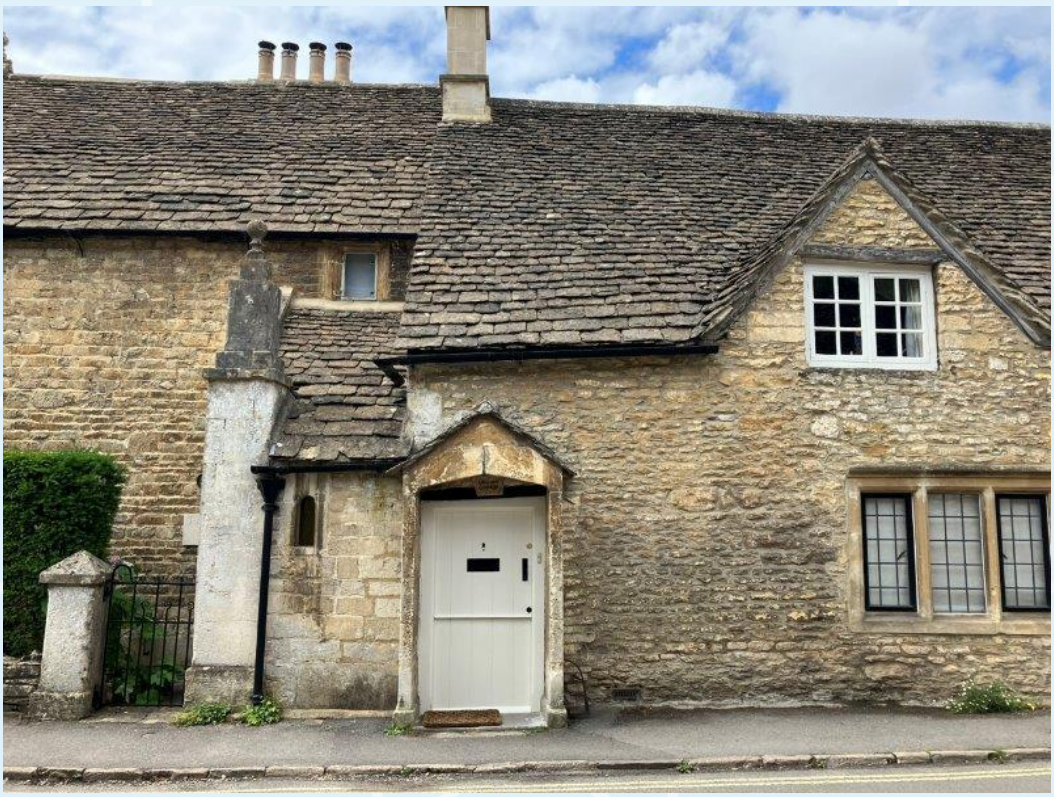

Property Flood Resilience (PFR) Survey Summary and Recommendations

Property address	Property ID
Unicorn Cottage The Street Castle Combe Chippenham SN14 7HU	CCOM016

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Survey date:	12/07/2023
Report date:	14/09/2023
Report version:	Version 1.0

Summary

Scheme Background
The flood risk posed to properties in Castle Combe and the surrounding communities has been identified for a number of years by the Environment Agency. Various flood protection options have been investigated following flood events, with no permanent, cost-effective or environmentally acceptable solution found. Property Flood Resilience (PFR) measures are now being investigated as a beneficial option to manage future flood risk and help reduce damage. The Environment Agency has appointed JBA Consulting to carry out PFR surveys at each property considered under the Castle Combe PFR Scheme.

Summary of flood risk	
Chance of flooding from river/tidal sources in any year according to the Environment Agency's Flood Map for Planning	High
Chance of flooding in any year from surface water according to the Environment Agency's Risk of Flooding from Surface Water Map	Low
Previous extent of flooding	Internal and external
Date of last flood	January 2023
Is property adjoining another property?	Yes

This property has been defined by the Environment Agency as eligible for an independent property flood risk survey. The survey will help confirm eligibility for measures through the scheme, dependent upon funding approval. Please see Section 2 for a detailed summary of the flood risk at this property.

Recommended Mitigation Measures
1. Supply and installation of one door barrier or flood door at the front of the property and one flood barrier and one window barrier at the rear.
2. Protection of one air vent.
3. Supply and installation of 1 full-port non-return valve on the foul sewer and one domestic non-return valve.
4. Supply of one portable electric puddle sucker pump.
5. The inspection of all service and drainage pipe entry/exit points and application of silicone sealant as required, to a maximum height of 600mm above Floor Level.
6. The inspection of all external and internal extension solid stone walls and application of mortar/sealant to all cracks and holes, including around service entry points, up to a maximum height of 600mm above Floor Level.
7. Application of a specialist breathable waterproof coating to all external and internal extension solid stone walls, up to a maximum height of 600mm above Floor Level.

Further details can be found in Sections 5.3 and 6.

Next Steps
Following issue of your PFR Survey Report, please fully consider the recommendations made and the products you feel would be suitable for you and your property. The Environment Agency will be in contact to arrange a follow up meeting to discuss the recommendations made. Where eligible, detailed options for the most appropriate measures to be provided under the scheme will also be discussed. Following discussions with all homeowners, the Environment Agency will appoint an installation contractor to carry out the works to those properties eligible under the scheme.

Further details can be found in Section 9.

Definitions

Protection Measures: Resistance measures aiming to reduce the amount of floodwater entering the property, such as door barriers and automatic airbricks.

Adaptation Measures: Changes to the building fabric aiming to reduce the damage caused by floodwater which has entered the property, such as tiled floors, waterproof plaster and raised electric sockets.

Property Flood Resilience (PFR): The outcome achieved by installing both protection and/or adaptation measures.

Annual Exceedance Probability (AEP): The likelihood of a flood happening is best described as the chance or probability of a particular sized flood occurring in one year. For example, "there is a 1 in 100 chance of flooding in any given year." This is usually described as a 1% annual exceedance probability (AEP) flood. So, a 1% AEP is equivalent to a 1 in 100-year flood in any one year.

Light Detection and Ranging (LIDAR): Means by which the height of the land is measured

Metres Above Ordnance Datum (m AOD): Height above sea level

Main River: Any watercourse marked as a Main River on a Main River map, as designated by Defra. The Environment Agency has powers to conduct flood defence work on Main Rivers.

Ordinary Watercourse: Every watercourse that is not designated as a Main River (other than a public sewer), including streams, ditches, drains and passages through which water flows. The Lead Local Flood Authority (LLFA) has powers to conduct flood defence work on Ordinary Watercourses.

Flood Risk Management Responsibilities

The Environment Agency is responsible for managing the flood risk from Main Rivers and the sea in England. Local Authorities are responsible for managing the flood risk posed by surface water sources, groundwater and ordinary watercourse and the local water company is responsible for sewer related flooding.

