



Department  
for Environment  
Food & Rural Affairs

# **Best Practice in Property Level Protection Systems**

## **Advice for Local Authorities**

**Date: May 2014**



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This best practice is based evaluation work carried out by JBA Consulting in 2011/12 and in 2013/14 on a property-level grant scheme funded by Defra and the Environment Agency between 2009 and 2013.

# Contents

<b>1</b>	<b>Summary .....</b>	<b>4</b>
<b>2</b>	<b>Background to Property-Level Protection.....</b>	<b>5</b>
<b>3</b>	<b>Finding Best Practice .....</b>	<b>6</b>
3.1	Headline Findings.....	6
<b>4</b>	<b>Case Studies .....</b>	<b>10</b>
4.1	Flood Resilient Property – East Peckham .....	10
4.2	Appleby-in-Westmorland .....	10
4.3	Flood Action 4 Buckingham .....	11
4.4	South Zeal, Okehampton, Devon.....	13
<b>5</b>	<b>Best practice .....</b>	<b>14</b>
5.1	Introduction .....	14
5.2	Best Practice Flow Chart .....	15
5.3	Best Practice Guide for Community Property-Level Protection Schemes.....	16
	<b>Annex 1 Background to the Recommendations .....</b>	<b>21</b>

# 1 Summary

Property-level protection schemes provide cost-effective and easy-to-implement tools for homeowners to take more effective action to manage their flood risk. Such measures extend the options for managing flood risk beyond having to rely simply on sandbags, helping to bring local communities together to engage and better manage their flood risk. Property-level protection schemes provide peace of mind and help to reduce the stress and damage that flooding causes.

The Property-level protection market developed significantly in response to the Defra and Environment Agency grant schemes between 2009 and 2012. However the review of the Defra scheme in 2011 noted that systems had not yet been widely tested in flood conditions. The extensive flooding witnessed during 2012 has provided the first real tests of both the measures and homeowner emergency plans.

A range of stakeholders involved in the planning, delivery and operation of property-level protection schemes were contacted in order to gather evidence about how these measures performed during the 2012 floods. This booklet presents a summary of the our research and is for Local Authorities involved in commissioning and providing advice on Property-level protection,

Where Property-level protection measures have been deployed and were required during a flood, they have performed as intended and successfully mitigated against the effects of the flooding, in the majority of properties.

This advice booklet presents good practice and examples of successful schemes e.g. Appleby and evidence that should encourage other flood risk communities to take such effective action themselves.

## Abbreviations

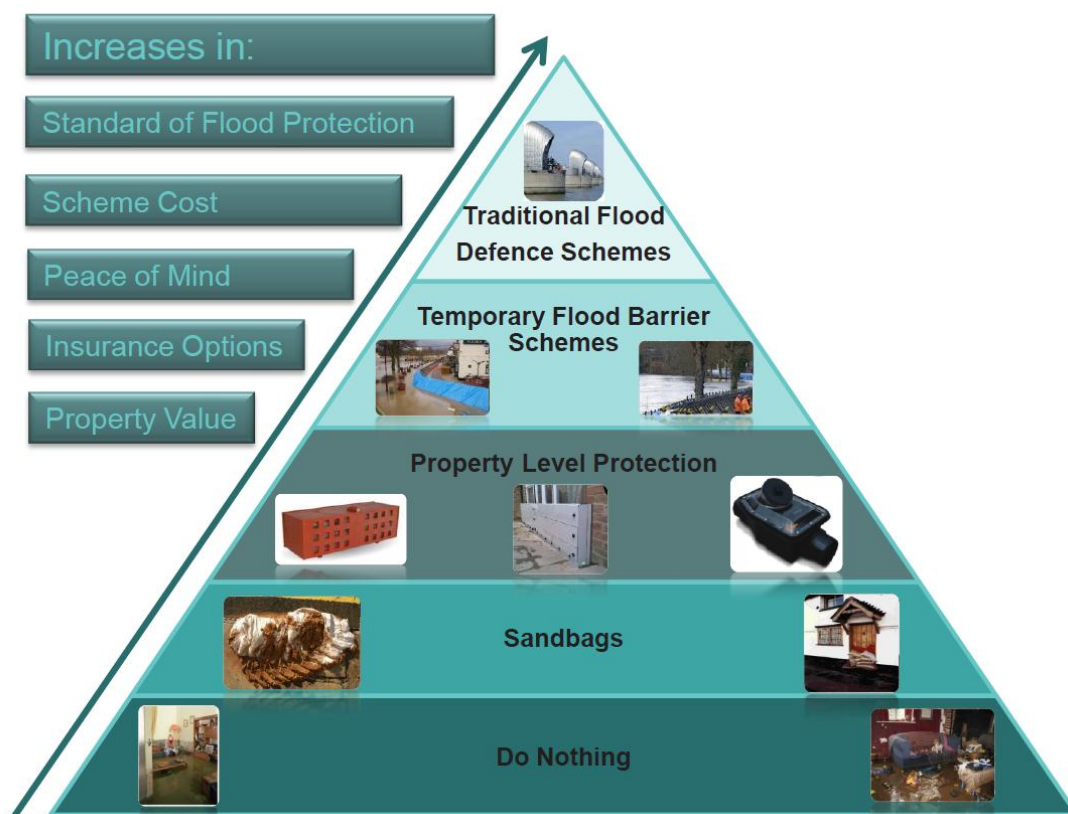
BSI .....	British Standards Institute
EA .....	Environment Agency
FPA .....	Flood Protection Association
LA.....	Local Authority
PLP .....	Property-level protection
NFF .....	National Flood Forum

