Flood Risk Assessment

To accompany a planning application for an extension to

3 Waterside, Castle Combe, Wiltshire, SN14 7HX

Prepared by

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1 Executive Summary

A The extension is to a dwelling house and this is minor development;

B The site lies in Flood Zone 3 and is at a High risk from surface water flooding;

C Flood resilience and mitigation methods will continue to be implemented on site;

D Access/egress routes are not affected and the site will (indeed may already) be signed up to flood warning schemes;

E There is no documented evidence of flood risk from any other sources;

F The development does not impact on flood risk elsewhere;

G Assuming the recommended mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing dwelling is considered acceptable.

Client actions required

I Sign up to flood warning schemes.

II Complete an emergency flood plan.

Designer actions required

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

2 Ensure plans clearly show FFL of the extension is no lower than the existing FFL.

3 Confirm the design intention to manage surface water at source in line with the drainage hierarchy.

2 Introduction

2.1 Site location

The project is at 3 Waterside, Castle Combe, Wiltshire, SN14 7HX (see Figure 1).



Figure 1: Site location plan, as indicated with North topmost. (source: EA flood mapping)

2.2 Development description

The proposal is for a domestic extension not exceeding 250m^2 in footprint. The site is an existing developed site and the proposed work is classed as minor development. The existing and proposed layouts and proposed sections are to be submitted under separate cover.

2.3 Site geology

Geological mapping data from within the vicinity indicate Alluvium - Clay, Silt, Sand And Gravel however this would require confirmation on site. If available on site, the superficial deposits will offer only medium to poor permeability.

Infiltration SuDS may not be viable (subject to site testing).

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.

Some of key policies are summarised as below.

3.1 Standing Advice

Generally the following applies: Apart from habitable basements, domestic extensions within the curtilage of the dwelling (see GDPO definition of, minor development) and non-domestic extensions with a footprint of less than 250 m^2 will not require a detailed FRA. These applications should demonstrate that the risk of flooding from all sources has been assessed. The main sources of flooding are likely to be tidal, surface water and sewer flooding.

3.2 Environment Agency Guidance on Standing Advice

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), you should follow the advice for:

- surface water management
- access and evacuation
- floor levels
- extra flood resistance and resilience measures

4 Flood risk analysis

4.1 Sources of potential flooding

Flood risk from various sources at the site is analysed in this section.

4.1.1 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 a river 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 3. This means that the site has a High probability of fluvial flooding (greater than a 1 in 100yr annual probability of fluvial flooding).

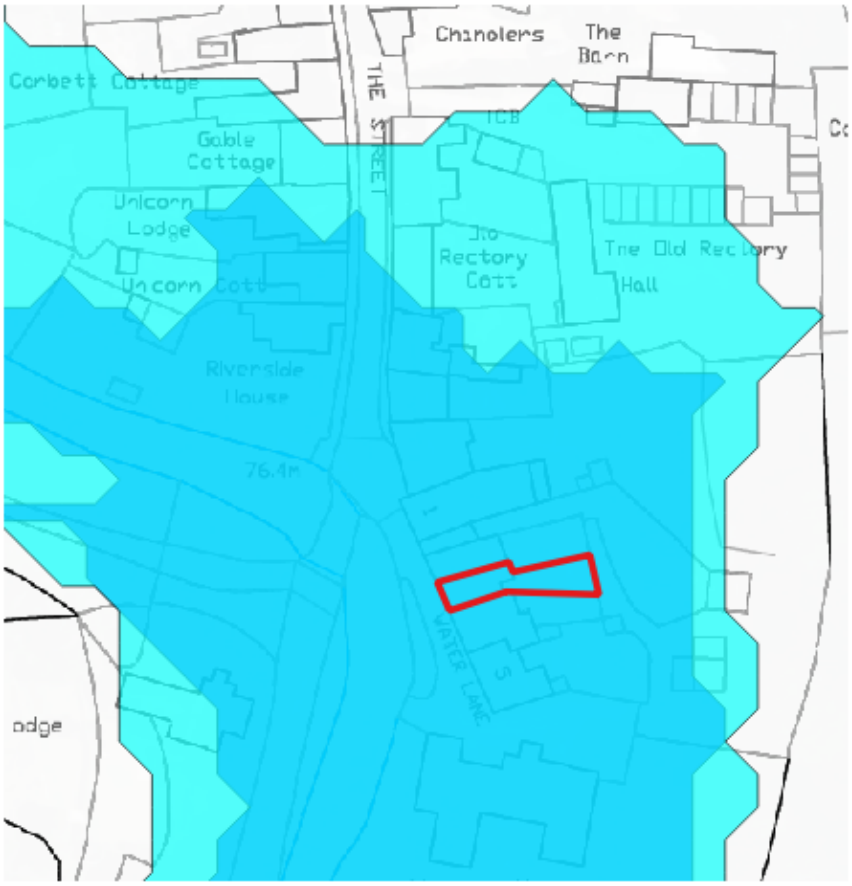


Figure 2: Flood mapping from the EA online data. The site falls within Flood Zone 3

Historic flooding

The site is shown to lie within an area of historic flooding as indicated in Figure 3.