Please Be Aware

Outline Design

This report outlines the survey findings, and the flood resilience options that may be available through the Castle Combe Property Flood Resilience (PFR) Scheme.

It should be noted that the options described within the report are outline recommendations only. The next stage of the scheme, dependent upon funding approval, will involve a discussion between the homeowner, appointed installation contractor and the Environment Agency to agree, select and design the products to be installed. The contractor will confirm that all installations and modifications to the property are fit for purpose and compliant with all relevant regulations, standards and guidance. The Environment Agency should confirm with the installation contractor that a warranty is available for the products installed.

It should also be noted that the recommended mitigation measures described would not be expected to cause an increase of flood risk to other properties or other parts of the local community.

No excavations were made to try to locate other entry points.

Construction (Design and Management) Regulations 2015 (CDM Regs)

The works required to the property will need to comply with the Construction (Design and Management) Regulations 2015 (CDM Regs). JBA will perform the role of a Designer, as specified in the Regulations. It should be noted though that JBA are independent consultants with no commercial interest in the manufacture or sale of any PFR products or in the contractors/companies that install these products. To maintain this independence we will not recommend, specify or design any particular product or measure. As such, the appointed contractor will also perform a Designer role, in undertaking product selection and detailed design.

Limitations of Flood Protection Measures

It should be noted that it is not possible to completely prevent flooding. Flood resilience and resistance measures are designed to mitigate flood risk, reduce damage and adverse consequences, and provide added peace of mind. They will help you to recover more quickly following a flood event. Flood resilience and resistance measures are explained further in Sections 5, 6 and 7 of this report. It is important to be aware that PFR products that have achieved BSI certification also have an allowable leakage rate. Portable puddle sucker pumps are therefore an important component of the measures provided.

Exclusions

The focus has been on assessing means to restrict the entry of floodwater to the property (flood protection) using resistance measures available through the scheme. More invasive options such as 'tanking' (sealing floors and walls) are excluded given the cost (typically £10,000 to £30,000). However, a range of flood adaptation measures and options are also identified (Section 7) which the property owner may wish to fund privately outside of the funded scheme. Such changes to the building fabric aim to reduce the damage caused when floodwater does enter the property.

The protection of gardens, detached garages and outbuildings is excluded from the scheme.

Future alterations to the property

Any alterations made to the property after the installation of flood protection measures may lead to barriers no longer being able to be installed or protect the property as designed and/or may create routes for water to bypass the measures installed. Similarly, the installation of additional vents, including those associated with a combustible heating appliance or outlet, should be installed with flood protection in mind, above the likely flood level to avoid sealing the vent and causing risk from noxious gases. The advice of a registered Gas Safe Engineer should be sought by the installation contractor where appropriate.

GDPR

This document has been prepared for the Environment Agency. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Environment Agency for the purposes of which it was originally commissioned and prepared.

In accordance with the General Data Protection Regulations (2018), JBA does not share any personal data with third parties, and any personal data collected is purely for the purposes of contacting residents to arrange PFR surveys. All personal data is managed in compliance with the requirements of the General Data Protection Regulations.

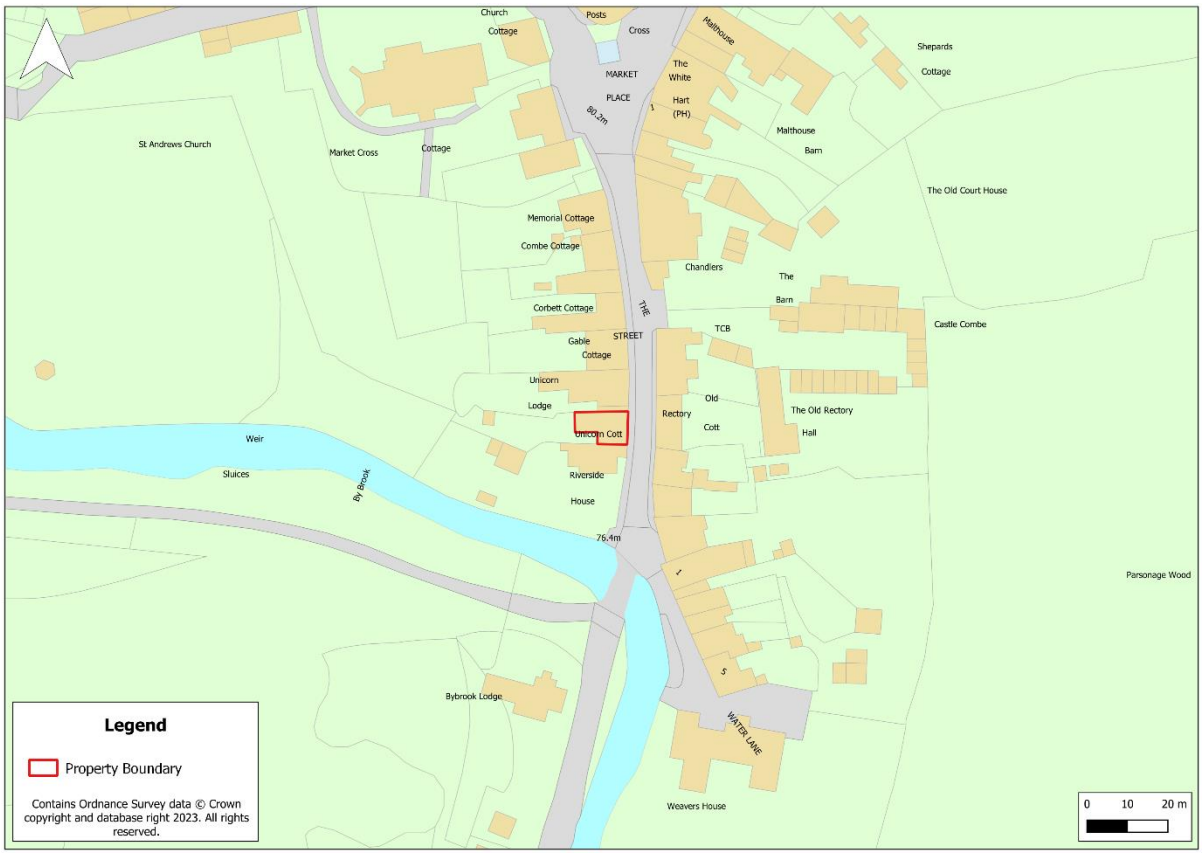
1 Property Information

1.1 General Details

Property ID:	CCOM016
Local Authority:	Wiltshire Council
Lead Local Flood Authority:	Wiltshire Council
Water Company:	Wessex Water
Is the property listed?	Grade II Listed
Is the property in a conservation area?	Yes
Type of property:	Terraced
Foul drainage system:	Main Sewer
Owner/tenant occupied:	Owner
Length of time at property:	2 Years
Is a local flood community group and community flood plan in place?	Yes

1.2 Property Location

Figure 1-1: Location Map



The property is located in Castle Combe, approximately 25 metres north of the By Brook.