## 2 Background to Property-Level Protection

Many homeowners benefit from traditional flood defence schemes such as flood walls and embankments. However, it is not always possible to install structural defences to protect communities, either on practical or economic grounds. In the past, property owners have therefore had to resort to sandbags, plywood boards and plastic sheets in efforts to protect their homes.

Such measures often prove ineffective, with frequent floods causing extensive damage and stress, leading to costly repairs, difficulties in obtaining affordable insurance and adverse impacts on both mortgage-ability and property value.

Property-level flood protection is the installation and deployment of a range of flood resistance and flood resilience measures. Resistance measures (dry proofing) such as door barriers are aimed at preventing water from entering individual properties; resilience measures, such as waterproof plaster, aim to limit the damage caused once it has entered (wet proofing).



Hierarchy of flood protection (image JBA)

## 3 Finding Best Practice

The recommendations in this booklet are underpinned by evidence from demonstration property level grant schemes operated by Defra and the Environment Agency between 2007 and 2011.

### 3.1 Headline Findings

#### 3.1.1 Appraisal and Scheme Management

Property-level Schemes need to address all sources of flooding, with a package of measures addressing risk 'in the whole', corresponding with the recommendations of the Pitt Review. Schemes should consider fluvial, surface water, foul and groundwater (or indeed the risk of rising water through the ground due to saturated conditions) in an integrated manner.

The approach should be suitable for the property, area and resident's circumstances and have identified whether there is any other viable alternative which could be adopted.

The rationale for undertaking a Property-level protection scheme evidently varies considerably across the country. What is evident from all those interviewed is that the eligibility criteria for inclusion within a community scheme must be **clear and transparent**.

#### 3.1.2 Engagement

**Early and ongoing engagement** is imperative to successful delivery of community schemes.

A flood group with nominated flood wardens and a proactive community flood group leader can help to build trust locally. The flood group provides a forum for discussion and the effective management and aftercare of the scheme through dovetailing with local emergency plans.

The water industry removed all technical terminology from any correspondence. Plain English is now used - for example, phrases such as '*mitigation*' or '*protection*' artificially raise expectations, and instead they opt for '*risk reduction*' rather than "*flood prevention*". A standardised glossary of terms is provided on page 16.

### 3.1.3 Survey

The Property-level Grant Schemes were funded through grants from Defra or the Environment Agency to local authorities, who delivered the schemes to households at risk in defined areas. Most local authorities appointed independent surveyors to deliver their schemes. The comments on surveyors reflect this context, and do not necessarily have implications for householders taking action independently.

- Where a surveyor is engaged, he or she should engage effectively with the homeowner, creating a productive relationship which will facilitate the entire Property-level protection process.
- Manufacturers / suppliers need to receive a Bill of Quantities as part of the tender process, completed by the surveyor.

There is no formally recognised qualification, national training or approved standard for Property-level Protection Surveyors and training and accreditation would help gain the trust of householders and scheme promoters, and ensure consistency across the industry.

### 3.1.4 Product Selection

- Consideration must be made of flood warning availability, and listed or conservation areas status restrictions.
- The package of measures must be manageable for the homeowner and their circumstances.
  - Passive measures, including flood doors, will often be more suitable than manual barriers.
  - Property-level protection may not be effective if properties are on permeable soils and do not have concrete floors. Concrete floors may also need to be sealed or tanked.
- It is also important, where possible, to identify and address any local increase (or perceptions) of risk to other nearby properties (albeit often negligible).