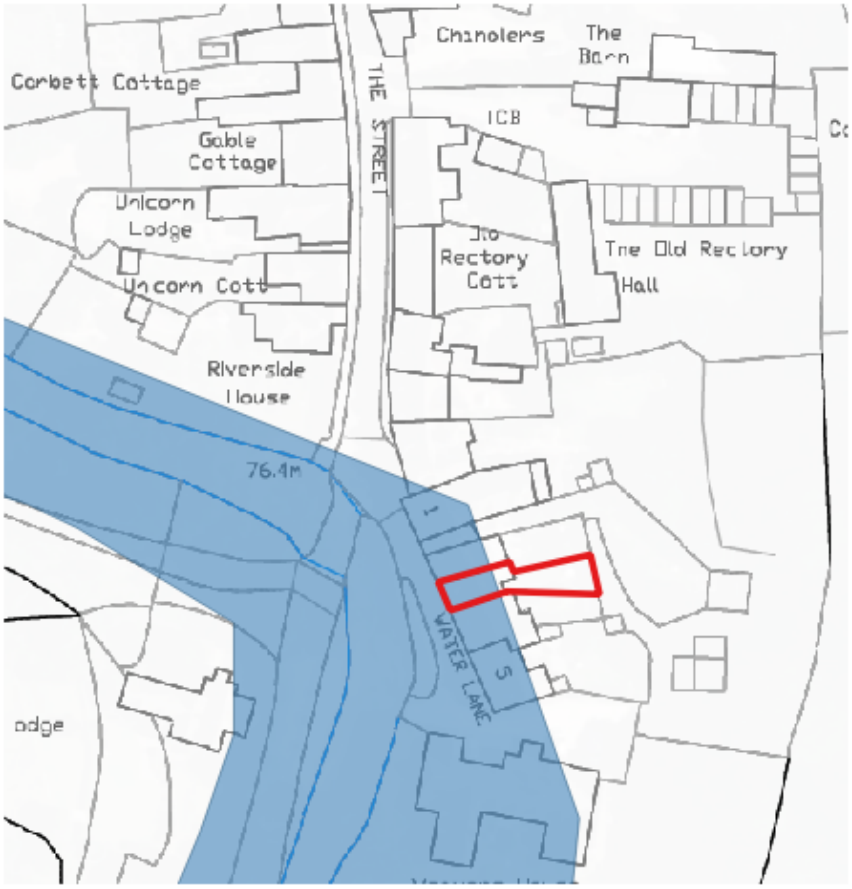


Figure 3: Historic flood mapping from the EA online data. The site falls within an area of historic flooding

4.1.2 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 is in an area at "no risk" from groundwater flooding as indicated within the SFRA as per extract at Figure 4.

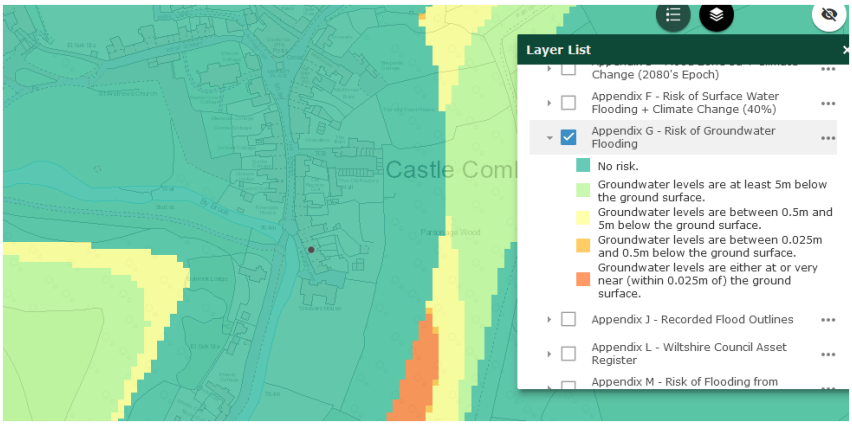


Figure 4: Susceptibility to ground water flooding. The site falls within an area at "no risk"

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

4.1.3 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.