1.3 Property Description and Existing PFR Measures

The property is a Grade II Listed, terraced, two-storey building originally constructed in the 1450s. The external walls of the property are constructed from solid stone.

The rear of the property has been extended and this is where the kitchen is now located. The external walls of the conservatory are constructed from a double skin of stone and concrete blockwork. The doors and windows on the rear wall of the conservatory situated within a timber frame.

The ground floor is constructed from solid stone. There are steps up of 480mm from the living room/utility area to the rear kitchen extension.

The property has a ground floor shower room which includes a shower, wash basin and toilet.

The owners of the neighbouring property Unicorn Lodge have installed a sump pump system in the rear garden to manage groundwater flooding at the rear of the two properties. Specific details of this pumping system are unknown.

There is currently no formal flood protection in place at this property.

1.4 Nature of Underlying Geology and Soil

The permeability of the underlying geology and soil impacts the local flood risk and natural drainage.

The property is situated on the Fuller's Earth Formation, a bedrock geology made up of calcareous mudstone. Mudstone tends to have low porosity and permeability however this is dependent upon grain size percentages and level of compaction undergone. As a result, upward percolation of groundwater and subsequent flooding should be considered.

This property is also situated on superficial deposits of alluvium, consisting of clay, silt, sand and gravel.

The local soils are identified to be mainly shallow lime-rich soils over chalk or limestone.

2 Assessment of Flood Risk

2.1 Flood History

Information on the property-specific flood history has been collected through confidential flood questionnaires and discussions with the owners of the property.

There have been a number of significant flood events in the area, notably in November 2012, and January 2023.

The homeowners reported that the main flood risk to the property is groundwater flooding. Groundwater is known to have risen up through the ground floors on at least three occasions. The most recent event occurred in January 2023. During this event, internal flood depths were reported to reach approximately 50mm. The two other reported events occurred prior to the owners purchasing the property, however it is likely that one of these events occurred in November 2012.

As mentioned in Section 1.3 above, the owners of Unicorn Lodge to the north installed a sump pump system in the rear garden in approximately 2009. This system manages groundwater levels at the rear of the properties and if thought to have benefitted this property.

2.2 Potential Sources of Flooding

2.2.1 Fluvial (Main River and Ordinary Watercourses)

The property is located within close proximity of the By Brook.

The Environment Agency's Flood Map for Planning shows the property is located within Flood Zone 3 and has a high probability of flooding.

High probability means that there is a greater than 1% chance of river flooding in any year.

2.2.2 Surface Water

High levels of precipitation increase the likelihood of surface water flooding.

The Environment Agency's Risk of Flooding from Surface Water map shows the property itself has a low probability of flooding. The road to the east of the property has a medium to high probability of flooding.

Low probability means that there is between a 0.1% and 1% chance of flooding in any year as a result of local rainfall. Medium probability means that there is between a 1% and 3.3% chance of flooding in any year as a result of local rainfall. High probability means that there is a greater than 3.3% chance of flooding in any year as a result of local rainfall.

The surface water mapping is indicative and will be affected by a range of site-specific conditions that will not be picked up by the Environment Agency's mapping. Please note that surface water issues have the potential to be exacerbated by poorly functioning surface water drains.

Figure 2-1: Environment Agency's Flood Map for Planning

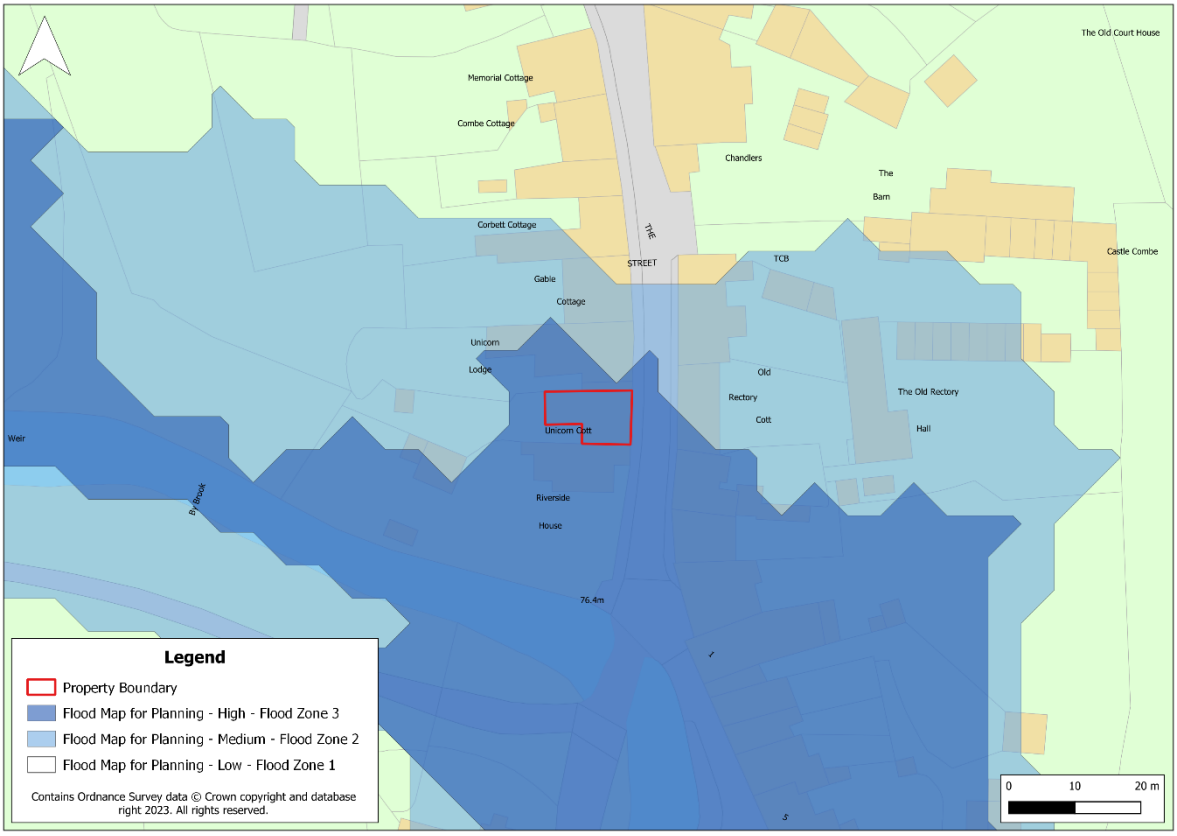
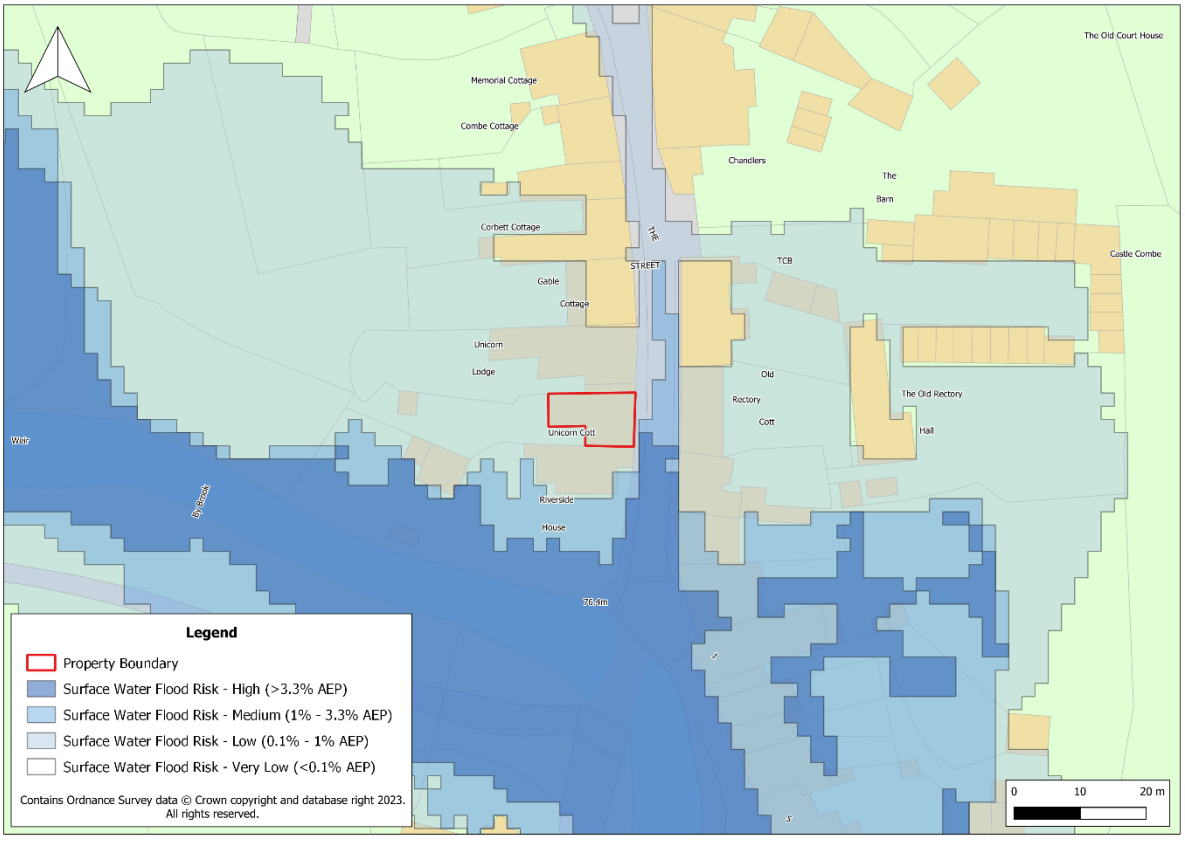