### 3.1.5 Installation and Sign-Off

- The handover process is critical to the success of a scheme. Clear instructions are needed for residents on how they are expected to store and maintain their defences, particularly for manual measures.
- The quality of installation works (and subsequent independent inspections and sign-off) is the most critical element of the process. There were examples of householders receiving barrier rails not adequately sealed to prevent water seepage, barriers resting on flexible uPVC or rotten timber thresholds, and fixings becoming degraded over time.
- The installation process should facilitate the aftercare, operation and ongoing ownership of the product.

- **Wet-testing** was seen as a key part of the product installation and handover process. In Alconbury and Alconbury Weston the trial raised confidence in the measures to the extent that sandbags were not requested for the villages: a usual precautionary measure prior to the installation of the property level protection measures.

## Wet Testing



Example of a wet test

“The wet-run was good to make people try their defences, which some residents had not done since having them. Some defences were shown to be damaged and fitted incorrectly, so the run raised awareness. Following the wet-run, the residents were happier with their defences and have not called for sandbags to be sent to the village since”

*Alconbury and Alconbury Weston Resident*

“When deployed in a wet-run, slow deployment was found, along with barriers still in boxes, not pre-tested, and some people had lost nuts and bolts, etc. to fit barriers. This was despite the fact that maintenance and adequate storage had been emphasised to the residents. This indicates the importance of community-level ‘drills’ and preparedness training”

*South Derbyshire Local Authority Project Manager*



### 3.1.6 Product Performance and Aftercare

The majority of schemes had still not been tested in flood conditions. However, where they had been deployed feedback has been generally positive.

Product testing and trial runs are useful to ensure that residents are aware of what they need to do. These can also identify storage and maintenance issues which will impact on the level of protection offered by the product.

Homeowner expectation is a key point and it should always be stressed that Property-Level Protection products will not completely prevent internal flooding but will limit the damage caused, particularly where the duration of flooding is short.

### Overall Assessment

- **Most properties where property-level protection measures have been deployed and actually required during a flood have helped to successfully mitigate the effects of the flooding.**
- **Where there were problems, these were associated with product installation, operation, maintenance and storage**
- **These findings highlight the need to capture and share best practice**

## 4 Case Studies

The following case studies demonstrate elements of best practice in relation to property-level protection schemes. They highlight what can be achieved by other communities at flood risk.

### 4.1 Flood Resilient Property – East Peckham

- The village of East Peckham was flooded twice in two days over Christmas 2013.
- In one property, fitted with flood gates and flood boards the ingress of water was slowed enough to allow furniture to be raised on bricks before it got into the house.
- Water that entered the house was swept into a sump containing a submersible pump in the living room.
- A gully inside the house took water from a drain near the front door straight to the sump, and from where it was pumped outside.



*"It was the best flood I've ever had! Everything was working, we didn't aim to make it perfectly dry...our aim was to keep the water to one or two inches. "It's all about slowing the water...it gives us time to get the bricks, move the furniture, move the car."*

Sue Chalkley, East Peckham – BBC News February 2014

### 4.2 Appleby-in-Westmorland

In 2007, Defra launched a pilot grant scheme that provided funding for the first formal property-level flood protection surveys and measures in six locations in England, including Appleby-in-Westmorland in Cumbria. 25 properties benefited from protection afforded by barriers, pumps and local flood walls - these included both residential properties and businesses. The image shows the local chip shop following a flood in November 2009, where flood barriers were deployed alongside sandbags. Six years after initiation this is one of the most established property-level protection schemes in the country.



In November 2009 a flood event occurred as the River Eden overtopped its banks and flooded one of the main streets in Appleby-in-Westmorland on The Sands. Subsequent research found the protection measures had been very successful and have helped to reduce anxiety about flooding. The 2009 flood was a local event, well within the design tolerances of the measures, residents also appreciated that a more severe flood, such as that experienced in 2005, would overwhelm the measures.