4.1.4 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, Figure 5, the footprint of the rear extension is in an area at High risk from surface water flooding (>1 in 30yr) with flood depths for the design period, 1 in 100yr event, to potentially 600mm above external ground level as shown in Figure 6.

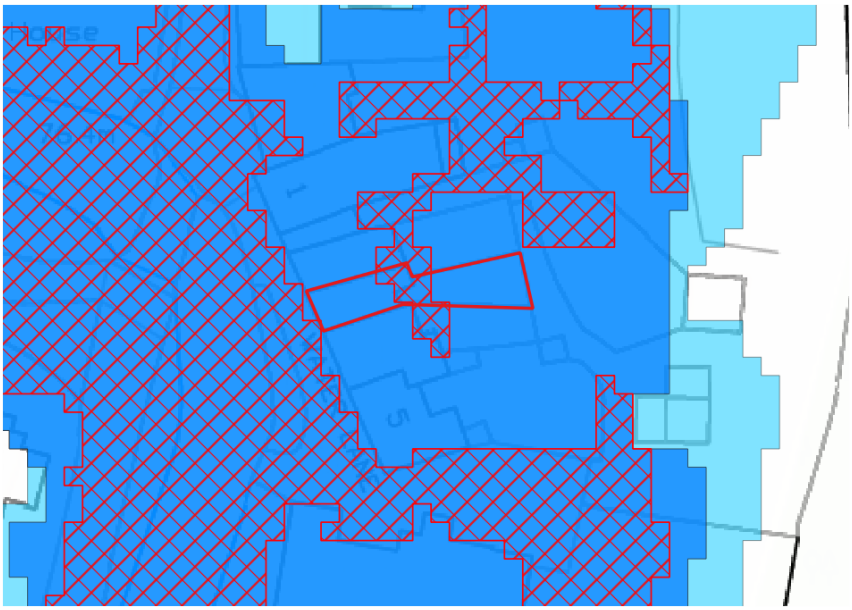


Figure 5: SW flood extent and depth mapping. The footprint of the extension is at High risk (>1 in 30yr) as denoted by the red hatching. Light blue indicates areas at a 1 in 1000yr risk and dark blue represents areas at a 1 in 100yr risk.

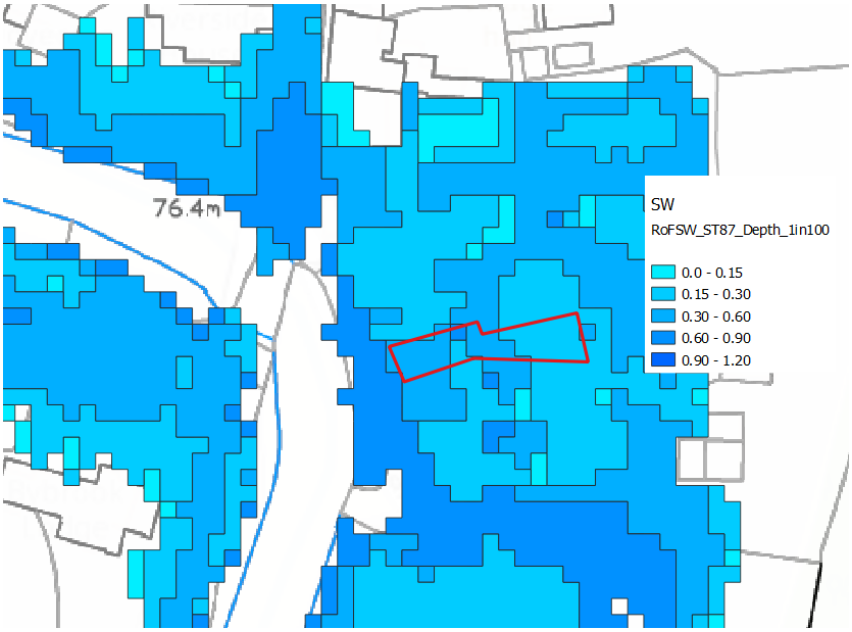


Figure 6: 1 in 100yr SW flood depth mapping. The footprint of the rear extension is at risk from flood depths to 600mm above relative external ground levels.

4.1.5 Flood risk from infrastructure failure

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

The site is not shown to be at flood risk due to reservoir failure, as shown in Figure 7.



Figure 7: Flood risk from reservoir flooding. (Source: EA flood mapping)

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

4.1.6 Urban flash flooding

With reference to the UFF dataset there are no referenced flash flood incidents at this location.

4.2 On-site surface water analysis and management

4.2.1 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.

