, in alignment with the SFRA, that the proposal should not be considered as new development in the functional floodplain but considered as a change of use of an existing building albeit, with an associated flood risk.

4.5 Surface water management

4.5.1 Generation of Run-off

The post-development surface water run-off volume will not increase when compared to the pre-development level because there is no overall reduction in permeable areas.

4.5.2 Impact on flood risk elsewhere

SW arising: Since the proposal does not increase the existing drained area the impact on flood risk elsewhere is negligible.

5 Levels

5.1 Site level data

The level data is extracted from the EA Lidar data for the site.

With reference to the nodes as shown in Figures 7 and 7, Table 1 provides the flood level data.

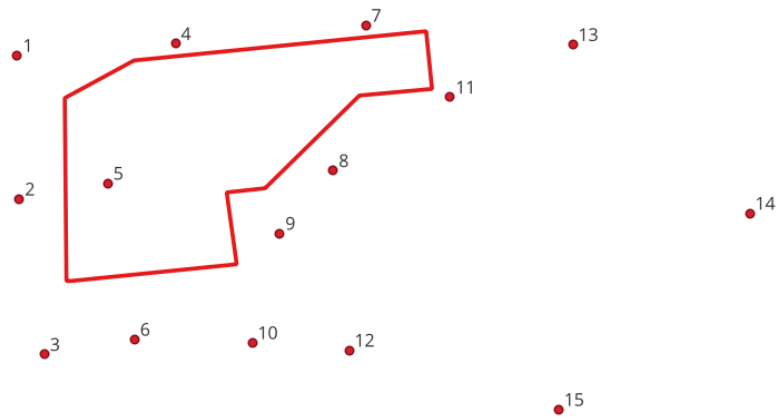


Figure 6: Site nodes

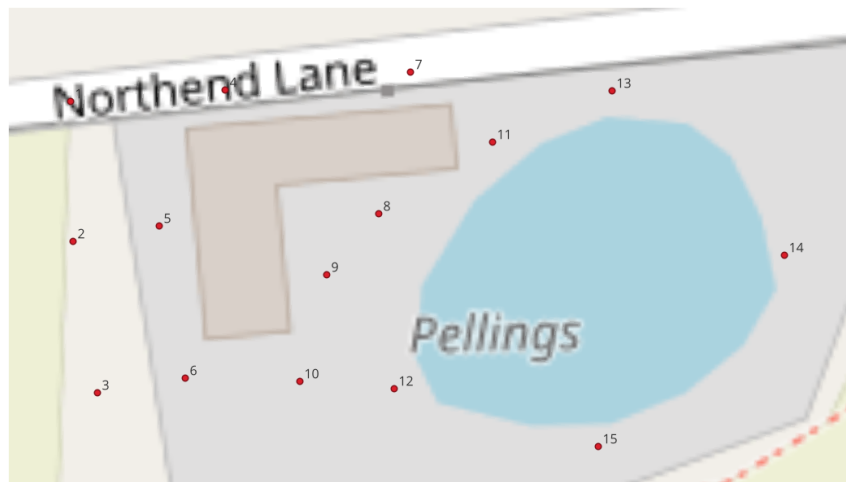


Figure 7: Site nodes relative to the proposal

Node	Site level, m AOD	Q 100yr SW flood depth range, m	Estimated flood depth on site, m (19.62 - site level)
1	19.64	0 - 0.3	N/A
2	19.22	0 - 0.3	N/A
3	19.69	Nil	N/A
4	19.59	0 - 0.3	0.03
5	19.75	Nil	Nil
6	19.68	Nil	Nil
7	19.52	0 - 0.3	0.1
8	19.30	0.3 - 0.6	0.32
9	19.46	0 - 0.3	0.16
10	19.60	Nil	Nil
11	18.83	0.6 - 0.9	0.79
12	19.62	Nil	Nil
13	19.56	0 - 0.3	0.06
14	19.02	0.3 - 0.6	0.6
15	19.27	0.3 - 0.6	0.35

Table 1: Site levels and SW flood depths based on Lidar and RoFSW data

5.2 External ground level

The courtyard ground level, at the lowest point is 19.30m AOD (central area, Node 8).

At the building's rear entrance the ground level is 19.75m AOD (Node 5).

5.3 Flood level data

With reference to Table 1, and assuming a level flood water, the estimated maximum 1 in 100yr flood level that conforms to all of the flood depth ranges, in column 2, on site is **19.62m AOD**. From this the estimated flood depth can be calculated as given in column 4. Node 14 is the key reference node.

5.4 Floor level data

The proposed floor level will need to be raised (to accommodate insulation and floor finishes) to circa 170mm above the existing building's ground (floor) levels relative to the rear entrance resulting in a FFL no lower than 19.92m AOD.

5.5 Sleeping accommodation

Sleeping accommodation should be set at least 600mm above predicted flood depths (i.e. 20.25m AOD) if single storey and at least 300mm above predicted flood levels if an upper floor is provided.

The height of the main barn indicates that a raised sleeping gallery/floor is feasible hence the required sleeping accommodation floor level can be achieved with careful design.