A number of factors affected the successful implementation of this pilot;

- Local people were receptive to the idea of the pilot due to the history of frequent flooding in the area, the impetus provided by the severe flood in 2005 and the community's pride in its ability to survive such flood events;
- The commitment and financial support given to the scheme by local flood risk management agencies and the ability of Environment Agency staff to work with people locally to win their trust.
- The presence in the community of suitable leaders and social structures.
- An active local Flood Action Group and regular multi-agency meetings to review levels of preparedness and awareness.
- The scheme has a well-rehearsed community emergency response plan that is triggered by local observations and the Environment Agency's flood warning service. A warning siren on the Fire Station is activated by the police or fire service which results in designated groups taking action within pre-defined areas, supporting residents to ensure barriers are deployed and pumps are ready. This also includes support from students at the local school as part of the overall community response.
- However - residents still deploy sandbags as an integral component of the overall response plan as an additional line of defence placed up against the blue Floodgates.

### **4.3 Flood Action 4 Buckingham**

The Buckingham scheme was promoted and delivered by Aylesbury Vale District Council as part of the Defra pilot, covering 96 properties. Good practice in supporting the community to implement flood resilience can be found in Buckingham where with support and guidance from the National Flood Forum, a group of people who had previously been affected by flooding was established – Flood Action 4 Buckingham (FA4B). Alongside FA4B an existing local charity, in this case 'Churches Together' was also used to create and support an emergency plan.



FA4B works with relevant official agencies and authorities on a 'rolling' action plan to collectively address on-going community flood concerns. Volunteers have undergone the National Flood Forum's training and hold an annual dry-run of their plan. FA4B also annually organises a flood information day in the Town to enable residents to gain information, learn more about the emergency plan, speak of flood concerns, and view a platform of flood resilience technologies

- The scheme was deployed in November 2012 although in the end flood water did not quite reach the barriers. However a number of properties experienced floodwater rising through the floors.
- Sumps were installed in concrete floors, not just suspended timber, typically to depths equivalent to a regular domestic dustbin, with electrics routed from higher level above floodwater levels. No generators were provided due to health and safety concerns.
- People who had installed under-floor heating were unwilling to disrupt this to install sumps and drainage pipe-work.
- Residents recognise the residual risk that water will still seep through brickwork and rise up through the floor but pumps are a vital element to mitigate these risks.
- There is a well-developed community emergency flood plan that the flood group test with dry runs every summer.
- There have been issues around levels of engagement during some tests with some residents choosing to opt out the most recent event, having deployed the measures in the November 2012 flood event. Some residents are not directly engaged and are therefore reliant on the volunteer flood wardens.
- Personal liability of the flood volunteers was resolved by establishing a group who received training from the Council and the Fire Service with liability being underwritten by AVDC upon successful completion.
- There were are also examples of inappropriate measures being provided to elderly residents who cannot lift or install large flood barriers without assistance; future schemes should consider homeowners' capability and needs in selecting appropriate measures.

#### 4.4 South Zeal, Okehampton, Devon



**Scheme Background:** A Property-Level Protection Scheme was initiated to protect properties from a ‘flashy’ stream. The residents are signed up to the Environment Agency’s flood warning alert scheme, but the Environment Agency warnings may come too late, because the stream is ‘too flashy.’ Property-Level Protection, in conjunction with strong emergency planning, has been used to great effect in the community. It is unlikely the community would have benefitted from any other scheme.

**Product Selection and Procurement:** All of the properties installed the same (manual) measures, so that everyone should know how to install each other’s measures, in case anyone gets into difficulty.

**Aftercare and Operation:** The measures were chosen with an emphasis on maintenance. This was especially true for the pumps provided: these were locally sourced so that if there is a problem, the residents can go and get them fixed locally. A proactive flood group and annual dry-run tests were cited as the reasons why the scheme has been successful. Residents were trained in deploying their measures through a training evening run by Floodgate, before the measures were purchased. This meant that residents know how to fit their barriers, but also that suitable measures were provided. The Parish Council organises a dry-run to be conducted once a year. This is conducted on “Parish Day,” when other Parish activities are also conducted, to ensure maximum participation. The dry-runs provide an opportunity for residents to check their equipment and if it is being stored correctly, and practice installation. They have also been useful to educate new tenants of the village’s rented property in how to install their measures.