4.2.2 SuDS Statement:

Surface water will be managed in full alignment with the SuDS hierarchy as required under provisions made under the Town and Country Planning Act 1990.

While not required for Planning permission consent it can be confirmed that all SW on site will be also be designed, installed and tested in full accordance with Part H of the Building Regulations 2010 (as amended 2013), Requirement H3, as made under the Building Act 1984.

It is unlikely that soakaways will be viable given the expected ground conditions associated with the local geology hence the recommendation of this report would be

to adopt the use of raised rain-garden planters and water butts as a viable and proportionate SuDS solution with the naturally reduced outfall from these taken to the existing drainage provision on site.

4.3 Impact on flood risk elsewhere

SW arising: Since the proposal is intending to manage any additional surface water at source the impact on flood risk elsewhere is Low.

5 Levels

5.1 Ground levels

76.26m AOD external at the front and rear entrances.

5.2 Flood level data

Fluvial - design period : Circa 77.0m AOD

Surface water - design period: 76.86m AOD

5.3 Floor level data

The proposed floor level to be no lower that any existing ground floor levels.

6 Management of flood risk

6.1 Flood risk resilience measures

Because the site is located in Flood Zone 3, and floor levels cannot be raised 300mm above assumed flood levels it is a recommendation of this report that, in line with current best practice[4], flood risk resilience measures should be incorporated into the development's construction, 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 77.0m 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 8.

Note: Flood depth are predicted to exceed 600mm in depth hence a "water entry" strategy must be adopted.

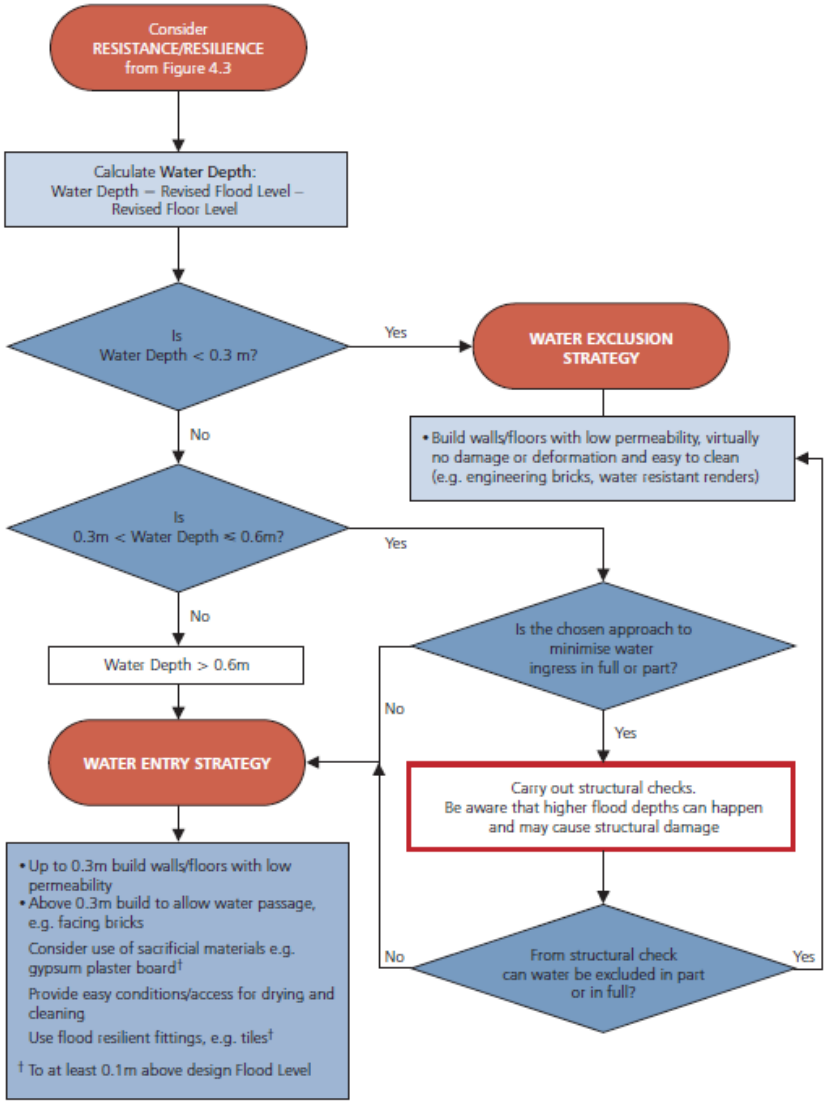


Figure 8: Design strategies for resistance and resilience[3]

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[1]

6.2 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 extension for use in any flooding event:

- Flood resilient doors: Specifically designed to prevent ingress of flood water - passive system (see also Figure 9).
- Door defence: As already implemented on site (Figure 10).
- 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 11).