Figure 2-2: Environment Agency's Risk of Flooding from Surface Water Map



2.2.3 Groundwater

A review of the BGS borehole records revealed two boreholes which have encountered water situated within a 250m radius of the site in similar geology.

The borehole records in the vicinity of the site suggest groundwater levels were noted at significant depths.

With increased precipitation, groundwater levels will rise, which could result in groundwater entering the property directly through the property floors, and an increased level of surface water overland flow.

2.2.4 Foul Drainage

The property may be at risk of flooding as a result of foul drainage becoming inundated, causing sewage to back up from the main sewer into the property. There have been no reports of poorly functioning drains, or sewage backing up into the property via the downstairs shower room.

2.3 Future Increase of Flood Risk

In the UK, climate change will not only cause changes to sea level, temperature and rainfall, but will also increase the chance of occurrence and severity of more extreme storm events.

The Environment Agency's latest guidance released in May 2022[1] predicts the following for the area:

- An increase in peak river flows of 26% - 39% by 2125 for the Avon Bristol and North Somerset Streams Management Catchment.
- An increase of 25% - 45% in peak rainfall intensity for the 1 in 100-year (1% AEP) event by 2125 for the Avon Bristol and North Somerset Streams Management Catchment.

1 Environment Agency (May 2022), Flood risk assessments: climate change allowances,

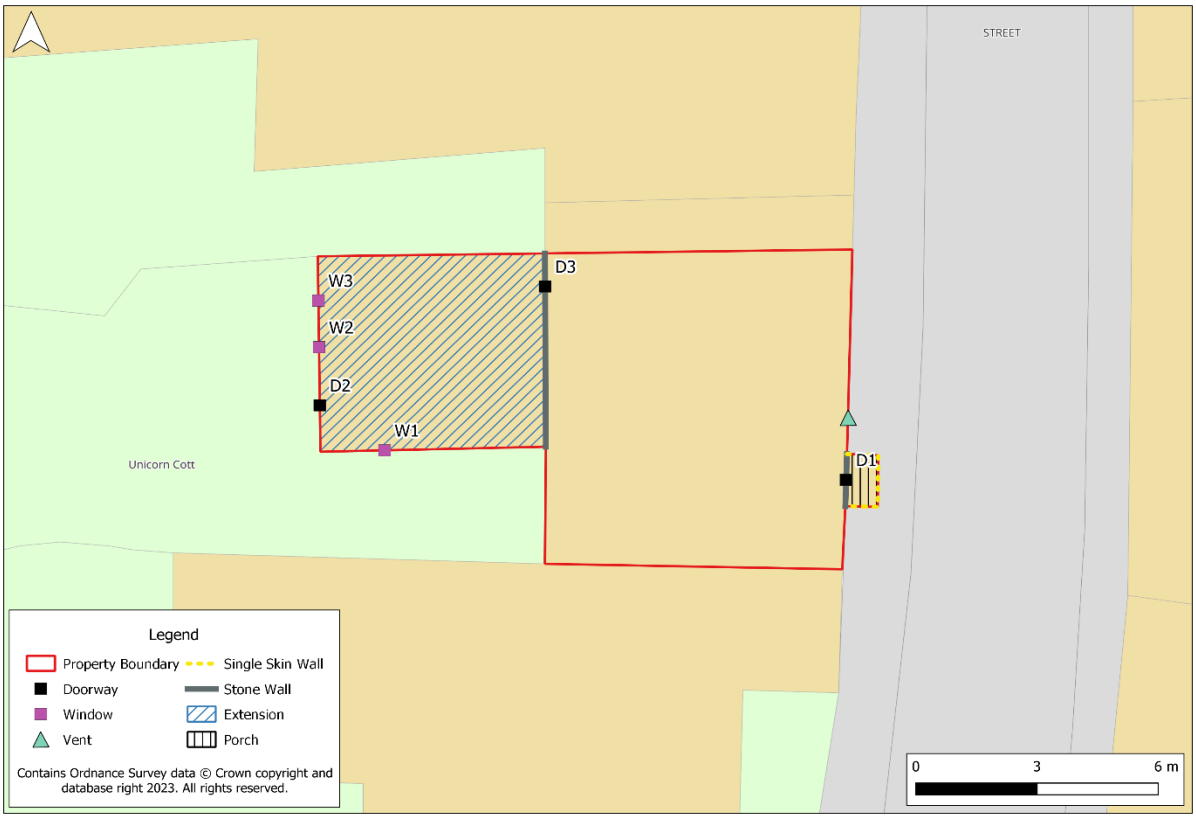
(available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances)