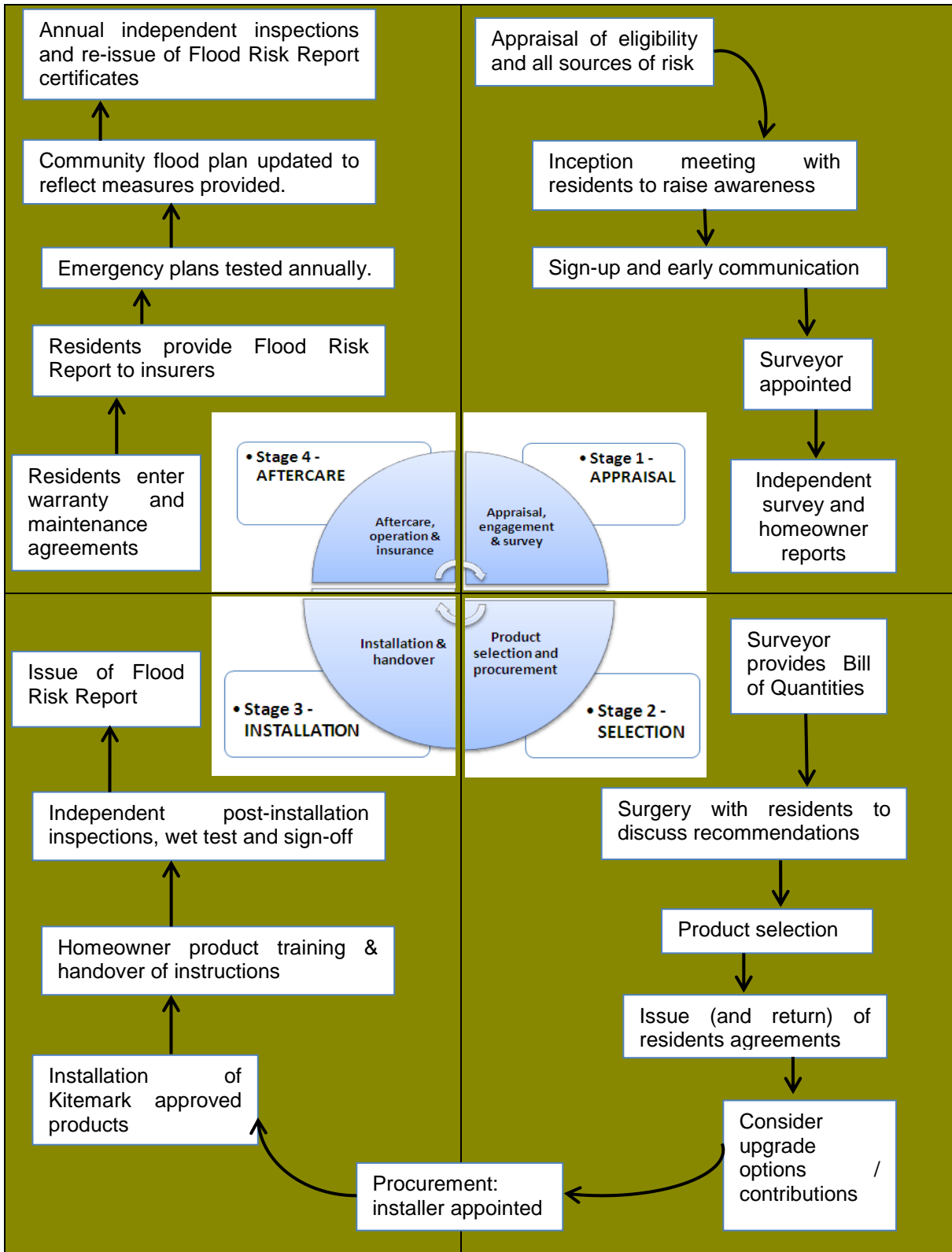
**Emergency Planning:** The village has a very comprehensive emergency plan, which also covers snow, amongst other hazards. The village has recently installed a water-level alert device, which has helped reduce the time required by flood wardens (who used to stay up all night in case of a flood) to monitor the gauge. Once a pre-set level is reached, a warning is sent out to about five residents (the local flood wardens) who “cascade” the alert out to other residents. This includes alerting residents external to the immediate properties at risk, who are happy to be called in to help the village. This is useful for those residents that may struggle with installing the measures to their property (for example, those on holiday, at work, or the elderly). To facilitate this, the village operates a key holder system so that access can be gained to these properties, and the flood protection measures are stored in a communal area.