- Air brick and flue covers (see also Figure 12).
- No service penetrations or other openings (cat flaps and letter boxes included) below 1m above FFL.



Figure 9: Aluminium doors under flood conditions. These appear to offer reasonable flood resilience



Figure 10: Flood gate as already adopted on site (as found via a Google search).



Figure 11: Anti flood air brick. Example from CSI products



Figure 12: 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 extension does not impact on existing access and egress routes. It is noted that the existing routes are within the flood risk zone (ref Figure 13).

It is therefore important that the occupiers gain early warning of likely flood events.

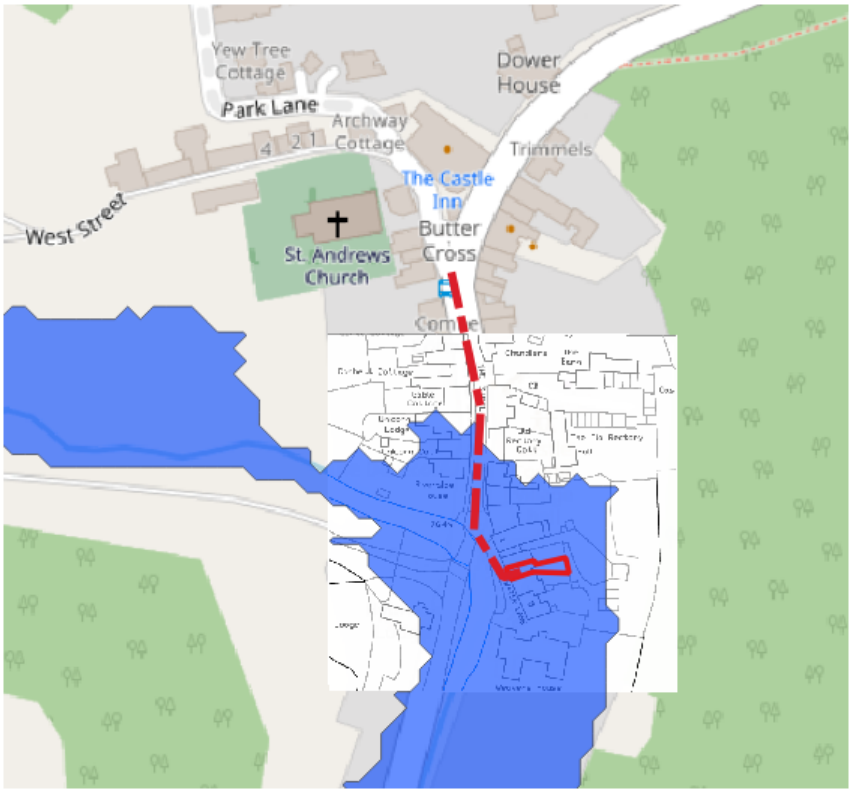


Figure 13: Access and Egress routes, although not ideal, are however existing and not impacted by the extension.

7.2 Flood warning schemes

Since it has been established that the site is in an area with a possibility of flooding the owners of the dwelling should (if they have not done so already) sign up to the E.A.

"Flood Warnings Direct" which is a free service providing flood warnings by phone, text or email. See https://www.fws.environment-agency.gov.uk/app/olr/register, or call the E.A. on 0345 988 1188 for full information.

7.3 Flood Plan

This report also provides the owners of the dwelling with a proforma Flood Plan (See Appendix A). The plan will, when completed bespoke to the dwelling, 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 E.A. Flood warning codes;
- Provide details of local radio stations
- Provide a check list of essential items.

8 Conclusions

Given that:

- The extension is to a dwelling house and this is minor development;
- The site lies in Flood Zone 3 and is at a High risk from surface water flooding;
- Flood resilience and mitigation methods will continue to be implemented on site;
- Access/egress routes are not affected and the site will (indeed may already) be signed up to flood warning schemes;
- There is no documented evidence of flood risk from any other sources;
- The development does not impact on flood risk elsewhere;

and assuming the recommended mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing dwelling is considered acceptable.

Signed:

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

Date: 29th January, 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?

Environment Agency

- Put important documents out of flood risk and protect in polythene ☐
- Check your insurance covers you for flooding ☐
- Look at the best way of stopping floodwater entering your property ☐
- Make a flood plan and prepare a flood kit ☐
- Find out where you can get sandbags ☐
- Identify who can help you/ who you can help ☐
- Identify what you would need to take with you if you had to leave your home ☐
- 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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