3 Routes of Water Ingress

3.1 Property Plan

Figure 3-1 shows the outline of the property, which has been annotated with the main potential ingress routes, up to 600mm above Floor Level.

Figure 3-1: Main Potential Ingress Routes



3.2 Potential Ingress Routes

3.2.1 Doorways and Windows

There are two external doorways (Front Door – D1 and Rear Door - D2) and three external windows (Side Window – W1, Rears Windows W2 & W3) which present a direct ingress route for water.

It should be noted that the rear door and windows are situated within the timber framed section of the rear extension.

3.2.2 Flooring

The ground floors of this property are constructed from solid flag stone throughout. The condition of the flooring is unknown; if there are any cracks or joints, they could present an additional ingress route. It has been reported that groundwater rises up through these floors.

3.2.3 Airbricks and Air Vents

There is one air vent, located at the front of the property. The function of this vent is unknown. Should floodwater enter this air vent, it may gain access to the property through the appliance. This vent may be associated with a combustible heating appliance outlet, the professional advice of a registered Gas Safe engineer should be sought as part of any flood protection works, to avoid sealing or constricting the vent causing risk from noxious gases.

There is also an unknown vent internally, within the step up to the rear of the property. It is recommended that this vent is inspected as it may also present an ingress route.

3.2.4 Walls

Although the condition of the external walls of the property is deemed to be sound, if floodwater were to remain in contact for an extended period of time it may seep into the property. This is especially true for any areas where the pointing and brickwork has degraded slightly.

3.2.5 Foul Drainage

Inundation of the foul drainage may cause sewage to back up along the system, resulting in internal flooding via the ground floor shower room.

4 Photographs

Survey Photos (12/07/2023)	
	
Front Door (D1)	Air vent at the front of the property
	
Steps up from the living room and kitchen to the conservatory/ extension.	Underfloor heating vent in step
	
Rear extension, Rear Door (D2) and Rear Windows (W1,W2,W3)	Rear garden and steps down towards rear of property

5 Measures to Reduce Flood Risk

5.1 Introduction

PFR options have been assessed within the scope of the Castle Combe PFR Scheme. The primary intention is to develop a cost-effective and practical range of PFR options within the immediate curtilage of the property, to help mitigate and reduce the effect of flooding through the use of resistance measures. Any other local options are also noted for further consideration where feasible or practical.

5.2 Design Criteria

5.2.1 Property Construction

As identified in Section 1.3, this property is constructed from solid stone with solid stone ground floors. There is a risk of internal property flooding. Mitigation of flooding as part of the Castle Combe PFR Scheme is recommended through protection measures.

5.2.2 Height of Flood Mitigation Required

To determine the possible height of flood mitigation required, JBA Consulting surveyed the property to establish the appropriate height to which flood mitigation measures can be provided.

The full height of the British Standards Institution (BSI) Kitemark for PFR measures is 900mm above Floor Level. However, research carried out for the Department for Communities and Local Government (DCLG) and the Environment Agency has recommended that the use of protection measures should generally be limited to a nominal protection height of 600mm above Floor Level: the lowest point of ground abutting the external property walls. This is because the structural integrity of the property may be compromised above this level, which also increases the risk of cracks and leaks. This height fully satisfies the criteria laid down by the Environment Agency for this scheme.

For this property, Floor Level has been taken as the level within the Front Door (D1).

If the installation of flood protection measures is required up to the maximum protection height of 900mm, the suitability of measures will need to be verified by a structural engineer and provided at the owner's risk.

5.2.3 Residual Flood Risk

As the flood risk posed to a property cannot be removed completely, it is recommended that PFR products are deployed in conjunction with pumps of a sufficient capacity. Pumps will help manage the residual flood risk from product leakage, seepage through walls and rising groundwater. A pump or pumps of sufficient capacity will aim to evacuate groundwater and/or seepage to outside the property at a greater rate to which it can infiltrate, thus minimising the internal water level. However, there will always be uncertainty regarding the extent of flow paths beneath the property and the installed pump capacity required to manage flood ingress.

The property owner may wish to consider purchasing either a battery back-up or a petrol generator for use with pumps in case electricity supply to the property is lost during a flood event. Care should be taken to ensure safe installation, use and maintenance of any battery back-up and/or generator, safe storage of fuel and venting of exhaust fumes.

5.2.4 Adjoining Properties

Since this property is mid-terrace, it is necessary to also consider the potential flood risk from adjoining properties. Floodwater entering an unprotected neighbouring property could cause flooding via seepage through walls. Measures installed at this property should therefore consider those installed at the neighbouring properties, which are also eligible for this PFR scheme.

5.2.5 Listed Buildings and Conservation Areas

The property is a Listed Building and located in a Conservation Area. Accordingly, approval will need to be sought from a Listed Building and Conservation Officer regarding the type of flood resilience measures permitted to be installed at this property. Listed Building Consent may be required for products available through this scheme.

5.2.6 Please Note

It should be noted that the options described here are outline, dependent on agreement between the homeowner, appointed installer, conservation officer, Listed Building officer and the Environment Agency. Further agreement will also be needed with the appointed contractor concerning the selection and detailed design of the PFR measures and installation works. It is the responsibility of the contractor to advise and agree on the detailed design of the products for installation and to ensure these and any modifications to the property are compliant with all relevant regulations, standards and guidance.

5.3 Recommended Mitigation Measures

The following table outlines the recommended mitigation measures:

	Recommended Mitigation Measures
1	Supply and installation of one door barrier or flood door at the front of the property and one flood barrier and one window barrier at the rear.
2	Protection of one air vent.
3	Supply and installation of 1 full-port non-return valve on the foul sewer and one domestic non-return valve.
4	Supply of one portable electric puddle sucker pump.
5	The inspection of all service and drainage pipe entry/exit points and application of silicone sealant as required, to a maximum height of 600mm above Floor Level.
6	The inspection of all external and internal extension solid stone walls and application of mortar/sealant to all cracks and holes, including around service entry points, up to a maximum height of 600mm above Floor Level.
7	Application of a specialist breathable waterproof coating to all external and internal extension solid stone walls, up to a maximum height of 600mm above Floor Level.