6 Management of flood risk

6.1 Improving the existing SW flow path

The existing SW flow path across the site is shown in Figure 8 where it can be seen that the adjacent pond forms part of the flow route South to North.

It is a recommendation of this report to ensure that the existing flow route is not impeded and that existing drainage ditches in proximity to the site are inspected and maintained where necessary.



Figure 8: Surface water flow paths overlain on Lidar data

6.2 Flood risk resilience measures

Because the site is at a High risk from surface water flooding it is a firm recommendation of this report, that in line with current best practice^[4] flood risk resilience measures should be incorporated into the development's fabric, specifically at ground floor and all construction below such that "the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment"^[5].

For the purpose of the following guidance the estimated flood level is 19.62m AOD

The Government's guidance states:

The design should be appropriately flood resistant and resilient by:

- using flood resistant materials that have low permeability to at least 600mm above the estimated flood level;
- making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level;
- using flood resilient materials (for example lime plaster) to at least 600mm above the estimated flood level;
- by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level;
- making it easy for water to drain away after flooding such as installing a sump and a pump;
- making sure there is access to all spaces to enable drying and cleaning;
- ensuring that soil pipes are protected from back-flow such as by using non-return valves.

In accordance with the document “Improving the Flood Performance of New Buildings - Flood Resilient Construction”^[3] a series of design approaches should be planned to mitigate the flood risk based on the flow chart as at Figure 9.

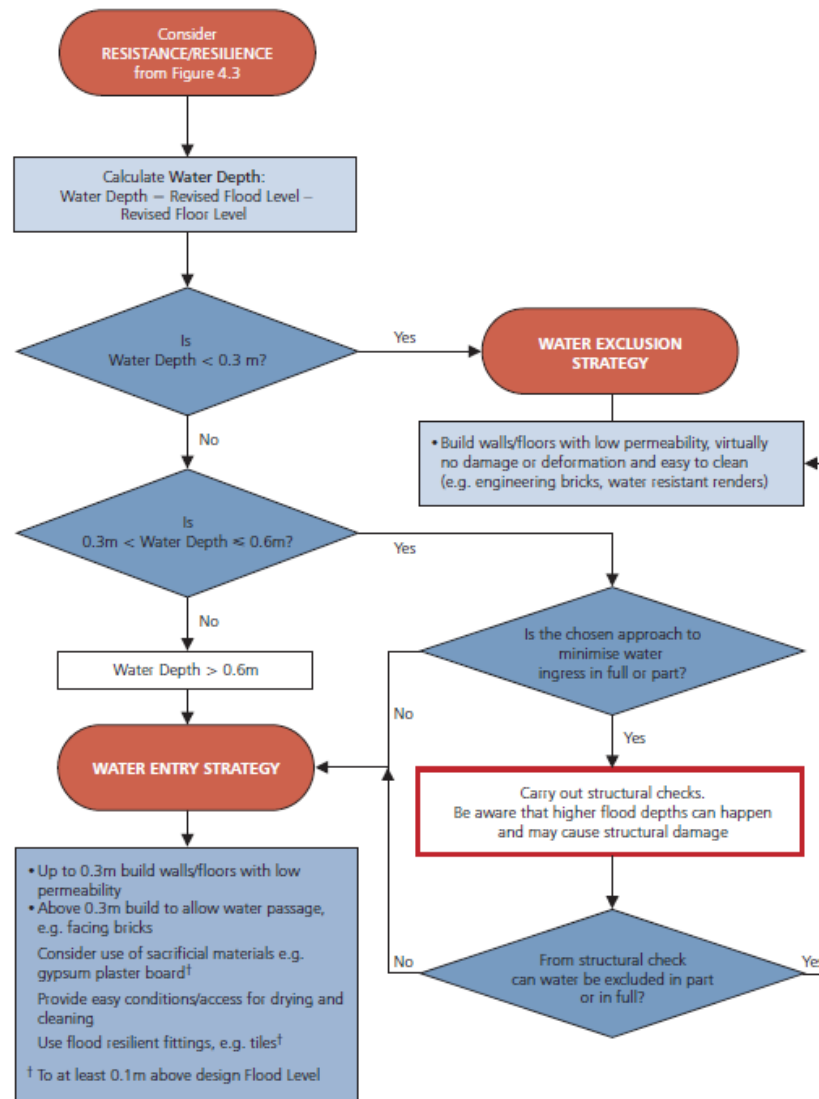


Figure 9: Design strategies for resistance and resilience^[3]

Table 2 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 2: Summary of Material Suitability for Building Components^[1]

6.3 Flood mitigation measures

The designer is also recommended to consider the provision of a combination of the following flood mitigation measures, to be installed if at all practicable, for use within and around the conversion for use in any flooding event:

- Flood resilient doors: Specifically designed to prevent ingress of flood water - passive system (see also Figure 10).
- Door defence: Bespoke barriers fitted externally across doors and low windows and/or the provision of filled sandbags (see also Figures 11 & 11).

- Anti flood air bricks: Where these are unavoidable, these offer replacements for standard air bricks these prevent water entering the sub floor void - passive system i.e. fully automatic (see also Figure 13).
- Air brick and flue covers (see also Figure 14).
- No service penetrations or other openings (cat flaps and letter boxes included) in the zone between FFL and 1m above FFL.