## **5 Best practice**

### **5.1 Introduction**

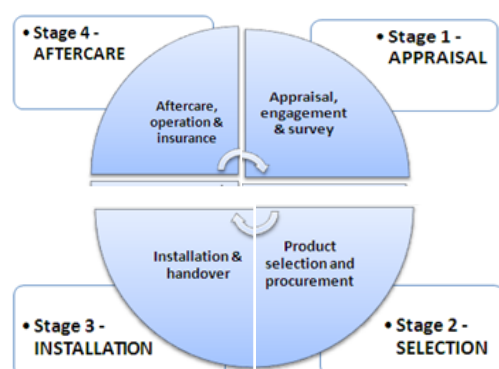
These recommendations set out actions that Local Authorities may choose to take in developing a scheme, or to support households to ensure that the measures installed work as effectively as possible. The flow chart below identifies the key steps for Local Authorities in property-level protection scheme delivery- a full list of best practice suggestions can be found in Section 5.3.

Best Practice Flow Chart





## 5.2 Best Practice Guide for Community Property-Level Protection Schemes

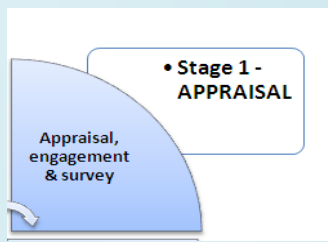


The suggestions made in this guide will help scheme managers operate in line with best practice, to ensure that measures installed perform as effective as possible. Where community schemes are being developed, scheme managers should aim to apply the best practice guidance, and consider the ongoing assessment of the “road-worthiness” of measures into the future. This is especially important as measures may not be needed for a number of years after installation, residents may change, etc. However, a coordinated flood group with a regularly tested emergency plan will ensure cohesion in community and homeowner response.

### Glossary of Terms

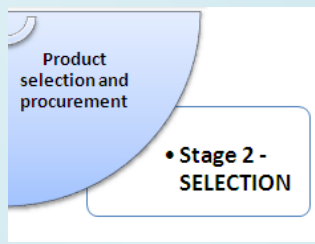
Communication plan	A plan compiled at the outset of a Property-Level Protection scheme which documents the frequency, audience and methods of all forms of communications (e.g. letters, public events, updates in local newsletters, etc.).
Dry proofing	Water is prevented from entering a property by sealing the building or using flood protection measures.
Flood resilience	The allowance of flood water into a property, but with the intention of reducing the damage once it enters (through measures such as tiled floor coverings, raised electrics etc.).
Flood resistance	The (intended) prevention of flood water into a property through a package of flood protection measures.
Kite-mark	The Kite-mark is a registered certification mark owned and operated by the British Standards Institute. PAS 1188 covers flood resilience products and systems.
Property-level protection	The installation and deployment of a range of flood resistance and flood resilience measures.
Wet proofing	Flood water is allowed to enter the building but an emergency plan and the adoption of flood resilience measures means the damage to building fabric and the contents is reduced.





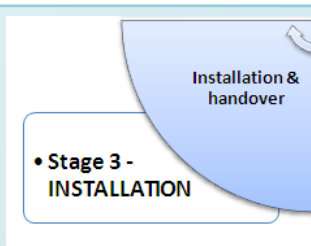
## Stage 1: Appraisal

- 1.1 The scope and suitability of a Property-Level Protection scheme should be assessed as part of a wider **appraisal of the hierarchy of all flood alleviation options**, to confirm whether a community defence scheme can be progressed. Accelerating an early PLP scheme could detract benefits from a viable community defence unless these are agreed as interim measures.
- 1.2 Where feasible Property-Level Protection **scheme promotion** can be led by all the relevant Risk Management Authorities at initial community meetings: Environment Agency, Local Authorities, Water Companies and as well as Parish Councils, Flood Groups or individuals.
- 1.3 The geographic **extent and eligibility** (including results from threshold surveys) for inclusion within a Property-Level Protection scheme should be early established at the outset so that properties and funding can be prioritised towards those at highest flood risk.
- 1.4 **All sources of flood risk** - rivers and streams, the sea, surface water, groundwater and from sewers and drains - should be identified and addressed in an integrated manner.
- 1.5 Time is needed for **early involvement and engagement with the community is the key to success**, idea coordinated through flood action groups and willing volunteer leaders. This helps to build trust, raise awareness, share knowledge and understanding and demands empathy from the surveyor.
- 1.6 Following early communication and engagement with the community, **momentum** should be maintained through ongoing effective dialogue. This should be aligned with a communications strategy developed by the leading Risk Management Authority at the outset.
- 1.7 **Managing expectation** is critical to ensure adequate preparations are made as part of an emergency plan. Important to raise awareness of Property-Level Protection and explain what it can and cannot do – i.e. it aims to mitigate flood risk and damage but it cannot prevent flooding.
- 1.8 **Standards of protection** are better than sandbags but inferior to an engineered defence scheme so homeowners should prepare for some leakage by moving valuables and using puddle and sump pumps. The importance of individual flood plans should be reminded, through the survey, reporting, installation and sign-off phases.
- 1.9 Options of a water entry resilient approach (**wet proofing**) or a water exclusion resistance approach (**dry proofing**) should be explained and the costs and benefits highlighted.
- 1.10 **The resident's agreement** is an important means to confirm participation and explain objectives and responsibilities.
- 1.11 **Independent property surveys** by accredited and competent flood risk professionals provide impartial advice to homeowners and support to scheme promoters throughout the process.
- 1.12 Property surveyors should use the **Flood Risk Report template** to provide guidance to homeowners from the initial survey and the post-construction "Flood Risk Report" for onward submission to insurers.
- 1.13 Survey reports should advise on options for Property-Level Protection **measures suitable for both person and property** from across the range of products available.