6 Details of Recommendations

6.1 Products available through the scheme

This section outlines the details of recommended measures listed in Section 5.

The type of product recommended and agreed by the installation contractor must take account of its suitability for the property, homeowner preferences and the ability of the homeowner to deploy. Products should be provided that comply with the British Standard BS851188 or are BSI Kitemarked under PAS1188 (where applicable), designed to provide suitable mitigation at the property given the level and sources of flood risk. All dimensions will be verified by the installation contractor before the works commence.

By contributing funds, householders may be able to, if necessary, upgrade the installation of the core package of PFR measures recommended for their home (for example, upgrading door barriers to flood doors). A range of products can be found in the National Flood Forum's Blue Pages Directory at: **www.bluepages.org.uk**

Further guidance can also be found at:

nationalfloodforum.org.uk/about-flooding/reducing-your-risk/protecting-your-property/

nationalfloodforum.org.uk/about-flooding/reducing-your-risk/property-protection-advisor/

6.1.1 Door Barriers

Description: Door barriers provide a relatively low-cost, simple-to-use and quick means to help limit the direct entry of floodwater into a property. The effectiveness depends on the seal around the individual frame, cill, surrounding wall and ground.

Details of recommendation:

Location	Width *#	Reveal *	Opens	Frame Materials	Barrier Height above Threshold	Suitable Product Types**
Front door- D1	1700	440	In (stable door)	Timber	600	1,2,3,4
Rear door- D2	2590	N/A	Out	Metal	180	1,2,3
Rear Window	1600	N/A	N/A	Metal	180	1,2,3,5

*All measurements in millimetres (approximate).

# denotes central pillar needed

**The type of product recommended takes account of the suitability of the door for each barrier type, homeowner preferences and the ability of the homeowner to deploy. A key is provided in Table 6-1. In discussion with the Environment Agency, there may be the option for homeowners to upgrade door barriers to flood doors by providing additional funding.

Emergency Evacuation- Flood Doors

To allow emergency evacuation from the building during a flood, one existing inward opening door should be provided with a manual door barrier, rather than an automatic flood door. If water is standing against a flood door, generally, the only option available to evacuate the property is by opening this inward opening door, despite resulting in water entering the property. Agreement of the most suitable product will be made following discussion between the Environment Agency and product installer/manufacturer.

Table 6-1: **Key to Generic Door and Window Barrier Product Types**	
	
Type 1: Free standing barrier expanding into recess/door reveals	**Type 2**: Screws into pre-installed sockets
	
Type 3: Individual demountable planks fitted to a pre-installed frame	**Type 4**: Flood door
	
Type 5: Flood window	**Type 6**: Flood gate installed in a flood wall

6.1.2 Airbrick and Air Vent Protection

Description: Automatic airbricks provide a low-cost and simple-to-use means to help limit the entry of floodwater through airbrick openings. Automatic airbricks maintain ventilation in dry conditions, but automatically close as water levels rise above the level of the airbricks.

Alternatively, the existing airbricks could be relocated at a higher level so that they continue to function during flood conditions.

Air vents that are at flood risk should be removed and sealed if redundant. If the air vents are in use, it is advisable to raise them above flood level or as high as possible. When air vents cannot be raised above flood level, protection options should be discussed with and provided by the installation contractor to limit the ingress of water via these openings.

Details of air vents:

It is recommended that sufficient airbrick replacements are provided to maintain the current airflow. The current situation is as follows.

Item	Number	Purpose	Size (height x width x protrusion)*	Present Material	Height above Floor Level*
Air vent	1	Unknown	80 x 230 x N/a	Metal	120

*All measurements in millimetres (approximate).

6.1.3 Non-Return Valves

Description: Non-return valves act to allow drainage flow from the property but contain a valve to stop floodwater or sewage from surging back into the property. These are installed in-situ and operate automatically.

Details of recommendation:

Location	Pipe diameter*	Material	Height above Ground Level*
Foul Chamber	TBC	TBC	N/A

*All measurements in millimetres (approximate)

6.1.4 Dewatering Pump

Description: Provision of one portable electric puddle sucker pump of sufficient capacity, to help limit the level of internal flooding. Typical discharge rates are 100-200 litres per minute for puddle sucker pumps and 500-600 litres per minute for sump pumps.

Details of recommendation: The sump pump arrangement is to be agreed with the owner and informed by detailed recommendation from the installer. If the sub-floor of this property is divided, the number of spaces should be investigated, and a pump is recommended for each space. Appropriate training should be provided by the installation contractor to ensure safe installation use, storage and maintenance of equipment. A certificate should be provided by the qualified electrician confirming safe installation. It is recommended that the sump pump is serviced in accordance with the manufacturer's guidance.

NOTE: The property owner may also consider purchasing either a battery back-up or a petrol generator for use with pumps in case electricity supply to the property is lost during a flood event. Care should be taken to ensure safe installation, use and maintenance of any battery back-up and/or generator, safe storage of fuel and venting of exhaust fumes. This is not covered by the Castle Combe PFR Scheme.

6.1.5 Inspections and Sealing

Description: This provides a low-cost and simple means to limit ingress of water around small pipes and cables. A durable silicone-based sealant injected into small gaps and around the entry points can provide a waterproof seal.

Details of Recommendation: Rake out existing sealant around service pipe and cable entry points, service boxes and vents and re-seal. This includes the gas and electric supply. This should be carried out up to a maximum height of 600mm above Floor Level.

NOTE: This survey will be restricted to such locations as are reasonably apparent by inspection from ground level from both inside and outside the property. No excavations will be made to try to locate other entry points.

6.1.6 Inspections and Re-Mortaring

Description: This provides a low-cost and simple means to limit ingress of water through application of mortar to cracks and holes in the property walls.

Details of Recommendation: Inspect all external walls and apply mortar to seal all cracks and holes, including around service entry points, up to a maximum height of 600mm above Floor Level.

NOTE: This survey will be restricted to such locations as are reasonably apparent by inspection from ground level from both inside and outside the property. No excavations will be made to try to locate other entry points.

6.1.7 Waterproof Walls

Description: This provides a low-cost and simple means to improve the water-resistance of walls. A colourless, breathable, water-resistant coating is sprayed or painted onto surfaces, limiting damage to walls caused by contact with water during flooding. For particularly vulnerable areas, a coloured waterproof render may be applied.