Figure 10: UPVC doors under flood conditions. These appear to offer reasonable flood resilience



Figure 11: Flood gate example.



Figure 12: Sand bag defence.



Figure 13: Anti flood air brick. Example from CSI products



Figure 14: Air brick covers. Example from Buffalo products

7 Management of residual risk

Any residual risk can be safely managed by not impairing access and evacuation routes, signing residents up to flood warning schemes and preparation of domestic flood plans.

7.1 Safe access and egress routes

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 buildings in design flood conditions.

The access and egress routes are as shown in Figure 15.

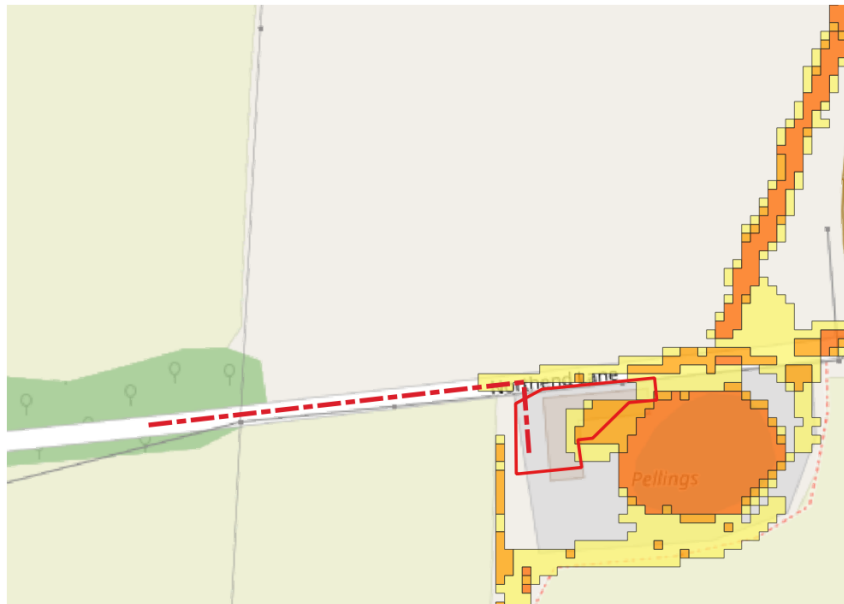


Figure 15: Access and Egress routes carry a hazard rating no higher than of “caution”.

7.2 Flood warning schemes

No warning schemes available for surface water flooding.

7.2.1 Flood Plan

This report provides the owners of the proposed dwelling with a proforma Flood Plan (See Appendix A for an example). The plan will, when completed bespoke to the site, provide guidance on emergency response procedures in the event of flooding to the site. This will:

- Provide details of who to contact and how;
- 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.

8 Conclusions

Given that:

- The site is at a High risk from surface water flooding;
- The existing building is a “solid building”, surface water on site has somewhere else to drain to and hence in alignment with the council’s SFRA, the proposal should not to be considered as new development in the functional floodplain.
- The proposal is change of use of an existing building and is non major development;
- Flood resilience and mitigation methods will be required, detailed and implemented on site;
- Sleeping accommodation will be designed to provide a minimum 600mm free-board over design period flood events;
- The immediately available access/egress route carries a hazard rating no greater than Caution;
- There is no documented evidence of flood risk from any other sources;
- The development does not impact on flood risk elsewhere;

and assuming the mitigation and evacuation procedures can be maintained over the lifetime of the development, the proposed non-major development to form a dwelling out of an existing barn is considered viable subject to recommendations made in this report.

Signed:



Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

Date: 29th October, 2024

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] D Kelly, M Barker, J Lamond, S McKeown, E Blundell, and E Suttie. Code of practice for property flood resilience. Technical report, CIRIA, 2020.
- [5] Ministry of Housing, Communities and Local Government. National planning policy framework. 2021.

A Emergency flood plan (example)

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings?
If not call Floodline on 0345 988 1188 to see
if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on 0345 988 1188.
This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?



☐ Put important documents out of flood risk and protect in polythene
 ☐ Look at the best way of stopping floodwater entering your property
 ☐ Find out where you can get sandbags
 ☐ Identify what you would need to take with you if you had to leave your home

☐ Check your insurance covers you for flooding
 ☐ Make a flood plan and prepare a flood kit
 ☐ Identify who can help you/who you can help
 ☐ Understand the flood warning codes

What can you do if a flood is expected in your area?

Actions	Location
Home • Move furniture and electrical items to safety • Put flood boards, polythene and sandbags in place • Make a list now of what you can move away from the risk • Turn off electricity, water and gas supplies • Roll up carpets and rugs • Unless you have time to remove them hang curtains over rods • Move sentimental items to safety • Put important documents in polythene bags and move to safety	
Garden and outside • Move your car out of the flood risk area • Move any large or loose items or weigh them down	
Business • Move important documents, computers and stock • Alert staff and request their help • Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance • Inform your family or friends that you may need to leave your home • Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now

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