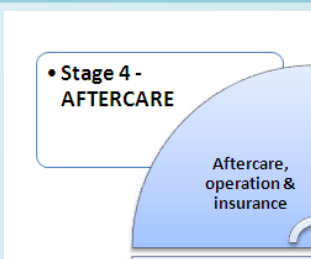
## **Stage 2: Selection**

- 2.1 Organise local **community surgeries** for homeowners to discuss their individual reports with the scheme promoter and surveyor. The preference is to involve the National Flood Forum at these surgeries to provide impartial advice and samples of products for homeowner inspection.
- 2.2 The surgeries and the scheme must **allow residents a choice of products** informed by support and guidance to ensure these are suitable for the person and property. They also provide opportunities for wider engagement events by scheme promoters (e.g. flood warning campaigns etc).
- 2.3 The surgeries allow for collection of **signed legal agreements** from residents wishing to participate in the PLP scheme ahead of product orders being placed. The agreement template provides a framework for local details around scheme objectives and responsibilities.
- 2.4 Options for **homeowners to contribute towards upgraded measures** should be offered if scheme funding is constrained (e.g. upgrading to flood doors).
- 2.5 The option of using **automatic flood doors should be encouraged** where costs allow or where the property status allows (in consultation with the local authority conservation officer).
- 2.6 Scheme promoters can use **schedule of works and cost estimates** provided by the surveyor to inform the product supplier tendering process.
- 2.7 A **simpler procurement** process is needed for local authorities. Framework agreements are a necessity to reduce the administrative burden of needing OJEU competitions for each project that will be undertaken.
- 2.8 Using the **Environment Agency's** Property-level Protection **procurement framework** can simplify and accelerate the selection and appointment of competent property flood risk surveyors and Property-Level Protection product suppliers and installers.
- 2.9 Product selection should prioritise Property-level Protection measures bearing the BSI PAS1188 **Kitemark accreditation** confirming performance under tests to maximum flood depths of 900mm. Predicted flood depths and protection heights at individual properties should be assessed and confirmed in the agreement.
- 2.10 The **property inspections** by the appointed product supplier will be undertaken to collect the specific, detailed measurements to confirm manufacturing orders and for subsequent installation.
- 2.11 Installers should recommend the **most suitable products** rather than just suggesting their own. There needs to be more openness within the market and the willingness for joint ventures.
- 2.12 Scheme surveys may also identify **other local flood alleviation options** such as flood walls and gates, embankments, community temporary barrier options etc which may also be assessed.