Details of Recommendation: Application of a waterproof render to a maximum height of 600mm above floor level. Application of a specialist breathable waterproof sealant to all other external walls up to a maximum of 600mm up from Floor Level.

NOTE: It is recommended that this is re-applied in accordance with the manufacturer's guidance.

6.2 Future Maintenance of Measures

Please note that if products are installed, it will be the property owner's responsibility to store, maintain and replace them as any such work is specifically excluded from this scheme. Details of the maintenance requirements will be issued by the installation contractor for any products installed and ownership handed to the property owner.

It is recommended that all products which require deployment prior to a flood (e.g. door barriers) are tested regularly and at least annually, and stored where they are:

- indoors,
- not resting on seals (ideally hung from walls),
- bagged (to prevent vermin damage),
- easily accessible,
- protected from extreme temperatures and UV light.

Alterations conducted to the property perimeter post-installation may mean measures such as barriers can no longer be installed, nor protect the property as designed, and/or may create routes for water to bypass the measures installed. It is recommended that any such alterations are undertaken with property flood protection in mind, and steps are taken to reduce the increased likelihood of water ingress into the property.

All PFR products should be handed over to the new owner along with any documentation regarding storage, maintenance and deployment should the property ever be sold or new tenants take up occupancy.

7 Flood Resilience

The installation of the recommended measures will not guarantee that the property will be watertight. There may also be hidden water ingress routes, or the standard of protection provided by the mitigation measures may be exceeded. Therefore, the following is a list of resilient adaption options that can help reduce the damage if floodwater enters a property. Although such flood resilience techniques are outside the scope of this scheme, they are options which the homeowner may wish to pursue:

1. Install water resilient skirting and water resilient plaster or membranes to internal walls.
2. Install water resilient floor coverings, such as ceramic tiles instead of carpet.
3. Raise kitchen utilities/white goods and raise or install flood resilient kitchen units.
4. Raise the electrical junction box, electrical sockets and any exposed circuitry so that they are situated above the maximum expected height of flooding.

It will be important to continue with/or develop practices for protecting furniture, carpets, electrical goods, personal belongings and documents (e.g. insurance policy documents, photographs etc), to safeguard such items in the event that water does enter the property.

Further information is available from:

www.nationalfloodforum.org.uk

8 Flood Preparedness

8.1 Flood Warnings

It is a requirement as part of the Castle Combe PFR Scheme for property owners to sign up for flood warnings where available.

8.1.1 Environment Agency

The Environment Agency operates a Flood Information Service for areas deemed to be at a risk of fluvial or coastal flooding.

If a flood event is forecast, alerts and warnings are issued using a set of four easily recognisable codes. Generic advice and examples of actions to be taken on receipt of the alert of warning are showing in the table below.

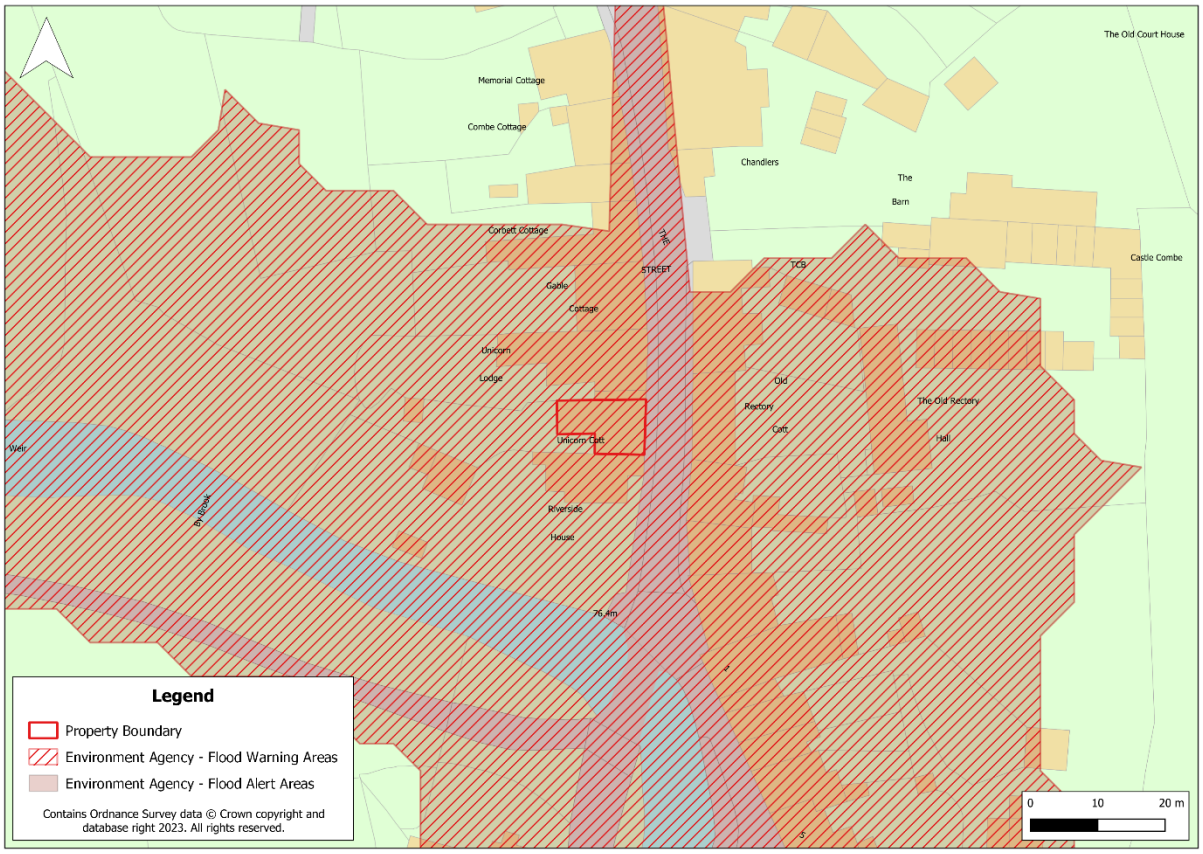
Flood code	What it means	What to do
 **Flood Alert**	Flooding is possible, be prepared	Be prepared to act on your flood plan. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast on our website.
 **Flood Warning**	Flooding is expected, immediate action is required	Move family, pets and valuables to a safe place. Turn off gas, electricity and water supplies if safe to do so. Put flood protection equipment in place.
 **Severe Flood Warning**	Severe flooding and danger to life	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.
Warning no longer in force	Warning has been removed in the last 24 hours	Be careful. Floodwater may still be around for several days and could be contaminated If you've been flooded, ring your insurance company as soon as possible.

There is one Flood Alert Area and one Flood Warning Area in Castle Combe. These warnings have been designed to give residents advance notice of flooding. Triggered from a number of locations upstream, these warnings can be received in a number of ways – landline, mobile, text and email. Using these warnings, along with local knowledge, property owners are able to take effective action, such as installing PFR measures, to reduce the consequence of flooding.