### **Stage 3: Installation**

- 3.1 The **quality of Property-level Protection product installation, handover and training is critical to future performance**, to be undertaken by specialist and competent contractors.
- 3.2 The **use of local builders** and craftsmen wherever possible is appreciated by the community and provides local buy-in and ownership.
- 3.3 **Cooperation and partnership between Property-Level Protection suppliers** is to be encouraged where homeowners have chosen a range of products from different manufacturers.
- 3.4 The practice of **product wet-testing** by the manufacturer/installer should be encouraged as a means of confirming installation quality and reassuring the homeowner.
- 3.5 There has been a mixed picture on **handover instructions** with many residents unclear how to use, maintain and store their products: the level of information provided in the past on product handover has been varied and understanding of product operation and maintenance sometimes low.
- 3.6 Clear and simple to understand training and **guidance on the correct handling and installation of the products** should be provided by the manufacturer to the homeowner.
- 3.7 Detailed guidance and instruction should be provided to the homeowner on **product maintenance and correct storage**. Evidence of poor performance has been seen as a result of incorrect product storage by the homeowner, with barriers left outside causing seals to perish; or stored resting on barrier seals; or where seals have been eaten by vermin.
- 3.8 Some residents in earlier schemes received equipment they found that they could not use without help from others in their community, emphasising the importance of **seeking clear information and advice about the suitability of any equipment**.
- 3.9 The provision of dewatering puddle pumps and sump pumps requires clear **guidance and instruction on the correct use and maintenance of the pumps**. Adequate ventilation of any pump or generator exhaust fumes is of critical health and safety importance.
- 3.10 The **post-construction inspection** should assess the quality of installation and be undertaken by the original independent property surveyor, with sign-off and the Flood Risk Report being completed for the homeowner.
- 3.11 Suppliers regularly provide homeowners with a box containing all necessary **spares and tools** and this practice should be encouraged.
- 3.12 A **community test event** as part of the handover, with dummy flood warning triggers and enactment of local emergency plans, is an effective means to ensure all residents receive flood warnings, can deployment the products correctly and that community support is available to those who may need assistance.



• Stage 4 -  
AFTERCARE

Aftercare,  
operation &  
insurance

### **Stage 4: Aftercare**

- 4.1 Product suppliers should continue to offer and encourage the wider uptake of **annual maintenance agreements** with homeowners.
- 4.2 Property-level Protection schemes can encourage communities to come together by helping to deliver schemes and provide assistance and **support to vulnerable residents** via flood warden and barrier buddy schemes.
- 4.3 **Local flood warning** arrangements should be developed where rapidly rising streams and surface water flooding can occur, regardless of main river flood warnings from the Environment Agency.
- 4.4 The Property-level Protection **measures should remain the property of the homeowner** and every effort should be made to encourage the correct storage, maintenance and installation of the products for long term security and confidence in their performance.
- 4.5 Without any community emergency plans or regular dry-run exercises the levels of preparedness for future floods is of concern. Such **emergency plans should be developed for all** Property-level Protection **schemes** and regularly tested and updated as is being encouraged by many of the Community Pathfinder projects.
- 4.6 Examples of **annual exercises and dry-run tests** represent good practice and have been established for some many schemes (e.g. Wallington, Chew Magna, South Zeal, Cross Keys, Toll Bar) as a way of testing emergency plans and identifying vulnerable residents in need of assistance.
- 4.7 An **annual test and inspection of the Property-level Protection measures and the deployment arrangements** is recommended. This should be carried out by competent and qualified surveyors to ensure the systems have been correctly maintained and are fit for use. This equates to the MOT for cars and should be regarded as a pre-requisite for submission to insurance companies on policy renewal.
- 4.8 Many companies offer training to the homeowner on how to use the system and are then given a 'Product User Guide' in both word and picture documents. **Product guarantees** of up to 3 years in some cases with some offering 'Product Failure Insurance' for added peace of mind.
- 4.9 Any **alterations or additions to the property** are the responsibility of the homeowner to ensure the level of flood protection has not been compromised and may need extending. Such Property-level Protection measures should remain with the property in the event of a change in ownership.
- 4.10 Homeowners are responsible for ensuring **tenants or holiday rental occupants** are aware of the Property-level Protection measures and understand how these are deployed in the event of a possible flood.
- 4.11 Local authority **emergency plans and the Community Risk Register** should recognise and include all properties where Property-level Protection measures have been installed.



# Annex 1 Background to the Recommendations

## Property-Level Protection Evaluation Report 2009-2011 Grant scheme

In September 2011 the Environment Agency appointed JBA Consulting to undertake an independent evaluation of the Defra Grant Scheme. The purpose was to review the Defra Grant Scheme approach, gather evidence and provide recommendations for improvements to delivery and uptake of Property-level protection in the future. The evaluation analysed the feedback from local authorities and residents, through a variety of methods:

- Review of 40 Post-installation Evaluation Reports submitted by local authorities and 9 case studies for detailed assessment.
- 2 evaluation workshops attended by local authorities, flood product manufacturers, Environment Agency staff and survey companies.
- Telephone interviews with residents, attendance at community flood group meetings and one to one meetings with residents.
- Feedback on draft findings and recommendations from an expert Steering Group.

Providing effective Property-level protection is a lengthy and involved process requiring a range of technical and communication skills. The figure below represents the four staged approach to Property-level Protection systems delivery that emerged from this report. The main recommendations are set out below.