The Environment Agency warnings available for the area are outlined in the table below along with a Quickdial code for each area. The Environment Agency's flood warning area map is shown in Figure 8-1.

Warning Type	Flood Warning Name	Description	Quickdial Code
Flood Warning	By Brook at Castle Combe	The Street and Water Lane in Castle Combe	310032
Flood Alert	Lower Bristol Avon Area	Lower River Avon, River Boyd, By and Brislington Brooks and tributaries	210004

Figure 8-1: Flood Warning Area Map



Through this service, the homeowner can sign up to receive Flood Alerts, Flood Warnings and Severe Flood Warnings. More information on how to register for this service is available from the Environment Agency's website at:

flood-warning-information.service.gov.uk

Alternatively, you can register by calling the 24-hour Floodline on:

0345 988 1188

It should be noted that this assessment is based on data made available by the Environment Agency in June 2023. The flood warning service is continually reviewed. It is recommended that resident check annually that they are signed up to receive the correct warnings by checking the following website:

flood-warning-information.service.gov.uk

8.1.2 Met Office Weather Warnings

The Met Office has a responsibility for providing weather warnings for the UK and issues Severe Weather Warnings to warn of severe or hazardous weather which has the potential to cause danger to life or widespread disruption. Warnings are issued through the National Severe Weather Warning service, available on the Met Office website:

www.metoffice.gov.uk/public/weather/warnings

It is recommended the homeowner signs up for Severe Weather Warning email alerts, also available on the Met Office website:

www.metoffice.gov.uk/about-us/guide-to-emails

8.2 Flood Plans

As part of this PFR scheme and through liaison with the National Flood Forum and the Environment Agency it is recommended that residents produce an individual and a Community Emergency Flood Action Plan.

The Community Flood Action Plan should list the lines of communication amongst the residents and emergency contact numbers. It should also include details of a "buddy system," whereby a local resident or neighbour can deploy any mitigation measures should a property owner not be present or may require assistance. The Community Flood Action Plan will help to identify those residents who may require assistance in deploying any flood mitigation measures. It should also identify evacuation procedures.

Residents are also encouraged to develop or review their own, individual Personal Flood Plan, which will help to identify a list of actions which can be quickly put in place during a flood event to minimise the disruption caused. The Environment Agency has prepared a template for individual flood plans, which is available by visiting:

www.gov.uk/prepare-for-flooding/future-flooding

This individual flood plan should link in with the Community Flood Action Plan.

9 What Next?

Following issue of the PFR survey report, it is important to fully consider the recommendations made and the type of products which would be suitable for the homeowner and the property.

The Environment Agency will be in contact with the homeowner to arrange a follow up meeting to discuss the recommendations made. Where eligible, detailed options for the most appropriate measures to be provided under the scheme will also be discussed.

It is also recommended that the homeowner:

1 Prepares or reviews and updates their own individual flood plan to verify the actions taken to help reduce the impact of flooding, as well as the time taken to recover following an event (Section 8.2).

2 If not already done so, become a member of the local Castle Combe Flood Group and participate in the creation of a Community Flood Action Plan, or confirm that the existing Community Flood Action Plan is up to date.

3 Consider whether they would like to contribute funds, if necessary, to upgrade the installation of the core package of PFR measures recommended (Section 5.3 and 6).

4 Consider installing any resilient adaption measures that may be of benefit to their property (Section 7).

Following discussions with all homeowners, the Environment Agency will appoint an installation contractor to carry out the works to those properties eligible under the scheme.

9.1 Quality check and demonstration of PFR

In line with Section 5 of CIRIA's Code of Practice for Property Flood Resilience[2], 'following completion of the works by the contractor, a quality check should be conducted. This is an assessment process by those who installed the measures on the property, to ensure the measures are operating effectively and are fit for purpose. It will allow the installer to review all works for functionality and suitability and should identify if there are any faults with the product(s) installed on the property. If there are any deployment or storage requirements for the installed measures, an assessment of these aspects should form part of the quality check. Defects with any aspects of the PFR measures should be rectified to the satisfaction of the client and end user.'

9.2 Post Installation Audit and Flood Risk Report

Once the appointed installation contractor confirms to the Environment Agency that all recommended works have been completed and are fit for purpose, JBA will return to carry out a Post Installation Audit (PIA) of the property.

In line with the Code of Practice, the audit will 'provide a robust impartial verification of the completion of the works to a suitable standard'. The audit will allow JBA to verify that the works have been undertaken with respect to the flood risk assessment and survey recommendations outlined in this report, and specifically are suitable for the nature of flood risk, the person and the property.

Following this visit, JBA will be able to produce a Post Installation Flood Risk Report (PIFRR) which will detail the works completed.

This PIFRR remains confidential to homeowner, but they may wish to share or refer to the report when talking to insurers or selling the property.

In accordance with the Code of Practice, the PIFRR does not comprise sign-off on the measures installed as this should be provided by the installation contractor.

[2] CIRIA (January 2021), Code of Practice for Property Flood Resilience (available at: https://www.ciria.org/ItemDetail?iProductCode=C790F&Category=FREEPUBS)

9.3 Snagging and Correction

The Code of Practice states that 'following the completion of the contractor's quality check any *in situ* testing of PFR measures and an independent PIA, plus any snags with the installation of the PFR measures, should be identified and raised with the contractor. An appropriate solution to these should be determined and the corrections should be carried out by the relevant party. The audit may then be repeated, at the request of the client, following the completion of the corrections.'

9.4 Sources of Additional Information

9.4.1 National Flood Forum

The National Flood Forum is a national charity dedicated to supporting and representing communities and individuals at risk of flooding. If you are interested in upgrading the installation of the core package of PFR measures recommended for your home, please visit the National Flood Forum's website:

nationalfloodforum.org.uk

For an initial indicative guide to the cost of installing property level flood protection measures to the property, please visit the National Flood Forum's Property Protection Advisor, developed by JBA for Defra:

nationalfloodforum.org.uk/about-flooding/reducing-your-risk/property-protection-advisor/

For an independent directory of flood protection products and services, please visit the National Flood Forum's Blue Pages Directory:

www.bluepages.org.uk

9.4.2 Flood Re

The 'Flood Re' reinsurance scheme, as agreed between the Government and insurance companies, was launched in April 2016. Flood Re is designed to provide homeowners at risk of flooding with access to affordable flood protection cover. Further information is available from:

www.floodre.co.uk

It should be remembered that the installation of PFR measures does not currently guarantee a reduction in insurance premiums and excesses. Regular maintenance and inspection of the measures will be essential to keep the products effective and to remain prepared for flooding.

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Offices at

Coleshill
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Newcastle upon Tyne
Newport
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